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PUGET SOUND AMBIENT MONITORING PROGRAM 1989

MARINE SEDIMENT MONITORING

Final Report
Appendices

January 1990

Prepared for
Washington Department of Ecology
Ambient Monitoring Section

Tetra Tech, Inc
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TC 3838
Final Report

PUGET SOUND AMBIENT MONITORING PROGRAM 1989: MARINE SEDIMENT MONITORING

APPENDICES

by

Tetra Tech, Inc.

for

Washington Department of Ecology
Ambient Monitoring Section

January 1990

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CONTENTS

APPENDIX A: 1989 MSMT STATION LOCATION INFORMATION

APPENDIX B: 1989 QUALITY ASSURANCE/QUALITY CONTROL MEMORANDA

APPENDIX C: 1989 CONVENTIONAL SEDIMENT CHEMISTRY DATA

APPENDIX D: 1989 SEDIMENT CHEMISTRY DATA

APPENDIX E: 1989 AMPHIPOD AND MICROTOX BIOASSAY DATA

APPENDIX F: 1989 BENTHIC INFAUNA DATA

APPENDIX G: MISCELLANEOUS SEDIMENT CHEMISTRY FIGURES AND TABLES

APPENDIX A

1989 MSMT STATION LOCATION INFORMATION

TABLES

Number		Page
A-1	1989 Station locations, depths, and descriptions	A-1

TABLE A-1 1989 STATION LOCATIONS, DEPTHS, AND DESCRIPTIONS

Station	State Plane Coordinates East	State Plane Coordinates North	Latitude North	Longitude West	Depth MLLW (m)	Description
1	1514070	732938	48 59'30"	122 51'26"	22.0	N Sound, near Blaine
2	1543060	674916	48 50'05"	122 43'50"	20.0	N. Sound, near Cherry Pt.
3	1485240	689714	48 52'16"	122 58'20"	217.7	Strait of Georgia, off Cherry Pt. - VOLATILES
4	1575040	618806	48 40'59"	122 35'33"	24.0	Bellingham Bay
5	1588170	587087	48 35'49"	122 32'07"	20.0	Samish Bay - FIELD REP, VOLATILES
6	1577960	558122	48 31'01"	122 34'29"	20.0	Padilla Bay, near Anacortes
7	1413860	447488	48 12'06"	123 14'14"	133.0	Strait of Juan de Fuca
8	1361820	424042	48 07'58"	123 26'50"	21.0	Port Angeles
9	1401800	424247	48 08'13"	123 17'01"	21.0	East of Port Angeles, off Green Pt.
10	1447240	435020	48 10'13"	123 05'56"	20.0	Dungeness Bay - VOLATILES
11	1496590	391666	48 03'19"	122 53'31"	20.0	Discovery Bay
12	1526140	401947	48 05'08"	122 46'20"	20.0	Port Townsend
13	1560100	311626	47 50'25"	122 37'29"	20.0	Hood Canal, N.
14	1533890	291882	47 47'04"	122 43'46"	115.0	Hood Canal, N - VOLATILES
15	1512500	267893	47 43'02"	122 48'50"	20.0	Dabob Bay
16	1352360	757216	47 22'49"	123 06'52"	20.0	Hood Canal, S.
17	1348920	753174	47 22'08"	123 07'40"	78.5	Hood Canal, S. - VOLATILES
18	1564730	463754	48 15'27"	122 37'13"	20.0	Oak Harbor
19	1599890	405199	48 05'57"	122 28'15"	121.0	Saratoga Passage - VOLATILES
20	1605230	432958	48 10'32"	122 27'05"	10.5	Port Susan
21	1655050	362555	48 59'07"	122 14'31"	20.0	Port Gardner, off S end of jetty at Everett
22	1644170	352015	48 57'21"	122 17'08"	20.5	Port Gardner, off Mukilteo
23	1631520	321145	47 52'14"	122 20'05"	20.0	Central Basin, E.
24	1624190	319161	47 51'53"	122 21'52"	180.0	Central Basin, E.
25	1590780	316714	47 51'22"	122 30'01"	20.0	Central Basin, W.
26	1601590	314760	47 51'05"	122 27'22"	262.0	Central Basin, W. - FIELD REP, VOLATILES
27	1618230	280972	47 45'35"	122 23'08"	20.0	Central Basin, off Richmond Beach
28	1592470	271780	47 43'59"	122 29'22"	20.0	Jefferson Head - VOLATILES
29	1601530	260237	47 42'07"	122 27'06"	195.0	Central Basin, NW of Shilshole Bay
30	1588330	231939	47 37'25"	122 30'10"	13.0	Eagle Harbor
31	1605210	242931	47 39'17"	122 26'07"	22.0	West Point
32	1611750	234688	47 37'57"	122 24'29"	20.0	Magnolia Bluff, near 4mi Rock - FIELD REP
33	1619570	218213	47 35'16"	122 22'30"	20.0	Elliott Bay, West of Duwamish Head
34	1548420	204772	47 32'48"	122 39'43"	8.5	Sinclair Inlet
35	1540090	229398	47 36'49"	122 41'53"	13.5	Dyes Inlet
36	1613330	191382	47 30'50"	122 23'53"	15.0	Central Basin, Brace Point
37	1598990	181950	47 29'14"	122 27'19"	20.0	Central Basin, North Vashon
38	1614010	160256	47 25'43"	122 23'34"	195.0	Point Pulley - FIELD REP, VOLATILES
39	1620630	126882	47 20'15"	122 21'48"	14.0	Dash Point
40	1602090	99693	47 15'43"	122 26'09"	9.8	Commencement Bay, Entrance to City Waterway
41	1606050	104577	47 16'32"	122 25'13"	20.0	Commencement Bay, Between Blair and Sitcum Wwys
42	1586690	115324	47 18'14"	122 29'57"	39.0	Commencement Bay, off Ruston
43	1526620	114590	47 17'53"	122 44'28"	20.0	Carr Inlet
44	1459960	674481	47 09'45"	122 40'16"	20.0	S. Sound, E. Side Anderson Island - FIELD REP
45	1440310	676046	47 09'55"	122 45'01"	53.0	S. Sound, Devils Head - VOLATILES
46	1432710	664304	47 07'57"	122 46'46"	22.0	S Sound, West of Nisqually Delta
47	1417030	702266	47 14'07"	122 50'49"	20.0	Case Inlet
48	1398280	662593	47 07'30"	122 55'03"	20.4	Budd Inlet, N.
49	1399170	646652	47 04'53"	122 54'43"	6.3	Budd Inlet, S.
50	1360270	695928	47 12'47"	123 04'28"	7.0	Oakland Bay, near Shelton

APPENDIX B

1989 QUALITY ASSURANCE/QUALITY CONTROL MEMORANDA

DATA VALIDATION REPORTS

METALS

SEMIVOLATILE ORGANIC COMPOUNDS

VOLATILE ORGANIC COMPOUNDS

TOTAL ORGANIC CARBON

GRAIN SIZE

TOTAL SULFIDES

AMPHIPOD BIOASSAY

MICROTOX BIOASSAY

BENTHIC INFAUNA

JACOBS ENGINEERING GROUP INC.
ENVIRONMENTAL SYSTEMS DIVISION
1111 THIRD AVENUE - SUITE 700 • SEATTLE WA 98101 • (206) 622-0907

July 24, 1989

Data Validation Report
Inorganic Analyses

Site:	Puget Sound
Project:	WDOE MSMP
Sample Numbers:	Stations 1-68
Samples Collected By:	Tetra Tech, Inc.

The samples included in this report were analyzed by Analytical Resources, Inc., of Seattle, Washington.

This report is submitted to: Tetra Tech, Inc., Bellevue, Washington

Data Evaluated by: Thomas D. Bowden TDB

Approved by: Raleigh C. Farlow RCF

Data Validation Report - Inorganic Analyses

Site:	Puget Sound
Project:	WDOE MSMP
Laboratory:	Analytical Resources, Inc.
Sample Numbers:	Stations 1 - 68
Matrix:	Sediment
Reviewer:	T.D. Bowden
Date:	July 24, 1989

I. Introduction

This report summarizes the validation of laboratory data for 68 marine sediment samples submitted to Analytical Resources, Inc. of Seattle, WA for total metals analyses. The samples are numbered sequentially, Station 1 through Station 68.

The samples were analyzed according to USEPA CLP SOW 788. A modification to the CLP SOW was employed by analyzing for antimony, arsenic, cadmium, lead, selenium, silver and thallium by GFAA MSA. Method quantitation limits have been lowered for this program by digesting larger sample weights and reducing final digestate volumes.

This report has been prepared in accordance with USEPA guidance "Laboratory Data Validation, Functional Guidelines for Evaluating Inorganics Analyses," dated July 1, 1988. Data validation criteria are found in the Functional Guidelines and the Puget Sound Ambient Monitoring Program, Marine Sediment Quality Implementation Plan, dated November, 1988.

Analytical results with associated data qualifiers are found in Table 1. Results are expressed in mg/kg dry weight. Average quantitation limits are presented in Table 1A. Sample holding times are summarized in Table 2.

Station 1 through Station 50 (fifty samples) are surficial sediment samples collected from different locations in Puget Sound. Samples with station identification greater than 50 are assigned surrogate station numbers. These remaining stations represent field-generated (laboratory blind) QC samples, specifically, duplicate splits from station composites, site replicates, and comparison samples, as summarized below:

Field Station	Sample Split	Site Replicates
Station 5	Station 51	Station 52 Station 53
Station 26	Station 54	Station 55 Station 56
Station 32	Station 57	Station 58 Station 59
Station 38	Station 60	Station 61 Station 62
Station 44	Station 63	Station 64 Station 65

Comparison Samples

Station 66
Station 67
Station 68

Field samples employed for laboratory QC include:

Duplicate Analysis	Matrix Spike Analysis	Serial Dilution
Station 5	Station 5	Station 50
Station 7	Station 7	
Station 28	Station 28	
Station 38	Station 38	

II. Discussion

A. Sample Holding Times

Technical requirements for sample holding time (time of collection to time of analysis) have only been established for water matrices (28 days for mercury, 6 months for other metals). All sediment samples associated with this project were analyzed for mercury within 23 days and other metals within 51 days (Table 2). Holding times were determined by comparing sampling dates on the Chain-of-Custody document with dates of analyses.

B. Calibration

Initial Calibration: Initial calibrations were performed using the required number of data points: two points for ICP analyses and five points for mercury analyses. A blank was included as one of the data points for each calibration, as required. Correlation coefficients for mercury calibrations are ≥0.995. Correlation coefficients were confirmed by recalculation.

Initial calibration criteria are not strictly applicable to the graphite furnace analyses since all graphite furnace analytes were quantitated by Method of Standard Additions (MSA).

Initial Calibration Verification: Initial calibration verification checks (ICV) were performed immediately after initial calibrations during ICP and mercury analytical runs, as required. All ICV recoveries are within acceptance limits (90-110% for ICP; 80-120% for mercury) with the exception of the potassium recovery for the ICP run on 4/05/89 (%R = 86.8). Potassium results associated with this run have not been qualified since the deviation is not considered significant for the intended use of the data.

Raw data were spot-checked (10-15%) for transcription errors. Recoveries were spot-checked (10-15%) for calculation errors. No significant transcription or calculation errors were found in any ICP or mercury data.

Continuing Calibration Verification: USEPA CLP SOW 788 requires that a continuing calibration verification (CCV) standard be analyzed at a frequency of ≥10% or every 2 hours during an analytical run, whichever is more frequent, and at the beginning of the run and after the last analytical sample.

Continuing calibration verification checks were performed as required during all mercury

analytical runs. Several CCVs analyzed during ICP runs did not satisfy the 10% frequency and 2 hour limit requirements because the laboratory did not include the initial CRDL standard and interference check samples as analytical samples, as required. For all ICP runs the final CRDL standard and interference check samples follow the final CCV, thus the CCV does not follow the last analytical sample in the run, as required in the CLP SOW.

All CCV recoveries are within acceptance limits (90-110% for ICP; 80-120% for mercury). The exceptions noted for ICP CCVs do not require qualification of related sample results since all CCV recoveries are acceptable, and all interference check sample recoveries are acceptable (see Section II-D).

Raw data were spot-checked (10-15%) for transcription errors. Recoveries were spot-checked (10-15%) for calculation errors. No significant transcription or calculation errors were found in any ICP or mercury data.

C. Blanks

Initial Calibration Blanks: Initial calibration blanks (ICB) were analyzed immediately after ICVs during all ICP and mercury analytical runs, as required. All mercury ICB results are less than the instrument detection limit (IDL). ICP ICB results that exceeded the Contract Quantitation Level (CQL) are summarized in Table 3.

All raw data were checked for transcription errors; no errors were found.

Continuing Calibration Blanks: Continuing calibration blanks (CCB) are required after every CCV and at the same frequency as the CCV during the analytical run.

CCBs were analyzed as required during all mercury analytical runs. CCBs were analyzed after every CCV during all ICP analytical runs. However, the exceptions to the frequency of analysis noted above for ICP CCVs also apply to ICP CCBs. In addition to the mercury and ICP analytical runs, CCBs were also analyzed after every graphite furnace MSA analysis.

All mercury and graphite furnace CCB results are <IDL. ICP CCB results that exceeded the IDL are summarized in Table 3. The exceptions noted for ICP CCBs do not require qualification of related sample results since all CCB results are acceptable (insignificant relative to sample results).

All raw data were checked for transcription errors; no errors were found.

Preparation Blanks: Preparation blanks were analyzed at the required frequency (one per digestion batch) for all methods, including graphite furnace analyses. Results are <IDL for all mercury and graphite furnace preparation blanks. ICP preparation blank results that exceeded the IDL are summarized in Table 3.

All raw data were checked for transcription errors; no errors were found.

For all ICP ICBs, CCBs, and preparation blanks with detected analytes, all associated sample results are >5X the highest blank value. Therefore, no results required qualification.

D. Interference Check Sample

ICP interference check solutions were analyzed at the beginning and end of each analytical run as required. All recoveries are within acceptance limits (80-120%). All data were checked for transcription errors and all recoveries were confirmed by recalculation.

E. Laboratory Control Sample

Solid laboratory control samples (LCS) were analyzed at the required frequency for ICP and graphite furnace (one per digestion batch). A total of four LCSs were analyzed. An LCS was also analyzed for each mercury digestion batch, although not required by the CLP SOW. The LCS is NBS 2704, Buffalo River Sediment. NBS certified values, and 95% confidence intervals are listed in Table 4A. Results for the four LCSs, and % recoveries (%R) are also listed in Table 4A.

Recoveries for most analytes are consistently low, relative to the NBS certified values. The NBS sample certified values include pollutant and crustal metal contributions expressed as total metal. The digestion procedure applied for this program is an acid digestion employing HNO_3/H_2O_2 recommended by USEPA. This procedure solubilizes leachable metal including that which is bioavailable with potential for yielding toxic effects. Using the LCSs as a measure of laboratory accuracy for an evaluation of digestion efficiency is determined to be inappropriate, and related sample results have not been qualified on a basis of comparison to the NBS certified values. Laboratory (ARI) 95% confidence intervals for NBS 2704 using the USEPA protocols are found in Table 4B. Measurement of accuracy is accomplished by analysis of matrix spike samples.

Table 4B summarizes the results of previous analyses of NBS 2704 by Analytical Resources, Inc. and the four analyses of the NBS material for this project. The coefficient of variation (CV) for all analyses by ARI for each analyte is generally <10%. The coefficients of variation for Sb, As, K, Se, Ag, Na, and Tl exceed 20%. However, three analyses of Sequim Bay sediment (Stations 66, 67 and 68; see Section II K) yield CVs ≤20% for all analytes. All results for LCSs analyzed as a part of this project fall within the 95% confidence interval (calculated from results for all ARI analyses of NBS 2704).

F. Duplicate Sample Analysis

A total of four laboratory duplicate analyses were performed, one per digestion batch. Results of duplicate analyses are within the appropriate acceptance limits for all analytes (for values ≥5X CQL, ±35% RPD; for values <5X CQL, ±CQL) (CQL = Contract Quantitation Level).

All data were checked for transcription errors and RPDs were confirmed by recalculation.

G. Matrix Spike Sample Analysis

Matrix spike samples were analyzed at the required frequency of ≥5%. A total of four matrix spike samples were analyzed, one per digestion batch.

For results where sample concentration does not exceed 4X spike concentration, all recoveries are within acceptance limits (75-125%) with the following exceptions:

Matrix Spike Recoveries (%R)
(Recoveries <75% or>125%)

Analyte	Station 5	Station 7	Station 28	Station 38
Antimony	28	40	61	26
Arsenic		72		
Cadmium	183	210	175	148
Lead	22	138		
Manganese		134		
Mercury			132	
Selenium	68	28	30	58

Associated sample results (i.e., by digestion batch) have been qualified in accordance with the Functional Guidelines as modified for the MSMP Project:

%R	Result <CQL	Result >CQL
>125	Not qualified	E - estimated
30-74	Not qualified	E - estimated
<30	R - unusable	E - estimated

H. Graphite Furnace QC Analysis

All samples were analyzed for antimony, arsenic, cadmium, lead, selenium, silver and thallium by graphite furnace, with the exception of lead for Stations 33, 34, 35, and 58, which were analyzed by ICP. In addition, Stations 51, 58 and 65 were analyzed for nickel by graphite furnace. All furnace analytes were quantitated by Method of Standard Additions (MSA) as a modification of the CLP protocol. This affords greater precision at low concentrations. Duplicate injections were performed on all MSA determinations. A CCB was analyzed between each MSA analysis.

According to the CLP SOW, the correlation coefficient for MSA determinations must be ≥0.995 to meet acceptance criteria. Since the CQL for this project is considerably lower than the CLP Contract-Required Quantitation Limit (CRQL), the acceptance criteria for the correlation coefficient has been lowered to ≥0.990.

The majority of MSA determinations meet this criterion. Correlation coefficients for all lead determinations are ≥0.995. Coefficients all for antimony, arsenic, nickel, selenium, silver and thallium determinations are ≥0.990 with the following exceptions:

Station 18	Thallium	r=0.963
Station 39	Silver	r=0.989

Results for both of these determinations are <CQL, and therefore have not been qualified.

The coefficients for several determinations for cadmium are <0.990. These include the following stations:

Station 5	Station 37	Station 54
Station 17	Station 39	Station 55
Station 19	Station 48	Station 56
Station 24	Station 51	Station 68
Station 33		

Cadmium results for all these stations are >CQL (with the exception of Station 17), and have therefore been qualified "E" (estimated).

I. ICP Serial Dilution

ICP serial dilution analysis is required at a frequency of ≥5%. Only one serial dilution analysis was performed, and therefore the frequency requirement is deficient by 3 samples. The percent difference (%D) between the diluted sample and the undiluted sample is within acceptance limits (≤10%) for all analytes. Acceptance limits are applied only to analytes with an original sample concentration ≥50X IDL.

ICP sample results have not been qualified due to the deficiency in frequency since results for the one serially diluted sample are acceptable for all analytes, and since all results for QC standards analyzed by ICP (interference check samples, ICVs, CCVs) showed no problems or deficiencies.

J. Sample Result Verification

Sample quantitation was verified for all analytes by recalculation on approximately 20% of the samples. No significant errors were detected. Results for all ICP parameters are within the linear range of the instrument. Results for all non-ICP parameters are within the calibrated range of the instrument, with the exception of the graphite furnace determination for cadmium on Station 30. The concentration of the sample exceeds the concentration of the highest addition (2.18 ug/l vs. 1.5 ug/l) This result has therefore been qualified "E" (estimated).

Results for all samples analyzed for lead by ICP (Stations 33, 34, 35, and 58) are >5X ICP IDL (>125 ug/l) as required, with the exception of Station 58 (Pb = 65.7 ug/l). Station 58 was not analyzed for lead by GFAA, and therefore the ICP result has been qualified "E" (estimated). No significant anomalies were noted in the raw data. All raw data are complete and legible.

K. Other Performance Data

Field-Generated QC Samples: Two types of field-generated QC samples were collected at 5 different stations. Station duplicates were generated by splitting composited sediment from the original grab sample; one assigned to the station number, the other assigned a surrogate station number. Site replicates were generated by collecting two additional grab samples at the site. Site replicates were assigned separate surrogate station numbers.

Results for all replicates, including the laboratory duplicate, are summarized in Table 5A. Summary statistics for these samples are presented in Table 5B. The coefficient of variation (CV) representing monitoring variability within a station was determined using all samples, including the laboratory duplicate. Relative percent differences (RPD) were determined relative to the original sample and the laboratory duplicate, and the original sample and the blind field-generated splits. The CVs and RPDs are generally low. For all stations, the mean CV for all metals is similar to the mean RPDs for all metals.

Sequim Bay Comparison Samples: Homogenized archived sediment samples from Sequim Bay were submitted for analysis as Stations 66, 67, and 68. Summary statistics for these samples are presented in Table 4B. With the exception of cadmium (CV=17.7%), coefficients of variation are <10% for all analytes.

L. Quarterly Submissions

Quarterly submissions found in the data package include:

Form X	Instrument Detection Limits (Quarterly)
Form XI	ICP Interelement Correction Factors (Annual)
Form XII	ICP Linear Ranges (Quarterly)

M. Overall Case Assessment

The level of effort exhibited by the laboratory for this sample group is better than average considering the matrix type and that the quantitation levels achieved are significantly lower than CLP SOW requirements. All deliverables required by the project are present and the data package is complete. The general quality of the data is good. A significant number of samples for several analytes required qualification as a result matrix spike recoveries, as summarized in Section III A and B. Overall, the data is considered to be usable for the intended purposes.

III. Summary of Qualified Data

A. The following results have been qualified "E" (estimated) because matrix spike recovery acceptance criteria were not met, as discussed in Section II G:

-	Antimony	Station 24 Stations 33, 34 Station 42 Station 44 Stations 63, 64
-	Arsenic	Stations 7 - 17
-	Cadmium	Stations 1 - 8 Station 12 Station 14 Stations 18, 19 Stations 21, 22 Station 24 Station 26 Stations 29, 30 Stations 33 - 35 Stations 37 - 41 Stations 45 - 49 Stations 51 - 57 Stations 60 - 68
-	Lead	Stations 1 - 27 Station 29 Stations 51 - 56 Stations 66 -68
-	Manganese	Stations 7 - 17
-	Mercury	Station 30 Stations 33 - 35

B. The following results have been qualified "R" (unusable) because matrix spike recovery acceptance criteria were not met, as discussed in Section II G:

-	Antimony	Stations 1 - 6
		Stations 18 - 23
		Stations 25 - 27
		Station 29
		Stations 38 - 41
		Station 43
		Stations 45 - 56
		Stations 60 - 62
		Stations 65 - 68
-	Selenium	Stations 7 - 17

C. The following results have been qualified "E" (estimated) because the correlation coefficients for MSA determinations were <0.990, as discussed in Section II H:

-	Cadmium	Station 5
		Station 19
		Station 24
		Station 33
		Station 37
		Station 39
		Station 48
		Station 51
		Stations 54 - 56
		Station 68

D. The following result has been qualified "E" (estimated) because the concentration of the sample exceeded the concentration of the highest addition, as discussed in Section II J:

-	Cadmium	Station 30

E. The following result has been qualified "E" (estimated) because quantitation by ICP did not satisfy the >5X ICP IDL requirement, as discussed in Section II J:

-	Lead	Station 58

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: July 24, 1989
Reviewer: T.D. Bowden
Matrix: Sediment
Sample Nos.: Stations 1 - 68

Table 1
Inorganic Analyses Results
(mg/kg, dry weight)

CAS No.	Analyte	Station 1 Result	Q	Station 2 Result	Q	Station 3 Result	Q	Station 4 Result	Q	Station 5 Result	Q	Station 6 Result	Q	Station 7 Result	Q	Station 8 Result	Q	Station 9 Result	Q	Station 10 Result	Q	Station 11 Result	Q	Station 12 Result	Q
7429-90-5	Aluminum	17200		14100		11200		19800		17500		6610		10800		15700		7690		12900		9380		16700	
7440-36-0	Antimony		R		R		R		R		R		R	0.23	U	0.40	U	0.22	U	0.22	U	0.32	U	0.39	U
7740-38-2	Arsenic	6.7		4.2		6.4		6.1		6.2		3.1		3.4	E	5.3	E	1.1	E	3.8	E	3.7	E	6.1	E
7740-39-3	Barium	45.8		41.6		31.4		52.1		46.2		15.6		19.1		35.9		13.9		25.3		19.4		41.8	
7740-41-7	Beryllium	0.47	U	0.29		0.32	U	0.53	U	0.41	U	0.23	U	0.23	U	0.40	U	0.22	U	0.22	U	0.32	U	0.42	
7740-43-9	Cadmium	0.23	E	0.25	E	0.20	E	0.16	E	0.15	E	0.10	E	0.070	E	0.48	E	0.041	U	0.060	U	0.063	U	0.11	E
7740-70-2	Calcium	5700		6330		22300		6380		6290		14300		5270		4370		3830		4310		6580		5490	
7740-47-3	Chromium	35.5		27.1		21.0		47.8		40.1		16.9		19.5		29.5		24.5		28.1		21.6		34.8	
7740-48-4	Cobalt	7.0		6.9		5.6		9.5		8.4		4.2		7.3		6.7		5.7		6.7		4.4		7.6	
7740-50-8	Copper	23.9		14.7		14.8		32.2		27.4		6.7		9.4		27.5		7.3		13.7		9.9		28.9	
7439-89-6	Iron	26800		22600		19400		31200		29000		11700		20800		24600		13000		19900		14200		27500	
7439-92-1	Lead	10.3	E	6.8	E	8.4	E	15.7	E	20.1	E	2.7	E	4.7	E	19.1	E	2.6	E	7.1	E	9.8	E	18.0	E
7439-95-4	Magnesium	11000		8800		7180		14100		11900		6180		8000		9260		8180		8270		5900		10800	
7439-96-5	Manganese	232		235		257		296		273		150		307	E	204	E	216	E	189	E	149	E	256	E
7439-97-6	Mercury	0.13	U	0.077	U	0.071	U	~~0.14~~ *		0.14		0.062	U	0.063	U	0.26		0.060	U	0.063	U	~~2.4~~ *		0.12	U
7440-02-0	Nickel	31.7		27.6		16.9		46.4		34.8		23.8		28.6		22.9		41.2		26.8		17.8		31.7	
7440-09-7	Potassium	3340		2280		2090		3990		3490		896		1010		2500		895		1740		1820		3170	
7782-49-2	Selenium	2.5	U	1.5	U	1.6	U	2.2	U	2.4	U	1.2	U		R		R		R		R		R		R
7440-22-4	Silver	0.12		0.061	U	0.12		0.17		0.13		0.047	U	0.046	U	0.13		0.041	U	0.060	U	0.063	U	0.12	
7740-23-5	Sodium	18600		9370		10900		25500		21300		4660		3430		14700		3360		8140		8300		18800	
7740-28-0	Thallium	0.49	U	0.31	U	0.31	U	0.44	U	0.48	U	0.24		0.23	U	0.41	U	0.21	U	0.30	U	0.32	U	0.38	U
7740-62-2	Vanadium	47.5		39.7		31.7		53.6		52.4		23.5		39.6		47.3		28.1		38.4		28.5		48.5	
7740-66-6	Zinc	74.9		58.0		53.2		87.8		78.9		28.2		38.2		88.0		24.5		46.3		34.0		74.9	

Data Qualifiers:

U: The material was analyzed for but not detected above the associated level, which is the sample quantitation limit.

E: The associated value is an estimated quantity because certain quality control criteria were not met.

R: The associated value is unusable. The analyte may or may not be nt.

* See Mercury Reanalyses.

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Table 1
Inorganic Analyses Results
(mg/kg, dry weight)

Date: July 24, 1989
Reviewer: T.D. Bowden
Matrix: Sediment
Sample Nos.: Stations 1 68

CAS No.	Analyte	Station 13 Result	Q	Station 14 Result	Q	Station 15 Result	Q	Station 16 Result	Q	Station 17 Result	Q	Station 18 Result	Q	Station 19 Result	Q	Station 20 Result	Q	Station 21 Result	Q	Station 22 Result	Q	Station 23 Result	Q	Station 24 Result	Q
7429-90-5	Aluminum	6620		10600		6960		13300		31000		15400		19100		18700		13500		5690		7220		22800	
7440-36-0	Antimony	0.24	U	0.25	U	0.26	U	0.20	U	0.41	U		R		R		R		R		R		R	0.52	E
7740-38-2	Arsenic	2.9	E	3.4	E	1.9	E	5.2	E	6.0	E	6.9		8.3		8.2		7.0		2.1		3.7		7.1	
7740-39-3	Barium	11.2		23.8		10.9		10.6		19.6		35.1		48.9		47.5		31.5		12.1		15.7		59.6	
7740-41-7	Beryllium	0.24	U	0.25	U	0.26	U	0.20	U	0.41	U	0.31	U	0.56	U	0.34	U	0.25	U	0.25	U	0.23	U	0.52	U
7740-43-9	Cadmium	0.044	U	0.097	E	0.051	U	0.048	U	0.18	U	0.37	E	0.42	E	0.068	U	0.40	E	0.070	E	0.048	U	0.23	E
7740-70-2	Calcium	2840		4460		3260		6450		13500		5110		5420		5180		3670		2700		3230		7030	
7740-47-3	Chromium	16.0		26.8		16.3		41.4		52.6		62.6		58.9		104		33.5		14.1		20.0		48.0	
7740-48-4	Cobalt	3.6		7.9		3.8		8.7		19.9		9.2		16.0		16.6		8.5		3.2		5.2		10.9	
7740-50-8	Copper	6.3		12.5		6.9		19.6		102		29.6		37.2		37.9		33.3		4.4		5.9		38.2	
7439-89-6	Iron	13100		19200		11000		24900		48900		24400		31400		33000		19500		7610		12100		32400	
7439-92-1	Lead	3.5	E	7.0	E	2.2	E	3.1	E	7.4	E	6.6	E	20.6	E	8.7	E	10.4	E	3.2	E	5.9	E	19.1	E
7439-95-4	Magnesium	4730		7290		4420		7340		17600		12200		14700		18800		8700		3440		5470		13300	
7439-96-5	Manganese	148	E	229	E	163	E	267	E	574	E	272		598		521		244		109		384		428	
7439-97-6	Mercury	0.064	U	0.056	U	0.051	U	0.061	U	0.10	U	0.084	U	0.14	U	0.088		0.073	U	0.057	U	0.050	U	0.13	
7440-02-0	Nickel	17.9		31.0		15.4		24.6		49.6		50.2		58.2		113		33.2		12.1		27.1		40.7	
7440-09-7	Potassium	1310		1600		924		1410		3040		2420		3730		2010		1540		867		1060		4080	
7782-49-2	Selenium		R		R		R		R		R	1.4	U	2.8	U	1.7	U	1.5	U	1.3	U	1.2	U	2.1	U
7440-22-4	Silver	0.044	U	0.072		0.051	U	0.048	U	0.14		0.14		0.23		0.089		0.16		0.050	U	0.048	U	0.37	
7740-23-5	Sodium	3850		6230		4650		4190		21100		12500		25200		9120		7770		3950		3600		22500	
7740-28-0	Thallium	0.22	U	0.29	U	0.25	U	0.24	U	0.45	U	0.28	U	0.56	U	0.34	U	0.30	U	0.25	U	0.24	U	0.42	U
7740-62-2	Vanadium	21.1		34.5		20.9		56.0		125		50.0		61.3		56.8		39.3		14.6		24.0		61.2	
7740-66-6	Zinc	24.5		41.2		24.5		37.7		79.7		61.7		88.6		74.5		57.5		18.8		26.4		99.2	

Data Qualifiers:

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E: The associated value is an estimated quantity because certain quality control criteria were not met.

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Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Table 1
Inorganic Analyses Results
(mg/kg, dry weight)

Date: July 24, 1989
Reviewer: T.D. Bowden
Matrix: Sediment
Sample Nos.: Stations 1 68

CAS No.	Analyte	Station 25 Result	Q	Station 26 Result	Q	Station 27 Result	Q	station 28 Result	Q	Station 29 Result	Q	Station 30 Result	Q	Station 31 Result	Q	Station 32 Result	Q	Station 33 Result	Q	Station 34 Result	Q	Station 35 Result	Q	Station 36 Result	Q
7429-90-5	Aluminum	5030		9410		6700		7480		18600		10200		6180		6270		9910		20600		18600		6790	
7440-36-0	Antimony		R		R		R	0.24	U		R	0.32	U	0.19	U	0.24	U	0.26	E	1.2	E	0.40	U	0.17	U
7740-38-2	Arsenic	0.74		4.7		2.5		2.5		6.7		4.4		2.9		3.4		5.9		11.5		9.4		1.5	
7740-39-3	Barium	10.3		23.4		17.2		13.0		51.1		24.1		14.2		12.9		44.8		53.9		42.3		14.0	
7740-41-7	Beryllium	0.24	U	0.28	U	0.24	U	0.24	U	0.53	U	0.32	U	0.19	U	0.24	U	0.26	U	0.52	U	0.40	U	0.17	U
7740-43-9	Cadmium	0.038	U	0.14	E	0.044	U	0.048	U	0.31	E	1.0	E	0.045	U	0.042	U	0.99	E	1.2	E	1.2	E	0.037	U
7740-70-2	Calcium	2650		5490		2970		3800		7050		4350		2860		3260		4170		7190		9600		3100	
7740-47-3	Chromium	11.7		24.1		15.8		21.6		40.4		26.4		14.3		16.2		27.5		59.8		46.1		20.4	
7740-48-4	Cobalt	2.3		6.9		3.8		4.8		10.2		5.0		4.1		4.4		5.4		8.7		7.8		4.0	
7740-50-8	Copper	2.7		10.3		4.8		5.0		33.8		29.7		4.7		6.4		35.7		129		66.0		5.8	
7439-89-6	Iron	6450		16800		9700		12500		28400		13600		9110		10100		14500		29100		24500		9410	
7439-92-1	Lead	2.2	E	5.8	E	6.9	E	5.9		17.8	E	20.2		7.8		11.8		38.1		94.4		68.3		4.7	
7439-95-4	Magnesium	3250		7460		3890		5550		11700		6050		4150		3770		5830		11300		10600		5430	
7439-96-5	Manganese	112		263		387		317		395		163		316		280		257		298		263		217	
7439-97-6	Mercury	0.065	U	0.055	U	0.047	U	0.061	U	0.13		0.19	E	0.044	U	0.064	U	0.11	E	0.86	E	0.51	E	0.049	U
7440-02-0	Nickel	12.3		29.7		12.8		21.7		37.7		22.6		15.7		13.9		27.2		41.7		40.1		24.3	
7440-09-7	Potassium	735		1530		1060		1310		3690		1810		988		1200		1310		3580		3370		835	
7782-49-2	Selenium	0.95	U	0.97	U	1.1	U	1.2	U	2.2	U	1.6	U	1.1	U	1.1	U	1.3	U	1.9	U	2.3	U	0.92	U
7440-22-4	Silver	0.038	U	0.070		0.044	U	0.048	U	0.43		0.35		0.045		0.10		0.19		1.9		1.1		0.037	U
7740-23-5	Sodium	3400		6510		2700		2860		20600		9690		3910		3890		6160		21200		22600		4090	
7740-28-0	Thallium	0.19	U	0.19	U	0.22	U	0.24	U	0.45	U	0.32	U	0.22	U	0.21	U	0.27	U	0.38	U	0.46	U	0.18	U
7740-62-2	Vanadium	13.2		28.7		20.2		22.5		49.7		28.4		17.8		20.6		29.6		56.5		51.4		19.9	
7740-66-6	Zinc	15.3		39.8		23.6		27.8		89.2		51.7		24.6		24.2		63.8		173		128		24.0	

Data Qualifiers:

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Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Table 1
Inorganic Analyses Results
(mg/kg, dry weight)

Date: July 24, 1989
Reviewer: T.D. Bowden
Matrix: Sediment
Sample Nos.: Stations 1 68

CAS No.	Analyte	Station 37 Result	Q	Station 38 Result	Q	Station 39 Result	Q	Station 40 Result	Q	Station 41 Result	Q	Station 42 Result	Q	Station 43 Result	Q	Station 44 Result	Q	Station 45 Result	Q	Station 46 Result	Q	Station 47 Result	Q	Station 48 Result	Q
7429-90-5	Aluminum	6550		22600		4890		6380		10400		7620		4380		7990		11000		7800		8160		21600	
7440-36-0	Antimony	0.19	U		R		R		R		R	1.3	E		R	0.41	E		R		R		R		R
7740-38-2	Arsenic	2.9		10.9		1.7		3.9		4.6		9.9		1.9		3.5		5.3		2.5		3.0		6.8	
7740-39-3	Barium	10.2		57.9		8.8		15.3		23.9		14.6		8.0		15.0		20.6		13.1		13.0		36.1	
7740-41-7	Beryllium	0.19	U	0.66	U	0.23	U	0.20	U	0.26	U	0.22	U	0.20	U	0.26	U	0.35	U	0.28	U	0.21	U	0.47	U
7740-43-9	Cadmium	0.083	E	0.22	E	0.060	E	0.12	E	0.087	E	0.037	U	0.041	U	0.046	U	0.38	E	0.13	E	0.10	E	1.2	E
7740-70-2	Calcium	3210		6730		2240		3530		5260		3240		2370		3560		4550		3810		3810		8830	
7740-47-3	Chromium	19.5		45.6		10.8		10.8		12.5		21.1		11.1		16.3		18.0		13.5		24.0		38.1	
7740-48-4	Cobalt	5.7		12.2		2.3		4.0		4.7		8.1		2.5		5.9		6.2		4.6		6.1		10.1	
7740-50-8	Copper	6.2		50.2		3.3		25.2		26.7		14.0		4.0		13.5		25.5		12.7		8.8		45.1	
7439-89-6	Iron	11400		32600		6910		9420		13700		15100		6460		11400		13900		9800		17700		26500	
7439-92-1	Lead	7.0		50.5		5.0		21.7		13.7		23.8		3.6		10.6		13.8		6.8		6.0		29.5	
7439-95-4	Magnesium	4600		13200		2710		2950		4250		5270		2690		4070		5050		3360		5830		10500	
7439-96-5	Manganese	278		713		128		105		118		1050		188		511		437		317		486		425	
7439-97-6	Mercury	0.059	U	0.24		0.043	U	0.096		0.055	U	0.047	U	0.059	U	0.068	U	0.085	U	0.059	U	0.065	U	0.14	U
7440-02-0	Nickel	16.8		40.1		8.6		7.9		9.8		26.6		9.6		15.7		15.4		11.0		25.4		35.0	
7440-09-7	Potassium	1270		4410		906		744		1210		1160		712		1130		1530		1180		1850		3880	
7782-49-2	Selenium	1.1	U	3.2	U	0.85	U	1.1	U	1.3	U	0.92	U	1.0	U	1.1	U	1.6	U	1.3	U	0.91	U	3.2	U
7440-22-4	Silver	0.043		0.55		0.034	U	0.15		0.21		0.037	U	0.041	U	0.075		0.17		0.062		0.038		0.37	
7740-23-5	Sodium	3630		29100		3180		4960		7780		3790		3610		6050		11400		6360		5300		26200	
7740-28-0	Thallium	0.21	U	0.64	U	0.17	U	0.22	U	0.26	U	0.18	U	0.21	U	0.23	U	0.32	U	0.26	U	0.18	U	0.65	U
7740-62-2	Vanadium	21.6		66.3		14.9		29.7		37.7		29.4		13.9		27.0		34.5		26.9		31.2		60.0	
7740-66-6	Zinc	25.7		110		16.6		33.6		33.1		46.8		14.7		34.4		46.4		28.4		33.0		94.9	

Data Qualifiers:

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Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Table 1
Inorganic Analyses Results
(mg/kg, dry weight)

Date: July 24, 1989
Reviewer: T.D. Bowden
Matrix: Sediment
Sample Nos.: Stations 1 68

CAS No.	Analyte	Station 49 Result	Q	Station 50 Result	Q	Station 51 Result	Q	Station 52 Result	Q	Station 53 Result	Q	Station 54 Result	Q	Station 55 Result	Q	Station 56 Result	Q	Station 57 Result	Q	Station 58 Result	Q	Station 59 Result	Q	Station 60 Result	Q
7429-90-5	Aluminum	25600		9230		16600		16400		18100		10300		9620		10300		6140		6560		6120		21200	
7440-36-0	Antimony		R		R		R		R		R		R		R		R	0.19	U	0.19	U	0.22	U		R
7740-38-2	Arsenic	8.2		2.1		6.6		6.5		6.2		2.9		3.4		4.3		4.2		5.6		4.9		11.1	
7740-39-3	Barium	29.2		12.4		44.3		44.2		49.1		25.1		21.6		27.2		13.1		14.3		13.0		54.3	
7740-41-7	Beryllium	0.49	U	0.25	U	0.41	U	0.55	U	0.43	U	0.28	U	0.26	U	0.22	U	0.19	U	0.19	U	0.22	U	0.57	U
7740-43-9	Cadmium	1.8	E	0.041	U	0.16	E	0.21	E	0.22	E	0.12	E	0.14	E	0.13	E	0.050	E	0.043	U	0.044	U	0.26	E
7740-70-2	Calcium	6840		6140		5850		5860		6300		6310		5670		5980		3190		3270		3150		6500	
7740-47-3	Chromium	39.0		21.7		37.2		37.6		40.4		26.6		24.3		25.3		14.4		14.9		13.4		43.5	
7740-48-4	Cobalt	8.6		7.1		7.7		7.7		8.9		7.5		7.0		7.4		4.1		4.1		4.1		12.1	
7740-50-8	Copper	53.5		9.9		25.3		25.4		28.7		11.7		10.1		11.7		6.3		7.9		6.4		48.2	
7439-89-6	Iron	28000		15200		27300		27300		29500		18200		16900		18500		9760		10200		9940		30900	
7439-92-1	Lead	26.2		3.2		13.4	E	12.9	E	15.3	E	5.8	E	4.1	E	5.7	E	12.2		16.3	E	10.3		41.0	
7439-95-4	Magnesium	10200		5330		11400		11500		12000		7950		7320		7930		3640		3740		3590		12600	
7439-96-5	Manganese	240		468		256		254		282		289		247		311		272		303		297		678	
7439-97-6	Mercury	0.19		0.051	U	0.12	U	0.13	U	~~2.3~~ *		0.060	U	0.063	U	0.063	U	0.056	U	0.058	U	0.058	U	0.24	
7440-02-0	Nickel	30.0		23.4		24.3		33.2		36.8		30.4		29.3		29.9		13.4		10.7		12.1		35.8	
7440-09-7	Potassium	3720		823		3220		3230		3530		1620		1550		1630		1110		1170		1140		4600	
7782-49-2	Selenium	3.2	U	1.0	U	2.6	U	2.2	U	2.0	U	1.4	U	1.0	U	1.3	U	1.2	U	1.1	U	1.1	U	3.5	U
7440-22-4	Silver	0.56		0.041	U	0.11	U	0.12		0.13		0.077		0.066		0.066		0.10		0.18		0.089		0.53	
7740-23-5	Sodium	24100		3490		22000		22400		20800		6590		5960		6070		3710		4070		3920		29000	
7740-28-0	Thallium	0.63	U	0.20	U	0.53	U	0.43	U	0.40	U	0.29	U	0.20	U	0.26	U	0.24	U	0.21	U	0.22	U	0.69	U
7740-62-2	Vanadium	51.7		37.3		48.6		48.9		54.3		30.9		29.9		30.6		20.0		20.9		19.6		60.5	
7740-66-6	Zinc	87.9		31.1		73.6		73.6		82.5		44.3		39.6		44.4		23.6		26.4		24.9		103	

Data Qualifiers:

U: The material was analyzed for but not detected above the associated level, which is the sample quantitation limit.

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* See Mercury Reanalysis.

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: July 24, 1989
Reviewer: T.D. Bowden
Matrix: Sediment
Sample Nos.: Stations 1 - 68

Table 1
Inorganic Analyses Results
(mg/kg, dry weight)

CAS No.	Analyte	Station 61 Result	Q	Station 62 Result	Q	Station 63 Result	Q	Station 64 Result	Q	Station 65 Result	Q	Station 66 Result	Q	Station 67 Result	Q	Station 68 Result	Q
7429-90-5	Aluminum	20100		20300		7920		7640		8210		10300		10900		10100	
7440-36-0	Antimony		R		R	0.22	E	0.35	E		R		R		R		R
7740-38-2	Arsenic	8.9		10.7		4.6		3.7		4.0		3.5		3.9		3.5	
7740-39-3	Barium	51.1		56.3		14.6		13.4		14.9		20.9		22.7		20.3	
7740-41-7	Beryllium	0.52	U	0.54	U	0.22	U	0.20	U	0.29	U	0.26	U	0.24	U	0.29	U
7740-43-9	Cadmium	0.15	E	0.33	E	0.081	E	0.064	E	0.067	E	0.46	E	0.69	E	0.69	E
7740-70-2	Calcium	6090		6160		3450		3520		3680		4040		4250		4270	
7740-47-3	Chromium	41.8		41.1		17.4		15.7		16.9		23.7		25.9		23.4	
7740-48-4	Cobalt	11.8		11.7		6.0		6.0		6.5		4.7		5.1		4.8	
7740-50-8	Copper	46.4		45.7		12.4		12.3		14.3		13.3		15.2		13.7	
7439-89-6	Iron	29800		29700		11600		11000		11900		15500		16800		15600	
7439-92-1	Lead	35.5		39.2		10.8		10.5		11.8		5.0	E	5.5	E	6.0	E
7439-95-4	Magnesium	12100		12100		4120		3950		4170		6920		7110		6760	
7439-96-5	Manganese	679		665		459		483		605		157		160		155	
7439-97-6	Mercury	0.19		0.21		0.049	U	0.050	U	0.075	U	0.059	U	0.050	U	0.052	U
7440-02-0	Nickel	34.9		34.8		16.3		15.9		11.8		24.5		25.2		24.3	
7440-09-7	Potassium	4270		4350		1210		1170		1370		1610		1780		1570	
7782-49-2	Selenium	2.6	U	2.3	U	1.4	U	1.3	U	1.4	U	1.3	U	1.2	U	1.4	U
7440-22-4	Silver	0.45		0.50		0.083		0.074		0.084		0.074		0.067		0.082	
7740-23-5	Sodium	26900		28900		5790		5580		6660		7550		7900		7450	
7740-28-0	Thallium	0.52	U	0.47	U	0.28	U	0.26	U	0.28	U	0.27	U	0.28		0.31	
7740-62-2	Vanadium	59.9		57.7		27.2		26.7		28.2		31.2		34.0		31.2	
7740-66-6	Zinc	102		97.6		34.7		33.5		37.0		39.3		43.7		39.9	

Data Qualifiers:

U: The material was analyzed for but not detected above the associated level, which is the sample quantitation limit.

E: The associated value is an estimated quantity because certain quality control criteria were not met.

R: The associated value is unusable. The analyte may or may not be present.

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: July 24, 1989
Reviewer: T.D. Bowden
Sample Nos.: Station 1-68

Table 1A
Quantitation Limits
(mg/kg, dry weight)

Analyte	Method	Quantitation Limit Average*	Lowest**
Aluminum	P	5.6	
Antimony	F	0.26	0.17
Arsenic	F	0.28	
Barium	P	0.28	
Beryllium	P	0.32	0.17
Cadmium	F	0.052	0.037
Calcium	P	2.8	
Chromium	P	1.4	
Cobalt	P	0.84	
Copper	P	0.56	
Iron	P	1.4	
Lead	F	0.28	
Magnesium	P	6.4	
Manganese	P	0.28	
Mercury	CV	0.069	0.043
Nickel	P	2.8	
Potassium	P	224	
Selenium	F	1.62	0.85
Silver	F	0.053	0.034
Sodium	P	2.8	
Thallium	F	0.32	0.17
Vanadium	P	0.56	
Zinc	P	1.1	

Method: P = ICP
F = Graphite Furnace AA
CV = Cold Vapor AA

** For analytes with only positive hits the average QL has been estimated by calculation using the IDL, an average sample weight, and an average %solids

* Lowest non-detect quantitated

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: July 24, 1989
Reviewer: T.D. Bowden
Matrix: Sediment
Sample Nos.: Stations 1-68

Table 2
Sample Holding Times

Sample Number	Date Collected	Date Lab Received	Date Analyese Completed ICP	AA	Hg	Holding Time (days) ICP	AA	Hg
Station 1	3/29/88	3/30/89	4/07/89	5/04/89	4/05/89	9	36	7
Station 2	3/29/88	3/30/89	4/07/89	5/05/89	4/05/89	9	37	7
Station 3	3/29/88	3/30/89	4/07/89	5/08/89	4/05/89	9	40	7
Station 4	3/29/88	3/30/89	4/07/89	5/80/89	4/05/89	9	40	7
Station 5	3/29/88	3/30/89	4/08/89	5/04/89	4/05/89	10	36	7
Station 6	3/29/88	3/30/89	4/08/89	5/08/89	4/05/89	10	40	7
Station 7	4/02/89	4/05/89	4/08/89	5/05/89	4/12/89	6	33	10
Station 8	4/02/89	4/05/89	4/08/89	5/04/89	4/12/89	6	32	10
Station 9	4/02/89	4/05/89	4/08/89	5/04/89	4/12/89	6	32	10
Station 10	4/02/89	4/05/89	4/08/89	5/04/89	4/12/89	6	32	10
Station 11	4/02/89	4/05/89	4/08/89	5/08/89	4/12/89	6	36	10
Station 12	4/03/89	4/05/89	4/09/89	5/08/89	4/12/89	6	35	9
Station 13	4/03/89	4/05/89	4/09/89	5/08/89	4/12/89	6	35	9
Station 14	4/03/89	4/05/89	4/09/89	5/08/89	4/12/89	6	35	9
Station 15	4/03/89	4/05/89	4/09/89	5/05/89	4/12/89	6	32	9
Station 16	4/04/89	4/05/89	4/09/89	5/08/87	4/12/89	5	34	8
Station 17	4/04/89	4/05/89	4/09/89	5/05/89	4/12/89	5	31	8
Station 18	3/28/89	3/30/89	4/08/89	5/08/89	4/05/89	11	41	8
Station 19	3/28/89	3/30/89	4/08/89	5/08/89	4/05/89	11	41	8
Station 20	3/28/89	3/30/89	4/08/89	5/08/89	4/05/89	11	41	8
Station 21	3/28/89	3/30/89	4/08/89	5/04/89	4/05/89	11	37	8
Station 22	3/24/89	3/27/89	4/07/89	5/04/89	4/05/89	14	41	12
Station 23	3/24/89	3/27/89	4/07/89	5/06/89	4/05/89	14	43	12
Station 24	3/24/89	3/27/89	4/07/89	5/06/89	4/05/89	14	43	12
Station 25	3/24/89	3/27/89	4/07/89	5/04/89	4/05/89	14	41	12
Station 26	3/24/89	3/27/89	4/07/89	5/06/89	4/05/89	14	43	12
Station 27	3/24/89	3/27/89	4/07/89	5/04/89	4/05/89	14	41	12
Station 28	3/23/89	3/24/89	4/07/89	5/04/89	4/05/89	14	42	13
Station 29	3/24/89	3/27/89	4/07/89	5/06/89	4/05/89	14	43	12
Station 30	3/22/89	3/24/89	4/07/89	5/04/89	4/11/89	16	43	20
Station 31	3/22/89	3/24/89	4/07/89	5/04/89	4/11/89	16	43	20
Station 32	3/23/89	3/24/89	4/07/89	5/04/89	4/11/89	15	42	19
Station 33	3/22/89	3/24/89	4/07/89	5/06/89	4/11/89	16	45	20
Station 34	3/23/89	3/24/89	4/07/89	5/02/89	4/11/89	15	40	19
Station 35	3/23/89	3/24/89	4/07/89	5/02/89	4/11/89	15	40	19
Station 36	3/22/89	3/24/89	4/07/89	5/04/89	4/11/89	14	43	20
Station 37	3/22/89	3/24/89	4/07/89	5/08/89	4/11/89	14	47	20
Station 38	3/21/89	3/22/89	4/05/89	5/04/89	4/11/89	15	44	21
Station 39	3/21/89	3/22/89	4/05/89	5/05/89	4/11/89	15	45	21
Station 40	3/21/89	3/22/89	4/05/89	5/04/89	4/11/89	15	44	21
Station 41	3/21/89	3/22/89	4/05/89	5/04/89	4/11/89	15	44	21
Station 42	3/21/89	3/22/89	4/05/89	5/04/89	4/11/89	15	44	21
Station 43	3/20/89	3/22/89	4/05/89	5/05/89	4/11/89	16	46	22
Station 44	3/20/89	3/22/89	4/05/89	5/04/89	4/11/89	16	45	22
Station 45	3/20/89	3/22/89	4/05/89	5/04/89	4/11/89	16	45	22
Station 46	3/20/89	3/22/89	4/05/89	5/04/89	4/11/89	16	45	22
Station 47	3/20/89	3/22/89	4/05/89	5/05/89	4/11/89	16	46	22
Station 48	3/19/89	3/22/89	4/05/89	5/04/89	4/11/89	17	46	23
Station 49	3/19/89	3/22/89	4/05/89	5/04/89	4/11/89	17	46	23
Station 50	3/19/89	3/22/89	4/05/89	5/04/89	4/11/89	17	46	23
Station 51	3/29/89	3/30/89	4/08/89	5/11/89	4/05/89	10	43	7
Station 52	3/29/89	3/30/89	4/08/89	5/11/89	4/05/89	10	43	7
Station 53	3/29/89	3/30/89	4/08/89	5/05/89	4/05/89	10	37	7
Station 54	3/24/89	3/27/89	4/07/89	5/06/89	4/05/89	14	43	12
Station 55	3/24/89	3/27/89	4/07/89	5/06/89	4/05/89	14	43	12
Station 56	3/24/89	3/27/89	4/07/89	5/06/59	4/05/89	14	43	12
Station 57	3/23/89	3/24/89	4/07/89	5/04/89	4/11/89	15	42	19
Station 58	3/23/89	3/24/89	4/07/89	5/10/89	4/11/89	15	48	19
Station 59	3/23/89	3/24/89	4/07/89	5/04/89	4/11/89	15	42	19
Station 60	3/21/89	3/22/89	4/05/89	5/04/89	4/11/89	15	44	21
Station 61	3/21/89	3/22/89	4/05/89	5/04/89	4/11/89	15	44	21
Station 62	3/21/89	3/22/89	4/05/89	5/05/89	4/11/89	15	45	21
Station 63	3/20/89	3/22/89	4/05/89	5/04/89	4/11/89	16	45	22
Station 64	3/20/89	3/22/89	4/05/89	5/04/89	4/11/89	16	45	22
Station 65	3/20/89	3/22/89	4/05/89	5/10/89	4/11/89	16	51	22
Station 66	3/28/89	3/30/89	4/08/89	5/05/89	4/05/89	11	38	8
Station 67	3/28/89	3/30/89	4/08/89	5/05/89	4/05/89	11	38	8
Station 68	3/28/89	3/30/89	4/08/89	5/08/89	4/05/89	11	41	8

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: July 24, 1989
Reviewer: T.D. Bowden
Matrix: Sediment
Sample Nos.: Stations 1-68

Table 3
ICP Blank Results
(Blanks with values >IDL)
(values in ug/l)

Analyte	IDL	ICB	CCB1	CCB2	CCB3	CCB4	Prep blank*
Run 4/05/89							
Al	20						5
Ca	10						7
Fe	5		8.6				1.7
Mg	10						2
Mn	1			-1			
Na	10						12
Run 4/07/89							
Ca	10					14.7	7
Fe	5						1.6
Mg	10		11.6				
Na	10						5
V	2	3.2		2.3		-2	
Zn	4						1.9
Run 4/08/89							
Ca	10	32.1	30.4				
Na	10						11
V	2		-2.5				
Run 4/09/89							
Ca	10						11
Fe	5						1.9
Na	10						9
V	2		-2.1				

* values in mg/kg

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: July 24, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 4A
LCS Summary

Analyte	NBS 2405 Buffalo River Sediment (mg/kg, dry weight) True Value	95% Confidence Interval		Laboratory Control Samples (mg/kg, dry weight) LCSS 2756Ref Result	%R	LCSS 2772Ref Result	%R	LCSS 2772Ref2 Result	%R	LCSS 2772Ref3 Result	%R
Aluminum	61100	59500	62700	13600	22.3	14200	23.2	12500	20.5	13700	22.4
Antimony	3.79	3.64	3.94	0.61	16.1	0.29	7.7	0.6	15.8	0.47	12.4
Arsenic	23.4	22.6	24.2	17	72.6	17.4	74.4	9.6	41.0	18.7	79.9
Barium	414	402	426	90.6	21.9	96.1	23.2	90.9	22.0	91.7	22.1
Beryllium	NA										
Cadmium	3.45	3.23	3.67	3.5	101.4	3.5	101.4	3.6	104.3	3.5	101.4
Calcium	26000	25700	26300	23800	91.5	23900	91.9	23500	90.4	23200	89.2
Chromium	135	130	140	85	63.0	87	64.4	83.1	61.6	83.4	61.8
Cobalt	14	13.4	14.6	11.8	84.3	11.5	82.1	11.9	85.0	11.2	80.0
Copper	98.6	93.6	103.6	90.1	91.4	95	96.3	93.5	94.8	92.9	94.2
Iron	41100	40100	42100	34300	83.5	34000	82.7	33200	80.8	33700	82.0
Lead	161	144	178	154	95.7	159	98.8	159	98.8	149	92.5
Magnesium	12000	11800	12200	9280	77.3	9930	82.8	9620	80.2	9550	79.6
Manganese	555	536	574	502	90.5	508	91.5	505	91.0	497	89.5
Mercury	1.44	1.37	1.51	1.46	101.4	1.47	102.1	1.3	90.3	1.5	104.2
Nickel	44.1	41.1	47.1	38	86.2	39	88.4	37	83.9	38	86.2
Potassium	20000	19600	20400	1970	9.9	1900	9.5	1510	7.6	1820	9.1
Selenium	NA										
Silver	NA										
Sodium	5470	5330	5610	130	2.4	134	2.4	129	2.4	132	2.4
Thallium	1.2	1.0	1.4	0.44	36.7	0.55	45.8	0.45	37.5	0.53	44.2
Vanadium	95	91	99	23.2	24.4	21.4	22.5	20.7	21.8	21.6	22.7
Zinc	438	426	450	418	95.4	430	98.2	415	94.7	402	91.8

NA: Not available

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: July 24, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 4B
Summary Statistics
Laboratory Control Samples
Sequim Bay Comparison Samples
(mg/kg, dry weight)

Analyte	Laboratory Control Samples n	Mean	SD	CV (%)	95% Confidence Interval		Sequim Bay Comparison Samples (Stations 66, 67, 68) n	Mean	SD	CV (%)
Aluminum	8	12584	1316.757	10.5	10424	14743	3	10433	339.935	3.3
Antimony	6	0.43	0.149	34.9	0.18	0.67				
Arsenic	12	20.5	7.070	34.5	8.9	32.1	3	3.6	0.189	5.2
Barium	8	89.6	5.194	5.8	81.0	98.1	3	21.3	1.020	4.8
Beryllium	12	0.58	0.109	19.0	0.40	0.75	3	0.26 *		
Cadmium	12	3.4	0.180	5.2	3.1	3.7	3	0.61	0.108	17.7
Calcium	8	23188	1010.492	4.4	21530	24845	3	4187	104.030	2.5
Chromium	12	82.8	5.089	6.1	74.5	91.1	3	24.3	1.115	4.6
Cobalt	8	11.3	0.615	5.5	10.3	12.3	3	4.9	0.170	3.5
Copper	12	91.4	4.354	4.8	84.2	98.5	3	14.1	0.818	5.8
Iron	8	32538	1752.810	5.4	29663	35412	3	15967	590.668	3.7
Lead	16	154	10.866	7.1	136	172	3	5.5	0.408	7.4
Magnesium	8	9145	579.288	6.3	8195	10095	3	6930	143.062	2.1
Manganese	8	491	22.806	4.6	454	529	3	157	2.055	1.3
Mercury	12	1.4	0.084	5.9	1.29	1.56	3	0.05 *		
Nickel	12	37.1	2.019	5.4	33.8	40.4	3	24.7	0.386	1.6
Potassium	8	1514	344.146	22.7	950	2079	3	1653	91.043	5.5
Selenium	8	0.99	0.465	47.1	0.23	1.75	3	1.3 *		
Silver	8	0.68	0.228	33.7	0.30	1.05	3	0.07	0.006	8.2
Sodium	8	228	150.167	66.0	3	474	3	7633	192.931	2.5
Thallium	7	0.43	0.110	25.4	0.25	0.61	3	0.29	0.017	5.9
Vanadium	8	21.1	1.432	6.8	18.8	23.5	3	32.1	1.320	4.1
Zinc	16	399	22.344	5.6	363	436	3	41.0	1.948	4.8

* Mean of QLs for non-detects

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: July 24, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 5A

Monitoring Variability Samples
(mg/kg, dry weight)

Analyte	Station 5 (1)	Station 5D (2)	Station 51 (3)	Station 52 (4)	Station 53 (4)	Station 26 (1)	Station 54 (3)	Station 55 (4)	Station 56 (4)
Aluminum	17500	16800	16600	16400	18100	9410	10300	9620	10300
Antimony	R	R	R	R	R	R	R	R	R
Arsenic	6.2	6.98	6.6	6.5	6.2 U	4.7	2.9	3.4	4.3
Barium	46.2	46	44.3	44.2	49.1	23.4	25.1	21.6	27.2
Beryllium	0.41 U	0.5 U	0.41 U	0.55 U	0.43 U	0.28 U	0.28 U	0.26 U	0.22 U
Cadmium	0.15 E	0.22 E	0.16 E	0.21 E	0.22 E	0.14 E	0.12 E	0.14 E	0.13 E
Calcium	6290	5810	5850	5860	6300	5490	6310	5670	5980
Chromium	40.1	37.5	37.2	37.6	40.4	24.1	26.6	24.3	25.3
Cobalt	8.4	7.6	7.7	7.7	8.9	6.9	7.5	7.0	7.4
Copper	27.4	26.9	25.3	25.4	28.7	10.3	11.7	10.1	11.7
Iron	29000	28400	27300	27300	29500	16800	18200	16900	18500
Lead	20.1 E	16.0 E	13.4 E	12.9 E	15.3 E	5.8 E	5.8 E	4.1 E	5.7 E
Magnesium	11900	11400	11400	11500	12000	7460	7950	7320	7930
Manganese	273	259	256	254	282	263	289	247	311
Mercury	0.14	0.13 U	0.12 U	0.13 U	2.3	0.055 U	0.060 U	0.063 U	0.063 U
Nickel	34.8	34	24.3	33.2	36.8	29.7	30.4	29.3	29.9
Potassium	3490	3270	3220	3230	3530	1530	1620	1550	1630
Selenium	2.4 U	2.4 U	2.6 U	2.2 U	2.0 U	0.97 U	1.4 U	1.0 U	1.3 U
Silver	0.13	0.15	0.11 U	0.12	0.13	0.070	0.077	0.066	0.066
Sodium	21300	21500	22000	22400	20800	6510	6590	5960	6070
Thallium	0.48 U	0.48 U	0.53 U	0.43 U	0.40 U	0.19 U	0.29 U	0.20 U	0.26 U
Vanadium	52.4	48.4	48.6	48.9	54.3	28.7	30.9	29.9	30.6
Zinc	78.9	75.6	73.6	73.6	82.5	39.8	44.3	39.6	44.4

(1) Primary sample
(2) Laboratory duplicate analysis
(3) Field split from composite of primary sample
(4) Separate grab sample at same station

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: July 24, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 5A

Monitoring Variability Samples
(mg/kg, dry weight)

Analyte	Station 38 (1)	Station 38D (2)	Station 60 (3)	Station 61 (4)	Station 62 (4)	Station 32 (1)	Station 57 (3)	Station 58 (4)	Station 59 (4)
Aluminum	22600	21100	21200	20100	20300	6270	6140	6560	6120
Antimony	R	R	R	R	R	0.24 U	0.19 U	0.19 U	0.22 U
Arsenic	10.9	10.7	11.1	8.9	10.7	3.4	4.2	5.6	4.9
Barium	57.9	54	54.3	51.1	56.3	12.9	13.1	14.3	13.0
Beryllium	0.66 U	0.5 U	0.57 U	0.52 U	0.54 U	0.24 U	0.19 U	0.19 U	0.22 U
Cadmium	0.22 E	0.34 E	0.26 E	0.15 E	0.33 E	0.042 U	0.050 E	0.043 U	0.044 U
Calcium	6730	7500	6500	6090	6160	3260	3190	3270	3150
Chromium	45.6	44.7	43.5	41.8	41.1	16.2	14.4	14.9	13.4
Cobalt	12.2	12.8	12.1	11.8	11.7	4.4	4.1	4.1	4.1
Copper	50.2	49.4	48.2	46.4	45.7	6.4	6.3	7.9	6.4
Iron	32600	31200	30900	29800	29700	10100	9760	10200	9940
Lead	50.5	41.2	41.0	35.5	39.2	11.8	12.2	16.3 E	10.3
Magnesium	13200	12600	12600	12100	12100	3770	3640	3740	3590
Manganese	713	684	678	679	665	280	272	303	297
Mercury	0.24	0.25	0.24	0.19	0.21	0.064 U	0.056 U	0.058 U	0.058 U
Nickel	40.1	38	35.8	34.9	34.8	13.9	13.4	10.7	12.1
Potassium	4410	4670	4600	4270	4350	1200	1110	1170	1140
Selenium	3.2 U	3.5 U	3.5 U	2.6 U	2.3 U	1.1 U	1.2 U	1.1 U	1.1 U
Silver	0.55	0.55	0.53	0.45	0.50	0.10	0.10	0.18	0.089
Sodium	29100	28300	29000	26900	28900	3890	3710	4070	3920
Thallium	0.64 U	0.69 U	0.69 U	0.52 U	0.47 U	0.21 U	0.24 U	0.21 U	0.22 U
Vanadium	66.3	62.7	60.5	59.9	57.7	20.6	20.0	20.9	19.6
Zinc	110	106	103	102	97.6	24.2	23.6	26.4	24.9

(1) Primary sample
(2) Laboratory duplicate analysis
(3) Field split from composite of primary sample
(4) Separate grab sample at same station

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: July 24, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 5A

Monitoring Variability Samples
(mg/kg, dry weight)

Analyte	Station 44 (1)	Station 63 (3)	Station 64 (4)	Station 65 (4)
Aluminum	7990	7920	7640	8210
Antimony	0.41 E	0.22 E	0.35 E	R
Arsenic	3.5	4.6	3.7	4.0
Barium	15.0	14.6	13.4	14.9
Beryllium	0.26 U	0.22 U	0.20 U	0.29 U
Cadmium	0.046 U	0.081 E	0.064 E	0.067 E
Calcium	3560	3450	3520	3680
Chromium	16.3	17.4	15.7	16.9
Cobalt	5.9	6.0	6.0	6.5
Copper	13.5	12.4	12.3	14.3
Iron	11400	11600	11000	11900
Lead	10.6	10.8	10.5	11.8
Magnesium	4070	4120	3950	4170
Manganese	511	459	483	605
Mercury	0.068 U	0.049 U	0.050 U	0.075 U
Nickel	15.7	16.3	15.9	11.8
Potassium	1130	1210	1170	1370
Selenium	1.1 U	1.4 U	1.3 U	1.4 U
Silver	0.075	0.083	0.074	0.084
Sodium	6050	5790	5580	6660
Thallium	0.23 U	0.28 U	0.26 U	0.28 U
Vanadium	27.0	27.2	26.7	28.2
Zinc	34.4	34.7	33.5	37.0

(1) Primary sample
(2) Laboratory duplicate analysis
(3) Field split from composite of primary sample
(4) Separate grab sample at same station

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: July 24, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 5B
Summary Statistics
Monitoring Variability Samples
(mg/kg, dry weight)

Analyte	Station 5 (1)			Station 5D (2)	Station 51 (3)	Station 26 (1)			Station 54 (3)
	Mean (n=5)	SD	CV (%)	RPD	RPD	Mean (n=4)	SD	CV (%)	RPD
Aluminum	17080	704.982	4.1	4.1	5.3	9908	461.257	4.7	9.0
Antimony						3.8	0.822	21.5	47.4
Arsenic	6.5	0.324	5.0	11.8	6.2	24.3	2.391	9.8	7.0
Barium	46.0	1.986	4.3	0.4	4.2	0.26 *			
Beryllium	0.46 *					0.13	0.010	7.7	15.4
Cadmium	0.19	0.034	17.9	37.8	6.5	5863	360.497	6.1	13.9
Calcium	6022	249.940	4.2	7.9	7.2	25.1	1.144	4.6	9.9
Chromium	38.6	1.553	4.0	6.7	7.5	7.2	0.294	4.1	8.3
Cobalt	8.1	0.568	7.0	10.0	8.7	11.0	0.870	7.9	12.7
Copper	26.7	1.429	5.3	1.8	8.0	17600	875.595	5.0	8.0
Iron	28300	992.472	3.5	2.1	6.0	5.4	0.835	15.6	0.0
Lead	15.5	2.855	18.4	22.7	40.0	7665	322.749	4.2	6.4
Magnesium	11640	288.097	2.5	4.3	4.3	278	28.255	10.2	9.4
Manganese	265	12.153	4.6	5.3	6.4	0.06 *			
Mercury	0.56	0.970	173.2	7.4	15.4	29.8	0.457	1.5	2.3
Nickel	32.6	4.840	14.8	2.3	35.5	1583	49.917	3.2	5.7
Potassium	3348	149.733	4.5	6.5	8.0	1.2 *			
Selenium	2.3 *					0.07	0.005	7.1	9.5
Silver	0.13	0.015	11.5	14.3	16.7	6283	313.834	5.0	1.2
Sodium	21600	620.484	2.9	0.9	3.2	0.24 *			
Thallium	0.46 *					30.0	0.978	3.3	7.4
Vanadium	50.5	2.675	5.3	7.9	7.5	42.0	2.686	6.4	10.7
Zinc	76.8	3.834	5.0	4.3	7.0				
Mean - all metals			15.1	8.9	9.6			8.5	11.8

(1) Primary sample
(2) Laboratory duplicate analysis
(3) Field split from composite of primary sample
* Mean of QLs for non-detects

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: July 24, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 5B
Summary Statistics
Monitoring Variability Samples
(mg/kg, dry weight)

Analyte	Station 38 (1)			Station 38D (2)	Station 60 (3)	Station 32 (1)			Station 57 (3)
	Mean (n=5)	SD	CV (%)	RPD	RPD	Mean (n=4)	SD	CV (%)	RPD
Aluminum	21060	986.408	4.7	6.9	6.4	6273	202.875	3.2	2.1
Antimony						0.21	0.024	11.4	23.3
Arsenic	10.5	0.888	8.5	1.9	1.8	4.5	0.943	20.8	21.1
Barium	54.7	2.569	4.7	7.0	6.4	13.3	0.655	4.9	1.5
Beryllium	0.56 *					0.21 *			
Cadmium	0.26	0.079	30.4	42.9	16.7	0.04	0.004	10.0	17.4
Calcium	6596	568.005	8.6	10.8	3.5	3218	57.373	1.8	2.2
Chromium	43.3	1.896	4.4	2.0	4.7	14.7	1.164	7.9	11.8
Cobalt	12.1	0.432	3.6	4.8	0.8	4.2	0.150	3.6	7.1
Copper	48.0	1.916	4.0	1.6	4.1	6.8	0.768	11.4	1.6
Iron	30840	1184.483	3.8	4.4	5.4	10000	192.527	1.9	3.4
Lead	41.5	5.537	13.3	20.3	20.8	12.7	2.567	20.3	3.3
Magnesium	12520	454.973	3.6	4.7	4.7	3685	84.261	2.3	3.5
Manganese	684	17.768	2.6	4.2	5.0	288	14.445	5.0	2.9
Mercury	0.23	0.025	10.9	4.1	0.0	0.06 *			
Nickel	36.7	2.286	6.2	5.4	11.3	12.5	1.434	11.4	3.7
Potassium	4460	169.115	3.8	5.7	4.2	1155	38.730	3.4	7.8
Selenium	3.0 *					1.1 *			
Silver	0.52	0.042	8.1	0.0	3.7	0.12	0.042	35.0	0.0
Sodium	28440	915.423	3.2	2.8	0.3	3898	147.733	3.8	4.7
Thallium	0.6 *					0.22 *			
Vanadium	61.4	3.258	5.3	5.6	9.1	20.3	0.585	2.9	3.0
Zinc	104	4.625	4.5	3.7	6.6	24.8	1.207	4.9	2.5
Mean - all metals			8.4	9.4	7.0			8.4	7.9

(1) Primary sample
(2) Laboratory duplicate analysis
(3) Field split from composite of primary sample
* Mean of QLs for non-detects

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: July 24, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 5B
Summary Statistics
Monitoring Variability Samples
(mg/kg, dry weight)

Analyte	Station 44 (1)			Station 63 (3)
	Mean (n=4)	SD	CV (%)	RPD
Aluminum	7940	235.089	3.0	0.9
Antimony	0.33	0.097	29.4 **	60.3
Arsenic	4.0	0.480	12.2	27.2
Barium	14.5	0.737	5.1	2.7
Beryllium	0.24 *			
Cadmium	0.06	0.014	23.3	55.1
Calcium	3553	96.393	2.7	3.1
Chromium	16.6	0.737	4.4	6.5
Cobalt	6.1	0.271	4.4	1.7
Copper	13.1	0.954	7.3	8.5
Iron	11475	377.492	3.3	1.7
Lead	10.9	0.597	5.5	1.9
Magnesium	4078	94.296	2.3	1.2
Manganese	515	63.966	12.4	10.7
Mercury	0.06 *			
Nickel	14.9	2.098	14.1	3.8
Potassium	1220	105.198	8.6	6.8
Selenium	1.3 *			
Silver	0.08	0.005	6.3	10.1
Sodium	6020	467.974	7.8	4.4
Thallium	0.26 *			
Vanadium	27.3	0.650	2.4	0.7
Zinc	34.9	1.490	4.3	0.9
Mean	all metals		9.3	13.1

(1) Primary sample
(2) Laboratory duplicate analysis
(3) Field split from composite of primary sample
* Mean of QLs for non-detects
** Antimony, n=3

Data Validation Report - Inorganic Analyses
Mercury Reanalyses

Site:	Puget Sound
Project:	WDOE MSMP
Laboratory:	Analytical Resources, Inc.
Sample Numbers:	Stations 5, 11, 53
Matrix:	Sediment
Reviewer:	T.D. Bowden / Jacobs Engineering Group
Date:	October 30, 1989

This report summarizes the validation of laboratory data for three MSMP samples resubmitted to Analytical Resources, Inc. for mercury analyses. Initial mercury results for these stations (5, 11, 53) were sufficiently high so as to necessitate confirmation.

The samples were analyzed according to the same protocol employed in the initial analyses. The data were validated using the same validation criteria that were applied to the initial data. The samples have been held frozen in archive since collection.

Laboratory quality control data for the reanalyzed samples satisfied all data validation criteria, including initial calibration, initial and continuing calibration verification checks, initial and continuing calibration blanks, preparation blank, matrix spike recovery, duplicate analysis, and laboratory control sample recovery. No results required qualification.

Results for both initial sample analyses and the reanalyses are summarized below, in mg/kg, dry weight:

Station	Initial Result	Reanalysis
5	0.14	0.11 U
11	2.4	0.12 U
53	2.3	0.071 U

Results of the reanalyses are all below quantitation limits. The laboratory reports that the initial results may reflect carryover of high concentrations from a separate case. Accordingly, results of the reanalyses should used in preference to the initial results.

JACOBS ENGINEERING GROUP INC.
ENVIRONMENTAL SYSTEMS DIVISION
1111 THIRD AVENUE - SUITE 700 • SEATTLE WA 98101 • (206) 622-0907

August 23, 1989

Data Validation Report
BNA Organics Analyses

Site:	Puget Sound
Project:	WDOE MSMP
Sample Numbers:	Stations 1-68
Samples Collected By:	Tetra Tech, Inc.

The samples included in this report were analyzed by Analytical Resources, Inc., of Seattle, Washington.

This report is submitted to: Tetra Tech, Inc., Bellevue, Washington

Data Evaluated by: Thomas D. Bowden TDB

Approved by: Raleigh C. Farlow RCF

Data Validation Report - BNA Analyses

Site:	Puget Sound
Project:	WDOE MSMP
Laboratory:	Analytical Resources, Inc.
Sample Number:	Stations 1 - 68
Matrix:	Sediment
Reviewer:	T.D. Bowden
Date:	August 23, 1989

I. Introduction

This report summarizes the validation of laboratory data for 68 marine sediment samples submitted to Analytical Resources, Inc. of Seattle, WA for base/neutral/acid (BNA) organics analyses.

The samples were analyzed employing a protocol modified after USEPA CLP SOW 2/88, IFB W802081D1 in order to decrease Method Quantitation Levels. These modifications include larger sample sizes (approximately 100 g, wet weight), class fractionation (SPE-Silica Gel Column) and subsequent analysis of non-polar (F1) and polar (F2) fractions, and some instrumental setup modifications for increased sensitivities. Several additional analytical parameters were added to the USEPA Target Compound List (TCL) for this project:

Cymene	B-Coprostanol
Caffeine	Cholesterol
9H-Carbazole	B-Sitosterol
Perylene	Retene
Pristane/Phytane	CPI (Carbon Preference Index)

Additional surrogate compounds were also included with the CLP-specified surrogates:

1,2-Dichlorobenzene-d4
2,3,5,6-p-Cresol-d4
Anthracene-d10
Acridine-d9
Fluoranthene-d10
Dibenzo(a,h)anthracene-d14

The ratio of Pristane to Phytane, and the n-Alkane CPI were determined and reported for all samples. In addition, four samples (Stations 4, 8, 21, and 66) were analyzed for 13 resin acids and substituted guaiacols:

Abietic acid	Neoabietic acid
Chlorodehydroabietic acid	Palustric acid
Dehydroabietic acid	Pimaric acid
Dichlorodehydroabietic acid	Sandacopimaric acid
4,5-Dichloroguaiacol	Tetrachloroguaiacol
Isopimaric acid	3,4,5(4,5,6)-Trichloroguaiacol
2-Methoxyphenol (Guaiacol)	

This report has been prepared in accordance with USEPA guidance "Laboratory Data Validation, Functional Guidelines for Evaluating Organics Analyses," dated February 1, 1988. Data validation criteria are found in the USEPA Functional Guidelines and the WDOE Puget Sound Ambient Monitoring Program, Marine Sediment Quality Implementation Plan, dated November, 1988.

Analytical results with associated data qualifiers are found in Table 1. Results are expressed in ug/kg, dry weight. Average quantitation limits are presented in Table 1A. Sample holding times are summarized in Table 2.

Samples from Station 1 through Station 50 (fifty samples) are surficial sediment samples collected from different locations in Puget Sound. Samples with station identification greater than 50 have been assigned surrogate station numbers. These remaining "stations" represent field-generated (laboratory blind) QC samples, specifically, duplicate splits taken from composited sediment from several van Veen grab samples, station replicates taken as separate aliquots from different van Veen grab samples at the same station, and comparison samples, as summarized below:

Field Station	Sample Split	Site Replicates
Station 5	Station 51	Station 52 Station 53
Station 26	Station 54	Station 55 Station 56
Station 32	Station 57	Station 58 Station 59
Station 38	Station 60	Station 61 Station 62
Station 44	Station 63	Station 64 Station 65

Comparison Samples (fortified Sequim Bay sediment sample)

Station 66
Station 67
Station 68

Field samples employed for laboratory QC include:

MS/MSD Analysis

Station 5
Station 26
Station 32
Station 38
Station 44

II. Discussion

A. Sample Holding Times

Technical requirements for maximum sample holding time (time of collection to time of extraction; time of extraction to time of analysis) for BNAs have been established only for water matrices (extraction within 7 days, analysis within 40 days). Sample preservation included holding on ice during transport and at 4°C in the laboratory until extraction. All sediment samples submitted for BNA analyses were extracted within 7 days, with the exception of Stations 48, 49, and 50 (9 days). Results associated with these stations have not been qualified since the deviation is slight and is not expected to affect data quality. All of the samples were analyzed within 40 days of extraction. Sample holding times were determined by comparing sampling dates on the Chain-of-Custody documents with dates of extractions and analyses reported in the data package.

B. GC/MS Tuning

The GC/MS tune was checked with Decafluorotriphenylphosphine (DFTPP) prior to all initial calibration runs and prior to all sample analysis runs. All ion abundances and relative abundances meet acceptance criteria. Mass spectral plots and associated mass listings were compared to entries on Form V. No transcription errors were found with the exception that the data for the tune check on 4/05/89 at 0732 hours has been switched on copies of Form V with the data for the tune check on 4/21/89 at 0809 hours.

All instrumental analyses, including standards, method blanks, matrix spikes, matrix spike duplicates, and station samples were performed within 12 hours of DFTPP analyses with the exception of the instrumental run on 4/21/89 beginning at 1018 hours. The laboratory indicated that the file for the tune check for this run was acceptable; however, it was lost and an earlier tune check (0809 hours) was substituted in the report. This substitution resulted in the exceedance of the 12-hour limit by the last two samples of the analytical run. Acceptance criteria were met for all tune checks associated with this data package, and thus no qualification of data is required due to tune check deviations.

C. Initial Calibration

Initial multipoint calibration was established at concentrations of 20, 50, 80, 120, and 160 ng/ul (ppm)(3/13/89) for all TCL compounds, surrogates and additional surrogates, and at concentrations of 20, 50, and 100 ng/ul (ppm) (3/29/89) for all additional target compounds. For each initial calibration run, all TCL compounds, additional non-CLP target compounds, surrogates and additional surrogates have Average Relative Response Factors (Average RRF) that are $\geq$0.05, with the exception of B-Sitosterol (0.042). An exception to the acceptance criteria has been made for sterols as explained under "Continuing Calibration." All Coefficients of Variation (CV) for RRFs are $\leq$30% with the following exceptions:

Compound	CV (%)	Stations with Positive Hits
4-Chloroaniline	31.0%	None
2,4-Dinitrophenol	36.4%	None

No samples have positive hits for these compounds and therefore no qualification of results is required for this deficiency.

RRFs were confirmed by recalculation at each concentration for 14 compounds in the TCL compound calibration run and for 3 compounds in the additional non-CLP target compound calibration run. The Average RRFs and CVs for these compounds were also recalculated and confirmed. No significant errors in transcription or calculation were detected.

The CLP surrogate compounds were the only surrogates summarized on Form VI. Average RRFs and CVs for all surrogates used were recalculated from raw data and confirmed to meet acceptance criteria.

D. Continuing Calibration

Continuing calibration was established on all instrumental analyses for all TCL compounds, additional non-CLP target compounds, surrogates and additional surrogates. Instrumentation continuing calibrations were checked at a concentration of 50 ng/ul (ppm).

A modification to the acceptance criteria has been employed for B-Coprostanol, Cholesterol, and B-Sitosterol. Because of the high degree of molecular fragmentation, and the consequent use of characteristic and minor ions in quantitation, the introduction of greater analytical variability is expected relative to the major ions used for the other TCL compounds. Therefore, the acceptance limits have been increased. The acceptance criterion for continuing calibration minimum RRF (RRF $\geq$0.05) has not been applied to these compounds. The acceptance criterion for %D between Average RRF and continuing calibration RRF (%D $\leq$25%) has been increased to %D $\leq$30% for these compounds.

With the exceptions listed in Table 3, all TCL compounds and surrogates have an RRF $\geq$0.05 and a Percent Difference (%D) $\leq$25% between the initial calibration Average RRF and the continuing calibration RRF, and all additional non-CLP target compounds have a %D $\leq$30%.

For the compounds listed in Table 3 all associated samples with positive hits that do not meet acceptance criteria for %D have been qualified "E" (estimated).

RRFs and %Ds were recalculated and confirmed for the same compounds selected for initial calibration. No significant errors in transcription or calculation were detected. All analyses were completed within the required 12 hour time limit for each analytical group, with the exception noted under Section IIB, "GC/MS Tuning."

No surrogate compounds were summarized on Form VII. %Ds for RRFs for all surrogates used were recalculated from raw data and confirmed to meet acceptance criteria.

E. Method Blank Analysis

Method blank analysis was performed at the required frequency (one per extraction batch). A total of ten method blanks were analyzed for both polar and non-polar fractions. Bis(2-Ethylhexyl)phthalate is the only program target compound detected in a method blank. This compound was detected in two method blanks (extraction dates 3/29/30 and 3/30/89). A mean and upper 95%ile level for all method blanks was calculated for bis(2-Ethylhexyl)phthalate (Table 4). The 95%ile value has been adjusted to reflect the mean dry sample weight of all samples. The reported quantitation limit for bis(2-Ethylhexyl)phthalate has then been adjusted by application of a "U" qualifier to all data with reported results less than or equal to the 95%ile value.

F. Surrogate Recovery

The USEPA CLP-specified surrogates and additional project-specified surrogates were added to all samples including method blanks, matrix spike samples, and matrix spike duplicate samples. Surrogates were spiked at the following levels:

Surrogate	Amount Spiked (ug)
2-Fluorophenol	100
Phenol-d5	100
Nitrobenzene-d5	50
2-Fluorobiphenyl	50
2,4,6-Tribromophenol	100
p-Terphenyl-d14	50
1,2-Dichlorobenzene-d4	50
2,3,5,6-p-Cresol-d4	50
Anthracene-d10	50
Acridine-d9	50
Fluoranthene-d10	50
Dibenzo(a,h)anthracene-d14	50

These amounts equate to average dry weight concentrations of 1,376 ug/kg (100 ug) and 688 ug/kg (50 ug).

Surrogate recoveries (%R) for all field samples are within the acceptance limits specified for this project (%R$\geq$ 50%) with the exceptions listed in Table 5. Qualifiers were applied to results using the following criteria: For any sample, if $\geq$3 surrogates in the neutral fraction or $\geq$3 surrogates in the acid fraction were <50%R, positive hits for the sample within the appropriate fraction were qualified "E" (estimated). For any sample, if $\geq$2 surrogates in a fraction were <10%R, non-detects in the appropriate fraction were qualified "R" (unusable).
These criteria are modified from the CLP criteria due to the increased number of surrogates used.

Transcription to Form II was checked for all surrogate recoveries. For 20% of all samples, surrogate data were verified by examination of Reconstructed Ion Chromatograms (RICs) and quantitation reports, and recoveries were confirmed by recalculation.

G. Matrix Spike/Matrix Spike Duplicate Analysis

MS/MSD analysis was performed on samples associated with five stations, Stations 5, 26, 32, 38, and 44. All MS/MSD samples were spiked with all of the program target compounds (including both CLP target compounds and all additional non-CLP target compounds) at the following equivalent dry weight concentrations:

Station 5	1250 ug/kg
Station 26	910 ug/kg
Station 32	956 ug/kg
Station 38	3400 ug/kg
Station 44	346 ug/kg

MS/MSD samples associated with Stations 38 and 44 were not spiked with the additional non-CLP target compounds.

MS/MSD analysis was evaluated for all program target compounds. Acceptance criteria used in applying qualifiers to associated samples are as follows:

1) If the average recovery for the MS and MSD sample is $\geq$50%, and the RPD is within limits, then no action has been taken.

2) If the average MS/MSD recovery is <50%, positive results for related samples have been qualified "E" (estimated).

3) If either the MS or the MSD recovery is <10%, non-detects for related samples have been qualified "R" (unusable).

4) If the RPD is <-100% or >+100%, positive results for related samples have been qualified "E" (estimated).

5) For each additional non-CLP target compound, the average of all MS and MSD recoveries and the corresponding coefficient of variation were calculated. All average %Rs were $\geq$50% and all CVs were $\leq$50%. Therefore it was decided that no action or qualification of data was necessary.

Table 6 summarizes MS/MSD results for all program target compounds that do not meet project-specified acceptance criteria. Qualifiers were applied to associated samples by extraction batch.

Since only 5 MS/MSD samples were extracted for 10 extraction batches, not every extraction batch has an associated MS/MSD sample. For those extraction batches without an associated MS/MSD sample, the MS/MSD sample in the chronologically closest extraction batch was used for evaluation.

As indicated above, MS/MSD samples associated with Stations 38 and 44 were not spiked for the additional, non-CLP TCL compounds. Therefore, matrix spike analysis could not be evaluated for these compounds for samples from associated extraction batches.

MS recovery for 3,3'-Dichlorobenzidine (Station 38) is = <10% (MS %R = 8.5%, MSD %R = 16.8%). MSD recovery for Hexachlorocyclopentadiene (Station 5) is <10% (MSD %R = 8.8%, MS %R = 37.6%). However, non-detects for samples associated with stations 5 and 38 have not been qualified for these compounds since the deviations are slight.

Transcription of sample results from Form I to Form III was confirmed for all compounds. Several errors were found, however none were significant. Approximately 20% of %Rs and RPDs were confirmed by recalculation. Recoveries and RPDs for incorrectly transcribed results were also recalculated. Quantitation was confirmed for all MS/MSD compounds.

H. Internal Standards Performance

CLP-specified internal standards were added to all sample extracts to yield the following concentrations:

Internal Standard	Concentration
1,4-Dichlorobenzene-d4	40 ng/ul
Naphthalene-d8	40 ng/ul
Acenaphthene-d10	50 ng/ul
Phenanthrene-d10	30 ng/ul
Chrysene-d12	50 ng/ul
Perylene-d12	57 ng/ul

All Retention Times (RT) are within acceptance limits (±30 seconds). The majority of internal standard areas for all samples are within the CLP-recommended acceptance limits (-50% to +100% of 12-hour calibration standard). Internal standards not meeting the CLP acceptance criteria are summarized in Table 7. The deviations from acceptance limits are not significant and no sample results have been qualified because of these exceptions.

Transcription accuracy from quantitation reports to Form VIII was checked and verified for approximately 50% of the samples. Several errors were found, none of which are significant.

I. TCL Compound Identification

The Relative Retention Times (RRT) for all reported TCL and additional compounds are within acceptance limits (±0.06 RRT units). Ion relative abundances were checked against reference spectra and were found to be acceptable. Some additional compounds, particularly sterols, were commonly flagged by the lab as "N" (presumptive evidence of presence). Reexamination of sample spectra relative to reference spectra indicates that many such flagged results do not require the "N" qualifier, and in these cases, the lab-assigned qualifier has been deleted.

J. Compound Quantitation and Reported Detection Limits

Quantitation calculations were verified for identified TCL compounds, surrogates, and matrix spike compounds in about 15% of all samples by recalculation of results from raw data. Quantitation was verified for all identified additional target compounds. The appropriate internal standard, quantitation ion, and RRF were used in quantitating all compounds. However, some results were either incorrectly calculated or incorrectly transcribed to Form I. These errors have been corrected in Table 1. Average quantitation limits are given in Table 1A.

K. Tentatively Identified Compounds

Table 8 summarizes Tentatively Identified Compounds (TICs) for each sample by total number present, average concentration, and maximum observed value. TICs detected in associated blanks have been accounted for and excluded from this summary.

L. System Performance

Examination of raw data revealed only slight degradation of system performance during or between some analytical runs. This degradation was not significant enough to warrant any corrective action or data qualification. RICs were examined for abrupt shifts in baseline, excessive baseline rise with increased temperature, and high background levels. In general, most RICs, particularly for the F2 fraction, show a marked increase in background at elevated GC temperatures. This phenomenon in a few cases was the result of background contribution of polymer leaching during sample fractionation. No effect on data quality could be found. No anomalous shifts in absolute retention times for internal standards were observed.

M. Other Performance Data

Field-Generated QC Samples: Two types of field-generated QC samples were collected from a station. Station duplicate splits were generated by taking two separate aliquots of sediment from a composite from at least two van Veen grab samples, with one aliquot assigned to the station number, and the other assigned a surrogate station number. Separate station replicates were generated by collecting two additional and separate van Veen grab samples while on station. Site replicates were assigned separate surrogate station numbers.

Results for all replicates are summarized in Table 9A. Summary statistics for these samples are presented in Table 9B. The coefficient of variation (CV) representing monitoring variability within a station was determined using all 4 samples. Relative Percent Differences (RPD) were determined relative to the original sample and the blind field-generated splits.

Sequim Bay Comparison Samples: Homogenized archived sediment from Sequim Bay were submitted for analysis in triplicate as Stations 66, 67 and 68. This material was acquired from Office of Puget Sound, USEPA Region X, and consists of a composited marine sediment that had been prepared as a fortified sample under contract by National Marine Fisheries, NOAA. Analytical results and summary statistics for these samples are presented in Table 10.

N. Resin Acids and Substituted Guaiacols

Introduction: Four samples, Stations 4, 8, 21, and 66 were analyzed for 13 resin acids and substituted guaiacols. MS/MSD analysis was performed on Station 8. GPC (Gel Permeation Column) cleanup was employed per CLP protocol prior to analysis. No surrogate compounds were added because the laboratory was unable to procure suitable surrogates within the time available. An acid fraction was prepared from a split of the extract employed for BNA analysis of Stations 4, 8, 21, and 66. This acid fraction was analyzed for resin acids and substituted guaiacols. Derivatization of resin acids and substituted guaiacols to methyl esters and methyl ethers, respectively, was accomplished by reaction of diazomethane with the acid fraction of sample extracts. Methylation of the acidic fraction is necessary to increase target compound vapor pressures yielding enhancements in detection limits and sensitivities for GC/MS analyses. An excess of diazomethane is added to the acid fraction of sample extracts and allowed to react at ambient temperature for a minimum of five minutes. The excess diazomethane is removed from the reaction mixture and the extract subsequently analyzed by GC/MS.

Holding Times: Recommended holding times for extraction and analysis of samples for Stations 4, 8, 21, and 66 were not exceeded. The recommended sample holding time prior to extraction for the MS/MSD sample was exceeded by 8 days (total of 15 days). The method blank extract was held 45 days prior to analysis. Holding times are summarized in Table 11A.

Initial Calibration: Initial multipoint calibration was established at concentrations of 20, 50, and 100 ng/ul (ppm) for all target compounds. All Average RRFs are >0.05 except Palustric acid (0.041). All CVs are <25% with the exception of Neoabietic acid (29.3%). These deviations from acceptance criteria are not considered significant for these compounds, and thus related results have not been qualified. RRFs, Average RRFs, and CVs were confirmed by recalculation at each concentration for 3 compounds.

Continuing Calibration: Continuing calibration was established for all instrumental analyses for all target compounds. Instrumentation runs on 4/21/89 and 4/24/89 were calibrated and checked at a concentration of 50 ng/ul (ppm). RRFs on both runs are all $\geq$0.05 with the exception of Palustric acid (0.029) on 4/24/89. The majority of %Ds between the Average RRF and the continuing calibration RRF are >30%. These exceptions are summarized in Table 11B. CLP acceptance criteria for %D have been applied, which has required the majority of results to be qualified "E" (estimated).

Method Blank: The method blank extracted 4/07/89 for BNA analyses was employed for resin acid and substituted guaiacol analysis. The blank was analyzed on 5/22/89, 45 days after extraction. None of the samples analyzed for resin acids/guaiacols were associated with the extraction batch for this method blank. Because of these factors, the method blank analysis may not have been appropriate for testing the potential for contamination by these compounds. None of the target compounds were detected in the method blank.

MS/MSD Analysis: MS/MSD analysis was performed on the sample from Station 8. Since the MS/MSD sample was extracted subsequent to all of the associated analytical samples, the MS/MSD analysis may not be a true measure of the recovery efficiencies for these compounds. The sample from Station 8 was spiked with four compounds:

Dehydroabietic acid
Abietic acid
Dichlorodehydroabietic acid*
3,4,5(4,5,6)-Trichloroguaiacol*

* Incorrectly reported on Form III

The spike concentration for the MS sample was 3880 ug/kg, dry weight equivalent, whereas the spike concentration for the MSD sample was 2890 ug/kg, dry weight equivalent. All MS and MSD recoveries are $\geq$10%. However, several are $\geq$10% but <50%:

	MS %R	MSD %R
Abietic acid	11.3	12.8
Dehydroabietic acid	27.6	26.3

All RPDs are within acceptance criteria. Compounds with MS/MSD recoveries <50% have been qualified "E" (estimated).

All MS/MSD results were checked for transcription and calculation errors. The laboratory used an average of the MS and the MSD sample weights in calculating dry weights (30.2 g). Although recovery and RPD calculations were not significantly affected using the average value, MS and MSD %Rs and RPDs were confirmed by recalculation using actual sample weights (MS = 25.8 g, MSD = 34.6 g).

Analytical results for unspiked compounds are consistently lower in the original sample as opposed to the MS/MSD sample. The holding time prior to extraction was greater for the MS/MSD sample than the original sample, and the extract holding time prior to analysis was greater for the original sample than the MS/MSD sample. This may suggest that the target compounds have a greater probability of remaining intact in the original sample matrix than in the concentrated solvent extract. An estimated average percent loss per week from the extract relative to the refrigerated sediment has been calculated using the results for non-spiked compounds from both samples:

Target Compound	Average % Loss per Week in Extract
Chlorodehydroabietic acid	20
Isopimaric acid	20
Neoabietic acid	30
Pimaric acid	60
Sandacopimaric acid	10

Internal Standards: Internal standards applied to the resin acid/substituted guaiacol analysis were Naphthalene-d8, Acenaphthene-d10, and Chrysene-d12. All RTs and internal standard areas meet acceptance criteria. No Form VIII was included in the data package. RTs and internal standard areas were checked and verified from quantitation reports.

Compound Identification/Quantitation: RRTs for all reported target compounds are within acceptance criteria. Ion relative abundances were checked against reference spectra and were found to be acceptable. The laboratory-assigned data qualifier "N" was removed from Sandacopimaric acid at Station 8, since the RRT and spectra were found to be acceptable. Quantitation calculations were verified for all detected compounds. For Stations 4 and 21, two peaks representing different isomers are present for Chlorodehydroabietic acid. The laboratory used only the larger of the two peaks for quantitation. The second peak has been included as a sum in the quantitation reported in Table 1, thus reporting Total Chlorodehydroabietic acid.

O. Overall Case Assessment

The level of effort exhibited by the laboratory for this data package is better than average. The quantitation levels achieved are significantly lower than CLP requirements. All deliverables required by the project are present. The laboratory has been requested to resubmit some corrected QC reporting forms and unreadable raw data. Overall, the data is considered usable for the intended purposes.

III. Summary of Qualified Data

A. The following results have been qualified "E" (estimated) because the Percent Difference (%D) between the Average Relative Response Factor and the continuing calibration Relative Response Factor does not meet acceptance criteria, as discussed in Section IID and IIN:

Hexachlorobenzene	Station 44
Pyrene	Stations 1, 2, 3, 4, 5, 6, 22, 23, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 58,59
Butylbenzylphthalate	Stations 34, 35

bis(2-Ethylhexyl)phthalate	Stations 28, 30, 33, 34, 35, 36, 59
Benzo(b)fluoranthene	Stations 46, 47, 48, 49, 60, 61, 62, 63, 64, 65
Benzo(k)fluoranthene	Stations 22, 37, 41, 44, 45, 58, 59
Benzo(g,h,i)perylene	Stations 49, 60, 61, 62, 63
B-Coprostanol	Stations 14, 22, 23, 28, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 49, 50, 58, 59, 60, 61, 62, 63
Cholesterol	Stations 14, 15, 16, 17, 22, 23, 37, 58, 59
B-Sitosterol	Stations 8, 9, 10, 11, 12, 13, 14, 15, 17, 22, 23, 26, 27, 37, 58, 59, 68
Abietic acid	Stations 8, 21
Chlorodehydroabietic acid	Stations 4, 8, 21
Dehydroabietic acid	Stations 4, 8, 21
Dichlorodehydroabietic acid	Station 4
Isopimaric acid	Station 8, 21
Neoabietic acid	Station 8
Palustric acid	Station 8
Pimaric acid	Station 8
Sandacopimaric acid	Station 8

B. The following results have been assigned the "U" qualifier in order to decrease significance of the reported value based on a statistical analysis of positive hits in method blanks, as discussed in Section IIE:

bis(2-Ethylhexyl)phthalate	Stations 1, 2, 3, 14, 18, 20, 22, 23, 25, 27, 28, 31, 32, 37, 39, 42, 46, 47, 50, 52, 54, 55, 56, 58, 63, 64, 65

C. The following results have been qualified "E" (estimated) because surrogate recoveries did not meet acceptance criteria, as discussed in Section II F:

Phenol	Stations 15, 57
Naphthalene	Stations 4, 36
Dibenzofuran	Station 36
Fluorene	Station 61
Pentachlorophenol	Station 57
Phenanthrene	Stations 4, 15, 27, 36, 49, 55, 57, 61
Fluoranthene	Stations 4, 15, 27, 36, 49, 57, 61
Pyrene	Stations 4, 15, 27, 36, 49, 55, 57, 61
Benzo(a)anthracene	Stations 4, 15, 27, 36, 49, 55, 57, 61
bis(2-Ethylhexyl)phthalate	Stations 4, 12, 36, 49, 57, 61
Chrysene	Stations 4, 15, 27, 36, 49, 55, 57, 61
Benzo(b+k)fluoranthene	Stations 4, 15, 27, 36, 49, 57, 61
Benzo(a)pyrene	Stations 27, 36, 49, 57, 61
Indeno(1,2,3-c,d)pyrene	Stations 27, 36, 49, 57, 61
Dibenz(a,h)anthracene	Stations 36, 57, 61
Benzo(g,h,i)perylene	Stations 27, 36, 49, 57, 61
Perylene	Stations 4, 36, 49, 55, 57, 61
B-Coprostanol	Stations 4, 27, 36, 39, 49, 50, 57, 61,
Cholesterol	Stations 4, 15, 27, 36, 39, 43, 49, 50, 55, 57, 61, 68
B-Sitosterol	Stations 4, 15, 27, 36, 39, 43, 49, 50, 55, 57, 61
Retene	Stations 43, 50, 57, 61

D. The following results have been qualified "E" (estimated) because matrix spike and/or matrix spike duplicate recoveries did not meet acceptance criteria, as discussed in Section IIG and IIN:

Phenol	Stations 25, 26, 32, 56, 57, 58, 59
Acenaphthene	Station 40
Benzo(g,h,i)perylene	Stations 8, 54, 66, 67, 68
Abietic acid	Station 8
Dehydroabietic acid	Station 8

E. The following results have been qualified "R" (unusable) because matrix spike/matrix spike duplicate recoveries did not meet acceptance criteria, as discussed in Section IIG:

Benzoic acid	Stations 22, 23, 24, 25, 26, 27, 28, 29, 30, 32, 24, 25, 28, 29, 40, 54, 55, 56, 57, 58, 59
4-Chloroaniline	All Stations (1-68), except Stations 38, 39, and 40
3,3'-Dichlorobenzidine	All Stations (1-68), except Stations 38, 39, and 40

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 23, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 1
BNA Organics Analyses Results
(ug/kg, dry weight)

CAS No.	Target Parameter	Station 1 Results	Q	Station 2 Results	Q	Station 3 Results	Q	Station 4 Results	Q	Station 5 Results	Q	Station 6 Results	Q	Station 7 Results	Q	Station 8 Results	Q	Station 9 Results	Q	Station 10 Results	Q
108-95-2	Phenol	22	U	57	U	11	E	29	U	26	U	11	U	18		9	N	12	U	20	N
111-44-4	bis(2-Chloroethyl)ether	22	U	15	U	15	U	29	U	26	U	11	U	12	U	20	U	12	U	15	U
95-57-8	2-Chlorophenol	22	U	15	U	15	U	29	U	26	U	11	U	12	U	20	U	12	U	15	U
541-73-1	1,3-Dichlorobenzene	22	U	15	U	15	U	29	U	26	U	11	U	12	U	20	U	12	U	15	U
106-46-7	1,4-Dichlorobenzene	22	U	15	U	15	U	29	U	26	U	11	U	12	U	20	U	12	U	15	U
100-51-6	Benzyl alcohol	110	U	72	U	74	U	140	U	130	U	54	U	61	U	100	U	58	U	74	U
95-50-1	1,2-Dichlorobenzene	22	U	15	U	15	U	29	U	26	U	11	U	12	U	20	U	12	U	15	U
95-48-7	2-Methylphenol	22	U	15	U	15	U	29	U	26	U	11	U	12	U	20	U	12	U	15	U
108-60-1	bis(2-Chloroisopropyl)ether	22	U	15	U	15	U	29	U	26	U	11	U	12	U	20	U	12	U	15	U
106-44-5	4-Methylphenol	22	U	15	U	15	U	29	U	26	U	11	U	12	U	20	U	12	U	15	U
621-64-7	N-Nitroso-di-n-propylamine	22	U	15	U	15	U	29	U	26	U	11	U	12	U	20	U	12	U	15	U
67-72-1	Hexachloroethane	43	U	29	U	30	U	58	U	52	U	22	U	24	U	41	U	23	U	29	U
98-95-3	Nitrobenzene	22	U	15	U	15	U	29	U	26	U	11	U	12	U	20	U	12	U	15	U
78-59-1	Isophorone	22	U	15	U	15	U	29	U	26	U	11	U	12	U	69		12	U	15	U
88-75-5	2-Nitrophenol	110	U	72	U	74	U	140	U	130	U	54	U	61	U	100	U	58	U	74	U
105-67-9	2,4-Dimethylphenol	43	U	29	U	30	U	58	U	52	U	22	U	24	U	41	U	23	U	29	U
65-85-0	Benzoic acid	220	U	145	U	148	U	290	U	260	U	110	U	120	U	200	U	120	U	150	U
111-91-1	bis(2-Chloroethoxy)methane	22	U	15	U	15	U	29	U	26	U	11	U	12	U	20	U	12	U	15	U
120-83-2	2,4-Dichlorophenol	65	U	43	U	45	U	87	U	78	U	32	U	37	U	61	U	35	U	44	U
120-82-1	1,2,4-Trichlorobenzene	22	U	15	U	15	U	29	U	26	U	11	U	12	U	20	U	12	U	15	U
91-20-3	Naphthalene	22	U	5	E	15	U	10	E	6	E	2	E	12	U	17	E	12	U	15	U
106-47-8	4-Chloroaniline		R		R		R		R		R		R		R		R		R		R
87-68-3	Hexachlorobutadiene	43	U	29	U	30	U	58	U	52	U	22	U	24	U	41	U	23	U	29	U
59-50-7	4-Chloro-3-methylphenol	43	U	29	U	30	U	58	U	52	U	22	U	24	U	41	U	23	U	29	U
91-57-6	2-Methylnaphthalene	22	U	6	E	3	E	29	U	6	E	11	U	12	U	14	E	12	U	15	U
77-47-4	Hexachlorocyclopentadiene	110	U	72	U	74	U	140	U	130	U	54	U	61	U	100	U	58	U	74	U
88-06-2	2,4,6-Trichlorophenol	110	U	72	U	74	U	140	U	130	U	54	U	61	U	100	U	58	U	74	U
95-95-4	2,4,5-Trichlorophenol	110	U	72	U	74	U	140	U	130	U	54	U	61	U	100	U	58	U	74	U
91-58-7	2-Chloronaphthalene	22	U	15	U	15	U	29	U	26	U	11	U	12	U	20	U	12	U	15	U
88-74-4	2-Nitroaniline	110	U	72	U	74	U	140	U	130	U	54	U	61	U	100	U	58	U	74	U
131-11-3	Dimethylphthalate	22	U	15	U	15	U	29	U	26	U	11	U	12	U	20	U	12	U	15	U
208-96-8	Acenaphthylene	22	U	15	U	15	U	29	U	26	U	11	U	12	U	6	E	12	U	15	U
99-09-2	3-Nitroaniline	110	U	72	U	74	U	140	U	130	U	54	U	61	U	100	U	58	U	74	U
83-32-9	Acenaphthene	22	U	15	U	15	U	29	U	26	U	11	U	12	U	6	E	12	U	15	U
51-28-5	2,4-Dinitrophenol	220	U	145	U	148	U	290	U	260	U	110	U	120	U	200	U	120	U	150	U
100-02-7	4-Nitrophenol	110	U	72	U	74	U	140	U	130	U	54	U	61	U	100	U	58	U	74	U
132-64-9	Dibenzofuran	22	U	15	U	15	U	29	U	26	U	11	U	12	U	13	E	12	U	15	U
121-14-2	2,4-Dinitrotoluene	110	U	72	U	74	U	140	U	130	U	54	U	61	U	100	U	58	U	74	U
606-20-2	2,6-Dinitrotoluene	110	U	72	U	74	U	140	U	130	U	54	U	61	U	100	U	58	U	74	U
84-66-2	Diethylphthalate	22	U	15	U	15	U	29	U	26	U	11	U	12	U	20	U	12	U	15	U
7005-72-3	4-Chlorophenyl-phenylether	22	U	15	U	15	U	29	U	26	U	11	U	12	U	20	U	12	U	15	U
86-73-7	Fluorene	22	U	5	E	15	U	29	U	26	U	11	U	12	U	21		12	U	15	U
100-01-6	4-Nitroaniline	110	U	72	U	74	U	140	U	130	U	54	U	61	U	100	U	58	U	74	U
534-52-1	4,6-Dinitro-2-methylphenol	220	U	145	U	148	U	290	U	260	U	110	U	120	U	200	U	120	U	150	U

Data Qualifiers:

R: The data are unusable. The parameter may or may not be present.
U: The parameter was analyzed for but not reported above the associated value, which is the sample quantitation limit.
N: Presumptive evidence of the presence of the parameter at an estimated quantity.
E: The associated value is an estimated quantity.

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 23, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 1
BNA Organics Analyses Results
(ug/kg, dry weight)

CAS No.	Target Parameter	Station 1 Results	Q	Station 2 Results	Q	Station 3 Results	Q	Station 4 Results	Q	Station 5 Results	Q	Station 6 Results	Q	Station 7 Results	Q	Station 8 Results	Q	Station 9 Results	Q	Station 10 Results	Q
86-30-6	N-Nitrosodiphenylamine	22	U	15	U	15	U	29	U	26	U	11	U	12	U	20	U	12	U	15	U
101-55-3	4-Bromophenyl-phenylether	22	U	15	U	15	U	29	U	26	U	11	U	12	U	20	U	12	U	15	U
118-74-1	Hexachlorobenzene	22	U	15	U	15	U	29	U	26	U	11	U	12	U	20	U	12	U	15	U
87-86-5	Pentachlorophenol	110	U	72	U	74	U	140	U	130	U	54	U	61	U	100	U	58	U	74	U
85-01-8	Phenanthrene	120		93		16	E	40	E	37	E	4	N	3	N	300		12	U	20	
120-12-7	Anthracene	22	U	20	E	15	U	29	U	260	U	11	U	12	U	54		12	U	15	U
84-74-2	Di-n-butylphthalate	22	U	15	U	15	U	29	U	26	U	11	U	12	U	20	U	12	U	15	U
206-44-0	Fluoranthene	120		120		10	N	32	E	34	E	7	E	3	N	270		12	U	10	E
129-00-0	Pyrene	76	E	95	E	6	E	26	E	25	E	4	E	5	N	190		12	U	8	E
85-68-7	Butylbenzylphthalate	22	U	15	U	15	U	29	U	26	U	11	U	3	U	20	U	12	U	15	U
91-94-1	3,3'-Dichlorobenzidine		R		R		R		R		R		R		R		R		R		R
56-55-3	Benzo(a)anthracene	43		49		15	U	13	E	14	E	6	E	12	U	94		12	U	5	N
117-81-7	bis(2-Ethylhexyl)phthalate	31	U	21	U	19	U	42	E	26	U	11	U	12	U	56		12	U	15	U
218-01-9	Chrysene	56		58		15	U	17	E	24	E	14		12	U	180		12	U	7	E
117-84-0	Di-n-octylphthalate	22	U	15	U	15	U	29	U	26	U	11	U	12	U	20	U	12	U	15	U
205-99-2	Benzo(b)fluoranthene	53		40		15	U	13	E			11	U	12	U						
207-08-9	Benzo(k)fluoranthene	52		39		15	U	12	E			11	U	12	U						
	Benzo(b+k)fluoranthene	105		79		15	U	25	E	36	E	11	U	12	U	270		24	U	15	N
50-32-8	Benzo(a)pyrene	47		40		15	U	29	U	10	N	11	U	12	U	75		12	U	55	
193-39-5	Indeno(1,2,3-c,d)pyrene	22	U	34	N	15	U	29	U	26	U	11	U	12	U	34		12	U	19	
53-70-3	Dibenz(a,h)anthracene	22	U	15	U	15	U	29	U	26	U	11	U	12	U	14	N	12	U	15	U
191-24-2	Benzo(g,h,i)perylene	22	U	15	U	15	U	29	U	26	U	11	U	12	U	35	E	12	U	15	U
25155-15-1	Cymene	22	U	15	U	15	U	29	U	26	U	11	U	12	U	20	U	12	U	15	U
86-74-8	9H-Carbazole	22	U	15	U	15	U	29	U	26	U	11	U	12	U	20	U	12	U	15	U
58-08-2	Caffeine	22	U	15	U	15	U	29	U	26	U	11	U	12	U	20	U	12	U	15	U
198-55-0	Perylene	47		30		17		20	E	33		11	N	12	U	48		12	U	20	N
80-97-7	B-Coprostanol	95		96		110		330	E	120		42		24	U	410		22		29	U
57-88-5	Cholesterol	2400		1100		600		1800	E	1400		510		680		1000		430		2000	
83-46-5	B-Sitosterol	2300		1100		700		2100	E	1600		310		61	U	3100	E	120	E	620	E
483-65-8	Retene	29		12	E	15	U	29	U	26	U	11	U	12	U	55		12	U	8	E
514-10-3	Abietic acid							58	U							180	E				
	Chlorodehydroabietic acid							210	N							90	E				
1740-19-8	Dehydroabietic acid							190	E							550	E				
	Dichlorodehydroabietic acid							150	N							82	U				
	4,5-Dichloroguaiacol							120	U							82	U				
5835-26-7	Isopimaric acid							120	U							210	E				
90-05-1	2-Methoxyphenol (Guaiacol)							58	U							41	U				
471-77-2	Neoabietic acid							230	U							82	E				
1945-53-5	Palustric acid							1200	U							120	N				
127-27-5	Pimaric acid							58	U							25	N				
	Sandacopimaric acid							58	U							49	E				
	Tetrachloroguaiacol							230	U							160	U				
	3,4,5(4,5,6)-Trichloroguaiacol							230	U							160	U				
	Pristane/Phytane	6.29		5.29		6.15		8.67		7.66		4.16		10.31		4.10		2.91		7.58	
	CPI	1.89		1.64		1.89		3.37		1.57		1.50		1.84		1.51		1.26		1.77	

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Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 23, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 1
BNA Organics Analyses Results
(ug/kg, dry weight)

CAS No.	Target Parameter	Station 11 Results	Q	Station 12 Results	Q	Station 13 Results	Q	Station 14 Results	Q	Station 15 Results	Q	Station 16 Results	Q	Station 17 Results	Q	Station 18 Results	Q	Station 19 Results	Q	Station 20 Results	Q
108-95-2	Phenol	55		25	U	12	U	14	U	11	E	13	U	25	U	20	U	520		16	U
111-44-4	bis(2-Chloroethyl)ether	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
95-57-8	2-Chlorophenol	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
541-73-1	1,3-Dichlorobenzene	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
106-46-7	1,4-Dichlorobenzene	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
100-51-6	Benzyl alcohol	76	U	130	U	61	U	70	U	64	U	63	U	130	U	100	U	150	U	78	U
95-50-1	1,2-Dichlorobenzene	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
95-48-7	2-Methylphenol	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
108-60-1	bis(2-Chloroisopropyl)ether	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
106-44-5	4-Methylphenol	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
621-64-7	N-Nitroso-di-n-propylamine	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
67-72-1	Hexachloroethane	31	U	50	U	24	U	28	U	26	U	25	U	50	U	40	U	61	U	31	U
98-95-3	Nitrobenzene	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
78-59-1	Isophorone	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
88-75-5	2-Nitrophenol	76	U	130	U	61	U	70	U	64	U	63	U	130	U	100	U	150	U	78	U
105-67-9	2,4-Dimethylphenol	31	U	50	U	24	U	28	U	26	U	25	U	50	U	40	U	61	U	31	U
65-85-0	Benzoic acid	150	U	250	U	120	U	140	U	129	U	130	U	250	U	200	U	310	U	160	U
111-91-1	bis(2-Chloroethoxy)methane	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
120-83-2	2,4-Dichlorophenol	46	U	76	U	36	U	42	U	39	U	38	U	75	U	60	U	92	U	47	U
120-82-1	1,2,4-Trichlorobenzene	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
91-20-3	Naphthalene	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
106-47-8	4-Chloroaniline		R		R		R		R		R		R		R		R		R		R
87-68-3	Hexachlorobutadiene	31	U	50	U	24	U	28	U	26	U	25	U	50	U	40	U	61	U	31	U
59-50-7	4-Chloro-3-methylphenol	31	U	50	U	24	U	28	U	26	U	25	U	50	U	40	U	61	U	31	U
91-57-6	2-Methylnaphthalene	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
77-47-4	Hexachlorocyclopentadiene	76	U	130	U	61	U	70	U	64	U	63	U	130	U	100	U	150	U	78	U
88-06-2	2,4,6-Trichlorophenol	76	U	130	U	61	U	70	U	64	U	63	U	130	U	100	U	150	U	78	U
95-95-4	2,4,5-Trichlorophenol	76	U	130	U	61	U	70	U	64	U	63	U	130	U	100	U	150	U	78	U
91-58-7	2-Chloronaphthalene	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
88-74-4	2-Nitroaniline	76	U	130	U	61	U	70	U	64	U	63	U	130	U	100	U	150	U	78	U
131-11-3	Dimethylphthalate	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
208-96-8	Acenaphthylene	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
99-09-2	3-Nitroaniline	76	U	130	U	61	U	70	U	64	U	63	U	130	U	100	U	150	U	78	U
83-32-9	Acenaphthene	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
51-28-5	2,4-Dinitrophenol	150	U	250	U	120	U	140	U	129	U	130	U	250	U	200	U	310	U	160	U
100-02-7	4-Nitrophenol	76	U	130	U	61	U	70	U	64	U	63	U	130	U	100	U	150	U	78	U
132-64-9	Dibenzofuran	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
121-14-2	2,4-Dinitrotoluene	76	U	130	U	61	U	70	U	64	U	63	U	130	U	100	U	150	U	78	U
606-20-2	2,6-Dinitrotoluene	76	U	130	U	61	U	70	U	64	U	63	U	130	U	100	U	150	U	78	U
84-66-2	Diethylphthalate	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
7005-72-3	4-Chlorophenyl-phenylether	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
86-73-7	Fluorene	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
100-01-6	4-Nitroaniline	76	U	130	U	61	U	70	U	64	U	63	U	130	U	100	U	150	U	78	U
534-52-1	4,6-Dinitro-2-methylphenol	150	U	250	U	120	U	140	U	129	U	130	U	250	U	200	U	310	U	160	U

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86-30-6	N-Nitrosodiphenylamine	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
101-55-3	4-Bromophenyl-phenylether	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
118-74-1	Hexachlorobenzene	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
87-86-5	Pentachlorophenol	76	U	130	U	61	U	70	U	64	U	63	U	130	U	100	U	150	U	78	U
85-01-8	Phenanthrene	22		33		8	E	13	E	9	E	13	U	25	U	20	U	40		7	N
120-12-7	Anthracene	15	U	6	E	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
84-74-2	Di-n-butylphthalate	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
206-44-0	Fluoranthene	12	E	40		5	E	10	E	15	E	13	U	9	E	10	E	49		6	E
129-00-0	Pyrene	10	E	32		4	E	6	E	12	E	13	U	9	E	7	E	52		16	U
85-68-7	Butylbenzylphthalate	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
91-94-1	3,3'-Dichlorobenzidine		R		R		R		R		R		R		R		R		R		R
56-55-3	Benzo(a)anthracene	5	E	8	E	12	U	14	U	7	E	13	U	5	E	20	U	20	E	16	U
117-81-7	bis(2-Ethylhexyl)phthalate	15	U	8300	E	12	U	18	U	13	U	13	U	40		20	U	27	U	32	U
218-01-9	Chrysene	7	E	29		12	U	7	E	17	E	13	U	9	N	20	U	27	E	8	E
117-84-0	Di-n-octylphthalate	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
205-99-2	Benzo(b)fluoranthene					12	U					13	U			20	U			16	U
207-08-9	Benzo(k)fluoranthene					12	U					13	U			20	U			16	U
	Benzo(b+k)fluoranthene	18	N	45		12	U	14	E	23	E	13	U	27	E	20	U	46		16	U
50-32-8	Benzo(a)pyrene	4	E	17	E	12	U	5	N	5	E	13	U	25	U	20	U	25	E	16	U
193-39-5	Indeno(1,2,3-c,d)pyrene	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
53-70-3	Dibenz(a,h)anthracene	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
191-24-2	Benzo(g,h,i)perylene	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
25155-15-1	Cymene	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
86-74-8	9H-Carbazole	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
58-08-2	Caffeine	15	U	25	U	12	U	14	U	13	U	13	U	25	U	20	U	31	U	16	U
198-55-0	Perylene	17		29		12	U	10	N	13	U	13	U	25	U	26	N	38		14	N
80-97-7	B-Coprostanol	74	N	190	N	24	U	64	N	26	U	25	U	50	U	40	U	170	N	120	
57-88-5	Cholesterol	1700		1700		290		440	E	310	E	530	E	1400	E	2100		2000		110	
83-46-5	B-Sitosterol	540	E	1500	E	90	N	440	E	680	N	63	U	2600	E	940	N	440		1500	N
483-65-8	Retene	8	N	19	E	12	U	14	U	13	U	13	U	25	U	20	U	24	N	10	E
514-10-3	Abietic acid																				
	Chlorodehydroabietic acid																				
1740-19-8	Dehydroabietic acid																				
	Dichlorodehydroabietic acid																				
	4,5-Dichloroguaiacol																				
5835-26-7	Isopimaric acid																				
90-05-1	2-Methoxyphenol (Guaiacol)																				
471-77-2	Neoabietic acid																				
1945-53-5	Palustric acid																				
127-27-5	Pimaric acid																				
	Sandacopimaric acid																				
	Tetrachloroguaiacol																				
	3,4,5(4,5,6)-Trichloroguaiacol																				
	Pristane/Phytane	6.72		6.52		9.92		9.34		5.22		4.67		10.42		7.04		7.32		3.42	
	CPI	1.78		1.37		1.37		1.70		2.00		1.61		2.75		1.69		3.50		3.05	

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Table 1
BNA Organics Analyses Results
(ug/kg, dry weight)

Date: August 23, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

CAS No.	Target Parameter	Station 21 Results	Q	Station 22 Results	Q	Station 23 Results	Q	Station 24 Results	Q	Station 25 Results	Q	Station 26 Results	Q	Station 27 Results	Q	Station 28 Results	Q	Station 29 Results	Q	Station 30 Results	Q
108-95-2	Phenol	10	N	9	U	9	U	17	U	11	N	9	N	8	U	8	U	18	U	12	U
111-44-4	bis(2-Chloroethyl)ether	15	U	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	12	U
95-57-8	2-Chlorophenol	15	U	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	12	U
541-73-1	1,3-Dichlorobenzene	15	U	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	12	U
106-46-7	1,4-Dichlorobenzene	15	U	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	12	U
100-51-6	Benzyl alcohol	77	U	45	U	45	U	86	U	42	U	43	U	42	U	39	U	88	U	60	U
95-50-1	1,2-Dichlorobenzene	15	U	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	12	U
95-48-7	2-Methylphenol	15	U	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	12	U
108-60-1	bis(2-Chloroisopropyl)ether	15	U	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	12	U
106-44-5	4-Methylphenol	15	U	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	12	U
621-64-7	N-Nitroso-di-n-propylamine	15	U	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	12	U
67-72-1	Hexachloroethane	31	U	18	U	18	U	34	U	17	U	17	U	17	U	16	U	35	U	24	U
98-95-3	Nitrobenzene	15	U	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	12	U
78-59-1	Isophorone	15	U	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	12	U
88-75-5	2-Nitrophenol	77	U	45	U	45	U	86	U	42	U	43	U	42	U	39	U	88	U	60	U
105-67-9	2,4-Dimethylphenol	31	U	18	U	18	U	34	U	17	U	17	U	17	U	16	U	35	U	24	U
65-85-0	Benzoic acid	150	U		R		R		R		R		R		R		R		R		R
111-91-1	bis(2-Chloroethoxy)methane	15	U	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	12	U
120-83-2	2,4-Dichlorophenol	46	U	27	U	27	U	52	U	25	U	26	U	25	U	24	U	53	U	36	U
120-82-1	1,2,4-Trichlorobenzene	15	U	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	12	U
91-20-3	Naphthalene	7	E	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	16	E
106-47-8	4-Chloroaniline		R		R		R		R		R		R		R		R		R		R
87-68-3	Hexachlorobutadiene	31	U	18	U	18	U	34	U	17	U	17	U	17	U	16	U	35	U	24	U
59-50-7	4-Chloro-3-methylphenol	31	U	18	U	18	U	34	U	17	U	17	U	17	U	16	U	35	U	24	U
91-57-6	2-Methylnaphthalene	6	E	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	8	E
77-47-4	Hexachlorocyclopentadiene	77	U	45	U	45	U	86	U	42	U	43	U	42	U	39	U	88	U	60	U
88-06-2	2,4,6-Trichlorophenol	77	U	45	U	45	U	86	U	42	U	43	U	42	U	39	U	88	U	60	U
95-95-4	2,4,5-Trichlorophenol	77	U	45	U	45	U	86	U	42	U	43	U	42	U	39	U	88	U	60	U
91-58-7	2-Chloronaphthalene	15	U	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	12	U
88-74-4	2-Nitroaniline	77	U	45	U	45	U	86	U	42	U	43	U	42	U	39	U	88	U	60	U
131-11-3	Dimethylphthalate	15	U	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	12	U
208-96-8	Acenaphthylene	15	U	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	41	
99-09-2	3-Nitroaniline	77	U	45	U	45	U	86	U	42	U	43	U	42	U	39	U	88	U	60	U
83-32-9	Acenaphthene	15	U	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	14	E
51-28-5	2,4-Dinitrophenol	150	U	90	U	90	U	170	U	84	U	86	U	84	U	79	U	180	U	120	U
100-02-7	4-Nitrophenol	77	U	45	U	45	U	86	U	42	U	43	U	42	U	39	U	88	U	60	U
132-64-9	Dibenzofuran	15	U	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	18	
121-14-2	2,4-Dinitrotoluene	77	U	45	U	45	U	86	U	42	U	43	U	42	U	39	U	88	U	60	U
606-20-2	2,6-Dinitrotoluene	77	U	45	U	45	U	86	U	42	U	43	U	42	U	39	U	88	U	60	U
84-66-2	Diethylphthalate	15	U	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	12	U
7005-72-3	4-Chlorophenyl-phenylether	15	U	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	12	U
86-73-7	Fluorene	3	N	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	39	
100-01-6	4-Nitroaniline	77	U	45	U	45	U	86	U	42	U	43	U	42	U	39	U	88	U	60	U
534-52-1	4,6-Dinitro-2-methylphenol	150	U	90	U	90	U	170	U	84	U	86	U	84	U	79	U	180	U	120	U

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CAS No.	Target Parameter	Station 21 Results	Q	Station 22 Results	Q	Station 23 Results	Q	Station 24 Results	Q	Station 25 Results	Q	Station 26 Results	Q	Station 27 Results	Q	Station 28 Results	Q	Station 29 Results	Q	Station 30 Results	Q
86-30-6	N-Nitrosodiphenylamine	15	U	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	12	U
101-55-3	4-Bromophenyl-phenylether	15	U	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	12	U
118-74-1	Hexachlorobenzene	15	U	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	12	U
87-86-5	Pentachlorophenol	77	U	45	U	45	U	86	U	42	U	43	U	42	U	39	U	88	U	60	U
85-01-8	Phenanthrene	44		19		9	U	28		8	U	16		8	E	8	N	28		220	
120-12-7	Anthracene	12	E	27		9	U	17	U	8	U	9	U	8	U	8	U	18	U	270	
84-74-2	Di-n-butylphthalate	15	U	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	12	U
206-44-0	Fluoranthene	66		37		4	E	41		8	U	17		15	E	8	E	41		510	
129-00-0	Pyrene	57		18	E	3	E	41		8	U	13		11	E	8	E	38	E	430	E
85-68-7	Butylbenzylphthalate	15	U	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	12	U
91-94-1	3,3'-Dichlorobenzidine		R		R		R		R		R		R		R		R		R		R
56-55-3	Benzo(a)anthracene	29		30		9	U	18		8	U	8	E	5	E	3	N	17	E	410	
117-81-7	bis(2-Ethylhexyl)phthalate	67		25	U	22	U	38		14	U	41		22	U	22	U	39		58	E
218-01-9	Chrysene	51		52		9	U	30		8	U	12		7	E	4	E	24		730	
117-84-0	Di-n-octylphthalate	15	U	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	12	U
205-99-2	Benzo(b)fluoranthene					9	U			8	U										
207-08-9	Benzo(k)fluoranthene					9	U			8	U										
	Benzo(b+k)fluoranthene	58		36	E	9	U	54		8	U	20		13	E	6	N	38		870	
50-32-8	Benzo(a)pyrene	30		20		9	U	24		8	U	12		6	E	8	U	27	N	380	
193-39-5	Indeno(1,2,3-c,d)pyrene	15	U	9	E	9	U	17	U	8	U	9	U	5	E	8	U	18	U	200	
53-70-3	Dibenz(a,h)anthracene	15	U	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	100	
191-24-2	Benzo(g,h,i)perylene	15	U	7	E	9	U	17	U	8	U	9	U	3	E	8	U	18	U	150	
25155-15-1	Cymene	15	U	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	12	U
86-74-8	9H-Carbazole	15	U	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	53	
58-08-2	Caffeine	15	U	9	U	9	U	17	U	8	U	9	U	8	U	8	U	18	U	12	U
198-55-0	Perylene	56		10		9	U	19		8	U	14		8	U	8	U	29		110	
80-97-7	B-Coprostanol	270		66	N	65	N	140		17	U	140		63	E	70	E	240		230	E
57-88-5	Cholesterol	1360		380	E	330	E	500		25	U	870		270	E	610		1600		1100	
83-46-5	B-Sitosterol	2300		360	E	150	E	480		42	U	580	E	130	E	260		730		620	
483-65-8	Retene	81		9	U	9	U	15	E	8	U	9		8	U	8	U	14	E	35	
514-10-3	Abietic acid	180	E																		
	Chlorodehydroabietic acid	100	N																		
1740-19-8	Dehydroabietic acid	520	E																		
	Dichlorodehydroabietic acid	62	U																		
	4,5-Dichloroguaiacol	62	U																		
5835-26-7	Isopimaric acid	160	E																		
90-05-1	2-Methoxyphenol (Guaiacol)	31	U																		
471-77-2	Neoabietic acid	120	U																		
1945-53-5	Palustric acid	620	U																		
127-27-5	Pimaric acid	31	U																		
	Sandacopimaric acid	31	U																		
	Tetrachloroguaiacol	120	U																		
	3,4,5(4,5,6)-Trichloroguaiacol	120	U																		
	Pristane/Phytane	2.47		5.08		5.63		6.86		3.02		4.24		6.63		8.52		5.39		6.20	
	CPI	3.80		3.56		1.91		2.08		1.90		1.50		1.81		2.29		1.59		2.86	

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N: Presumptive evidence of the presence of the parameter at an estimated quantity.
E: The associated value is an estimated quantity.

Table 1
BNA Organics Analyses Results
(ug/kg, dry weight)

CAS No.	Target Parameter	Station 31 Results	Q	Station 32 Results	Q	Station 33 Results	Q	Station 34 Results	Q	Station 35 Results	Q	Station 36 Results	Q	Station 37 Results	Q	Station 38 Results	Q	Station 39 Results	Q	Station 40 Results	Q
108-95-2	Phenol	11	N	13	E	29		18	U	21	U	13	U	10	U	68	U	12	U	26	U
111-44-4	bis(2-Chloroethyl)ether	11	U	8	U	11	U	18	U	21	U	13	U	10	U	68	U	12	U	26	U
95-57-8	2-Chlorophenol	11	U	8	U	11	U	18	U	21	U	13	U	10	U	68	U	12	U	26	U
541-73-1	1,3-Dichlorobenzene	11	U	8	U	11	U	18	U	21	U	13	U	10	U	68	U	12	U	13	U
106-46-7	1,4-Dichlorobenzene	11	U	8	U	11	U	18	U	21	U	13	U	10	U	68	U	12	U	13	U
100-51-6	Benzyl alcohol	57	U	39	U	56	U	92	U	110	U	63	U	50	U	340	U	60	U	130	U
95-50-1	1,2-Dichlorobenzene	11	U	8	U	11	U	18	U	21	U	13	U	10	U	68	U	12	U	13	U
95-48-7	2-Methylphenol	11	U	8	U	11	U	18	U	21	U	13	U	10	U	68	U	12	U	26	U
108-60-1	bis(2-Chloroisopropyl)ether	11	U	8	U	11	U	18	U	21	U	13	U	10	U	68	U	12	U	26	U
106-44-5	4-Methylphenol	11	U	8	U	11	U	18	U	21	U	13	U	10	U	68	U	12	U	26	U
621-64-7	N-Nitroso-di-n-propylamine	11	U	8	U	11	U	18	U	21	U	13	U	10	U	68	U	12	U	26	U
67-72-1	Hexachloroethane	23	U	15	U	22	U	37	U	42	U	25	U	20	U	140	U	24	U	26	U
98-95-3	Nitrobenzene	11	U	8	U	11	U	18	U	21	U	13	U	10	U	68	U	12	U	26	U
78-59-1	Isophorone	11	U	8	U	11	U	18	U	21	U	13	U	10	U	68	U	12	U	26	U
88-75-5	2-Nitrophenol	57	U	39	U	56	U	92	U	110	U	63	U	50	U	340	U	60	U	130	U
105-67-9	2,4-Dimethylphenol	23	U	15	U	22	U	37	U	42	U	25	U	20	U	140	U	24	U	51	U
65-85-0	Benzoic acid	110	U		R	110	U		R		R	130	U	100	U		R		R		R
111-91-1	bis(2-Chloroethoxy)methane	11	U	8	U	11	U	18	U	21	U	13	U	10	U	68	U	12	U	26	U
120-83-2	2,4-Dichlorophenol	34	U	23	U	33	U	55	U	63	U	38	U	30	U	200	U	36	U	77	U
120-82-1	1,2,4-Trichlorobenzene	11	U	8	U	11	U	18	U	21	U	13	U	10	U	68	U	12	U	13	U
91-20-3	Naphthalene	11	U	8	U	19		6	E	7	E	13	N	10	U	68	U	12	U	54	
106-47-8	4-Chloroaniline		R		R		R		R		R		R		R	200	U	36	U	77	U
87-68-3	Hexachlorobutadiene	23	U	15	U	22	U	37	U	42	U	25	U	20	U	140	U	24	U	26	U
59-50-7	4-Chloro-3-methylphenol	23	U	15	U	22	U	37	U	42	U	25	U	20	U	140	U	24	U	51	U
91-57-6	2-Methylnaphthalene	11	U	8	U	10	E	4	E	18	E	13	U	10	U	68	U	12	U	45	
77-47-4	Hexachlorocyclopentadiene	57	U	39	U	56	U	92	U	110	U	63	U	50	U	340	U	60	U	64	U
88-06-2	2,4,6-Trichlorophenol	57	U	39	U	56	U	92	U	110	U	63	U	50	U	340	U	60	U	130	U
95-95-4	2,4,5-Trichlorophenol	57	U	39	U	56	U	92	U	110	U	63	U	50	U	340	U	60	U	130	U
91-58-7	2-Chloronaphthalene	11	U	8	U	11	U	18	U	21	U	13	U	10	U	68	U	12	U	13	U
88-74-4	2-Nitroaniline	57	U	39	U	56	U	92	U	110	U	63	U	50	U	340	U	60	U	130	U
131-11-3	Dimethylphthalate	11	U	8	U	11	U	18	U	21	U	13	U	10	U	68	U	12	U	26	U
208-96-8	Acenaphthylene	11	U	8	U	13		11	E	56		13	U	10	U	68	U	12	U	330	
99-09-2	3-Nitroaniline	57	U	39	U	56	U	92	U	110	U	63	U	50	U	340	U	60	U	130	U
83-32-9	Acenaphthene	11	U	8	U	17	E	4	E	21	U	8	E	10	U	68	U	12	U	55	E
51-28-5	2,4-Dinitrophenol	110	U	77	U	110	U	180	U	210	U	130	U	100	U	680	U	120	U	260	U
100-02-7	4-Nitrophenol	57	U	39	U	56	U	92	U	110	U	63	U	50	U	340	U	60	U	130	U
132-64-9	Dibenzofuran	11	U	8	U	10	E	18	U	21	U	12	E	10	U	68	U	12	U	32	
121-14-2	2,4-Dinitrotoluene	57	U	39	U	56	U	92	U	110	U	63	U	50	U	340	U	60	U	130	U
606-20-2	2,6-Dinitrotoluene	57	U	39	U	56	U	92	U	110	U	63	U	50	U	340	U	60	U	130	U
84-66-2	Diethylphthalate	11	U	8	U	11	U	18	U	21	U	13	U	10	U	68	U	12	U	26	U
7005-72-3	4-Chlorophenyl-phenylether	11	U	8	U	11	U	18	U	21	U	13	U	10	U	68	U	12	U	13	U
86-73-7	Fluorene	11	U	8	U	28		4	E	15	E	13	U	10	U	68	U	12	U	250	
100-01-6	4-Nitroaniline	57	U	39	U	56	U	92	U	110	U	63	U	50	U	340	U	60	U	130	U
534-52-1	4,6-Dinitro-2-methylphenol	110	U	77	U	110	U	180	U	210	U	130	U	100	U	680	U	120	U	260	U

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E: The associated value is an estimated quantity.

Table 1
BNA Organics Analyses Results
(ug/kg, dry weight)

CAS No.	Target Parameter	Station 31 Results	Q	Station 32 Results	Q	Station 33 Results	Q	Station 34 Results	Q	Station 35 Results	Q	Station 36 Results	Q	Station 37 Results	Q	Station 38 Results	Q	Station 39 Results	Q	Station 40 Results	Q
86-30-6	N-Nitrosodiphenylamine	11	U	8	U	11	U	18	U	21	U	13	U	10	U	68	U	12	U	26	U
101-55-3	4-Bromophenyl-phenylether	11	U	8	U	11	U	18	U	21	U	13	U	10	U	68	U	12	U	13	U
118-74-1	Hexachlorobenzene	11	U	8	U	11	U	18	U	21	U	13	U	10	U	68	U	12	U	13	U
87-86-5	Pentachlorophenol	57	U	39	U	56	U	92	U	110	U	63	U	50	U	340	U	60	U	130	U
85-01-8	Phenanthrene	21		16		220		79		120		16	E	6	E	55	E	12	U	1500	
120-12-7	Anthracene	5	N	6	E	90		27	E	140		2	E	10	U	17	N	12	U	1100	
84-74-2	Di-n-butylphthalate	11	U	8	U	11	E	30		16	E	13	U	10	U	68	U	12	U	26	U
206-44-0	Fluoranthene	32		28		300		200		460		22	E	11		130		12	U	1700	
129-00-0	Pyrene	33	E	27	E	310	E	190	E	550	E	20	E	10	E	110		12	U	1900	
85-68-7	Butylbenzylphthalate	11	U	8	U	11	U	31	E	18	E	13	U	10	U	68	U	12	U	39	
91-94-1	3,3'-Dichlorobenzidine		R		R		R		R		R		R		R	340	U	60	U	130	U
56-55-3	Benzo(a)anthracene	15		14		160		89		310		14	E	5	E	61	E	12	U	1300	
117-81-7	bis(2-Ethylhexyl)phthalate	26	U	27	U	50	E	160	E	120	E	59	E	12	U	95		24	U	470	
218-01-9	Chrysene	20		25		260		130		410		22	E	7	E	79		12	U	1500	
117-84-0	Di-n-octylphthalate	11	U	8	U	11	U	18	U	21	U	13	U	10	U	68	U	12	U	26	U
205-99-2	Benzo(b)fluoranthene																	12	U		
207-08-9	Benzo(k)fluoranthene																	12	U		
	Benzo(b+k)fluoranthene	27		37		390		220		480		38	E	9	E	140		12	U	1900	
50-32-8	Benzo(a)pyrene	20		20		220		120		390		16	E	10	U	79		12	U	1400	
193-39-5	Indeno(1,2,3-c,d)pyrene	14		19		140		94		250		14	E	10	U	71		12	U	830	
53-70-3	Dibenz(a,h)anthracene	11	U	8	U	51		35	N	58	N	4	N	10	U	68	U	12	U	340	
191-24-2	Benzo(g,h,i)perylene	12		15		120		68		210		8	N	10	U	80		12	U	670	
25155-15-1	Cymene	11	U	8	U	11	U	18	U	20	U	13	U	10	U	70	U	12	U	30	U
86-74-8	9H-Carbazole	11	U	8	U	11	U	18	U	21	U	13	U	10	U	68	U	12	U	110	
58-08-2	Caffeine	11	U	8	U	11	U	18	U	21	U	13	U	10	U	68	U	12	U	13	U
198-55-0	Perylene	12		12		72		46		110		21	E	5	N	76		12	U	360	
80-97-7	B-Coprostanol	160	E	83	E	140	E	570	E	240	E	230	E	71	E	640	E	110	E	1000	E
57-88-5	Cholesterol	670		490		490		2400		1500		480	E	570		1000	E	250	E	1300	
83-46-5	B-Sitosterol	220		260		470		770		1100		650	E	290		1500	E	170	E	2300	
483-65-8	Retene	11	U	6		22		44	E	58		13	U	10	E	80		12	U	95	
514-10-3	Abietic acid																				
	Chlorodehydroabietic acid																				
1740-19-8	Dehydroabietic acid																				
	Dichlorodehydroabietic acid																				
	4,5-Dichloroguaiacol																				
5835-26-7	Isopimaric acid																				
90-05-1	2-Methoxyphenol (Guaiacol)																				
471-77-2	Neoabietic acid																				
1945-53-5	Palustric acid																				
127-27-5	Pimaric acid																				
	Sandacopimaric acid																				
	Tetrachloroguaiacol																				
	3,4,5(4,5,6)-Trichloroguaiacol																				
	Pristane/Phytane	4.05		4.28		4.23		3.60		7.50		7.53		9.38		8.83		3.72		3.09	
	CPI	2.28		1.52		2.56		2.14		2.75		2.18		2.59		2.76		1.96		1.84	

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Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 23, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 1
BNA Organics Analyses Results
(ug/kg, dry weight)

CAS No.	Target Parameter	Station 41 Results	Q	Station 42 Results	Q	Station 43 Results	Q	Station 44 Results	Q	Station 45 Results	Q	Station 46 Results	Q	Station 47 Results	Q	Station 48 Results	Q	Station 49 Results	Q	Station 50 Results	Q
108-95-2	Phenol	240		11	U	12	U	26		17	U	13	U	40		31	U	27	U	13	U
111-44-4	bis(2-Chloroethyl)ether	15	U	11	U	12	U	14	U	17	U	13	U	14	U	31	U	27	U	13	U
95-57-8	2-Chlorophenol	15	U	11	U	12	U	14	U	17	U	13	U	14	U	31	U	27	U	13	U
541-73-1	1,3-Dichlorobenzene	15	U	11	U	12	U	14	U	17	U	13	U	14	U	31	U	27	U	13	U
106-46-7	1,4-Dichlorobenzene	15	U	11	U	12	U	14	U	17	U	13	U	14	U	31	U	27	U	13	U
100-51-6	Benzyl alcohol	74	U	54	U	62	U	68	U	86	U	65	U	68	U	150	U	130	U	64	U
95-50-1	1,2-Dichlorobenzene	15	U	11	U	12	U	4	N	17	U	13	U	14	U	31	U	27	U	13	U
95-48-7	2-Methylphenol	15	U	11	U	12	U	14	U	17	U	13	U	14	U	31	U	27	U	13	U
108-60-1	bis(2-Chloroisopropyl)ether	15	U	11	U	12	U	14	U	17	U	13	U	14	U	31	U	27	U	13	U
106-44-5	4-Methylphenol	15	U	11	U	12	U	14	U	17	U	13	U	14	U	31	U	27	U	13	U
621-64-7	N-Nitroso-di-n-propylamine	15	U	11	U	12	U	14	U	17	U	13	U	14	U	31	U	27	U	13	U
67-72-1	Hexachloroethane	30	U	22	U	25	U	27	U	34	U	26	U	27	U	61	U	53	U	26	U
98-95-3	Nitrobenzene	15	U	11	U	12	U	14	U	17	U	13	U	14	U	31	U	27	U	13	U
78-59-1	Isophorone	15	U	11	U	12	U	14	U	17	U	13	U	14	U	31	U	27	U	13	U
88-75-5	2-Nitrophenol	74	U	54	U	62	U	68	U	86	U	65	U	68	U	150	U	130	U	64	U
105-67-9	2,4-Dimethylphenol	30	U	22	U	25	U	27	U	34	U	26	U	27	U	61	U	53	U	26	U
65-85-0	Benzoic acid	150	U	110	U	120	U	140	U	170	U	130	U	140	U	310	U	270	U	130	U
111-91-1	bis(2-Chloroethoxy)methane	15	U	11	U	12	U	14	U	17	U	13	U	14	U	31	U	27	U	13	U
120-83-2	2,4-Dichlorophenol	45	U	32	U	37	U	41	U	52	U	39	U	41	U	92	U	80	U	38	U
120-82-1	1,2,4-Trichlorobenzene	15	U	11	U	12	U	14	U	17	U	13	U	14	U	31	U	27	U	13	U
91-20-3	Naphthalene	8	E	11	U	12	U	7	E	17	U	13	U	14	U	31	U	27	U	13	U
106-47-8	4-Chloroaniline		R		R		R		R		R		R		R		R		R		R
87-68-3	Hexachlorobutadiene	30	U	22	U	25	U	3	N	34	U	26	U	27	U	61	U	53	U	26	U
59-50-7	4-Chloro-3-methylphenol	30	U	22	U	25	U	27	U	34	U	26	U	27	U	61	U	53	U	26	U
91-57-6	2-Methylnaphthalene	6	E	11	U	12	U	5	E	17	U	13	U	14	U	31	U	27	U	13	U
77-47-4	Hexachlorocyclopentadiene	74	U	54	U	62	U	68	U	86	U	65	U	68	U	150	U	130	U	64	U
88-06-2	2,4,6-Trichlorophenol	74	U	54	U	62	U	68	U	86	U	65	U	68	U	150	U	130	U	64	U
95-95-4	2,4,5-Trichlorophenol	74	U	54	U	62	U	68	U	86	U	65	U	68	U	150	U	130	U	64	U
91-58-7	2-Chloronaphthalene	15	U	11	U	12	U	4	E	17	U	13	U	14	U	31	U	27	U	13	U
88-74-4	2-Nitroaniline	74	U	54	U	62	U	68	U	86	U	65	U	68	U	150	U	130	U	64	U
131-11-3	Dimethylphthalate	15	U	11	U	12	U	14	U	17	U	13	U	14	U	31	U	27	U	13	U
208-96-8	Acenaphthylene	15	U	11	U	12	U	5	E	17	U	13	U	14	U	31	U	27	U	13	U
99-09-2	3-Nitroaniline	74	U	54	U	62	U	68	U	86	U	65	U	68	U	150	U	130	U	64	U
83-32-9	Acenaphthene	15	U	11	U	12	U	6	E	17	U	13	U	14	U	31	U	27	U	13	U
51-28-5	2,4-Dinitrophenol	150	U	110	U	120	U	140	U	170	U	130	U	140	U	310	U	270	U	130	U
100-02-7	4-Nitrophenol	74	U	54	U	62	U	68	U	86	U	65	U	68	U	150	U	130	U	64	U
132-64-9	Dibenzofuran	15	U	11	U	12	U	5	E	17	U	13	U	14	U	31	U	27	U	13	U
121-14-2	2,4-Dinitrotoluene	74	U	54	U	62	U	68	U	86	U	65	U	68	U	150	U	130	U	64	U
606-20-2	2,6-Dinitrotoluene	74	U	54	U	62	U	68	U	86	U	65	U	68	U	150	U	130	U	64	U
84-66-2	Diethylphthalate	15	U	11	U	12	U	14	U	17	U	13	U	14	U	31	U	27	U	13	U
7005-72-3	4-Chlorophenyl-phenylether	15	U	11	U	12	U	5	E	17	U	13	U	14	U	31	U	27	U	13	U
86-73-7	Fluorene	15	U	11	U	12	U	5	E	17	U	13	U	14	U	31	U	27	U	13	U
100-01-6	4-Nitroaniline	74	U	54	U	62	U	68	U	86	U	65	U	68	U	150	U	130	U	64	U
534-52-1	4,6-Dinitro-2-methylphenol	150	U	110	U	120	U	140	U	170	U	130	U	140	U	310	U	270	U	130	U

Data Qualifiers:

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U: The parameter was analyzed for but not reported above the associated value, which is the sample quantitation limit.
N: Presumptive evidence of the presence of the parameter at an estimated quantity.
E: The associated value is an estimated quantity.

Table 1
BNA Organics Analyses Results
(ug/kg, dry weight)

Date: August 23, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

CAS No.	Target Parameter	Station 41 Results	Q	Station 42 Results	Q	Station 43 Results	Q	Station 44 Results	Q	Station 45 Results	Q	Station 46 Results	Q	Station 47 Results	Q	Station 48 Results	Q	Station 49 Results	Q	Station 50 Results	Q
86-30-6	N-Nitrosodiphenylamine	15	U	11	U	12	U	14	U	17	U	13	U	14	U	31	U	27	U	13	U
101-55-3	4-Bromophenyl-phenylether	15	U	11	U	12	U	4	N	17	U	13	U	14	U	31	U	27	U	13	U
118-74-1	Hexachlorobenzene	15	U	11	U	12	U	5	E	17	U	13	U	14	U	31	U	27	U	13	U
87-86-5	Pentachlorophenol	74	U	54	U	62	U	68	U	86	U	65	U	68	U	150	U	130	U	64	U
85-01-8	Phenanthrene	46		11	U	12	U	15	E	11	E	13	U	14	U	30	E	59	E	13	U
120-12-7	Anthracene	14	E	11	U	12	U	7	E	3	N	13	U	14	U	6	N	19	N	13	U
84-74-2	Di-n-butylphthalate	15	U	11	U	12	U	14	U	17	U	13	U	14	U	31	U	27	U	13	U
206-44-0	Fluoranthene	93		7	E	12	U	23		22		9	E	6	E	56		74	E	13	U
129-00-0	Pyrene	73		4	E	12	U	20	E	23		5	E	6	E	60		75	E	13	U
85-68-7	Butylbenzylphthalate	15	U	11	U	12	U	14	U	17	U	13	U	14	U	31	U	27	U	13	U
91-94-1	3,3'-Dichlorobenzidine		R		R		R		R		R		R		R		R		R		R
56-55-3	Benzo(a)anthracene	28		11	U	12	U	7	N	9	N	5	N	15	U	24	E	39	E	13	U
117-81-7	bis(2-Ethylhexyl)phthalate	150		16	U	12	U	170		47		14	U	15	U	89		75	E	26	U
218-01-9	Chrysene	49		11	U	12	U	12	E	16	N	7	E	14	U	35		61	E	13	U
117-84-0	Di-n-octylphthalate	15	U	11	U	12	U	14	U	17	U	13	U	14	U	31	U	27	U	13	U
205-99-2	Benzo(b)fluoranthene			11	U	12	U													13	U
207-08-9	Benzo(k)fluoranthene			11	U	12	U													13	U
	Benzo(b+k)fluoranthene	68	E	11	U	12	U	17	E	22	E	11	E	6	E	61	E	100	E	13	U
50-32-8	Benzo(a)pyrene	29		11	U	12	U	9	E	11	E	13	U	14	U	28	E	34	E	13	U
193-39-5	Indeno(1,2,3-c,d)pyrene	21		11	U	12	U	6	E	8	E	13	U	14	U	21	E	50	E	13	U
53-70-3	Dibenz(a,h)anthracene	15	U	11	U	12	U	14	U	17	U	13	U	14	U	31	U	27	U	13	U
191-24-2	Benzo(g,h,i)perylene	22		11	U	12	U	6	E	7	E	13	U	14	U	23	N	55	E	13	U
25155-15-1	Cymene	15	U	11	U	12	U	14	U	17	U	13	U	14	U	31	U	27	U	13	U
86-74-8	9H-Carbazole	15	U	11	U	12	U	14	U	17	U	13	U	14	U	31	U	27	U	13	U
58-08-2	Caffeine	15	U	11	U	12	U	14	U	17	U	13	U	14	U	31	U	27	U	13	U
198-55-0	Perylene	23		11	U	12	U	8	N	13	E	6	E	4	E	37		70	E	13	U
80-97-7	B-Coprostanol	4700		120		25	U	100		140		72		27	U	560		480	E	28	E
57-88-5	Cholesterol	12000		480		450	E	1100		640		860		470		3400		2600	E	560	E
83-46-5	B-Sitosterol	4300		280		120	E	550		690		540		230		3800		3500	E	550	E
483-65-8	Retene	110		7	E	5	E	19	E	39		20	E	11	E	81		76	E	5	E
514-10-3	Abietic acid																				
	Chlorodehydroabietic acid																				
1740-19-8	Dehydroabietic acid																				
	Dichlorodehydroabietic acid																				
	4,5-Dichloroguaiacol																				
5835-26-7	Isopimaric acid																				
90-05-1	2-Methoxyphenol (Guaiacol)																				
471-77-2	Neoabietic acid																				
1945-53-5	Palustric acid																				
127-27-5	Pimaric acid																				
	Sandacopimaric acid																				
	Tetrachloroguaiacol																				
	3,4,5(4,5,6)-Trichloroguaiacol																				
	Pristane/Phytane	2.88		4.96		4.74		11.73		12.80		16.77		20.94		15.67		1.37		2.58	
	CPI	3.18		1.57		2.31		3.11		2.65		2.60		2.68		3.48		3.03		1.42	

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Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 23, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 1
BNA Organics Analyses Results
(ug/kg, dry weight)

CAS No.	Target Parameter	Station 51 Results	Q	Station 52 Results	Q	Station 53 Results	Q	Station 54 Results	Q	Station 55 Results	Q	Station 56 Results	Q	Station 57 Results	Q	Station 58 Results	Q	Station 59 Results	Q	Station 60 Results	Q
86-30-6	N-Nitrosodiphenylamine	27	U	25	U	24	U	11	U	9	U	10	U	9	U	8	U	9	U	35	U
101-55-3	4-Bromophenyl-phenylether	27	U	25	U	24	U	11	U	9	U	10	U	9	U	8	U	9	U	35	U
118-74-1	Hexachlorobenzene	27	U	25	U	24	U	11	U	9	U	10	U	9	U	8	U	9	U	35	U
87-86-5	Pentachlorophenol	130	U	120	U	120	U	55	U	47	U	51	U	10	E	41	U	44	U	170	U
85-01-8	Phenanthrene	42		69		58	N	23		7	E	52		13	E	26		25		98	
120-12-7	Anthracene	27	U	25	U	8	N	3	E	9	U	240		4	E	14	E	11		28	E
84-74-2	Di-n-butylphthalate	27	U	25	U	24	U	11	U	9	U	10	U	9	U	8	U	9	U	35	U
206-44-0	Fluoranthene	40		57		52		21		6	E	37		24	E	49		44		160	
129-00-0	Pyrene	31	E	41		30		19		5	E	28		25	E	47	E	39	E	150	
85-68-7	Butylbenzylphthalate	27	U	25	U	24	U	11	U	9	U	10	U	9	U	8	U	9	U	35	U
91-94-1	3,3'-Dichlorobenzidine		R		R		R		R		R		R		R		R		R		R
56-55-3	Benzo(a)anthracene	17	E	21	E	20	E	8	E	5	E	12		12	E	28		23		64	
117-81-7	bis(2-Ethylhexyl)phthalate	34		32	U	37		26	U	13	U	21	U	41	E	29	U	46	E	190	
218-01-9	Chrysene	28		39		33		10	E	8	E	20		21	E	48		35		93	
117-84-0	Di-n-octylphthalate	27	U	25	U	24	U	11	U	9	U	10	U	9	U	8	U	9	U	35	U
205-99-2	Benzo(b)fluoranthene									9	U										
207-08-9	Benzo(k)fluoranthene									9	U										
	Benzo(b+k)fluoranthene	41	N	50		43	E	17		9	U	26		35	E	62	E	59	E	180	E
50-32-8	Benzo(a)pyrene	21	E	23	E	15	E	6	E	9	U	15		16	E	35		27		110	
193-39-5	Indeno(1,2,3-c,d)pyrene	27	U	25	U	24	U	5	E	9	U	10	U	12	E	31		15		88	
53-70-3	Dibenz(a,h)anthracene	27	U	25	U	24	U	11	U	9	U	10	U	7	E	9		9	N	35	U
191-24-2	Benzo(g,h,i)perylene	27	U	25	U	24	U	4	E	9	U	10	U	11	E	27		14		110	E
25155-15-1	Cymene	27	U	25	U	24	U	11	U	9	U	10	U	9	U	8	U	9	U	35	U
86-74-8	9H-Carbazole	27	U	25	U	24	U	11	U	9	U	110		9	U	8	U	9	U	35	U
58-08-2	Caffeine	27	U	25	U	24	U	11	U	9	U	10	U	9	U	8	U	9	U	35	U
198-55-0	Perylene	43		45		36		11		8	N	17		11	E	21		14		120	
80-97-7	B-Coprostanol	120		240		170		110		19	U	79		35	E	120	E	88	E	610	E
57-88-5	Cholesterol	1400		2200		1800		860		680	E	610		300	E	870	E	590	E	1500	
83-46-5	B-Sitosterol	1600		2500		2100		370		47	E	300		100	E	340	E	200	E	1700	
483-65-8	Retene	17	E	25		22	E	6	N	9	U	9	E	6	E	6	E	11	E	120	
514-10-3	Abietic acid																				
	Chlorodehydroabietic acid																				
1740-19-8	Dehydroabietic acid																				
	Dichlorodehydroabietic acid																				
	4,5-Dichloroguaiacol																				
5835-26-7	Isopimaric acid																				
90-05-1	2-Methoxyphenol (Guaiacol)																				
471-77-2	Neoabietic acid																				
1945-53-5	Palustric acid																				
127-27-5	Pimaric acid																				
	Sandacopimaric acid																				
	Tetrachloroguaiacol																				
	3,4,5(4,5,6)-Trichloroguaiacol																				
	Pristane/Phytane	9.13		8.66		7.21		5.36		6.09		6.12		4.26		4.79		4.99		7.25	
	CPI	1.41		2.01		1.52		2.20		1.57		1.64		1.37		1.86		2.23		1.66	

Data Qualifiers:

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U: The parameter was analyzed for but not reported above the associated value, which is the sample quantitation limit.
N: Presumptive evidence of the presence of the parameter at an estimated quantity.
E: The associated value is an estimated quantity.

Table 1
BNA Organics Analyses Results
(ug/kg, dry weight)

Date: August 23, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

CAS No.	Target Parameter	Station 51 Results	Q	Station 52 Results	Q	Station 53 Results	Q	Station 54 Results	Q	Station 55 Results	Q	Station 56 Results	Q	Station 57 Results	Q	Station 58 Results	Q	Station 59 Results	Q	Station 60 Results	Q
86-30-6	N-Nitrosodiphenylamine	27	U	25	U	24	U	11	U	9	U	10	U	9	U	8	U	9	U	35	U
101-55-3	4-Bromophenyl-phenylether	27	U	25	U	24	U	11	U	9	U	10	U	9	U	8	U	9	U	35	U
118-74-1	Hexachlorobenzene	27	U	25	U	24	U	11	U	9	U	10	U	9	U	8	U	9	U	35	U
87-86-5	Pentachlorophenol	130	U	120	U	120	U	55	U	47	U	51	U	10	E	41	U	44	U	170	U
85-01-8	Phenanthrene	42		69		58	N	23		7	E	52		13	E	26		25		98	
120-12-7	Anthracene	27	U	25	U	8	N	3	E	9	U	240		4	E	14	E	11		28	E
84-74-2	Di-n-butylphthalate	27	U	25	U	24	U	11	U	9	U	10	U	9	U	8	U	9	U	35	U
206-44-0	Fluoranthene	40		57		52		21		6	E	37		24	E	49		44		160	
129-00-0	Pyrene	31	E	41		30		19		5	E	28		25	E	47	E	39	E	150	
85-68-7	Butylbenzylphthalate	27	U	25	U	24	U	11	U	9	U	10	U	9	U	8	U	9	U	35	U
91-94-1	3,3'-Dichlorobenzidine		R		R		R		R		R		R		R		R		R		R
56-55-3	Benzo(a)anthracene	17	E	21	E	20	E	8	E	5	E	12		12	E	28		23		64	
117-81-7	bis(2-Ethylhexyl)phthalate	34		32	U	37		26	U	13	U	21	U	41	E	29	U	46	E	190	
218-01-9	Chrysene	28		39		33		10	E	8	E	20		21	E	48		35		93	
117-84-0	Di-n-octylphthalate	27	U	25	U	24	U	11	U	9	U	10	U	9	U	8	U	9	U	35	U
205-99-2	Benzo(b)fluoranthene									9	U										
207-08-9	Benzo(k)fluoranthene									9	U										
	Benzo(b+k)fluoranthene	41	N	50		43	E	17		9	U	26		35	E	62	E	59	E	180	E
50-32-8	Benzo(a)pyrene	21	E	23	E	15	E	6	E	9	U	15		16	E	35		27		110	
193-39-5	Indeno(1,2,3-c,d)pyrene	27	U	25	U	24	U	5	E	9	U	10	U	12	E	31		15		88	
53-70-3	Dibenz(a,h)anthracene	27	U	25	U	24	U	11	U	9	U	10	U	7	E	9		9	N	35	U
191-24-2	Benzo(g,h,i)perylene	27	U	25	U	24	U	4	E	9	U	10	U	11	E	27		14		110	E
25155-15-1	Cymene	27	U	25	U	24	U	11	U	9	U	10	U	9	U	8	U	9	U	35	U
86-74-8	9H-Carbazole	27	U	25	U	24	U	11	U	9	U	110		9	U	8	U	9	U	35	U
58-08-2	Caffeine	27	U	25	U	24	U	11	U	9	U	10	U	9	U	8	U	9	U	35	U
198-55-0	Perylene	43		45		36		11		8	N	17		11	E	21		14		120	
80-97-7	B-Coprostanol	120		240		170		110		19	U	79		35	E	120	E	88	E	610	E
57-88-5	Cholesterol	1400		2200		1800		860		680	E	610		300	E	870	E	590	E	1500	
83-46-5	B-Sitosterol	1600		2500		2100		370		47	E	300		100	E	340	E	200	E	1700	
483-65-8	Retene	17	E	25		22	E	6	N	9	U	9	E	6	E	6	E	11	E	120	
514-10-3	Abietic acid																				
	Chlorodehydroabietic acid																				
1740-19-8	Dehydroabietic acid																				
	Dichlorodehydroabietic acid																				
	4,5-Dichloroguaiacol																				
5835-26-7	Isopimaric acid																				
90-05-1	2-Methoxyphenol (Guaiacol)																				
471-77-2	Neoabietic acid																				
1945-53-5	Palustric acid																				
127-27-5	Pimaric acid																				
	Sandacopimaric acid																				
	Tetrachloroguaiacol																				
	3,4,5(4,5,6)-Trichloroguaiacol																				
	Pristane/Phytane	9.13		8.66		7.21		5.36		6.09		6.12		4.26		4.79		4.99		7.25	
	CPI	1.41		2.01		1.52		2.20		1.57		1.64		1.37		1.86		2.23		1.66	

Data Qualifiers:
- R: The data are unusable. The parameter may or may not be present.
- U: The parameter was analyzed for but not reported above the associated value, which is the sample quantitation limit.
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Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 23, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 1
BNA Organics Analyses Results
(ug/kg, dry weight)

CAS No.	Target Parameter	Station 61 Results	Q	Station 62 Results	Q	Station 63 Results	Q	Station 64 Results	Q	Station 65 Results	Q	Station 66 Results	Q	Station 67 Results	Q	Station 68 Results	Q
108-95-2	Phenol	28	U	29	U	21		22		15	U	94		110		130	
111-44-4	bis(2-Chloroethyl)ether	28	U	29	U	14	U	13	U	15	U	14	U	15	U	14	U
95-57-8	2-Chlorophenol	28	U	29	U	14	U	13	U	15	U	14	U	15	U	14	U
541-73-1	1,3-Dichlorobenzene	28	U	29	U	14	U	13	U	15	U	11	E	13	E	13	E
106-46-7	1,4-Dichlorobenzene	28	U	29	U	14	U	13	U	15	U	5	N	5	N	5	N
100-51-6	Benzyl alcohol	140	U	140	U	70	U	66	U	73	U	72	U	73	U	72	U
95-50-1	1,2-Dichlorobenzene	28	U	29	U	14	U	13	U	15	U	8	N	9	N	9	N
95-48-7	2-Methylphenol	28	U	29	U	14	U	13	U	15	U	14	U	15	U	14	U
108-60-1	bis(2-Chloroisopropyl)ether	28	U	29	U	14	U	13	U	15	U	14	U	15	U	14	U
106-44-5	4-Methylphenol	28	U	29	U	14	U	13	U	15	U	260		290		310	
621-64-7	N-Nitroso-di-n-propylamine	28	U	29	U	14	U	13	U	15	U	14	U	15	U	14	U
67-72-1	Hexachloroethane	55	U	58	U	28	U	26	U	29	U	29	U	29	U	29	U
98-95-3	Nitrobenzene	28	U	29	U	14	U	13	U	15	U	14	U	15	U	14	U
78-59-1	Isophorone	28	U	29	U	14	U	13	U	15	U	54		64		65	
88-75-5	2-Nitrophenol	140	U	140	U	70	U	66	U	73	U	72	U	73	U	72	U
105-67-9	2,4-Dimethylphenol	55	U	58	U	28	U	26	U	29	U	29	U	29	U	29	U
65-85-0	Benzoic acid	270	U	290	U	140	U	130	U	150	U	150	U	150	U	150	U
111-91-1	bis(2-Chloroethoxy)methane	28	U	29	U	14	U	13	U	15	U	14	U	15	U	14	U
120-83-2	2,4-Dichlorophenol	82	U	87	U	42	U	39	U	44	U	43	U	44	U	43	U
120-82-1	1,2,4-Trichlorobenzene	28	U	29	U	14	U	13	U	15	U	14	U	15	U	14	U
91-20-3	Naphthalene	28	U	10	N	14	U	13	U	15	U	46		55		57	
106-47-8	4-Chloroaniline		R		R		R		R		R		R		R		R
87-68-3	Hexachlorobutadiene	55	U	58	U	28	U	26	U	29	U	29	U	29	U	29	U
59-50-7	4-Chloro-3-methylphenol	55	U	58	U	28	U	26	U	29	U	29	U	29	U	29	U
91-57-6	2-Methylnaphthalene	28	U	29	U	20	U	13	U	15	U	40		45		69	
77-47-4	Hexachlorocyclopentadiene	140	U	140	U	70	U	66	U	73	U	72	U	73	U	72	U
88-06-2	2,4,6-Trichlorophenol	140	U	140	U	70	U	66	U	73	U	72	U	73	U	72	U
95-95-4	2,4,5-Trichlorophenol	140	U	140	U	70	U	66	U	73	U	72	U	73	U	72	U
91-58-7	2-Chloronaphthalene	28	U	29	U	14	U	13	U	15	U	14	U	15	U	14	U
88-74-4	2-Nitroaniline	140	U	140	U	70	U	66	U	73	U	72	U	73	U	72	U
131-11-3	Dimethylphthalate	28	U	29	U	14	U	13	U	15	U	14	U	15	U	14	U
208-96-8	Acenaphthylene	28	U	9	N	14	U	13	U	15	U	46		46		58	
99-09-2	3-Nitroaniline	140	U	140	U	70	U	66	U	73	U	72	U	73	U	72	U
83-32-9	Acenaphthene	28	U	29	U	14	U	13	U	15	U	78		79		100	
51-28-5	2,4-Dinitrophenol	270	U	290	U	140	U	130	U	150	U	150	U	150	U	150	U
100-02-7	4-Nitrophenol	140	U	140	U	70	U	66	U	73	U	72	U	73	U	72	U
132-64-9	Dibenzofuran	28	U	8	N	14	U	13	U	15	U	14	U	15	U	14	U
121-14-2	2,4-Dinitrotoluene	140	U	140	U	70	U	66	U	73	U	72	U	73	U	72	U
606-20-2	2,6-Dinitrotoluene	140	U	140	U	70	U	66	U	73	U	72	U	73	U	72	U
84-66-2	Diethylphthalate	28	U	29	U	14	U	13	U	15	U	14	U	15	U	14	U
7005-72-3	4-Chlorophenyl-phenylether	28	U	29	U	14	U	13	U	15	U	86		84		98	
86-73-7	Fluorene	10	E	10	E	14	U	13	U	15	U	85		82		100	
100-01-6	4-Nitroaniline	140	U	140	U	70	U	66	U	73	U	72	U	73	U	72	U
534-52-1	4,6-Dinitro-2-methylphenol	270	U	290	U	140	U	130	U	150	U	150	U	150	U	150	U

Data Qualifiers:

R: The data are unusable. The parameter may or may not be present.
U: The parameter was analyzed for but not reported above the associated value, which is the sample quantitation limit.
N: Presumptive evidence of the presence of the parameter at an estimated quantity.
E: The associated value is an estimated quantity.

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 23, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 1
BNA Organics Analyses Results
(ug/kg, dry weight)

CAS No.	Target Parameter	Station 61 Results	Q	Station 62 Results	Q	Station 63 Results	Q	Station 64 Results	Q	Station 65 Results	Q	Station 66 Results	Q	Station 67 Results	Q	Station 68 Results	Q
86-30-6	N-Nitrosodiphenylamine	28	U	29	U	14	U	13	U	15	U	14	U	15	U	14	U
101-55-3	4-Bromophenyl-phenylether	28	U	29	U	14	U	13	U	15	U	190		200		210	
118-74-1	Hexachlorobenzene	28	U	29	U	14	U	13	U	15	U	14	U	15	U	14	U
87-86-5	Pentachlorophenol	140	U	140	U	70	U	66	U	73	U	270		270		180	
85-01-8	Phenanthrene	91	E	73		6	E	7	N	14	J	140		140		140	
120-12-7	Anthracene	15	N	23	N	14	U	13	U	15	U	120		110		160	
84-74-2	Di-n-butylphthalate	28	U	29	U	14	U	13	U	15	U	14	U	15	U	14	U
206-44-0	Fluoranthene	150	E	140		12	E	14		21		130		120		150	
129-00-0	Pyrene	150	E	140		11	E	11	E	18		93		85		120	
85-68-7	Butylbenzylphthalate	28	U	29	U	14	U	13	U	15	U	14	U	15	U	14	U
91-94-1	3,3'-Dichlorobenzidine		R		R		R		R		R		R		R		R
56-55-3	Benzo(a)anthracene	57	E	58		8	E	7	E	10	E	86		84		110	
117-81-7	bis(2-Ethylhexyl)phthalate	83	E	83		20	U	19	U	18	U	82		79		120	
218-01-9	Chrysene	95	E	87		12	E	10	E	12	E	110		120		130	
117-84-0	Di-n-octylphthalate	28	U	29	U	14	U	13	U	15	U	14	U	15	U	14	U
205-99-2	Benzo(b)fluoranthene																
207-08-9	Benzo(k)fluoranthene																
	Benzo(b+k)fluoranthene	150	E	140	E	17	E	14	E	18	E	100		100		120	
50-32-8	Benzo(a)pyrene	86	E	72		9	E	7	E	8	E	120		110		130	
193-39-5	Indeno(1,2,3-c,d)pyrene	64	E	74		9	E	13	U	6	E	14	U	15	U	14	U
53-70-3	Dibenz(a,h)anthracene	14	N	21	N	14	U	13	U	15	U	95		98		130	
191-24-2	Benzo(g,h,i)perylene	93	E	68	E	7	E	5	E	5	E	55	E	50	E	68	E
25155-15-1	Cymene	28	U	29	U	14	U	13	U	15	U	14	U	15	U	14	U
86-74-8	9H-Carbazole	28	U	29	U	14	U	13	U	15	U	14	U	15	U	14	U
58-08-2	Caffeine	28	U	29	U	14	U	13	U	15	U	14	U	15	U	14	U
198-55-0	Perylene	84	E	73		9	E	7	N	8	N	140		150		160	
80-97-7	B-Coprostanol	510	E	630	E	110	E	76		72		190		190		340	N
57-88-5	Cholesterol	1100	E	1200		870		790		640		880		910		2200	E
83-46-5	B-Sitosterol	1700	E	1500		540		430		370		400		350		1900	E
483-65-8	Retene	65	E	56		14	E	16	E	18		14	U	15	U	14	U
514-10-3	Abietic acid											29	U				
	Chlorodehydroabietic acid											120	U				
1740-19-8	Dehydroabietic acid											29	U				
	Dichlorodehydroabietic acid											58	U				
	4,5-Dichloroguaiacol											58	U				
5835-26-7	Isopimaric acid											58	U				
90-05-1	2-Methoxyphenol (Guaiacol)											29	U				
471-77-2	Neoabietic acid											120	U				
1945-53-5	Palustric acid											580	U				
127-27-5	Pimaric acid											29	U				
	Sandacopimaric acid											29	U				
	Tetrachloroguaiacol											390					
	3,4,5(4,5,6)-Trichloroguaiacol											120	U				
	Pristane/Phytane	7.36		9.64		9.78		9.81		10.59		4.66		5.13		4.28	
	CPI	1.56		2.41		2.72		2.87		2.19		1.68		1.12		1.52	

Data Qualifiers:

R: The data are unusable. The parameter may or may not be present.
U: The parameter was analyzed for but not reported above the associated value, which is the sample quantitation limit.
N: Presumptive evidence of the presence of the parameter at an estimated quantity.
E: The associated value is an estimated quantity.

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 23, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 1A
Quantitation Limits
(ug/kg, dry weight)

Target Parameter	Quantitation Limit Average	Quantitation Limit Lowest
Phenol	16	8
bis(2-Chloroethyl)ether	16	8
2-Chlorophenol	16	8
1,3-Dichlorobenzene	16	8
1,4-Dichlorobenzene	17	8
Benzyl alcohol	83	39
1,2-Dichlorobenzene	17	8
2-Methylphenol	17	8
bis(2-Chloroisopropyl)ether	17	8
4-Methylphenol	17	8
N-Nitroso-di-n-propylamine	17	8
Hexachloroethane	33	15
Nitrobenzene	17	8
Isophorone	17	8
2-Nitrophenol	84	39
2,4-Dimethylphenol	50	15
Benzoic acid	173	100
bis(2-Chloroethoxy)methane	17	8
2,4-Dichlorophenol	50	13
1,2,4-Trichlorobenzene	17	8
Naphthalene	17	8
4-Chloroaniline		
Hexachlorobutadiene	33	16
4-Chloro-3-methylphenol	34	16
2-Methylnaphthalene	17	8
Hexachlorocyclopentadiene	74	39
2,4,6-Trichlorophenol	84	39
2,4,5-Trichlorophenol	84	39
2-Chloronaphthalene	17	8
2-Nitroaniline	84	39
Dimethylphthalate	17	8
Acenaphthylene	17	8
3-Nitroaniline	84	39
Acenaphthene	19	8
2,4-Dinitrophenol	169	77
4-Nitrophenol	84	39
Dibenzofuran	17	8
2,4-Dinitrotoluene	84	39
2,6-Dinitrotoluene	84	39
Diethylphthalate	17	8
4-Chlorophenyl-phenylether	17	8
Fluorene	17	8
4-Nitroaniline	84	39
4,6-Dinitro-2-methylphenol	169	77

Target Parameter	Quantitation Limit Average	Quantitation Limit Lowest
N-Nitrosodiphenylamine	17	8
4-Bromophenyl-phenylether	17	8
Hexachlorobenzene	17	8
Pentachlorophenol	85	41
Phenanthrene	14	8
Anthracene	22	8
Di-n-butylphthalate	16	8
Fluoranthene	12	8
Pyrene	12	10
Butylbenzylphthalate	16	3
3,3'-Dichlorobenzidine		
Benzo(a)anthracene	13	8
bis(2-Ethylhexyl)phthalate	18	11
Chrysene	12	11
Di-n-octylphthalate	17	8
Benzo(b)fluoranthene	12	8
Benzo(k)fluoranthene	12	8
Benzo(b+k)fluoranthene	13	8
Benzo(a)pyrene	14	8
Indeno(1,2,3-c,d)pyrene	16	8
Dibenz(a,h)anthracene	16	8
Benzo(g,h,i)perylene	16	8
Cymene	17	8
9H-Carbazole	17	8
Caffeine	17	8
Perylene	12	8
B-Coprostanol	29	17
Cholesterol	25	25
B-Sitosterol	55	42
Retene	14	8
Abietic acid	44	29
Chlorodehydroabietic acid	120	120
Dehydroabietic acid	29	29
Dichlorodehydroabietic acid	67	58
4,5-Dichloroguaiacol	81	58
Isopimaric acid	89	58
2-Methoxyphenol (Guaiacol)	40	29
Neoabietic acid	157	120
Palustric acid	800	580
Pimaric acid	39	29
Sandacopimaric acid	39	29
Tetrachloroguaiacol	170	120
3,4,5(4,5,6)-Trichloroguaiacol	158	120

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 23, 1989
Reviewer: T.D. Bowden
Matrix: Sediment
Sample Nos.: Stations 1-68

Table 2

BNAs
Sample/Extract Holding Times

Sample Number	Date Collected	Date Extracted	Holding Time* (Extraction)	Date Analyzed F1	Date Analyzed F2	Holding Time* F1 (Analysis)	Holding Time* F2
Station 1	3/29/88	4/04/89	6	4/14/89	4/14/89	10	10
Station 2	3/29/88	4/04/89	6	4/14/89	4/14/89	10	10
Station 3	3/29/88	4/04/89	6	4/14/89	4/14/89	10	10
Station 4	3/29/88	4/04/89	6	4/14/89	4/14/89	10	10
Station 5	3/29/88	4/04/89	6	4/15/89	4/15/89	11	11
Station 6	3/29/88	4/04/89	6	4/15/89	4/15/89	11	11
Station 7	4/02/89	4/06/89	4	4/21/89	4/21/89	15	15
Station 8	4/02/89	4/06/89	4	4/21/89	4/21/89	15	15
Station 9	4/02/89	4/06/89	4	4/21/89	4/25/89	15	19
Station 10	4/02/89	4/06/89	4	4/25/89	4/28/89	19	22
Station 11	4/02/89	4/06/89	4	4/25/89	4/25/89	19	19
Station 12	4/03/89	4/07/89	4	4/25/89	4/25/89	18	18
Station 13	4/03/89	4/07/89	4	4/25/89	4/25/89	18	18
Station 14	4/03/89	4/07/89	4	4/25/89	4/25/89	18	18
Station 15	4/03/89	4/07/89	4	4/25/89	4/26/89	18	19
Station 16	4/04/89	4/07/89	3	4/26/89	4/26/89	19	19
Station 17	4/04/89	4/07/89	3	4/26/89	4/26/89	19	19
Station 18	3/28/89	4/03/89	6	4/15/89	4/15/89	12	12
Station 19	3/28/89	4/03/89	6	4/15/89	4/15/89	12	12
Station 20	3/28/89	4/03/89	6	4/15/89	4/15/89	12	12
Station 21	3/28/89	4/03/89	6	4/15/89	4/15/89	12	12
Station 22	3/25/89	3/29/89	4	4/06/89	4/06/89	8	8
Station 23	3/25/89	3/29/89	4	4/06/89	4/07/89	8	9
Station 24	3/25/89	3/29/89	4	4/28/89	5/05/89	30	37
Station 25	3/24/89	3/30/89	6	4/07/89	4/07/89	8	8
Station 26	3/24/89	3/30/89	6	4/07/89	4/21/89	8	9
Station 27	3/24/89	3/29/89	5	4/10/89	4/10/89	12	12
Station 28	3/23/89	3/29/89	6	4/05/89	4/05/89	7	7
Station 29	3/24/89	3/29/89	5	4/10/89	4/14/89	12	16
Station 30	3/22/89	3/29/89	7	4/05/89	4/05/89	7	7
Station 31	3/22/89	3/28/89	6	4/05/89	4/05/89	8	8
Station 32	3/23/89	3/29/89	6	4/05/89	4/05/89	7	7
Station 33	3/22/89	3/28/89	6	4/05/89	4/05/89	8	8
Station 34	3/23/89	3/29/89	6	4/05/89	4/06/89	7	8
Station 35	3/23/89	3/29/89	6	4/06/89	4/06/89	8	8
Station 36	3/22/89	3/28/89	6	4/06/89	4/12/89	9	15
Station 37	3/22/89	3/28/89	6	4/06/89	4/06/89	9	9
Station 38	3/21/89	3/24/89	3	3/31/89	3/31/89	7	7
Station 39	3/21/89	3/24/89	3	3/31/89	3/31/89	7	7
Station 40	3/21/89	3/24/89	3	3/31/89	4/04/89	7	11
Station 41	3/21/89	3/28/89	7	4/01/89	4/01/89	4	4
Station 42	3/21/89	3/28/89	7	4/01/89	4/01/89	4	4
Station 43	3/20/89	3/27/89	7	4/01/89	4/01/89	5	5
Station 44	3/20/89	3/27/89	7	4/01/89	4/01/89	5	5
Station 45	3/20/89	3/27/89	7	4/01/89	4/01/89	5	5
Station 46	3/20/89	3/27/89	7	4/02/89	4/02/89	6	6
Station 47	3/20/89	3/27/89	7	4/02/89	4/02/89	6	6
Station 48	3/19/89	3/28/89	9	4/02/89	4/02/89	5	5
Station 49	3/19/89	3/28/89	9	4/03/89	4/03/89	6	6
Station 50	3/19/89	3/28/89	9	4/03/89	4/03/89	6	6
Station 51	3/29/89	4/04/89	6	4/15/89	4/15/89	11	11
Station 52	3/29/89	4/04/89	6	4/19/89	4/19/89	15	15
Station 53	3/29/89	4/04/89	6	4/19/89	4/19/89	15	15
Station 54	3/24/89	3/30/89	6	4/12/89	4/12/89	13	13
Station 55	3/24/89	3/30/89	6	4/12/89	4/12/89	13	13
Station 56	3/24/89	3/30/89	6	4/12/89	4/12/89	13	13
Station 57	3/23/89	3/29/89	6	4/28/89	5/05/89	30	37
Station 58	3/23/89	3/29/89	6	4/06/89	4/06/89	8	8
Station 59	3/23/89	3/29/89	6	4/06/89	4/12/89	8	14
Station 60	3/21/89	3/28/89	7	4/03/89	4/03/89	6	6
Station 61	3/21/89	3/28/89	7	4/03/89	4/04/89	6	7
Station 62	3/21/89	3/28/89	7	4/04/89	4/04/89	7	7
Station 63	3/20/89	3/27/89	7	4/02/89	4/04/89	6	8
Station 64	3/20/89	3/27/89	7	4/02/89	4/02/89	6	6
Station 65	3/20/89	3/27/89	7	4/02/89	4/02/89	6	6
Station 66	3/28/89	4/03/89	6	4/20/89	4/20/89	17	17
Station 67	3/28/89	4/03/89	6	4/20/89	4/20/89	17	17
Station 68	3/28/89	4/03/89	6	4/21/89	4/21/89	18	18

* Holding time in days.
Extraction - Time of collection to time of extraction.
Analysis - Time of extracation to time of analysis.

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 23, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 3
Continuing Calibration Check
Summary of Exceptions*

Target Parameter	Calibration Check Date											
	3/31/89	4/01/89	4/02/89	4/03/89	4/05/89 (0732)	4/05/89 (1556)	4/06/89	4/10/89	4/14/89	4/21/89	4/25/89 (1035)	4/25/89 (1656)
Hexachlorobenzene		-29.7										
Pyrene					-35.8	-34.5	-40.2	-26.8	-29.5			
Butylbenzylphthalate						-35.1						
bis(2-Ethylhexyl)phthalate					-31.3	-34.0	-37.9					
Benzo(b)fluoranthene			-33.4	-31.0								
Benzo(k)fluoranthene		-30.6					-34.1					
Benzo(g,h,i)perylene				26.7								
B-Coprostanol	-35.2			-41.0	-33.6	-45.6	-73.8					34.4
Cholesterol							-50.0					45.7
B-Sitosterol							-31.0	33.3		40.5	31.0	57.1

* Compounds with Percent Differences (%D) that do not meet project acceptance criteria and that have associated positive hits. The value listed is %D.

Project acceptance criteria: Sterols - %D <=30%.
All other compounds - %D <=25%.

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 23, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 4
Method Blank Summary
(values in ng/ul, estimated)

Date of Method Blank Extraction

Target Parameter	3/24/89	3/27/89	3/28/89-1	3/28/89-2	3/29/89	3/30/89	4/03/89	4/04/89	4/06/89	4/07/89
bis(2-Ethylhexyl)phthalate	2.0 U	1.0 U	1.0 U	1.0 U	2.7	1.1	1.0 U	1.0 U	1.0 U	1.0 U

Target Parameter	n	Mean	SD	95%ile	Adjusted 95%ile*
bis(2-Ethylhexyl)phthalate	10	0.8	0.8	2.1	29

* Value in ug/kg, dry weight. Dry weight conversion applied using mean sample weight (72.66 g). This value has been use in assigning the "U" qualifier in order to decrease the significance of the reported value.

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI
Page 1 of 2

Table 5

Surrogate Recovery
Summary of Exceptions
(value = % Recovery)

Date: August 23, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

	Acid Fraction					Neutral Fraction						
Sample	2FP	PHL	PCR	TBP	ACR	DCB	NBZ	FBP	ANT	FLA	TPH	DBA
Station 1	27.9	49.7										
Station 2	35.9											
Station 3	35.0											
Station 4	16.8	25.6	32.8	39.1	44.8	33.0	32.9	39.9	48.3		42.9	40.8
Station 5	34.4											
Station 6	35.5											
Station 7	14.2	32.5										
Station 8	9.2	27.6				21.1	34.8					
Station 9	21.7	37.8										
Station 10	25.4	46.8										
Station 11	28.2	43.1										
Station 12	17.2	32.0					46.8					
Station 12R*	0	24.7	39.8			46.6	29.8					
Station 13	25.2	41.5										
Station 14	20.5	37.3										
Station 15	20.9	37.2			49.6							
Station 16	19.6	36.0										
Station 17	18.4	35.1										
Station 18	35.4											
Station 19	28.8	41.2				49.6						
Station 20	34.8	49.2										
Station 21	24.4	40.7				39.2	46.9					
Station 22	23.7	38.6					47.6					
Station 23	24.8	40.7										
Station 24	21.6	35.7										
Station 25	26.7	44.8										
Station 26	16.5	34.2										
Station 27	23.0	35.6	48.5			48.0						
Station 28	25.1	39.9										
Station 29	21.2	38.9				46.6						
Station 30	22.5	39.6				46.1	49.3					
Station 31	33.6											
Station 32	17.8	33.9					49.5					
Station 33	23.6	44.6				47.7						
Station 34	25.3	42.6										
Station 35	24.1	40.0										

2FP	2-Fluorophenol	ACR	Acridine-d9	ANT	Anthracene-d10
PHL	Phenol-d5	DCB	1,2-Dichlorobenzene-d14	FLA	Fluoranthene-d10
PCR	p-Cresol-d4	NBZ	Nitrobenene-d5	TPH	Terphenyl-d14
TBP	2,4,6-Tribromophenol	FBP	2-Fluorobiphenyl	DBA	Dibenzo(a,h)anthracene-d14

* F2 Rerun at 1:10 dilution

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Table 5

Surrogate Recovery
Summary of Exceptions
(value = % Recovery)

Date: August 23, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

	Acid Fraction					Neutral Fraction						
Sample	2FP	PHL	PCR	TBP	ACR	DCB	NBZ	FBP	ANT	FLA	TPH	DBA
Station 36	7.2	16.9	29.7		45.4		23.0				36.5	39.4
Station 37	36.8											
Station 38	23.9	43.8										
Station 39	19.1	34.8	47.8			45.5	42.3					
Station 40												180
Station 41	27.2	45.3										
Station 41R*	29.9	47.7										
Station 42	29.8	47.5										
Station 43	23.7	40.7			45.6							
Station 44	25.3	42.2										
Station 45	23.5	40.4				47.3	47.4					
Station 46	21.5	41.8										
Station 47	28.4	47.6										
Station 48	27.6											
Station 49	7.2	21.5	43.2			27.5	32.1					
Station 50	5.8	16.6	37.7			37.7	35.5					
Station 51	24.1	44.6										
Station 52	30.3	46.6										
Station 53	22.7	38.4										
Station 54	33.0	47.2										
Station 55	10.5	21.7	40.3		38.3	44.6	33.5					
Station 56	21.0	36.0				48.2						
Station 57	11.5	24.6	47.9			34.8	36.6	49.9				
Station 58	26.9	44.2										
Station 59	23.5	38.3				49.6						
Station 60	22.9	40.8										
Station 61	9.9	24.4	42.5			34.9	33.9					
Station 62	21.3	40.5										
Station 63	26.4	43.3										
Station 64	25.5	47.1										
Station 65	26.1	41.4					49.8					
Station 66	15.7	28.2				42.0	41.3					
Station 67	24.9	37.1										
Station 68	22.4	38.5				46.8	47.4					
Station 68R*	31.1				156	48.0			167	151		

2FP	2-Fluorophenol	ACR	Acridine-d9	ANT	Anthracene-d10
PHL	Phenol-d5	DCB	1,2-Dichlorobenzene-d14	FLA	Fluoranthene-d10
PCR	p-Cresol-d4	NBZ	Nitrobenene-d5	TPH	Terphenyl-d14
TBP	2,4,6-Tribromophenol	FBP	2-Fluorobiphenyl	DBA	Dibenzo(a,h)anthracene-d14

* F2 Rerun at 1:10 dilution

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 23, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 6
MS/MSD Analysis
Summary of Exceptions

Station 5

Compound	MS %R	MSD %R	RPD	Associated Samples with Positive Hits, or Non-detects When %R<10%
4-Chloroaniline	5.2	8.8		Stations 1-21, 51-53, 66-68
Hexachlorocyclopentadiene	37.6	8.8	124	None
3,3'-Dichlorobenzidine	2.8	9.6	-110	Stations 1-21, 51-53, 66-68
Benzo(g,h,i)perylene	19.2	14.4		Stations 8, 66, 67, 68

Station 26

Compound	MS %R	MSD %R	RPD	Associated Samples with Positive Hits, or Non-detects When %R<10%
Phenol	29.8	39.7		Stations 25, 26, 56
Benzoic acid	0	29.7	-200	Stations 25, 26, 54, 55, 56
4-Chloroaniline	2.7	3.3		Stations 25, 26, 54, 55, 56
3,3'-Dichlorobenzidine	0	1.2	-200	Stations 25, 26, 54, 55, 56
Benzo(g,h,i)perylene	39.5	57.1		Station 54

Station 32

Compound	MS %R	MSD %R	RPD	Associated Samples with Positive Hits, or Non-detects When %R<10%
Phenol	34.5	30.3		Stations 32, 57, 58, 59
Benzoic acid	0	0.5	-200	Stations 22-24, 27-30, 32, 34, 35, 57-59
4-Chloroaniline	2.7	4.2		Stations 22-24, 27-30, 32, 34, 35, 57-59
3,3'-Dichlorobenzidine	2.7	0.4	147	Stations 22-24, 27-30, 32, 34, 35, 57-59

Station 38

Compound	MS %R	MSD %R	RPD	Associated Samples with Positive Hits, or Non-detects When %R<10%
Acenaphthene	35.3	50.0		Station 40
Benzoic acid	0	0		Stations 38, 39, 40
3,3'-Dichlorobenzidine	8.5	16.8		None

Station 44

Compound	MS %R	MSD %R	RPD	Associated Samples with Positive Hits, or Non-detects When %R<10%
4-Chloroaniline	7.8	6.4		Stations 31, 33, 36, 37, 41-50, 60-65
3,3'-Dichlorobenzidine	0	0		Stations 31, 33, 36, 37, 41-50, 60-65

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 23, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 7
Internal Standards
Summary of Exceptions

Date	Sample	Internal Standard (1)	Internal Standard Areas 12-hour (previous)	Internal Standard Areas Sample	Acceptance Limits (2) -50% (+/- factor of 2)	Acceptance Limits (2) +100%		Factor of 12-hour area	Concentration of IS (ug/kg, dry weight)
4/12/89	Station 36 (F2R)	DCB	125922	284738	62961	251844	+	2.26	504 ug/kg
		NPT	467548	1026220	233774	935096	+	2.19	504 ug/kg
		ANT	258924	517964	129462	517848	+	2.00	630 ug/kg
		CRY	320988	696524	160494	641976	+	2.17	630 ug/kg
	Station 59 (F2)	DCB	125922	332040	62961	251844	+	2.64	353 ug/kg
		NPT	467548	1071160	233774	935096	+	2.29	353 ug/kg
		ANT	258924	548668	129462	517848	+	2.12	441 ug/kg
		CRY	320988	712899	160494	641976	+	2.22	441 ug/kg
4/21/89	Method Blank 4/07 (F1)	DCB	97050	210174	48525	194100	+	2.17	400 ug/kg
		NPT	401834	829642	200917	803668	+	2.06	400 ug/kg
		PRY	286734	640811	143367	573468	+	2.23	570 ug/kg
	Method Blank 4/07 (F2)	DCB	97050	249070	48525	194100	+	2.57	400 ug/kg
		NPT	401834	969822	200917	803668	+	2.41	400 ug/kg
		ANT	261620	624132	130810	523240	+	2.39	500 ug/kg
		PHN	261267	606585	130634	522534	+	2.32	300 ug/kg
		CRY	349133	793620	174567	698266	+	2.27	500 ug/kg
		PRY	286734	710820	143367	573468	+	2.48	570 ug/kg
4/25/89	Station 9 (F2R)	DCB	76606	156218	38303	153212	+	2.04	466 ug/kg
(1035)	Station 12 (F2)	DCB	76606	163908	38303	153212	+	2.14	1008 ug/kg
4/25/89	Station 14 (F2)	NPT	301086	682570	150543	602172	+	2.27	558 ug/kg
(1656)		ANT	200986	414738	100493	401972	+	2.06	697 ug/kg
		PHN	225919	453161	112960	451838	+	2.01	418 ug/kg

(1) DCB 1,4-Dichlorobenzene-d4
NPT Naphthalene-d8
ANT Acenaphthene-d10
PHN Phenanthrene-d10
CRY Chrysene-d12
PRY Perylene-d12

(2) Acceptance limits based on a factor of +/-2 of value from 12-hour standard area

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 23, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 8
TIC Summary

Station	Number of Unknowns	Average Concentration (ug/kg, dry weight)	Maximum Concentration (ug/kg, dry weight)
Station 1	19	830	1500
Station 2	17	370	690
Station 3	19	290	620
Station 4	21	800	2200
Station 5	15	640	1100
Station 6	13	220	680
Station 7	8	280	370
Station 8	16	540	2400
Station 9	16	350	2200
Station 10	14	480	3500
Station 11	17	450	2200
Station 12	15	510	3500
Station 13	16	300	1800
Station 14	20	320	2100
Station 15	22	270	1800
Station 16	17	350	2100
Station 17	17	830	4400
Station 18	19	360	840
Station 19	14	710	1400
Station 20	26	420	1000
Station 21	22	610	1500
Station 22	18	98	230
Station 23	20	52	140
Station 24	23	730	1000
Station 25	13	64	220
Station 26	24	280	630
Station 27	16	41	96
Station 28	15	52	82
Station 29	24	380	750
Station 30	8	450	710
Station 31	20	260	2900
Station 32	12	58	110
Station 33	10	820	4800
Station 34	21	640	1400
Station 35	24	1000	2400
Station 36	18	240	640
Station 37	13	150	380
Station 38	18	900	1400
Station 39	13	93	160
Station 40	10	920	1400
Station 41	22	8640	150000
Station 42	10	98	190
Station 43	12	440	3600
Station 44	10	290	700
Station 45	11	310	620
Station 46	11	240	710
Station 47	7	110	200
Station 48	16	1600	4700
Station 49	20	2400	10000
Station 50	11	270	1100
Station 51	17	800	1400
Station 52	17	3400	11000
Station 53	21	260	1000
Station 54	15	95	220
Station 55	23	170	430
Station 56	18	270	1300
Station 57	18	130	390
Station 58	12	100	360
Station 59	17	75	140
Station 60	19	3300	11000
Station 61	20	520	1100
Station 62	22	750	1800
Station 63	16	220	480
Station 64	16	160	490
Station 65	15	140	290
Station 66	17	320	1200
Station 67	13	440	1000
Station 68	15	760	1700

All concentrations are considered estimates.

Tentatively identified compounds (TICs) that were found in both the method blank and the sample were not included in this summary.

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Table 9A

Monitoring Variability Samples
(ug/kg, dry weight)

Date: August 23, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

CAS No.	Target Parameter	Station 5 (1)	Station 51 (2)	Station 52 (3)	Station 53 (3)	Station 26 (1)	Station 54 (2)	Station 55 (3)	Station 56 (3)
108-95-2	Phenol	26 U	27 U	25 U	24 U	9 N	11 U	9 U	7 N
111-44-4	bis(2-Chloroethyl)ether	26 U	27 U	25 U	24 U	9 U	11 U	9 U	10 U
95-57-8	2-Chlorophenol	26 U	27 U	25 U	24 U	9 U	11 U	9 U	10 U
541-73-1	1,3-Dichlorobenzene	26 U	27 U	25 U	24 U	9 U	11 U	9 U	10 U
106-46-7	1,4-Dichlorobenzene	26 U	27 U	25 U	24 U	9 U	11 U	9 U	10 U
100-51-6	Benzyl alcohol	130 U	130 U	120 U	120 U	43 U	55 U	47 U	51 U
95-50-1	1,2-Dichlorobenzene	26 U	27 U	25 U	24 U	9 U	11 U	9 U	10 U
95-48-7	2-Methylphenol	26 U	27 U	25 U	24 U	9 U	11 U	9 U	10 U
108-60-1	bis(2-Chloroisopropyl)ether	26 U	27 U	25 U	24 U	9 U	11 U	9 U	10 U
106-44-5	4-Methylphenol	26 U	27 U	25 U	24 U	9 U	11 U	9 U	10 U
621-64-7	N-Nitroso-di-n-propylamine	26 U	27 U	25 U	24 U	9 U	11 U	9 U	10 U
67-72-1	Hexachloroethane	52 U	54 U	49 U	47 U	17 U	22 U	19 U	20 U
98-95-3	Nitrobenzene	26 U	27 U	25 U	24 U	9 U	11 U	9 U	10 U
78-59-1	Isophorone	26 U	27 U	25 U	24 U	9 U	11 U	9 U	10 U
88-75-5	2-Nitrophenol	130 U	130 U	120 U	120 U	43 U	55 U	47 U	51 U
105-67-9	2,4-Dimethylphenol	52 U	54 U	49 U	47 U	17 U	22 U	19 U	20 U
65-85-0	Benzoic acid	260 U	270 U	250 U	240 U	R	R	R	R
111-91-1	bis(2-Chloroethoxy)methane	26 U	27 U	25 U	24 U	9 U	11 U	9 U	10 U
120-83-2	2,4-Dichlorophenol	78 U	81 U	74 U	71 U	26 U	33 U	28 U	30 U
120-82-1	1,2,4-Trichlorobenzene	26 U	27 U	25 U	24 U	9 U	11 U	9 U	10 U
91-20-3	Naphthalene	6 E	27 U	8 E	7 E	9 U	11 U	9 U	9 E
106-47-8	4-Chloroaniline	R	R	R	R	R	R	R	R
87-68-3	Hexachlorobutadiene	52 U	54 U	49 U	47 U	17 U	22 U	19 U	20 U
59-50-7	4-Chloro-3-methylphenol	52 U	54 U	49 U	47 U	17 U	22 U	19 U	20 U
91-57-6	2-Methylnaphthalene	6 E	15 E	6 E	6 E	9 U	11 U	9 U	7 E
77-47-4	Hexachlorocyclopentadiene	130 U	130 U	120 U	120 U	43 U	55 U	47 U	51 U
88-06-2	2,4,6-Trichlorophenol	130 U	130 U	120 U	120 U	43 U	55 U	47 U	51 U
95-95-4	2,4,5-Trichlorophenol	130 U	130 U	120 U	120 U	43 U	55 U	47 U	51 U
91-58-7	2-Chloronaphthalene	26 U	27 U	25 U	24 U	9 U	11 U	9 U	10 U
88-74-4	2-Nitroaniline	130 U	130 U	120 U	120 U	43 U	55 U	47 U	51 U
131-11-3	Dimethylphthalate	26 U	27 U	25 U	24 U	9 U	11 U	9 U	10 U
208-96-8	Acenaphthylene	26 U	27 U	25 U	24 U	9 U	11 U	9 U	10 U
99-09-2	3-Nitroaniline	130 U	130 U	120 U	120 U	43 U	55 U	47 U	51 U
83-32-9	Acenaphthene	26 U	27 U	25 U	24 U	9 U	11 U	9 U	10 U
51-28-5	2,4-Dinitrophenol	260 U	270 U	250 U	240 U	86 U	110 U	94 U	101 U
100-02-7	4-Nitrophenol	130 U	130 U	120 U	120 U	43 U	55 U	47 U	51 U
132-64-9	Dibenzofuran	26 U	27 U	25 U	24 U	9 U	11 U	9 U	8 E
121-14-2	2,4-Dinitrotoluene	130 U	130 U	120 U	120 U	43 U	55 U	47 U	51 U
606-20-2	2,6-Dinitrotoluene	130 U	130 U	120 U	120 U	43 U	55 U	47 U	51 U
84-66-2	Diethylphthalate	26 U	27 U	25 U	24 U	9 U	11 U	9 U	10 U
7005-72-3	4-Chlorophenyl-phenylether	26 U	27 U	25 U	24 U	9 U	11 U	9 U	10 U
86-73-7	Fluorene	26 U	27 U	25 U	24 U	9 U	11 U	9 U	22
100-01-6	4-Nitroaniline	130 U	130 U	120 U	120 U	43 U	55 U	47 U	51 U
534-52-1	4,6-Dinitro-2-methylphenol	260 U	270 U	250 U	240 U	86 U	110 U	94 U	101 U

(1) Primary sample.
(2) Sample split of primary sample, composited from several van Veen field grabs.
(3) Separate van Veen grab sample at same station as primary sample.

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Table 9A

Monitoring Variability Samples
(ug/kg, dry weight)

Date: August 23, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

CAS No.	Target Parameter	Station 5 (1)	Station 51 (2)	Station 52 (3)	Station 53 (3)	Station 26 (1)	Station 54 (2)	Station 55 (3)	Station 56 (3)
86-30-6	N-Nitrosodiphenylamine	26 U	27 U	25 U	24 U	9 U	11 U	9 U	10 U
101-55-3	4-Bromophenyl-phenylether	26 U	27 U	25 U	24 U	9 U	11 U	9 U	10 U
118-74-1	Hexachlorobenzene	26 U	27 U	25 U	24 U	9 U	11 U	9 U	10 U
87-86-5	Pentachlorophenol	130 U	130 U	120 U	120 U	43 U	55 U	47 U	51 U
85-01-8	Phenanthrene	37 E	42	69	58 N	16	23	7 E	52
120-12-7	Anthracene	260 U	27 U	25 U	8 N	9 U	3 E	9 U	240
84-74-2	Di-n-butylphthalate	26 U	27 U	25 U	24 U	9 U	11 U	9 U	10 U
206-44-0	Fluoranthene	34 E	40	57	52	17	21	6 E	37
129-00-0	Pyrene	25 E	31 E	41	30	13	19	5 E	28
85-68-7	Butylbenzylphthalate	26 U	27 U	25 U	24 U	9 U	11 U	9 U	10 U
91-94-1	3,3'-Dichlorobenzidine	R	R	R	R	R	R	R	R
56-55-3	Benzo(a)anthracene	14 E	17 E	21 E	20 E	8 E	8 E	5 E	12
117-81-7	bis(2-Ethylhexyl)phthalate	26 U	34	32 U	37	41	26 U	13 U	21 U
218-01-9	Chrysene	24 E	28	39	33	12	10 E	8 E	20
117-84-0	Di-n-octylphthalate	26 U	27 U	25 U	24 U	9 U	11 U	9 U	10 U
205-99-2	Benzo(b)fluoranthene							9 U	
207-08-9	Benzo(k)fluoranthene							9 U	
	Benzo(b+k)fluoranthene	36 E	41 N	50	43 E	20	17	9 U	26
50-32-8	Benzo(a)pyrene	10 N	21 E	23 E	15 E	12	6 E	9 U	15
193-39-5	Indeno(1,2,3-c,d)pyrene	26 U	27 U	25 U	24 U	9 U	5 E	9 U	10 U
53-70-3	Dibenz(a,h)anthracene	26 U	27 U	25 U	24 U	9 U	11 U	9 U	10 U
191-24-2	Benzo(g,h,i)perylene	26 U	27 U	25 U	24 U	9 U	4 E	9 U	10 U
25155-15-1	Cymene	26 U	27 U	25 U	24 U	9 U	11 U	9 U	10 U
86-74-8	9H-Carbazole	26 U	27 U	25 U	24 U	9 U	11 U	9 U	110
58-08-2	Caffeine	26 U	27 U	25 U	24 U	9 U	11 U	9 U	10 U
198-55-0	Perylene	33	43	45	36	14	11	8 N	17
80-97-7	B-Coprostanol	120	120	240	170	140	110	19 U	79
57-88-5	Cholesterol	1400	1400	2200	1800	870	860	680 E	610
83-46-5	B-Sitosterol	1600	1600	2500	2100	580 E	370	47 E	300
483-65-8	Retene	26 U	17 E	25	22 E	9	6 N	9 U	9 E
514-10-3	Abietic acid								
	Chlorodehydroabietic acid								
1740-19-8	Dehydroabietic acid								
	Dichlorodehydroabietic acid								
	4,5-Dichloroguaiacol								
5835-26-7	Isopimaric acid								
90-05-1	2-Methoxyphenol (Guaiacol)								
471-77-2	Neoabietic acid								
1945-53-5	Palustric acid								
127-27-5	Pimaric acid								
	Sandacopimaric acid								
	Tetrachloroguaiacol								
	4,5,6-Trichloroguaiacol								
	Pristane/Phytane	7.66	9.13	8.66	7.21	4.24	5.36	6.09	6.12
	CPI Index	1.57	1.41	2.01	1.52	1.50	2.20	1.57	1.64

(1) Primary sample.
(2) Sample split of primary sample, composited from several van Veen field grabs.
(3) Separate van Veen grab sample at same station as primary sample.

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Table 9A

Monitoring Variability Samples
(ug/kg, dry weight)

Date: August 23, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

CAS No.	Target Parameter	Station 32 (1)	Station 57 (2)	Station 58 (3)	Station 59 (3)	Station 38 (1)	Station 60 (2)	Station 61 (3)	Station 62 (3)
108-95-2	Phenol	13 E	15 E	35 E	13 E	68 U	35 U	28 U	29 U
111-44-4	bis(2-Chloroethyl)ether	8 U	9 U	8 U	9 U	68 U	35 U	28 U	29 U
95-57-8	2-Chlorophenol	8 U	9 U	8 U	9 U	68 U	35 U	28 U	29 U
541-73-1	1,3-Dichlorobenzene	8 U	9 U	8 U	9 U	68 U	35 U	28 U	29 U
106-46-7	1,4-Dichlorobenzene	8 U	9 U	8 U	9 U	68 U	35 U	28 U	29 U
100-51-6	Benzyl alcohol	39 U	43 U	41 U	44 U	340 U	170 U	140 U	140 U
95-50-1	1,2-Dichlorobenzene	8 U	9 U	8 U	9 U	68 U	35 U	28 U	29 U
95-48-7	2-Methylphenol	8 U	9 U	8 U	9 U	68 U	35 U	28 U	29 U
108-60-1	bis(2-Chloroisopropyl)ether	8 U	9 U	8 U	9 U	68 U	35 U	28 U	29 U
106-44-5	4-Methylphenol	8 U	9 U	8 U	9 U	68 U	35 U	28 U	29 U
621-64-7	N-Nitroso-di-n-propylamine	8 U	9 U	8 U	9 U	68 U	35 U	28 U	29 U
67-72-1	Hexachloroethane	15 U	17 U	16 U	18 U	140 U	69 U	55 U	58 U
98-95-3	Nitrobenzene	8 U	9 U	8 U	9 U	68 U	35 U	28 U	29 U
78-59-1	Isophorone	8 U	9 U	8 U	9 U	68 U	35 U	28 U	29 U
88-75-5	2-Nitrophenol	39 U	43 U	41 U	44 U	340 U	170 U	140 U	140 U
105-67-9	2,4-Dimethylphenol	15 U	17 U	16 U	18 U	140 U	69 U	55 U	58 U
65-85-0	Benzoic acid	R	R	R	R	R	350 U	270 U	290 U
111-91-1	bis(2-Chloroethoxy)methane	8 U	9 U	8 U	9 U	68 U	35 U	28 U	29 U
120-83-2	2,4-Dichlorophenol	23 U	26 U	24 U	27 U	200 U	100 U	82 U	87 U
120-82-1	1,2,4-Trichlorobenzene	8 U	9 U	8 U	9 U	68 U	35 U	28 U	29 U
91-20-3	Naphthalene	8 U	9 U	3 E	3 E	68 U	35 U	28 U	10 N
106-47-8	4-Chloroaniline	R	R	R	R	200 U	R	R	R
87-68-3	Hexachlorobutadiene	15 U	17 U	16 U	18 U	140 U	69 U	55 U	58 U
59-50-7	4-Chloro-3-methylphenol	15 U	17 U	16 U	18 U	140 U	69 U	55 U	58 U
91-57-6	2-Methylnaphthalene	8 U	9 U	8 U	9 U	68 U	35 U	28 U	29 U
77-47-4	Hexachlorocyclopentadiene	39 U	43 U	41 U	44 U	340 U	170 U	140 U	140 U
88-06-2	2,4,6-Trichlorophenol	39 U	43 U	41 U	44 U	340 U	170 U	140 U	140 U
95-95-4	2,4,5-Trichlorophenol	39 U	43 U	41 U	44 U	340 U	170 U	140 U	140 U
91-58-7	2-Chloronaphthalene	8 U	9 U	8 U	9 U	68 U	35 U	28 U	29 U
88-74-4	2-Nitroaniline	39 U	43 U	41 U	44 U	340 U	170 U	140 U	140 U
131-11-3	Dimethylphthalate	8 U	9 U	8 U	9 U	68 U	35 U	28 U	29 U
208-96-8	Acenaphthylene	8 U	9 U	8 U	2 E	68 U	35 U	28 U	9 N
99-09-2	3-Nitroaniline	39 U	43 U	41 U	44 U	340 U	170 U	140 U	140 U
83-32-9	Acenaphthene	8 U	9 U	8 U	9 U	68 U	35 U	28 U	29 U
51-28-5	2,4-Dinitrophenol	77 U	87 U	81 U	88 U	680 U	350 U	270 U	290 U
100-02-7	4-Nitrophenol	39 U	43 U	41 U	44 U	340 U	170 U	140 U	140 U
132-64-9	Dibenzofuran	8 U	9 U	8 U	9 U	68 U	35 U	28 U	8 N
121-14-2	2,4-Dinitrotoluene	39 U	43 U	41 U	44 U	340 U	170 U	140 U	140 U
606-20-2	2,6-Dinitrotoluene	39 U	43 U	41 U	44 U	340 U	170 U	140 U	140 U
84-66-2	Diethylphthalate	8 U	9 U	8 U	9 U	68 U	35 U	28 U	29 U
7005-72-3	4-Chlorophenyl-phenylether	8 U	9 U	8 U	9 U	68 U	35 U	28 U	29 U
86-73-7	Fluorene	8 U	9 U	8 U	3 E	68 U	35 U	10 E	10 E
100-01-6	4-Nitroaniline	39 U	43 U	41 U	44 U	340 U	170 U	140 U	140 U
534-52-1	4,6-Dinitro-2-methylphenol	77 U	87 U	81 U	88 U	680 U	350 U	270 U	290 U

(1) Primary sample.
(2) Sample split of primary sample, composited from several van Veen field grabs.
(3) Separate van Veen grab sample at same station as primary sample.

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Table 9A

Monitoring Variability Samples
(ug/kg, dry weight)

Date: August 23, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

CAS No.	Target Parameter	Station 32 (1)	Station 57 (2)	Station 58 (3)	Station 59 (3)	Station 38 (1)	Station 60 (2)	Station 61 (3)	Station 62 (3)
86-30-6	N-Nitrosodiphenylamine	8 U	9 U	8 U	9 U	68 U	35 U	28 U	29 U
101-55-3	4-Bromophenyl-phenylether	8 U	9 U	8 U	9 U	68 U	35 U	28 U	29 U
118-74-1	Hexachlorobenzene	8 U	9 U	8 U	9 U	68 U	35 U	28 U	29 U
87-86-5	Pentachlorophenol	39 U	10 E	41 U	44 U	340 U	170 U	140 U	140 U
85-01-8	Phenanthrene	16	13 E	26	25	55 E	98	91 E	73
120-12-7	Anthracene	6 E	4 E	14 E	11	17 N	28 E	15 N	23 N
84-74-2	Di-n-butylphthalate	8 U	9 U	8 U	9 U	68 U	35 U	28 U	29 U
206-44-0	Fluoranthene	28	24 E	49	44	130	160	150 E	140
129-00-0	Pyrene	27 E	25 E	47 E	39 E	110	150	150 E	140
85-68-7	Butylbenzylphthalate	8 U	9 U	8 U	9 U	68 U	35 U	28 U	29 U
91-94-1	3,3'-Dichlorobenzidine	R	R	R	R	340 U	R	R	R
56-55-3	Benzo(a)anthracene	14	12 E	28	23	61 E	64	57 E	58
117-81-7	bis(2-Ethylhexyl)phthalate	27 U	41 E	29 U	46 E	95	190	83 E	83
218-01-9	Chrysene	25	21 E	48	35	79	93	95 E	87
117-84-0	Di-n-octylphthalate	8 U	9 U	8 U	9 U	68 U	35 U	28 U	29 U
205-99-2	Benzo(b)fluoranthene								
207-08-9	Benzo(k)fluoranthene								
	Benzo(b+k)fluoranthene	37	35 E	62 E	59 E	140	180 E	150 E	140 E
50-32-8	Benzo(a)pyrene	20	16 E	35	27	79	110	86 E	72
193-39-5	Indeno(1,2,3-c,d)pyrene	19	12 E	31	15	71	88	64 E	74
53-70-3	Dibenz(a,h)anthracene	8 U	7 E	9	9 N	68 U	35 U	14 N	21 N
191-24-2	Benzo(g,h,i)perylene	15	11 E	27	14	80	110 E	93 E	68 E
25155-15-1	Cymene	8 U	9 U	8 U	9 U	70 U	35 U	28 U	29 U
86-74-8	9H-Carbazole	8 U	9 U	8 U	9 U	68 U	35 U	28 U	29 U
58-08-2	Caffeine	8 U	9 U	8 U	9 U	68 U	35 U	28 U	29 U
198-55-0	Perylene	12	11 E	21	14	76	120	84 E	73
80-97-7	B-Coprostanol	83 E	35 E	120 E	88 E	640 E	610 E	510 E	630 E
57-88-5	Cholesterol	490	300 E	870 E	590 E	1000 E	1500	1100 E	1200
83-46-5	B-Sitosterol	260	100 E	340 E	200 E	1500 E	1700	1700 E	1500
483-65-8	Retene	6	6 E	6 E	11 E	80	120	65 E	56
514-10-3	Abietic acid								
	Chlorodehydroabietic acid								
1740-19-8	Dehydroabietic acid								
	Dichlorodehydroabietic acid								
	4,5-Dichloroguaiacol								
5835-26-7	Isopimaric acid								
90-05-1	2-Methoxyphenol (Guaiacol)								
471-77-2	Neoabietic acid								
1945-53-5	Palustric acid								
127-27-5	Pimaric acid								
	Sandacopimaric acid								
	Tetrachloroguaiacol								
	4,5,6-Trichloroguaiacol								
	Pristane/Phytane	4.28	4.26	4.79	4.99	8.83	7.25	7.36	9.64
	CPI Index	1.52	1.37	1.86	2.23	2.76	1.66	1.56	2.41

(1) Primary sample.
(2) Sample split of primary sample, composited from several van Veen field grabs.
(3) Separate van Veen grab sample at same station as primary sample.

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Table 9A

Monitoring Variability Samples
(ug/kg, dry weight)

Date: August 23, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

CAS No.	Target Parameter	Station 44 (1)	Station 63 (2)	Station 64 (3)	Station 65 (3)
108-95-2	Phenol	26	21	22	15 U
111-44-4	bis(2-Chloroethyl)ether	14 U	14 U	13 U	15 U
95-57-8	2-Chlorophenol	14 U	14 U	13 U	15 U
541-73-1	1,3-Dichlorobenzene	14 U	14 U	13 U	15 U
106-46-7	1,4-Dichlorobenzene	14 U	14 U	13 U	15 U
100-51-6	Benzyl alcohol	68 U	70 U	66 U	73 U
95-50-1	1,2-Dichlorobenzene	4 N	14 U	13 U	15 U
95-48-7	2-Methylphenol	14 U	14 U	13 U	15 U
108-60-1	bis(2-Chloroisopropyl)ether	14 U	14 U	13 U	15 U
106-44-5	4-Methylphenol	14 U	14 U	13 U	15 U
621-64-7	N-Nitroso-di-n-propylamine	14 U	14 U	13 U	15 U
67-72-1	Hexachloroethane	27 U	28 U	26 U	29 U
98-95-3	Nitrobenzene	14 U	14 U	13 U	15 U
78-59-1	Isophorone	14 U	14 U	13 U	15 U
88-75-5	2-Nitrophenol	68 U	70 U	66 U	73 U
105-67-9	2,4-Dimethylphenol	27 U	28 U	26 U	29 U
65-85-0	Benzoic acid	140 U	140 U	130 U	150 U
111-91-1	bis(2-Chloroethoxy)methane	14 U	14 U	13 U	15 U
120-83-2	2,4-Dichlorophenol	41 U	42 U	39 U	44 U
120-82-1	1,2,4-Trichlorobenzene	14 U	14 U	13 U	15 U
91-20-3	Naphthalene	7 E	14 U	13 U	15 U
106-47-8	4-Chloroaniline	R	R	R	R
87-68-3	Hexachlorobutadiene	3 N	28 U	26 U	29 U
59-50-7	4-Chloro-3-methylphenol	27 U	28 U	26 U	29 U
91-57-6	2-Methylnaphthalene	5 E	20 U	13 U	15 U
77-47-4	Hexachlorocyclopentadiene	68 U	70 U	66 U	73 U
88-06-2	2,4,6-Trichlorophenol	68 U	70 U	66 U	73 U
95-95-4	2,4,5-Trichlorophenol	68 U	70 U	66 U	73 U
91-58-7	2-Chloronaphthalene	4 E	14 U	13 U	15 U
88-74-4	2-Nitroaniline	68 U	70 U	66 U	73 U
131-11-3	Dimethylphthalate	14 U	14 U	13 U	15 U
208-96-8	Acenaphthylene	5 E	14 U	13 U	15 U
99-09-2	3-Nitroaniline	68 U	70 U	66 U	73 U
83-32-9	Acenaphthene	6 E	14 U	13 U	15 U
51-28-5	2,4-Dinitrophenol	140 U	140 U	130 U	150 U
100-02-7	4-Nitrophenol	68 U	70 U	66 U	73 U
132-64-9	Dibenzofuran	5 E	14 U	13 U	15 U
121-14-2	2,4-Dinitrotoluene	68 U	70 U	66 U	73 U
606-20-2	2,6-Dinitrotoluene	68 U	70 U	66 U	73 U
84-66-2	Diethylphthalate	14 U	14 U	13 U	15 U
7005-72-3	4-Chlorophenyl-phenylether	5 E	14 U	13 U	15 U
86-73-7	Fluorene	5 E	14 U	13 U	15 U
100-01-6	4-Nitroaniline	68 U	70 U	66 U	73 U
534-52-1	4,6-Dinitro-2-methylphenol	140 U	140 U	130 U	150 U

(1) Primary sample.
(2) Sample split of primary sample, composited from several van Veen field grabs.
(3) Separate van Veen grab sample at same station as primary sample.

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Table 9A

Monitoring Variability Samples
(ug/kg, dry weight)

Date: August 23, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

CAS No.	Target Parameter	Station 44 (1)	Station 63 (2)	Station 64 (3)	Station 65 (3)
86-30-6	N-Nitrosodiphenylamine	14 U	14 U	13 U	15 U
101-55-3	4-Bromophenyl-phenylether	4 N	14 U	13 U	15 U
118-74-1	Hexachlorobenzene	5 E	14 U	13 U	15 U
87-86-5	Pentachlorophenol	68 U	70 U	66 U	73 U
85-01-8	Phenanthrene	15 E	6 E	7 N	14 J
120-12-7	Anthracene	7 E	14 U	13 U	15 U
84-74-2	Di-n-butylphthalate	14 U	14 U	13 U	15 U
206-44-0	Fluoranthene	23	12 E	14	21
129-00-0	Pyrene	20 E	11 E	11 E	18
85-68-7	Butylbenzylphthalate	14 U	14 U	13 U	15 U
91-94-1	3,3'-Dichlorobenzidine	R	R	R	R
56-55-3	Benzo(a)anthracene	7 N	8 E	7 E	10 E
117-81-7	bis(2-Ethylhexyl)phthalate	170	20 U	19 U	18 U
218-01-9	Chrysene	12 E	12 E	10 E	12 E
117-84-0	Di-n-octylphthalate	14 U	14 U	13 U	15 U
205-99-2	Benzo(b)fluoranthene				
207-08-9	Benzo(k)fluoranthene				
	Benzo(b+k)fluoranthene	17 E	17 E	14 E	18 E
50-32-8	Benzo(a)pyrene	9 E	9 E	7 E	8 E
193-39-5	Indeno(1,2,3-c,d)pyrene	6 E	9 E	13 U	6 E
53-70-3	Dibenz(a,h)anthracene	14 U	14 U	13 U	15 U
191-24-2	Benzo(g,h,i)perylene	6 E	7 E	5 E	5 E
25155-15-1	Cymene	14 U	14 U	13 U	15 U
86-74-8	9H-Carbazole	14 U	14 U	13 U	15 U
58-08-2	Caffeine	14 U	14 U	13 U	15 U
198-55-0	Perylene	8 N	9 E	7 N	8 N
80-97-7	B-Coprostanol	100	110 E	76	72
57-88-5	Cholesterol	1100	870	790	640
83-46-5	B-Sitosterol	550	540	430	370
483-65-8	Retene	19 E	14 E	16 E	18
514-10-3	Abietic acid				
	Chlorodehydroabietic acid				
1740-19-8	Dehydroabietic acid				
	Dichlorodehydroabietic acid				
	4,5-Dichloroguaiacol				
5835-26-7	Isopimaric acid				
90-05-1	2-Methoxyphenol (Guaiacol)				
471-77-2	Neoabietic acid				
1945-53-5	Palustric acid				
127-27-5	Pimaric acid				
	Sandacopimaric acid				
	Tetrachloroguaiacol				
	4,5,6-Trichloroguaiacol				
	Pristane/Phytane	11.73	9.78	9.81	10.59
	CPI Index	3.11	2.72	2.87	2.19

(1) Primary sample.
(2) Sample split of primary sample, composited from several van Veen field grabs.
(3) Separate van Veen grab sample at same station as primary sample.

Table 9B

Summary Statistics
Monitoring Variability Samples
(ug/kg, dry weight)

Date: August 23, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

	Stations:	5, 51, 52, 53 (a)			5, 51 (b)	26, 54, 55, 56 (a)			26, 54 (b)	32, 57, 58, 59 (a)			32, 57 (b)
CAS No.	Target Parameter	Mean	SD	CV	RPD	Mean	SD	CV	RPD	Mean	SD	CV	RPD
108-95-2	Phenol	26 U				9	1	11.1	-20.0	19	9	47.4	-14.3
111-44-4	bis(2-Chloroethyl)ether	26 U				10 U				9 U			
95-57-8	2-Chlorophenol	26 U				10 U				9 U			
541-73-1	1,3-Dichlorobenzene	26 U				10 U				9 U			
106-46-7	1,4-Dichlorobenzene	26 U				10 U				9 U			
100-51-6	Benzyl alcohol	125 U				49 U				42 U			
95-50-1	1,2-Dichlorobenzene	26 U				10 U				9 U			
95-48-7	2-Methylphenol	26 U				10 U				9 U			
108-60-1	bis(2-Chloroisopropyl)ether	26 U				10 U				9 U			
106-44-5	4-Methylphenol	26 U				10 U				9 U			
621-64-7	N-Nitroso-di-n-propylamine	26 U				10 U				9 U			
67-72-1	Hexachloroethane	51 U				20 U				17 U			
98-95-3	Nitrobenzene	26 U				10 U				9 U			
78-59-1	Isophorone	26 U				10 U				9 U			
88-75-5	2-Nitrophenol	125 U				49 U				42 U			
105-67-9	2,4-Dimethylphenol	51 U				20 U				17 U			
65-85-0	Benzoic acid	255 U				R				R			
111-91-1	bis(2-Chloroethoxy)methane	26 U				10 U				9 U			
120-83-2	2,4-Dichlorophenol	76 U				29 U				25 U			
120-82-1	1,2,4-Trichlorobenzene	26 U				10 U				9 U			
91-20-3	Naphthalene	12	9	75.0	-127.3	10 U				6	3	50.0	-11.8
106-47-8	4-Chloroaniline	R				R				R			
87-68-3	Hexachlorobutadiene	51 U				20 U				17 U			
59-50-7	4-Chloro-3-methylphenol	51 U				20 U				17 U			
91-57-6	2-Methylnaphthalene	8	4	50.0	-85.7	9 U				9 U			
77-47-4	Hexachlorocyclopentadiene	125 U				49 U				42 U			
88-06-2	2,4,6-Trichlorophenol	125 U				49 U				42 U			
95-95-4	2,4,5-Trichlorophenol	125 U				49 U				42 U			
91-58-7	2-Chloronaphthalene	26 U				10 U				9 U			
88-74-4	2-Nitroaniline	125 U				49 U				42 U			
131-11-3	Dimethylphthalate	26 U				10 U				9 U			
208-96-8	Acenaphthylene	26 U				10 U				7 U			
99-09-2	3-Nitroaniline	125 U				49 U				42 U			
83-32-9	Acenaphthene	26 U				10 U				9 U			
51-28-5	2,4-Dinitrophenol	255 U				98 U				83 U			
100-02-7	4-Nitrophenol	125 U				49 U				42 U			

(a) Mean, standard deviation, and coefficient of variation calculated using results for all four samples.
CV calculated only if two or more values were positive hits.
(b) RPD calculated from results of primary sample and split from field composite.
RPD calculated if one value was a positive hit.

The value of the QL has been used in calculations.
"U" indicates the mean of non-detects
"R" indicates one or more values were unusable

Table 98

Summary Statistics
Monitoring Variability Samples
(ug/kg, dry weight)

	Stations:	5, 51, 52, 53 (a)			5, 51 (b)	26, 54, 55, 56 (a)			26, 54 (b)	32, 57, 58, 59 (a)			32, 57 (b)
CAS No.	Target Parameter	Mean	SD	CV	RPD	Mean	SD	CV	RPD	Mean	SD	CV	RPD
132-64-9	Dibenzofuran	26 U				9 U				9 U			
121-14-2	2,4-Dinitrotoluene	125 U				49 U				42 U			
606-20-2	2,6-Dinitrotoluene	125 U				49 U				42 U			
84-66-2	Diethylphthalate	26 U				10 U				9 U			
7005-72-3	4-Chlorophenyl-phenylether	26 U				10 U				9 U			
86-73-7	Fluorene	26 U				13 U				7 U			
100-01-6	4-Nitroaniline	125 U				49 U				42 U			
534-52-1	4,6-Dinitro-2-methylphenol	255 U				98 U				83 U			
86-30-6	N-Nitrosodiphenylamine	26 U				10 U				9 U			
101-55-3	4-Bromophenyl-phenylether	26 U				10 U				9 U			
118-74-1	Hexachlorobenzene	26 U				10 U				9 U			
87-86-5	Pentachlorophenol	125 U				49 U				34 U			
85-01-8	Phenanthrene	52	13	25.0	-12.7	25	17	68.0	-35.9	20	6	30.0	20.7
120-12-7	Anthracene	80 U				65	101	155.4	100.0	9	4	44.4	40.0
84-74-2	Di-n-butylphthalate	26 U				10 U				9 U			
206-44-0	Fluoranthene	46	9	19.6	-16.2	20	11	55.0	-21.1	36	10	27.8	15.4
129-00-0	Pyrene	32	6	18.8	-21.4	16	8	50.0	-37.5	35	9	25.7	7.7
85-68-7	Butylbenzylphthalate	26 U				10 U				9 U			
91-94-1	3,3'-Dichlorobenzidine	R				R				R			
56-55-3	Benzo(a)anthracene	18	3	16.7	-19.4	8	2	25.0	0.0	19	7	36.8	15.4
117-81-7	bis(2-Ethylhexyl)phthalate	32	4	12.5	-26.7	25 U				36	8	22.2	-41.2
218-01-9	Chrysene	31	6	19.4	-15.4	13	5	38.5	18.2	32	10	31.3	17.4
117-84-0	Di-n-octylphthalate	26 U				10 U				9 U			
	Benzo(b+k)fluoranthene	43	5	11.6	-13.0	18	6	33.3	16.2	48	12	25.0	5.6
50-32-8	Benzo(a)pyrene	17	5	29.4	-71.0	11	3	27.3	66.7	25	7	28.0	22.2
193-39-5	Indeno(1,2,3-c,d)pyrene	26 U				8 U				19	7	36.8	45.2
53-70-3	Dibenz(a,h)anthracene	26 U				10 U				8	1	12.5	13.3
191-24-2	Benzo(g,h,i)perylene	26 U				8 U				17	6	35.3	30.8
25155-15-1	Cymene	26 U				10 U				9 U			
86-74-8	9H-Carbazole	26 U				35 U				9 U			
58-08-2	Caffeine	26 U				10 U				9 U			
198-55-0	Perylene	39	5	12.8	-26.3	13	3	23.1	24.0	15	4	26.7	8.7
80-97-7	B-Coprostanol	163	49	30.1	0.0	87	45	51.7	24.0	82	30	36.6	81.4
57-88-5	Cholesterol	1700	332	19.5	0.0	755	113	15.0	1.2	563	206	36.6	48.1
83-46-5	B-Sitosterol	1950	377	19.3	0.0	324	190	58.6	44.2	225	88	39.1	88.9
483-65-8	Retene	23	4	17.4	41.9	8	1	12.5	40.0	7	2	28.6	0.0
	Pristane/Phytane	8.17	0.77	9.4	-17.5	5.45	0.76	13.9	-23.3	4.58	0.32	7.0	0.5
	CPI Index	1.63	0.23	14.1	10.7	1.73	0.28	16.2	-37.8	1.75	0.33	18.9	10.4

(a) Mean, standard deviation, and coefficient of variation calculated using results for all four samples.
CV calculated only if two or more values were positive hits.
(b) RPD calculated from results of primary sample and split from field composite.
RPD calculated if one value was a positive hit.

The value of the QL has been used in calculations.
"U" indicates the mean of non-detects
"R" indicates one or more values were unusable

Date: August 23, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 9B

Summary Statistics
Monitoring Variability Samples
(ug/kg, dry weight)

	Stations:	38, 60, 61, 62 (a)			38, 60 (b)	44, 63, 64, 65 (a)			44, 63 (b)
CAS No.	Target Parameter	Mean	SD	CV	RPD	Mean	SD	CV	RPD
108-95-2	Phenol	40 U				21	4	19.0	21.3
111-44-4	bis(2-Chloroethyl)ether	40 U				14 U			
95-57-8	2-Chlorophenol	40 U				14 U			
541-73-1	1,3-Dichlorobenzene	40 U				14 U			
106-46-7	1,4-Dichlorobenzene	40 U				14 U			
100-51-6	Benzyl alcohol	198 U				69 U			
95-50-1	1,2-Dichlorobenzene	40 U				12 U			
95-48-7	2-Methylphenol	40 U				14 U			
108-60-1	bis(2-Chloroisopropyl)ether	40 U				14 U			
106-44-5	4-Methylphenol	40 U				14 U			
621-64-7	N-Nitroso-di-n-propylamine	40 U				14 U			
67-72-1	Hexachloroethane	81 U				28 U			
98-95-3	Nitrobenzene	40 U				14 U			
78-59-1	Isophorone	40 U				14 U			
88-75-5	2-Nitrophenol	198 U				69 U			
105-67-9	2,4-Dimethylphenol	81 U				28 U			
65-85-0	Benzoic acid	R				140 U			
111-91-1	bis(2-Chloroethoxy)methane	40 U				14 U			
120-83-2	2,4-Dichlorophenol	117 U				42 U			
120-82-1	1,2,4-Trichlorobenzene	40 U				14 U			
91-20-3	Naphthalene	35 U				12 U			
106-47-8	4-Chloroaniline	R				R			
87-68-3	Hexachlorobutadiene	81 U				22 U			
59-50-7	4-Chloro-3-methylphenol	81 U				28 U			
91-57-6	2-Methylnaphthalene	40 U				13 U			
77-47-4	Hexachlorocyclopentadiene	198 U				69 U			
88-06-2	2,4,6-Trichlorophenol	198 U				69 U			
95-95-4	2,4,5-Trichlorophenol	198 U				69 U			
91-58-7	2-Chloronaphthalene	40 U				12 U			
88-74-4	2-Nitroaniline	198 U				69 U			
131-11-3	Dimethylphthalate	40 U				14 U			
208-96-8	Acenaphthylene	35 U				12 U			
99-09-2	3-Nitroaniline	198 U				69 U			
83-32-9	Acenaphthene	40 U				12 U			
51-28-5	2,4-Dinitrophenol	398 U				140 U			
100-02-7	4-Nitrophenol	198 U				69 U			

(a) Mean, standard deviation, and coefficient of variation calculated using results for all four samples.
CV calculated only if two or more values were positive hits.
(b) RPD calculated from results of primary sample and split from field composite.
RPD calculated if one value was a positive hit.

The value of the QL has been used in calculations.
"U" indicates the mean of non-detects
"R" indicates one or more values were unusable

Table 98

Summary Statistics
Monitoring Variability Samples
(ug/kg, dry weight)

	Stations:	38, 60, 61, 62 (a)			38, 60 (b)	44, 63, 64, 65 (a)			44, 63 (b)
CAS No.	Target Parameter	Mean	SD	CV	RPD	Mean	SD	CV	RPD
132-64-9	Dibenzofuran	35 U				12 U			
121-14-2	2,4-Dinitrotoluene	198 U				69 U			
606-20-2	2,6-Dinitrotoluene	198 U				69 U			
84-66-2	Diethylphthalate	40 U				14 U			
7005-72-3	4-Chlorophenyl-phenylether	40 U				12 U			
86-73-7	Fluorene	31	24	77.4	64.1	12 U			
100-01-6	4-Nitroaniline	198 U				69 U			
534-52-1	4,6-Dinitro-2-methylphenol	398 U				140 U			
86-30-6	N-Nitrosodiphenylamine	40 U				14 U			
101-55-3	4-Bromophenyl-phenylether	40 U				12 U			
118-74-1	Hexachlorobenzene	40 U				12 U			
87-86-5	Pentachlorophenol	198 U				69 U			
85-01-8	Phenanthrene	79	17	21.5	-56.2	11	4	36.4	85.7
120-12-7	Anthracene	21	5	23.8	-48.9	12 U			
84-74-2	Di-n-butylphthalate	40 U				14 U			
206-44-0	Fluoranthene	145	11	7.6	-20.7	18	5	27.8	62.9
129-00-0	Pyrene	138	16	11.6	-30.8	15	4	26.7	58.1
85-68-7	Butylbenzylphthalate	40 U				14 U			
91-94-1	3,3'-Dichlorobenzidine	R				R			
56-55-3	Benzo(a)anthracene	60	3	5.0	-4.8	8	1	12.5	-13.3
117-81-7	bis(2-Ethylhexyl)phthalate	113	45	39.8	-66.7	57 U			
218-01-9	Chrysene	89	6	6.7	-16.3	12	1	8.3	0.0
117-84-0	Di-n-octylphthalate	40 U				14 U			
	Benzo(b+k)fluoranthene	153	16	10.5	-25.0	17	2	11.8	0.0
50-32-8	Benzo(a)pyrene	87	14	16.1	-32.8	8	1	12.5	0.0
193-39-5	Indeno(1,2,3-c,d)pyrene	74	9	12.2	-21.4	9	3	33.3	-40.0
53-70-3	Dibenz(a,h)anthracene	35	21	60.0	64.1	14 U			
191-24-2	Benzo(g,h,i)perylene	88	16	18.2	-31.6	6	1	16.7	-15.4
25155-15-1	Cymene	41 U				14 U			
86-74-8	9H-Carbazole	40 U				14 U			
58-08-2	Caffeine	40 U				14 U			
198-55-0	Perylene	88	19	21.6	-44.9	8	1	12.5	-11.8
80-97-7	B-Coprostanol	598	52	8.7	4.8	90	16	17.8	-9.5
57-88-5	Cholesterol	1200	187	15.6	-40.0	850	166	19.5	23.4
83-46-5	B-Sitosterol	1600	100	6.3	-12.5	473	76	16.1	1.8
483-65-8	Retene	80	24	30.0	-40.0	17	2	11.8	30.3
	Pristane/Phytane	8.27	1.01	12.2	19.7	10.48	0.79	7.5	18.1
	CPI Index	2.10	0.50	23.8	49.8	2.72	0.34	12.5	13.4

(a) Mean, standard deviation, and coefficient of variation calculated using results for all four samples.
CV calculated only if two or more values were positive hits.
(b) RPD calculated from results of primary sample and split from field composite.
RPD calculated if one value was a positive hit.

The value of the QL has been used in calculations.
"U" indicates the mean of non-detects
"R" indicates one or more values were unusable

ECOLOGY CONTRACT NUMBER: C0089130
SITE: PUGET SOUND
LAB: ARI

DATE: AUGUST 1, 1989
REVIEWER: P. STRIPLIN
MATRIX: SEDIMENT

TABLE 1. Results for total organic carbon analyses (mg/g C DW).

Sample Number	Station I.D.	Total organic carbon results	Data qualifier
2772W	1	15.0	
2772X	2	6.8	
2772Y	3	12.0	
2772Z	4	20.0	
2772AA	5*	18.0	
2772AG	51 (5-R)	17.0	E
2772AH	52 (5-2)	19.0	E
2772AI	53 (5-3)	18.0	
2772AB	6	2.5	E
2772AM	7	3.3	E
2772AN	8	39.0	E
2772AO	9	0.6	E
2772AP	10	6.1	E
2772AQ	11	6.4	E
2772AR	12	15.0	E
2772AS	13	1.8	E
2772AT	14	3.5	E
2772AU	15	2.4	E
2772AV	16	1.8	E
2772AW	17	15.0	E
2772AC	18	9.3	E
2772AD	19	19.0	E
2772AE	20	10.0	E
2772AF	21	13.0	E
2772M	22	1.5	
2772N	23	1.2	
2772O	24	17.0	
2772P	25	0.7	
2772Q	26*	5.6	
2772T	54 (26-R)	4.5	
2772U	55 (26-2)	4.0	
2772V	56 (26-3)	3.5	
2772R	27	1.2	
2772A	28	1.5	
2772S	29	16.0	
2772B	30	14.0	
2772C	31	1.5	
2772D	32*	1.8	
2772J	57 (32-R)	1.1	
2772K	58 (32-2)	2.2	
2772L	59 (32-3)	1.3	
2772E	33	6.4	
2772F	34	22.0	
2772G	35	23.0	
2772H	36	1.3	

these stations.

All data were checked for transcription errors and found to be correct.

F. Sample Result Verification

All raw data are legible and complete. Stations where environmental variability was measured and an additional 10 percent of the remaining stations were selected at random and checked for transcription errors. No errors were found.

G. Overall Case Assessment

Acceptable warning and control limits for total organic carbon data are discussed above. The data quality objectives presented in the Department of Ecology sediment quality task implementation plan were largely met. The quality of the deliverables was good and the data package was 100 percent complete.

Data associated with two analytical groups (18 stations) were qualified as estimates because matrix spike/matrix spike duplicate recoveries exceeded the target criteria range. This data (as it is qualified) may not affect its usefulness for the purposes of the program

In spite of the data qualifications discussed above the general data quality was good when considering the range of TOC values found.

These data are acceptable and useful for the intended purposes of this project.

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 23, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 10
Comparison Sample Summary
Fortified Sequim Bay Sediment
(ug/kg, dry weight)

Target Parameter	Amount Added (1)	Summary of Previous Independent Analyses n	Mean	CV	95%ile Value Lower	Upper	Station 66 Result	Q	Station 67 Result	Q	Station 68 Result	Q	Mean	CV
Phenol	557	5	325	107	0	895	94		110		130		111	13
bis(2-Chloroethyl)ether							14	U	15	U	14	U		
2-Chlorophenol							14	U	15	U	14	U		
1,3-Dichlorobenzene	101	5	37	54	4	70	11	E	13	E	13	E	12	8
1,4-Dichlorobenzene	51	4	27	74	0	60	5	N	5	N	5	N	5	0
Benzyl alcohol							72	U	73	U	72	U		
1,2-Dichlorobenzene	169	4	37	65	0	76	8	N	9	N	9	N	9	5
2-Methylphenol							14	U	15	U	14	U		
bis(2-Chloroisopropyl)ether							14	U	15	U	14	U		
4-Methylphenol	507	5	215	36	88	342	260		290		310		287	7
N-Nitroso-di-n-propylamine							14	U	15	U	14	U		
Hexachloroethane							29	U	29	U	29	U		
Nitrobenzene	169						14	U	15	U	14	U		
Isophorone	169	4	103	19	71	135	54		64		65		61	8
2-Nitrophenol							72	U	73	U	72	U		
2,4-Dimethylphenol							29	U	29	U	29	U		
Benzoic acid							150	U	150	U	150	U		
bis(2-Chloroethoxy)methane							14	U	15	U	14	U		
2,4-Dichlorophenol							43	U	44	U	43	U		
1,2,4-Trichlorobenzene							14	U	15	U	14	U		
Naphthalene	169	7	96	18	68	124	46		55		57		53	9
4-Chloroaniline								R		R		R		
Hexachlorobutadiene	169	2	5				29	U	29	U	29	U		
4-Chloro-3-methylphenol							29	U	29	U	29	U		
2-Methylnaphthalene	169	7	107	44	30	184	40		45		69		51	25
Hexachlorocyclopentadiene							72	U	73	U	72	U		
2,4,6-Trichlorophenol							72	U	73	U	72	U		
2,4,5-Trichlorophenol							72	U	73	U	72	U		
2-Chloronaphthalene							14	U	15	U	14	U		
2-Nitroaniline							72	U	73	U	72	U		
Dimethylphthalate							14	U	15	U	14	U		
Acenaphthylene	169	5	90	30	46	134	46		46		58		50	11
3-Nitroaniline							72	U	73	U	72	U		
Acenaphthene	169	7	100	27	56	144	78		79		100		86	12
2,4-Dinitrophenol							150	U	150	U	150	U		
4-Nitrophenol							72	U	73	U	72	U		
Dibenzofuran							14	U	15	U	14	U		

(1) Converted from wet weight (ng/g) to dry weight (ug/kg) using percent moisture determined by ARI (40.8%).

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 23, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 10
Comparison Sample Summary
Fortified Sequim Bay Sediment
(ug/kg, dry weight)

Target Parameter	Amount Added (1)	Summary of Previous Independent Analyses n	Mean	CV	95%ile Value Lower	Upper	Station 66 Result	Q	Station 67 Result	Q	Station 68 Result	Q	Mean	CV
2,4-Dinitrotoluene	169						72	U	73	U	72	U		
2,6-Dinitrotoluene	169						72	U	73	U	72	U		
Diethylphthalate							14	U	15	U	14	U		
4-Chlorophenyl-phenylether	169	3	121				86		84		98		89	7
Fluorene	169	7	107	43	32	182	85		82		100		89	9
4-Nitroaniline							72	U	73	U	72	U		
4,6-Dinitro-2-methylphenol							150	U	150	U	150	U		
N-Nitrosodiphenylamine							14	U	15	U	14	U		
4-Bromophenyl-phenylether	169	3	261				190		200		210		200	4
Hexachlorobenzene							14	U	15	U	14	U		
Pentachlorophenol	507	5	389	23	242	536	270		270		180		240	18
Phenanthrene	169	7	208	55	20	396	140		140		140		140	0
Anthracene	169	7	123	28	67	179	120		110		160		130	17
Di-n-butylphthalate							14	U	15	U	14	U		
Fluoranthene	169	7	127	24	77	177	130		120		150		133	9
Pyrene	169	7	112	46	28	196	93		85		120		99	15
Butylbenzylphthalate							14	U	15	U	14	U		
3,3'-Dichlorobenzidine								R		R		R		
Benzo(a)anthracene	169	7	106	50	19	193	86		84		110		93	13
bis(2-Ethylhexyl)phthalate	169						82		79		120		94	20
Chrysene	169	7	123	32	58	188	110		120		130		120	7
Di-n-octylphthalate							14	U	15	U	14	U		
Benzo(b+k)fluoranthene	169	5	121	45	32	210	100		100		120		107	9
Benzo(a)pyrene	169	7	124	47	28	220	120		110		130		120	7
Indeno(1,2,3-c,d)pyrene	169	2	25				14	U	15	U	14	U		
Dibenz(a,h)anthracene	169	7	93	52	14	172	95		98		130		108	15
Benzo(g,h,i)perylene	169	5	101	49	20	182	55	E	50	E	68	E	58	13
Cymene							14	U	15	U	14	U		
9H-Carbazole							14	U	15	U	14	U		
Caffeine							14	U	15	U	14	U		
Perylene							140		150		160		150	5
B-Coprostanol	270						190		190		340	N	240	29
Cholesterol							880		910		2200	E	1330	46
B-Sitosterol							400		350		1900	E	883	81
Retene							14	U	15	U	14	U		
2-Methoxyphenol (guaiacol)	507													
Tetrachloroguaiacol	507						390							

(1) Converted from wet weight (ng/g) to dry weight (ug/kg) using percent moisture determined by ARI (40.8%).

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 23, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 11A
Resin Acids/Substituted Guaiacols

Holding Times

Sample	Date Sampled	Date Extracted	Date Analyzed	Holding Time (days) Extraction	Analysis
Station 4	3/29/89	4/04/89	4/21/89	6	14
Station 8	4/02/89	4/07/89	4/24/89	5	17
Station 21	3/28/89	4/03/89	4/21/89	6	18
Station 66	3/28/89	4/03/89	4/24/89	6	21
Station 8 MS	4/02/89	4/17/89	4/24/89	15	7
Station 8 MSD	4/02/89	4/17/89	4/24/89	15	7
Method Blank		4/07/89	5/22/89		45

Holding Times: Extraction - Time of collection to time of extraction.
Analysis - Time of extracation to time of analysis.

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 23, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 11B
Resin Acids/Substituted Guaiacols

Continuing Calibration
Exception Summary*

Target Parameter	Calibration Check Date 4/21/89	4/24/89
Abietic acid	38.0	-30.5
Chlorodehydroabietic acid	38.1	-35.3
Dehydroabietic acid	35.2	-33.5
Dichlorodehydroabietic acid	31.7	
Isopimaric acid	38.5	-37.6
Neoabietic acid		-47.0
Palustric acid		-56.1
Pimaric acid		-44.9
Sandacopimaric acid		-44.7

* Compounds with Percent Differences (%D) that do not meet project acceptance criteria and that have associated positive hits. The value listed is %D.

JACOBS ENGINEERING GROUP INC.
ENVIRONMENTAL SYSTEMS DIVISION
1111 THIRD AVENUE - SUITE 700 • SEATTLE WA 98101 • (206) 622-0907

August 28, 1989

Data Validation Report
Pesticide/PCB Analyses

Site:	Puget Sound
Project:	WDOE MSMP
Sample Numbers:	Stations 1-68
Samples Collected By:	Tetra Tech, Inc.

The samples included in this report were analyzed by Analytical Resources, Inc., of Seattle, Washington.

This report is submitted to: Tetra Tech, Inc., Bellevue, Washington

Data Evaluated by: Thomas D. Bowden TDB

Approved by: Raleigh C. Farlow RCF

Data Validation Report - Pesticide/PCB Analyses

Site:	Puget Sound
Project:	WDOE MSMP
Laboratory:	Analytical Resources, Inc.
Sample Number:	Stations 1 - 68
Matrix:	Sediment
Reviewer:	T.D. Bowden
Date:	August 28, 1989

I. Introduction

This report summarizes the validation of laboratory data for 68 marine sediment samples submitted to Analytical Resources, Inc. of Seattle, WA for organochlorine pesticide and PCB analyses.

The samples were analyzed according to the protocol described in USEPA CLP SOW 2/88, IFB W802081D1. Modifications in sample size were made in order to achieve lower than CLP-specified quantitation limits.

This report has been prepared in accordance with USEPA guidance "Laboratory Data Validation, Functional Guidelines for Evaluating Organics Analyses," dated February 1, 1988. Data validation criteria are found in the USEPA Functional Guidelines and the WDOE Puget Sound Ambient Monitoring Program, Marine Sediment Quality Implementation Plan, dated November, 1988.

Analytical results with associated data qualifiers are found in Table 1. Results are expressed in ug/kg, dry weight. Average quantitation limits are presented in Table 1A. Sample holding times are summarized in Table 2.

Samples from Station 1 through Station 50 (fifty samples) are surficial sediment samples collected from different locations in Puget Sound. Samples with station identification greater than 50 have been assigned surrogate station numbers. These "stations" (Stations 50-68) represent field-generated (laboratory blind) QC samples, specifically, duplicate splits taken from composited sediment from several van Veen grab samples, station replicates taken as separate aliquots from different van Veen grab samples at the same station, and comparison samples, as summarized below:

Field Station	Sample Split*	Station Replicates
Station 5	Station 51	Station 52 Station 53
Station 26	Station 54	Station 55 Station 56
Station 32	Station 57	Station 58 Station 59
Station 38	Station 60	Station 61 Station 62
Station 44	Station 63	Station 64 Station 65

* From homogenized composite

Comparison Samples (fortified Sequim Bay sediment sample)

Station 66
Station 67
Station 68

Field samples employed for laboratory QC include:

MS/MSD Analysis

Station 5
Station 26
Station 32
Station 38
Station 44

II. Discussion

A. Sample Holding Times

Technical requirements for maximum sample holding time (time of collection to time of extraction; time of extraction to time of analysis) for pesticides/PCBs have been established only for water matrices (extraction within 7 days, analysis within 40 days). Sample preservation included holding on ice during transport and 4°C in the laboratory until extraction. All sediment samples submitted for BNA analyses were extracted within 7 days, with the following exceptions:

Station 15	10 days
Stations 48-50	9 days
Stations 43-47, 63, 65	8 days

Results associated with these stations have not been qualified since the deviation is slight and is not expected to affect data quality. All of the samples were analyzed within 40 days of extraction. Sample holding times were determined by comparing sampling dates on the Chain-of-Custody documents with dates of extractions and analyses reported in the data package.

B. Instrument Performance

DDT Retention Time: Retention time for 4,4'-DDT is greater than 12 minutes on standard chromatograms for all 72-hour instrumentation runs, as required. All standard chromatograms show adequate resolution between peaks.

Retention Time Windows: Retention time windows have been reported on Form IX for both columns, as required. Retention Times (RT) for all pesticide standards reported on Form IX are within the established retention time windows with the exception of Endrin ketone and Heptachlor in the following Individual Mix A standards:

Compound	Column	Date	Time	RT	Window
Endrin ketone	DB5	3/31/89	1418	25.33	26.05-26.47
Endrin ketone	DB5	4/01/89	0802	25.20	26.05-26.47
Heptachlor	DB608	4/05/89	1604	12.62	12.43-12.61

The retention time window was expanded for these compounds by approximately 20%. No response for the compounds was found within this expanded window on chromatograms of associated samples. Therefore, these exceptions are not expected to have any effect on data quality.

All raw data were checked for transcription accuracy to Form IX. No significant transcription errors were found.

DDT/Endrin Degradation Check: Percent degradation for DDT and Endrin, as reported on Form VIIID, exceeds 20% in Evaluation Standard Mix B during the following periods:

Run Date	Time	Column	Percent Degradation DDT	Percent Degradation Endrin
3/30-4/01	0336	DB5	38.3	22.5
3/30-4/01	0336	DB608	41.1	
4/03-4/06	0653	DB608	21.2	
4/07-4/08	1036	DB5	30.9	
4/07-4/08	1036	DB608	30.9	

No positive results for either DDT or Endrin, or their derivatives, were reported for any samples associated with these standards. Therefore, no data require qualification.

All raw data were examined to verify the reported percent degradation of DDT and Endrin. Percent degradations were recalculated for approximately 35% of Evaluation Standard Mix B analyses.

DBC Retention Time Check: The Percent Difference (%D) in retention time for Dibutylchlorendate between Evaluation Standard Mix A and all subsequent standards and samples is $\leq$1.5% (wide-bore capillary column requirement) in all 72-hour instrumentation runs. %Ds were recalculated for approximately 10% of all analyses. No significant calculation errors were found.

C. Calibration

Initial Calibration: Initial multipoint calibration was established for each 72-hour instrumentation run for all TCL compounds and the surrogate. The Percent Relative Standard Deviation (%RSD) of calibration factors (Evaluation Mixes A, B, and C) for Aldrin, Endrin, 4,4'-DDT, and Dibutylchlorendate exceeds 10% in the following runs:

Run Date	Column	Compound	%RSD
4/07-4/08	DB608	Endrin	10.7
4/21-4/23	DB608	4,4'-DDT	10.7
5/03-5/04	DB608	DBC	12.0

Quantitation was not performed using column DB608 during these instrumentation runs. Therefore, the QC exceptions do not affect any data.

Calibration factors and %RSDs were recalculated from raw data for two of the six instrumentation runs (3/30-4/01, 4/11-4/12). No significant errors were found.

Analytical Sequence: With the exception of the instrumentation run on 5/03-5/04, all runs end with only Individual Mix A instead of both Individual Standard Mix A and B, as required. This exception is not expected to affect data quality since all analyses of Individual Mix B during each run are acceptable. The 72-hour analytical sequence was followed for all other standards and samples during all instrumentation runs.

Continuing Calibration: The Percent Difference (%D) between calibration factors (initial calibration versus continuing calibration) is $\leq$15% for all continuing calibration standards used in quantitation, and $\leq$20% for all continuing calibration standards used in confirmation. %D was confirmed by recalculation for all standards used in quantitation or confirmation.

D. Method Blank Analysis

Method blank analysis was performed at the required frequency (one per extraction batch). A total of nine method blanks were analyzed. No TCL pesticide or PCBs were detected in any method blank. Raw data for all method blanks were examined. The chromatogram for the first method blank analyzed (extracted 3/24/89, analyzed 3/30/89 at 1813 hours) shows evidence of minor contamination, possibly from instrumental carryover of a field sample extract. However, none of the peaks present in the chromatogram could be associated with a TCL pesticide or PCB.

E. Surrogate Recovery

The USEPA CLP-specified surrogate, Dibutylchlorendate, was added to all samples including method blanks, matrix spike samples, and matrix spike duplicate samples. The surrogate was spiked at a mass of 1 ug, which is equivalent to a mean dry weight concentration of 28 ug/kg.

Surrogate recoveries (%R) for all field samples are within the acceptance limits specified for this project (%R$\geq$ 50%). Transcription to Form II was checked for all data. For 30% of all samples, surrogate data were verified by examination of chromatograms and quantitation reports, and recoveries were confirmed by recalculation.

F. Matrix Spike/Matrix Spike Duplicate Analysis

MS/MSD analysis was performed on samples associated with Stations 5, 26, 32, 38, and 44. All MS/MSD samples were spiked with following TCL pesticides:

Compound	Amount Spiked (ug)	Mean Equivalent Concentration (ug/kg)
Lindane	0.2	5.6
Heptachlor	0.2	5.6
Aldrin	0.2	5.6
Dieldrin	0.5	14.1
Endrin	0.5	14.1
4,4'-DDT	0.5	14.1

All MS/MSD analyses meet project-specified acceptance criteria ($\geq$50% recovery (%R), $\pm$100% Relative Percent Difference (RPD)) for all CLP-specified spike compounds, with the following exceptions:

Station	MS %R	MSD %R
Station 5	53	46
Station 38	41	33

The average MS/MSD recovery for Station 5 (50%) is considered acceptable. The average MS/MSD recovery for Station 38 is <50%. However, no positive results were reported for the spiked compounds in any samples associated with Station 38, and therefore no results require qualification.

Transcription of laboratory data to Form III was confirmed for all compounds. %Rs and RPDs were confirmed by recalculation. No significant errors were found. Quantitation was confirmed for all MS/MSD compounds.

G. TCL Compound Identification

Chromatograms and quantitation reports were examined for all samples analyzed. Retention Times (RT) for positive results were all within the appropriate RT window for both columns. All reported non-detects were checked for accuracy and verified to be correct. GC/MS confirmation was not required.

H. Compound Quantitation and Reported Detection Limits

Quantitation calculations were verified for all identified TCL compounds in all samples by recalculation of results from raw data. Average quantitation limits are given in Table 1A.

I. Other Performance Data

Field-Generated QC Samples: Two types of field-generated QC samples were collected at a frequency of 10%. Station duplicate splits were generated by taking two separate aliquots of sediment from a composite of at least two van Veen grab samples, with one aliquot assigned to the station number, and the other assigned a surrogate station number. Separate station replicates were generated by collecting two additional and separate van Veen grab samples while on station. Site replicates were assigned separate surrogate station numbers.

Results for all replicates are summarized in Table 3A. Summary statistics for these samples are presented in Table 3B. The coefficient of variation (CV) representing monitoring variability within a station was determined using all 4 samples. Relative Percent Differences (RPD) were determined relative to the original sample and the blind field-generated duplicate splits.

Sequim Bay Comparison Samples: Homogenized archived sediment from Sequim Bay were submitted blind for analysis in triplicate as Stations 66, 67 and 68. This material was acquired from the Office of Puget Sound, USEPA Region X, and consists of a composited marine sediment that had been prepared as a fortified sample under contract by National Marine Fisheries, NOAA. Analytical results and summary statistics for these samples are presented in Table 4.

J. Overall Case Assessment

The level of effort exhibited by the laboratory for this data package is better than average. The quantitation levels achieved are significantly lower than CLP requirements. All deliverables required by the project are present, and the data package is complete. Overall, the data is considered usable for the intended purposes.

III. Summary of Qualified Data

No sample results associated with this data package require qualification for QC deficiencies.

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 28, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 1
Pesticides/PCBs Analyses Results
(ug/kg, dry weight)

CAS No.	Compound	Station 1 Result Q	Station 2 Result Q	Station 3 Result Q	Station 4 Result Q	Station 5 Result Q	Station 6 Result Q	Station 7 Result Q	Station 8 Result Q	Station 9 Result Q	Station 10 Result Q
319-84-6	alpha-BHC	1.5 U	0.9 U	0.9 U	1.8 U	1.5 U	0.6 U	0.7 U	1.2 U	0.7 U	0.9 U
319-85-7	beta-BHC	1.5 U	0.9 U	0.9 U	1.8 U	1.5 U	0.6 U	0.7 U	1.2 U	0.7 U	0.9 U
319-86-8	delta-BHC	1.5 U	0.9 U	0.9 U	1.8 U	1.5 U	0.6 U	0.7 U	1.2 U	0.7 U	0.9 U
58-89-9	gamma-BHC (Lindane)	1.5 U	0.9 U	0.9 U	1.8 U	1.5 U	0.6 U	0.7 U	1.2 U	0.7 U	0.9 U
76-44-8	Heptachlor	1.5 U	0.9 U	0.9 U	1.8 U	1.5 U	0.6 U	0.7 U	1.2 U	0.7 U	0.9 U
309-00-2	Aldrin	1.5 U	0.9 U	0.9 U	1.8 U	1.5 U	0.6 U	0.7 U	1.2 U	0.7 U	0.9 U
1024-57-3	Heptachlor epoxide	1.5 U	0.9 U	0.9 U	1.8 U	1.5 U	0.6 U	0.7 U	1.2 U	0.7 U	0.9 U
959-98-8	Endosulfan I	1.5 U	0.9 U	0.9 U	1.8 U	1.5 U	0.6 U	0.7 U	1.2 U	0.7 U	0.9 U
60-57-1	Dieldrin	2.5 U	1.4 U	1.4 U	2.7 U	2.5 U	0.9 U	1.1 U	1.8 U	1.1 U	1.4 U
72-55-9	4,4'-DDE	2.5 U	1.4 U	1.4 U	2.7 U	2.5 U	0.9 U	1.1 U	1.8 U	1.1 U	1.4 U
72-20-8	Endrin	2.5 U	1.4 U	1.4 U	2.7 U	2.5 U	0.9 U	1.1 U	1.8 U	1.1 U	1.4 U
33213-65-9	Endosulfan II	2.5 U	1.4 U	1.4 U	2.7 U	2.5 U	0.9 U	1.1 U	1.8 U	1.1 U	1.4 U
72-54-8	4,4'-DDD	4.5 U	2.7 U	2.7 U	5.4 U	4.5 U	1.8 U	2.1 U	3.6 U	2.1 U	2.7 U
1031-07-8	Endosulfan sulfate	4.5 U	2.7 U	2.7 U	5.4 U	4.5 U	1.8 U	2.1 U	3.6 U	2.1 U	2.7 U
50-29-3	4,4'-DDT	3.0 U	1.8 U	1.8 U	3.6 U	3.0 U	1.2 U	1.4 U	2.4 U	1.4 U	1.8 U
72-43-5	Methoxychlor	6.0 U	3.6 U	3.6 U	7.2 U	6.0 U	2.4 U	2.8 U	4.8 U	2.8 U	3.6 U
53494-70-5	Endrin ketone	2.5 U	1.4 U	1.4 U	2.7 U	2.5 U	0.9 U	1.1 U	1.8 U	1.1 U	1.4 U
5103-74-2	gamma-Chlordane	1.5 U	0.9 U	0.9 U	1.8 U	1.5 U	0.6 U	0.7 U	1.2 U	0.7 U	0.9 U
5103-71-9	alpha-Chlordane	1.5 U	0.9 U	0.9 U	1.8 U	1.5 U	0.6 U	0.7 U	1.2 U	0.7 U	0.9 U
8001-35-2	Toxaphene	220 U	130 U	130 U	270 U	220 U	90 U	110 U	180 U	110 U	140 U
-	Aroclor 1016/1242	30 U	18 U	18 U	36 U	30 U	12 U	14 U	24 U	14 U	18 U
12672-29-6	Aroclor 1248	30 U	18 U	18 U	36 U	30 U	12 U	14 U	24 U	14 U	18 U
11097-69-1	Aroclor 1254	30 U	18 U	18 U	36 U	30 U	12 U	14 U	24 U	14 U	18 U
11096-82-5	Aroclor 1260	30 U	18 U	18 U	36 U	30 U	12 U	14 U	24 U	14 U	18 U

Data Qualifiers:

U: The parameter was analyzed for but not reported above the associated value, which is the sample quantitation limit.

E: The associated value is an estimated quantity.

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 28, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 1
Pesticides/PCBs Analyses Results
(ug/kg, dry weight)

CAS No.	Compound	Station 11 Result	Q	Station 12 Result	Q	Station 13 Result	Q	Station 14 Result	Q	Station 15 Result	Q	Station 16 Result	Q	Station 17 Result	Q	Station 18 Result	Q	Station 19 Result	Q	Station 20 Result	Q
319-84-6	alpha-BHC	0.9	U	1.5	U	0.7	U	0.8	U	0.8	U	0.7	U	1.5	U	1.3	U	1.8	U	1.0	U
319-85-7	beta-BHC	0.9	U	1.5	U	0.7	U	0.8	U	0.8	U	0.7	U	1.5	U	1.3	U	1.8	U	1.0	U
319-86-8	delta-BHC	0.9	U	1.5	U	0.7	U	0.8	U	0.8	U	0.7	U	1.5	U	1.3	U	1.8	U	1.0	U
58-89-9	gamma-BHC (Lindane)	0.9	U	1.5	U	0.7	U	0.8	U	0.8	U	0.7	U	1.5	U	1.3	U	1.8	U	1.0	U
76-44-8	Heptachlor	0.9	U	1.5	U	0.7	U	0.8	U	0.8	U	0.7	U	1.5	U	1.3	U	1.8	U	1.0	U
309-00-2	Aldrin	0.9	U	1.5	U	0.7	U	0.8	U	0.8	U	0.7	U	1.5	U	1.3	U	1.8	U	1.0	U
1024-57-3	Heptachlor epoxide	0.9	U	1.5	U	0.7	U	0.8	U	0.8	U	0.7	U	1.5	U	1.3	U	1.8	U	1.0	U
959-98-8	Endosulfan I	0.9	U	1.5	U	0.7	U	0.8	U	0.8	U	0.7	U	1.5	U	1.3	U	1.8	U	1.0	U
60-57-1	Dieldrin	1.4	U	2.3	U	1.1	U	1.2	U	1.2	U	1.1	U	2.3	U	2.0	U	2.7	U	1.5	U
72-55-9	4,4'-DDE	1.4	U	2.3	U	1.1	U	1.2	U	1.2	U	1.1	U	2.3	U	2.0	U	2.7	U	1.5	U
72-20-8	Endrin	1.4	U	2.3	U	1.1	U	1.2	U	1.2	U	1.1	U	2.3	U	2.0	U	2.7	U	1.5	U
33213-65-9	Endosulfan II	1.4	U	2.3	U	1.1	U	1.2	U	1.2	U	1.1	U	2.3	U	2.0	U	2.7	U	1.5	U
72-54-8	4,4'-DDD	2.7	U	4.5	U	2.1	U	2.4	U	2.4	U	2.1	U	4.5	U	3.9	U	5.4	U	3.0	U
1031-07-8	Endosulfan sulfate	2.7	U	4.5	U	2.1	U	2.4	U	2.4	U	2.1	U	4.5	U	3.9	U	5.4	U	3.0	U
50-29-3	4,4'-DDT	1.8	U	3.0	U	1.4	U	1.6	U	1.6	U	1.4	U	3.0	U	2.6	U	3.6	U	2.0	U
72-43-5	Methoxychlor	3.6	U	6.0	U	2.8	U	3.2	U	3.2	U	2.8	U	6.0	U	5.2	U	7.2	U	4.0	U
53494-70-5	Endrin ketone	1.4	U	2.3	U	1.1	U	1.2	U	1.2	U	1.1	U	2.3	U	2.0	U	2.7	U	1.5	U
5103-74-2	gamma-Chlordane	0.9	U	1.5	U	0.7	U	0.8	U	0.8	U	0.7	U	1.5	U	1.3	U	1.8	U	1.0	U
5103-71-9	alpha-Chlordane	0.9	U	1.5	U	0.7	U	0.8	U	0.8	U	0.7	U	1.5	U	1.3	U	1.8	U	1.0	U
8001-35-2	Toxaphene	140	U	230	U	110	U	120	U	120	U	110	U	230	U	190	U	270	U	150	U
-	Aroclor 1016/1242	18	U	30	U	14	U	16	U	16	U	14	U	30	U	26	U	36	U	20	U
12672-29-6	Aroclor 1248	18	U	30	U	14	U	16	U	16	U	14	U	30	U	26	U	36	U	20	U
11097-69-1	Aroclor 1254	18	U	30	U	14	U	16	U	16	U	14	U	30	U	26	U	36	U	20	U
11096-82-5	Aroclor 1260	18	U	30	U	14	U	16	U	16	U	14	U	30	U	26	U	36	U	20	U

Data Qualifiers:

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Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 28, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 1
Pesticides/PCBs Analyses Results
(ug/kg, dry weight)

CAS No.	Compound	Station 21 Result	Q	Station 22 Result	Q	Station 23 Result	Q	Station 24 Result	Q	Station 25 Result	Q	Station 26 Result	Q	Station 27 Result	Q	Station 28 Result	Q	Station 29 Result	Q	Station 30 Result	Q
319-84-6	alpha-BHC	0.9	U	0.8	U	0.8	U	1.4	U	0.6	U	0.6	U	0.7	U	0.6	U	1.4	U	0.9	U
319-85-7	beta-BHC	0.9	U	0.8	U	0.8	U	1.4	U	0.6	U	0.6	U	0.7	U	0.6	U	1.4	U	0.9	U
319-86-8	delta-BHC	0.9	U	0.8	U	0.8	U	1.4	U	0.6	U	0.6	U	0.7	U	0.6	U	1.4	U	0.9	U
58-89-9	gamma-BHC (Lindane)	0.9	U	0.8	U	0.8	U	1.4	U	0.6	U	0.6	U	0.7	U	0.6	U	1.4	U	0.9	U
76-44-8	Heptachlor	0.9	U	0.8	U	0.8	U	1.4	U	0.6	U	0.6	U	0.7	U	0.6	U	1.4	U	0.9	U
309-00-2	Aldrin	0.9	U	0.8	U	0.8	U	1.4	U	0.6	U	0.6	U	0.7	U	0.6	U	1.4	U	1.1	U
1024-57-3	Heptachlor epoxide	0.9	U	0.8	U	0.8	U	1.4	U	0.6	U	0.6	U	0.7	U	0.6	U	1.4	U	0.9	U
959-98-8	Endosulfan I	0.9	U	0.8	U	0.8	U	1.4	U	0.6	U	0.6	U	0.7	U	0.6	U	1.4	U	0.9	U
60-57-1	Dieldrin	1.4	U	1.2	U	1.2	U	2.1	U	0.9	U	0.9	U	1.1	U	0.9	U	2.1	U	1.4	U
72-55-9	4,4'-DDE	1.4	U	1.2	U	1.2	U	2.1	U	0.9	U	0.9	U	1.1	U	0.9	U	2.1	U	1.4	U
72-20-8	Endrin	1.4	U	1.2	U	1.2	U	2.1	U	0.9	U	0.9	U	1.1	U	0.9	U	2.1	U	1.4	U
33213-65-9	Endosulfan II	1.4	U	1.2	U	1.2	U	2.1	U	0.9	U	0.9	U	1.1	U	0.9	U	2.1	U	1.4	U
72-54-8	4,4'-DDD	2.7	U	2.4	U	2.4	U	4.2	U	1.8	U	1.8	U	2.1	U	1.8	U	4.2	U	2.7	U
1031-07-8	Endosulfan sulfate	2.7	U	2.4	U	2.4	U	4.2	U	1.8	U	1.8	U	2.1	U	1.8	U	4.2	U	2.7	U
50-29-3	4,4'-DDT	1.8	U	1.6	U	1.6	U	2.8	U	1.2	U	1.2	U	1.4	U	1.2	U	2.8	U	1.8	U
72-43-5	Methoxychlor	3.6	U	3.2	U	3.2	U	5.6	U	2.4	U	2.4	U	2.8	U	2.4	U	5.6	U	3.6	U
53494-70-5	Endrin ketone	1.4	U	1.2	U	1.2	U	2.1	U	0.9	U	0.9	U	1.1	U	0.9	U	2.1	U	1.4	U
5103-74-2	gamma-Chlordane	1.1	U	0.8	U	0.8	U	1.4	U	0.6	U	0.6	U	0.7	U	0.6	U	1.4	U	0.9	U
5103-71-9	alpha-Chlordane	0.9	U	0.8	U	0.8	U	1.4	U	0.6	U	0.6	U	0.7	U	0.6	U	1.4	U	0.9	U
8001-35-2	Toxaphene	130	U	120	U	120	U	210	U	90	U	90	U	110	U	90	U	210	U	135	U
-	Aroclor 1016/1242	18	U	16	U	16	U	28	U	12	U	12	U	14	U	12	U	28	U	18	U
12672-29-6	Aroclor 1248	18	U	16	U	16	U	28	U	12	U	12	U	14	U	12	U	28	U	18	U
11097-69-1	Aroclor 1254	30		16	U	16	U	28	U	12	U	12	U	14	U	12	U	6.0	E	14	E
11096-82-5	Aroclor 1260	18	U	16	U	16	U	28	U	12	U	12	U	14	U	12	U	28	U	18	U

Data Qualifiers:

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E: The associated value is an estimated quantity.

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 28, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 1
Pesticides/PCBs Analyses Results
(ug/kg, dry weight)

CAS No.	Compound	Station 31 Result	Station 31 Q	Station 32 Result	Station 32 Q	Station 33 Result	Station 33 Q	Station 34 Result	Station 34 Q	Station 35 Result	Station 35 Q	Station 36 Result	Station 36 Q	Station 37 Result	Station 37 Q	Station 38 Result	Station 38 Q	Station 39 Result	Station 39 Q	Station 40 Result	Station 40 Q
319-84-6	alpha-BHC	0.6	U	0.7	U	0.8	U	1.4	U	1.4	U	0.6	U	0.6	U	0.6	U	0.2	U	0.3	U
319-85-7	beta-BHC	0.6	U	0.7	U	0.8	U	1.4	U	1.4	U	0.6	U	0.6	U	0.6	U	0.2	U	0.3	U
319-86-8	delta-BHC	0.6	U	0.7	U	0.8	U	1.4	U	1.4	U	0.6	U	0.6	U	0.6	U	0.2	U	0.3	U
58-89-9	gamma-BHC (Lindane)	0.6	U	0.7	U	0.8	U	1.4	U	1.4	U	0.6	U	0.6	U	0.6	U	0.2	U	0.3	U
76-44-8	Heptachlor	0.6	U	0.7	U	0.8	U	1.4	U	1.4	U	0.6	U	0.6	U	0.6	U	0.2	U	0.3	U
309-00-2	Aldrin	0.6	U	0.7	U	0.8	U	1.4	U	1.4	U	0.6	U	0.6	U	0.6	U	0.2	U	0.3	U
1024-57-3	Heptachlor epoxide	0.6	U	0.7	U	0.8	U	1.4	U	1.4	U	0.6	U	0.6	U	0.6	U	0.2	U	0.3	U
959-98-8	Endosulfan I	0.6	U	0.7	U	0.8	U	1.4	U	1.4	U	0.6	U	0.6	U	0.6	U	0.2	U	0.3	U
60-57-1	Dieldrin	0.9	U	1.1	U	1.2	U	2.1	U	2.1	U	0.9	U	0.9	U	0.9	U	0.3	U	0.5	U
72-55-9	4,4'-DDE	0.9	U	1.1	U	1.2	U	2.1	U	2.1	U	0.9	U	0.9	U	1.6	U	0.3	U	0.5	U
72-20-8	Endrin	0.9	U	1.1	U	1.2	U	2.1	U	2.1	U	0.9	U	0.9	U	0.9	U	0.3	U	0.5	U
33213-65-9	Endosulfan II	0.9	U	1.1	U	1.2	U	2.1	U	2.1	U	0.9	U	0.9	U	0.9	U	0.3	U	0.5	U
72-54-8	4,4'-DDD	1.8	U	2.1	U	2.6		4.2	U	4.2	U	1.8	U	1.8	U	1.8	U	0.6	U	0.9	U
1031-07-8	Endosulfan sulfate	1.8	U	2.1	U	2.4	U	4.2	U	4.2	U	1.8	U	1.8	U	1.8	U	0.6	U	0.9	U
50-29-3	4,4'-DDT	1.2	U	1.4	U	1.6	U	2.8	U	2.8	U	1.2	U	1.2	U	1.2	U	0.4	U	0.6	U
72-43-5	Methoxychlor	2.4	U	2.8	U	3.2	U	5.6	U	5.6	U	2.4	U	2.4	U	2.4	U	0.8	U	1.2	U
53494-70-5	Endrin ketone	0.9	U	1.1	U	1.2	U	2.1	U	2.1	U	0.9	U	0.9	U	0.9	U	0.3	U	0.5	U
5103-74-2	gamma-Chlordane	0.6	U	0.7	U	2.8	U	1.4	U	1.4	U	0.6	U	0.6	U	0.6	U	0.2	U	0.3	U
5103-71-9	alpha-Chlordane	0.6	U	0.7	U	0.9		1.4	U	1.4	U	0.6	U	0.6	U	0.6	U	0.2	U	0.3	U
8001-35-2	Toxaphene	90	U	110	U	120	U	210	U	210	U	90	U	90	U	90	U	30	U	45	U
-	Aroclor 1016/1242	12	U	14	U	16	U	28	U	28	U	12	U	12	U	12	U	4.0	U	6.0	U
12672-29-6	Aroclor 1248	12	U	14	U	16	U	28	U	28	U	12	U	12	U	12	U	4.0	U	6.0	U
11097-69-1	Aroclor 1254	4.0	E	6.7	E	40		49		15		12	U	12	U	16		4.0	U	10	
11096-82-5	Aroclor 1260	12	U	14	U	16	U	28	U	28	U	12	U	12	U	12	U	4.0	U	6.0	U

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Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 28, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 1
Pesticides/PCBs Analyses Results
(ug/kg, dry weight)

CAS No.	Compound	Station 41 Result	Q	Station 42 Result	Q	Station 43 Result	Q	Station 44 Result	Q	Station 45 Result	Q	Station 46 Result	Q	Station 47 Result	Q	Station 48 Result	Q	Station 49 Result	Q	Station 50 Result	Q
319-84-6	alpha-BHC	0.7	U	0.7	U	0.7	U	0.8	U	1.0	U	0.8	U	0.7	U	2.0	U	2.0	U	0.7	U
319-85-7	beta-BHC	0.7	U	0.7	U	0.7	U	0.8	U	1.0	U	0.8	U	0.7	U	2.0	U	2.0	U	0.7	U
319-86-8	delta-BHC	0.7	U	0.7	U	0.7	U	0.8	U	1.0	U	0.8	U	0.7	U	2.0	U	2.0	U	0.7	U
58-89-9	gamma-BHC (Lindane)	0.7	U	0.7	U	0.7	U	0.8	U	1.0	U	0.8	U	0.7	U	2.0	U	2.0	U	0.7	U
76-44-8	Heptachlor	0.7	U	0.7	U	0.7	U	0.8	U	1.0	U	0.8	U	0.7	U	2.0	U	2.0	U	0.7	U
309-00-2	Aldrin	0.7	U	0.7	U	0.7	U	0.8	U	1.0	U	0.8	U	0.7	U	2.0	U	2.0	U	0.7	U
1024-57-3	Heptachlor epoxide	0.7	U	0.7	U	0.7	U	0.8	U	1.0	U	0.8	U	0.7	U	2.0	U	2.0	U	0.7	U
959-98-8	Endosulfan I	0.7	U	0.7	U	0.7	U	0.8	U	1.0	U	0.8	U	0.7	U	2.0	U	2.0	U	0.7	U
60-57-1	Dieldrin	1.1	U	1.1	U	1.1	U	1.2	U	1.5	U	1.2	U	1.1	U	3.0	U	3.0	U	1.1	U
72-55-9	4,4'-DDE	1.1	U	1.1	U	1.1	U	1.2	U	1.5	U	1.2	U	1.1	U	3.0	U	3.0	U	1.1	U
72-20-8	Endrin	1.1	U	1.1	U	1.1	U	1.2	U	1.5	U	1.2	U	1.1	U	3.0	U	3.0	U	1.1	U
33213-65-9	Endosulfan II	1.1	U	1.1	U	1.1	U	1.2	U	1.5	U	1.2	U	1.1	U	3.0	U	3.0	U	1.1	U
72-54-8	4,4'-DDD	2.1	U	2.1	U	2.1	U	2.4	U	3.0	U	2.4	U	2.1	U	6.0	U	6.0	U	2.1	U
1031-07-8	Endosulfan sulfate	2.1	U	2.1	U	2.1	U	2.4	U	3.0	U	2.4	U	2.1	U	6.0	U	6.0	U	2.1	U
50-29-3	4,4'-DDT	1.4	U	1.4	U	1.4	U	1.6	U	2.0	U	1.6	U	1.4	U	4.0	U	4.0	U	1.4	U
72-43-5	Methoxychlor	2.8	U	2.8	U	2.8	U	3.2	U	4.0	U	3.2	U	2.8	U	8.0	U	8.0	U	2.8	U
53494-70-5	Endrin ketone	1.1	U	1.1	U	1.1	U	1.2	U	1.5	U	1.2	U	1.1	U	3.0	U	3.0	U	1.1	U
5103-74-2	gamma-Chlordane	0.7	U	0.7	U	0.7	U	0.8	U	1.0	U	0.8	U	0.7	U	2.0	U	2.0	U	0.7	U
5103-71-9	alpha-Chlordane	0.7	U	0.7	U	0.7	U	0.8	U	1.0	U	0.8	U	0.7	U	2.0	U	2.0	U	0.7	U
8001-35-2	Toxaphene	105	U	105	U	105	U	120	U	150	U	120	U	105	U	300	U	300	U	105	U
-	Aroclor 1016/1242	14	U	14	U	14	U	16	U	20	U	20	U	14	U	40	U	40	U	14	U
12672-29-6	Aroclor 1248	14	U	14	U	14	U	16	U	20	U	20	U	14	U	40	U	40	U	14	U
11097-69-1	Aroclor 1254	14	U	14	U	14	U	16	U	20	U	20	U	14	U	18	E	22	E	14	U
11096-82-5	Aroclor 1260	14	U	14	U	14	U	16	U	20	U	20	U	14	U	40	U	40	U	14	U

Data Qualifiers:

U: The parameter was analyzed for but not reported above the associated value, which is the sample quantitation limit.

E: The associated value is an estimated quantity.

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 28, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 1
Pesticides/PCBs Analyses Results
(ug/kg, dry weight)

CAS No.	Compound	Station 51 Result	Q	Station 52 Result	Q	Station 53 Result	Q	Station 54 Result	Q	Station 55 Result	Q	Station 56 Result	Q	Station 57 Result	Q	Station 58 Result	Q	Station 59 Result	Q	Station 60 Result	Q
319-84-6	alpha-BHC	1.5	U	1.3	U	1.3	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.0	U
319-85-7	beta-BHC	1.5	U	1.3	U	1.3	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.0	U
319-86-8	delta-BHC	1.5	U	1.3	U	1.3	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.0	U
58-89-9	gamma-BHC (Lindane)	1.5	U	1.3	U	1.3	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.0	U
76-44-8	Heptachlor	1.5	U	1.3	U	1.3	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.0	U
309-00-2	Aldrin	1.5	U	1.3	U	1.3	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.0	U
1024-57-3	Heptachlor epoxide	1.5	U	1.3	U	1.3	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.0	U
959-98-8	Endosulfan I	1.5	U	1.3	U	1.3	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.0	U
60-57-1	Dieldrin	2.5	U	2.0	U	2.0	U	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U	3.0	U
72-55-9	4,4'-DDE	2.5	U	2.0	U	2.0	U	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U	3.0	U
72-20-8	Endrin	2.5	U	2.0	U	2.0	U	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U	3.0	U
33213-65-9	Endosulfan II	2.5	U	2.0	U	2.0	U	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U	3.0	U
72-54-8	4,4'-DDD	4.5	U	3.9	U	3.9	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	6.0	U
1031-07-8	Endosulfan sulfate	4.5	U	3.9	U	3.9	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	2.1	U	6.0	U
50-29-3	4,4'-DDT	3.0	U	2.6	U	2.6	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	4.0	U
72-43-5	Methoxychlor	6.0	U	5.2	U	5.2	U	2.8	U	2.8	U	2.8	U	2.8	U	2.8	U	2.8	U	8.0	U
53494-70-5	Endrin ketone	2.5	U	2.0	U	2.0	U	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U	3.0	U
5103-74-2	gamma-Chlordane	1.5	U	1.3	U	1.3	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.0	U
5103-71-9	alpha-Chlordane	1.5	U	1.3	U	1.3	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	0.7	U	2.0	U
8001-35-2	Toxaphene	220	U	190	U	190	U	110	U	110	U	110	U	110	U	110	U	110	U	300	U
-	Aroclor 1016/1242	30	U	26	U	26	U	14	U	14	U	14	U	14	U	14	U	14	U	40	U
12672-29-6	Aroclor 1248	30	U	26	U	26	U	14	U	14	U	14	U	14	U	14	U	14	U	40	U
11097-69-1	Aroclor 1254	30	U	26	U	26	U	14	U	14	U	14	U	7.6	E	8.5	E	5.5	E	22	E
11096-82-5	Aroclor 1260	30	U	26	U	26	U	14	U	14	U	14	U	14	U	14	U	14	U	40	U

Data Qualifiers:
U: The parameter was analyzed for but not reported above the associated value, which is the sample quantitation limit.
E: The associated value is an estimated quantity.

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 28, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 1
Pesticides/PCBs Analyses Results
(ug/kg, dry weight)

CAS No.	Compound	Station 61 Result	Q	Station 62 Result	Q	Station 63 Result	Q	Station 64 Result	Q	Station 65 Result	Q	Station 66 Result	Q	Station 67 Result	Q	Station 68 Result	Q
319-84-6	alpha-BHC	2.0	U	2.0	U	0.8	U	0.8	U	0.9	U	1.0		1.1		1.1	
319-85-7	beta-BHC	2.0	U	2.0	U	0.8	U	0.8	U	0.9	U	0.9	U	0.9	U	0.9	U
319-86-8	delta-BHC	2.0	U	2.0	U	0.8	U	0.8	U	0.9	U	0.9	U	0.9	U	0.9	U
58-89-9	gamma-BHC (Lindane)	2.0	U	2.0	U	0.8	U	0.8	U	0.9	U	1.3		1.5		1.6	
76-44-8	Heptachlor	2.0	U	2.0	U	0.8	U	0.8	U	0.9	U	0.9	U	0.9	U	0.9	U
309-00-2	Aldrin	2.0	U	2.0	U	0.8	U	0.8	U	0.9	U	0.9	U	0.9	U	0.9	U
1024-57-3	Heptachlor epoxide	2.0	U	2.0	U	0.8	U	0.8	U	0.9	U	0.9	U	0.9	U	0.9	U
959-98-8	Endosulfan I	2.0	U	2.0	U	0.8	U	0.8	U	0.9	U	24		28		30	
60-57-1	Dieldrin	3.0	U	3.0	U	1.2	U	1.2	U	1.4	U	1.4	U	1.4	U	1.4	U
72-55-9	4,4'-DDE	3.0	U	3.0	U	1.2	U	1.2	U	1.4	U	1.4	U	1.4	U	1.4	U
72-20-8	Endrin	3.0	U	3.0	U	1.2	U	1.2	U	1.4	U	1.4	U	1.4	U	1.4	U
33213-65-9	Endosulfan II	3.0	U	3.0	U	1.2	U	1.2	U	1.4	U	18		22		22	
72-54-8	4,4'-DDD	6.0	U	6.0	U	2.4	U	2.4	U	2.7	U	2.7	U	2.7	U	2.7	U
1031-07-8	Endosulfan sulfate	6.0	U	6.0	U	2.4	U	2.4	U	2.7	U	2.7	U	2.7	U	2.7	U
50-29-3	4,4'-DDT	4.0	U	4.0	U	1.6	U	1.6	U	1.8	U	1.8	U	1.8	U	1.8	U
72-43-5	Methoxychlor	8.0	U	8.0	U	3.2	U	3.2	U	3.6	U	3.6	U	3.6	U	3.6	U
53494-70-5	Endrin ketone	3.0	U	3.0	U	1.2	U	1.2	U	1.4	U	1.4	U	1.4	U	1.4	U
5103-74-2	gamma-Chlordane	2.0	U	2.0	U	0.8	U	0.8	U	0.9	U	0.9	U	1.4	U	1.6	U
5103-71-9	alpha-Chlordane	2.0	U	2.0	U	0.8	U	0.8	U	0.9	U	0.9	U	0.9	U	0.9	U
8001-35-2	Toxaphene	300	U	300	U	120	U	120	U	140	U	130	U	130	U	130	U
-	Aroclor 1016/1242	40	U	40	U	16	U	16	U	18	U	18	U	18	U	18	U
12672-29-6	Aroclor 1248	40	U	40	U	16	U	16	U	18	U	18	U	18	U	18	U
11097-69-1	Aroclor 1254	22	E	28	E	16	U	16	U	18	U	100		120		130	
11096-82-5	Aroclor 1260	40	U	40	U	16	U	16	U	18	U	18	U	18	U	18	U

Data Qualifiers:

U: The parameter was analyzed for but not reported above the associated value, which is the sample quantitation limit.

E: The associated value is an estimated quantity.

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 28, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 1A

Pesticides/PCBs
Quantitation Limits
(ug/kg, dry weight)

Target Parameter	Quantitation Limit Average	Lowest
alpha-BHC	1.0	0.2
beta-BHC	1.0	0.2
delta-BHC	1.0	0.2
gamma-BHC (Lindane)	1.0	0.2
Heptachlor	1.0	0.2
Aldrin	1.0	0.2
Heptachlor epoxide	1.0	0.2
Endosulfan I	1.0	0.2
Dieldrin	1.5	0.3
4,4'-DDE	1.5	0.3
Endrin	1.5	0.3
Endosulfan II	1.5	0.3
4,4'-DDD	3.0	0.6
Endosulfan sulfate	3.0	0.6
4,4'-DDT	2.0	0.4
Methoxychlor	4.0	0.8
Endrin ketone	1.5	0.3
gamma-Chlordane	1.0	0.2
alpha-Chlordane	1.0	0.2
Toxaphene	149	30
Aroclor 1016/1242	20	4.0
Aroclor 1248	20	4.0
Aroclor 1254	19	4.0
Aroclor 1260	20	4.0

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 28, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 2

Pesticides/PCBs
Sample/Extract Holding Times

Sample Number	Date Collected	Date Extracted	Holding Time* (Extraction)	Date Analyzed	Holding Time* (Analysis)
Station 1	3/29/88	4/04/89	6	4/07/89	3
Station 2	3/29/88	4/04/89	6	4/08/89	4
Station 3	3/29/88	4/04/89	6	4/08/89	4
Station 4	3/29/88	4/04/89	6	4/08/89	4
Station 5	3/29/88	4/04/89	6	4/08/89	4
Station 6	3/29/88	4/04/89	6	4/08/89	4
Station 7	4/02/89	4/06/89	4	4/22/89	16
Station 8	4/02/89	4/06/89	4	4/23/89	17
Station 9	4/02/89	4/06/89	4	4/23/89	17
Station 10	4/02/89	4/06/89	4	4/23/89	17
Station 11	4/02/89	4/06/89	4	4/23/89	17
Station 12	4/03/89	4/07/89	4	4/23/89	16
Station 13	4/03/89	4/07/89	4	4/23/89	16
Station 14	4/03/89	4/07/89	4	4/23/89	16
Station 15	4/03/89	4/13/89	10	5/04/89	21
Station 16	4/04/89	4/07/89	3	4/23/89	16
Station 17	4/04/89	4/07/89	3	4/23/89	16
Station 18	3/28/89	4/03/89	6	4/08/89	5
Station 19	3/28/89	4/03/89	6	4/08/89	5
Station 20	3/28/89	4/03/89	6	4/08/89	5
Station 21	3/28/89	4/03/89	6	4/12/89	9
Station 22	3/25/89	3/29/89	4	4/04/89	6
Station 23	3/25/89	3/29/89	4	4/04/89	6
Station 24	3/25/89	3/29/89	4	4/05/89	7
Station 25	3/24/89	3/30/89	6	4/04/89	5
Station 26	3/24/89	3/30/89	6	4/05/89	6
Station 27	3/24/89	3/28/89	4	4/04/89	7
Station 28	3/23/89	3/28/89	5	4/04/89	7
Station 29	3/24/89	3/28/89	4	4/05/89	8
Station 30	3/22/89	3/28/89	6	4/04/89	7
Station 31	3/22/89	3/28/89	6	4/01/89	4
Station 32	3/23/89	3/28/89	5	4/05/89	8
Station 33	3/22/89	3/28/89	6	4/04/89	7
Station 34	3/23/89	3/28/89	5	4/06/89	9
Station 35	3/23/89	3/28/89	5	4/05/89	8
Station 36	3/22/89	3/28/89	6	4/01/89	4
Station 37	3/22/89	3/28/89	6	4/01/89	4
Station 38	3/21/89	3/24/89	3	3/30/89	6
Station 39	3/21/89	3/24/89	3	3/30/89	6
Station 40	3/21/89	3/24/89	3	3/31/89	7
Station 41	3/21/89	3/28/89	7	3/31/89	3
Station 42	3/21/89	3/28/89	7	3/31/89	3
Station 43	3/20/89	3/28/89	8	3/31/89	3
Station 44	3/20/89	3/28/89	8	3/31/89	3
Station 45	3/20/89	3/28/89	8	3/31/89	3
Station 46	3/20/89	3/28/89	8	3/31/89	3
Station 47	3/20/89	3/28/89	8	3/31/89	3
Station 48	3/19/89	3/28/89	9	4/04/89	7
Station 49	3/19/89	3/28/89	9	4/04/89	7
Station 50	3/19/89	3/28/89	9	3/31/89	3
Station 51	3/29/89	4/04/89	6	4/08/89	4
Station 52	3/29/89	4/04/89	6	4/08/89	4
Station 53	3/29/89	4/04/89	6	4/08/89	4
Station 54	3/24/89	3/30/89	6	4/05/89	6
Station 55	3/24/89	3/30/89	6	4/05/89	6
Station 56	3/24/89	3/30/89	6	4/05/89	6
Station 57	3/23/89	3/28/89	5	4/04/89	7
Station 58	3/23/89	3/28/89	5	4/05/89	8
Station 59	3/23/89	3/28/89	5	4/04/89	7
Station 60	3/21/89	3/28/89	7	4/04/89	7
Station 61	3/21/89	3/28/89	7	4/04/89	7
Station 62	3/21/89	3/28/89	7	4/04/89	7
Station 63	3/20/89	3/28/89	8	4/01/89	4
Station 64	3/20/89	3/28/89	8	4/01/89	4
Station 65	3/20/89	3/28/89	8	4/01/89	4
Station 66	3/28/89	4/03/89	6	4/12/89	9
Station 67	3/28/89	4/03/89	6	4/12/89	9
Station 68	3/28/89	4/03/89	6	4/12/89	9

* Holding time in days.
Extraction - Time of collection to time of extraction.
Analysis - Time of extraction to time of analysis.

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Table 3A

Pesticides/PCBs
Monitoring Variability Samples
(ug/kg, dry weight)

Date: August 28, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

CAS No.	Target Parameter	Station 5 (1)	Station 51 (2)	Station 52 (3)	Station 53 (3)	Station 26 (1)	Station 54 (2)	Station 55 (3)	Station 56 (3)
319-84-6	alpha-BHC	1.5 U	1.5 U	1.3 U	1.3 U	0.6 U	0.7 U	0.7 U	0.7 U
319-85-7	beta-BHC	1.5 U	1.5 U	1.3 U	1.3 U	0.6 U	0.7 U	0.7 U	0.7 U
319-86-8	delta-BHC	1.5 U	1.5 U	1.3 U	1.3 U	0.6 U	0.7 U	0.7 U	0.7 U
58-89-9	gamma-BHC (Lindane)	1.5 U	1.5 U	1.3 U	1.3 U	0.6 U	0.7 U	0.7 U	0.7 U
76-44-8	Heptachlor	1.5 U	1.5 U	1.3 U	1.3 U	0.6 U	0.7 U	0.7 U	0.7 U
309-00-2	Aldrin	1.5 U	1.5 U	1.3 U	1.3 U	0.6 U	0.7 U	0.7 U	0.7 U
1024-57-3	Heptachlor epoxide	1.5 U	1.5 U	1.3 U	1.3 U	0.6 U	0.7 U	0.7 U	0.7 U
959-98-8	Endosulfan I	1.5 U	1.5 U	1.3 U	1.3 U	0.6 U	0.7 U	0.7 U	0.7 U
60-57-1	Dieldrin	2.5 U	2.5 U	2.0 U	2.0 U	0.9 U	1.1 U	1.1 U	1.1 U
72-55-9	4,4'-DDE	2.5 U	2.5 U	2.0 U	2.0 U	0.9 U	1.1 U	1.1 U	1.1 U
72-20-8	Endrin	2.5 U	2.5 U	2.0 U	2.0 U	0.9 U	1.1 U	1.1 U	1.1 U
33213-65-9	Endosulfan II	2.5 U	2.5 U	2.0 U	2.0 U	0.9 U	1.1 U	1.1 U	1.1 U
72-54-8	4,4'-DDD	4.5 U	4.5 U	3.9 U	3.9 U	1.8 U	2.1 U	2.1 U	2.1 U
1031-07-8	Endosulfan sulfate	4.5 U	4.5 U	3.9 U	3.9 U	1.8 U	2.1 U	2.1 U	2.1 U
50-29-3	4,4'-DDT	3.0 U	3.0 U	2.6 U	2.6 U	1.2 U	1.4 U	1.4 U	1.4 U
72-43-5	Methoxychlor	6.0 U	6.0 U	5.2 U	5.2 U	2.4 U	2.8 U	2.8 U	2.8 U
53494-70-5	Endrin ketone	2.5 U	2.5 U	2.0 U	2.0 U	0.9 U	1.1 U	1.1 U	1.1 U
5103-74-2	gamma-Chlordane	1.5 U	1.5 U	1.3 U	1.3 U	0.6 U	0.7 U	0.7 U	0.7 U
5103-71-9	alpha-Chlordane	1.5 U	1.5 U	1.3 U	1.3 U	0.6 U	0.7 U	0.7 U	0.7 U
8001-35-2	Toxaphene	220 U	220 U	190 U	190 U	90 U	110 U	110 U	110 U
-	Aroclor 1016/1242	30 U	30 U	26 U	26 U	12 U	14 U	14 U	14 U
12672-29-6	Aroclor 1248	30 U	30 U	26 U	26 U	12 U	14 U	14 U	14 U
11097-69-1	Aroclor 1254	30 U	30 U	26 U	26 U	12 U	14 U	14 U	14 U
11096-82-5	Aroclor 1260	30 U	30 U	26 U	26 U	12 U	14 U	14 U	14 U

(1) Primary sample.
(2) Sample split of primary sample, composited from several van Veen field grabs.
(3) Separate van Veen grab sample at same station as primary sample.

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Table 3
Pesticides/PCBs
Monitoring Variability Samples
(ug/kg, dry weight)

Date: August 28, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

CAS No.	Target Parameter	Station 32 (1)	Station 57 (2)	Station 58 (3)	Station 59 (3)	Station 38 (1)	Station 60 (2)	Station 61 (3)	Station 62 (3)
319-84-6	alpha-BHC	0.7 U	0.7 U	0.7 U	0.7 U	0.6 U	2.0 U	2.0 U	2.0 U
319-85-7	beta-BHC	0.7 U	0.7 U	0.7 U	0.7 U	0.6 U	2.0 U	2.0 U	2.0 U
319-86-8	delta-BHC	0.7 U	0.7 U	0.7 U	0.7 U	0.6 U	2.0 U	2.0 U	2.0 U
58-89-9	gamma-BHC (Lindane)	0.7 U	0.7 U	0.7 U	0.7 U	0.6 U	2.0 U	2.0 U	2.0 U
76-44-8	Heptachlor	0.7 U	0.7 U	0.7 U	0.7 U	0.6 U	2.0 U	2.0 U	2.0 U
309-00-2	Aldrin	0.7 U	0.7 U	0.7 U	0.7 U	0.6 U	2.0 U	2.0 U	2.0 U
1024-57-3	Heptachlor epoxide	0.7 U	0.7 U	0.7 U	0.7 U	0.6 U	2.0 U	2.0 U	2.0 U
959-98-8	Endosulfan I	0.7 U	0.7 U	0.7 U	0.7 U	0.6 U	2.0 U	2.0 U	2.0 U
60-57-1	Dieldrin	1.1 U	1.1 U	1.1 U	1.1 U	0.9 U	3.0 U	3.0 U	3.0 U
72-55-9	4,4'-DDE	1.1 U	1.1 U	1.1 U	1.1 U	1.6 U	3.0 U	3.0 U	3.0 U
72-20-8	Endrin	1.1 U	1.1 U	1.1 U	1.1 U	0.9 U	3.0 U	3.0 U	3.0 U
33213-65-9	Endosulfan II	1.1 U	1.1 U	1.1 U	1.1 U	0.9 U	3.0 U	3.0 U	3.0 U
72-54-8	4,4'-DDD	2.1 U	2.1 U	2.1 U	2.1 U	1.8 U	6.0 U	6.0 U	6.0 U
1031-07-8	Endosulfan sulfate	2.1 U	2.1 U	2.1 U	2.1 U	1.8 U	6.0 U	6.0 U	6.0 U
50-29-3	4,4'-DDT	1.4 U	1.4 U	1.4 U	1.4 U	1.2 U	4.0 U	4.0 U	4.0 U
72-43-5	Methoxychlor	2.8 U	2.8 U	2.8 U	2.8 U	2.4 U	8.0 U	8.0 U	8.0 U
53494-70-5	Endrin ketone	1.1 U	1.1 U	1.1 U	1.1 U	0.9 U	3.0 U	3.0 U	3.0 U
5103-74-2	gamma-Chlordane	0.7 U	0.7 U	0.7 U	0.7 U	0.6 U	2.0 U	2.0 U	2.0 U
5103-71-9	alpha-Chlordane	0.7 U	0.7 U	0.7 U	0.7 U	0.6 U	2.0 U	2.0 U	2.0 U
8001-35-2	Toxaphene	110 U	110 U	110 U	110 U	90 U	300 U	300 U	300 U
-	Aroclor 1016/1242	14 U	14 U	14 U	14 U	12 U	40 U	40 U	40 U
12672-29-6	Aroclor 1248	14 U	14 U	14 U	14 U	12 U	40 U	40 U	40 U
11097-69-1	Aroclor 1254	6.7 E	7.6 E	8.5 E	5.5 E	16	22 E	22 E	28 E
11096-82-5	Aroclor 1260	14 U	14 U	14 U	14 U	12 U	40 U	40 U	40 U

(1) Primary sample.
(2) Sample split of primary sample, composited from several van Veen field grabs.
(3) Separate van Veen grab sample at same station as primary sample.

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Table 3
Pesticides/PCBs
Monitoring Variability Samples
(ug/kg, dry weight)

Date: August 28, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

CAS No.	Target Parameter	Station 44 (1)	Station 63 (2)	Station 64 (3)	Station 65 (3)
319-84-6	alpha-BHC	0.8 U	0.8 U	0.8 U	0.9 U
319-85-7	beta-BHC	0.8 U	0.8 U	0.8 U	0.9 U
319-86-8	delta-BHC	0.8 U	0.8 U	0.8 U	0.9 U
58-89-9	gamma-BHC (Lindane)	0.8 U	0.8 U	0.8 U	0.9 U
76-44-8	Heptachlor	0.8 U	0.8 U	0.8 U	0.9 U
309-00-2	Aldrin	0.8 U	0.8 U	0.8 U	0.9 U
1024-57-3	Heptachlor epoxide	0.8 U	0.8 U	0.8 U	0.9 U
959-98-8	Endosulfan I	0.8 U	0.8 U	0.8 U	0.9 U
60-57-1	Dieldrin	1.2 U	1.2 U	1.2 U	1.4 U
72-55-9	4,4'-DDE	1.2 U	1.2 U	1.2 U	1.4 U
72-20-8	Endrin	1.2 U	1.2 U	1.2 U	1.4 U
33213-65-9	Endosulfan II	1.2 U	1.2 U	1.2 U	1.4 U
72-54-8	4,4'-DDD	2.4 U	2.4 U	2.4 U	2.7 U
1031-07-8	Endosulfan sulfate	2.4 U	2.4 U	2.4 U	2.7 U
50-29-3	4,4'-DDT	1.6 U	1.6 U	1.6 U	1.8 U
72-43-5	Methoxychlor	3.2 U	3.2 U	3.2 U	3.6 U
53494-70-5	Endrin ketone	1.2 U	1.2 U	1.2 U	1.4 U
5103-74-2	gamma-Chlordane	0.8 U	0.8 U	0.8 U	0.9 U
5103-71-9	alpha-Chlordane	0.8 U	0.8 U	0.8 U	0.9 U
8001-35-2	Toxaphene	120 U	120 U	120 U	140 U
-	Aroclor 1016/1242	16 U	16 U	16 U	18 U
12672-29-6	Aroclor 1248	16 U	16 U	16 U	18 U
11097-69-1	Aroclor 1254	16 U	16 U	16 U	18 U
11096-82-5	Aroclor 1260	16 U	16 U	16 U	18 U

(1) Primary sample.
(2) Sample split of primary sample, composited from several van Veen field grabs.
(3) Separate van Veen grab sample at same station as primary sample.

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 28, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 4
Pesticides/PCBs

Comparison Sample Summary
Fortified Sequim Bay Sediment
(ug/kg, dry weight)

Target Parameter	Amount Added (a)	Summary of Previous Independent Analyses n	Mean	RPD	Station 66 Result Q	Station 67 Result Q	Station 68 Result Q	Mean	CV
alpha-BHC	1.7	1	0.6		1.0	1.1	1.1	1.1	4.3
beta-BHC		1	0.1 U		0.9 U	0.9 U	0.9 U		
delta-BHC		1	0.1 U		0.9 U	0.9 U	0.9 U		
gamma-BHC (Lindane)	1.7	2	1.0	80	1.3	1.5	1.6	1.5	8.3
Heptachlor	1.7	2	0.2 *	100	0.9 U	0.9 U	0.9 U		
Aldrin	1.7	2	1.0 *	180	0.9 U	0.9 U	0.9 U		
Heptachlor epoxide	1.7	2	1.3	46	0.9 U	0.9 U	0.9 U		
Endosulfan I	3.4	1	31.0		24	28	30	27.3	9.1
Dieldrin	1.7	2	0.6 *	100	1.4 U	1.4 U	1.4 U		
4,4'-DDE	3.4	2	0.6 *	90	1.4 U	1.4 U	1.4 U		
Endrin	3.4	1	1.5		1.4 U	1.4 U	1.4 U		
Endosulfan II	3.4	1	16.0		18	22	22	20.7	9.1
4,4'-DDD	3.4	2	0.6 *	110	2.7 U	2.7 U	2.7 U		
Endosulfan sulfate		1	0.3 U		2.7 U	2.7 U	2.7 U		
4,4'-DDT	3.4	1	0.3 U		1.8 U	1.8 U	1.8 U		
Methoxychlor		1	1.4 U		3.6 U	3.6 U	3.6 U		
Endrin ketone		1	0.3 U		1.4 U	1.4 U	1.4 U		
gamma-Chlordane		1			0.9 U	1.4 U	1.6 U		
alpha-Chlordane	8.4	1			0.9 U	0.9 U	0.9 U		
Toxaphene		1	3 U		130 U	130 U	130 U		
Aroclor 1016/1242		1	1.4 U		18 U	18 U	18 U		
Aroclor 1248		1	1.4 U		18 U	18 U	18 U		
Aroclor 1254	169	1	78.0		100	120	130	116.7	10.7
Aroclor 1260		1	2.8 U		18 U	18 U	18 U		

(a) Converted from wet weight (ng/g) to dry weight (ug/kg) using percent moisture determined by ARI (40.8%).

JANUARY 2, 1990 ADDENDUM TO
DATA VALIDATION REPORT
VOLATILE ORGANIC COMPOUNDS

This report submitted to: Tetra Tech, Inc.
Bellevue, Washington

Prepared by: Raleigh Farlow
Jacobs Engineering Group, Inc.
Seattle, Washington

Purge and Trap Conditions for Analyses of Volatile Organic Compounds[a]

1. 80-100 gm of wet sediment is weighed in a 125 mL flask containing a PTFE-coated stir bar.

2. Volatile-free water is added to bring the volume up to approximately 100 mL.

3. Internal standards and surrogates are added (~12.5 ng each) via gas-tight syringe into the sample. The flask is subsequently sealed with a PTFE-cap containing sample and purge gas lines.

4. Sample is stirred, heated to 75-80°C, and purged with He for 13 min into an adsorbent trap. The sample line is routed through a mist eliminator (~8 cm x 1 cm) containing ~1 mL of volatile-free water (prior to the adsorbent trap). The mist eliminator minimizes excessive water from interfering with normal operation of the purge and trap apparatus and chromatograph.

5. Following sample purge, the adsorbed analytes are desorbed for 4 min from a standard U.S. EPA CLP Tenax trap onto a 105 m Megabore-fused silica chromatographic column.

6. The chromatograph is held at 35°C for 4 min and then raised to 160°C at 6°/min (hold = 0 min), then raised to 250°C at 15°/min and held at 250°C for 1 min for the completion of the chromatographic run.

7. The purge and trap (sample) vessel and mist eliminator are changed and replaced with clean glassware following the analysis of each sample. The entire analytical system (up to the mass spectrometer) is baked for approximately 10 min between each sample run.

[a] These conditions are deviations to the U.S. EPA CLP protocol employed for achieving project requirements. These deviations and those identified in the data validation QA memorandum are changes made to the CLP protocol and are consistent with the Puget Sound Estuary Program *Recommended Protocols for Measuring Environmental Variability in Puget Sound* (Tetra Tech 1986b).

JACOBS ENGINEERING GROUP INC.
ENVIRONMENTAL SYSTEMS DIVISION
1111 THIRD AVENUE - SUITE 700 • SEATTLE WA 98101 • (206) 622-0907

August 2, 1989

Data Validation Report
Volatile Organic Analyses

Site: Puget Sound

Project: WDOE MSMP

Sample Numbers: Stations 3, 5, 10, 14, 17, 19, 26, 29, 38, 45, 51, 52, 53, 60, 61, 62, 66, 67

Samples Collected By: Tetra Tech, Inc.

The samples included in this report were analyzed by Analytical Resources, Inc., of Seattle, Washington.

This report is submitted to: Tetra Tech, Inc., Bellevue, Washington

Data Evaluated by: Thomas D. Bowden TDB

Approved by: Raleigh C. Farlow RCF

Data Validation Report - Volatiles Analyses

Site:	Puget Sound
Project:	WDOE MSMP
Laboratory:	Analytical Resources, Inc.
Sample Number	Stations- 3, 5, 10, 14, 17, 19, 26, 29, 38, 45, 51, 52, 53, 60, 61, 62, 66, 67
Matrix:	Sediment
Reviewer:	T.D. Bowden
Date:	August 2, 1989

I. Introduction

This report summarizes the validation of laboratory data for 18 marine sediment samples submitted to Analytical Resources, Inc. of Seattle, WA for volatile organics analyses.

The samples were analyzed employing a protocol modified after USEPA CLP SOW 2/88, IFB W802081D1. Modifications to the USEPA CLP Protocol were employed to lower Contract Quantitation Levels. These modifications include larger sample sizes (approximately 100 g, wet weight) and some instrumental modifications for increased sensitivities. 1,1,2-Trichloro-1,2,2-trifluoroethane was added to the USEPA Target Compound List (TCL) for this project.

This report has been prepared in accordance with USEPA guidance "Laboratory Data Validation, Functional Guidelines for Evaluating Organics Analyses," dated February 1, 1988. Data validation criteria are found in the USEPA Functional Guidelines and the WDOE Puget Sound Ambient Monitoring Program, Marine Sediment Quality Implementation Plan, dated November, 1988.

Analytical results with associated data qualifiers are found in Table 1. Results are expressed in ug/kg, dry weight. Average quantitation limits are presented in Table 1A. Sample holding times are summarized in Table 2.

Samples up through and including Station 50 (fifty samples) are surficial sediment samples collected from different locations in Puget Sound. Samples with station identification greater than 50 are assigned surrogate station numbers. These remaining stations represent field-generated (laboratory blind) QC samples, specifically, duplicate splits taken as separate aliquots from the same van Veen grab sample, station replicates taken as separate aliquots from different van Veen grab samples at the same station, and comparison samples, as summarized below:

Field Station	Sample Split	Station Replicates
Station 5	Station 51	Station 52 Station 53
Station 38	Station 60	Station 61 Station 62

Comparison Samples (fortified Sequim Bay sediment sample)

Station 66
Station 67

Field samples employed for laboratory QC include:

MS/MSD Analysis

Station 5
Station 17
Station 38

II. Discussion

A. Sample Holding Times

Technical requirements for maximum sample holding time (time of collection to time of analysis) for volatiles have been established only for water matrices (7 days). All sediment samples associated with this project were analyzed for volatiles within 7 days, with the exception of Station 38 (8 days)(Table 2). Results associated with Station 38 have not been qualified since the deviation is not significant. Sample holding times were determined by comparing sampling dates on the Chain-of-Custody document with dates of analyses.

B. GC/MS Tuning

The GC/MS tune was checked with Bromofluorobenzene (BFB) prior to all initial calibration runs and prior to all sample analysis runs. All instrumental analyses, including standards, method blanks, matrix spikes, matrix spike duplicates, and station samples were analyzed within 12 hours of BFB injection for all analytical runs. Mass spectral plots and associated mass listings were compared to Form V; no transcription errors were found. Percent relative abundances were confirmed by recalculation. All ion abundances and percent relative abundances meet acceptance criteria.

C. Initial Calibration

Initial multipoint calibration was established at concentrations of 100, 250, 500, 1000, 5000 ng/l (ppt)(3/22/89); 250, 500, 1250, 2500, and 5000 ng/l (3/28/89); and 25, 50, 100, 250, and 500 ng/l (4/06/9) for all TCL compounds and surrogates. For each initial calibration run, all TCL compounds and surrogates with Relative Response Factors (RRF) reported at a minimum of three concentrations have Average Relative Response Factors (Average RRF) that are $\geq$0.05. All Coefficients of Variation (CV) for RRFs are $\leq$30% with the following exceptions:

Date	Compound	CV (%)	Stations with Positive Hits
3/22/89	Methylene chloride	37.9%	45, 60, 61, 62
	4-Methyl-2-pentanone	39.7%	None
	2-Hexanone	36.6%	None
3/28/89	Methylene chloride	48.9%	All on 3/28/89*
	Acetone	77.2%	All on 3/28/89*
	2-Butanone	32.6%	29, 38
4/06/89	Vinyl acetate	35.1%	None

* See listing on following page

Samples with positive hits for these compounds and a CV $\geq$35% have been qualified "E" (estimated) in accordance with the CLP Functional Guidelines and the project Implementation Plan.

RRFs were confirmed by recalculation for eight compounds in each calibration run for all concentrations. The Average RRFs and %RSDs for these eight compounds were also recalculated and confirmed. Surrogates were not reported on Form VI. Surrogate RRFs, Average RRFs and CVs were recalculated and confirmed from raw data. The units of concentration reported on Form VI should read "ng/l", not ug/l as reported.

Samples and associated TCL responses were quantitated relative to the initial calibrations run on the following dates:

3/22/89	3/28/89	4/06/89
Station 45	Station 3	Station 10
Station 60	Station 5	Station 14
Station 61	Station 19	Station 17
Station 62	Station 26	
	Station 29	
	Station 38	
	Station 51	
	Station 52	
	Station 53	
	Station 66	
	Stat 5 Rerun	
	Stat	
	Stat Rerun	

D. Continuing Calibration

Continuing calibration was established for five separate analytical runs for all TCL compounds and surrogates. Instrumentation runs on 3/23/89, 3/29/89, 3/31/89, and 4/03/89 were calibrated and checked at a concentration of 2500 ng/l (ppt). The analytical run on 4/07/89 was calibrated and checked at 500 ng/l. With the exceptions listed below, all TCL compounds and surrogates have an RRF $\geq$0.05 and a Percent Difference (%D) $\leq$25% between the initial calibration Average RRF and the continuing calibration RRF.

Date	Compound	RRF	%D	Stations with Positive Hits
3/23/89	Acetone	0.021		60, 61
	Methylene chloride		26.6%	45, 60, 61, 62
3/29/89	Acetone	0.049		26, 29, 38
	Methylene chloride		50.1%	26, 29, 38
	1,1,2-Trichloro-1,2,2-trifluoroethane		25.9%	None
3/31/89	Methylene chloride		62.1%	3, 5, 19, 66
	Carbon disulfide		41.3%	3, 5, 19, 66
	2-Butanone		-80.0%	None
	1,2-Dichloropropane		25.2%	None
	2-Hexanone		-72.9%	66
4/03/89	Methylene chloride		55.0%	51, 52, 53, 67
	2-Chloroethylvinylether		33.5%	None
	4-Methyl-2-pentanone		44.0%	52, 67
	2-Hexanone		26.4%	67
4/07/89	Methylene chloride		39.6%	10, 14, 17
	Acetone		31.0%	14, 17
	2-Butanone	0.005	83.3%	10

Samples with positive hits for these compounds and a %D $\geq$30% or an RRF $\leq$0.045 have been qualified "E" (estimated). Samples with non-detects for Acetone (3/23/89) and 2-Butanone (4/07/89) have been qualified "R" (unusable). Qualifiers have been applied in accordance with the CLP Functional Guidelines and the project Implementation Plan.

Samples are associated with the continuing calibration standards run on the following dates:

3/23/89	3/29/89	3/31/89	4/03/89	4/07/89
Station 45	Station 26	Station 3	Station 51	Station 10
Station 60	Station 29	Station 5	Station 52	Station 14
Station 61	Station 38	Station 19	Station 53	Station 17
Station 62		Station 66	Station 67	
		Station 66R	Station 67R	

RRFs and %Ds were recalculated and confirmed for the same eight compounds selected above. All analyses were completed within the required 12 hour time limit for each analytical group. Two Average RRFs were transcribed incorrectly from Form VI to Form VII. These errors did not significantly affect the related %Ds or measurements of data quality. Surrogates were not reported on Form VII. Surrogate RRFs and %Ds were recalculated and confirmed from raw data. The units of concentration reported on Form VII should read "ng/l", not ug/l as reported.

E. Method Blank Analysis

Method blank analyses were performed at the required frequency (once per 12 hour time period per analytical group). Two method blanks were analyzed for each of the analytical groups run on 3/23/89 and 3/29/89. Method blank results for positive hits are summarized in Table 3. A mean and upper 95% confidence limit has been calculated for compounds detected in three or more blanks. The 95%ile value has been adjusted to reflect the mean dry sample weight of all samples. The reported quantitation limit has then been adjusted using the adjusted 95%ile value for these compounds in all samples by application of a "U" qualifier to all data with reported results less than the 95%ile value.

F. Surrogate Recovery

The USEPA CLP-specified surrogates were added to all samples including method blanks, matrix spike samples, and matrix spike duplicate samples. For all analytical runs other than 4/07/89, the surrogate spike level was 1.25 ng/ml (an average of 3.5 ug/kg, dry weight, for all samples). For the run on 4/07/89, the spike level was 0.50 ng/ml (an average of 1.4 ug/kg, dry weight, for all samples). All surrogate recoveries (%R) are within the acceptance limits specified for this project (%R$\geq$ 50%). All data were verified by examination of Reconstructed Ion Chromatograms (RICs) and quantitation reports. All recoveries were confirmed by recalculation. Station 3 was not included on Form II. Surrogate recoveries for Station 3 were calculated from raw data and confirmed to be within acceptance limits.

G. Matrix Spike/Matrix Spike Duplicate Analysis

MS/MSD analysis was performed on samples associated with three stations, 5, 17 and 38. As specified for the project, all MS/MSD samples were spiked with all of the CLP target compounds at the following concentrations:

Station 5	1.73 ug/kg
Station 17	1.53 ug/kg (incorrectly reported as 0.136 on Form III)
Station 38	3.00 ug/kg

RPDs (Relative Percent Difference) for all MS/MSD samples are within project-specified acceptance limits (RPD ±100%) for all compounds. %Rs are within project-specified acceptance limits (%R ≥50%) with the following exceptions:

Station	Compound	MS %R	MSD %R
Station 5	1,1,1-Trichloroethane	45.1	
	Carbon tetrachloride	32.9	26.0
	Vinyl acetate	35.3	32.9
	Dibromochloromethane	47.4	37.6
	Bromoform	35.8	31.2
Station 17	Chloromethane	0	0
	Carbon tetrachloride	0	0
	Vinyl acetate	0	0
	Bromodichloromethane	11.0	24.3
	cis-1,3-Dichloropropene	33.8	38.2
	Dibromochloromethane	0	0
	trans-1,3-Dichloropropene	25.0	33.8
	Bromoform	0	0
	2-Hexanone	0	0
Station 38	Methylene chloride	-432	-1163
	Acetone	-199	-532
	2-Butanone		33.2
	Carbon tetrachloride	21.9	26.2
	Vinyl acetate	25.2	28.6
	Dibromochloromethane	39.9	43.2
	Bromoform	26.6	31.6

Recoveries for all CLP-specified matrix spike compounds are within the acceptance limits specified in the project Implementation Plan, thus no data have been qualified.

All %Rs and RPDs were confirmed by recalculation. Quantitation was confirmed for all MS/MSD compounds. Transcription of sample results from Form I to Form III was confirmed for all compounds. Values for MS concentration and %R are switched with MSD concentrations/%Rs on Form III for Station 38. Additionally, Total Xylenes spike concentration on Station 38 should read "6.0", not "3.0."

H. Internal Standards Performance

In addition to the three CLP-specified internal standards, an additional four compounds were added as internal standards for this project:

CLP Internal Standards	Additional Internal Standards
Bromochloromethane (BCM)	Iodomethane-d3 (IM)
1,4-Difluorobenzene (DFB)	1,1-Dichloroethane-2,2,2-d3 (DCE)
Chlorobenzene-d5 (CBZ)	Iodopropane-d7 (IP)
	Bromobenzene-d5 (BB)

Internal standards (IS) were added to all samples at a concentration of 1.25 ng/ml (an average of 3.5 ug/kg, dry weight, for all samples) except the group analyzed on 4/07/89 for which the internal standards were added at a concentration of 0.50 ng/ml (an average of 1.4 ug/kg, dry weight, for all samples). All Retention Times (RT) are within acceptance limits (±30 seconds). The majority of IS areas for all samples are within the CLP recommended acceptance limits (-50% to +100% of the IS area for the 12-hour calibration standard). Internal standards not meeting the CLP acceptance criteria are summarized in Table 7. However, no sample results have been qualified as a result of these exceptions. Results for several internal standards were not reported on Form VIII. Areas for these unreported standards that do not meet acceptance criteria are included in Table 7.

Transcription accuracy was checked and verified for all samples from quantitation reports to Form VIII.

I. TCL Compound Identification

The Relative Retention Times (RRT) for all reported TCL compounds are within acceptance limits (±0.06 RRT units). Ion relative abundances were checked against reference spectra and were found to be acceptable.

J. Compound Quantitation and Reported Detection Limits

Quantitation calculations were verified for surrogates, matrix spike compounds, and identified TCL compounds in all samples by recalculation of results from raw data. The appropriate internal standard, quantitation ion, and RRF were used in quantitating all compounds. All results were correctly calculated and transcribed to Form I. Average quantitation limits are given in Table 1A.

K. Tentatively Identified Compounds

Table 6 summarizes Tentatively Identified Compounds (TICs) for each sample by total number present, average concentration, and maximum observed value. TICs detected in associated blanks have been accounted for and excluded from this summary.

L. System Performance

Examination of raw data revealed no indication of degradation of system performance during or between analytical runs. RICs were examined for abrupt shifts in baseline, excessive baseline rise with increased temperature, and high background levels. No anomalous shifts in absolute retention times for internal standards was observed.

M. Other Performance Data

Field-Generated QC Samples: Two types of field-generated QC samples were collected from a station. Station duplicate splits were generated by taking two separate surficial aliquots of sediment from the same van Veen grab sample; one aliquot assigned to the station number, the other assigned a surrogate station number. Station replicates were generated by collecting two additional and separate van Veen grab samples while on station. Site replicates were assigned separate surrogate station numbers.

Results for all replicates are summarized in Table 4A. Summary statistics for these samples are presented in Table 4B. The coefficient of variation (CV) representing monitoring variability within a station was determined using all 4 samples. Relative percent differences (RPD) were determined relative to the original sample and the blind field-generated splits.

Sequim Bay Comparison Samples: Homogenized archived sediment samples from Sequim Bay were submitted for analysis as Stations 66 and 67. This sample was acquired from Office of Puget Sound, USEPA Region X, and consists of a composited marine sediment that had been prepared as a fortified sample under contract by National Marine Fisheries, NOAA. VOAs results for this sample may be the first ever to be reported. Analytical results and summary statistics for these samples are presented in Table 5.

N. Overall Case Assessment

The level of effort exhibited by the laboratory for this data package is better than average. The quantitation levels achieved are significantly lower than CLP requirements. All deliverables required by the project are present. The data package is not entirely complete, and the laboratory has been requested to resubmit some corrected QC reporting forms and missing or unreadable raw data. These omissions from the data package are not significant and have not hindered the validation of the data. Overall, the data is considered usable for the intended purposes.

III. Summary of Qualified Data

A. The following results have been qualified "E" (estimated) because the coefficient of variation for Relative Response Factors (initial calibration) does not meet acceptance criteria, as discussed in Section IIC:

Methylene chloride	-	Stations 3, 5, 19, 26, 29, 38, 45, 51, 52, 53, 60, 61, 62, 66, 67
Acetone	-	Stations 3, 5, 19, 26, 29, 38, 51, 52, 53, 66, 67

B. The following results have been qualified "E" (estimated) because the Percent Difference (%D) between the Average Relative Response Factor and the continuing calibration Relative Response Factor does not meet acceptance criteria, as discussed in Section IID:

Methylene chloride	-	Stations 3, 5, 10, 14, 17, 19, 26, 29, 38, 51, 52, 53, 66, 67
Acetone	-	Stations 14, 17
Carbon disulfide	-	Stations 3, 5, 19, 66
2-Butanone	-	Station 10
4-Methyl-2-pentanone	-	Stations 52, 67
2-Hexanone	-	Station 66

C. The following results have been qualified "E" (estimated) because the continuing calibration Relative Response Factor does not meet acceptance criteria, as discussed in Section IID:

Acetone	-	Stations 60, 61
2-Butanone	-	Station 10

D. The following results have been qualified "R" (unusable) because the continuing calibration Relative Response Factor does not meet acceptance criteria, as discussed in Section IID:

Acetone	-	Stations 45, 62
2-Butanone	-	Stations 14, 17

E. The following results have been assigned the "U" qualifier in order to decrease significance of the reported value based on a statistical analysis of positive hits in method blanks, as discussed in Section IIE:

Methylene chloride	-	Stations 10, 14, 17, 45, 51, 52, 60, 61, 62
Acetone	-	Stations 3, 5, 14, 17, 26, 51, 53
Chloroform	-	Stations 60, 61
1,1,1-Trichloroethane	-	Stations 14, 17, 60, 61
Benzene	-	Stations 14, 17
Tetrachloroethene	-	Station 3
Toluene	-	Station 45
Ethylbenzene	-	Station 17, 45
Total Xylenes	-	Station 45

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 2, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 1
Volatile Organics Analyses Results
(ug/kg, dry weight)

CAS No.	Target Parameter	Station 3 Results	Q	Station 5 Results	Q	Station 10 Results	Q	Station 14 Results	Q	Station 17 Results	Q	Station 19 Results	Q	Station 26 Results	Q	Station 29 Results	Q	Station 38 Results	Q	Station 45 Results	Q
74-87-3	Chloromethane	0.16	U	0.35	U	0.19	U	0.17	U	0.30	U	0.38	U	0.14	U	0.31	U	0.46	U	0.20	U
74-83-9	Bromomethane	0.08	U	0.17	U	0.09	U	0.08	U	0.15	U	0.19	U	0.07	U	0.16	U	0.23	U	0.10	U
75-01-4	Vinyl chloride	0.16	U	0.35	U	0.19	U	0.17	U	0.30	U	0.38	U	0.14	U	0.31	U	0.46	U	0.20	U
75-00-3	Chloroethane	0.16	U	0.35	U	0.19	U	0.17	U	0.30	U	0.38	U	0.14	U	0.31	U	0.46	U	0.20	U
75-09-2	Methylene chloride	8.5	E	9.8	E	1.5	U	1.1	U	1.1	U	6.0	E	4.7	E	24	E	52	E	0.63	U
67-64-1	Acetone	5.4	U	3.5	U	0.10	U	2.2	U	4.4	U	12	E	7.3	U	30	E	69	E		R
75-15-0	Carbon disulfide	1.6	N	3.3	N	3.0		0.99		1.5		0.90	E	3.7		3.1	N	0.09	U	1.3	
75-35-4	1,1-Dichloroethene	0.016	U	0.035	U	0.019	U	0.017	U	0.030	U	0.038	U	0.014	U	0.031	U	0.046	U	0.020	U
75-34-3	1,1-Dichloroethane	1.10		0.035	U	0.019	U	0.017	U	0.030	U	0.038	U	0.014	U	0.520		0.046	U	0.020	U
156-60-5	trans-1,2-Dichloroethene	0.033	U	0.069	U	0.037	U	0.034	U	0.061	U	0.075	U	0.028	U	0.063	U	0.092	U	0.040	U
156-59-2	cis-1,2-Dichloroethene	0.033	U	0.069	U	0.037	U	0.034	U	0.061	U	0.075	U	0.028	U	0.063	U	0.046		0.040	U
67-66-3	Chloroform	0.076		0.190		0.060		0.035		0.030	U	0.060		0.160		0.120		0.120		0.047	
107-06-2	1,2-Dichloroethane	0.033	U	0.069	U	0.037	U	0.034	U	0.061	U	0.075	U	0.028	U	0.063	U	0.092	U	0.040	U
78-93-3	2-Butanone	0.08	U	0.17	U	8.5	E		R		R	0.19	U	0.07	U	5.0	N	13	N	1.0	U
71-55-6	1,1,1-Trichloroethane	6.60		0.720		0.021	U	0.042	U	0.021	U	0.820		0.055	N	0.490		0.046	U	0.061	
56-23-5	Carbon tetrachloride	0.016	U	0.035	U	0.019	U	0.017	U	0.030	U	0.038	U	0.014	U	0.031	U	0.046	U	0.020	U
108-05-4	Vinyl acetate	0.03	U	0.07	U	0.04	U	0.03	U	0.06	U	0.08	U	0.03	U	0.06	U	0.09	U	0.04	U
75-27-4	Bromodichloromethane	0.033	U	0.069	U	0.037	U	0.034	U	0.061	U	0.075	U	0.028	U	0.063	U	0.092	U	0.040	U
78-87-5	1,2-Dichloropropane	0.066	U	0.140	U	0.075	U	0.068	U	0.120	U	0.150	U	0.057	U	0.125	U	0.180	U	0.081	U
10061-01-5	cis-1,3-Dichloropropene	0.033	U	0.069	U	0.037	U	0.034	U	0.061	U	0.075	U	0.028	U	0.063	U	0.092	U	0.040	U
79-01-6	Trichloroethene	0.016	U	0.035	U	0.019	U	0.017	U	0.030	U	0.038	U	0.011	N	0.031	U	0.046	U	0.008	N
124-48-1	Dibromochloromethane	0.016	U	0.035	U	0.019	U	0.017	U	0.030	U	0.038	U	0.014	U	0.031	U	0.046	U	0.020	U
79-00-5	1,1,2-Trichloroethane	0.033	U	0.069	U	0.037	U	0.034	U	0.061	U	0.075	U	0.028	U	0.063	U	0.092	U	0.040	U
71-43-2	Benzene	0.081		0.120		0.060		0.042	U	0.055	U	0.110		0.068		0.150		0.170		0.020	U
10061-02-6	trans-1,3-Dichloropropene	0.033	U	0.069	U	0.037	U	0.034	U	0.061	U	0.075	U	0.028	U	0.063	U	0.092	U	0.040	U
110-75-8	2-Chloroethylvinylether	0.08	U	0.17	U	0.09	U	0.08	U	0.15	U	0.19	U	0.07	U	0.16	U	0.23	U	0.10	U
75-25-2	Bromoform	0.020		0.069	U	0.110		0.034	U	0.061	U	0.075	U	0.042		0.063	U	0.092	U	0.040	U
108-10-1	4-Methyl-2-pentanone	0.10	N	0.07	U	0.09	N	0.03	U	0.06	U	0.08	U	0.03	U	0.15		0.09	U	0.04	U
591-78-6	2-Hexanone	0.08	U	0.17	U	0.09	U	0.08	U	0.15	U	0.19	U	0.07	U	0.16	U	0.23	U	0.10	U
127-18-4	Tetrachloroethene	0.025	U	0.038		0.034		0.035		0.030	U	0.034		0.069		0.094		0.170		0.036	
79-34-5	1,1,2,2-Tetrachloroethane	0.033	U	0.069	U	0.037	U	0.034	U	0.061	U	0.075	U	0.028	U	0.063	U	0.092	U	0.040	U
108-88-3	Toluene	0.140		0.250		0.140		0.100		0.110		0.140		0.100		0.244		0.240		0.087	U
108-90-7	Chlorobenzene	0.016	U	0.035	U	0.019	U	0.017	U	0.030	U	0.038	U	0.014	U	0.050	N	0.046	U	0.020	U
100-41-4	Ethylbenzene	0.049		0.066		0.073		0.017	U	0.024	U	0.034		0.044		0.075		0.065		0.020	U
100-42-5	Styrene	0.016	U	0.069		0.019	U	0.017	U	0.030	U	0.038	U	0.014	U	0.031	U	0.046	U	0.020	U
1330-20-7	Total Xylenes	0.220		0.270		0.200		0.120		0.110		0.170		0.170	N	0.320	N	0.320		0.083	U
76-13-1	1,1,2-Cl-1,2,2-F ethane	0.033	U	0.069	U	0.037	U	0.034	U	0.061	U	0.075	U	0.028	U	0.063	U	0.230	U	0.100	U

Data Qualifiers:

R: The data are unusable. The parameter may or may not be present.
U: The parameter was analyzed for but not reported above the associated value, which is the sample quantitation limit.
N: Presumptive evidence of the presence of the parameter at an estimated quantity.
E: The associated value is an estimated quantity.

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 2, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 1
Volatile Organic Analyses Results
(ug/kg, dry weight)

CAS No.	Target Parameter	Station 51 Results	Q	Station 52 Results	Q	Station 53 Results	Q	Station 60 Results	Q	Station 61 Results	Q	Station 62 Results	Q	Station 66 Results	Q	Station 67 Results	Q
74-87-3	Chloromethane	0.30	U	0.33	U	0.32	U	0.41	U	0.38	U	0.38	U	0.20	U	0.19	U
74-83-9	Bromomethane	0.15	U	0.17	U	0.16	U	0.20	U	0.19	U	0.19	U	0.10	U	0.09	U
75-01-4	Vinyl chloride	0.30	U	0.33	U	0.32	U	0.41	U	0.38	U	0.38	U	0.20	U	0.19	U
75-00-3	Chloroethane	0.30	U	0.33	U	0.32	U	0.41	U	0.38	U	0.38	U	0.20	U	0.19	U
75-09-2	Methylene chloride	1.2	U	1.3	U	2.7	E	1.3	U	0.80	U	1.5	U	170	E	120	E
67-64-1	Acetone	2.2	U	11	E	4.0	U	28	E	34	E		R	14000	E	22000	E
75-15-0	Carbon disulfide	0.57		2.3		2.2		0.04	U	0.33		0.99		91	E	76	
75-35-4	1,1-Dichloroethene	0.030	U	0.033	U	0.032	U	0.041	U	0.038	U	0.038	U	0.020	U	0.019	U
75-34-3	1,1-Dichloroethane	0.030	U	0.033	U	0.032	U	0.041	U	0.038	U	0.038	U	0.020	U	0.019	U
156-60-5	trans-1,2-Dichloroethene	0.060	U	0.066	U	0.063	U	0.081	U	0.075	U	0.077	U	0.040	U	0.037	U
156-59-2	cis-1,2-Dichloroethene	0.060	U	0.066	U	0.063	U	0.081	U	0.075	U	0.077	U	0.040	U	0.037	U
67-66-3	Chloroform	0.210		0.310		0.270		0.020	U	0.030	U	0.065	N	2.40		1.70	
107-06-2	1,2-Dichloroethane	0.060	U	0.066	U	0.063	U	0.081	U	0.075	U	0.077	U	0.040	U	0.037	U
78-93-3	2-Butanone	0.15	U	0.17	U	0.16	U	2.0	U	1.9	U	1.9	U	0.10	U	0.093	U
71-55-6	1,1,1-Trichloroethane	0.087		0.190		0.083		0.033	U	0.045	U	0.180	N	0.020	U	0.019	U
56-23-5	Carbon tetrachloride	0.030	U	0.030	U	0.032	U	0.016	U	0.038	U	0.038	U	0.020	U	0.019	U
108-05-4	Vinyl acetate	0.06	U	0.07	U	0.06	U	0.08	U	0.08	U	0.08	U	0.04	U	0.04	U
75-27-4	Bromodichloromethane	0.060	U	0.066	U	0.063	U	0.081	U	0.075	U	0.077	U	0.040	U	0.037	U
78-87-5	1,2-Dichloropropane	0.120	U	0.130	U	0.130	U	0.160	U	0.150	U	0.150	U	0.080	U	0.075	U
10061-01-5	cis-1,3-Dichloropropene	0.060	U	0.066	U	0.063	U	0.081	U	0.075	U	0.077	U	0.040	U	0.037	U
79-01-6	Trichloroethene	0.030	U	0.033	U	0.032	U	0.041	U	0.038	U	0.038	U	0.020		0.013	N
124-48-1	Dibromochloromethane	0.030	U	0.033	U	0.032	U	0.041	U	0.038	U	0.038	U	0.020	U	0.019	U
79-00-5	1,1,2-Trichloroethane	0.060	U	0.066	U	0.063	U	0.081	U	0.075	U	0.077	U	0.040	U	0.037	U
71-43-2	Benzene	0.072		0.100		0.083		0.085		0.083		0.038	U	0.660		0.530	
10061-02-6	trans-1,3-Dichloropropene	0.060	U	0.066	U	0.063	U	0.081	U	0.075	U	0.077	U	0.040	U	0.037	U
110-75-8	2-Chloroethylvinylether	0.15	U	0.17	U	0.16	U	0.20	U	0.19	U	0.19	U	0.10	U	0.09	U
75-25-2	Bromoform	0.060	U	0.066	U	0.063	U	0.081	U	0.075	U	0.077	U	0.040	U	0.037	U
108-10-1	4-Methyl-2-pentanone	0.06	U	0.46	E	0.06	U	0.08	U	0.08	U	0.08	U	0.36		0.64	E
591-78-6	2-Hexanone	0.15	U	0.17	U	0.16	U	0.20	U	0.19	U	0.19	U	0.91	E	4.3	
127-18-4	Tetrachloroethene	0.048		0.053		0.054		0.045		0.057		0.050		0.044		0.034	
79-34-5	1,1,2,2-Tetrachloroethane	0.060	U	0.066	U	0.063	U	0.081	U	0.075	U	0.077	U	0.040	U	0.037	U
108-88-3	Toluene	0.150		0.240		0.200		0.170		0.180		0.240		5.00		5.00	
108-90-7	Chlorobenzene	0.030	U	0.033	U	0.032	U	0.041	U	0.038	U	0.038	U	0.020	U	0.041	
100-41-4	Ethylbenzene	0.036		0.080		0.070		0.037		0.045		0.050		2.90		1.30	
100-42-5	Styrene	0.039	N	0.070		0.110		0.041	U	0.038	U	0.038	U	0.020	U	0.019	U
1330-20-7	Total Xylenes	0.190		0.300		0.250		0.200		0.240		0.250		12.0		9.90	
76-13-1	1,1,2-Cl-1,2,2-F ethane	0.060	U	0.066	U	0.063	U	0.200	U	0.190	U	0.192	U	0.040	U	0.037	U

Data Qualifiers:

R: The data are unusable. The parameter may or may not be present.
U: The parameter was analyzed for but not reported above the associated value, which is the sample quantitation limit.
N: Presumptive evidence of the presence of the parameter at an estimated quantity.
E: The associated value is an estimated quantity.

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 2, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 1A
Quantitation Limits
(ug/kg, dry weight)

Compound	Quantitation Limit Average	Lowest (1)
Chloromethane	0.29	0.16
Bromomethane	0.14	0.07
Vinyl chloride	0.29	0.14
Chloroethane	0.29	0.14
Methylene chloride	0.03 **	
Acetone	*	0.10
Carbon disulfide	0.07	0.04
1,1-Dichloroethene	0.030	0.014
1,1-Dichloroethane	0.029	0.014
trans-1,2-Dichloroethene	0.057	0.028
cis-1,2-Dichloroethene	0.055	0.028
Chloroform	0.031 **	
1,2-Dichloroethane	0.057	0.028
2-Butanone	0.60	0.07
1,1,1-Trichloroethane	0.028	0.019
Carbon tetrachloride	0.028	0.014
Vinyl acetate	0.06	0.03
Bromodichloromethane	0.057	0.028
1,2-Dichloropropane	0.114	0.066
cis-1,3-Dichloropropene	0.057	0.028
Trichloroethene	0.031	0.016
Dibromochloromethane	0.029	0.014
1,1,2-Trichloroethane	0.057	0.028
Benzene	0.029	0.020
trans-1,3-Dichloropropene	0.057	0.028
2-Chloroethylvinylether	0.14	0.07
Bromoform	0.058	0.034
4-Methyl-2-pentanone	0.06	0.03
2-Hexanone	0.15	0.08
Tetrachloroethene	0.031 **	0.030
1,1,2,2-Tetrachloroethane	0.057	0.028
Toluene	0.028 ***	
Chlorobenzene	0.028	0.014
Ethylbenzene	0.028 ***	0.017
Styrene	0.028	0.014
Total Xylenes	0.028 ***	
1,1,2-Cl-1,2,2-F ethane	0.087	0.033

* Only 1 non-detect, no value substituted.
** <=1 non-detect. Average QL for trichlorethene has been substituted.
*** <=1 non-detect. Average QL for styrene has been substituted.

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 2, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 2
Sample Holding Times

Sample Number	Date Collected	Date Lab Received	Date Analyzed	Holding Time (days)
Station 3	3/29/89	3/30/89	3/31/89	2
Station 5	3/29/89	3/30/89	3/31/89	2
Station 10	4/02/89	4/05/89	4/07/89	5
Station 14	4/03/89	4/05/89	4/07/89	4
Station 17	4/04/89	4/05/89	4/07/89	3
Station 19	3/28/89	3/30/89	3/31/89	3
Station 26	3/24/89	3/27/89	3/29/89	5
Station 29	3/24/89	3/27/89	3/29/89	5
Station 38	3/21/89	3/22/89	3/29/89	8
Station 45	3/20/89	3/22/89	3/23/89	3
Station 51	3/29/89	3/30/89	4/03/89	5
Station 52	3/29/89	3/30/89	4/03/89	5
Station 53	3/29/89	3/30/89	4/03/89	5
Station 60	3/21/89	3/22/89	3/23/89	2
Station 61	3/21/89	3/22/89	3/23/89	2
Station 62	3/21/89	3/22/89	3/23/89	2
Station 66	3/28/89	3/30/89	3/31/89	3
Station 67	3/28/89	3/30/89	4/03/89	6

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 2, 1989
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Matrix: Sediment

Table 3
Method Blank Summary
(values in ug/l, estimated)

Compound	3/23/89-1	3/23/89-2	3/29/89-1	3/29/89-2	3/31/89	4/03/89	4/07/89
Methylene chloride	0.08	0.08	0.30	0.40	0.70	0.07	0.22
Acetone	2.0 U	3.1	2.9	2.0	0.62	0.39	0.25
Carbon disulfide	0.04	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Chloroform	0.010 U	0.010 U	0.010 U	0.011	0.007	0.010 U	0.010 U
1,1,1-Trichloroethane	0.023	0.009	0.010 U	0.010 U	0.010 U	0.010 U	0.012
Carbon tetrachloride	0.008	0.004	0.010 U	0.010 U	0.010 U	0.003	0.010 U
Benzene	0.010 U	0.016	0.013	0.021	0.016	0.007	0.010
4-Methyl-2-pentanone	0.02 U	0.02 U	0.02 U	0.02 U	0.01	0.02 U	0.02 U
Tetrachloroethene	0.010 U	0.010 U	0.010 U	0.006	0.005	0.010 U	0.010 U
Toluene	0.019	0.032	0.012	0.022	0.022	0.010	0.026
Chlorobenzene	0.010 U	0.010 U	0.010 U	0.010 U	0.008	0.010 U	0.010 U
Ethylbenzene	0.007	0.006	0.010 U	0.010	0.009	0.010 U	0.005
Total Xylenes	0.024	0.032	0.018	0.030	0.028	0.013	0.023

Compound	n	Mean	SD	95%ile CI	Adjusted 95%ile CI*
Methylene chloride	7	0.26	0.21	0.60	1.7
Acetone	7	1.61	1.10	3.4	9.5
Carbon disulfide	7	0.02	0.01	0.04	0.11
Chloroform	7	0.010	0.001	0.012	0.033
1,1,1-Trichloroethane	7	0.012	0.005	0.020	0.056
Carbon tetrachloride	7	0.008	0.003	0.013	0.036
Benzene	7	0.013	0.004	0.020	0.056
4-Methyl-2-pentanone	7	0.02	0.00	0.02	0.06
Tetrachloroethene	7	0.009	0.002	0.012	0.033
Toluene	7	0.020	0.007	0.031	0.087
Chlorobenzene	7	0.010	0.001	0.012	0.033
Ethylbenzene	7	0.008	0.002	0.011	0.031
Total Xylenes	7	0.024	0.006	0.034	0.095

* Value in ug/kg, dry weight conversion applied using mean sample weight (35.83 g).
This value has been used to adjust the quantitation level for associated samples.

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 2, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 4A

Monitoring Variability Samples
(ug/kg, dry weight)

Compound	Station 5 (1)	Station 51 (2)	Station 52 (3)	Station 53 (3)	Station 38 (1)	Station 60 (2)	Station 61 (3)	Station 62 (3)
Chloromethane	0.35 U	0.30 U	0.33 U	0.32 U	0.46 U	0.41 U	0.38 U	0.38 U
Bromomethane	0.17 U	0.15 U	0.17 U	0.16 U	0.23 U	0.20 U	0.19 U	0.19 U
Vinyl chloride	0.35 U	0.30 U	0.33 U	0.32 U	0.46 U	0.41 U	0.38 U	0.38 U
Chloroethane	0.35 U	0.30 U	0.33 U	0.32 U	0.46 U	0.41 U	0.38 U	0.38 U
Methylene chloride	9.8 E	1.2 U	1.3 U	2.7 E	52 E	1.3 U	0.80 U	1.5 U
Acetone	3.5 U	2.2 U	11 E	4.0 U	69 E	28 E	34 E	R
Carbon disulfide	3.3 N	0.57	2.3	2.2	0.09 U	0.04 U	0.33	0.99
1,1-Dichloroethene	0.035 U	0.030 U	0.033 U	0.032 U	0.046 U	0.041 U	0.038 U	0.038 U
1,1-Dichloroethane	0.035 U	0.030 U	0.033 U	0.032 U	0.046 U	0.041 U	0.038 U	0.038 U
trans-1,2-Dichloroethene	0.069 U	0.060 U	0.066 U	0.063 U	0.092 U	0.081 U	0.075 U	0.077 U
cis-1,2-Dichloroethene	0.069 U	0.060 U	0.066 U	0.063 U	0.046	0.081 U	0.075 U	0.077 U
Chloroform	0.190	0.210	0.310	0.270	0.120	0.020 U	0.030 U	0.065 N
1,2-Dichloroethane	0.069 U	0.060 U	0.066 U	0.063 U	0.092 U	0.081 U	0.075 U	0.077 U
2-Butanone	0.17 U	0.15 U	0.17 U	0.16 U	13 N	2.0 U	1.9 U	1.9 U
1,1,1-Trichloroethane	0.720	0.087	0.190	0.083	0.046 U	0.033 U	0.045 U	0.180 N
Carbon tetrachloride	0.035 U	0.030 U	0.030 U	0.032 U	0.046 U	0.016 U	0.038 U	0.038 U
Vinyl acetate	0.07 U	0.06 U	0.07 U	0.06 U	0.09 U	0.08 U	0.08 U	0.08 U
Bromodichloromethane	0.069 U	0.060 U	0.066 U	0.063 U	0.092 U	0.081 U	0.075 U	0.077 U
1,2-Dichloropropane	0.140 U	0.120 U	0.130 U	0.130 U	0.180 U	0.160 U	0.150 U	0.150 U
cis-1,3-Dichloropropene	0.069 U	0.060 U	0.066 U	0.063 U	0.092 U	0.081 U	0.075 U	0.077 U
Trichloroethene	0.035 U	0.030 U	0.033 U	0.032 U	0.046 U	0.041 U	0.038 U	0.038 U
Dibromochloromethane	0.035 U	0.030 U	0.033 U	0.032 U	0.046 U	0.041 U	0.038 U	0.038 U
1,1,2-Trichloroethane	0.069 U	0.060 U	0.066 U	0.063 U	0.092 U	0.081 U	0.075 U	0.077 U
Benzene	0.120	0.072	0.100	0.083	0.170	0.085	0.083 U	0.038 U
trans-1,3-Dichloropropene	0.069 U	0.060 U	0.066 U	0.063 U	0.092 U	0.081 U	0.075 U	0.077 U
2-Chloroethylvinylether	0.17 U	0.15 U	0.17 U	0.16 U	0.23 U	0.20 U	0.19 U	0.19 U
Bromoform	0.069 U	0.060 U	0.066 U	0.063 U	0.092 U	0.081 U	0.075 U	0.077 U
4-Methyl-2-pentanone	0.07 U	0.06 U	0.46 E	0.06 U	0.09 U	0.08 U	0.08 U	0.08 U
2-Hexanone	0.17 U	0.15 U	0.17 U	0.16 U	0.23 U	0.20 U	0.19 U	0.19 U
Tetrachloroethene	0.038	0.048	0.053	0.054	0.170	0.045	0.057	0.050
1,1,2,2-Tetrachloroethane	0.069 U	0.060 U	0.066 U	0.063 U	0.092 U	0.081 U	0.075 U	0.077 U
Toluene	0.250	0.150	0.240	0.200	0.240	0.170	0.180	0.240
Chlorobenzene	0.035 U	0.030 U	0.033 U	0.032 U	0.046 U	0.041 U	0.038 U	0.038 U
Ethylbenzene	0.066	0.036	0.080	0.070	0.065	0.037	0.045	0.050
Styrene	0.069 U	0.039 N	0.070	0.110	0.046 U	0.041 U	0.038 U	0.038 U
Total Xylenes	0.270	0.190	0.300	0.250	0.320	0.200	0.240	0.250
1,1,2-Cl-1,2,2-F ethane	0.069 U	0.060 U	0.066 U	0.063 U	0.230 U	0.200 U	0.190 U	0.192 U

(1) Primary sample.
(2) Sample from same van Veen field grab.
(3) Separate van Veen grab sample at same station

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 2, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 4B

Summary Statistics
Monitoring Variability Samples
(ug/kg, dry weight)

Compound	Station 5 (1)			Station 51 (2)	Station 38 (1)			Station 60 (2)
	Mean	SD	CV (%)	RPD	Mean	SD	CV (%)	RPD
Chloromethane	0.33 U				0.41 U			
Bromomethane	0.16 U				0.20 U			
Vinyl chloride	0.33 U				0.41 U			
Chloroethane	0.33 U				0.41 U			
Methylene chloride	3.8	3.5	92.1	156.4	14	22	157.1	190.2
Acetone	5.2			45.6	44 *	18	40.9	84.5
Carbon disulfide	2.1	0.98	46.7	141.1	0.36	0.38	105.6	
1,1-Dichloroethene	0.033 U				0.041 U			
1,1-Dichloroethane	0.033 U				0.041 U			
trans-1,2-Dichloroethene	0.065 U				0.081 U			
cis-1,2-Dichloroethene	0.065 U				0.070			-55.1
Chloroform	0.245	0.05	20.4	-10.0	0.059	0.04	67.8	142.9
1,2-Dichloroethane	0.065 U				0.08 U			
2-Butanone	0.16 U				4.7			146.7
1,1,1-Trichloroethane	0.270	0.26	96.3	156.9	0.076			
Carbon tetrachloride	0.032 U				0.035 U			
Vinyl acetate	0.06 U				0.081 U			
Bromodichloromethane	0.065 U				0.081 U			
1,2-Dichloropropane	0.130 U				0.160 U			
cis-1,3-Dichloropropene	0.065 U				0.081 U			
Trichloroethene	0.033 U				0.041 U			
Dibromochloromethane	0.033 U				0.041 U			
1,1,2-Trichloroethane	0.065 U				0.081 U			
Benzene	0.094	0.02	21.3	50.0	0.094			66.7
trans-1,3-Dichloropropene	0.065 U				0.081 U			
2-Chloroethylvinylether	0.16 U				0.20 U			
Bromoform	0.065 U				0.081 U			
4-Methyl-2-pentanone	0.16				0.08 U			
2-Hexanone	0.16 U				0.20 U			
Tetrachloroethene	0.048	0.01	20.8	-23.3	0.081	0.05	61.7	116.3
1,1,2,2-Tetrachloroethane	0.065 U				0.081 U			
Toluene	0.210	0.04	19.0	50.0	0.208	0.03	14.4	34.1
Chlorobenzene	0.033 U				0.041 U			
Ethylbenzene	0.063	0.02	31.7	58.8	0.049	0.01	20.4	54.9
Styrene	0.072	0.03	41.7	55.6	0.041 U			
Total Xylenes	0.253	0.04	15.8	34.8	0.253	0.04	15.8	46.2
1,1,2-Cl-1,2,2-F ethane	0.065 U				0.203 U			

(1) Primary Sample.
(2) Sample from same van Veen field grab.

* n=3

CV calculated if two or more values were positive hits.
RPD calculated if one or more values were positive hits.
The value of the QL has been used in calculations.

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 2, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 5

Sequim Bay Comparison Samples
(ug/kg, dry weight)

Compound	Station 66	Station 67	RPD
Chloromethane	0.20 U	0.19 U	
Bromomethane	0.10 U	0.09 U	
Vinyl chloride	0.20 U	0.19 U	
Chloroethane	0.20 U	0.19 U	
Methylene chloride	170 E	120 E	34.5
Acetone	14000 E	22000 E	-44.4
Carbon disulfide	91 E	76	18.0
1,1-Dichloroethene	0.020 U	0.019 U	
1,1-Dichloroethane	0.020 U	0.019 U	
trans-1,2-Dichloroethene	0.040 U	0.037 U	
cis-1,2-Dichloroethene	0.040 U	0.037 U	
Chloroform	2.40	1.70	34.1
1,2-Dichloroethane	0.040 U	0.037 U	
2-Butanone	0.10 U	0.093 U	
1,1,1-Trichloroethane	0.020 U	0.019 U	
Carbon tetrachloride	0.020 U	0.019 U	
Vinyl acetate	0.04 U	0.04 U	
Bromodichloromethane	0.040 U	0.037 U	
1,2-Dichloropropane	0.080 U	0.075 U	
cis-1,3-Dichloropropene	0.040 U	0.037 U	
Trichloroethene	0.020	0.013 N	42.4
Dibromochloromethane	0.020 U	0.019 U	
1,1,2-Trichloroethane	0.040 U	0.037 U	
Benzene	0.660	0.530	21.8
trans-1,3-Dichloropropene	0.040 U	0.037 U	
2-Chloroethylvinylether	0.10 U	0.09 U	
Bromoform	0.040 U	0.037 U	
4-Methyl-2-pentanone	0.36	0.64 E	-56.0
2-Hexanone	0.91 E	4.3	-130.1
Tetrachloroethene	0.044	0.034	25.6
1,1,2,2-Tetrachloroethane	0.040 U	0.037 U	
Toluene	5.00	5.00	0.0
Chlorobenzene	0.020 U	0.041	-68.9
Ethylbenzene	2.90	1.30	76.2
Styrene	0.020 U	0.019 U	
Total Xylenes	12.0	9.90	19.2
1,1,2-Cl-1,2,2-F ethane	0.040 U	0.037 U	

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 2, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 6
TIC Summary

Station	Number of Unknowns	Average Concentration (ug/kg)	Maximum Value (ug/kg)
Station 3	7	1.6	8.1
Station 5	6	4.1	10.0
Station 10	7	1.7	7.7
Station 14	6	0.9	3.6
Station 17	7	2.6	9.3
Station 19	5	2.3	5.3
Station 26	4	1.5	5.3
Station 29	5	22	68
Station 38	3	7.4	13
Station 45	6	2.3	9.2
Station 51	6	1.1	3.0
Station 52	7	2.0	7.8
Station 53	8	2.0	4.2
Station 60	3	2.1	4.0
Station 61	5	1.7	4.5
Station 62	5	2.3	5.3
Station 66	9	240	1600
Station 67	9	354	2300

Tentatively identified compounds (TICs) that were found in both the method blank and the sample were not included in this summary.

Values in ug/kg, dry weight

Project: WDOE MSMP
Site: Puget Sound
Lab: ARI

Date: August 2, 1989
Reviewer: T.D. Bowden
Matrix: Sediment

Table 7
Internal Standards Summary

Date	Sample	Internal Standard (1)	Internal Standard Area 12-hour	Sample	Acceptance Limits (2) -50% (+/- factor of 2)	+100%		Factor of 12-hour area	Concentration of IS (ug/kg, dry weight)
3/23/89	Station 61	BB	317479	142748	158740	634958	-	2.22	4.7
3/29/89	Station 26	BB	153142	354467	76571	306284	+	2.31	1.8
	Station 29	BCM	47363	96710	23682	94726	+	2.04	3.9
		DCE	140459	306072	70230	280918	+	2.18	3.9
		BB	153142	327817	76571	306284	+	2.14	3.9
	Method Blank 2	BCM	47363	126106	23682	94726	+	2.66	3.5
		DFB	276864	757294	138432	553728	+	2.74	3.5
		CBZ	201810	502362	100905	403620	+	2.49	3.5
		IM	184549	639770	92275	369098	+	3.47	3.5
		DCE	140459	416348	70230	280918	+	2.96	3.5
		IP	80166	246147	40083	160332	+	3.07	3.5
		BB	153142	568525	76571	306284	+	3.71	3.5
3/31/89	Station 5	CBZ	619876	289470	309938	1239752	-	2.14	4.3
		IM	808081	332879	404041	1616162	-	2.43	4.3
		BB	593817	289687	296909	1187634	-	2.05	4.3
	Station 5 MS	CBZ	619876	288482	309938	1239752	-	2.15	4.3
		IM	808081	396818	404041	1616162	-	2.04	4.3
	Station 5 MSD	CBZ	619876	300280	309938	1239752	-	2.06	4.3
		IM	808081	350818	404041	1616162	-	2.30	4.3
	Station 19	CBZ	619876	291388	309938	1239752	-	2.13	4.7
		IM	808081	310772	404041	1616162	-	2.60	4.7
		BB	593817	286991	296909	1187634	-	2.07	4.7
	Station 66	IM	808081	205671	404041	1616162	-	3.93	2.5
4/03/89	Station 51	BCM	125104	51231	62552	250208	-	2.44	3.7
		CBZ	579024	225460	289512	1158048	-	2.57	3.7
		BB	670869	187618	335435	1341738	-	3.58	3.7
	Station 53	BB	670869	302356	335435	1341738	-	2.22	4.0
	Station 67	IM	744440	199373	372220	1488880	-	3.73	2.3
4/07/89	Station 14	BB	176295	70172	88148	352590	-	2.51	0.8
	Station 17 MS	IM	198659	84741	99330	397318	-	2.34	1.5

(1) BCM Bromochloromethane
DFB 1,4-Difluorobenzene
CBZ Chlorobenzene-d5
IM Iodomethane-d3
DCE 1,1-Dichloroethane-2,2,2-d3
IP Iodopropane-d7
BB Bromobenzene-d5

(2) Acceptance limits based on +/- factor of 2 of 12-hour standard area

August 2, 1989

Data Validation Report
Total Organic Carbon Analyses

Site:	Puget Sound
Station Numbers:	1-50
Samples Numbers:	2756 A through 2756 S 2772 A through 2772 AW
Samples collected by:	Tetra Tech, Inc.

The samples included in this report were analyzed by Analytical Resources Inc. (ARI) of Seattle, Washington under a subcontract to Tetra Tech, Inc. of Bellevue Washington. Funding for this contract is provided by the Ambient Monitoring Section of the Washington State Department of Ecology.

This report is submitted to:

Raleigh Farlow (Jacobs Engineering Group, Inc.)

Data Evaluated by: Peter L. Striplin (Ecology)

Approved by: Raleigh Farlow RF (Jacobs Engineering Group, Inc.)

Data Validation Report - Total Organic Carbon Analyses

Site: Puget Sound
Ecology Contract Number: C0089130
Laboratory: Analytical Resources Inc.
Station Numbers: 1 - 50;
Sample Numbers: 2756 A through 2756 S and 2772 A through 2772 AW
Matrix: Sediment
Reviewer: Peter L. Striplin
Date: August 2, 1989

I. Introduction

Sixty-eight sediment samples including three project comparison samples (PCS) from 50 stations were submitted to Analytical Resources, Inc. (ARI) for total organic carbon analyses. The Chain of Custody Report shows that all samples were received intact.

Samples were collected using a 0.1 square meter van Veen grab sampler. Sediment for total organic carbon analyses were removed from the upper two centimeters of sediment in the sampler. Each sample consisted of homogenized composites from three van Veen grabs at each station. All samples were placed on ice until delivered to ARI.

Field generated quality control samples include two samples submitted as blind laboratory duplicates (splits from homogenized composite grabs) to evaluate sample handling and analytical variability (ie. Station 5 and 51); and two blind samples representing seperate van Veen composites from the same station for measuring monitoring variability (ie. analytical plus environmental variability; stations 5=52=53). The quality control samples also included two additional samples for matrix spike and matrix spike duplicate analyses (MS/MSD). Total organic carbon project comparison samples (Sequim Bay reference) were submitted as three surrogate stations to ARI for determination of analytical variability.

Blind laboratory duplicate (Field splits of homogenized grabs)

Station I.D.	Sample Number	Lab Sample Number
5	5	2772 AA
	51	2772 AG
26	26	2772 Q
	54	2772 T
32	32	2772 D
	57	2772 J

38	38	2756 A
	60	2756 N
44	44	2756 G
	63	2756 Q

Monitoring variability samples

Station I.D.	Sample Number	Lab Sample Number
5	5	2772 AA
	52	2772 AH
	53	2772 AI
26	26	2772 Q
	55	2772 U
	56	2772 V
32	32	2772 D
	58	2772 K
	59	2772 L
38	38	2756 A
	61	2756 O
	62	2756 P
44	44	2756 G
	64	2756 R
	65	2756 S

The analytical results with associated data qualifiers are found in Table 1. Sample holding times are summarized in Table 2. Table 3 lists the correlation coefficients and calibration response factors. The relative percent difference (RPD) between the initial calibration average TOC value and continuing calibration verification sample values are also presented in Table 3. Table 4 shows the results of the duplicate, matrix spike and matrix spike duplicate sample analyses. The relative percent difference (RPD) between the duplicate sample analyses and the MS/MSD analysis is also presented. The monitoring variability at five stations is presented in Table 5. The variability is presented as the coefficient of variation for all samples analyzed from the station.

The samples were analyzed according to the Puget Sound Estuary Program recommended protocols for measuring conventional sediment variables: Total organic carbon analysis (Tetra Tech, 1986). This report has been prepared in accordance with the Washington Department of Ecology implementation plan for the sediment quality

task of the Puget Sound Ambient Monitoring Program (Striplin, 1988) and modeled after the Washington Department of Ecology document " Data Validation Guidance Manual for Selected Sediment Variables" Draft version (PTI, 1989) and the USEPA document "Laboratory Data Validation, Functional Guidelines for Evaluating Inorganic Analyses," dated July 1, 1988.

II. Discussion

A. Sample Holding Times/Preservation

There are no EPA recommended maximum holding times for total organic carbon in sediments. The Puget Sound Protocols state that sediment samples for total organic carbon analysis can be frozen and held for up to six months. All samples were held at four degrees centigrade and analyzed within 19 days from collection. Holding times were determined by comparing the sampling dates recorded on the chain of custody document with the laboratory analysis logs.

All samples were preserved in the field by being kept on ice from the time of collection until they were delivered to ARI.

No qualification of sample results are required.

B. Calibration

The linearity of the calibration curve was determined by conducting a least squares regression analysis of the range of actual concentrations versus the measured concentrations of a KHP standard (Table 3). The correlation coefficient was greater than 0.998 and was within the specified limits cited in the Puget Sound Protocols. Response factors were calculated to show the reproducibility of results over the expected range of total organic carbon concentrations (Table 3). Initial and continuing calibration verification samples were run at the appropriate frequency. There are no CCV percent difference criteria in the Puget Sound Protocols for total organic carbon. For semivolatile organic compounds the calibration verification criteria allow a percent difference less than or equal to 25 percent (EPA, 1988; PTI, 1989). Applying these criteria to the total organic carbon measurements, results in no RPDs outside of the proposed target range.

Continuing calibration blanks were run at the recommended frequency. No significant problems were identified.

No qualification of data is required.

ECOLOGY CONTRACT NUMBER: C0089130
SITE: PUGET SOUND
LAB: ARI

DATE: AUGUST 1, 1989
REVIEWER: P. STRIPLIN
MATRIX: SEDIMENT

TABLE 2. Sample holding times for total organic carbon analysis.

Sample Number	Station I.D.	Date Collected	Date Lab. Received	Date Analyzed	Holding Times (days)
2756A	38*	3/21/89	3/22/89	4/06/89	17
2756A	38 LAB DUP	3/21/89	3/22/89	4/06/89	17
2756A	38 MS	3/21/89	3/22/89	4/06/89	17
2756A	38 MSD	3/21/89	3/22/89	4/06/89	17
2756B	39	3/21/89	3/22/89	4/06/89	17
2756C	40	3/21/89	3/22/89	4/06/89	17
2756D	41	3/21/89	3/22/89	4/06/89	17
2756E	42	3/21/89	3/22/89	4/06/89	17
2756F	43	3/20/89	3/22/89	4/06/89	18
2756G	44*	3/20/89	3/22/89	4/06/89	18
2756H	45	3/20/89	3/22/89	4/06/89	18
2756H	45 MS	3/20/89	3/22/89	4/06/89	18
2756H	45 MSD	3/20/89	3/22/89	4/06/89	18
2756I	46	3/20/89	3/22/89	4/06/89	18
2756J	47	3/20/89	3/22/89	4/06/89	18
2756K	48	3/19/89	3/22/89	4/06/89	19
2756L	49	3/19/89	3/22/89	4/06/89	19
2756M	50	3/19/89	3/22/89	4/06/89	19
2756N	60 (38-R)	3/21/89	3/22/89	4/06/89	17
2756N	60 LAB DUP	3/21/89	3/22/89	4/06/89	17
2756O	61 (38-2)	3/21/89	3/22/89	4/06/89	17
2756P	62 (38-3)	3/21/89	3/22/89	4/06/89	17
2756Q	63 (44-R)	3/20/89	3/22/89	4/06/89	18
2756Q	63 LAB DUP	3/20/89	3/22/89	4/06/89	18
2756Q	63 MS	3/20/89	3/22/89	4/06/89	18
2756Q	63 MSD	3/20/89	3/22/89	4/06/89	18
2756R	64 (44-2)	3/20/89	3/22/89	4/06/89	18
2756S	65 (44-3)	3/20/89	3/22/89	4/06/89	18
2772A	28	3/23/89	3/24/89	4/06/89	14
2772A	28 LAB DUP	3/23/89	3/24/89	4/06/89	14
2772A	28 MS	3/23/89	3/24/89	4/06/89	15
2772A	28 MSD	3/23/89	3/24/89	4/06/89	15
2772B	30	3/22/89	3/24/89	4/06/89	16
2772C	31	3/22/89	3/24/89	4/06/89	16
2772D	32*	3/23/89	3/24/89	4/06/89	15
2772E	33	3/22/89	3/24/89	4/06/89	16
2772E	33 LAB DUP	3/22/89	3/24/89	4/06/89	16
2772F	34	3/23/89	3/24/89	4/06/89	15
2772G	35	3/23/89	3/24/89	4/07/89	16
2772H	36	3/22/89	3/24/89	4/07/89	17
2772H	36 LAB DUP	3/22/89	3/24/89	4/07/89	17
2772H	36 MS	3/22/89	3/24/89	4/07/89	17
2772H	36 MSD	3/22/89	3/24/89	4/07/89	17

TABLE 1. (continued)

2772I	37	2.1
2756A	38*	20.0
2756N	60 (38-R)	21.0
2756O	61 (38-2)	22.0
2756P	62 (38-3)	20.0
2756B	39	0.9
2756C	40	7.0
2756D	41	8.0
2756E	42	0.9
2756F	43	1.4
2756G	44*	4.3
2756Q	63 (44-R)	4.4
2756R	64 (44-2)	4.0
2756S	65 (44-3)	4.3
2756H	45	9.6
2756I	46	4.2
2756J	47	2.9
2756K	48	25.0
2756L	49	27.0
2756M	50	2.0
2772AJ	66	8.8
2772AK	67	9.2
2772AL	68	7.2

* Denotes a station where monitoring variability was measured.

TABLE 2. Sample holding times (continued)

2772I	37		3/22/89	3/24/89	4/07/89	17
2772J	57	(32-R)	3/23/89	3/24/89	4/07/89	16
2772K	58	(32-2)	3/23/89	3/24/89	4/07/89	16
2772L	59	(32-3)	3/23/89	3/24/89	4/07/89	16
2772M	22		3/25/89	3/27/89	4/07/89	13
2772N	23		3/25/89	3/27/89	4/07/89	13
2772N	23	LAB DUP	3/25/89	3/27/89	4/07/89	13
2772N	23	MS	3/25/89	3/27/89	4/07/89	14
2772N	23	MSD	3/25/89	3/27/89	4/07/89	14
2772O	24		3/25/89	3/27/89	4/07/89	13
2772P	25		3/24/89	3/27/89	4/07/89	14
2772Q	26*		3/24/89	3/27/89	4/07/89	14
2772R	27		3/24/89	3/27/89	4/07/89	14
2772S	29		3/24/89	3/27/89	4/07/89	14
2772T	54	(26-R)	3/24/89	3/27/89	4/07/89	15
2772U	55	(26-2)	3/24/89	3/27/89	4/07/89	15
2772V	56	(26-3)	3/24/89	3/27/89	4/07/89	15
2772W	1		3/29/89	3/30/89	4/07/89	10
2772X	2		3/29/89	3/30/89	4/07/89	10
2772X	2	LAB DUP	3/29/89	3/30/89	4/07/89	10
2772X	2	MS	3/29/89	3/30/89	4/07/89	10
2772X	2	MSD	3/29/89	3/30/89	4/07/89	10
2772Y	3		3/29/89	3/30/89	4/07/89	10
2772Z	4		3/29/89	3/30/89	4/07/89	10
2772AA	5*		3/29/89	3/30/89	4/07/89	10
2772AB	6		3/29/89	3/30/89	4/07/89	10
2772AC	18		3/28/89	3/30/89	4/07/89	11
2772AD	19		3/28/89	3/30/89	4/07/89	11
2772AE	20		3/28/89	3/30/89	4/07/89	11
2772AF	21		3/28/89	3/30/89	4/07/89	11
2772AF	21	LAB DUP	3/28/89	3/30/89	4/07/89	11
2772AF	21	MS	3/28/89	3/30/89	4/07/89	11
2772AF	21	MSD	3/28/89	3/30/89	4/07/89	11
2772AG	51	(5-R)	3/29/89	3/30/89	4/07/89	10
2772AH	52	(5-2)	3/29/89	3/30/89	4/07/89	10
2772AI	53	(5-3)	3/29/89	3/30/89	4/07/89	10
2772AJ	66		3/29/89	3/30/89	4/07/89	10
2772AK	67		3/29/89	3/30/89	4/07/89	10
2772AL	68		3/29/89	3/30/89	4/07/89	10
2772AM	7		4/02/89	4/05/89	4/10/89	9
2772AN	8		4/02/89	4/05/89	4/10/89	9
2772AO	9		4/02/89	4/05/89	4/10/89	9
2772AP	10		4/02/89	4/05/89	4/10/89	9
2772AP	10	LAB DUP	4/02/89	4/05/89	4/10/89	9
2772AP	10	MS	4/02/89	4/05/89	4/10/89	9
2772AP	10	MSD	4/02/89	4/05/89	4/10/89	9
2772AQ	11		4/02/89	4/05/89	4/10/89	9
2772AR	12		4/03/89	4/05/89	4/10/89	8
2772AS	13		4/03/89	4/05/89	4/10/89	8
2772AT	14		4/03/89	4/05/89	4/10/89	8

TABLE 2. Sample holding times (continued)

2772AU	15	4/03/89	4/05/89	4/10/89	8
2772AV	16	4/04/89	4/05/89	4/10/89	7
2772AW	17	4/04/89	4/05/89	4/10/89	7

* Denotes a station where monitoring variability was measured

C. Duplicate Sample Analysis

Laboratory duplicate analyses were run on ten samples. The results are presented in Table 4. The RPD ranged from 0 to 38 percent and are within the +/- 50 percent target criteria.

Samples on which duplicate analyses were performed

Station I.D.	Sample Number
38	2756A DUP
60	2756N DUP
63	2756Q DUP
28	2772A DUP
33	2772E DUP
36	2772H DUP
23	2772N DUP
2	2772X DUP
21	2772AF DUP
10	2772AP DUP

D. Matrix Spike Analysis

Matrix spike (MS) and matrix spike duplicate (MSD) analyses were performed on nine samples. No recovery criteria have been previously identified for total organic carbon analyses, however, the program acceptance criteria for semivolatile organics are applied for these analyses (50-150%). Recoveries associated with two analytical groups (batchs) fall outside the target criteria range. All samples associated with those analytical groups and associated data are qualified as estimates. One transcription error was found in the recovery calculations. All calculations were checked and corrected. With the noted exceptions all other recoveries remained within acceptable limits.

Matrix spike (MS) / matrix spike duplicate (MSD) samples		
Station I.D.	MS sample number	MSD sample number
38	2756A MS	2756A MSD
45	2756H MS	2756H MSD
63	2756Q MS	2756Q MSD
28	2772A MS	2772A MSD
36	2772H MS	2772A MSD
23	2772N MS	2772N MSD
2	2772X MS	2772X MSD
21	2772AF MS	2772AF MSD
10	2772AP MS	2772AP MSD

Data from two batchs were qualified as estimates due to MS/MSD recoveries exceeding the target criteria range. Stations associated with those groups include:

Batch 8 stations - 6,18,19,20,21,51,52
Batch 10 stations - 7,8,9,10,11,12,13,14,15,16,17

E. Monitoring Variability: Blind Sample Duplicate Analyses

Total monitoring variability was estimated by determining the coefficient of variation among all total organic carbon samples at each station listed in the introduction. The coefficient of variation indicated that all stations were within the 50 percent target range (Table 5). The greatest variability was at Station 32 with a 31 percent coefficient of variation.

The relative percent difference of the "blind sample duplicate analyses" (field splits of homogenized grabs) ranged from 2.3 to 48 percent (Table 5). The RPD between the split samples at Station 32 showed the greatest variability (48%). All data were within the target criteria range. For three of the five stations the variability of the blind field replicate samples were less than that found for the blind field duplicate (split) samples. However, the differences among all measurements are considered insignificant. This suggests that there is little measurable difference between analytical and environmental variability for the total organic carbon at

ECOLOGY CONTRACT NUMBER: C0089130
SITE: PUGET SOUND
LAB: ARI

DATE: AUGUST 1, 1989
REVIEWER: P. STRIPLIN
MATRIX: SEDIMENT

Table 3. Calibration linearity and stability. Results of least squares regression analysis and calculated response factors for total organic carbon data. DW=dry weight

Initial Calibration

Linearity

N	5	Average TOC (mg/g)	2.35
Y-intercept	63.512	Std. Deviation	0.57
Slope	0.942	Percent RSD	24.3
r	0.99952		

Calibration Factors (C.F.)

Actual Conc. (ppm in soln)	C.F.
2000	0.513
1200	0.504
600	0.478
280	0.414
80	0.301

Continuing Calibration

Calib. Check	TOC (mg/g DW)	% D
1	2.10	11.1
2	2.11	10.9
3	2.13	9.8
4	2.09	11.6
5	2.09	11.6
6	2.12	10.5
7	2.16	8.4
8	2.20	6.7
9	2.19	7.2
10	2.18	7.7
11	2.20	6.7
12	2.15	9.0
13	2.10	12.0

ECOLOGY CONTRACT NUMBER: C0089130 DATE: AUGUST 1, 1989
SITE: PUGET SOUND REVIEWER: P. STRIPLIN
LAB: ARI MATRIX: SEDIMENT

Table 4. Total organic carbon QA/QC Report. Duplicates, matrix spikes and matrix spike duplicate results. All concentrations are in mg/Kg, dry wt.

SAMPLE NUMBER	STATION I.D.	TOC (mg/g C) SAMPLE	DUP.	RPD
DUPLICATE ANALYSES				
2756 A	38	20	21	4.9
2756 N	60	21	21	0
2756 Q	63	4.4	4.4	0
2772 A	28	1.5	1.4	6.9
2772 E	33	6.4	6.6	3.1
2772 H	36	1.3	1.6	21
2772 N	23	1.2	1.1	8.9
2772 X	2	6.8	7.5	9.8
2772 AF	21	13	19	38
2772 AP	10	6.1	6.5	6.3

MATRIX SPIKE (MS) AND MATRIX SPIKE DUPLICATE (MSD) ANALYSES

SAMPLE NUMBER	STATION I.D.	PERCENT RECOVERY MS	MSD	RPD
2756 A	38	117	130	10.5
2756 H	45	122	119	2.5
2756 Q	63	151	104	36.8
2772 A	28	109	104	4.7
2772 H	36	115	118	2.6
2772 N	23	92	106	14.6
2772 X	2	140	124	12.1
2772 AF	21	184	94	65.0
2772 AP	10	164	175	6.5

NOTE: Percent recovery calculations for spikes are based on calculations using the initial sample result.

ECOLOGY CONTRACT NUMBER: C0089130
SITE: PUGET SOUND
LAB: ARI

DATE: AUGUST 1, 1989
REVIEWER: P. STRIPLIN
MATRIX: SEDIMENT

Table 5. Blind sample duplicates and environmental variability data. (R) = Blind sample duplicate (Split), (2) = Second sample from station, (3) = Third sample from station. * Indicates the average concentration for the station was used to calculate the RPD.

Station I.D.	Sample Number	Sample conc.	Dup. conc.		
5	2772 AA	18		N	4
51 (R)	2772 AG	17		MEAN	18
52 (2)	2772 AH	19		S.D.	0.8
53 (3)	2772 AI	18		C.V.	4.6
				*RPD (5,51)	5.7
RPD (5,51) = Blind sample duplicate splits					
26	2772 Q	5.6		N	4
54 (R)	2772 T	4.5		MEAN	4.4
55 (2)	2772 U	4.0		S.D.	0.9
56 (3)	2772 V	3.5		C.V.	20
				RPD (26,54)	22
RPD (26,54) = Blind sample duplicate splits					
32	2772 D	1.8		N	4
57 (R)	2772 J	1.1		MEAN	1.6
58 (2)	2772 K	2.2		S.D.	0.5
59 (3)	2772 L	1.3		C.V.	31
				RPD (32,57)	48
RPD (32,57) = Blind sample duplicate splits					
38	2756 A	20	21	N	6
60 (R)	2756 N	21	21	MEAN	21
61 (2)	2756 O	22		S.D.	0.8
62 (3)	2756 P	20		C.V.	3.6
				*RPD (38,60)	2.4
RPD (38,60) = Blind sample duplicate splits					
44	2756 G	4.3		N	5
63 (R)	2756 Q	4.4	4.4	MEAN	4.3
64 (2)	2756 R	4.0		S.D.	0.2
65 (3)	2756 S	4.3		C.V.	3.7
				RPD (44,63)	2.3
RPD (44,63) = Blind sample duplicate splits					
Project comparison samples				N	3
				MEAN	8.4
66	2772 AJ	8.8		S.D.	1.1
67	2772 AK	9.2		C.V.	13.6
68	2772 AL	7.2			

ECOLOGY CONTRACT NUMBER: C0089130
SITE: PUGET SOUND
LAB: CAS SR NUMBER 89538

DATE: JULY 13, 1989
REVIEWER: P. STRIPLIN
MATRIX: SEDIMENT

TABLE 1. Results for total sulfide analyses (mg/kg dry wt).

Sample Number	Station I.D.	Total sulfides results	Data qualifier
538-42	1	0.48	
538-43	2	0.40	
538-44	3	0.56	
538-45	4	0.38	
538-46	5*	0.25	U
538-52	51 (5-R)	0.25	U
538-53	52 (5-2)	0.44	
538-54	53 (5-3)	0.25	U
538-47	6	0.25	U
538-55	7	0.25	U
538-56	8	0.25	U
538-57	9	0.26	
538-58	10	0.25	U
538-59	11	0.91	
538-60	12	0.25	U
538-61	13	0.25	U
538-62	14	0.55	
538-63	15	0.47	
538-64	16	0.25	U
538-65	17	0.25	U
538-48	18	0.25	U
538-49	19	0.25	U
538-50	20	0.25	U
538-51	21	0.25	U
538-32	22	0.25	U
538-33	23	0.39	
538-34	24	0.25	U
538-35	25	0.42	
538-36	26*	0.39	
538-39	54 (26-R)	0.25	U
538-40	55 (26-2)	0.41	
538-41	56 (26-3)	0.25	U
538-37	27	0.25	U
538-20	28	0.72	
538-38	29	0.94	
538-21	30	1.07	
538-22	31	0.48	
538-23	32*	0.25	U
538-29	57 (32-R)	1.15	
538-30	58 (32-2)	0.25	U
538-31	59 (32-3)	0.90	
538-24	33	0.25	U
538-25	34	0.25	U
538-26	35	0.25	U
538-27	36	0.25	U
538-28	37	1.04	

TABLE 1. (continued)

Sample Number	Station I.D.	Total sulfides results	Data qualifier
538-1	38*	0.89	
538-14	60 (38-R)	0.70	
538-15	61 (38-2)	0.76	
538-16	62 (38-3)	0.25	U
538-2	39	0.38	
538-3	40	0.30	
538-4	41	0.25	U
538-5	42	0.25	U
538-6	43	0.53	
538-7	44*	0.25	U
538-17	63 (44-R)	0.26	
538-18	64 (44-2)	0.25	U
538-19	65 (44-3)	0.34	
538-8	45	0.25	U
538-9	46	0.25	U
538-10	47	0.25	U
538-11	48	1.01	
538-12	49	0.74	
538-13	50	0.25	U

* Denotes environmental/monitoring variability station

The numbers in parentheses refer to the station, blind laboratory duplicate and/or replicate that the station is related to.

ie. 51 (5-R) - Station 51 is the blind lab duplicate for Station 5.
52 (5-2) - Station 52 is the second set of composites from Station 5.
53 (5-3) - Station 53 is the third set of composites from Station 5.

ECOLOGY CONTRACT NUMBER: C0089130
SITE: PUGET SOUND
LAB: CAS SR NUMBER 89538

DATE: JULY 13, 1989
REVIEWER: P. STRIPLIN
MATRIX: SEDIMENT

TABLE 2. Sample holding times for total sulfide analyses.

SAMPLE NUMBER	STATION I.D.	DATE COLLECTED	DATE LAB. RECEIVED	DATE ANALYZED	HOLDING TIMES (days)
538-1	38*	3/21/89	3/22/89	3/25/89	5
538-2	39	3/21/89	3/22/89	3/25/89	5
538-3	40	3/21/89	3/22/89	3/25/89	5
538-4	41	3/21/89	3/22/89	3/25/89	5
538-5	42	3/21/89	3/22/89	3/25/89	5
538-6	43	3/20/89	3/22/89	3/25/89	6
538-7	44*	3/20/89	3/22/89	3/25/89	6
538-8	45	3/20/89	3/22/89	3/25/89	6
538-9	46	3/20/89	3/22/89	3/25/89	6
538-10	47	3/20/89	3/22/89	3/25/89	6
538-11	48	3/19/89	3/22/89	3/25/89	7
538-12	49	3/19/89	3/22/89	3/25/89	7
538-13	50	3/19/89	3/22/89	3/25/89	7
538-14	60 (38-R)	3/21/89	3/22/89	3/25/89	5
538-15	61 (38-2)	3/21/89	3/22/89	3/25/89	5
538-16	62 (38-3)	3/21/89	3/22/89	3/25/89	5
538-17	63 (44-R)	3/20/89	3/22/89	3/25/89	6
538-18	64 (44-2)	3/20/89	3/22/89	3/25/89	6
538-19	65 (44-3)	3/20/89	3/22/89	3/25/89	6
538-20	28	3/23/89	3/24/89	3/29/89	7
538-21	30	3/22/89	3/24/89	3/29/89	8
538-22	31	3/22/89	3/24/89	3/29/89	8
538-23	32*	3/23/89	3/24/89	3/29/89	7
538-24	33	3/22/89	3/24/89	3/29/89	8
538-25	34	3/23/89	3/24/89	3/29/89	7
538-26	35	3/23/89	3/24/89	3/29/89	7
538-27	36	3/22/89	3/24/89	3/29/89	8
538-28	37	3/22/89	3/24/89	3/29/89	8
538-29	57 (32-R)	3/23/89	3/24/89	3/29/89	7
538-30	58 (32-2)	3/23/89	3/24/89	3/29/89	7
538-31	59 (32-3)	3/23/89	3/24/89	3/29/89	7
538-32	22	3/25/89	3/27/89	3/30/89	6
538-33	23	3/25/89	3/27/89	3/30/89	6
538-34	24	3/25/89	3/27/89	3/30/89	6
538-35	25	3/24/89	3/27/89	3/30/89	7
538-36	26*	3/24/89	3/27/89	3/30/89	7
538-37	27	3/24/89	3/27/89	3/30/89	7
538-38	29	3/24/89	3/27/89	3/30/89	7
538-39	54 (26-R)	3/24/89	3/27/89	3/30/89	7
538-40	55 (26-2)	3/24/89	3/31/89	3/30/89	7
538-41	56 (26-3)	3/24/89	3/31/89	3/30/89	7
538-42	1	3/29/89	3/31/89	4/04/89	7
538-43	2	3/29/89	3/31/89	4/04/89	7
538-44	3	3/29/89	3/31/89	4/04/89	7
538-45	4	3/29/89	3/31/89	4/04/89	7
538-46	5*	3/29/89	3/31/89	4/04/89	7

TABLE 2 (Continued)

SAMPLE NUMBER	STATION I.D.	DATE COLLECTED	DATE LAB. RECEIVED	DATE ANALYZED	HOLDING TIMES (days)
538-47	6	3/29/89	3/31/89	4/04/89	7
538-48	18	3/28/89	3/31/89	4/04/89	8
538-49	19	3/28/89	3/31/89	4/04/89	8
538-50	20	3/28/89	3/31/89	4/04/89	8
538-51	21	3/28/89	3/31/89	4/04/89	8
538-52	51 (5-R)	3/29/89	3/31/89	4/05/89	8
538-53	52 (5-2)	3/29/89	3/31/89	4/05/89	8
538-54	53 (5-3)	3/29/89	3/31/89	4/05/89	8
538-55	7	4/02/89	4/05/89	4/08/89	7
538-56	8	4/02/89	4/05/89	4/08/89	7
538-57	9	4/02/89	4/05/89	4/08/89	7
538-58	10	4/02/89	4/05/89	4/08/89	7
538-59	11	4/02/89	4/05/89	4/08/89	7
538-60	12	4/03/89	4/05/89	4/08/89	6
538-61	13	4/03/89	4/05/89	4/08/89	6
538-62	14	4/03/89	4/05/89	4/08/89	6
538-63	15	4/03/89	4/05/89	4/08/89	6
538-64	16	4/04/89	4/05/89	4/08/89	6
538-65	17	4/04/89	4/05/89	4/08/89	6

There are no maximum technical holding time criteria for total sulfide analysis in sediment. However, a maximum holding time is applied and is consistent with the maximum holding time recommended for sulfides in preserved water samples.

ECOLOGY CONTRACT NUMBER: C0089130
SITE: PUGET SOUND
LAB: CAS SR NUMBER 89538

DATE: JULY 13, 1989
REVIEWER: P. STRIPLIN
MATRIX: SEDIMENT

Table 3. Calibration linearity and stability. Results of least squares regression analysis and calculated response factors of sulfide data by batch and sample number.

BATCH NUMBER	1	2	3	4	5	6
SAMPLE NUMBERS	538-1 538-19	538-20 538-31	538-32 538-41	538-42 538-51	538-52 538-54	538-55 538-65
N	4	5	4	5	5	5
Y intercept	0.0095	0.0015	0.0024	0.0014	-0.0013	-0.0045
Slope	0.4463	0.4173	0.4435	0.5098	0.4149	0.5265
r	0.998	0.998	0.998	0.999	0.999	0.999
CCV Recov (I)	109	94	92	94	88	-
CCV Recov (M)	98	-	-	-	-	-
CCV Recov (F)	87	103	103	87	-	104

RESPONSE FACTORS

BATCH NUMBER	1	2	3	4	5	6
SAMPLE NUMBERS Concentration	538-1 538-19	538-20 538-31	538-32 538-41	538-42 538-51	538-52 538-54	538-55 538-65
0	0	0	0	0	0	0
0.05			0.400	0.620	0.340	0.380
0.10	0.550	0.470	0.550	0.470	0.430	0.440
0.20		0.420				
0.50	0.500	0.414	0.446	0.524	0.404	0.504
0.80		0.421		0.508	0.416	0.526
1.00	0.447					
1.50	0.412					
MEAN	0.477	0.431	0.465	0.531	0.398	0.463
STD. DEV.	0.060	0.026	0.077	0.064	0.039	0.066
COEF. VAR.(%)	13.4	6.0	16.6	12.1	9.8	14.3
Initial CCV	0.486	0.394	0.414	0.482	0.364	0.444
Final CCV	0.394	0.434	0.460	0.458	NONE	0.536
*RPD (Init.)	1.9	8.9	11.6	9.7	8.9	4.2
*RPD (Final)	19.5	0.69	1.1	14.8	-	14.6

* RPD was calculated using the mean response factor and the response factors for the initial and final CCV.

ECOLOGY CONTRACT NUMBER: C0089130
SITE: PUGET SOUND
LAB: CAS SR NUMBER 89538

DATE: JULY 13, 1989
REVIEWER: P. STRIPLIN
MATRIX: SEDIMENT

Table 4. Total sulfides QA/QC Report. Duplicates, matrix spikes and matrix spike duplicate results. All concentrations are in mg/Kg, dry wt.

STATION I.D.	5	25	28	38	53	7
SAMPLE NUMBER	538-46	538-35	538-20	538-1	538-54	538-55
DUPLICATE ANALYSES						
Result "A"	0.25 U	0.25 U	0.74	0.98	0.25 U	0.25 U
Result "B"	0.25 U	0.42	0.70	0.79	0.25 U	0.25 U
RPD	0	50.7	5.7	21.6	0	0
Reported result	0.25 U	0.42	0.72	0.89	0.25 U	0.25 U
MATRIX SPIKE (MS) AND MATRIX SPIKE DUPLICATE (MSD) ANALYSES						
MS level (mg/kg, WW)	5.05	4.97	2.42	5.3	NA	4.76
MSD level (mg/kg, WW)	4.96		2.39	5.3		
MS recovery (%)	90	122	103	116		87
MSD recovery (%)	85	-	115	113	-	
Average spike recovery (%)	87.5	122	109	114.5	-	87
Spike Conc.	4.70	6.48	2.87	7.17	NA	4.38
Spike Dup. Conc.	4.47	-	3.11	6.98		-
RPD	5.04	-	8.03	2.70		-

NOTE: Percent recovery calculations for spikes are based on calculations using "Result A" except for 538-35, where "Result B" was used.

ECOLOGY CONTRACT NUMBER: C0089130
SITE: PUGET SOUND
LAB: CAS SR NUMBER 89538

DATE: JULY 13, 1989
REVIEWER: P. STRIPLIN
MATRIX: SEDIMENT

Table 5. Blind sample duplicates and environmental variability data. (R) = Blind sample duplicate, (2) = Second sample from station, (3) = Third sample from station. * Indicates the average concentration for the station was used to calculate the RPD.

		Duplicate			
Station I.D.	Sample Number	"A"	"B"		
5	538-46	0.25 U	0.25 U	N	5
51 (R)	538-52	0.25 U		MEAN	0.288
52 (2)	538-53	0.44		S.D.	0.085
53 (3)	538-54	0.25 U		C.V.	29.5
				*RPD (5,51)	0
26	538-36	0.39		N	4
54 (R)	538-39	0.25 U		MEAN	0.325
55 (2)	538-40	0.41		S.D.	0.087
56 (3)	538-41	0.25 U		C.V.	26.8
				RPD (26,54)	43.8
32	538-23	0.25 U		N	4
57 (R)	538-29	1.15		MEAN	0.637
58 (2)	538-30	0.25 U		S.D.	0.459
59 (3)	538-31	0.90		C.V.	43.8
				RPD (32,57)	128.6
38	538-1	0.985	0.793	N	5
60 (R)	538-14	0.70		MEAN	0.698
61 (2)	538-15	0.76		S.D.	0.272
62 (3)	538-16	0.25 U		C.V.	39.0
				*RPD (38,60)	23.8
44	538-7	0.25 U		N	4
63 (R)	538-17	0.26		MEAN	0.275
64 (2)	538-18	0.25 U		S.D.	0.044
65 (3)	538-19	0.34		C.V.	15.9
				RPD (44,63)	3.9

July 13, 1989

Data Validation Report
Total Sulfides Analyses

Site:	Puget Sound
Station Numbers:	1-65
Samples Numbers:	538-1 through 538-65
Samples collected by:	Tetra Tech, Inc.

The samples included in this report were analyzed by Columbia Analytical Services, Inc. of Longview, Washington under a subcontract to Tetra Tech, Inc. of Bellevue Washington. Funding for this contract is provided by the Ambient Monitoring Section of the Washington State Department of Ecology.

This report is submitted to:

Raleigh Farlow (Jacobs Engineering Group, Inc.)

Data Evaluated by: Peter L. Striplin (Ecology)

Approved by: Raleigh Farlow (Jacobs Engineering Group, Inc.)
RJF 8/3/89

Data Validation Report - Total Sulfide Analyses

Site: Puget Sound
Ecology Contract Number: C0089130
Laboratory: Columbia Analytical Services, Inc.
Station Numbers: 1 - 50; Sample Numbers: 538-1 through 538-65
Matrix: Sediment
Reviewer: Peter L. Striplin
Date: June 19, 1989

I. Introduction

Sixty-nine sediment samples from 50 stations were submitted to Columbia Analytical Services, Inc. (CAS) for total sulfide analyses. The Chain of Custody Report shows that all samples were received intact.

Samples were collected using a 0.1 meter square van Veen sampler. Sediment for total sulfide analyses were removed from the sampler as grabs from the upper two centimeters of sediment. No compositing or homogenizing was applied to the sample. Samples were preserved using zinc acetate and kept on ice until delivered to the laboratory.

Field generated quality control samples include two samples collected as blind laboratory replicates to examine the variability within the van Veen sampler (ie. Station 5 and 51); and two samples to measure monitoring variability (ie. analytical and environmental variability; stations 5=52=53). The quality control samples listed below included two additional samples for matrix spike and matrix spike duplicate analysis (MS/MSD).

Blind laboratory duplicate (Two samples from one van Veen grab)

Station I.D.	Sample Number	Lab Sample Number
5	5	538-46
	51	538-52
26	26	538-36
	54	538-39
32	32	538-23
	57	538-29
38	38	538-1
	60	538-14
44	44	538-7
	63	538-17

Monitoring variability

Station I.D.	Sample Number	Lab Sample Number
5	5	538-46
	52	538-53
	53	538-54
26	26	538-36
	55	538-40
	56	538-41
32	32	538-23
	58	538-30
	59	538-31
38	38	538-1
	61	538-15
	62	538-16
44	44	538-7
	64	538-18
	65	538-19

The analytical results are found in Table 1. Sample holding times are summarized in Table 2. Table 3 lists the correlation coefficients and calibration response factors by analytical group. The relative percent difference (RPD) between the average response factors and continuing calibration verification sample response factors are also presented in Table 3. Table 4 shows the results of the duplicate, spike and spike duplicate sample analyses. The relative percent difference (RPD) between the duplicate sample analyses and the MS/MSD analysis is also presented. The environmental variability at five stations is presented in Table 5. The variability is presented as the coefficient of variation for all samples analyzed from the station.

The samples were analyzed according to the Puget Sound Estuary Program recommended protocols for measuring conventional sediment variables: Total sulfide analysis (Tetra Tech, 1986). This report has been prepared in accordance with the Washington Department of Ecology implementation plan for the sediment quality task of the Puget Sound Ambient Monitoring Program (Striplin, 1988) and modeled after the Washington Department of Ecology document " Data Validation Guidance Manual for Selected Sediment Variables." Draft version (PTI, 1989) and the USEPA document "Laboratory Data Validation, Functional Guidelines for Evaluating Inorganic Analyses," dated July 1, 1988.

II. Discussion

A. Sample Holding Times/Preservation Laboratory:

There are no EPA recommended maximum holding times for total sulfides in sediments. The Puget Sound Protocols recommends that the holding time for water also be applied for sediments. The holding time for sulfide analysis in water is seven days. Twelve of the 69 samples analyzed by CAS exceeded the recommended holding time by one day (Table 2). All other samples were analyzed within the recommended time. Holding times were determined by comparing the sampling dates recorded on the chain of custody document with the laboratory analysis logs.

All sample were preserved in the field with zinc acetate and by being kept on ice from the time of collection till they were received by CAS.

No data were qualified because preserved samples analyzed one day past the recommended holding time are not expected to be affected. Stations 51, 52, and 53 were analyzed on day eight while Station 5, a replicate, was analyzed on day seven and there was no significant difference among the results (Tables 1 & 2).

B. Calibration

The linearity of the calibration curve was determined by conducting a least squares regression analysis of absorbance versus standards concentration for each batch (Table 3). All correlation coefficients were greater than or equal to 0.998 and were within the specified limits cited in the Puget Sound Protocols. Response factors were calculated to show the reproducability of results over the expected range of total sulfide concentrations (Table 3). Initial and continuing calibration verification samples were run at the appropriate frequency. There are no CCV recovery criteria in the Puget Sound Protocols for total sulfides. For metals analyses the calibration verification range is 90-110 percent. Applying these to the total sulfide results, finds three recoveries outside of the proposed target criteria of +/- 10 percent. the In Batch 1 the final CCV was 87%, batch 4 the final CCV was 89% batch 5 the recovery was 88%.

Continuing calibration blanks were run at the recommended frequency of one per batch. No significant problems were identified.

No data qualifiers were found to be necessary as a result of the three CCV recoveries being slightly outside of the recommended target criteria range.

C. Duplicate Sample Analysis

Duplicate samples were run at five stations corresponding to one sample per batch. The results are presented in Table 4.

Laboratory duplicate samples

Station I.D.	Sample Number	Lab Sample Number	
38	538-1	538-1A	538-1B
28	538-20	538-20A	538-20B
25	538-35	538-35A	538-35B
5	538-46	538-46A	538-46B
53	538-54	538-54A	538-54B
7	538-55	538-55A	538-55B

D. Matrix Spike Analysis

Matrix spike (MS) samples were analyzed at five stations and matrix spike duplicates (MSD) were analyzed at three of the five. One spike was run per batch except in Batch 5 which consisted of three samples. No recovery criteria have been identified for total sulfide analyses, however the acceptance criteria for metals will be applied for these analyses (75-125%). All recoveries are within the proposed acceptance limits. Four transcription errors were found in the recovery calculations. All calculations were checked and corrected. All recoveries remained within acceptable limits.

No data qualifiers were applied to these data as a result of the matrix spike/matrix spike duplicate analyses.

E. Monitoring Variability/Blind Sample Duplicate Analyses

The total monitoring variability was measured by determining the coefficient of variation among all sulfide samples at each

station listed above. The coefficient of variation indicated that all stations were within the 50 percent target range except at station 32. The reported concentration ranged from <0.25 to 1.15 mg/Kg resulting in a coefficient of variation of 72% (Table 5).

The relative percent difference of the "blind laboratory splits" ranged from zero to 128.6 percent (Table 5). Since the sediment for sulfide analysis is not part of a homogenized composite, the results are not a measure of analytical variability but are a measure of the total monitoring variability within the van Veen sampler. These data show that the amongst grab variability (ie. Stations 32,57,58,and 59) is equal to the within grab variability (Stations 32 and 57).

All data were checked for transcription errors and found to be correct.

F. Sample Result Verification

All raw data are legible and complete. Stations where environmental variability was measured and an additional 10 percent of the remaining stations were selected at random and checked for transcription errors. One transcription error was found at Station 25 (538-35). The station is identified as lab code number 538-25 on the QA/QC report when it should be 538-35.

G. Overall Case Assessment

Acceptable warning and control limits for total sulfides data are discussed above. The data quality objectives discussed in the Department of Ecology sediment quality task implementation plan were met. The quality of the deliverables was good and the data package was 100 percent complete. The following QA/QC inconsistencies were identified based on the target criteria:

1. Holding times on 12 of the 69 samples were exceeded by one day (Table 2).

2. Three CCV recoveries were outside of target criteria by two to three percent (Table 3).

In spite of the two QC deviations the general data quality was good and no data required qualification.

These data are acceptable and useful for the intended purposes of this project.

July 25, 1989

Data Validation Report
Grain Size Analyses

Site:	Puget Sound
Station Numbers:	1-65
Samples Numbers:	538-1 through 538-65
Samples collected by:	Tetra Tech, Inc.

The samples included in this report were analyzed by Columbia Analytical Services, Inc. of Longview Washington under a subcontract to Tetra Tech, Inc. of Bellevue Washington. Funding for this contract is provided by the Ambient Monitoring Section of the Washington State Department of Ecology.

This report is submitted to:

Raleigh Farlow (Jacobs Engineering Group, Inc.)

Data Evaluated by: Peter L. Striplin (Ecology)

Approved by: Raleigh Farlow (Jacobs Engineering Group, Inc.)
RF 8/7/89

Data Validation Report - Grain Size Analyses

Site: Puget Sound
Ecology Contract Number: C0089130
Laboratory: Columbia Analytical Services, Inc.
Station Numbers: 1 - 50; Sample Numbers: 538-1 through 538-65
Matrix: Sediment
Reviewer: Peter L. Striplin
Date: June 19, 1989

I. Introduction

Sixty-five sediment samples from 50 stations were submitted to Columbia Analytical Services, Inc. (CAS) for grain size analyses. The Chain of Custody Report shows that all samples were received intact. However, CAS noted problems with the first two sample delivery groups. The problems were associated with the use of a single plastic zip-lock bag as a sample container for sediment. There was suspicion that moisture may have been lost due to loose seals or punctures in the bags. The following sample delivery groups used double zip-lock bags and no further problems occurred.

Sediment samples for grain size analysis were collected using a chain rigged van Veen grab sampler. The van Veen samples a surface area of 0.1 sq. m at a maximum penetration depth of 18 cm. Samples for grain size analysis were removed from the upper two cm of the sediment. Each sample consisted of composites from three replicate van Veen grab samples. All samples were placed on ice until delivered to CAS.

Field generated quality control samples include two samples collected as blind laboratory duplicates (splits) in order to evaluate sample handling and analytical variability (ie. Station 5 and 51); and two additional composites of three grab samples to measure monitoring variability (ie. stations 5=52=53).

Blind laboratory duplicate (Split from a single composite)

Station I.D.	Sample Number	Lab Sample Number
5	5	538-46
	51	538-52
26	26	538-36
	54	538-39
32	32	538-23
	57	538-29

38	38	538-1
	60	538-14
44	44	538-7
	63	538-17

Monitoring variability

Station I.D.	Sample Number	Lab Sample Number
5	5	538-46
	52	538-53
	53	538-54
26	26	538-36
	55	538-40
	56	538-41
32	32	538-23
	58	538-30
	59	538-31
38	38	538-1
	61	538-15
	62	538-16
44	44	538-7
	64	538-18
	65	538-19

The analytical results are found in Table 1. Sample holding times are summarized in Table 2. Table 3 lists the percent recovery of solids for each whole sample. Table 4 shows the total variance as measured by the coefficient of variation (CV) among all samples from each replicated station and the relative percent difference (RPD) for each pair of blind laboratory duplicate splits.

The samples were analyzed according to the Puget Sound Estuary Program recommended protocols for measuring conventional sediment variables: Particle size (Tetra Tech, 1986). This report has been prepared in accordance with the Washington Department of Ecology implementation plan for the sediment quality task of the Puget Sound Ambient Monitoring Program (Striplin, 1988) and modeled after the Washington Department of Ecology document " Data Validation Guidance Manual for Selected Sediment Variables" Draft version (PTI, 1989) and the USEPA document "Laboratory Data Validation, Functional Guidelines for Evaluating Inorganic Analyses," dated July 1, 1988.

II. Discussion

A. Sample Holding Times/Preservation Laboratory:

There are no EPA recommended maximum holding times for grain size analyses, however the Puget Sound Protocols recommend that sediments not be held for over six months. All samples for this study were analyzed within 50 days (Table 2). Holding times were determined by comparing the sampling dates recorded on the chain of custody document with the laboratory analysis logs.

All samples were preserved in the field by holding on ice from the time of collection till they were received by CAS. As noted above, some moisture may have been lost because of loose seals or punctures on the zip-lock storage bags for the first two sample delivery groups.

B. Sample Recovery

General acceptance criteria for grain size results as specified in the Puget Sound Protocols include a 95 to 105 percent recovery of the combined fraction weights when compared to initial calculated dry weight of the sample aliquot. However, the Department of Ecology Draft Data Validation Guidance Manual states that," If samples have recoveries less than 95 percent but greater than 90 percent, these low recoveries would probably not significantly change the size fractions. For recoveries less than 90 percent the data need to be reviewed as to the possible effect the low recoveries might have on the size fractions reported." The percent recoveries were recalculated and are presented in Table 3. Seven stations had recoveries less than 95 percent, but none were below 90 percent. Examination of the laboratory bench sheets showed no discernable problems. Five samples had been reanalyzed due to low recoveries of the silt/clay fraction. The reanalysis showed at most a five percent change in the recovery of the silt/clay fraction. The reanalyzed fractions were within the Puget Sound Protocols.

No qualification of sample results were found to be necessary.

C. Monitoring Variability/Blind Laboratory Sample Analyses

The total variation among the particle size fractions as measured by the coefficient of variation among all samples is within the proposed 50 percent acceptance limit for recoveries. The proposed acceptance criteria for recoveries is consistent with the 50 percent criteria for organic

parameters as specified in the Puget Sound protocols and Ecology's implementation plan.

The relative percent difference of the blind laboratory duplicate splits were within the +/- 20 percent target range except for the split between samples 38 and 60 (Station 38). The RPD for the silt (4-8 phi) category was -29.~~19~~ percent and for the clay (>8 phi) category the RPD was 35.9~~88~~ percent. All data were checked for transcription errors and RPD were confirmed by recalculation.

D. Sample Result Verification

All raw data are legible and complete. Ten percent of all stations were selected at random and checked for transcription errors, and to ensure that the percent recovery of the particle size fractions were within target criteria. Stations where samples for environmental variability were collected and measured were also checked. One transcription error was found at Station 3 (538-44). The dry weight in grams was reported as 0.9775 and the lab bench sheet reported 0.8775. This results in a change for total percent recovery from 91.174 to 90.836. No errors were detected on comparing the recovery of the total dry weight and particle size fraction dry weight.

E. Overall Case Assessment

The target criteria for accepting grain size data were met with minor exceptions. The quality of the deliverables was generally good and the data package was complete. The data quality was good with minor deviations noted for seven samples ~~(90 > R < 95). percent.~~ (90 < %R < 95).

No data required qualification based on the proposed acceptance criteria.

These data are acceptable and useful for the intended purposes of this project.

ECOLOGY CONTRACT NUMBER: C0089130
SITE: PUGET SOUND
LAB: CAS SR NUMBER 89538

DATE: JUNE 19, 1989
REVIEWER: P. STRIPLIN
MATRIX: SEDIMENT

TABLE 1. Grain size analyses results. Phi sizes in parentheses.

SAMPLE NUMBER	STATION I.D.	% GRAVEL (<-1)	% SAND VC (-1-0)	C (0-1)	M (1-2)	F (2-3)	VF (3-4)	% SILT (4-8)	% CLAY (>8)
538-42	1	0.00	0.00	0.50	2.72	1.32	2.13	70.45	22.87
538-43	2	0.10	0.36	0.54	1.07	5.47	42.42	37.85	12.17
538-44	3	33.85	3.62	1.75	4.25	5.66	18.23	25.51	7.14
538-45	4	0.00	0.75	1.87	1.36	1.37	1.32	70.77	22.56
538-46	5*	0.00	0.21	0.09	0.73	0.85	2.41	72.73	22.98
538-52	51 (5-R)	0.00	0.13	0.08	0.43	0.58	2.14	76.11	20.53
538-53	52 (5-2)	0.00	0.10	0.18	0.51	0.84	2.11	68.45	27.81
538-54	53 (5-3)	0.00	0.05	0.15	0.87	1.28	3.03	66.70	27.94
538-47	6	0.32	0.98	3.32	27.44	55.49	5.40	3.92	3.13
538-55	7	22.16	7.78	9.73	39.42	13.11	1.71	3.45	2.64
538-56	8	0.77	0.44	1.33	5.02	5.49	21.19	48.61	17.16
538-57	9	6.13	5.61	18.89	55.11	12.49	0.44	0.32	1.01
538-58	10	0.00	0.18	0.63	3.18	32.55	26.23	25.74	11.50
538-59	11	0.32	0.85	2.67	17.56	47.65	6.69	15.15	9.10
538-60	12	0.43	0.05	0.15	0.86	1.79	6.44	66.10	24.19
538-61	13	0.30	0.97	13.55	46.00	19.09	10.41	6.47	3.21
538-62	14	0.00	0.95	10.65	31.16	17.35	12.28	17.42	10.19
538-63	15	0.43	0.38	2.07	24.05	44.45	20.40	5.02	3.20
538-64	16	1.41	3.13	10.56	22.20	40.20	18.65	2.06	1.80
538-65	17	0.77	0.85	1.19	1.95	1.49	1.26	63.05	29.45
538-48	18	0.00	0.27	0.70	17.23	17.63	4.02	37.85	22.30
538-49	19	0.00	0.22	1.75	3.67	5.14	7.95	33.74	47.52
538-50	20	0.00	0.13	0.17	0.32	0.36	4.92	73.32	20.79
538-51	21	0.00	0.36	0.62	2.80	8.77	35.29	45.79	6.37
538-32	22	0.23	0.18	1.16	12.37	58.04	23.81	2.51	1.68
538-33	23	1.86	5.58	17.85	39.02	30.09	3.55	0.73	1.33
538-34	24	0.00	0.30	1.15	4.98	2.68	3.77	48.14	38.98
538-35	25	0.00	0.58	1.46	41.55	52.93	1.64	0.45	1.40
538-36	26*	0.00	0.22	0.98	10.86	53.76	18.48	9.42	6.27
538-39	54 (26-R)	0.00	0.23	1.12	10.23	56.63	16.25	9.11	6.43
538-40	55 (26-2)	0.00	0.19	0.79	9.56	54.33	20.53	7.67	6.93
538-41	56 (26-3)	0.09	0.10	0.99	7.19	52.07	22.69	9.85	7.01
538-37	27	0.10	0.26	3.73	57.10	30.12	5.54	1.45	1.71
538-20	28	0.11	0.25	2.05	44.99	42.99	4.68	2.19	2.74
538-38	29	0.00	0.31	1.59	4.79	3.36	6.83	69.08	14.04
538-21	30	0.00	0.02	0.38	3.73	8.43	31.40	48.05	7.99
538-22	31	0.61	1.13	2.27	28.72	58.79	7.75	0.07	1.66
538-23	32*	0.21	0.19	1.78	24.53	61.70	5.85	2.99	2.76
538-29	57 (32-R)	0.52	0.21	2.22	22.96	63.28	4.52	0.93	5.36
538-30	58 (32-2)	0.68	0.51	1.82	21.80	58.96	6.39	5.38	4.45
538-31	59 (32-3)	0.23	0.18	1.65	20.01	66.00	6.08	2.80	3.05

TABLE 1. (Continued

SAMPLE NUMBER	STATION I.D.	% GRAVEL (<-1)	% SAND VC (-1-0)	C (0-1)	M (1-2)	F (2-3)	VF (3-4)	% SILT (4-8)	% CLAY (>8)
538-24	33	1.07	0.83	1.41	7.39	32.33	32.93	18.80	5.24
538-25	34	0.41	0.56	0.77	1.80	1.40	3.49	71.68	19.90
538-26	35	0.00	0.43	1.27	6.50	0.66	12.27	69.24	9.63
538-27	36	0.06	0.36	3.00	28.95	57.13	8.31	0.51	1.69
538-28	37	1.02	1.45	9.05	37.29	36.42	8.93	4.35	1.50
538-1	38*	0.00	0.07	1.54	3.58	1.68	1.66	44.89	46.57
538-14	60 (38-R)	0.00	0.16	1.35	3.68	1.84	2.02	59.59	31.36
538-15	61 (38-2)	0.00	0.00	0.49	2.41	1.17	1.25	49.28	45.41
538-16	62 (38-3)	0.30	0.02	0.23	2.32	1.43	1.83	47.65	46.21
538-2	39	0.10	1.27	8.83	35.46	49.28	3.36	0.34	1.36
538-3	40	0.51	0.92	9.29	29.84	33.19	10.61	11.21	4.42
538-4	41	0.00	0.25	0.20	1.56	2.53	14.33	69.14	12.00
538-5	42	0.00	0.64	3.06	45.09	46.69	1.29	0.85	2.38
538-6	43	0.00	0.05	0.99	20.81	61.31	10.55	3.01	3.29
538-7	44*	1.20	1.29	4.93	14.97	37.74	24.90	8.65	6.32
538-17	63 (44-R)	0.36	1.31	4.94	14.64	38.30	24.59	13.16	2.70
538-18	64 (44-2)	0.90	2.41	6.93	17.10	37.41	23.69	4.95	6.61
538-19	65 (44-3)	0.62	0.87	4.34	14.36	34.14	28.41	13.08	4.17
538-8	45	0.00	0.16	0.51	1.39	6.83	35.21	46.18	9.10
538-9	46	3.85	0.98	3.97	25.68	48.78	3.66	7.91	1.57
538-10	47	0.00	0.20	0.91	5.13	24.11	46.18	15.67	7.80
538-11	48	3.08	0.22	1.93	3.98	3.67	5.84	44.81	36.47
538-12	49	0.00	0.15	1.85	2.57	2.56	4.74	57.89	30.24
538-13	50	0.43	0.16	0.89	26.53	65.38	2.80	1.72	2.08

* Denotes environmental/monitoring variability station
The numbers in parentheses refer to the station, blind laboratory duplicate and/or replicate that the station is related to.

ie. 51 (5-R) - Station 51 is the blind lab duplicate for Station 5.
52 (5-2) - Station 52 is the second set of composites from Station 5.
53 (5-3) - Station 53 is the third set of composites from Station 5.

ECOLOGY CONTRACT NUMBER: C0089130
SITE: PUGET SOUND
LAB: CASE SR NUMBER 89538

DATE: JUNE 7, 1989
REVIEWER: P. STRIPLIN
MATRIX: SEDIMENT

TABLE 2. Sample holding times for grain size analysis.

SAMPLE NUMBER	STATION I.D.	DATE COLLECTED	DATE LAB. RECEIVED	DATE ANALYZED	HOLDING TIMES(days)
538-1	38*	3/21/89	3/22/89	4/17/89	28
538-2	39	3/21/89	3/22/89	4/17/89	28
538-3	40	3/21/89	3/22/89	4/17/89	28
538-4	41	3/21/89	3/22/89	4/17/89	28
538-5	42	3/21/89	3/22/89	4/17/89	28
538-6	43	3/20/89	3/22/89	4/17/89	29
538-7	44*	3/20/89	3/22/89	4/17/89	29
538-8	45	3/20/89	3/22/89	4/17/89	29
538-9	46	3/20/89	3/22/89	4/17/89	29
538-10	47	3/20/89	3/22/89	4/17/89	29
538-11	48	3/19/89	3/22/89	4/17/89	30
538-12	49	3/19/89	3/22/89	4/17/89	30
538-13	50	3/19/89	3/22/89	4/17/89	30
538-14	60 (38-R)	3/21/89	3/22/89	4/17/89	28
538-15	61 (38-2)	3/21/89	3/22/89	4/17/89	28
538-16	62 (38-3)	3/21/89	3/22/89	4/17/89	28
538-17	63 (44-R)	3/20/89	3/22/89	4/17/89	29
538-18	64 (44-2)	3/20/89	3/22/89	4/17/89	29
538-19	65 (44-3)	3/20/89	3/22/89	4/17/89	29
538-20	28	3/23/89	3/24/89	4/19/89	28
538-21	30	3/22/89	3/24/89	4/27/89	36
538-22	31	3/22/89	3/24/89	4/27/89	36
538-23	32*	3/23/89	3/24/89	4/27/89	35
538-24	33	3/22/89	3/24/89	4/27/89	36
538-25	34	3/23/89	3/24/89	4/27/89	35
538-26	35	3/23/89	3/24/89	4/27/89	35
538-27	36	3/22/89	3/24/89	4/27/89	36
538-28	37	3/22/89	3/24/89	4/27/89	36
538-29	57 (32-R)	3/23/89	3/24/89	4/27/89	35
538-30	58 (32-2)	3/23/89	3/24/89	4/27/89	35
538-31	59 (32-3)	3/23/89	3/24/89	4/27/89	35
538-32	22	3/25/89	3/27/89	5/05/89	42
538-33	23	3/25/89	3/27/89	5/05/89	42
538-34	24	3/25/89	3/27/89	5/05/89	42
538-35	25	3/24/89	3/27/89	5/05/89	43
538-36	26*	3/24/89	3/27/89	5/05/89	43
538-37	27	3/24/89	3/27/89	5/05/89	43
538-38	29	3/24/89	3/27/89	5/05/89	43
538-39	54 (26-R)	3/24/89	3/27/89	5/05/89	43
538-40	55 (26-2)	3/24/89	3/27/89	5/05/89	43
538-41	56 (26-3)	3/24/89	3/27/89	5/12/89	50
538-42	1	3/29/89	3/31/89	5/12/89	45
538-43	2	3/29/89	3/31/89	5/12/89	45
538-44	3	3/29/89	3/31/89	5/12/89	45
538-45	4	3/29/89	3/31/89	5/12/89	45
538-46	5*	3/29/89	3/31/89	5/12/89	45

TABLE 2. Sample holding times (continued)

SAMPLE NUMBER	STATION I.D.	DATE COLLECTED	DATE LAB. RECEIVED	DATE ANALYZED	HOLDING TIMES(days)
538-47	6	3/29/89	3/31/89	5/12/89	45
538-48	18	3/28/89	3/31/89	5/12/89	46
538-49	19	3/28/89	3/31/89	5/12/89	46
538-50	20	3/28/89	3/31/89	5/12/89	46
538-51	21	3/28/89	3/31/89	5/12/89	46
538-52	51 (5-R)	3/29/89	3/31/89	4/12/89	45
538-53	52 (5-2)	3/29/89	3/31/89	5/15/89	48
538-54	53 (5-3)	3/29/89	3/31/89	5/15/89	48
538-55	7	4/02/89	4/05/89	5/15/89	44
538-56	8	4/02/89	4/05/89	5/15/89	44
538-57	9	4/02/89	4/05/89	5/15/89	44
538-58	10	4/02/89	4/05/89	5/15/89	44
538-59	11	4/02/89	4/05/89	5/15/89	44
538-60	12	4/03/89	4/05/89	5/15/89	43
538-61	13	4/03/89	4/05/89	5/15/89	43
538-62	14	4/03/89	4/05/89	5/15/89	43
538-63	15	4/03/89	4/05/89	5/15/89	43
538-64	16	4/04/89	4/05/89	5/15/89	42
538-65	17	4/04/89	4/05/89	5/15/89	42

ECOLOGY CONTRACT NUMBER: C0089130 DATE: JULY 25, 1989
SITE: PUGET SOUND REVIEWER: PETER STRIPLIN
LAB: CAS SR NUMBER 89538 MATRIX: SEDIMENT

TABLE 3. Sample recoveries for grain size analysis

SAMPLE NUMBER	STATION I.D.	DRY WT. GRAMS	WT. REC. GRAMS	PERCENT RECOVERY
538-1	38*	6.5270	6.5274	100
538-2	39	67.9490	68.2493	100
538-3	40	35.8192	35.4908	99.1
538-4	41	14.9703	14.5004	96.9
538-5	42	72.3112	72.3048	100
538-6	43	25.1790	24.9549	99.1
538-7	44*	21.8586	21.6767	99.2
538-8	45	14.8851	14.1206	94.9
538-9	46	27.3870	27.8618	102
538-10	47	29.4009	28.4550	96.8
538-11	48	7.7462	8.0890	104
538-12	49	9.4402	9.4234	99.8
538-13	50	31.6319	31.9125	101
538-14	60 (38-R)	7.8475	7.1908	91.6
538-15	61 (38-2)	7.4548	7.6091	102
538-16	62 (38-3)	6.4493	6.6214	103
538-17	63 (44-R)	36.7279	36.3575	99.0
538-18	64 (44-2)	29.2876	28.3992	97.0
538-19	65 (44-3)	30.1525	30.1912	100
538-20	28	32.8102	32.7076	99.7
538-21	30	17.5333	16.7443	95.5
538-22	31	44.0409	43.0003	97.6
538-23	32*	44.3481	44.2159	99.7
538-24	33	25.2661	24.1515	95.6
538-25	34	13.6694	13.3448	97.6
538-26	35	12.2517	12.8824	105
538-27	36	52.2626	52.0925	99.7
538-28	37	46.9598	46.0847	98.1
538-29	57 (32-R)	35.0063	35.3360	100
538-30	58 (32-2)	36.8996	36.5336	99.0
538-31	59 (32-3)	45.2253	45.4999	100
538-32	22	59.9459	57.5549	96.0
538-33	23	63.5433	66.3022	104
538-34	24	10.6637	10.7491	100
538-35	25	50.8666	51.6630	101
538-36	26*	31.9958	30.2108	94.4
538-37	27	57.1872	55.9762	97.9
538-38	29	10.7173	10.6478	99.4
538-39	54 (26-R)	30.8348	30.6373	99.4
538-40	55 (26-2)	39.7354	37.9817	95.6
538-41	56 (26-3)	18.8142	18.4757	98.2

Table 3. (Continued)

SAMPLE NUMBER	STATION I.D.	DRY WT. GRAMS	WT. REC. GRAMS	PERCENT RECOVERY
538-42	1	9.2737	9.5310	102
538-43	2	20.3483	19.8786	97.6
538-44	3	29.5849	26.9738	91.1
538-45	4	9.3603	8.9309	95.4
538-46	5*	12.1702	12.2712	100
538-47	6	38.4089	38.0027	98.9
538-48	18	14.3785	13.9252	96.8
538-49	19	9.2719	8.5643	92.4
538-50	20	18.1014	17.4852	96.6
538-51	21	25.4015	23.9246	94.2
538-52	51 (5-R)	9.5954	9.9158	103
538-53	52 (5-2)	11.2487	10.6038	94.3
538-54	53 (5-3)	10.2272	10.3452	101
538-55	7	63.9544	63.5507	99.4
538-56	8	14.8961	14.6872	98.6
538-57	9	54.7291	53.5761	97.9
538-58	10	18.5069	18.5701	100
538-59	11	23.7858	23.7272	99.7
538-60	12	12.3288	12.4424	101
538-61	13	46.9713	45.9226	97.8
538-62	14	25.4697	25.3725	99.6
538-63	15	44.2846	43.6927	98.7
538-64	16	42.5127	41.3613	97.3
538-65	17	12.7314	12.8713	101

ECOLOGY CONTRACT NUMBER: C0089130 DATE: JUNE 7, 1989
SITE: PUGET SOUND REVIEWER: P. STRIPLIN
LAB: CAS SR NUMBER 89538 MATRIX: SEDIMENT

TABLE 4. Monitoring variability. Coefficient of variation and relative percent difference (RPD) for replicated stations.

Description		LABORATORY NUMBER STATION NUMBER							
	Phi size	538-46 STA. 5	538-52 STA. 51	538-53 STA. 52	538-54 STA. 53	MEAN	TOTAL VARIANCE S.D.	% C.V.	RPD (5&51)
Gravel	<-1 Phi	0	0	0	0	0	0		
VC Sand	-1 to 0 Phi	0.21	0.13	0.1	0.05	0.12	0.067	54.71	65.31
C Sand	0 TO 1 Phi	0.09	0.08	0.18	0.15	0.13	0.047	38.37	8.0
M Sand	1 to 2 Phi	0.73	0.43	0.51	0.87	0.64	0.201	31.74	47.24
F Sand	2 to 3 Phi	0.85	0.58	0.84	1.28	0.89	0.29	32.67	30.42
VF Sand	3 to 4 Phi	2.41	2.14	2.11	3.03	2.42	0.43	17.62	11.14
Silt	4 to 8 Phi	72.73	76.11	68.45	66.70	70.9	4.24	5.98	-4.76
Clay	> 8 Phi	22.98	20.53	27.81	27.94	24.8	3.67	14.80	9.87

RPD (5&51) = Blind laboratory duplicate splits

		538-36 STA. 26	538-39 STA. 54	538-40 STA. 55	538-41 STA. 56	MEAN	TOTAL VARIANCE S.D.	% C.V.	RPD (26&54)
Gravel	<-1 Phi	0	0	0	0.09	0.02	0.05	200	0
VC Sand	-1 to 0 Phi	0.22	0.23	0.19	0.1	0.19	0.06	31.98	0
C Sand	0 TO 1 Phi	0.98	1.12	0.79	0.99	0.97	0.14	14.01	-0.14
M Sand	1 to 2 Phi	10.86	10.23	9.56	7.19	9.46	1.60	16.95	-1.48
F Sand	2 to 3 Phi	53.76	56.63	54.33	52.07	54.20	1.88	3.48	1.16
VF Sand	3 to 4 Phi	18.48	16.25	20.53	22.69	19.49	2.76	14.16	-14.73
Silt	4 to 8 Phi	9.42	9.11	7.67	9.85	9.01	0.95	10.49	24.74
Clay	> 8 Phi	6.27	6.43	6.93	7.01	6.66	0.37	5.49	4.65

RPD (26&54) = Blind laboratory duplicate splits

		538-23 STA. 32	538-29 STA. 57	538-30 STA. 58	538-31 STA. 59	MEAN	TOTAL VARIANCE S.D.	% C.V.	RPD (32&57)
Gravel	<-1 Phi	0.21	0.52	0.68	0.23	0.41	0.23	55.87	-75.61
VC Sand	-1 to 0 Phi	0.19	0.21	0.51	0.18	0.27	0.16	58.28	-7.34
C Sand	0 TO 1 Phi	1.78	2.22	1.82	1.65	1.87	0.25	13.17	-23.56
M Sand	1 to 2 Phi	24.53	22.96	21.8	20.01	22.33	1.91	8.54	7.03
F Sand	2 to 3 Phi	61.7	63.28	58.96	66.00	62.95	2.95	4.71	-2.53
VF Sand	3 to 4 Phi	5.85	4.52	6.39	6.08	5.71	0.82	14.42	23.29
Silt	4 to 8 Phi	2.99	0.93	5.38	2.80	3.03	1.82	60.32	68.10
Clay	> 8 Phi	2.76	5.36	4.45	3.05	3.91	1.22	31.21	-66.58

RPD (32&57) = Blind laboratory duplicate splits

TABLE 4. (Continued)

		538-1 STA. 38	538-14 STA. 60	538-15 STA. 61	538-16 STA. 62	MEAN	TOTAL VARIANCE S.D.	% C.V.	RPD (38&60)
Gravel	<-1 Phi	0	0	0	0.3	0.08	0.15	200.00	0
VC Sand	-1 to 0 Phi	0.07	0.16	0	0.02	0.06	0.07	114.17	-144.00
C Sand	0 TO 1 Phi	1.54	1.35	0.49	0.23	0.90	0.64	70.92	21.05
M Sand	1 to 2 Phi	3.58	3.68	2.41	2.32	3.00	0.73	24.43	-3.34
F Sand	2 to 3 Phi	1.68	1.84	1.17	1.43	1.53	0.29	19.17	-10.46
VF Sand	3 to 4 Phi	1.66	2.02	1.25	1.83	1.69	0.33	19.42	-21.30
Silt	4 to 8 Phi	44.89	59.59	49.28	47.65	50.35	6.42	12.75	-29.19
Clay	> 8 Phi	46.57	31.36	45.41	46.21	42.39	7.37	17.38	35.88

RPD (38&60) = Blind laboratory duplicate splits

		538-7 STA. 44	538-17 STA. 63	538-18 STA. 64	538-19 STA. 65	MEAN	TOTAL VARIANCE S.D.	% C.V.	RPD (44&63)
Gravel	<-1 Phi	1.2	0.36	0.9	0.62	0.77	0.36	46.97	109.09
VC Sand	-1 to 0 Phi	1.29	1.31	2.41	0.87	1.47	0.66	44.81	-1.36
C Sand	0 TO 1 Phi	4.93	4.94	6.93	4.34	5.29	1.13	21.42	-0.19
M Sand	1 to 2 Phi	14.97	14.64	17.1	14.36	15.27	1.25	8.17	2.16
F Sand	2 to 3 Phi	37.74	38.30	37.41	34.14	36.90	1.87	5.08	-1.52
VF Sand	3 to 4 Phi	24.9	24.59	23.69	28.41	25.40	2.07	8.16	1.22
Silt	4 to 8 Phi	8.65	13.16	4.95	13.08	9.96	3.95	39.65	-45.28
Clay	> 8 Phi	6.32	2.70	6.61	4.17	4.95	1.85	37.44	73.13

RPD (44&63) = Blind laboratory duplicate splits

TETRA TECH INTEROFFICE CORRESPONDENCE

DATE: July 20, 1989 FROM: L. Williams

SUBJECT: MSMP Amphipod Bioassay - QA Review LOCATION: Bellevue

TO: K. Keeley, TC 3838-05 File

SUMMARY OF DATA QUALITY

Overall the three series of amphipod bioassays followed the recommended Puget Sound Estuary Program (PSEP) protocols (Tetra Tech and E.V.S. 1986) and the Sediment Quality Implementation Plan (Striplin 1988). With two exceptions, all of the data are considered acceptable without qualification. As indicated below, results of one of the sediment bioassays and all of the positive control bioassays should be qualified as usable estimates.

SAMPLE COLLECTION, TRANSPORT, AND CHAIN-OF-CUSTODY

Sediment samples were collected at 50 locations in Puget Sound and at a control site (West Beach, Whidbey Island). These sediment samples were delivered to the INVERT*AID laboratory for sediment toxicity tests using the amphipod *Rhepoxynius abronius*. Sediment samples were delivered to the INVERT*AID laboratory in three separate batches on 25 March 1989, 27 March 1989, and 4 April 1989. Compliance with quality assurance (QA) and chain-of-custody procedures for the collection and transport of sediment samples are described in the Puget Sound Marine Sediment Monitoring Program Cruise Report (Tetra Tech 1989).

Methods for collection, transport, and handling of test amphipods were appropriate. Amphipods were collected on three occasions for bioassays of each of the three sets of sediment samples. On each occasion, the amphipods were dredged at West Beach (Whidbey Island), placed in plastic buckets that contained a 2-cm layer of sediment and seawater from the collection site, and transported to the laboratory within 24 h. Salinity of seawater at the collection site was 30.5 ppt and temperature at the site was 48°F (8.9^{o}C).

STORAGE AND HOLDING TIMES

Sediment storage and holding times were appropriate and followed recommendations of the PSEP protocols (Tetra Tech and E.V.S. 1986) and the Sediment Quality Implementation Plan (Striplin 1988). Sediments were stored at 4° C in the dark for 0-7 days before toxicity testing (Table 1).

TABLE 1. DATES AND HOLDING PERIODS FOR AMPHIPOD BIOASSAYS

	Bioassay Series		
	Series 1[a]	Series 2[b]	Series 3[c]
Amphipods collected	March 19	March 25	April 6
Amphipods received	March 20	March 26	April 7
Sediment received	March 25	March 29	April 4
Bioassay started	March 25	March 30	April 11
Bioassay ended	April 4	April 9	April 21

[a]Samples 30-31, 33, 36-50, and Control 1.

[b]Samples 22-29, 32, 34-35, and Control 2.

[c]Samples 1-21, and Control 3.

Amphipod culture and holding times were appropriate and followed recommendations of the PSEP protocols (Tetra Tech and E.V.S. 1986) and the Sediment Quality Implementation Plan (Striplin 1988). Amphipods were acclimated to laboratory conditions for 4 or 5 days before toxicity testing (Table 1). During this acclimation period, the amphipods were incubated at 15 ± 1° C and aerated with an oil-free laboratory compressor.

GRAIN SIZE AND INTERSTITIAL SALINITY

Grain size and interstitial salinity are two variables that can affect amphipod bioassay results. Grain size analyses were conducted by Columbia Analytical Laboratories. A review and QA report of the sediment grain size analyses are being prepared by Ecology. When the grain size data and QA report are made available, they will be evaluated for possible biases in interpretation of the amphipod bioassays.

Interstitial salinity for each test sediment and each positive control sediment was measured with a refractometer. Interstitial salinities were typically ≥25 ppt, and did not require adjustment. The following minor problems are associated with interstitial salinity data:

- Series 1 - Interstitial salinity was not measured in Sample Number 47. Station 47 is located in a subtidal area (20 m) offshore from Hartstene Island in Case Inlet, and is not in the vicinity of a major river discharge that could cause extreme fluctuations in salinity. The depth and location of Station 47 indicate that interstitial salinity should be approximately the same as that in the water column. Salinity in this area typically ranges from 28 to 30 ppt (Collias et al. 1974). Based on these considerations, the bioassay data for Station 47 are considered acceptable.

- Series 2 - Interstitial salinity (25 ppt) in Sample Number 28 was low, but was within the acceptable range for toxicity testing. However, the lid was loosely fastened to the sample container, and the container was turned on its side when it was delivered to the laboratory. Thus, freshwater from melting ice that was used to cool the samples during transport to the laboratory may have crept under the container's lid, diluted the sediment porewater, and lowered the interstitial salinity. Consequently, the bioassay data for Station 28 are considered acceptable as estimates. Although the salinity was within an acceptable range, porewater dilution may result in underestimation of sediment toxicity.

BIOASSAY METHODS

Sediment bioassays consisted of amphipod exposure to test sediments collected at 50 locations in Puget Sound or to clean control sediments collected at West Beach on Whidbey Island. Positive control bioassays

consisted of amphipod exposure to a reference toxicant (i.e., cadmium chloride) dissolved in seawater.

Sediment Bioassays

The testing apparatus, test procedures, volume of test sediments, numbers of analytical replicates, numbers of organisms per replicate, and duration of bioassays were appropriate and followed recommendations of the PSEP protocols (Tetra Tech and E.V.S. 1986) and the Sediment Quality Implementation Plan (Striplin 1988).

Bioassays were conducted on five analytical replicates of each test sediment and each negative control sediment. A negative control sediment from the amphipod collection site was run concurrently with each series of test sediments. For each replicate, a 2-cm layer of sediment was placed in the bottom of a 1-L glass container and covered with 800 mL of seawater. Seawater used in the bioassay was obtained from Day Island in Tacoma and West Beach at Whidbey Island. The two sources of bioassay seawater were mixed, filtered (15 µm nominal pore diameter), and adjusted to 28 ppt salinity. Each container was then placed in random order in a 14° C water bath under constant illumination, aerated, and left undisturbed overnight. The bioassay was then started by seeding each container with 20 amphipods. Test containers were checked daily to establish early trends in mortality and sediment avoidance (i.e., amphipod emergence), and also to gently sink any amphipods that had left the sediments overnight and become trapped by surface tension at the air-water interface. One of the replicate containers for each sediment bioassay was also used for daily measurements of water chemistry (i.e., temperature, salinity, dissolved oxygen, and pH).

For each sediment bioassay, the temperature in the water chemistry container was 14° C throughout the 10-day test. This temperature was within the range (15 ± 1° C) specified in the PSEP protocols (Tetra Tech and E.V.S. 1986) and the Sediment Quality Implementation Plan (Striplin 1988). With the exception of Samples 27 and 28, salinity was within the range (28 ± 1 ppt) specified in the PSEP protocols (Tetra Tech and E.V.S. 1986) and the Sediment Quality Implementation Plan (Striplin 1988). For Samples 27 and 28, salinity values ranged from 29 ppt at the beginning of the test to 30 ppt at the end of the test. This slight increase in salinity may be attributed to gradual evaporation of seawater during the 10-day test, and did not result in any substantive stress to the amphipods. Amphipod survivorship was high (90 to 100 percent) in the various test replicates for these sediment samples. Dissolved oxygen concentrations in the various bioassays ranged from 7.6 to 8.3 mg/L during the 10-day test period, and were well above the minimum (i.e., >5 mg/L) specified in the Implementation Plan. The pH levels in the various bioassays ranged from 7.6 to 8.1 during the 10-day test period, and were well within the pH range (i.e., 8 ± 1) specified in the Implementation Plan.

Positive Controls

A reference toxicant bioassay was conducted in parallel with each of the three series of sediment bioassays. In each reference toxicant

bioassay, amphipods were exposed to five concentrations (i.e., 0.5, 1.0, 1.5, 2.0 and 3.0 mg/L) of cadmium chloride in seawater. Ten amphipods were exposed to each toxicant concentration for 96 h. At the end of the exposure period, the number living and dead animals were counted.

The data generated in the reference toxicant bioassays are acceptable, but should be qualified as estimates. In general, the U.S. EPA (1985) recommends that a minimum of 20 organisms be exposed to each toxicant concentration. Also, reference toxicant bioassays require a positive control that consists of exposure to clean seawater that does not contain the reference toxicant. The positive control is needed to verify that mortality independent of toxicant exposure is ≤10 percent, and to adjust responses to toxicant exposure using Abbott's formula (Finney 1971).

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TETRA TECH INTEROFFICE CORRESPONDENCE

DATE: August 3, 1989 FROM: G. Pascoe

SUBJECT: MSMP Microtox Bioassay - QA Review LOCATION: Bellevue

TO: K. Keeley, TC 3838-05 File

SUMMARY OF DATA QUALITY

Fifty samples of sediments from Puget Sound were analyzed by the Microtox bioassay for toxicity. Procedures and statistical analysis of the bioassays followed the recommendations of the Puget Sound Estuary Program (PSEP) (Tetra Tech and E.V.S. 1986) and the Sediment Quality Implementation Plan (Striplin 1988). With one exception, the data are considered acceptable without qualification. Results of one of the positive control bioassays were inaccurately calculated and should be qualified as unusable.

SAMPLE COLLECTION, TRANSPORT, AND CHAIN-OF-CUSTODY

Tetra Tech collected sediment samples at 50 locations in Puget Sound. Portions (approximately 200 g in an 8-oz jar) of these sediment samples were delivered to Laucks Testing Laboratory for sediment toxicity tests using the Microtox procedure. Sediment samples were delivered to the Laucks laboratory in five separate batches on 22 March 1989, 24 March 1989, 27 March 1989, 30 March 1989, and 5 April 1989. Compliance with quality assurance procedures and chain-of-custody procedures for the collection and transport of sediment samples are described in the Puget Sound Marine Sediment Monitoring Program Cruise Report (Tetra Tech 1989).

STORAGE AND HOLDING TIMES

Sediment storage and holding times were appropriate and followed recommendations of the PSEP protocols (Tetra Tech and E.V.S. 1986) and the Sediment Quality Implementation Plan (Striplin 1988). Sediments were stored at 4° C in the dark for 7-13 days before toxicity testing.

INTERSTITIAL SALINITY

Luminescence of *Photobacterium phosphoreum* that is cultured and equilibrated in 2.0 percent NaCl increases upon exposure to various salt concentrations below 3.5 percent NaCl. At an average porewater salinity in sediments of 30 ppt following extraction and dilution with 2.0 percent NaCl, luminescence in response to the salt content of the sediments may increase up to 5 percent of initial levels (Williams et al. 1986). For this reason, it is recommended in Williams et al. (1986) that a calibration curve

be constructed for effects of salinity of sediment supernatant on luminescence intensity during the bioassay.

The salinity calibration curves constructed by Laucks were for bacterial exposure to a range of NaCl from 15 to 25 percent, rather than 15 to 25 parts per thousand (ppt), the expected range of final salinity in the Microtox bioassay testing wells. For this reason, the calibration curves provided by Laucks Testing Laboratory are not usable for the purposes of this bioassay. Detailed procedures for constructing and using a salinity calibration curve are not provided in the PSEP protocols.

Final salinities in the testing wells may be determined by direct measurement of sediment supernatant salinities or by estimation based on dilutions of the interstitial water during the bioassay. Neither sediment supernatant salinities nor interstitial salinities were determined during the Microtox bioassay. However, the interstitial salinity of each sample sediment was measured during the amphipod bioassay by INVERT*AID. Interstitial salinities of the sample sediments were typically $\geq$25 ppt and did not require adjustment. The salinities were within a range not expected to affect bacterial luminescence more than 5 percent after sediment extraction and sample dilution with 2.0 percent NaCL (Williams et al. 1986). Therefore, corrections for salinity effects on luminescence measurements are not required for these five series of samples.

BIOASSAY METHODS

Laucks Testing Laboratory performed the Microtox bioassay on sediment samples collected from 50 locations in Puget Sound. Two types of positive control bioassays were performed using bacterial exposures to sodium arsenate or phenol.

Sediment Bioassays

The testing apparatus, test procedures, weight of test sediments, numbers of analytical replicates, and the duration of bioassays were appropriate and followed recommendations of the PSEP protocols (Tetra Tech and E.V.S. 1986) and the Sediment Quality Implementation Plan (Striplin 1988).

Bioassays were conducted on saline extracts of individual sediment samples with two analytical replicates of each concentration of test sediment extract. Reagent controls were performed with each test sediment and consisted of duplicate blanks of 0 percent sediment in Microtox diluent (2.0 percent NaCl w/v in doubly-distilled, organic-free water). Extraction was conducted on 30 mg of sediments removed from the 8-oz sample jars to 30-mL glass containers equipped with fritted glass caps. Extraction consisted of washing sediments for 24 h in 10 mL of Microtox diluent in the dark at 4^{0} C by gentle agitation (100 rpm) on a rotary shaker table. The sediment slurries were then transferred to 30-mL Corex tubes and centrifuged for 15 min at 9,000 rpm in a refrigerated centrifuge. The acceleration (i.e., increase over gravitational force) was not recorded by Laucks and could not be determined. The supernatant was drawn off by pipet, placed in a clean test tube, cooled on ice, and used immediately in preparation of dilutions for the bioassay.

The bioassay protocol followed that described in Williams et al. (1986) and the PSEP protocols. Freeze-dried bacteria were rehydrated with 0.5 mL of reconstitution solution and kept in a 4° C, temperature-regulated well on the Microtox analyzer. A single vial was used each day and all assays were conducted within 3 h of rehydration. Serial dilutions of the sediment supernatant were prepared by the addition of diluent and stored in 15° C, temperature-regulated wells. Sediment supernatant dilutions were 100, 50, 25, and 12.5 percent. For each sediment supernatant replicate, aliquots of bacterial suspension (10 uL) were added to the diluent (0.5 mL) and pre-incubated for 15 min in one of the 15° C wells on the analyzer. This assured temperature equilibration of the bacterial suspension and stability of luminescence. After initial luminescence was measured, sediment supernatant was added to the bacterial suspension in a volume equal to the diluent (i.e., 0.5 mL) to make final sediment supernatant dilutions of 50, 25, 12.5, and 6.25 percent. Luminescence was then measured after 5 and 15 min.

Positive Controls

Two reference toxicant bioassays were conducted in parallel on each day that sediment samples were assayed. Bacteria were exposed in the first reference bioassay to four concentrations of sodium arsenate (101, 50.5, 25.25, and 12.13 ppm, final concentrations) and in the second reference bioassay to four concentrations of phenol (80, 40, 20, and 10 ppm, final concentrations) in Microtox diluent. Protocols for the reference bioassays were identical to those used for the sediment samples.

Reference toxicant bioassays gave acceptable EC_{50} values as compared with Williams et al. (1986) and Beckman (1981), with the exception of a single sodium arsenate bioassay performed on 29 March 1989. For that bioassay, sediment supernatant blanks were inappropriately calculated. Consequently, the blank-corrected luminescence values calculated for the individual samples are inaccurate.

Statistical Analyses

Procedures for calculating EC_{50} values for the raw data are acceptable and followed the guidance provided by Beckman (1982) for the Microtox system, with one exception. The duplicate reagent blank ratios (i.e., ratio of final light reading to initial light reading for each bioassay reagent blank) were not pooled to obtain an average bioassay blank ratio. Instead, for each sediment supernatant concentration, light readings from one of the duplicate samples were compared with one of the blank bioassay ratios, and the second duplicate light readings were compared with the other blank ratio. This data reduction method is expected to have minimal effect on the outcome of this particular series of bioassays.

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TETRA TECH INTEROFFICE CORRESPONDENCE

DATE: 17 October 1989 FROM: K. Keeley

SUBJECT: MSMT Benthic Infauna - QA Review LOCATION: Bellevue

TO: TC-3838 File

SUMMARY OF DATA QUALITY

The sampling and analysis of benthic infauna assemblages in Puget Sound for the 1989 Marine Sediment Monitoring Task of the Puget Sound Ambient Monitoring Program followed the recommended Puget Sound Estuary Program (PSEP) protocols (Tetra Tech 1987) and the Sediment Quality Implementation Plan (Striplin 1988). With three exceptions, the data are considered acceptable without qualification. Three vials containing mollusc specimens [i.e., Stations 11 (Rep 1), 30 (Rep 5), and 35 (Rep 3)] were broken, and thus specimens were neither identified nor enumerated. Therefore, Stations 11, 30, and 35 include Mollusca data from two rather than three replicates.

SAMPLE COLLECTION, TRANSPORT, AND CHAIN-OF-CUSTODY

Benthic macroinvertebrates were collected at 50 subtidal stations in Puget Sound between 18 March and 5 April 1989. Among the 50 stations, water depths ranged from 6.3 to 15 m for 9 stations, from 20 to 24 m for 30 stations, and from 39 to 262 m for 11 stations (corrected to mean lower low water).

Five replicate grab samples were collected at each station, for a total of 250 samples. All grab samples were collected using a 0.1-m^2 modified single or double van Veen grab sampler. In the field, samples were washed on a sieve with 1.0-mm mesh openings and fixed with a 10 percent solution of buffered formalin. Sample tracking records followed each sample through all stages of sample collection and laboratory processing.

The field sampling methods used to collect benthic macroinvertebrate samples during the 1989 survey are outlined in the Sediment Quality Implementation Plan (Striplin 1988) and the Puget Sound protocols (Tetra Tech 1987). The following discussion summarizes those procedures.

Following deployment and retrieval of the van Veen grab, it was placed in a sieve stand and the sediment sample was inspected carefully to determine the acceptability of the sample. Samples were rejected if excessive leakage or surface disturbance occurred. Samples were also rejected if they did not meet the following minimum penetration depths:

- Medium to coarse sand and gravel - 4 to 5 cm
- Fine sand and sandy silt - 7 to 10 cm
- Silt - 10 cm.

Under most conditions, samples were rejected if the top layer of sediments in the sampler touched the wire mesh (i.e., 16-17 cm penetration depth) on the grab sampler doors or flaps. However, if an acceptable sample could not be collected after numerous attempts, then samples that touched the wire mesh were judged acceptable.

When a sample was judged to be acceptable, the following qualitative sediment characteristics were recorded:

- Penetration depth
- Sediment texture
- Sediment color
- Presence and strength of odors
- Degree of leakage and/or surface disturbance
- Presence of debris or shell fragments.

Field logsheets for all stations are provided in the cruise summary report (Tetra Tech 1989).

After the foregoing observations were recorded, the sampler was opened and the sediment was released into the top section of the sieving stand. The sediment was then washed from above with a gentle spray of seawater, and the larger masses of sediment were broken apart. Sediment was rinsed into a sieve box located in the lower level of the sieving stand. The sediment in the sieve box was then completely washed until materials no longer passed through the 1.0-mm mesh screen. That portion retained on the screen was placed in a plastic sample bag having external and internal labels. Samples were then fixed in the field with a 10 percent solution of Borax-buffered formalin.

LABORATORY ANALYSIS

In the laboratory, benthic macroinvertebrate samples were washed on a 0.5-mm sieve and transferred to a 70 percent solution of alcohol. The rescreening process was performed by Herrera Environmental Consultants and QA/QC was conducted by Tetra Tech.

Of the 250 samples (i.e., 50 stations) scheduled for analysis, 100 samples (i.e., replicates 2 and 4 for each station) were transferred to Mr. Pete Striplin of Ecology. These samples have not been processed. The

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remaining 150 samples (i.e., replicates 1, 3, and 5 from each station) were transferred to Mr. Howard Jones of Marine Taxonomic Services (MTS). Project personnel who sorted and identified the samples are identified in the letter from MTS dated 31 August 1989. Organisms were identified to the lowest possible taxonomic level. Planktonic organisms that occurred in the samples were not enumerated. Also, colonial organisms that occurred in the samples were not enumerated, but were given an abundance of "1" to note their presence in the sample [the database would not accept alpha characters (e.g., "P" for present)]. Specimens of each species (or lowest possible taxon) that occurred in the survey were placed in a reference museum prepared by the taxonomists.

A site visit to the benthic laboratory was performed on 22 April 1989 by Dr. Gordon Bilyard. As summarized in a memorandum (Bilyard, G., 10 May 1989, personal communication), no problems were observed during the site visit.

QUALITY ASSURANCE/QUALITY CONTROL

Quality control (QC) checks of sample sorting were performed by resorting 20 percent of each sample. If the 20 percent resort indicated a calculated difference of 5.0 percent or greater in total sample abundance for all taxa combined, the entire sample was resorted. Quality control checks of taxonomic identifications were performed by having one expert taxonomist re-identify 5 percent of another taxonomist's samples. All specimens placed in the reference museum were also verified by the expert taxonomists. Taxonomic identifications were also compared with specimens in the Puget Sound voucher collection that was prepared during Puget Sound Estuary Program studies for the U.S. EPA Region X Office of Puget Sound.

After samples were sorted and had passed QC, 20 percent of the detritus from each sample was placed in a jar, labeled, topped off with alcohol, and taped shut. Those jars were then sealed in a 5-gal bucket.

Tetra Tech provided MTS with a LOTUS spreadsheet containing species names and NODC codes. Howard Jones entered the benthic infauna data from the taxonomist's original laboratory data sheets onto the spreadsheet. He then requested NODC codes for all new species that were not listed on the original spreadsheet MTS received from Tetra Tech, and he manually entered the new codes and abundances to the end of the spreadsheet. Howard Jones verified all entries against the original laboratory sheets after data entry. The hard copies of the data set were reviewed for errors. Because Tetra Tech provided the species names and NODC codes in a spreadsheet for data entry purposes, the only possible errors could have occurred in the list of species names and codes that Howard Jones entered at the end of the files for each station. Each name and code entered manually was verified, and errors were corrected.

QA/QC procedures resulted in an acceptable data set without qualification. However, Mollusca data are missing for Stations 11 (Rep 1), 30 (Rep 5), and 35 (Rep 3) because the sample containers were broken.

TETRA TECH INC 11820 NORTHUP WAY SUITE 100 E BELLEVUE WASHINGTON 98005-1927 206/822-9596

Because most *Lumbrineris* spp. were identified to species level, relatively few *Lumbrineris* spp. were placed in the Lumbrineridae Groups I-IV. Thus, it will not be necessary to combine the *Lumbrineris* spp. and the Lumbrineridae Groups during data analyses.

As is indicated in the original laboratory data sheets, Howard Jones did not agree with some discrepancies that were identified by Herb Wilson (a Polychaeta QA taxonomist) in the Polychaeta data set. Tetra Tech discussed those discrepancies with Howard, and we concur with Howard's decisions.

DATA DELIVERABLES

On 5 September 1989, Tetra Tech received the following from MTS: diskettes containing LOTUS spreadsheets of data for 50 stations, hard copy of data for Stations 1-30, a list of name changes for the taxonomic dictionary, benthic sorting QC report, station tracking records, and a status report for the remaining work to be completed. Hard copy of data for Stations 31-50 was received on 8 September 1989. Results of the Polychaeta and Mollusca QA were verbally transmitted to Tetra Tech on 25 September 1989.

On 16 October 1989, Tetra Tech received the original taxonomists' laboratory sheets, which were reviewed and found to be complete. A checklist of all taxa identified for the project was received, and the list was reviewed for accuracy. The QA results from various taxonomists were also provided, and it appeared that the QA information provided by MTS to Tetra Tech on 25 September was accurate. The reference museum and buckets containing the vials of sorted residue will be submitted to Tetra Tech at a later date.

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TETRA TECH INC 11820 NORTHUP WAY SUITE 100 E BELLEVUE WASHINGTON 98005-1927 206/822-9596

APPENDIX C

1989 CONVENTIONAL SEDIMENT CHEMISTRY DATA

TABLES

Number		Page
C-1	Grain size determinations in Puget Sound sediments	C-1
C-2	Conventional variables in Puget Sound sediments: total organic carbon and sulfides	C-5

TABLE C-1. GRAIN SIZE DETERMINATIONS IN PUGET SOUND SEDIMENTS

Station	Sample	Sampling Date	Percent Gravel (<1 phi)	Percent Very Coarse Sand (-1-0 phi)	Percent Coarse Sand (0-1 phi)	Percent Medium Sand (1-2 phi)	Percent Fine Sand (2-3 phi)	Percent Very Fine Sand (3-4 phi)
1	1	03/29/89	0.00	0.00	0.50	2.72	1.32	2.13
2	1	03/29/89	0.10	0.36	0.54	1.07	5.47	42.42
3	1	03/29/89	33.85	3.62	1.75	4.25	5.66	18.23
4	1	03/29/89	0.00	0.75	1.87	1.36	1.37	1.32
5	1	03/29/89	0.00	0.21	0.09	0.73	0.85	2.41
5	1R	03/29/89	0.00	0.13	0.08	0.43	0.58	2.14
5	2	03/29/89	0.00	0.10	0.18	0.51	0.84	2.11
5	3	03/29/89	0.00	0.05	0.15	0.87	1.28	3.03
5	Mean	03/29/89	0.00	0.11	0.50	0.65	0.94	2.47
6	1	03/29/89	0.32	0.98	3.32	27.44	55.49	5.40
7	1	04/02/89	22.16	7.78	9.73	39.42	13.11	1.71
8	1	04/02/89	0.77	0.44	1.33	5.02	5.49	21.19
9	1	04/02/89	6.13	5.61	18.89	55.11	12.49	0.44
10	1	04/02/89	0.00	0.18	0.63	3.18	32.55	26.23
11	1	04/02/89	0.32	0.85	2.67	17.56	47.65	6.69
12	1	04/03/89	0.43	0.05	0.15	0.86	1.79	6.44
13	1	04/03/89	0.30	0.97	13.55	46.00	19.09	10.41
14	1	04/03/89	0.00	0.95	10.65	31.16	17.35	12.28
15	1	04/03/89	0.43	0.38	2.07	24.05	44.45	20.40
16	1	04/04/89	1.41	3.13	10.56	22.20	40.20	18.65
17	1	04/04/89	0.77	0.85	1.19	1.95	1.49	1.26
18	1	03/28/89	0.00	0.27	0.70	17.23	17.63	4.02
19	1	03/28/89	0.00	0.22	1.75	3.67	5.14	7.95
20	1	03/28/89	0.00	0.13	0.17	0.32	0.36	4.92
21	1	03/28/89	0.00	0.36	0.62	2.80	8.77	35.29
22	1	03/25/89	0.23	0.18	1.16	12.37	58.04	23.81
23	1	03/25/89	1.86	5.58	17.85	39.02	30.09	3.55
24	1	03/25/89	0.00	0.30	1.15	4.98	2.68	3.77
25	1	03/24/89	0.00	0.58	1.46	41.55	52.93	1.64
26	1	03/24/89	0.00	0.22	0.98	10.86	53.76	18.48
26	1R	03/24/89	0.00	0.23	1.12	10.23	56.63	16.25
26	2	03/24/89	0.00	0.19	0.79	9.56	54.33	20.53
26	3	03/24/89	0.09	0.10	0.99	7.19	52.07	22.69
26	Mean	03/24/89	0.03	0.17	2.90	9.10	53.86	20.20
27	1	03/24/89	0.10	0.26	3.73	57.10	30.12	5.54
28	1	03/23/89	0.11	0.25	2.05	44.99	42.99	4.68
29	1	03/24/89	0.00	0.31	1.59	4.79	3.36	6.83
30	1	03/22/89	0.00	0.02	0.38	3.73	8.43	31.40
31	1	03/22/89	0.61	1.13	2.27	28.72	58.79	7.75
32	1	03/23/89	0.21	0.19	1.78	24.53	61.70	5.85
32	1R	03/23/89	0.52	0.21	2.22	22.96	63.28	4.52
32	2	03/23/89	0.68	0.51	1.82	21.80	58.96	6.39
32	3	03/23/89	0.23	0.18	1.65	20.01	66.00	6.08
32	Mean	03/23/89	0.43	0.30	1.83	21.85	62.48	5.89
33	1	03/22/89	1.07	0.83	1.41	7.39	32.33	32.93
34	1	03/23/89	0.41	0.56	0.77	1.80	1.40	3.49
35	1	03/23/89	0.00	0.43	1.27	6.50	0.66	12.27
36	1	03/22/89	0.06	0.36	3.00	28.95	57.13	8.31
37	1	03/21/89	1.02	1.45	9.05	37.29	36.42	8.93
38	1	03/21/89	0.00	0.07	1.54	3.58	1.68	1.66
38	1R	03/21/89	0.00	0.16	1.35	3.68	1.84	2.02
38	2	03/21/89	0.00	0.00	0.49	2.41	1.17	1.25
38	3	03/21/89	0.30	0.02	0.23	2.32	1.43	1.83
38	Mean	03/21/89	0.10	0.04	0.72	2.79	1.45	1.64
39	1	03/21/89	0.10	1.27	8.83	35.46	49.28	3.36
40	1	03/21/89	0.51	0.92	9.29	29.84	33.19	10.61
41	1	03/21/89	0.00	0.25	0.20	1.56	2.53	14.33
42	1	03/21/89	0.00	0.64	3.06	45.09	46.69	1.29

TABLE C-1. (Continued)

Station	Sample	Sampling Date	Percent Gravel (<1 phi)	Percent Very Coarse Sand (-1-0 phi)	Percent Coarse Sand (0-1 phi)	Percent Medium Sand (1-2 phi)	Percent Fine Sand (2-3 phi)	Percent Very Fine Sand (3-4 phi)
43	1	03/20/89	0.00	0.05	0.99	20.81	61.31	10.55
44	1	03/20/89	1.20	1.29	4.93	14.97	37.74	24.90
44	1R	03/20/89	0.36	1.31	4.94	14.64	38.30	24.59
44	2	03/20/89	0.90	2.41	6.93	17.10	37.41	23.69
44	3	03/20/89	0.62	0.87	4.34	14.36	34.14	28.41
44	Mean	03/20/89	0.77	1.50	5.40	15.42	36.52	25.62
45	1	03/20/89	0.00	0.16	0.51	1.39	6.83	35.21
46	1	03/20/89	3.85	0.98	3.97	25.68	48.78	3.66
47	1	03/20/89	0.00	0.20	0.91	5.13	24.11	46.18
48	1	03/19/89	3.08	0.22	1.93	3.98	3.67	5.84
49	1	03/19/89	0.00	0.15	1.85	2.57	2.56	4.74
50	1	03/19/89	0.43	0.16	0.89	26.53	65.38	2.80

TABLE C-1. (Continued)

Station	Sample	Sampling Date	Percent Sand (-1-4 phi)	Percent Silt (4-8 phi)	Percent Clay (>8 phi)	Percent Fines (>4 phi)
1	1	03/29/89	6.67	70.45	22.87	93.32
2	1	03/29/89	49.86	37.85	12.17	50.02
3	1	03/29/89	33.51	25.51	7.14	32.65
4	1	03/29/89	6.67	70.77	22.56	93.33
5	1	03/29/89	4.29	72.73	22.98	95.71
5	1R	03/29/89	3.36	76.11	20.53	96.64
5	2	03/29/89	3.74	68.45	27.81	96.26
5	3	03/29/89	5.38	66.70	27.94	94.64
5	Mean	03/29/89	4.32	69.86	25.83	95.69
6	1	03/29/89	92.63	3.92	3.13	7.05
7	1	04/02/89	71.75	3.45	2.64	6.09
8	1	04/02/89	33.47	48.61	17.16	65.77
9	1	04/02/89	92.54	0.32	1.01	1.33
10	1	04/02/89	62.77	25.74	11.50	37.24
11	1	04/02/89	75.42	15.15	9.10	24.25
12	1	04/03/89	9.29	66.10	24.19	90.29
13	1	04/03/89	90.02	6.47	3.21	9.68
14	1	04/03/89	72.39	17.42	10.19	27.61
15	1	04/03/89	91.35	5.02	3.20	8.22
16	1	04/04/89	94.74	2.06	1.80	3.86
17	1	04/04/89	6.74	63.05	29.45	92.50
18	1	03/28/89	39.85	37.85	22.30	60.15
19	1	03/28/89	18.73	33.74	47.52	81.26
20	1	03/28/89	5.90	73.32	20.79	94.11
21	1	03/28/89	47.84	45.79	6.37	52.16
22	1	03/25/89	95.56	2.51	1.68	4.19
23	1	03/25/89	96.09	0.73	1.33	2.06
24	1	03/25/89	12.88	48.14	38.98	87.12
25	1	03/24/89	98.16	0.45	1.40	1.85
26	1	03/24/89	84.30	9.42	6.27	15.69
26	1R	03/24/89	84.46	9.11	6.43	15.54
26	2	03/24/89	85.40	7.67	6.93	14.60
26	3	03/24/89	83.04	9.85	7.01	16.86
26	Mean	03/24/89	84.27	8.93	6.76	15.69
27	1	03/24/89	96.75	1.45	1.71	3.16
28	1	03/23/89	94.96	2.19	2.74	4.93
29	1	03/24/89	16.88	69.08	14.04	83.12
30	1	03/22/89	43.96	48.05	7.99	56.04
31	1	03/22/89	98.66	0.07	1.66	1.73
32	1	03/23/89	94.05	2.99	2.76	5.75
32	1R	03/23/89	93.19	0.93	5.36	6.29
32	2	03/23/89	89.48	5.38	4.45	9.83
32	3	03/23/89	93.92	2.80	3.05	5.85
32	Mean	03/23/89	92.34	3.38	3.85	7.23
33	1	03/22/89	74.89	18.80	5.24	24.04
34	1	03/23/89	8.02	71.68	19.90	91.58
35	1	03/23/89	21.13	69.24	9.63	78.87
36	1	03/22/89	97.75	0.51	1.69	2.20
37	1	03/21/89	93.14	4.35	1.50	5.85
38	1	03/21/89	8.53	44.89	46.57	91.46
38	1R	03/21/89	9.05	59.59	31.36	90.95
38	2	03/21/89	5.32	49.28	45.41	94.69
38	3	03/21/89	5.83	47.65	46.21	93.86
38	Mean	03/21/89	6.65	49.72	43.53	93.25
39	1	03/21/89	98.20	0.34	1.36	1.70
40	1	03/21/89	83.85	11.21	4.42	15.63
41	1	03/21/89	18.87	69.14	12.00	81.14
42	1	03/21/89	96.77	0.85	2.38	3.23
43	1	03/20/89	93.71	3.01	3.29	6.30

TABLE C-1. (Continued)

Station	Sample	Sampling Date	Percent Sand (-1-4 phi)	Percent Silt (4-8 phi)	Percent Clay (>8 phi)	Percent Fines (>4 phi)
44	1	03/20/89	83.83	8.65	6.32	14.97
44	1R	03/20/89	83.78	13.16	2.70	15.86
44	2	03/20/89	87.54	4.95	6.61	11.56
44	3	03/20/89	82.12	13.08	4.17	17.25
44	Mean	03/20/89	84.49	9.64	5.09	14.74
45	1	03/20/89	44.10	46.18	9.10	55.28
46	1	03/20/89	83.07	7.91	1.57	9.48
47	1	03/20/89	76.53	15.67	7.80	23.47
48	1	03/19/89	15.64	44.81	36.47	81.28
49	1	03/19/89	11.87	57.89	30.24	88.13
50	1	03/19/89	95.76	1.72	2.08	3.80

TABLE C-2. CONVENTIONAL VARIABLES IN PUGET SOUND SEDIMENTS: TOTAL ORGANIC CARBON AND SULFIDES

Station	Sample	Sampling Date	Total Organic Carbon (Percent)	Sulfides (mg/kg)
1	1	03/29/89	1.50	0.48
2	1	03/29/89	0.68	0.40
3	1	03/29/89	1.20	0.56
4	1	03/29/89	2.00	0.38
5	1	03/29/89	1.80	U0.25
5	1R	03/29/89	E1.70	U0.25
5	2	03/29/89	E1.90	0.44
5	3	03/29/89	1.80	U0.25
5	Mean	03/29/89	E1.80	E0.21
6	1	03/29/89	E0.25	U0.25
7	1	04/02/89	E0.33	U0.25
8	1	04/02/89	E3.90	U0.25
9	1	04/02/89	E0.06	0.26
10	1	04/02/89	E0.61	U0.25
11	1	04/02/89	E0.64	0.91
12	1	04/03/89	E1.50	U0.25
13	1	04/03/89	E0.18	U0.25
14	1	04/03/89	E0.35	0.55
15	1	04/03/89	E0.24	0.47
16	1	04/04/89	E0.18	U0.25
17	1	04/04/89	E1.50	U0.25
18	1	03/28/89	E0.93	U0.25
19	1	03/28/89	E1.90	U0.25
20	1	03/28/89	E1.00	U0.25
21	1	03/28/89	E1.30	U0.25
22	1	03/25/89	0.15	U0.25
23	1	03/25/89	0.12	0.39
24	1	03/25/89	1.70	U0.25
25	1	03/24/89	0.07	0.42
26	1	03/24/89	0.56	0.39
26	1R	03/24/89	0.45	U0.25
26	2	03/24/89	0.40	0.41
26	3	03/24/89	0.35	U0.25
26	Mean	03/24/89	0.42	E0.27
27	1	03/24/89	0.12	U0.25
28	1	03/23/89	0.15	0.72
29	1	03/24/89	1.60	0.94
30	1	03/22/89	1.40	1.07
31	1	03/22/89	0.15	0.48
32	1	03/23/89	0.18	U0.25
32	1R	03/23/89	0.11	1.15
32	2	03/23/89	0.22	U0.25
32	3	03/23/89	0.13	0.90
32	Mean	03/23/89	0.17	E0.58
33	1	03/22/89	0.64	U0.25
34	1	03/23/89	2.20	U0.25
35	1	03/23/89	2.30	U0.25
36	1	03/22/89	0.13	U0.25
37	1	03/21/89	0.21	1.04
38	1	03/21/89	2.00	0.89
38	1R	03/21/89	2.10	0.70
38	2	03/21/89	2.20	0.76
38	3	03/21/89	2.00	U0.25
38	Mean	03/21/89	2.10	E0.62
39	1	03/21/89	0.09	0.38
40	1	03/21/89	0.70	0.30
41	1	03/21/89	0.80	U0.25
42	1	03/21/89	0.09	U0.25

TABLE C-2. (Continued)

Station	Sample	Sampling Date	Total Organic Carbon (Percent)	Sulfides (mg/kg)
43	1	03/20/89	0.14	0.53
44	1	03/20/89	0.43	U0.25
44	1R	03/20/89	0.44	0.26
44	2	03/20/89	0.40	U0.25
44	3	03/20/89	0.43	0.34
44	Mean	03/20/89	0.42	E0.21
45	1	03/20/89	0.96	U0.25
46	1	03/20/89	0.42	U0.25
47	1	03/20/89	0.29	U0.25
48	1	03/19/89	2.50	1.01
49	1	03/19/89	2.70	0.74
50	1	03/19/89	0.20	U0.25
SRM1	1	03/29/89	0.88	
SRM2	1	03/29/89	0.92	
SRM3	1	03/29/89	0.72	

APPENDIX D

1989 SEDIMENT CHEMISTRY DATA

TABLES

Number		Page
D-1	Concentrations (mg/kg dry weight) of metals in Puget Sound sediments	D-1
D-2	Concentrations (ug/kg dry weight) of volatile organic compounds in Puget Sound sediments: halogenated alkanes I	D-9
D-3	Concentrations (ug/kg dry weight) of volatile organic compounds in Puget Sound sediments: halogenated alkanes II	D-10
D-4	Concentrations (ug/kg dry weight) of volatile organic compounds in Puget Sound sediments: miscellaneous halogenated alkanes	D-11
D-5	Concentrations (ug/kg dry weight) of volatile organic compounds in Puget Sound sediments: halogenated alkenes	D-12
D-6	Concentrations (ug/kg dry weight) of volatile organic compounds in Puget Sound sediments: aromatic hydrocarbons	D-14
D-7	Concentrations (ug/kg dry weight) of volatile organic compounds in Puget Sound sediments: chlorinated aromatic hydrocarbons	D-15
D-8	Concentrations (ug/kg dry weight) of volatile organic compounds in Puget Sound sediments: ethers	D-16
D-9	Concentrations (ug/kg dry weight) of volatile organic compounds in Puget Sound sediments: miscellaneous volatile organic compounds	D-17
D-10	Concentrations (ug/kg dry weight) of extractable organic compounds in Puget Sound sediments: phenols	D-19
D-11	Concentrations (ug/kg dry weight) of extractable organic compounds in Puget Sound sediments: chlorinated phenols	D-21
D-12	Concentrations (ug/kg dry weight) of extractable organic compounds in Puget Sound sediments: substituted phenols	D-23
D-13	Concentrations (ug/kg dry weight) of extractable organic compounds in Puget Sound sediments: low molecular weight polynuclear aromatic hydrocarbons	D-25

D-14 Concentrations (ug/kg dry weight) of extractable organic compounds in Puget Sound sediments: high molecular weight polynuclear aromatic hydrocarbons D-27

D-15 Concentrations (ug/kg dry weight) of extractable organic compounds in Puget Sound sediments: chlorinated aromatic hydrocarbons D-31

D-16 Concentrations (ug/kg dry weight) of extractable organic compounds in Puget Sound sediments: chlorinated aliphatic hydrocarbons D-33

D-17 Concentrations (ug/kg dry weight) of extractable organic compounds in Puget Sound sediments: phthalates D-35

D-18 Concentrations (ug/kg dry weight) of extractable organic compounds in Puget Sound sediments: miscellaneous oxygenated compounds D-37

D-19 Concentrations (ug/kg dry weight) of extractable organic compounds in Puget Sound sediments: oxygenated nitrogen compounds D-39

D-20 Concentrations (ug/kg dry weight) of extractable organic compounds in Puget Sound sediments: miscellaneous organic compounds D-41

D-21 Concentrations (ug/kg dry weight) of extractable organic compounds in Puget Sound sediments: miscellaneous base/neutrals D-45

D-22 Concentrations (ug/kg dry weight) of extractable organic compounds in Puget Sound sediments: resin acids and guaiacols D-51

D-23 Concentrations (ug/kg dry weight) of pesticides and PCBs in Puget Sound sediments D-52

EXPLANATION OF MEAN CALCULATIONS

Replicate analyses were performed on sediment samples collected at a five separate stations to measure analytical and field variabilities. At those five stations, values for a given variable were averaged in order to express a single mean value for that variable. Mean values were calculated as follows:

- Metals, semivolatile organic compounds, pesticides and PCBs, total organic carbon, grain size - Because a combination of analytical and field replicates exist at a single station, the mean of the analytical replicates was calculated and averaged with the values from the field replicates. Thus, mean values were calculated by first determining the mean of the laboratory analytical replicates [i.e., (Sample 1 + Sample 1R)/2], and then adding Samples 2 and 3, and dividing by 3 [i.e., (((Sample 1 + 1R)/2) + Sample 2 + Sample 3)/3]. The means of the analytical replicates were determined first because those samples were taken from homogenized sediments from a grab, and the field replicates were taken from unhomogenized sediments from different casts of the grab (intuitively, analytical variability should be less than field variability because analytical replicate samples are collected from homogenized sediments).

- Volatile organic compounds, sulfides - For these compounds, mean values were calculated by a different method [i.e., (Sample 1 + Sample 1R + Sample 2 + Sample 3)/4]. This method was used because the analytical replicates for these compounds were taken as separate samples and not from homogenized sediments.

The following rules were used to average analytical or field replicate values:

- If all replicate values for a given variable were undetected, the mean of the undetected values was calculated and a "U" qualifier was assigned.

- If one or more values for a given variable were detected in a sample, then all of the detected values and detection limits were averaged. The value of the detection limit that was used was the quantitation limit divided by 2 (QL/2) or zero, as defined in Tetra Tech (1989b).

Means of replicates were reported to the same number of significant figures as the individual with the fewest significant figures.

SEDIMENT CHEMISTRY DATA

Chemical data collected during March/April 1989 in support of the Marine Sediment Monitoring Task of the Puget Sound Ambient Monitoring Program are presented in the following appendix. Data qualifiers were used to describe, clarify, or explain data values. A complete list of the data qualifiers used in the program is provided below:

- U = The compound or element was not detected at the detection limit shown. Detection limits are generally defined as the lowest measurable concentration reliably detectable by a particular methodology.

- E = The reported concentration is an estimate. The estimated qualifier was assigned for a variety of reasons including exceedance of control limits for calibration, precision, and accuracy.

- R = The compound was analyzed for but the data are unusable. The variable may or may not be present.

- N = There is presumptive evidence of presence of organic parameter at an estimated quantity.

Metals concentrations are reported in mg/kg dry weight, and organic compounds are reported in ug/kg dry weight. The following are comparable units: mg/kg = ug/gm = ppm; ug/kg = ng/gm = ppb.

TABLE D-1 .. CONCENTRATIONS (MG/KG DRY WEIGHT) OF METALS
IN PUGET SOUND SEDIMENTS

Station	Sample	Sampling Date	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium
1	1	03/29/89	17200	R	6.7	45.8	U0.47	E0.23
2	1	03/29/89	14100	R	4.2	41.6	0.29	E0.25
3	1	03/29/89	11200	R	6.4	31.4	U0.32	E0.20
4	1	03/29/89	19800	R	6.1	52.1	U0.53	E0.16
5	1	03/29/89	17500	R	6.2	46.2	U0.41	E0.15
5	1R	03/29/89	16600	R	6.6	44.3	U0.41	E0.16
5	2	03/29/89	16400	R	6.5	44.2	U0.55	E0.21
5	3	03/29/89	18100	R	6.2	49.1	U0.43	E0.22
5	Mean	03/29/89	17200	R	6.4	46.2	U0.46	E0.19
6	1	03/29/89	6610	R	3.1	15.6	U0.23	E0.10
7	1	04/02/89	10800	U0.23	E3.4	19.1	U0.23	E0.070
8	1	04/02/89	15700	U0.40	E5.3	35.9	U0.40	E0.48
9	1	04/02/89	7690	U0.22	E1.1	13.9	U0.22	U0.041
10	1	04/02/89	12900	U0.22	E3.8	25.3	U0.22	U0.060
11	1	04/02/89	9380	U0.32	E3.7	19.4	U0.32	U0.063
12	1	04/03/89	16700	U0.39	E6.1	41.8	0.42	E0.11
13	1	04/03/89	6620	U0.24	E2.9	11.2	U0.24	U0.044
14	1	04/03/89	10600	U0.25	E3.4	23.8	U0.25	E0.097
15	1	04/03/89	6960	U0.26	E1.9	10.9	U0.26	U0.051
16	1	04/04/89	13300	U0.20	E5.2	10.6	U0.20	U0.048
17	1	04/04/89	31000	U0.41	E6.0	19.6	U0.41	U0.18
18	1	03/28/89	15400	R	6.9	35.1	U0.31	E0.37
19	1	03/28/89	19100	R	8.3	48.9	U0.56	E0.42
20	1	03/28/89	18700	R	8.2	47.5	U0.34	U0.068
21	1	03/28/89	13500	R	7.0	31.5	U0.25	E0.40
22	1	03/25/89	5690	R	2.1	12.1	U0.25	E0.070
23	1	03/25/89	7220	R	3.7	15.7	U0.23	U0.048
24	1	03/25/89	22800	E0.52	7.1	59.6	U0.52	E0.23
25	1	03/24/89	5030	R	0.74	10.3	U0.24	U0.038
26	1	03/24/89	9410	R	4.7	23.4	U0.28	E0.14
26	1R	03/24/89	10300	R	2.9	25.1	U0.28	E0.12
26	2	03/24/89	9620	R	3.4	21.6	U0.26	E0.14
26	3	03/24/89	10300	R	4.3	27.2	U0.22	E0.13
26	Mean	03/24/89	9920	R	3.8	24.4	U0.25	E0.13
27	1	03/24/89	6700	R	2.5	17.2	U0.24	U0.044
28	1	03/23/89	7480	U0.24	2.5	13.0	U0.24	U0.048
29	1	03/24/89	18600	R	6.7	51.1	U0.53	E0.31
30	1	03/22/89	10200	U0.32	4.4	24.1	U0.32	E1.0
31	1	03/22/89	6180	U0.19	2.9	14.2	U0.19	U0.045
32	1	03/23/89	6270	U0.24	3.4	12.9	U0.24	U0.042
32	1R	03/23/89	6140	U0.19	4.2	13.1	U0.19	E0.050
32	2	03/23/89	6560	U0.19	5.6	14.3	U0.19	U0.043
32	3	03/23/89	6120	0.22	4.9	13.0	U0.22	U0.044
32	Mean	03/23/89	6300	E0.14	4.8	13.4	U0.21	E0.026
33	1	03/22/89	9910	E0.26	5.9	44.8	U0.26	E0.99
34	1	03/23/89	20600	E1.2	11.5	53.9	U0.52	E1.2
35	1	03/23/89	18600	U0.40	9.4	42.3	U0.40	E1.2
36	1	03/22/89	6790	U0.17	1.5	14.0	U0.17	U0.037
37	1	03/21/89	6550	U0.19	2.9	10.2	U0.19	E0.083
38	1	03/21/89	22600	R	10.9	57.9	U0.66	E0.22
38	1R	03/21/89	21200	R	11.1	54.3	U0.57	E0.26
38	2	03/21/89	20100	R	8.9	51.1	U0.52	E0.15
38	3	03/21/89	20300	R	10.7	56.3	U0.54	E0.33
38	Mean	03/21/89	20800	R	10.2	54.5	U0.56	E0.24
39	1	03/21/89	4890	R	1.7	8.8	U0.23	E0.060
40	1	03/21/89	6380	R	3.9	15.3	U0.20	E0.12
41	1	03/21/89	10400	R	4.6	23.9	U0.26	E0.087
42	1	03/21/89	7620	E1.3	9.9	14.6	U0.22	U0.037
43	1	03/20/89	4380	R	1.9	8.0	U0.20	U0.041

TABLE D-1 (Continued)

Station	Sample	Sampling Date	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium
44	1	03/20/89	7990	E0.41	3.5	15.0	U0.26	U0.046
44	1R	03/20/89	7920	E0.22	4.6	14.6	U0.22	E0.081
44	2	03/20/89	7640	E0.35	3.7	13.4	U0.20	E0.064
44	3	03/20/89	8210	R	4.0	14.9	U0.29	E0.067
44	Mean	03/20/89	7930	E0.33	3.9	14.3	U0.24	E0.061
45	1	03/20/89	11000	R	5.3	20.6	U0.35	E0.38
46	1	03/20/89	7800	R	2.5	13.1	U0.28	E0.13
47	1	03/20/89	8160	R	3.0	13.0	U0.21	E0.10
48	1	03/19/89	21600	R	6.8	36.1	U0.47	E1.2
49	1	03/19/89	25600	R	8.2	29.2	U0.49	E1.8
50	1	03/19/89	9230	R	2.1	12.4	U0.25	U0.041
SRM1	1	03/29/89	10300	R	3.5	20.9	U0.26	E0.46
SRM2	1	03/29/89	10900	R	3.9	22.7	U0.24	E0.69
SRM3	1	03/29/89	10100	R	3.5	20.3	U0.29	E0.69

TABLE D-1. (Continued)

Station	Sample	Sampling Date	Calcium	Chromium	Cobalt	Copper	Iron	Lead
1	1	03/29/89	5700	35.5	7.0	23.9	26800	E10.3
2	1	03/29/89	6330	27.1	6.9	14.7	22600	E6.8
3	1	03/29/89	22300	21.0	5.6	14.8	19400	E8.4
4	1	03/29/89	6380	47.8	9.5	32.2	31200	E15.7
5	1	03/29/89	6290	40.1	8.4	27.4	29000	E20.1
5	1R	03/29/89	5850	37.2	7.7	25.3	27300	E13.4
5	2	03/29/89	5860	37.6	7.7	25.4	27300	E12.9
5	3	03/29/89	6300	40.4	8.9	28.7	29500	E15.3
5	Mean	03/29/89	6080	38.9	8.2	26.8	28300	E15.0
6	1	03/29/89	14300	16.9	4.2	6.7	11700	E2.7
7	1	04/02/89	5270	19.5	7.3	9.4	20800	E4.7
8	1	04/02/89	4370	29.5	6.7	27.5	24600	E19.1
9	1	04/02/89	3830	24.5	5.7	7.3	13000	E2.6
10	1	04/02/89	4310	28.1	6.7	13.7	19900	E7.1
11	1	04/02/89	6580	21.6	4.4	9.9	14200	E9.8
12	1	04/03/89	5490	34.8	7.6	28.9	27500	E18.0
13	1	04/03/89	2840	16.0	3.6	6.3	13100	E3.5
14	1	04/03/89	4460	26.8	7.9	12.5	19200	E7.0
15	1	04/03/89	3260	16.3	3.8	6.9	11000	E2.2
16	1	04/04/89	6450	41.4	8.7	19.6	24900	E3.1
17	1	04/04/89	13500	52.6	19.9	102	48900	E7.4
18	1	03/28/89	5110	62.6	9.2	29.6	24400	E6.6
19	1	03/28/89	5420	58.9	16.0	37.2	31400	E20.6
20	1	03/28/89	5180	104	16.6	37.9	33000	E8.7
21	1	03/28/89	3670	33.5	8.5	33.3	19500	E10.4
22	1	03/25/89	2700	14.1	3.2	4.4	7610	E3.2
23	1	03/25/89	3230	20.0	5.2	5.9	12100	E5.9
24	1	03/25/89	7030	48.0	10.9	38.2	32400	E19.1
25	1	03/24/89	2650	11.7	2.3	2.7	6450	E2.2
26	1	03/24/89	5490	24.1	6.9	10.3	16800	E5.8
26	1R	03/24/89	6310	26.6	7.5	11.7	18200	E5.8
26	2	03/24/89	5670	24.3	7.0	10.1	16900	E4.1
26	3	03/24/89	5980	25.3	7.4	11.7	18500	E5.7
26	Mean	03/24/89	5850	15.0	7.2	10.9	17600	E5.2
27	1	03/24/89	2970	15.8	3.8	4.8	9700	E6.9
28	1	03/23/89	3800	21.6	4.8	5.0	12500	5.9
29	1	03/24/89	7050	40.4	10.2	33.8	28400	E17.8
30	1	03/22/89	4350	26.4	5.0	29.7	13600	20.2
31	1	03/22/89	2860	14.3	4.1	4.7	9110	7.8
32	1	03/23/89	3260	16.2	4.4	6.4	10100	11.8
32	1R	03/23/89	3190	14.4	4.1	6.3	9760	12.2
32	2	03/23/89	3270	14.9	4.1	7.9	10200	E16.3
32	3	03/23/89	3150	13.4	4.1	6.4	9940	10.3
32	Mean	03/23/89	3220	14.5	4.2	6.9	10000	E12.9
33	1	03/22/89	4170	27.5	5.4	35.7	14500	38.1
34	1	03/23/89	7190	59.8	8.7	129	29100	94.4
35	1	03/23/89	9600	46.1	7.8	66.0	24500	68.3
36	1	03/22/89	3100	20.4	4.0	5.8	9410	4.7
37	1	03/21/89	3210	19.5	5.7	6.2	11400	7.0
38	1	03/21/89	6730	45.6	12.2	50.2	32600	50.5
38	1R	03/21/89	6500	43.5	12.1	48.2	30900	41.0
38	2	03/21/89	6090	41.8	11.8	46.4	29800	35.5
38	3	03/21/89	6160	41.1	11.7	45.7	29700	39.2
38	Mean	03/21/89	6290	42.5	11.9	47.1	30400	40.1
39	1	03/21/89	2240	10.8	2.3	3.3	6910	5.0
40	1	03/21/89	3530	10.8	4.0	25.2	9420	21.7
41	1	03/21/89	5260	12.5	4.7	26.7	13700	13.7
42	1	03/21/89	3240	21.1	8.1	14.0	15100	23.8
43	1	03/20/89	2370	11.1	2.5	4.0	6460	3.6

TABLE D-1 (Continued)

Station	Sample	Sampling Date	Calcium	Chromium	Cobalt	Copper	Iron	Lead
44	1	03/20/89	3560	16.3	5.9	13.5	11400	10.6
44	1R	03/20/89	3450	17.4	6.0	12.4	11600	10.8
44	2	03/20/89	3520	15.7	6.0	12.3	11000	10.5
44	3	03/20/89	3680	16.9	6.5	14.3	11900	11.8
44	Mean	03/20/89	3570	16.5	6.1	13.2	11500	11.0
45	1	03/20/89	4550	18.0	6.2	25.5	13900	13.8
46	1	03/20/89	3810	13.5	4.6	12.7	9800	6.8
47	1	03/20/89	3810	24.0	6.1	8.8	17700	6.0
48	1	03/19/89	8830	38.1	10.1	45.1	26500	29.5
49	1	03/19/89	6840	39.0	8.6	53.5	28000	26.2
50	1	03/19/89	6140	21.7	7.1	9.9	15200	3.2
SRM1	1	03/29/89	4040	23.7	4.7	13.3	15500	E5.0
SRM2	1	03/29/89	4250	25.9	5.1	15.2	16800	E5.5
SRM3	1	03/29/89	4270	23.4	4.8	13.7	15600	E6.0

TABLE D-1 (Continued)

Station	Sample	Sampling Date	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium
1	1	03/29/89	11000	232	U0.13	31.7	3340	U2.5
2	1	03/29/89	8800	235	U0.077	27.6	2280	U1.5
3	1	03/29/89	7180	257	U0.071	16.9	2090	U1.6
4	1	03/29/89	14100	296	0.14	46.4	3990	U2.2
5	1	03/29/89	11900	273	U0.11	34.8	3490	U2.4
5	1R	03/29/89	11400	256	U0.12	24.3	3220	U2.6
5	2	03/29/89	11500	254	U0.13	33.2	3230	U2.2
5	3	03/29/89	12000	282	U0.12	36.8	3530	U2.0
5	Mean	03/29/89	11700	267	U0.10	33.1	3370	U2.2
6	1	03/29/89	6180	150	U0.062	23.8	896	U1.2
7	1	04/02/89	8000	E307	U0.063	28.6	1010	R
8	1	04/02/89	9260	E204	0.26	22.9	2500	R
9	1	04/02/89	8180	E216	U0.060	41.2	895	R
10	1	04/02/89	8270	E189	U0.063	26.8	1740	R
11	1	04/02/89	5900	E149	U0.12	17.8	1820	R
12	1	04/03/89	10800	E256	U0.12	31.7	3170	R
13	1	04/03/89	4730	E148	U0.064	17.9	1310	R
14	1	04/03/89	7290	E229	U0.056	31.0	1600	R
15	1	04/03/89	4420	E163	U0.051	15.4	924	R
16	1	04/04/89	7340	E267	U0.061	24.6	1410	R
17	1	04/04/89	17600	E574	U0.10	49.6	3040	R
18	1	03/28/89	12200	272	U0.084	50.2	2420	U1.4
19	1	03/28/89	14700	598	U0.14	58.2	3730	U2.8
20	1	03/28/89	18800	521	0.088	113	2010	U1.7
21	1	03/28/89	8700	244	U0.073	33.2	1540	U1.5
22	1	03/25/89	3440	109	U0.057	12.1	867	U1.3
23	1	03/25/89	5470	384	U0.050	27.1	1060	U1.2
24	1	03/25/89	13300	428	0.13	40.7	4080	U2.1
25	1	03/24/89	3250	112	U0.065	12.3	735	U0.95
26	1	03/24/89	7460	263	U0.055	29.7	1530	U0.97
26	1R	03/24/89	7950	289	U0.060	30.4	1620	U1.4
26	2	03/24/89	7320	247	U0.063	29.3	1550	U1.0
26	3	03/24/89	7930	311	U0.063	29.9	1630	U1.3
26	Mean	03/24/89	7650	278	U0.061	29.8	1580	U1.16
27	1	03/24/89	3890	387	U0.047	12.8	1060	U1.1
28	1	03/23/89	5550	317	U0.061	21.7	1310	U1.2
29	1	03/24/89	11700	395	0.13	37.7	3690	U2.2
30	1	03/22/89	6050	163	E0.19	22.6	1810	U1.6
31	1	03/22/89	4150	316	U0.044	15.7	988	U1.1
32	1	03/23/89	3770	280	U0.064	13.9	1200	U1.1
32	1R	03/23/89	3640	272	U0.056	13.4	1110	U1.2
32	2	03/23/89	3740	303	U0.058	10.7	1170	U1.1
32	3	03/23/89	3590	297	U0.058	12.1	1140	U1.1
32	Mean	03/23/89	3680	292	U0.059	12.1	1150	U1.1
33	1	03/22/89	5830	257	E0.11	27.2	1310	U1.3
34	1	03/23/89	11300	298	E0.86	41.7	3580	U1.9
35	1	03/23/89	10600	263	E0.51	40.1	3370	U2.3
36	1	03/22/89	5430	217	U0.049	24.3	835	U0.92
37	1	03/21/89	4600	278	U0.059	16.8	1270	U1.1
38	1	03/21/89	13200	713	0.24	40.1	4410	U3.2
38	1R	03/21/89	12600	678	0.24	35.8	4600	U3.5
38	2	03/21/89	12100	679	0.19	34.9	4270	U2.6
38	3	03/21/89	12100	665	0.21	34.8	4350	U2.3
38	Mean	03/21/89	12400	680	0.21	35.9	4380	U2.7
39	1	03/21/89	2710	128	U0.043	8.6	906	U0.85
40	1	03/21/89	2950	105	0.096	7.9	744	U1.1
41	1	03/21/89	4250	118	U0.055	9.8	1210	U1.3
42	1	03/21/89	5270	1050	U0.047	26.6	1160	U0.92
43	1	03/20/89	2690	188	U0.059	9.6	712	U1.0

TABLE D-1 (Continued)

Station	Sample	Sampling Date	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium
44	1	03/20/89	4070	511	U0.068	15.7	1130	U1.1
44	1R	03/20/89	4120	459	U0.049	16.3	1210	U1.4
44	2	03/20/89	3950	483	U0.050	15.9	1170	U1.3
44	3	03/20/89	4170	605	U0.075	11.8	1370	U1.4
44	Mean	03/20/89	4070	524	U0.061	14.6	1240	U1.3
45	1	03/20/89	5050	437	U0.085	15.4	1530	U1.6
46	1	03/20/89	3360	317	U0.059	11.0	1180	U1.3
47	1	03/20/89	5830	486	U0.065	25.4	1850	U0.91
48	1	03/19/89	10500	425	U0.14	35.0	3880	U3.2
49	1	03/19/89	10200	240	0.19	30.0	3720	U3.2
50	1	03/19/89	5330	468	U0.051	23.4	823	U1.0
SRM1	1	03/29/89	6920	157	U0.059	24.5	1610	U1.3
SRM2	1	03/29/89	7110	160	U0.050	25.2	1780	U1.2
SRM3	1	03/29/89	6760	155	U0.052	24.3	1570	U1.4

TABLE D-1 (Continued)

Station	Sample	Sampling Date	Silver	Sodium	Thallium	Vanadium	Zinc
1	1	03/29/89	0.12	18600	U0.49	47.5	74.9
2	1	03/29/89	U0.061	9370	U0.31	39.7	58.0
3	1	03/29/89	0.12	10900	U0.31	31.7	53.2
4	1	03/29/89	0.17	25500	U0.44	53.6	87.8
5	1	03/29/89	0.13	21300	U0.48	52.4	78.9
5	1R	03/29/89	U0.11	22000	U0.53	48.6	73.6
5	2	03/29/89	0.12	22400	U0.43	48.9	73.6
5	3	03/29/89	0.13	20800	U0.40	54.3	82.5
5	Mean	03/29/89	E0.11	21600	U0.45	51.2	77.5
6	1	03/29/89	U0.047	4660	0.24	23.5	28.2
7	1	04/02/89	U0.046	3430	U0.23	39.6	38.2
8	1	04/02/89	0.13	14700	U0.41	47.3	88.0
9	1	04/02/89	U0.041	3360	U0.21	28.1	24.5
10	1	04/02/89	U0.060	8140	U0.30	38.4	46.3
11	1	04/02/89	U0.063	8300	U0.32	28.5	34.0
12	1	04/03/89	0.12	18800	U0.38	48.5	74.9
13	1	04/03/89	U0.044	3850	U0.22	21.1	24.5
14	1	04/03/89	0.072	6230	U0.29	34.5	41.2
15	1	04/03/89	U0.051	4650	U0.25	20.9	24.5
16	1	04/04/89	U0.048	4190	U0.24	56.0	37.7
17	1	04/04/89	0.14	21100	U0.45	125	79.7
18	1	03/28/89	0.14	12500	U0.28	50.0	61.7
19	1	03/28/89	0.23	25200	U0.56	61.3	88.6
20	1	03/28/89	0.089	9120	U0.34	56.8	74.5
21	1	03/28/89	0.16	7770	U0.30	39.3	57.5
22	1	03/25/89	U0.050	3950	U0.25	14.6	18.8
23	1	03/25/89	U0.048	3600	U0.24	24.0	26.4
24	1	03/25/89	0.37	22500	U0.42	61.2	99.2
25	1	03/24/89	U0.038	3400	U0.19	13.2	15.3
26	1	03/24/89	0.070	6510	U0.19	28.7	39.8
26	1R	03/24/89	0.077	6590	U0.29	30.9	44.3
26	2	03/24/89	0.066	5960	U0.20	29.9	39.6
26	3	03/24/89	0.066	6070	U0.26	30.6	44.4
26	Mean	03/24/89	0.068	6190	U0.23	30.1	42.0
27	1	03/24/89	U0.044	2700	U0.22	20.2	23.6
28	1	03/23/89	U0.048	2860	U0.24	22.5	27.8
29	1	03/24/89	0.43	20600	U0.45	49.7	89.2
30	1	03/22/89	0.35	9690	U0.32	28.4	51.7
31	1	03/22/89	0.045	3910	U0.22	17.8	24.6
32	1	03/23/89	0.10	3890	U0.21	20.6	24.2
32	1R	03/23/89	0.10	3710	U0.24	20.0	23.6
32	2	03/23/89	0.18	4070	U0.21	20.9	26.4
32	3	03/23/89	0.089	3920	U0.22	19.6	24.9
32	Mean	03/23/89	0.12	3930	U0.22	20.3	25.1
33	1	03/22/89	0.19	6160	U0.27	29.6	63.8
34	1	03/23/89	1.9	21200	U0.38	56.5	173
35	1	03/23/89	1.1	22600	U0.46	51.4	128
36	1	03/22/89	U0.037	4090	U0.18	19.9	24.0
37	1	03/21/89	0.043	3630	U0.21	21.6	25.7
38	1	03/21/89	0.55	29100	U0.64	66.3	110
38	1R	03/21/89	0.53	29000	U0.69	60.5	103
38	2	03/21/89	0.45	26900	U0.52	59.9	102
38	3	03/21/89	0.50	28900	U0.47	57.7	97.6
38	Mean	03/21/89	0.50	28300	U0.55	60.3	102
39	1	03/21/89	U0.034	3180	U0.17	14.9	16.6
40	1	03/21/89	0.15	4960	U0.22	29.7	33.6
41	1	03/21/89	0.21	7780	U0.26	37.7	33.1
42	1	03/21/89	U0.037	3790	U0.18	29.4	46.8
43	1	03/20/89	U0.041	3610	U0.21	13.9	14.7

TABLE D-1. (Continued)

Station	Sample	Sampling Date	Silver	Sodium	Thallium	Vanadium	Zinc
44	1	03/20/89	0.075	6050	U0.23	27.0	34.4
44	1R	03/20/89	0.083	5790	U0.28	27.2	34.7
44	2	03/20/89	0.074	5580	U0.26	26.7	33.5
44	3	03/20/89	0.084	6660	U0.28	28.2	37.0
44	Mean	03/20/89	0.079	6050	U0.26	27.3	35.0
45	1	03/20/89	0.17	11400	U0.32	34.5	46.4
46	1	03/20/89	0.062	6360	U0.26	26.9	28.4
47	1	03/20/89	0.038	5300	U0.18	31.2	33.0
48	1	03/19/89	0.37	26200	U0.65	60.0	94.9
49	1	03/19/89	0.56	24100	U0.63	51.7	87.9
50	1	03/19/89	U0.041	3490	U0.20	37.3	31.1
SRM1	1	03/29/89	0.074	7550	U0.27	31.2	39.3
SRM2	1	03/29/89	0.067	7900	0.28	34.0	43.7
SRM3	1	03/29/89	0.082	7450	0.31	31.2	39.9

TABLE D-2. CONCENTRATIONS (UG/KG DRY WEIGHT) OF VOLATILE ORGANIC COMPOUNDS IN PUGET SOUND SEDIMENTS: HALOGENATED ALKANES I

Station	Sample	Sampling Date	Chloro-methane	Bromo-methane	Chloro-ethane	1,1'-Di-chloro-ethane	Chloroform	1,2-Di-chloro-ethane
3	1	03/29/89	U0 16	U0.08	U0.16	1 10	0 076	U0 033
5	1	03/29/89	U0 35	U0 17	U0.35	U0.035	0.190	U0 069
5	1R	03/29/89	U0.30	U0 15	U0.30	U0.030	0.210	U0.060
5	2	03/29/89	U0 33	U0.17	U0.33	U0 033	0.310	U0.066
5	3	03/29/89	U0 32	U0.16	U0.32	U0.032	0.270	U0 063
5	Mean	03/29/89	U0.33	U0.16	U0 33	U0.033	0.250	U0.065
10	1	04/02/89	U0.19	U0 09	U0 19	U0.019	0.060	U0.037
14	1	04/03/89	U0.17	U0 08	U0.17	U0 017	0.035	U0.034
17	1	04/04/89	U0 30	U0.15	U0.30	U0 030	U0.030	U0.061
19	1	03/28/89	U0.38	U0.19	U0.38	U0.038	0.060	U0 075
26	1	03/24/89	U0.14	U0 07	U0 14	U0.014	0.160	U0.028
29	1	03/24/89	U0.31	U0 16	U0 31	0 520	0.120	U0.063
38	1	03/21/89	U0 46	U0.23	U0.46	U0.046	0 120	U0.092
38	1R	03/21/89	U0 41	U0.20	U0.41	U0.041	U0 020	U0 081
38	2	03/21/89	U0 38	U0.19	U0 38	U0.038	U0.030	U0.075
38	3	03/21/89	U0.38	U0 19	U0.38	U0.038	N0.065	U0.077
38	Mean	03/21/89	U0.41	U0.20	U0.41	U0 041	E0.046	U0 081
45	1	03/20/89	U0 20	U0.10	U0.20	U0.020	0 047	U0 040
SRM1	1	03/29/89	U0 20	U0.10	U0 20	U0.020	2.40	U0.040
SRM2	1	03/29/89	U0.19	U0.09	U0.19	U0.019	1.70	U0.037

TABLE D-3 CONCENTRATIONS (UG/KG DRY WEIGHT) OF VOLATILE ORGANIC COMPOUNDS IN PUGET SOUND SEDIMENTS: HALOGENATED ALKANES II

Station	Sample	Sampling Date	Carbon tetra-chloride	Bromo-dichloro-methane	1,2-Di-chloro-propane	Chloro-dibromo-methane	1,1,2-Trichloro-ethane	Bromoform
3	1	03/29/89	U0.016	U0.033	U0.066	U0.016	U0.033	0.020
5	1	03/29/89	U0.035	U0.069	U0.140	U0.035	U0.069	U0.069
5	1R	03/29/89	U0.030	U0.060	U0.120	U0.030	U0.060	U0.060
5	2	03/29/89	U0.030	U0.066	U0.130	U0.033	U0.066	U0.066
5	3	03/29/89	U0.032	U0.063	U0.130	U0.032	U0.063	U0.063
5	Mean	03/29/89	U0.032	U0.065	U0.130	U0.033	U0.065	U0.065
10	1	04/02/89	U0.019	U0.037	U0.075	U0.019	U0.037	0.110
14	1	04/03/89	U0.017	U0.034	U0.068	U0.017	U0.034	U0.034
17	1	04/04/89	U0.030	U0.061	U0.120	U0.030	U0.061	U0.061
19	1	03/28/89	U0.038	U0.075	U0.150	U0.038	U0.075	U0.075
26	1	03/24/89	U0.014	U0.028	U0.057	U0.014	U0.028	0.042
29	1	03/24/89	U0.031	U0.063	U0.125	U0.031	U0.063	U0.063
38	1	03/21/89	U0.046	U0.092	U0.180	U0.046	U0.092	U0.092
38	1R	03/21/89	U0.016	U0.081	U0.160	U0.041	U0.081	U0.081
38	2	03/21/89	U0.038	U0.075	U0.150	U0.038	U0.075	U0.075
38	3	03/21/89	U0.038	U0.077	U0.150	U0.038	U0.077	U0.077
38	Mean	03/21/89	U0.035	U0.081	U0.160	U0.041	U0.081	U0.081
45	1	03/20/89	U0.020	U0.040	U0.081	U0.020	U0.040	U0.040
SRM1	1	03/29/89	U0.020	U0.040	U0.080	U0.020	U0.040	U0.040
SRM2	1	03/29/89	U0.019	U0.037	U0.075	U0.019	U0.037	U0.037

TABLE D-4. CONCENTRATIONS (UG/KG DRY WEIGHT) OF VOLATILE ORGANIC COMPOUNDS IN PUGET SOUND SEDIMENTS: MISCELLANEOUS HALOGENATED ALKANES

Station	Sample	Sampling Date	1,1,2,2-Tetra-chloro-ethane	Methylene chloride	1,1,1-Tri-chloro-ethane
3	1	03/29/89	U0.033	E8.5	6.60
5	1	03/29/89	U0.069	E9.8	0.720
5	1R	03/29/89	U0.060	U1.2	0.087
5	2	03/29/89	U0.066	U1.3	0.190
5	3	03/29/89	U0.063	E2.7	0.083
5	Mean	03/29/89	U0.065	U3.5	0.270
10	1	04/02/89	U0.037	U1.5	U0.021
14	1	04/03/89	U0.034	U1.1	U0.042
17	1	03/28/89	U0.061	U1.1	U0.021
19	1	03/28/89	U0.075	E6.0	0.820
26	1	03/24/89	U0.028	E4.7	N0.055
29	1	03/24/89	U0.063	E24	0.490
38	1	03/21/89	U0.092	E52	U0.046
38	1R	03/21/89	U0.081	U1.3	U0.033
38	2	03/21/89	U0.075	U0.80	U0.045
38	3	03/21/89	U0.077	U1.5	N0.180
38	Mean	03/21/89	U0.081	U13	E0.061
45	1	03/20/89	U0.040	U0.63	0.061
SRM1	1	03/29/89	U0.040	E170	U0.020
SRM2	1	03/29/89	U0.037	E120	U0.019

TABLE D-5. CONCENTRATIONS (UG/KG DRY WEIGHT) OF VOLATILE ORGANIC COMPOUNDS IN PUGET SOUND SEDIMENTS: HALOGENATED ALKENES

Station	Sample	Sampling Date	Vinyl chloride	1,1'-Di-chloro-ethene	Trans-1,2-dichloro-ethene	Trans-1,3-dichloro-propene	Cis-1,3-dichloro-propene	Trichloro-ethene
3	1	03/29/89	U0.16	U0.016	U0.033	U0.033	U0.033	U0.016
5	1	03/29/89	U0.35	U0.035	U0.069	U0.069	U0.069	U0.035
5	1R	03/29/89	U0.30	U0.030	U0.060	U0.060	U0.060	U0.030
5	2	03/29/89	U0.33	U0.033	U0.066	U0.066	U0.066	U0.033
5	3	03/29/89	U0.32	U0.032	U0.063	U0.063	U0.063	U0.032
5	Mean	03/29/89	U0.33	U0.033	U0.065	U0.065	U0.065	U0.033
10	1	04/02/89	U0.19	U0.019	U0.037	U0.037	U0.037	U0.019
14	1	04/03/89	U0.17	U0.017	U0.034	U0.034	U0.034	U0.017
17	1	04/04/89	U0.30	U0.030	U0.061	U0.061	U0.061	U0.030
19	1	03/28/89	U0.38	U0.038	U0.075	U0.075	U0.075	U0.038
26	1	03/24/89	U0.14	U0.014	U0.028	U0.028	U0.028	N0.011
29	1	03/24/89	U0.31	U0.031	U0.063	U0.063	U0.063	U0.031
38	1	03/21/89	U0.46	U0.046	U0.092	U0.092	U0.092	U0.046
38	1R	03/21/89	U0.41	U0.041	U0.081	U0.081	U0.081	U0.041
38	2	03/21/89	U0.38	U0.038	U0.075	U0.075	U0.075	U0.038
38	3	03/21/89	U0.38	U0.038	U0.077	U0.077	U0.077	U0.038
38	Mean	03/21/89	U0.41	U0.041	U0.081	U0.081	U0.081	U0.041
45	1	03/20/89	U0.20	U0.020	U0.040	U0.040	U0.040	N0.008
SRM1	1	03/29/89	U0.20	U0.020	U0.040	U0.040	U0.040	0.020
SRM2	1	03/29/89	U0.19	U0.019	U0.037	U0.037	U0.037	N0.013

TABLE D-5 (Continued)

Station	Sample	Sampling Date	Tetra-chloro-ethene
3	1	03/29/89	U0.025
5	1	03/29/89	0.038
5	1R	03/29/89	0.048
5	2	03/29/89	0.053
5	3	03/29/89	0.054
5	Mean	03/29/89	0.048
10	1	04/02/89	0.034
14	1	04/03/89	0.035
17	1	04/04/89	U0.030
19	1	03/28/89	0.034
26	1	03/24/89	0.069
29	1	03/24/89	0.094
38	1	03/21/89	0.170
38	1R	03/21/89	0.045
38	2	03/21/89	0.057
38	3	03/21/89	0.050
38	Mean	03/21/89	0.081
45	1	03/20/89	0.036
SRM1	1	03/29/89	0.044
SRM2	1	03/29/89	0.034

TABLE D-6. CONCENTRATIONS (UG/KG DRY WEIGHT) OF VOLATILE ORGANIC COMPOUNDS IN PUGET SOUND SEDIMENTS: AROMATIC HYDROCARBONS

Station	Sample	Sampling Date	Benzene	Toluene	Total Xylenes	Styrene
3	1	03/29/89	0.081	0.140	0.220	U0.016
5	1	03/29/89	0.120	0.250	0.270	0.069
5	1R	03/29/89	0.072	0.150	0.190	N0.039
5	2	03/29/89	0.100	0.240	0.300	0.070
5	3	03/29/89	0.083	0.200	0.250	0.110
5	Mean	03/29/89	0.094	0.210	0.250	E0.072
10	1	04/02/89	0.060	0.140	0.200	U0.019
14	1	04/03/89	U0.042	0.100	0.120	U0.017
17	1	04/04/89	U0.055	0.110	0.110	U0.030
19	1	03/28/89	0.110	0.140	0.170	U0.038
26	1	03/24/89	0.068	0.100	N0.170	U0.014
29	1	03/24/89	0.150	0.244	N0.320	U0.031
38	1	03/21/89	0.170	0.240	0.320	U0.046
38	1R	03/21/89	0.085	0.170	0.200	U0.041
38	2	03/21/89	0.083	0.180	0.240	U0.038
38	3	03/21/89	U0.038	0.240	0.250	U0.038
38	Mean	03/21/89	E0.089	0.210	0.250	U0.041
45	1	03/20/89	U0.020	U0.087	U0.083	U0.020
SRM1	1	03/29/89	0.660	5.00	12.0	U0.020
SRM2	1	03/29/89	0.530	5.00	9.90	U0.019

TABLE D-7. CONCENTRATIONS (UG/KG DRY WEIGHT) OF VOLATILE ORGANIC COMPOUNDS IN PUGET SOUND SEDIMENTS: CHLORINATED AROMATIC HYDROCARBONS

Station	Sample	Sampling Date	Chloro-benzene
3	1	03/29/89	U0.016
5	1	03/29/89	U0.035
5	1R	03/29/89	U0.030
5	2	03/29/89	U0.033
5	3	03/29/89	U0.032
5	Mean	03/29/89	U0.033
10	1	04/02/89	U0.019
14	1	04/03/89	U0.017
17	1	03/28/89	U0.030
19	1	03/28/89	U0.038
26	1	03/24/89	U0.014
29	1	03/24/89	N0.050
38	1	03/21/89	U0.046
38	1R	03/21/89	U0.041
38	2	03/21/89	U0.038
38	3	03/21/89	U0.038
38	Mean	03/21/89	U0.041
45	1	03/20/89	U0.020
SRM1	1	03/29/89	U0.020
SRM2	1	03/29/89	0.041

TABLE D-8. CONCENTRATIONS (UG/KG DRY WEIGHT) OF VOLATILE ORGANIC COMPOUNDS IN PUGET SOUND SEDIMENTS: ETHERS

Station	Sample	Sampling Date	2-Chloro-ethylvinyl ether
3	1	03/29/89	U0.08
5	1	03/29/89	U0.17
5	1R	03/29/89	U0.15
5	2	03/29/89	U0.17
5	3	03/29/89	U0.16
5	Mean	03/29/89	U0.16
10	1	04/02/89	U0.09
14	1	04/03/89	U0.08
17	1	03/28/89	U0.15
19	1	03/28/89	U0.19
26	1	03/24/89	U0.07
29	1	03/24/89	U0.16
38	1	03/21/89	U0.23
38	1R	03/21/89	U0.20
38	2	03/21/89	U0.19
38	3	03/21/89	U0.19
38	Mean	03/21/89	U0.20
45	1	03/20/89	U0.10
SRM1	1	03/29/89	U0.10
SRM2	1	03/29/89	U0.09

TABLE D-9. CONCENTRATIONS (UG/KG DRY WEIGHT) OF VOLATILE ORGANIC COMPOUNDS IN PUGET SOUND SEDIMENTS: MISCELLANEOUS VOLATILE ORGANIC COMPOUNDS

Station	Sample	Sampling Date	1,1,2-trichloro-1,2,2-tri-fluoro-ethane	2-Butanone	2-Hexanone	4-Methyl-2-pentanone	Acetone	Carbon Disulfide
3	1	03/29/89	U0 033	U0.08	U0.08	N0.10	U5 4	N1.6
5	1	03/29/89	U0.069	U0.17	U0.17	U0.07	U3 5	N3.3
5	1R	03/29/89	U0.060	U0 15	U0.15	U0.06	U2.2	0 57
5	2	03/29/89	U0.066	U0 17	U0.17	E0 46	E11	2.3
5	3	03/29/89	U0 063	U0 16	U0.16	U0 06	U4 0	2.2
5	Mean	03/29/89	U0.065	U0 16	U0 16	E0 14	E4.0	E2.1
10	1	04/02/89	U0.037	E8.5	U0.09	N0 09	U0.10	3.0
14	1	04/03/89	U0 034	R	U0 08	U0.03	U2 2	0 99
17	1	04/04/89	U0 061	R	U0 15	U0.06	U4.4	1 5
19	1	03/28/89	U0 075	U0.19	U0.19	U0.08	E12	E0.90
26	1	03/24/89	U0.028	U0 07	U0.07	U0.03	U7.3	3.7
29	1	03/24/89	U0.063	N5.0	U0.16	0.15	E30	N3.1
38	1	03/21/89	U0.230	N13	U0.23	U0.09	E69	U0.09
38	1R	03/21/89	U0.200	U2 0	U0.20	U0 08	E28	U0 04
38	2	03/21/89	U0.190	U1 9	U0.19	U0.08	E34	0 33
38	3	03/21/89	U0.192	U1 9	U0.19	U0 08	R	0 99
38	Mean	03/21/89	U0.200	E4 0	U0 20	U0.08	E44	E0.35
45	1	03/20/89	U0.100	U1 0	U0 10	U0.04	R	1.3
SRM1	1	03/29/89	U0 040	U0.10	E0 91	0.36	E14000	E91
SRM2	1	03/29/89	U0.037	U0.093	4.3	E0.64	E22000	76

TABLE D-9 (Continued)

Station	Sample	Sampling Date	Cis-1,2-dichloro-ethene	Ethyl-benzene	Vinyl acetate
3	1	03/29/89	U0.033	0.049	U0.03
5	1	03/29/89	U0.069	0.066	U0.07
5	1R	03/29/89	U0.060	0.036	U0.06
5	2	03/29/89	U0.066	0.080	U0.07
5	3	03/29/89	U0.063	0.070	U0.06
5	Mean	03/29/89	U0.065	0.063	U0.07
10	1	04/02/89	U0.037	0.073	U0.04
14	1	04/03/89	U0.034	U0.017	U0.03
17	1	04/04/89	U0.061	U0.024	U0.06
19	1	03/28/89	U0.075	0.034	U0.08
26	1	03/24/89	U0.028	0.044	U0.03
29	1	03/24/89	U0.063	0.075	U0.06
38	1	03/21/89	0.046	0.065	U0.09
38	1R	03/21/89	U0.081	0.037	U0.08
38	2	03/21/89	U0.075	0.045	U0.08
38	3	03/21/89	U0.077	0.050	U0.08
38	Mean	03/21/89	E0.011	0.049	U0.08
45	1	03/20/89	U0.040	U0.020	U0.04
SRM1	1	03/29/89	U0.040	2.90	U0.04
SRM2	1	03/29/89	U0.037	1.30	U0.04

TABLE D-10. CONCENTRATIONS (UG/KG DRY WEIGHT) OF EXTRACTABLE ORGANIC COMPOUNDS IN PUGET SOUND SEDIMENTS: PHENOLS

Station	Sample	Sampling Date	Phenol	2-Methyl-phenol	4-Methyl-phenol	2,4-Dimethyl-phenol
1	1	03/29/89	U22	U22	U22	U43
2	1	03/29/89	U57	U15	U15	U29
3	1	03/29/89	E11	U15	U15	U30
4	1	03/29/89	U29	U29	U29	U58
5	1	03/29/89	U26	U26	U26	U52
5	1R	03/29/89	U27	U27	U27	U54
5	2	03/29/89	U25	U25	U25	U49
5	3	03/29/89	U24	U24	U24	U47
5	Mean	03/29/89	U25	U25	U25	U50
6	1	03/29/89	U11	U11	U11	U22
7	1	04/02/89	18	U12	U12	U24
8	1	04/02/89	N9	U20	U20	U41
9	1	04/02/89	U12	U12	U12	U23
10	1	04/02/89	N20	U15	U15	U29
11	1	04/02/89	55	U15	U15	U31
12	1	04/03/89	U25	U25	U25	U50
13	1	04/03/89	U12	U12	U12	U24
14	1	04/03/89	U14	U14	U14	U28
15	1	04/03/89	E11	U13	U13	U26
16	1	04/04/89	U13	U13	U13	U25
17	1	04/04/89	U25	U25	U25	U50
18	1	03/28/89	U20	U20	U20	U40
19	1	03/28/89	520	U31	U31	U61
20	1	03/28/89	U16	U16	U16	U31
21	1	03/28/89	N10	U15	U15	U31
22	1	03/25/89	U9	U9	U9	U18
23	1	03/25/89	U9	U9	U9	U18
24	1	03/25/89	U17	U17	U17	U34
25	1	03/24/89	N11	U8	U8	U17
26	1	03/24/89	N9	U9	U9	U17
26	1R	03/24/89	U11	U11	U11	U22
26	2	03/24/89	U9	U9	U9	U19
26	3	03/24/89	N7	U10	U10	U20
26	Mean	03/24/89	E6	U10	U10	U19
27	1	03/24/89	U8	U8	U8	U17
28	1	03/23/89	U8	U8	U8	U16
29	1	03/24/89	U18	U18	U18	U35
30	1	03/22/89	U12	U12	U12	U24
31	1	03/22/89	N11	U11	U11	U23
32	1	03/23/89	E13	U8	U8	U15
32	1R	03/23/89	E15	U9	U9	U17
32	2	03/23/89	E35	U8	U8	U16
32	3	03/23/89	E13	U9	U9	U18
32	Mean	03/23/89	E21	U9	U9	U17
33	1	03/22/89	29	U11	U11	U22
34	1	03/23/89	U18	U18	U18	U37
35	1	03/23/89	U21	U21	U21	U42
36	1	03/22/89	U13	U13	U13	U25
37	1	03/21/89	U10	U10	U10	U20
38	1	03/21/89	U68	U68	U68	U140
38	1R	03/21/89	U35	U35	U35	U69
38	2	03/21/89	U28	U28	U28	U55
38	3	03/21/89	U29	U29	U29	U58
38	Mean	03/21/89	U36	U36	U36	U73
39	1	03/21/89	U12	U12	U12	U24
40	1	03/21/89	U26	U26	U26	U51
41	1	03/21/89	240	U15	U15	U30
42	1	03/21/89	U11	U11	U11	U22
43	1	03/20/89	U12	U12	U12	U25
44	1	03/20/89	26	U14	U14	U27

TABLE D-10. (Continued)

Station	Sample	Sampling Date	Phenol	2-Methyl-phenol	4-Methyl-phenol	2,4-Dimethyl-phenol
44	1R	03/20/89	21	U14	U14	U28
44	2	03/20/89	22	U13	U13	U26
44	3	03/20/89	U15	U15	U15	U29
44	Mean	03/20/89	E17	U15	U15	U27
45	1	03/20/89	U17	U17	U17	U34
46	1	03/20/89	U13	U13	U13	U26
47	1	03/20/89	40	U14	U14	U27
48	1	03/19/89	U31	U31	U31	U61
49	1	03/19/89	U27	U27	U27	U53
50	1	03/19/89	U13	U13	U13	U26
SRM1	1	03/29/89	94	U14	260	U29
SRM2	1	03/29/89	110	U15	290	U29
SRM3	1	03/29/89	130	U14	310	U29

TABLE D-11. CONCENTRATIONS (UG/KG DRY WEIGHT) OF EXTRACTABLE ORGANIC COMPOUNDS IN PUGET SOUND SEDIMENTS: CHLORINATED PHENOLS

Station	Sample	Sampling Date	2-Chloro-phenol	2,4-Di-chloro-phenol	4-Chloro-3-methyl-phenol	2,4,6-Tri-chloro-phenol	2,4,5-Tri-chloro-phenol	Penta-chloro-phenol
1	1	03/29/89	U22	U65	U43	U110	U110	U110
2	1	03/29/89	U15	U43	U29	U72	U72	U72
3	1	03/29/89	U15	U45	U30	U74	U74	U74
4	1	03/29/89	U29	U87	U58	U140	U140	U140
5	1	03/29/89	U26	U78	U52	U130	U130	U130
5	1R	03/29/89	U27	U81	U54	U130	U130	U130
5	2	03/29/89	U25	U74	U49	U120	U120	U120
5	3	03/29/89	U24	U71	U47	U120	U120	U120
5	Mean	03/29/89	U25	U75	U50	U120	U120	U120
6	1	03/29/89	U11	U32	U22	U54	U54	U54
7	1	04/02/89	U12	U37	U24	U61	U61	U61
8	1	04/02/89	U20	U61	U41	U100	U100	U100
9	1	04/02/89	U12	U35	U23	U58	U58	U58
10	1	04/02/89	U15	U44	U29	U74	U74	U74
11	1	04/02/89	U15	U46	U31	U76	U76	U76
12	1	04/03/89	U25	U76	U50	U130	U130	U130
13	1	04/03/89	U12	U36	U24	U61	U61	U61
14	1	04/03/89	U14	U42	U28	U70	U70	U70
15	1	04/03/89	U13	U39	U26	U64	U64	U64
16	1	04/04/89	U13	U38	U25	U63	U63	U63
17	1	04/04/89	U25	U75	U50	U130	U130	U130
18	1	03/28/89	U20	U60	U40	U100	U100	U100
19	1	03/28/89	U31	U92	U61	U150	U150	U150
20	1	03/28/89	U16	U47	U31	U78	U78	U78
21	1	03/28/89	U15	U46	U31	U77	U77	U77
22	1	03/25/89	U9	U27	U18	U45	U45	U45
23	1	03/25/89	U9	U27	U18	U45	U45	U45
24	1	03/25/89	U17	U52	U34	U86	U86	U86
25	1	03/24/89	U8	U25	U17	U42	U42	U42
26	1	03/24/89	U9	U26	U17	U43	U43	U43
26	1R	03/24/89	U11	U33	U22	U55	U55	U55
26	2	03/24/89	U9	U28	U19	U47	U47	U47
26	3	03/24/89	U10	U30	U20	U51	U51	U51
26	Mean	03/24/89	U10	U29	U19	U49	U49	U49
27	1	03/24/89	U8	U25	U17	U42	U42	U42
28	1	03/23/89	U8	U24	U16	U39	U39	U39
29	1	03/24/89	U18	U53	U35	U88	U88	U88
30	1	03/22/89	U12	U36	U24	U60	U60	U60
31	1	03/22/89	U11	U34	U23	U57	U57	U57
32	1	03/23/89	U8	U23	U15	U39	U39	U39
32	1R	03/23/89	U9	U26	U17	U43	U43	E10
32	2	03/23/89	U8	U24	U16	U41	U41	U41
32	3	03/23/89	U9	U27	U18	U44	U44	U44
32	Mean	03/23/89	U9	U25	U17	U42	U42	U42
33	1	03/22/89	U11	U33	U22	U56	U56	U56
34	1	03/23/89	U18	U55	U37	U92	U92	U92
35	1	03/23/89	U21	U63	U42	U110	U110	U110
36	1	03/22/89	U13	U38	U25	U63	U63	U63
37	1	03/21/89	U10	U30	U20	U50	U50	U50
38	1	03/21/89	U68	U200	U140	U340	U340	U340
38	1R	03/21/89	U35	U100	U69	U170	U170	U170
38	2	03/21/89	U28	U82	U55	U140	U140	U140
38	3	03/21/89	U29	U87	U58	U140	U140	U140
38	Mean	03/21/89	U36	U110	U73	U180	U180	U180
39	1	03/21/89	U12	U36	U24	U60	U60	U60
40	1	03/21/89	U26	U77	U51	U130	U130	U130
41	1	03/21/89	U15	U45	U30	U74	U74	U74
42	1	03/21/89	U11	U32	U22	U54	U54	U54
43	1	03/20/89	U12	U37	U25	U62	U62	U62

TABLE D-11 (Continued)

Station	Sample	Sampling Date	2-Chloro-phenol	2,4-Di-chloro-phenol	4-Chloro-3-methyl-phenol	2,4,6-Tri-chloro-phenol	2,4,5-Tri-chloro-phenol	Penta-chloro-phenol
44	1	03/20/89	U14	U41	U27	U68	U68	U68
44	1R	03/20/89	U14	U42	U28	U70	U70	U70
44	2	03/20/89	U13	U39	U26	U66	U66	U66
44	3	03/20/89	U15	U44	U29	U73	U73	U73
44	Mean	03/20/89	U14	U41	U27	U69	U69	U69
45	1	03/20/89	U17	U52	U34	U86	U86	U86
46	1	03/20/89	U13	U39	U26	U65	U65	U65
47	1	03/20/89	U14	U41	U27	U68	U68	U68
48	1	03/19/89	U31	U92	U61	U150	U150	U150
49	1	03/19/89	U27	U80	U53	U130	U130	U130
50	1	03/19/89	U13	U38	U26	U64	U64	U64
SRM1	1	03/29/89	U14	U43	U29	U72	U72	270
SRM2	1	03/29/89	U15	U44	U29	U73	U73	270
SRM3	1	03/29/89	U14	U43	U29	U72	U72	180

TABLE D-12. CONCENTRATIONS (UG/KG DRY WEIGHT) OF EXTRACTABLE ORGANIC COMPOUNDS IN PUGET SOUND SEDIMENTS: SUBSTITUTED PHENOLS

Station	Sample	Sampling Date	2-Nitro-phenol	4-Nitro-phenol	2,4-Di-nitro-phenol	4,6-Dinitro-o-cresol
1	1	03/29/89	U110	U110	U220	U220
2	1	03/29/89	U72	U72	U140	U140
3	1	03/29/89	U74	U74	U140	U140
4	1	03/29/89	U140	U140	U290	U290
5	1	03/29/89	U130	U130	U260	U260
5	1R	03/29/89	U130	U130	U270	U270
5	2	03/29/89	U120	U120	U250	U250
5	3	03/29/89	U120	U120	U240	U240
5	Mean	03/29/89	U120	U120	U250	U250
6	1	03/29/89	U54	U54	U110	U110
7	1	04/02/89	U61	U61	U120	U120
8	1	04/02/89	U100	U100	U200	U200
9	1	04/02/89	U58	U58	U120	U120
10	1	04/02/89	U74	U74	U150	U150
11	1	04/02/89	U76	U76	U150	U150
12	1	04/03/89	U130	U130	U250	U250
13	1	04/03/89	U61	U61	U120	U120
14	1	04/03/89	U70	U70	U140	U140
15	1	04/03/89	U64	U64	U120	U120
16	1	04/04/89	U63	U63	U130	U130
17	1	04/04/89	U130	U130	U250	U250
18	1	03/28/89	U100	U100	U200	U200
19	1	03/28/89	U150	U150	U310	U310
20	1	03/28/89	U78	U78	U160	U160
21	1	03/28/89	U77	U77	U150	U150
22	1	03/25/89	U45	U45	U90	U90
23	1	03/25/89	U45	U45	U90	U90
24	1	03/25/89	U86	U86	U170	U170
25	1	03/24/89	U42	U42	U84	U84
26	1	03/24/89	U43	U43	U86	U86
26	1R	03/24/89	U55	U55	U110	U110
26	2	03/24/89	U47	U47	U94	U94
26	3	03/24/89	U51	U51	U100	U100
26	Mean	03/24/89	U49	U49	U97	U97
27	1	03/24/89	U42	U42	U84	U84
28	1	03/23/89	U39	U39	U79	U79
29	1	03/24/89	U88	U88	U180	U180
30	1	03/22/89	U60	U60	U120	U120
31	1	03/22/89	U57	U57	U110	U110
32	1	03/23/89	U39	U39	U77	U77
32	1R	03/23/89	U43	U43	U87	U87
32	2	03/23/89	U41	U41	U81	U81
32	3	03/23/89	U44	U44	U88	U88
32	Mean	03/23/89	U42	U42	U84	U84
33	1	03/22/89	U56	U56	U110	U110
34	1	03/23/89	U92	U92	U180	U180
35	1	03/23/89	U110	U110	U210	U210
36	1	03/22/89	U63	U63	U130	U130
37	1	03/21/89	U50	U50	U100	U100
38	1	03/21/89	U340	U340	U680	U680
38	1R	03/21/89	U170	U170	U350	U350
38	2	03/21/89	U140	U140	U270	U270
38	3	03/21/89	U140	U140	U290	U290
38	Mean	03/21/89	U180	U180	U360	U360
39	1	03/21/89	U60	U60	U120	U120
40	1	03/21/89	U130	U130	U260	U260
41	1	03/21/89	U74	U74	U150	U150
42	1	03/21/89	U54	U54	U110	U110
43	1	03/20/89	U62	U62	U120	U120

TABLE D-12 (Continued)

Station	Sample	Sampling Date	2-Nitro-phenol	4-Nitro-phenol	2,4-Di-nitro-phenol	4,6-Dinitro-o-cresol
44	1	03/20/89	U68	U68	U140	U140
44	1R	03/20/89	U70	U70	U140	U140
44	2	03/20/89	U66	U66	U130	U130
44	3	03/20/89	U73	U73	U150	U150
44	Mean	03/20/89	U69	U69	U140	U140
45	1	03/20/89	U86	U86	U170	U170
46	1	03/20/89	U65	U65	U130	U130
47	1	03/20/89	U68	U68	U140	U140
48	1	03/19/89	U150	U150	U310	U310
49	1	03/19/89	U130	U130	U270	U270
50	1	03/19/89	U64	U64	U130	U130
SRM1	1	03/29/89	U72	U72	U150	U150
SRM2	1	03/29/89	U73	U73	U150	U150
SRM3	1	03/29/89	U72	U72	U150	U150

TABLE D-13 CONCENTRATIONS (UG/KG DRY WEIGHT) OF EXTRACTABLE ORGANIC COMPOUNDS IN PUGET SOUND SEDIMENTS: LOW MOLECULAR WEIGHT POLYNUCLEAR AROMATIC HYDROCARBONS

Station	Sample	Sampling Date	Naphtha-lene	Acenaph-thylene	Acenaph-thene	Fluorene	Phenan-threne	Anthracene
1	1	03/29/89	U22	U22	U22	U22	120	U22
2	1	03/29/89	E5	U15	U15	E5	93	E20
3	1	03/29/89	U15	U15	U15	U15	E16	U15
4	1	03/29/89	E10	U29	U29	U29	E40	U29
5	1	03/29/89	E6	U26	U26	U26	E37	U26
5	1R	03/29/89	U27	U27	U27	U27	42	U27
5	2	03/29/89	E8	U25	U25	U25	69	U25
5	3	03/29/89	E7	U24	U24	U24	N58	N8
5	Mean	03/29/89	E8	U25	U25	U25	E55	E11
6	1	03/29/89	E2	U11	U11	U11	N4	U11
7	1	04/02/89	U12	U12	U12	U12	N3	U12
8	1	04/02/89	E17	E6	E6	21	300	54
9	1	04/02/89	U12	U12	U12	U12	U12	U12
10	1	04/02/89	U15	U15	U15	U15	20	U15
11	1	04/02/89	U15	U15	U15	U15	22	U15
12	1	04/03/89	U25	U25	U25	U25	33	E6
13	1	04/03/89	U12	U12	U12	U12	E8	U12
14	1	04/03/89	U14	U14	U14	U14	E13	U14
15	1	04/03/89	U13	U13	U13	U13	E9	U13
16	1	04/04/89	U13	U13	U13	U13	U13	U13
17	1	04/04/89	U25	U25	U25	U25	U25	U25
18	1	03/28/89	U20	U20	U20	U20	U20	U20
19	1	03/28/89	U31	U31	U31	U31	40	U31
20	1	03/28/89	U16	U16	U16	U16	N7	U16
21	1	03/28/89	E7	U15	U15	N3	44	E12
22	1	03/25/89	U9	U9	U9	U9	19	27
23	1	03/25/89	U9	U9	U9	U9	U9	U9
24	1	03/25/89	U17	U17	U17	U17	28	U17
25	1	03/24/89	U8	U8	U8	U8	U8	U8
26	1	03/24/89	U9	U9	U9	U9	16	U9
26	1R	03/24/89	U11	U11	U11	U11	23	E3
26	2	03/24/89	U9	U9	U9	U9	E7	U9
26	3	03/24/89	E9	U10	U10	22	52	240
26	Mean	03/24/89	E6	U10	U10	E11	E26	E83
27	1	03/24/89	U8	U8	U8	U8	E8	U8
28	1	03/23/89	U8	U8	U8	U8	N8	U8
29	1	03/24/89	U18	U18	U18	U18	28	U18
30	1	03/22/89	E16	41	E14	39	220	270
31	1	03/22/89	U11	U11	U11	U11	21	N5
32	1	03/23/89	U8	U8	U8	U8	16	E6
32	1R	03/23/89	U9	U9	U9	U9	E13	E4
32	2	03/23/89	E3	U8	U8	U8	26	E14
32	3	03/23/89	E3	E2	U9	E3	25	11
32	Mean	03/23/89	E3	E4	U9	E4	E22	E10
33	1	03/22/89	19	13	E17	28	220	90
34	1	03/23/89	E6	E11	E4	E4	79	E27
35	1	03/23/89	E7	56	U21	E15	120	140
36	1	03/22/89	N13	U13	E8	U13	E16	E2
37	1	03/21/89	U10	U10	U10	U10	E6	U10
38	1	03/21/89	U68	U68	U68	U68	E55	N17
38	1R	03/21/89	U35	U35	U35	U35	98	E28
38	2	03/21/89	U28	U28	U28	E10	E91	N15
38	3	03/21/89	N10	N9	U29	E10	73	N23
38	Mean	03/21/89	E16	E16	U36	E15	E80	E20
39	1	03/21/89	U12	U12	U12	U12	U12	U12
40	1	03/21/89	54	330	E55	250	1500	1100
41	1	03/21/89	E8	U15	U15	U15	46	E14
42	1	03/21/89	U11	U11	U11	U11	U11	U11
43	1	03/20/89	U12	U12	U12	U12	U12	U12
44	1	03/20/89	E7	E5	E6	E5	E15	E7

TABLE D-13. (Continued)

Station	Sample	Sampling Date	Naphtha-lene	Acenaph-thylene	Acenaph-thene	Fluorene	Phenan-threne	Anthracene
44	1R	03/20/89	U14	U14	U14	U14	E6	U14
44	2	03/20/89	U13	U13	U13	U13	N7	U13
44	3	03/20/89	U15	U15	U15	U15	E14	U15
44	Mean	03/20/89	E7	E7	E7	E7	E7	E7
45	1	03/20/89	U17	U17	U17	U17	E11	N3
46	1	03/20/89	U13	U13	U13	U13	U13	U13
47	1	03/20/89	U14	U14	U14	U14	U14	U14
48	1	03/19/89	U31	U31	U31	U31	E30	N6
49	1	03/19/89	U27	U27	U27	U27	E59	N19
50	1	03/19/89	U13	U13	U13	U13	U13	U13
SRM1	1	03/29/89	46	46	78	85	140	120
SRM2	1	03/29/89	55	46	79	82	140	110
SRM3	1	03/29/89	57	58	100	100	140	160

TABLE D-14. CONCENTRATIONS (UG/KG DRY WEIGHT) OF EXTRACTABLE ORGANIC COMPOUNDS IN PUGET SOUND SEDIMENTS: HIGH MOLECULAR WEIGHT POLYNUCLEAR AROMATIC HYDROCARBONS

Station	Sample	Sampling Date	Fluor-anthene	Benzo(a)-anthracene	Chrysene	Benzo(b)-fluor-anthene	Benzo(k)-fluor-anthene	Benzo(b+k)-fluor-anthenes
1	1	03/29/89	120	43	56	53	52	105
2	1	03/29/89	120	49	58	40	39	79
3	1	03/29/89	N10	U15	U15	U15	U15	U15
4	1	03/29/89	E32	E13	E17	E13	E12	E25
5	1	03/29/89	E34	E14	E24	C	C	E36
5	1R	03/29/89	40	E17	28	C	C	N41
5	2	03/29/89	57	E21	39	C	C	50
5	3	03/29/89	52	E20	33	C	C	E43
5	Mean	03/29/89	E49	E19	E33	C	C	E44
6	1	03/29/89	E7	E6	14	U11	U11	U11
7	1	04/02/89	N3	U12	U12	U12	U12	U12
8	1	04/02/89	270	94	180	C	C	270
9	1	04/02/89	U12	U12	U12	C	C	U24
10	1	04/02/89	E10	N5	E7	C	C	N15
11	1	04/02/89	E12	E5	E7	C	C	N18
12	1	04/03/89	40	E8	29	C	C	45
13	1	04/03/89	E5	U12	U12	U12	U12	U12
14	1	04/03/89	E10	U14	E7	C	C	E14
15	1	04/03/89	E15	E7	E17	C	C	E23
16	1	04/04/89	U13	U13	U13	U13	U13	U13
17	1	04/04/89	E9	E5	N9	C	C	E27
18	1	03/28/89	E10	U20	U20	U20	U20	U20
19	1	03/28/89	49	E20	E27	C	C	46
20	1	03/28/89	E6	U16	E8	U16	U16	U16
21	1	03/28/89	66	29	51	C	C	58
22	1	03/25/89	37	30	52	C	C	E36
23	1	03/25/89	E4	U9	U9	U9	U9	U9
24	1	03/25/89	41	18	30	C	C	54
25	1	03/24/89	U8	U8	U8	U8	U8	U8
26	1	03/24/89	17	E8	12	C	C	20
26	1R	03/24/89	21	E8	E10	C	C	17
26	2	03/24/89	E6	E5	E8	U9	U9	U9
26	3	03/24/89	37	12	20	C	C	26
26	Mean	03/24/89	E21	E8	E13	C	C	E17
27	1	03/24/89	E15	E5	E7	C	C	E13
28	1	03/23/89	E8	N3	E4	C	C	N6
29	1	03/24/89	41	E17	24	C	C	38
30	1	03/22/89	510	410	730	C	C	870
31	1	03/22/89	32	15	20	C	C	27
32	1	03/23/89	28	14	25	C	C	37
32	1R	03/23/89	E24	E12	E21	C	C	E35
32	2	03/23/89	49	28	48	C	C	E62
32	3	03/23/89	44	23	35	C	C	E59
32	Mean	03/23/89	E40	E21	E35	C	C	E52
33	1	03/22/89	300	160	260	C	C	390
34	1	03/23/89	200	89	130	C	C	220
35	1	03/23/89	460	310	410	C	C	480
36	1	03/22/89	E22	E14	E22	C	C	E38
37	1	03/21/89	11	E5	E7	C	C	E9
38	1	03/21/89	130	E61	79	C	C	140
38	1R	03/21/89	160	64	93	C	C	E180
38	2	03/21/89	E150	E57	E95	C	C	E150
38	3	03/21/89	140	58	87	C	C	E140
38	Mean	03/21/89	E150	E59	E89	C	C	E150
39	1	03/21/89	U12	U12	U12	U12	U12	U12
40	1	03/21/89	1700	1300	1500	C	C	1900
41	1	03/21/89	93	28	49	C	C	E68
42	1	03/21/89	E7	U11	U11	U11	U11	U11

TABLE D-14 (Continued)

Station	Sample	Sampling Date	Fluor-anthene	Benzo(a)-anthracene	Chrysene	Benzo(b)-fluor-anthene	Benzo(k)-fluor-anthene	Benzo(b+k)-fluor-anthenes
43	1	03/20/89	U12	U12	U12	U12	U12	U12
44	1	03/20/89	23	N7	E12	C	C	E17
44	1R	03/20/89	E12	E8	E12	C	C	E17
44	2	03/20/89	14	E7	E10	C	C	E14
44	3	03/20/89	21	E10	E12	C	C	E18
44	Mean	03/20/89	E17	E8	E11	C	C	E16
45	1	03/20/89	22	N9	N16	C	C	E22
46	1	03/20/89	E9	N5	E7	C	C	E11
47	1	03/20/89	E6	U15	U14	C	C	E6
48	1	03/19/89	56	E24	35	C	C	E61
49	1	03/19/89	E74	E39	E61	C	C	E100
50	1	03/19/89	U13	U13	U13	U13	U13	U13
SRM1	1	03/29/89	130	86	110	C	C	100
SRM2	1	03/29/89	120	84	120	C	C	100
SRM3	1	03/29/89	150	110	130	C	C	120

TABLE D-14 (Continued)

Station	Sample	Sampling Date	Pyrene	Benzo(a)-pyrene	Indeno-(1,2,3-cd) pyrene	Dibenzo-(a,h)-anthracene	Benzo-(g,h,i)-perylene
1	1	03/29/89	E76	47	U22	U22	U22
2	1	03/29/89	E95	40	N34	U15	U15
3	1	03/29/89	E6	U15	U15	U15	U15
4	1	03/29/89	E26	U29	U29	U29	U29
5	1	03/29/89	E25	N10	U26	U26	U26
5	1R	03/29/89	E31	E21	U27	U27	U27
5	2	03/29/89	41	E23	U25	U25	U25
5	3	03/29/89	30	E15	U24	U24	U24
5	Mean	03/29/89	E33	E18	U25	U25	U25
6	1	03/29/89	E4	U11	U11	U11	U11
7	1	04/02/89	N5	U12	U12	U12	U12
8	1	04/02/89	190	75	34	N14	E35
9	1	04/02/89	U12	U12	U12	U12	U12
10	1	04/02/89	E8	55	19	U15	U15
11	1	04/02/89	E10	E4	U15	U15	U15
12	1	04/03/89	32	E17	U25	U25	U25
13	1	04/03/89	E4	U12	U12	U12	U12
14	1	04/03/89	E6	N5	U14	U14	U14
15	1	04/03/89	E12	E5	U13	U13	U13
16	1	04/04/89	U13	U13	U13	U13	U13
17	1	04/04/89	E9	U25	U25	U25	U25
18	1	03/28/89	E7	U20	U20	U20	U20
19	1	03/28/89	52	E25	U31	U31	U31
20	1	03/28/89	U16	U16	U16	U16	U16
21	1	03/28/89	57	30	U15	U15	U15
22	1	03/25/89	E18	20	E9	U9	E7
23	1	03/25/89	E3	U9	U9	U9	U9
24	1	03/25/89	41	24	U17	U17	U17
25	1	03/24/89	U8	U8	U8	U8	U8
26	1	03/24/89	13	12	U9	U9	U9
26	1R	03/24/89	19	E6	E5	U11	E4
26	2	03/24/89	E5	U9	U9	U9	U9
26	3	03/24/89	28	15	U10	U10	U10
26	Mean	03/24/89	E16	E10	E5	U10	E5
27	1	03/24/89	E11	E6	E5	U8	E3
28	1	03/23/89	E8	U8	U8	U8	U8
29	1	03/24/89	E38	N27	U18	U18	U18
30	1	03/22/89	E430	380	200	100	150
31	1	03/22/89	E33	20	14	U11	12
32	1	03/23/89	E27	20	19	U8	15
32	1R	03/23/89	E25	E16	E12	E7	E11
32	2	03/23/89	E47	35	31	9	27
32	3	03/23/89	E39	27	15	N9	14
32	Mean	03/23/89	E37	E27	E20	E8	E18
33	1	03/22/89	E310	220	140	51	120
34	1	03/23/89	E190	120	94	N35	68
35	1	03/23/89	E550	390	250	N58	210
36	1	03/22/89	E20	E16	E14	N4	N8
37	1	03/21/89	E10	U10	U10	U10	U10
38	1	03/21/89	110	79	71	U68	80
38	1R	03/21/89	150	110	88	U35	E110
38	2	03/21/89	E150	E86	E64	N14	E93
38	3	03/21/89	140	72	74	N21	E68
38	Mean	03/21/89	E140	E84	E72	E20	E85
39	1	03/21/89	U12	U12	U12	U12	U12
40	1	03/21/89	1900	1400	830	340	670
41	1	03/21/89	73	29	21	U15	22
42	1	03/21/89	E4	U11	U11	U11	U11
43	1	03/20/89	U12	U12	U12	U12	U12
44	1	03/20/89	E20	E9	E6	U14	E6
44	1R	03/20/89	E11	E9	E9	U14	E7

TABLE D-14 (Continued)

Station	Sample	Sampling Date	Pyrene	Benzo(a)-pyrene	Indeno-(1,2,3-cd)pyrene	Dibenzo-(a,h)-anthracene	Benzo-(g,h,i)-perylene
44	2	03/20/89	E11	E7	U13	U13	E5
44	3	03/20/89	18	E8	E6	U15	E5
44	Mean	03/20/89	E15	E8	E7	U14	E6
45	1	03/20/89	23	E11	E8	U17	E7
46	1	03/20/89	E5	U13	U13	U13	U13
47	1	03/20/89	E6	U14	U14	U14	U14
48	1	03/19/89	60	E28	E21	U31	N23
49	1	03/19/89	E75	E34	E50	U27	E55
50	1	03/19/89	U13	U13	U13	U13	U13
SRM1	1	03/29/89	93	120	U14	95	E55
SRM2	1	03/29/89	85	110	U15	98	E50
SRM3	1	03/29/89	120	130	U14	130	E68

TABLE D-15 CONCENTRATIONS (UG/KG DRY WEIGHT) OF EXTRACTABLE ORGANIC COMPOUNDS IN PUGET SOUND SEDIMENTS: CHLORINATED AROMATIC HYDROCARBONS

Station	Sample	Sampling Date	1,3-Di-chloro-benzene	1,4-Di-chloro-benzene	1,2-Di-chloro-benzene	1,2,4-Tri-chloro-benzene	2-Chloro-naphthalene	Hexachloro-benzene
1	1	03/29/89	U22	U22	U22	U22	U22	U22
2	1	03/29/89	U15	U15	U15	U15	U15	U15
3	1	03/29/89	U15	U15	U15	U15	U15	U15
4	1	03/29/89	U29	U29	U29	U29	U29	U29
5	1	03/29/89	U26	U26	U26	U26	U26	U26
5	1R	03/29/89	U27	U27	U27	U27	U27	U27
5	2	03/29/89	U25	U25	U25	U25	U25	U25
5	3	03/29/89	U24	U24	U24	U24	U24	U24
5	Mean	03/29/89	U25	U25	U25	U25	U25	U25
6	1	03/29/89	U11	U11	U11	U11	U11	U11
7	1	04/02/89	U12	U12	U12	U12	U12	U12
8	1	04/02/89	U20	U20	U20	U20	U20	U20
9	1	04/02/89	U12	U12	U12	U12	U12	U12
10	1	04/02/89	U15	U15	U15	U15	U15	U15
11	1	04/02/89	U15	U15	U15	U15	U15	U15
12	1	04/03/89	U25	U25	U25	U25	U25	U25
13	1	04/03/89	U12	U12	U12	U12	U12	U12
14	1	04/03/89	U14	U14	U14	U14	U14	U14
15	1	04/03/89	U13	U13	U13	U13	U13	U13
16	1	04/04/89	U13	U13	U13	U13	U13	U13
17	1	04/04/89	U25	U25	U25	U25	U25	U25
18	1	03/28/89	U20	U20	U20	U20	U20	U20
19	1	03/28/89	U31	U31	U31	U31	U31	U31
20	1	03/28/89	U16	U16	U16	U16	U16	U16
21	1	03/28/89	U15	U15	U15	U15	U15	U15
22	1	03/25/89	U9	U9	U9	U9	U9	U9
23	1	03/25/89	U9	U9	U9	U9	U9	U9
24	1	03/25/89	U17	U17	U17	U17	U17	U17
25	1	03/24/89	U8	U8	U8	U8	U8	U8
26	1	03/24/89	U9	U9	U9	U9	U9	U9
26	1R	03/24/89	U11	U11	U11	U11	U11	U11
26	2	03/24/89	U9	U9	U9	U9	U9	U9
26	3	03/24/89	U10	U10	U10	U10	U10	U10
26	Mean	03/24/89	U10	U10	U10	U10	U10	U10
27	1	03/24/89	U8	U8	U8	U8	U8	U8
28	1	03/23/89	U8	U8	U8	U8	U8	U8
29	1	03/24/89	U18	U18	U18	U18	U18	U18
30	1	03/22/89	U12	U12	U12	U12	U12	U12
31	1	03/22/89	U11	U11	U11	U11	U11	U11
32	1	03/23/89	U8	U8	U8	U8	U8	U8
32	1R	03/23/89	U9	U9	U9	U9	U9	U9
32	2	03/23/89	U8	U8	U8	U8	U8	U8
32	3	03/23/89	U9	U9	U9	U9	U9	U9
32	Mean	03/23/89	U9	U9	U9	U9	U9	U9
33	1	03/22/89	U11	U11	U11	U11	U11	U11
34	1	03/23/89	U18	U18	U18	U18	U18	U18
35	1	03/23/89	U21	U21	U21	U21	U21	U21
36	1	03/22/89	U13	U13	U13	U13	U13	U13
37	1	03/21/89	U10	U10	U10	U10	U10	U10
38	1	03/21/89	U68	U68	U68	U68	U68	U68
38	1R	03/21/89	U35	U35	U35	U35	U35	U35
38	2	03/21/89	U28	U28	U28	U28	U28	U28
38	3	03/21/89	U29	U29	U29	U29	U29	U29
38	Mean	03/21/89	U36	U36	U36	U36	U36	U36
39	1	03/21/89	U12	U12	U12	U12	U12	U12
40	1	03/21/89	U13	U13	U13	U13	U13	U13
41	1	03/21/89	U15	U15	U15	U15	U15	U15
42	1	03/21/89	U11	U11	U11	U11	U11	U11
43	1	03/20/89	U12	U12	U12	U12	U12	U12

TABLE D-15 (Continued)

Station	Sample	Sampling Date	1,3-Di-chloro-benzene	1,4-Di-chloro-benzene	1,2-Di-chloro-benzene	1,2,4-Tri-chloro-benzene	2-Chloro-naphthalene	Hexachloro-benzene
44	1	03/20/89	U14	U14	N4	U14	E4	E5
44	1R	03/20/89	U14	U14	U14	U14	U14	U14
44	2	03/20/89	U13	U13	U13	U13	U13	U13
44	3	03/20/89	U15	U15	U15	U15	U15	U15
44	Mean	03/20/89	U14	U14	E1	U14	E1	E2
45	1	03/20/89	U17	U17	U17	U17	U17	U17
46	1	03/20/89	U13	U13	U13	U13	U13	U13
47	1	03/20/89	U14	U14	U14	U14	U14	U14
48	1	03/19/89	U31	U31	U31	U31	U31	U31
49	1	03/19/89	U27	U27	U27	U27	U27	U27
50	1	03/19/89	U13	U13	U13	U13	U13	U13
SRM1	1	03/29/89	E11	N5	N8	U14	U14	U14
SRM2	1	03/29/89	E13	N5	N9	U15	U15	U15
SRM3	1	03/29/89	E13	N5	N9	U14	U14	U14

TABLE D-16. CONCENTRATIONS (UG/KG DRY WEIGHT) OF EXTRACTABLE ORGANIC COMPOUNDS IN PUGET SOUND SEDIMENTS: CHLORINATED ALIPHATIC HYDROCARBONS

Station	Sample	Sampling Date	Hexa-chloro-ethane	Hexa-chloro-butadiene	Hexa-chloro-cyclo-pentadiene
1	1	03/29/89	U43	U43	U110
2	1	03/29/89	U29	U29	U72
3	1	03/29/89	U30	U30	U74
4	1	03/29/89	U58	U58	U140
5	1	03/29/89	U52	U52	U130
5	1R	03/29/89	U54	U54	U130
5	2	03/29/89	U49	U49	U120
5	3	03/29/89	U47	U47	U120
5	Mean	03/29/89	U50	U50	U120
6	1	03/29/89	U22	U22	U54
7	1	04/02/89	U24	U24	U61
8	1	04/02/89	U41	U41	U100
9	1	04/02/89	U23	U23	U58
10	1	04/02/89	U29	U29	U74
11	1	04/02/89	U31	U31	U76
12	1	04/03/89	U50	U50	U130
13	1	04/03/89	U24	U24	U61
14	1	04/03/89	U28	U28	U70
15	1	04/03/89	U26	U26	U64
16	1	04/04/89	U25	U25	U63
17	1	04/04/89	U50	U50	U130
18	1	03/28/89	U40	U40	U100
19	1	03/28/89	U61	U61	U150
20	1	03/28/89	U31	U31	U78
21	1	03/28/89	U31	U31	U77
22	1	03/25/89	U18	U18	U45
23	1	03/25/89	U18	U18	U45
24	1	03/25/89	U34	U34	U86
25	1	03/24/89	U17	U17	U42
26	1	03/24/89	U17	U17	U43
26	1R	03/24/89	U22	U22	U55
26	2	03/24/89	U19	U19	U47
26	3	03/24/89	U20	U20	U51
26	Mean	03/24/89	U19	U19	U49
27	1	03/24/89	U17	U17	U42
28	1	03/23/89	U16	U16	U39
29	1	03/24/89	U35	U35	U88
30	1	03/22/89	U24	U24	U60
31	1	03/22/89	U23	U23	U57
32	1	03/23/89	U15	U15	U39
32	1R	03/23/89	U17	U17	U43
32	2	03/23/89	U16	U16	U41
32	3	03/23/89	U18	U18	U44
32	Mean	03/23/89	U17	U17	U42
33	1	03/22/89	U22	U22	U56
34	1	03/23/89	U37	U37	U92
35	1	03/23/89	U42	U42	U110
36	1	03/22/89	U25	U25	U63
37	1	03/21/89	U20	U20	U50
38	1	03/21/89	U140	U140	U340
38	1R	03/21/89	U69	U69	U170
38	2	03/21/89	U55	U55	U140
38	3	03/21/89	U58	U58	U140
38	Mean	03/21/89	U73	U73	U180
39	1	03/21/89	U24	U24	U60
40	1	03/21/89	U26	U26	U64
41	1	03/21/89	U30	U30	U74
42	1	03/21/89	U22	U22	U54

TABLE D-16. (Continued)

Station	Sample	Sampling Date	Hexa-chloro-ethane	Hexa-chloro-butadiene	Hexa-chloro-cyclo-pentadiene
43	1	03/20/89	U25	U25	U62
44	1	03/20/89	U27	N3	U68
44	1R	03/20/89	U28	U28	U70
44	2	03/20/89	U26	U26	U66
44	3	03/20/89	U29	U29	U73
44	Mean	03/20/89	U27	E1	U69
45	1	03/20/89	U34	U34	U86
46	1	03/20/89	U26	U26	U65
47	1	03/20/89	U27	U27	U68
48	1	03/19/89	U61	U61	U150
49	1	03/19/89	U53	U53	U130
50	1	03/19/89	U26	U26	U64
SRM1	1	03/29/89	U29	U29	U72
SRM2	1	03/29/89	U29	U29	U73
SRM3	1	03/29/89	U29	U29	U72

TABLE D-17. CONCENTRATIONS (UG/KG DRY WEIGHT) OF EXTRACTABLE ORGANIC COMPOUNDS IN PUGET SOUND SEDIMENTS: PHTHALATES

Station	Sample	Sampling Date	Dimethyl phthalate	Diethyl phthalate	Di-n-butyl phthalate	Butyl-benzyl phthalate	Bis-(2-ethyl-hexyl)-phthalate	Di-n-octyl phthalate
1	1	03/29/89	U22	U22	U22	U22	U31	U22
2	1	03/29/89	U15	U15	U15	U15	U21	U15
3	1	03/29/89	U15	U15	U15	U15	U19	U15
4	1	03/29/89	U29	U29	U29	U29	E42	U29
5	1	03/29/89	U26	U26	U26	U26	U26	U26
5	1R	03/29/89	U27	U27	U27	U27	34	U27
5	2	03/29/89	U25	U25	U25	U25	U32	U25
5	3	03/29/89	U24	U24	U24	U24	37	U24
5	Mean	03/29/89	U25	U25	U25	U25	E25	U25
6	1	03/29/89	U11	U11	U11	U11	U11	U11
7	1	04/02/89	U12	U12	U12	U3	U12	U12
8	1	04/02/89	U20	U20	U20	U20	56	U20
9	1	04/02/89	U12	U12	U12	U12	U12	U12
10	1	04/02/89	U15	U15	U15	U15	U15	U15
11	1	04/02/89	U15	U15	U15	U15	U15	U15
12	1	04/03/89	U25	U25	U25	U25	E8300	U25
13	1	04/03/89	U12	U12	U12	U12	U12	U12
14	1	04/03/89	U14	U14	U14	U14	U18	U14
15	1	04/03/89	U13	U13	U13	U13	U13	U13
16	1	04/04/89	U13	U13	U13	U13	U13	U13
17	1	04/04/89	U25	U25	U25	U25	40	U25
18	1	03/28/89	U20	U20	U20	U20	U20	U20
19	1	03/28/89	U31	U31	U31	U31	U27	U31
20	1	03/28/89	U16	U16	U16	U16	U32	U16
21	1	03/28/89	U15	U15	U15	U15	67	U15
22	1	03/25/89	U9	U9	U9	U9	U25	U9
23	1	03/25/89	U9	U9	U9	U9	U22	U9
24	1	03/25/89	U17	U17	U17	U17	38	U17
25	1	03/24/89	U8	U8	U8	U8	U14	U8
26	1	03/24/89	U9	U9	U9	U9	41	U9
26	1R	03/24/89	U11	U11	U11	U11	U26	U11
26	2	03/24/89	U9	U9	U9	U9	U13	U9
26	3	03/24/89	U10	U10	U10	U10	U21	U10
26	Mean	03/24/89	U10	U10	U10	U10	E15	U10
27	1	03/24/89	U8	U8	U8	U8	U22	U8
28	1	03/23/89	U8	U8	U8	U8	U22	U8
29	1	03/24/89	U18	U18	U18	U18	39	U18
30	1	03/22/89	U12	U12	U12	U12	E58	U12
31	1	03/22/89	U11	U11	U11	U11	U26	U11
32	1	03/23/89	U8	U8	U8	U8	U27	U8
32	1R	03/23/89	U9	U9	U9	U9	E41	U9
32	2	03/23/89	U8	U8	U8	U8	U29	U8
32	3	03/23/89	U9	U9	U9	U9	E46	U9
32	Mean	03/23/89	U9	U9	U9	U9	E29	U9
33	1	03/22/89	U11	U11	E11	U11	E50	U11
34	1	03/23/89	U18	U18	30	E31	E160	U18
35	1	03/23/89	U21	U21	E16	E18	E120	U21
36	1	03/22/89	U13	U13	U13	U13	E59	U13
37	1	03/21/89	U10	U10	U10	U10	U12	U10
38	1	03/21/89	U68	U68	U68	U68	95	U68
38	1R	03/21/89	U35	U35	U35	U35	190	U35
38	2	03/21/89	U28	U28	U28	U28	E83	U28
38	3	03/21/89	U29	U29	U29	U29	83	U29
38	Mean	03/21/89	U36	U36	U36	U36	E100	U36
39	1	03/21/89	U12	U12	U12	U12	U24	U12
40	1	03/21/89	U26	U26	U26	39	470	U26
41	1	03/21/89	U15	U15	U15	U15	150	U15
42	1	03/21/89	U11	U11	U11	U11	U16	U11

TABLE D-17 (Continued)

Station	Sample	Sampling Date	Dimethyl phthalate	Diethyl phthalate	Di-n-butyl phthalate	Butyl-benzyl phthalate	Bis-(2-ethyl-hexyl)-phthalate	Di-n-octyl phthalate
43	1	03/20/89	U12	U12	U12	U12	U12	U12
44	1	03/20/89	U14	U14	U14	U14	170	U14
44	1R	03/20/89	U14	U14	U14	U14	U20	U14
44	2	03/20/89	U13	U13	U13	U13	U19	U13
44	3	03/20/89	U15	U15	U15	U15	U18	U15
44	Mean	03/20/89	U14	U14	U14	U14	E36	U14
45	1	03/20/89	U17	U17	U17	U17	47	U17
46	1	03/20/89	U13	U13	U13	U13	U14	U13
47	1	03/20/89	U14	U14	U14	U14	U15	U14
48	1	03/19/89	U31	U31	U31	U31	89	U31
49	1	03/19/89	U27	U27	U27	U27	E75	U27
50	1	03/19/89	U13	U13	U13	U13	U26	U13
SRM1	1	03/29/89	U14	U14	U14	U14	82	U14
SRM2	1	03/29/89	U15	U15	U15	U15	79	U15
SRM3	1	03/29/89	U14	U14	U14	U14	120	U14

TABLE D-18. CONCENTRATIONS (UG/KG DRY WEIGHT) OF EXTRACTABLE ORGANIC COMPOUNDS IN PUGET SOUND SEDIMENTS: MISCELLANEOUS OXYGENATED COMPOUNDS

Station	Sample	Sampling Date	Isophorone	Benzyl alcohol	Benzoic acid	Dibenzo-furan	Copro-stanol
1	1	03/29/89	U22	U110	U220	U22	95
2	1	03/29/89	U15	U72	U140	U15	96
3	1	03/29/89	U15	U74	U140	U15	110
4	1	03/29/89	U29	U140	U290	U29	E330
5	1	03/29/89	U26	U130	U260	U26	120
5	1R	03/29/89	U27	U130	U270	U27	120
5	2	03/29/89	U25	U120	U250	U25	240
5	3	03/29/89	U24	U120	U240	U24	170
5	Mean	03/29/89	U25	U120	U250	U25	180
6	1	03/29/89	U11	U54	U110	U11	42
7	1	04/02/89	U12	U61	U120	U12	U24
8	1	04/02/89	69	U100	U200	E13	410
9	1	04/02/89	U12	U58	U120	U12	22
10	1	04/02/89	U15	U74	U150	U15	U29
11	1	04/02/89	U15	U76	U150	U15	N74
12	1	04/03/89	U25	U130	U250	U25	N190
13	1	04/03/89	U12	U61	U120	U12	U24
14	1	04/03/89	U14	U70	U140	U14	N64
15	1	04/03/89	U13	U64	U120	U13	U26
16	1	04/04/89	U13	U63	U130	U13	U25
17	1	04/04/89	U25	U130	U250	U25	U50
18	1	03/28/89	U20	U100	U200	U20	U40
19	1	03/28/89	U31	U150	U310	U31	N170
20	1	03/28/89	U16	U78	U160	U16	120
21	1	03/28/89	U15	U77	U150	U15	270
22	1	03/25/89	U9	U45	R	U9	N66
23	1	03/25/89	U9	U45	R	U9	N65
24	1	03/25/89	U17	U86	R	U17	140
25	1	03/24/89	U8	U42	R	U8	U17
26	1	03/24/89	U9	U43	R	U9	140
26	1R	03/24/89	U11	U55	R	U11	110
26	2	03/24/89	U9	U47	R	U9	U19
26	3	03/24/89	U10	U51	R	E8	79
26	Mean	03/24/89	U10	U49	R	E3	E71
27	1	03/24/89	U8	U42	R	U8	E63
28	1	03/23/89	U8	U39	R	U8	E70
29	1	03/24/89	U18	U88	R	U18	240
30	1	03/22/89	U12	U60	R	18	E230
31	1	03/22/89	U11	U57	U110	U11	E160
32	1	03/23/89	U8	U39	R	U8	E83
32	1R	03/23/89	U9	U43	R	U9	E35
32	2	03/23/89	U8	U41	R	U8	E120
32	3	03/23/89	U9	U44	R	U9	E88
32	Mean	03/23/89	U9	U42	R	U9	E89
33	1	03/22/89	U11	U56	U110	E10	E140
34	1	03/23/89	U18	U92	R	U18	E570
35	1	03/23/89	U21	U110	R	U21	E240
36	1	03/22/89	U13	U63	U130	E12	E230
37	1	03/21/89	U10	U50	U100	U10	E71
38	1	03/21/89	U68	U340	R	U68	E640
38	1R	03/21/89	U35	U170	U350	U35	E610
38	2	03/21/89	U28	U140	U270	U28	E510
38	3	03/21/89	U29	U140	U290	N8	E630
38	Mean	03/21/89	U36	U180	U300	E3	E590
39	1	03/21/89	U12	U60	R	U12	E110
40	1	03/21/89	U26	U130	R	32	E1000
41	1	03/21/89	U15	U74	U150	U15	4700
42	1	03/21/89	U11	U54	U110	U11	120
43	1	03/20/89	U12	U62	U120	U12	U25
44	1	03/20/89	U14	U68	U140	E5	100

TABLE D-18. (Continued)

Station	Sample	Sampling Date	Isophorone	Benzyl alcohol	Benzoic acid	Dibenzo-furan	Copro-stanol
44	1R	03/20/89	U14	U70	U140	U14	E110
44	2	03/20/89	U13	U66	U130	U13	76
44	3	03/20/89	U15	U73	U150	U15	72
44	Mean	03/20/89	U14	U69	U140	E1	E84
45	1	03/20/89	U17	U86	U170	U17	140
46	1	03/20/89	U13	U65	U130	U13	72
47	1	03/20/89	U14	U68	U140	U14	U27
48	1	03/19/89	U31	U150	U310	U31	560
49	1	03/19/89	U27	U130	U270	U27	E480
50	1	03/19/89	U13	U64	U130	U13	E28
SRM1	1	03/29/89	54	U72	U150	U14	190
SRM2	1	03/29/89	64	U73	U150	U15	190
SRM3	1	03/29/89	65	U72	U150	U14	N340

TABLE D-19. CONCENTRATIONS (UG/KG DRY WEIGHT) OF EXTRACTABLE ORGANIC COMPOUNDS IN PUGET SOUND SEDIMENTS: OXYGENATED NITROGEN COMPOUNDS

Station	Sample	Sampling Date	N-nitroso-diphenyl-amine	9(H)-carbazole
1	1	03/29/89	U22	U22
2	1	03/29/89	U15	U15
3	1	03/29/89	U15	U15
4	1	03/29/89	U29	U29
5	1	03/29/89	U26	U26
5	1R	03/29/89	U27	U27
5	2	03/29/89	U25	U25
5	3	03/29/89	U24	U24
5	Mean	03/29/89	U25	U25
6	1	03/29/89	U11	U11
7	1	04/02/89	U12	U12
8	1	04/02/89	U20	U20
9	1	04/02/89	U12	U12
10	1	04/02/89	U15	U15
11	1	04/02/89	U15	U15
12	1	04/03/89	U25	U25
13	1	04/03/89	U12	U12
14	1	04/03/89	U14	U14
15	1	04/03/89	U13	U13
16	1	04/04/89	U13	U13
17	1	04/04/89	U25	U25
18	1	03/28/89	U20	U20
19	1	03/28/89	U31	U31
20	1	03/28/89	U16	U16
21	1	03/28/89	U15	U15
22	1	03/25/89	U9	U9
23	1	03/25/89	U9	U9
24	1	03/25/89	U17	U17
25	1	03/24/89	U8	U8
26	1	03/24/89	U9	U9
26	1R	03/24/89	U11	U11
26	2	03/24/89	U9	U9
26	3	03/24/89	U10	110
26	Mean	03/24/89	U10	E40
27	1	03/24/89	U8	U8
28	1	03/23/89	U8	U8
29	1	03/24/89	U18	U18
30	1	03/22/89	U12	53
31	1	03/22/89	U11	U11
32	1	03/23/89	U8	U8
32	1R	03/23/89	U9	U9
32	2	03/23/89	U8	U8
32	3	03/23/89	U9	U9
32	Mean	03/23/89	U9	U9
33	1	03/22/89	U11	U11
34	1	03/23/89	U18	U18
35	1	03/23/89	U21	U21
36	1	03/22/89	U13	U13
37	1	03/21/89	U10	U10
38	1	03/21/89	U68	U68
38	1R	03/21/89	U35	U35
38	2	03/21/89	U28	U28
38	3	03/21/89	U29	U29
38	Mean	03/21/89	U36	U36
39	1	03/21/89	U12	U12
40	1	03/21/89	U26	110
41	1	03/21/89	U15	U15
42	1	03/21/89	U11	U11
43	1	03/20/89	U12	U12

TABLE D-19. (Continued)

Station	Sample	Sampling Date	N-nitroso-diphenyl-amine	9(H)-carbazole
44	1	03/20/89	U14	U14
44	1R	03/20/89	U14	U14
44	2	03/20/89	U13	U13
44	3	03/20/89	U15	U15
44	Mean	03/20/89	U14	U14
45	1	03/20/89	U17	U17
46	1	03/20/89	U13	U13
47	1	03/20/89	U14	U14
48	1	03/19/89	U31	U31
49	1	03/19/89	U27	U27
50	1	03/19/89	U13	U13
SRM1	1	03/29/89	U14	U14
SRM2	1	03/29/89	U15	U15
SRM3	1	03/29/89	U14	U14

TABLE D-20 CONCENTRATIONS (UG/KG DRY WEIGHT) OF EXTRACTABLE ORGANIC COMPOUNDS IN PUGET SOUND SEDIMENTS: MISCELLANEOUS ORGANIC COMPOUNDS

Station	Sample	Sampling Date	Beta-sitosterol	Caffeine	Choles-terol	Perylene	n-alkanes Carbon Preference Index	Pristane/ phytane ratio
1	1	03/29/89	2300	U22	2400	47	1.89	6.29
2	1	03/29/89	1100	U15	1100	30	1.64	5.29
3	1	03/29/89	700	U15	600	17	1.89	6.15
4	1	03/29/89	E2100	U29	E1800	E20	3.37	8.67
5	1	03/29/89	1600	U26	1400	33	1.57	7.66
5	1R	03/29/89	1600	U27	1400	43	1.41	9.13
5	2	03/29/89	2500	U25	2200	45	2.01	8.66
5	3	03/29/89	2100	U24	1800	36	1.52	7.21
5	Mean	03/29/89	2100	U25	1800	40	1.67	8.09
6	1	03/29/89	310	U11	510	N11	1.50	4.16
7	1	04/02/89	U61	U12	680	U12	1.84	10.31
8	1	04/02/89	E3100	U20	1000	48	1.51	4.10
9	1	04/02/89	E120	U12	430	U12	1.26	2.91
10	1	04/02/89	E620	U15	2000	N20	1.77	7.58
11	1	04/02/89	E540	U15	1700	17	1.78	6.72
12	1	04/03/89	E1500	U25	1700	29	1.37	6.52
13	1	04/03/89	N90	U12	290	U12	1.37	9.92
14	1	04/03/89	E440	U14	E440	N10	1.70	9.34
15	1	04/03/89	N680	U13	E310	U13	2.00	5.22
16	1	04/04/89	U63	U13	E530	U13	1.61	4.67
17	1	04/04/89	E2600	U25	E1400	U25	2.75	10.42
18	1	03/28/89	N940	U20	2100	N26	1.69	7.04
19	1	03/28/89	440	U31	2000	38	3.50	7.32
20	1	03/28/89	N1500	U16	110	N14	3.05	3.42
21	1	03/28/89	2300	U15	1300	56	3.80	2.47
22	1	03/25/89	E360	U9	E380	10	3.56	5.08
23	1	03/25/89	E150	U9	E330	U9	1.91	5.63
24	1	03/25/89	480	U17	500	19	2.08	6.86
25	1	03/24/89	U42	U8	U25	U8	1.90	3.02
26	1	03/24/89	E580	U9	870	14	1.50	4.24
26	1R	03/24/89	370	U11	860	11	2.20	5.36
26	2	03/24/89	E47	U9	E680	N8	1.57	6.09
26	3	03/24/89	300	U10	610	17	1.64	6.12
26	Mean	03/24/89	E270	U10	E720	E13	1.69	5.67
27	1	03/24/89	E130	U8	E270	U8	1.81	6.63
28	1	03/23/89	260	U8	610	U8	2.29	8.52
29	1	03/24/89	730	U18	1600	29	1.59	5.39
30	1	03/22/89	620	U12	1100	110	2.86	6.20
31	1	03/22/89	220	U11	670	12	2.28	4.05
32	1	03/23/89	260	U8	490	12	1.52	4.28
32	1R	03/23/89	E100	U9	E300	E11	1.37	4.26
32	2	03/23/89	E340	U8	E870	21	1.86	4.79
32	3	03/23/89	E200	U9	E590	14	2.23	4.99
32	Mean	03/23/89	E240	U9	E620	E15	1.85	4.68
33	1	03/22/89	470	U11	490	72	2.56	4.23
34	1	03/23/89	770	U18	2400	46	2.14	3.60
35	1	03/23/89	1100	U21	1500	110	2.75	7.50
36	1	03/22/89	E650	U13	E480	E21	2.18	7.53
37	1	03/21/89	290	U10	570	N5	2.59	9.38
38	1	03/21/89	E1500	U68	E1000	76	2.76	8.83
38	1R	03/21/89	1700	U35	1500	120	1.66	7.25
38	2	03/21/89	E1700	U28	E1100	E84	1.56	7.36
38	3	03/21/89	1500	U29	1200	73	2.41	9.64
38	Mean	03/21/89	E1600	U36	E1200	E85	2.06	8.35
39	1	03/21/89	E170	U12	E250	U12	1.96	3.72
40	1	03/21/89	2300	U13	1300	360	1.84	3.09
41	1	03/21/89	4300	U15	12000	23	3.18	2.88
42	1	03/21/89	280	U11	480	U11	1.57	4.96

TABLE D-20 (Continued)

Station	Sample	Sampling Date	Beta-sitosterol	Caffeine	Choles-terol	Perylene	n-alkanes Carbon Preference Index	Pristane/ phytane ratio
43	1	03/20/89	E120	U12	E450	U12	2.31	4.74
44	1	03/20/89	550	U14	1100	N8	3.11	11.73
44	1R	03/20/89	540	U14	870	E9	2.72	9.78
44	2	03/20/89	430	U13	790	N7	2.87	9.81
44	3	03/20/89	370	U15	640	N8	2.19	10.59
44	Mean	03/20/89	450	U14	810	E8	2.66	10.40
45	1	03/20/89	690	U17	640	E13	2.65	12.80
46	1	03/20/89	540	U13	860	E6	2.60	16.77
47	1	03/20/89	230	U14	470	E4	2.68	20.94
48	1	03/19/89	3800	U31	3400	37	3.48	15.67
49	1	03/19/89	E3500	U27	E2600	E70	3.03	1.37
50	1	03/19/89	E550	U13	E560	U13	1.42	2.58
SRM1	1	03/29/89	400	U14	880	140	1.68	4.66
SRM2	1	03/29/89	350	U15	910	150	1.12	5.13
SRM3	1	03/29/89	E1900	U14	E2200	160	1.52	4.28

TABLE D-20 (Continued)

Station	Sample	Sampling Date	Retene	Cymene
1	1	03/29/89	29	U22
2	1	03/29/89	E12	U15
3	1	03/29/89	U15	U15
4	1	03/29/89	U29	U29
5	1	03/29/89	U26	U26
5	1R	03/29/89	E17	U27
5	2	03/29/89	25	U25
5	3	03/29/89	E22	U24
5	Mean	03/29/89	E19	U25
6	1	03/29/89	U11	U11
7	1	04/02/89	U12	U12
8	1	04/02/89	55	U20
9	1	04/02/89	U12	U12
10	1	04/02/89	E8	U15
11	1	04/02/89	N8	U15
12	1	04/03/89	E19	U25
13	1	04/03/89	U12	U12
14	1	04/03/89	U14	U14
15	1	04/03/89	U13	U13
16	1	04/04/89	U13	U13
17	1	04/04/89	U25	U25
18	1	03/28/89	U20	U20
19	1	03/28/89	N24	U31
20	1	03/28/89	E10	U16
21	1	03/28/89	81	U15
22	1	03/25/89	U9	U9
23	1	03/25/89	U9	U9
24	1	03/25/89	E15	U17
25	1	03/24/89	U8	U8
26	1	03/24/89	9	U9
26	1R	03/24/89	N6	U11
26	2	03/24/89	U9	U9
26	3	03/24/89	E9	U10
26	Mean	03/24/89	E5	U10
27	1	03/24/89	U8	U8
28	1	03/23/89	U8	U8
29	1	03/24/89	E14	U18
30	1	03/22/89	35	U12
31	1	03/22/89	U11	U11
32	1	03/23/89	6	U8
32	1R	03/23/89	E6	U9
32	2	03/23/89	E6	U8
32	3	03/23/89	E11	U9
32	Mean	03/23/89	E8	U9
33	1	03/22/89	22	U11
34	1	03/23/89	E44	U18
35	1	03/23/89	58	U20
36	1	03/22/89	U13	U13
37	1	03/21/89	E10	U10
38	1	03/21/89	80	U70
38	1R	03/21/89	120	U35
38	2	03/21/89	E65	U28
38	3	03/21/89	56	U29
38	Mean	03/21/89	E74	U37
39	1	03/21/89	U12	U12
40	1	03/21/89	95	U30
41	1	03/21/89	110	U15
42	1	03/21/89	E7	U11
43	1	03/20/89	E5	U12
44	1	03/20/89	E19	U14
44	1R	03/20/89	E14	U14
44	2	03/20/89	E16	U13

TABLE D-20. (Continued)

Station	Sample	Sampling Date	Retene	Cymene
44	3	03/20/89	18	U15
44	Mean	03/20/89	E17	U14
45	1	03/20/89	39	U17
46	1	03/20/89	E20	U13
47	1	03/20/89	E11	U14
48	1	03/19/89	81	U31
49	1	03/19/89	E76	U27
50	1	03/19/89	E5	U13
SRM1	1	03/29/89	U14	U14
SRM2	1	03/29/89	U15	U15
SRM3	1	03/29/89	U14	U14

TABLE D-21. CONCENTRATIONS (UG/KG DRY WEIGHT) OF EXTRACTABLE ORGANIC COMPOUNDS IN PUGET SOUND SEDIMENTS: MISCELLANEOUS BASE/NEUTRALS

Station	Sample	Sampling Date	Bis-(2-chloro-ethyl)-ether	Bis-(2-chloro-isopropyl) ether	Bis-(2-chloro-ethoxy)-methane	4-Chloro-phenyl phenyl ether	4-Bromo-phenyl phenyl ether	3-3'-Di-chloro-benzidine
1	1	03/29/89	U22	U22	U22	U22	U22	R
2	1	03/29/89	U15	U15	U15	U15	U15	R
3	1	03/29/89	U15	U15	U15	U15	U15	R
4	1	03/29/89	U29	U29	U29	U29	U29	R
5	1	03/29/89	U26	U26	U26	U26	U26	R
5	1R	03/29/89	U27	U27	U27	U27	U27	R
5	2	03/29/89	U25	U25	U25	U25	U25	R
5	3	03/29/89	U24	U24	U24	U24	U24	R
5	Mean	03/29/89	U25	U25	U25	U25	U25	R
6	1	03/29/89	U11	U11	U11	U11	U11	R
7	1	04/02/89	U12	U12	U12	U12	U12	R
8	1	04/02/89	U20	U20	U20	U20	U20	R
9	1	04/02/89	U12	U12	U12	U12	U12	R
10	1	04/02/89	U15	U15	U15	U15	U15	R
11	1	04/02/89	U15	U15	U15	U15	U15	R
12	1	04/03/89	U25	U25	U25	U25	U25	R
13	1	04/03/89	U12	U12	U12	U12	U12	R
14	1	04/03/89	U14	U14	U14	U14	U14	R
15	1	04/03/89	U13	U13	U13	U13	U13	R
16	1	04/04/89	U13	U13	U13	U13	U13	R
17	1	04/04/89	U25	U25	U25	U25	U25	R
18	1	03/28/89	U20	U20	U20	U20	U20	R
19	1	03/28/89	U31	U31	U31	U31	U31	R
20	1	03/28/89	U16	U16	U16	U16	U16	R
21	1	03/28/89	U15	U15	U15	U15	U15	R
22	1	03/25/89	U9	U9	U9	U9	U9	R
23	1	03/25/89	U9	U9	U9	U9	U9	R
24	1	03/25/89	U17	U17	U17	U17	U17	R
25	1	03/24/89	U8	U8	U8	U8	U8	R
26	1	03/24/89	U9	U9	U9	U9	U9	R
26	1R	03/24/89	U11	U11	U11	U11	U11	R
26	2	03/24/89	U9	U9	U9	U9	U9	R
26	3	03/24/89	U10	U10	U10	U10	U10	R
26	Mean	03/24/89	U10	U10	U10	U10	U10	R
27	1	03/24/89	U8	U8	U8	U8	U8	R
28	1	03/23/89	U8	U8	U8	U8	U8	R
29	1	03/24/89	U18	U18	U18	U18	U18	R
30	1	03/22/89	U12	U12	U12	U12	U12	R
31	1	03/22/89	U11	U11	U11	U11	U11	R
32	1	03/23/89	U8	U8	U8	U8	U8	R
32	1R	03/23/89	U9	U9	U9	U9	U9	R
32	2	03/23/89	U8	U8	U8	U8	U8	R
32	3	03/23/89	U9	U9	U9	U9	U9	R
32	Mean	03/23/89	U9	U9	U9	U9	U9	R
33	1	03/22/89	U11	U11	U11	U11	U11	R
34	1	03/23/89	U18	U18	U18	U18	U18	R
35	1	03/23/89	U21	U21	U21	U21	U21	R
36	1	03/22/89	U13	U13	U13	U13	U13	R
37	1	03/21/89	U10	U10	U10	U10	U10	R
38	1	03/21/89	U68	U68	U68	U68	U68	U340
38	1R	03/21/89	U35	U35	U35	U35	U35	R
38	2	03/21/89	U28	U28	U28	U28	U28	R
38	3	03/21/89	U29	U29	U29	U29	U29	R
38	Mean	03/21/89	U36	U36	U36	U36	U36	R
39	1	03/21/89	U12	U12	U12	U12	U12	U60
40	1	03/21/89	U26	U26	U26	U13	U13	U130
41	1	03/21/89	U15	U15	U15	U15	U15	R
42	1	03/21/89	U11	U11	U11	U11	U11	R

TABLE D-21 (Continued)

Station	Sample	Sampling Date	Bis-(2-chloro-ethyl)-ether	Bis-(2-chloro-isopropyl) ether	Bis-(2-chloro-ethoxy)-methane	4-Chloro-phenyl phenyl ether	4-Bromo-phenyl phenyl ether	3-3'-Di-chloro-benzidine
43	1	03/20/89	U12	U12	U12	U12	U12	R
44	1	03/20/89	U14	U14	U14	E5	N4	R
44	1R	03/20/89	U14	U14	U14	U14	U14	R
44	2	03/20/89	U13	U13	U13	U13	U13	R
44	3	03/20/89	U15	U15	U15	U15	U15	R
44	Mean	03/20/89	U14	U14	U14	E1	E1	R
45	1	03/20/89	U17	U17	U17	U17	U17	R
46	1	03/20/89	U13	U13	U13	U13	U13	R
47	1	03/20/89	U14	U14	U14	U14	U14	R
48	1	03/19/89	U31	U31	U31	U31	U31	R
49	1	03/19/89	U27	U27	U27	U27	U27	R
50	1	03/19/89	U13	U13	U13	U13	U13	R
SRM1	1	03/29/89	U14	U14	U14	86	190	R
SRM2	1	03/29/89	U15	U15	U15	84	200	R
SRM3	1	03/29/89	U14	U14	U14	98	210	R

TABLE D-21 (Continued)

Station	Sample	Sampling Date	2-Nitro-aniline	3-Nitro-aniline	4-Nitro-aniline	4-Chloro-aniline	N-nitroso-di-n-propyl-amine	Nitro-benzene
1	1	03/29/89	U110	U110	U110	R	U22	U22
2	1	03/29/89	U72	U72	U72	R	U15	U15
3	1	03/29/89	U74	U74	U74	R	U15	U15
4	1	03/29/89	U140	U140	U140	R	U29	U29
5	1	03/29/89	U130	U130	U130	R	U26	U26
5	1R	03/29/89	U130	U130	U130	R	U27	U27
5	2	03/29/89	U120	U120	U120	R	U25	U25
5	3	03/29/89	U120	U120	U120	R	U24	U24
5	Mean	03/29/89	U120	U120	U120	R	U25	U25
6	1	03/29/89	U54	U54	U54	R	U11	U11
7	1	04/02/89	U61	U61	U61	R	U12	U12
8	1	04/02/89	U100	U100	U100	R	U20	U20
9	1	04/02/89	U58	U58	U58	R	U12	U12
10	1	04/02/89	U74	U74	U74	R	U15	U15
11	1	04/02/89	U76	U76	U76	R	U15	U15
12	1	04/03/89	U130	U130	U130	R	U25	U25
13	1	04/03/89	U61	U61	U61	R	U12	U12
14	1	04/03/89	U70	U70	U70	R	U14	U14
15	1	04/03/89	U64	U64	U64	R	U13	U13
16	1	04/04/89	U63	U63	U63	R	U13	U13
17	1	04/04/89	U130	U130	U130	R	U25	U25
18	1	03/28/89	U100	U100	U100	R	U20	U20
19	1	03/28/89	U150	U150	U150	R	U31	U31
20	1	03/28/89	U78	U78	U78	R	U16	U16
21	1	03/28/89	U77	U77	U77	R	U15	U15
22	1	03/25/89	U45	U45	U45	R	U9	U9
23	1	03/25/89	U45	U45	U45	R	U9	U9
24	1	03/25/89	U86	U86	U86	R	U17	U17
25	1	03/24/89	U42	U42	U42	R	U8	U8
26	1	03/24/89	U43	U43	U43	R	U9	U9
26	1R	03/24/89	U55	U55	U55	R	U11	U11
26	2	03/24/89	U47	U47	U47	R	U9	U9
26	3	03/24/89	U51	U51	U51	R	U10	U10
26	Mean	03/24/89	U49	U49	U49	R	U10	U10
27	1	03/24/89	U42	U42	U42	R	U8	U8
28	1	03/23/89	U39	U39	U39	R	U8	U8
29	1	03/24/89	U88	U88	U88	R	U18	U18
30	1	03/22/89	U60	U60	U60	R	U12	U12
31	1	03/22/89	U57	U57	U57	R	U11	U11
32	1	03/23/89	U39	U39	U39	R	U8	U8
32	1R	03/23/89	U43	U43	U43	R	U9	U9
32	2	03/23/89	U41	U41	U41	R	U8	U8
32	3	03/23/89	U44	U44	U44	R	U9	U9
32	Mean	03/23/89	U42	U42	U42	R	U9	U9
33	1	03/22/89	U56	U56	U56	R	U11	U11
34	1	03/23/89	U92	U92	U92	R	U18	U18
35	1	03/23/89	U110	U110	U110	R	U21	U21
36	1	03/22/89	U63	U63	U63	R	U13	U13
37	1	03/21/89	U50	U50	U50	R	U10	U10
38	1	03/21/89	U340	U340	U340	U200	U68	U68
38	1R	03/21/89	U170	U170	U170	R	U35	U35
38	2	03/21/89	U140	U140	U140	R	U28	U28
38	3	03/21/89	U140	U140	U140	R	U29	U29
38	Mean	03/21/89	U180	U180	U180	R	U36	U36
39	1	03/21/89	U60	U60	U60	U36	U12	U12
40	1	03/21/89	U130	U130	U130	U77	U26	U26
41	1	03/21/89	U74	U74	U74	R	U15	U15
42	1	03/21/89	U54	U54	U54	R	U11	U11
43	1	03/20/89	U62	U62	U62	R	U12	U12
44	1	03/20/89	U68	U68	U68	R	U14	U14
44	1R	03/20/89	U70	U70	U70	R	U14	U14

TABLE D-21 (Continued)

Station	Sample	Sampling Date	2-Nitro-aniline	3-Nitro-aniline	4-Nitro-aniline	4-Chloro-aniline	N-nitroso-di-n-propyl-amine	Nitro-benzene
44	2	03/20/89	U66	U66	U66	R	U13	U13
44	3	03/20/89	U73	U73	U73	R	U15	U15
44	Mean	03/20/89	U69	U69	U69	R	U14	U14
45	1	03/20/89	U86	U86	U86	R	U17	U17
46	1	03/20/89	U65	U65	U65	R	U13	U13
47	1	03/20/89	U68	U68	U68	R	U14	U14
48	1	03/19/89	U150	U150	U150	R	U31	U31
49	1	03/19/89	U130	U130	U130	R	U27	U27
50	1	03/19/89	U64	U64	U64	R	U13	U13
SRM1	1	03/29/89	U72	U72	U72	R	U14	U14
SRM2	1	03/29/89	U73	U73	U73	R	U15	U15
SRM3	1	03/29/89	U72	U72	U72	R	U14	U14

TABLE D-21 (Continued)

Station	Sample	Sampling Date	2,4-Di-nitro-toluene	2,6-Di-nitro-toluene	2-Methyl-naphtha-lene
1	1	03/29/89	U110	U110	U22
2	1	03/29/89	U72	U72	E6
3	1	03/29/89	U74	U74	E3
4	1	03/29/89	U140	U140	U29
5	1	03/29/89	U130	U130	E6
5	1R	03/29/89	U130	U130	E15
5	2	03/29/89	U120	U120	E6
5	3	03/29/89	U120	U120	E6
5	Mean	03/29/89	U120	U120	E8
6	1	03/29/89	U54	U54	U11
7	1	04/02/89	U61	U61	U12
8	1	04/02/89	U100	U100	E14
9	1	04/02/89	U58	U58	U12
10	1	04/02/89	U74	U74	U15
11	1	04/02/89	U76	U76	U15
12	1	04/03/89	U130	U130	U25
13	1	04/03/89	U61	U61	U12
14	1	04/03/89	U70	U70	U14
15	1	04/03/89	U64	U64	U13
16	1	04/04/89	U63	U63	U13
17	1	04/04/89	U130	U130	U25
18	1	03/28/89	U100	U100	U20
19	1	03/28/89	U150	U150	U31
20	1	03/28/89	U78	U78	U16
21	1	03/28/89	U77	U77	E6
22	1	03/25/89	U45	U45	U9
23	1	03/25/89	U45	U45	U9
24	1	03/25/89	U86	U86	U17
25	1	03/24/89	U42	U42	U8
26	1	03/24/89	U43	U43	U9
26	1R	03/24/89	U55	U55	U11
26	2	03/24/89	U47	U47	U9
26	3	03/24/89	U51	U51	E7
26	Mean	03/24/89	U49	U49	E5
27	1	03/24/89	U42	U42	U8
28	1	03/23/89	U39	U39	U8
29	1	03/24/89	U88	U88	U18
30	1	03/22/89	U60	U60	E8
31	1	03/22/89	U57	U57	U11
32	1	03/23/89	U39	U39	U8
32	1R	03/23/89	U43	U43	U9
32	2	03/23/89	U41	U41	U8
32	3	03/23/89	U44	U44	U9
32	Mean	03/23/89	U42	U42	U9
33	1	03/22/89	U56	U56	E10
34	1	03/23/89	U92	U92	E4
35	1	03/23/89	U110	U110	E18
36	1	03/22/89	U63	U63	U13
37	1	03/21/89	U50	U50	U10
38	1	03/21/89	U340	U340	U68
38	1R	03/21/89	U170	U170	U35
38	2	03/21/89	U140	U140	U28
38	3	03/21/89	U140	U140	U29
38	Mean	03/21/89	U180	U180	U36
39	1	03/21/89	U60	U60	U12
40	1	03/21/89	U130	U130	45
41	1	03/21/89	U74	U74	E6
42	1	03/21/89	U54	U54	U11
43	1	03/20/89	U62	U62	U12
44	1	03/20/89	U68	U68	E5
44	1R	03/20/89	U70	U70	U20

TABLE D-21 (Continued)

Station	Sample	Sampling Date	2,4-Di-nitro-toluene	2,6-Di-nitro-toluene	2-Methyl-naphtha-lene
44	2	03/20/89	U66	U66	U13
44	3	03/20/89	U73	U73	U15
44	Mean	03/20/89	U69	U69	E7
45	1	03/20/89	U86	U86	U17
46	1	03/20/89	U65	U65	U13
47	1	03/20/89	U68	U68	U14
48	1	03/19/89	U150	U150	U31
49	1	03/19/89	U130	U130	U27
50	1	03/19/89	U64	U64	U13
SRM1	1	03/29/89	U72	U72	40
SRM2	1	03/29/89	U73	U73	45
SRM3	1	03/29/89	U72	U72	69

TABLE D-22. CONCENTRATIONS (UG/KG DRY WEIGHT) OF EXTRACTABLE ORGANIC COMPOUNDS IN PUGET SOUND SEDIMENTS: RESIN ACIDS AND GUAIACOLS

Station	Sample	Sampling Date	Dichloro-dehydro-abietic acid	4,5,6-Tri-chloro-guaiacol	Chloro-dehydro-abietic acid	Tetra-chloro-guaiacol	Dehydro-abietic acid	Sandaco-pimaric acid
4	1	03/29/89	N150	U230	N210	U230	E190	U58
8	1	04/02/89	U82	U160	E90	U160	E550	E49
21	1	03/28/89	U62	U120	N100	U120	E520	U31
SRM1	1	03/29/89	U58	U120	U120	390	U29	U29

TABLE D-22. (Continued)

Station	Sample	Sampling Date	Neoabietic acid	Palustric acid	Pimaric acid	Isopimaric acid	Abietic acid	4,5-Di-chloro-guaiacol
4	1	03/29/89	U230	U1200	U58	U120	U58	U120
8	1	04/02/89	E82	N120	N25	E210	E180	U82
21	1	03/28/89	U120	U620	U31	E160	E180	U62
SRM1	1	03/29/89	U120	U580	U29	U58	U29	U58

TABLE D-22. (Continued)

Station	Sample	Sampling Date	Guaiacol
4	1	03/29/89	U58
8	1	04/02/89	U41
21	1	03/28/89	U31
SRM1	1	03/29/89	U29

TABLE D-23. CONCENTRATIONS (UG/KG DRY WEIGHT) OF PESTICIDES AND PCBS IN PUGET SOUND SEDIMENTS

Station	Sample	Sampling Date	Aldrin	Alpha-chlordane	Gamma-chlordane	p,p'-DDD	p,p'-DDE	p,p'-DDT
1	1	03/29/89	U1.5	U1.5	U1.5	U4.5	U2.5	U3.0
2	1	03/29/89	U0.9	U0.9	U0.9	U2.7	U1.4	U1.8
3	1	03/29/89	U0.9	U0.9	U0.9	U2.7	U1.4	U1.8
4	1	03/29/89	U1.8	U1.8	U1.8	U5.4	U2.7	U3.6
5	1	03/29/89	U1.5	U1.5	U1.5	U4.5	U2.5	U3.0
5	1R	03/29/89	U1.5	U1.5	U1.5	U4.5	U2.5	U3.0
5	2	03/29/89	U1.3	U1.3	U1.3	U3.9	U2.0	U2.6
5	3	03/29/89	U1.3	U1.3	U1.3	U3.9	U2.0	U2.6
5	Mean	03/29/89	U1.4	U1.4	U1.4	U4.1	U2.2	U2.7
6	1	03/29/89	U0.6	U0.6	U0.6	U1.8	U0.9	U1.2
7	1	04/02/89	U0.7	U0.7	U0.7	U2.1	U1.1	U1.4
8	1	04/02/89	U1.2	U1.2	U1.2	U3.6	U1.8	U2.4
9	1	04/02/89	U0.7	U0.7	U0.7	U2.1	U1.1	U1.4
10	1	04/02/89	U0.9	U0.9	U0.9	U2.7	U1.4	U1.8
11	1	04/02/89	U0.9	U0.9	U0.9	U2.7	U1.4	U1.8
12	1	04/03/89	U1.5	U1.5	U1.5	U4.5	U2.3	U3.0
13	1	04/03/89	U0.7	U0.7	U0.7	U2.1	U1.1	U1.4
14	1	04/03/89	U0.8	U0.8	U0.8	U2.4	U1.2	U1.6
15	1	04/03/89	U0.8	U0.8	U0.8	U2.4	U1.2	U1.6
16	1	04/04/89	U0.7	U0.7	U0.7	U2.1	U1.1	U1.4
17	1	04/04/89	U1.5	U1.5	U1.5	U4.5	U2.3	U3.0
18	1	03/28/89	U1.3	U1.3	U1.3	U3.9	U2.0	U2.6
19	1	03/28/89	U1.8	U1.8	U1.8	U5.4	U2.7	U3.6
20	1	03/28/89	U1.0	U1.0	U1.0	U3.0	U1.5	U2.0
21	1	03/28/89	U0.9	U0.9	U1.1	U2.7	U1.4	U1.8
22	1	03/25/89	U0.8	U0.8	U0.8	U2.4	U1.2	U1.6
23	1	03/25/89	U0.8	U0.8	U0.8	U2.4	U1.2	U1.6
24	1	03/25/89	U1.4	U1.4	U1.4	U4.2	U2.1	U2.8
25	1	03/24/89	U0.6	U0.6	U0.6	U1.8	U0.9	U1.2
26	1	03/24/89	U0.6	U0.6	U0.6	U1.8	U0.9	U1.2
26	1R	03/24/89	U0.7	U0.7	U0.7	U2.1	U1.1	U1.4
26	2	03/24/89	U0.7	U0.7	U0.7	U2.1	U1.1	U1.4
26	3	03/24/89	U0.7	U0.7	U0.7	U2.1	U1.1	U1.4
26	Mean	03/24/89	U0.7	U0.7	U0.7	U2.0	U1.1	U1.4
27	1	03/24/89	U0.7	U0.7	U0.7	U2.1	U1.1	U1.4
28	1	03/23/89	U0.6	U0.6	U0.6	U1.8	U0.9	U1.2
29	1	03/24/89	U1.4	U1.4	U1.4	U4.2	U2.1	U2.8
30	1	03/22/89	U1.1	U0.9	U0.9	U2.7	U1.4	U1.8
31	1	03/22/89	U0.6	U0.6	U0.6	U1.8	U0.9	U1.2
32	1	03/23/89	U0.7	U0.7	U0.7	U2.1	U1.1	U1.4
32	1R	03/23/89	U0.7	U0.7	U0.7	U2.1	U1.1	U1.4
32	2	03/23/89	U0.7	U0.7	U0.7	U2.1	U1.1	U1.4
32	3	03/23/89	U0.7	U0.7	U0.7	U2.1	U1.1	U1.4
32	Mean	03/23/89	U0.7	U0.7	U0.7	U2.1	U1.1	U1.4
33	1	03/22/89	U0.8	0.9	U2.8	N2.6	U1.2	R0.0
34	1	03/23/89	U1.4	U1.4	U1.4	U4.2	U2.1	U2.8
35	1	03/23/89	U1.4	U1.4	U1.4	U4.2	U2.1	U2.8
36	1	03/22/89	U0.6	U0.6	U0.6	U1.8	U0.9	U1.2
37	1	03/21/89	U0.6	U0.6	U0.6	U1.8	U0.9	U1.2
38	1	03/21/89	U0.6	U0.6	U0.6	U1.8	U1.6	U1.2
38	1R	03/21/89	U2.0	U2.0	U2.0	U6.0	U3.0	U4.0
38	2	03/21/89	U2.0	U2.0	U2.0	U6.0	U3.0	U4.0
38	3	03/21/89	U2.0	U2.0	U2.0	U6.0	U3.0	U4.0
38	Mean	03/21/89	U1.8	U1.8	U1.8	U5.3	U2.8	U3.5
39	1	03/21/89	U0.2	U0.2	U0.2	U0.6	U0.3	U0.4
40	1	03/21/89	U0.3	U0.3	U0.3	U0.9	U0.5	U0.6
41	1	03/21/89	U0.7	U0.7	U0.7	U2.1	U1.1	U1.4
42	1	03/21/89	U0.7	U0.7	U0.7	U2.1	U1.1	U1.4
43	1	03/20/89	U0.7	U0.7	U0.7	U2.1	U1.1	U1.4
44	1	03/20/89	U0.8	U0.8	U0.8	U2.4	U1.2	U1.6

TABLE D-23 (Continued)

Station	Sample	Sampling Date	Aldrin	Alpha-chlordane	Gamma-chlordane	p,p'-DDD	p,p'-DDE	p,p'-DDT
44	1R	03/20/89	U0.8	U0.8	U0.8	U2.4	U1.2	U1.6
44	2	03/20/89	U0.8	U0.8	U0.8	U2.4	U1.2	U1.6
44	3	03/20/89	U0.9	U0.9	U0.9	U2.7	U1.4	U1.8
44	Mean	03/20/89	U0.8	U0.8	U0.8	U2.5	U1.3	U1.7
45	1	03/20/89	U1.0	U1.0	U1.0	U3.0	U1.5	U2.0
46	1	03/20/89	U0.8	U0.8	U0.8	U2.4	U1.2	U1.6
47	1	03/20/89	U0.7	U0.7	U0.7	U2.1	U1.1	U1.4
48	1	03/19/89	U2.0	U2.0	U2.0	U6.0	U3.0	U4.0
49	1	03/19/89	U2.0	U2.0	U2.0	U6.0	U3.0	U4.0
50	1	03/19/89	U0.7	U0.7	U0.7	U2.1	U1.1	U1.4
SRM1	1	03/29/89	U0.9	U0.9	U0.9	U2.7	U1.4	U1.8
SRM2	1	03/29/89	U0.9	U0.9	U1.4	U2.7	U1.4	U1.8
SRM3	1	03/29/89	U0.9	U0.9	U1.6	U2.7	U1.4	U1.8

TABLE D-23. (Continued)

Station	Sample	Sampling Date	Dieldrin	Alpha-endosulfan	Beta-endosulfan	Endosulfan sulfate	Endrin	Endrin ketone
1	1	03/29/89	U2.5	U1.5	U2.5	U4.5	U2.5	U2.5
2	1	03/29/89	U1.4	U0.9	U1.4	U2.7	U1.4	U1.4
3	1	03/29/89	U1.4	U0.9	U1.4	U2.7	U1.4	U1.4
4	1	03/29/89	U2.7	U1.8	U2.7	U5.4	U2.7	U2.7
5	1	03/29/89	U2.5	U1.5	U2.5	U4.5	U2.5	U2.5
5	1R	03/29/89	U2.5	U1.5	U2.5	U4.5	U2.5	U2.5
5	2	03/29/89	U2.0	U1.3	U2.0	U3.9	U2.0	U2.0
5	3	03/29/89	U2.0	U1.3	U2.0	U3.9	U2.0	U2.0
5	Mean	03/29/89	U2.2	U1.4	U2.2	U4.1	U2.2	U2.2
6	1	03/29/89	U0.9	U0.6	U0.9	U1.8	U0.9	U0.9
7	1	04/02/89	U1.1	U0.7	U1.1	U2.1	U1.1	U1.1
8	1	04/02/89	U1.8	U1.2	U1.8	U3.6	U1.8	U1.8
9	1	04/02/89	U1.1	U0.7	U1.1	U2.1	U1.1	U1.1
10	1	04/02/89	U1.4	U0.9	U1.4	U2.7	U1.4	U1.4
11	1	04/02/89	U1.4	U0.9	U1.4	U2.7	U1.4	U1.4
12	1	04/03/89	U2.3	U1.5	U2.3	U4.5	U2.3	U2.3
13	1	04/03/89	U1.1	U0.7	U1.1	U2.1	U1.1	U1.1
14	1	04/03/89	U1.2	U0.8	U1.2	U2.4	U1.2	U1.2
15	1	04/03/89	U1.2	U0.8	U1.2	U2.4	U1.2	U1.2
16	1	04/04/89	U1.1	U0.7	U1.1	U2.1	U1.1	U1.1
17	1	04/04/89	U2.3	U1.5	U2.3	U4.5	U2.3	U2.3
18	1	03/28/89	U2.0	U1.3	U2.0	U3.9	U2.0	U2.0
19	1	03/28/89	U2.7	U1.8	U2.7	U5.4	U2.7	U2.7
20	1	03/28/89	U1.5	U1.0	U1.5	U3.0	U1.5	U1.5
21	1	03/28/89	U1.4	U0.9	U1.4	U2.7	U1.4	U1.4
22	1	03/25/89	U1.2	U0.8	U1.2	U2.4	U1.2	U1.2
23	1	03/25/89	U1.2	U0.8	U1.2	U2.4	U1.2	U1.2
24	1	03/25/89	U2.1	U1.4	U2.1	U4.2	U2.1	U2.1
25	1	03/24/89	U0.9	U0.6	U0.9	U1.8	U0.9	U0.9
26	1	03/24/89	U0.9	U0.6	U0.9	U1.8	U0.9	U0.9
26	1R	03/24/89	U1.1	U0.7	U1.1	U2.1	U1.1	U1.1
26	2	03/24/89	U1.1	U0.7	U1.1	U2.1	U1.1	U1.1
26	3	03/24/89	U1.1	U0.7	U1.1	U2.1	U1.1	U1.1
26	Mean	03/24/89	U1.1	U0.7	U1.1	U2.0	U1.1	U1.1
27	1	03/24/89	U1.1	U0.7	U1.1	U2.1	U1.1	U1.1
28	1	03/23/89	U0.9	U0.6	U0.9	U1.8	U0.9	U0.9
29	1	03/24/89	U2.1	U1.4	U2.1	U4.2	U2.1	U2.1
30	1	03/22/89	U1.4	U0.9	U1.4	U2.7	U1.4	U1.4
31	1	03/22/89	U0.9	U0.6	U0.9	U1.8	U0.9	U0.9
32	1	03/23/89	U1.1	U0.7	U1.1	U2.1	U1.1	U1.1
32	1R	03/23/89	U1.1	U0.7	U1.1	U2.1	U1.1	U1.1
32	2	03/23/89	U1.1	U0.7	U1.1	U2.1	U1.1	U1.1
32	3	03/23/89	U1.1	U0.7	U1.1	U2.1	U1.1	U1.1
32	Mean	03/23/89	U1.1	U0.7	U1.1	U2.1	U1.1	U1.1
33	1	03/22/89	U1.2	U0.8	U1.2	U2.4	U1.2	U1.2
34	1	03/23/89	U2.1	U1.4	U2.1	U4.2	U2.1	U2.1
35	1	03/23/89	U2.1	U1.4	U2.1	U4.2	U2.1	U2.1
36	1	03/22/89	U0.9	U0.6	U0.9	U1.8	U0.9	U0.9
37	1	03/21/89	U0.9	U0.6	U0.9	U1.8	U0.9	U0.9
38	1	03/21/89	U0.9	U0.6	U0.9	U1.8	U0.9	U0.9
38	1R	03/21/89	U3.0	U2.0	U3.0	U6.0	U3.0	U3.0
38	2	03/21/89	U3.0	U2.0	U3.0	U6.0	U3.0	U3.0
38	3	03/21/89	U3.0	U2.0	U3.0	U6.0	U3.0	U3.0
38	Mean	03/21/89	U2.6	U1.8	U2.6	U5.3	U2.6	U2.6
39	1	03/21/89	U0.3	U0.2	U0.3	U0.6	U0.3	U0.3
40	1	03/21/89	U0.5	U0.3	U0.5	U0.9	U0.5	U0.5
41	1	03/21/89	U1.1	U0.7	U1.1	U2.1	U1.1	U1.1
42	1	03/21/89	U1.1	U0.7	U1.1	U2.1	U1.1	U1.1
43	1	03/20/89	U1.1	U0.7	U1.1	U2.1	U1.1	U1.1
44	1	03/20/89	U1.2	U0.8	U1.2	U2.4	U1.2	U1.2
44	1R	03/20/89	U1.2	U0.8	U1.2	U2.4	U1.2	U1.2
44	2	03/20/89	U1.2	U0.8	U1.2	U2.4	U1.2	U1.2

TABLE D-23 (Continued)

Station	Sample	Sampling Date	Dieldrin	Alpha-endosulfan	Beta-endosulfan	Endosulfan sulfate	Endrin	Endrin ketone
44	3	03/20/89	U1.4	U0.9	U1.4	U2.7	U1.4	U1.4
44	Mean	03/20/89	U1.3	U0.8	U1.3	U2.5	U1.3	U1.3
45	1	03/20/89	U1.5	U1.0	U1.5	U3.0	U1.5	U1.5
46	1	03/20/89	U1.2	U0.8	U1.2	U2.4	U1.2	U1.2
47	1	03/20/89	U1.1	U0.7	U1.1	U2.1	U1.1	U1.1
48	1	03/19/89	U3.0	U2.0	U3.0	U6.0	U3.0	U3.0
49	1	03/19/89	U3.0	U2.0	U3.0	U6.0	U3.0	U3.0
50	1	03/19/89	U1.1	U0.7	U1.1	U2.1	U1.1	U1.1
SRM1	1	03/29/89	U1.4	24	18	U2.7	U1.4	U1.4
SRM2	1	03/29/89	U1.4	28	22	U2.7	U1.4	U1.4
SRM3	1	03/29/89	U1.4	30	22	U2.7	U1.4	U1.4

TABLE D-23 (Continued)

Station	Sample	Sampling Date	Heptachlor	Heptachlor epoxide	Alpha-HCH	Beta-HCH	Delta-HCH	Gamma-HCH
1	1	03/29/89	U1.5	U1.5	U1.5	U1.5	U1.5	U1.5
2	1	03/29/89	U0.9	U0.9	U0.9	U0.9	U0.9	U0.9
3	1	03/29/89	U0.9	U0.9	U0.9	U0.9	U0.9	U0.9
4	1	03/29/89	U1.8	U1.8	U1.8	U1.8	U1.8	U1.8
5	1	03/29/89	U1.5	U1.5	U1.5	U1.5	U1.5	U1.5
5	1R	03/29/89	U1.5	U1.5	U1.5	U1.5	U1.5	U1.5
5	2	03/29/89	U1.3	U1.3	U1.3	U1.3	U1.3	U1.3
5	3	03/29/89	U1.3	U1.3	U1.3	U1.3	U1.3	U1.3
5	Mean	03/29/89	U1.5	U1.5	U1.5	U1.5	U1.5	U1.5
6	1	03/29/89	U0.6	U0.6	U0.6	U0.6	U0.6	U0.6
7	1	04/02/89	U0.7	U0.7	U0.7	U0.7	U0.7	U0.7
8	1	04/02/89	U1.2	U1.2	U1.2	U1.2	U1.2	U1.2
9	1	04/02/89	U0.7	U0.7	U0.7	U0.7	U0.7	U0.7
10	1	04/02/89	U0.9	U0.9	U0.9	U0.9	U0.9	U0.9
11	1	04/02/89	U0.9	U0.9	U0.9	U0.9	U0.9	U0.9
12	1	04/03/89	U1.5	U1.5	U1.5	U1.5	U1.5	U1.5
13	1	04/03/89	U0.7	U0.7	U0.7	U0.7	U0.7	U0.7
14	1	04/03/89	U0.8	U0.8	U0.8	U0.8	U0.8	U0.8
15	1	04/03/89	U0.8	U0.8	U0.8	U0.8	U0.8	U0.8
16	1	04/04/89	U0.7	U0.7	U0.7	U0.7	U0.7	U0.7
17	1	04/04/89	U1.5	U1.5	U1.5	U1.5	U1.5	U1.5
18	1	03/28/89	U1.3	U1.3	U1.3	U1.3	U1.3	U1.3
19	1	03/28/89	U1.8	U1.8	U1.8	U1.8	U1.8	U1.8
20	1	03/28/89	U1.0	U1.0	U1.0	U1.0	U1.0	U1.0
21	1	03/28/89	U0.9	U0.9	U0.9	U0.9	U0.9	U0.9
22	1	03/25/89	U0.8	U0.8	U0.8	U0.8	U0.8	U0.8
23	1	03/25/89	U0.8	U0.8	U0.8	U0.8	U0.8	U0.8
24	1	03/25/89	U1.4	U1.4	U1.4	U1.4	U1.4	U1.4
25	1	03/24/89	U0.6	U0.6	U0.6	U0.6	U0.6	U0.6
26	1	03/24/89	U0.6	U0.6	U0.6	U0.6	U0.6	U0.6
26	1R	03/24/89	U0.7	U0.7	U0.7	U0.7	U0.7	U0.7
26	2	03/24/89	U0.7	U0.7	U0.7	U0.7	U0.7	U0.7
26	3	03/24/89	U0.7	U0.7	U0.7	U0.7	U0.7	U0.7
26	Mean	03/24/89	U0.7	U0.7	U0.7	U0.7	U0.7	U0.7
27	1	03/24/89	U0.7	U0.7	U0.7	U0.7	U0.7	U0.7
28	1	03/23/89	U0.6	U0.6	U0.6	U0.6	U0.6	U0.6
29	1	03/24/89	U1.4	U1.4	U1.4	U1.4	U1.4	U1.4
30	1	03/22/89	U0.9	U0.9	U0.9	U0.9	U0.9	U0.9
31	1	03/22/89	U0.6	U0.6	U0.6	U0.6	U0.6	U0.6
32	1	03/23/89	U0.7	U0.7	U0.7	U0.7	U0.7	U0.7
32	1R	03/23/89	U0.7	U0.7	U0.7	U0.7	U0.7	U0.7
32	2	03/23/89	U0.7	U0.7	U0.7	U0.7	U0.7	U0.7
32	3	03/23/89	U0.7	U0.7	U0.7	U0.7	U0.7	U0.7
32	Mean	03/23/89	U0.7	U0.7	U0.7	U0.7	U0.7	U0.7
33	1	03/22/89	U0.8	U0.8	U0.8	U0.8	U0.8	U0.8
34	1	03/23/89	U1.4	U1.4	U1.4	U1.4	U1.4	U1.4
35	1	03/23/89	U1.4	U1.4	U1.4	U1.4	U1.4	U1.4
36	1	03/22/89	U0.6	U0.6	U0.6	U0.6	U0.6	U0.6
37	1	03/21/89	U0.6	U0.6	U0.6	U0.6	U0.6	U0.6
38	1	03/21/89	U0.6	U0.6	U0.6	U0.6	U0.6	U0.6
38	1R	03/21/89	U2.0	U2.0	U2.0	U2.0	U2.0	U2.0
38	2	03/21/89	U2.0	U2.0	U2.0	U2.0	U2.0	U2.0
38	3	03/21/89	U2.0	U2.0	U2.0	U2.0	U2.0	U2.0
38	Mean	03/21/89	U1.8	U1.8	U1.8	U1.8	U1.8	U1.8
39	1	03/21/89	U0.2	U0.2	U0.2	U0.2	U0.2	U0.2
40	1	03/21/89	U0.3	U0.3	U0.3	U0.3	U0.3	U0.3
41	1	03/21/89	U0.7	U0.7	U0.7	U0.7	U0.7	U0.7
42	1	03/21/89	U0.7	U0.7	U0.7	U0.7	U0.7	U0.7
43	1	03/20/89	U0.7	U0.7	U0.7	U0.7	U0.7	U0.7
44	1	03/20/89	U0.8	U0.8	U0.8	U0.8	U0.8	U0.8
44	1R	03/20/89	U0.8	U0.8	U0.8	U0.8	U0.8	U0.8
44	2	03/20/89	U0.8	U0.8	U0.8	U0.8	U0.8	U0.8

TABLE D-23 (Continued)

Station	Sample	Sampling Date	Heptachlor	Heptachlor epoxide	Alpha-HCH	Beta-HCH	Delta-HCH	Gamma-HCH
44	3	03/20/89	U0.9	U0.9	U0.9	U0.9	U0.9	U0.9
44	Mean	03/20/89	U0.8	U0.8	U0.8	U0.8	U0.8	U0.8
45	1	03/20/89	U1.0	U1.0	U1.0	U1.0	U1.0	U1.0
46	1	03/20/89	U0.8	U0.8	U0.8	U0.8	U0.8	U0.8
47	1	03/20/89	U0.7	U0.7	U0.7	U0.7	U0.7	U0.7
48	1	03/19/89	U2.0	U2.0	U2.0	U2.0	U2.0	U2.0
49	1	03/19/89	U2.0	U2.0	U2.0	U2.0	U2.0	U2.0
50	1	03/19/89	U0.7	U0.7	U0.7	U0.7	U0.7	U0.7
SRM1	1	03/29/89	U0.9	U0.9	1.0	U0.9	U0.9	1.3
SRM2	1	03/29/89	U0.9	U0.9	1.1	U0.9	U0.9	1.5
SRM3	1	03/29/89	U0.9	U0.9	1.1	U0.9	U0.9	1.6

TABLE D-23 (Continued)

Station	Sample	Sampling Date	PCB-1016	PCB-1242	PCB-1016/1242	PCB-1248	PCB-1254	PCB-1260
1	1	03/29/89	C	C	U30	U30	U30	U30
2	1	03/29/89	C	C	U18	U18	U18	U18
3	1	03/29/89	C	C	U18	U18	U18	U18
4	1	03/29/89	C	C	U36	U36	U30	U36
5	1	03/29/89	C	C	U30	U30	U30	U30
5	1R	03/29/89	C	C	U30	U30	U30	U30
5	2	03/29/89	C	C	U26	U26	U26	U26
5	3	03/29/89	C	C	U26	U26	U26	U26
5	Mean	03/29/89	C	C	U27	U27	U27	U27
6	1	03/29/89	C	C	U12	U12	U12	U12
7	1	04/02/89	C	C	U14	U14	U14	U14
8	1	04/02/89	C	C	U24	U24	U24	U24
9	1	04/02/89	C	C	U14	U14	U14	U14
10	1	04/02/89	C	C	U18	U18	U18	U18
11	1	04/02/89	C	C	U18	U18	U18	U18
12	1	04/03/89	C	C	U30	U30	U30	U30
13	1	04/03/89	C	C	U14	U14	U14	U14
14	1	04/03/89	C	C	U16	U16	U16	U16
15	1	04/03/89	C	C	U16	U16	U16	U16
16	1	04/04/89	C	C	U14	U14	U14	U14
17	1	04/04/89	C	C	U30	U30	U30	U30
18	1	03/28/89	C	C	U26	U26	U26	U26
19	1	03/28/89	C	C	U36	U36	U36	U36
20	1	03/28/89	C	C	U20	U20	U20	U20
21	1	03/28/89	C	C	U18	U18	30	U18
22	1	03/25/89	C	C	U16	U16	U16	U16
23	1	03/25/89	C	C	U16	U16	U16	U16
24	1	03/25/89	C	C	U28	U28	U28	U28
25	1	03/24/89	C	C	U12	U12	U12	U12
26	1	03/24/89	C	C	U12	U12	U12	U12
26	1R	03/24/89	C	C	U14	U14	U14	U14
26	2	03/24/89	C	C	U14	U14	U14	U14
26	3	03/24/89	C	C	U14	U14	U14	U14
26	Mean	03/24/89	C	C	U14	U14	U14	U14
27	1	03/24/89	C	C	U14	U14	U14	U14
28	1	03/23/89	C	C	U12	U12	U12	U12
29	1	03/24/89	C	C	U28	U28	E6.0	U28
30	1	03/22/89	C	C	U18	U18	E14	U18
31	1	03/22/89	C	C	U12	U12	E4.0	U12
32	1	03/23/89	C	C	U14	U14	E6.7	U14
32	1R	03/23/89	C	C	U14	U14	E7.6	U14
32	2	03/23/89	C	C	U14	U14	E8.5	U14
32	3	03/23/89	C	C	U14	U14	E5.5	U14
32	Mean	03/23/89	C	C	U14	U14	E7.0	U14
33	1	03/22/89	C	C	U16	U16	40	U16
34	1	03/23/89	C	C	U28	U28	49	U28
35	1	03/23/89	C	C	U28	U28	15	U28
36	1	03/22/89	C	C	U12	U12	U12	U12
37	1	03/21/89	C	C	U12	U12	U12	U12
38	1	03/21/89	C	C	U12	U12	16	U12
38	1R	03/21/89	C	C	U40	U40	E22	U40
38	2	03/21/89	C	C	U40	U40	E22	U40
38	3	03/21/89	C	C	U40	U40	E28	U40
38	Mean	03/21/89	C	C	U35	U35	E23	U35
39	1	03/21/89	C	C	U4.0	U4.0	U4.0	U4.0
40	1	03/21/89	C	C	U6.0	U6.0	10	U6.0
41	1	03/21/89	C	C	U14	U14	U14	U14
42	1	03/21/89	C	C	U14	U14	U14	U14
43	1	03/20/89	C	C	U14	U14	U14	U14
44	1	03/20/89	C	C	U16	U16	U16	U16
44	1R	03/20/89	C	C	U16	U16	U16	U16
44	2	03/20/89	C	C	U16	U16	U16	U16

TABLE D-23. (Continued)

Station	Sample	Sampling Date	PCB-1016	PCB-1242	PCB-1016/1242	PCB-1248	PCB-1254	PCB-1260
44	3	03/20/89	C	C	U18	U18	U18	U18
44	Mean	03/20/89	C	C	U17	U17	U17	U17
45	1	03/20/89	C	C	U20	U20	U20	U20
46	1	03/20/89	C	C	U20	U20	U20	U20
47	1	03/20/89	C	C	U14	U14	U14	U14
48	1	03/19/89	C	C	U40	U40	E18	U40
49	1	03/19/89	C	C	U40	U40	E22	U40
50	1	03/19/89	C	C	U14	U14	U14	U14
SRM1	1	03/29/89	C	C	U18	U18	100	U18
SRM2	1	03/29/89	C	C	U18	U18	120	U18
SRM3	1	03/29/89	C	C	U18	U18	130	U18

TABLE D-23. (Continued)

Station	Sample	Sampling Date	Methoxy-chlor	Toxaphene
1	1	03/29/89	U6.0	U220
2	1	03/29/89	U3.6	U130
3	1	03/29/89	U3.6	U130
4	1	03/29/89	U7.2	U270
5	1	03/29/89	U6.0	U220
5	1R	03/29/89	U6.0	U220
5	2	03/29/89	U5.2	U190
5	3	03/29/89	U5.2	U190
5	Mean	03/29/89	U5.5	U200
6	1	03/29/89	U2.4	U90
7	1	04/02/89	U2.8	U110
8	1	04/02/89	U4.8	U180
9	1	04/02/89	U2.8	U110
10	1	04/02/89	U3.6	U140
11	1	04/02/89	U3.6	U140
12	1	04/03/89	U6.0	U230
13	1	04/03/89	U2.8	U110
14	1	04/03/89	U3.2	U120
15	1	04/03/89	U3.2	U120
16	1	04/04/89	U2.8	U110
17	1	04/04/89	U6.0	U230
18	1	03/28/89	U5.2	U190
19	1	03/28/89	U7.2	U270
20	1	03/28/89	U4.0	U150
21	1	03/28/89	U3.6	U130
22	1	03/25/89	U3.2	U120
23	1	03/25/89	U3.2	U120
24	1	03/25/89	U5.6	U210
25	1	03/24/89	U2.4	U90
26	1	03/24/89	U2.4	U90
26	1R	03/24/89	U2.8	U110
26	2	03/24/89	U2.8	U110
26	3	03/24/89	U2.8	U110
26	Mean	03/24/89	U2.7	U110
27	1	03/24/89	U2.8	U110
28	1	03/23/89	U2.4	U90
29	1	03/24/89	U5.6	U210
30	1	03/22/89	U3.6	U130
31	1	03/22/89	U2.4	U90
32	1	03/23/89	U2.8	U110
32	1R	03/23/89	U2.8	U110
32	2	03/23/89	U2.8	U110
32	3	03/23/89	U2.8	U110
32	Mean	03/23/89	U2.8	U110
33	1	03/22/89	U3.2	U120
34	1	03/23/89	U5.6	U210
35	1	03/23/89	U5.6	U210
36	1	03/22/89	U2.4	U90
37	1	03/21/89	U2.4	U90
38	1	03/21/89	U2.4	U90
38	1R	03/21/89	U8.0	U300
38	2	03/21/89	U8.0	U300
38	3	03/21/89	U8.0	U300
38	Mean	03/21/89	U7.1	U170
39	1	03/21/89	U0.8	U30
40	1	03/21/89	U1.2	U45
41	1	03/21/89	U2.8	U100
42	1	03/21/89	U2.8	U100
43	1	03/20/89	U2.8	U100
44	1	03/20/89	U3.2	U120
44	1R	03/20/89	U3.2	U120
44	2	03/20/89	U3.2	U120

TABLE D-23 (Continued)

Station	Sample	Sampling Date	Methoxy-chlor	Toxaphene
44	3	03/20/89	U3.6	U140
44	Mean	03/20/89	U3.3	U130
45	1	03/20/89	U4.0	U150
46	1	03/20/89	U3.2	U120
47	1	03/20/89	U2.8	U100
48	1	03/19/89	U8.0	U300
49	1	03/19/89	U8.0	U300
50	1	03/19/89	U2.8	U100
SRM1	1	03/29/89	U3.6	U130
SRM2	1	03/29/89	U3.6	U130
SRM3	1	03/29/89	U3.6	U130

APPENDIX E

1989 AMPHIPOD AND MICROTOX BIOASSAY DATA

TABLES

Number		Page
E-1	1989 Amphipod bioassay data by station	E-1
E-2	1989 Microtox bioassay data by station	E-6

TABLE E-1. 1989 AMPHIPOD BIOASSAY DATA BY STATION

Station	Sample	Reference Toxicant Concen-tration	Replicate	Number Tested	Number Survivors	Number Emerged	Percent Mortality	Percent Emergence	Data Qualifier[a]	Analysis Start Date
1	1	N/A	1	20	20	0	0.00	0.00		04/11/89
1	1	N/A	2	20	19	0	5.00	0.00		04/11/89
1	1	N/A	3	20	19	0	5.00	0.00		04/11/89
1	1	N/A	4	20	19	0	5.00	0.00		04/11/89
1	1	N/A	5	20	20	0	0.00	0.00		04/11/89
2	1	N/A	1	20	15	0	25.00	0.00		04/11/89
2	1	N/A	2	20	15	0	25.00	0.00		04/11/89
2	1	N/A	3	20	20	0	0.00	0.00		04/11/89
2	1	N/A	4	20	15	0	25.00	0.00		04/11/89
2	1	N/A	5	20	18	0	10.00	0.00		04/11/89
3	1	N/A	1	20	18	0	10.00	0.00		04/11/89
3	1	N/A	2	20	20	0	0.00	0.00		04/11/89
3	1	N/A	3	20	18	14	10.00	7.00		04/11/89
3	1	N/A	4	20	18	0	10.00	0.00		04/11/89
3	1	N/A	5	20	14	0	30.00	0.00		04/11/89
4	1	N/A	1	20	16	0	20.00	0.00		04/11/89
4	1	N/A	2	20	20	0	0.00	0.00		04/11/89
4	1	N/A	3	20	20	0	0.00	0.00		04/11/89
4	1	N/A	4	20	19	0	5.00	0.00		04/11/89
4	1	N/A	5	20	20	0	0.00	0.00		04/11/89
5	1	N/A	1	20	19	0	5.00	0.00		04/11/89
5	1	N/A	2	20	19	0	5.00	0.00		04/11/89
5	1	N/A	3	20	20	0	0.00	0.00		04/11/89
5	1	N/A	4	20	19	0	5.00	0.00		04/11/89
5	1	N/A	5	20	19	10	5.00	5.00		04/11/89
6	1	N/A	1	20	18	0	10.00	0.00		04/11/89
6	1	N/A	2	20	18	0	10.00	0.00		04/11/89
6	1	N/A	3	20	16	0	20.00	0.00		04/11/89
6	1	N/A	4	20	16	0	20.00	0.00		04/11/89
6	1	N/A	5	20	19	0	5.00	0.00		04/11/89
7	1	N/A	1	20	19	0	5.00	0.00		04/11/89
7	1	N/A	2	20	17	10	15.00	5.00		04/11/89
7	1	N/A	3	20	20	0	0.00	0.00		04/11/89
7	1	N/A	4	20	18	0	10.00	0.00		04/11/89
7	1	N/A	5	20	17	0	15.00	0.00		04/11/89
8	1	N/A	1	20	20	6	0.00	3.00		04/11/89
8	1	N/A	2	20	18	0	10.00	0.00		04/11/89
8	1	N/A	3	20	17	0	15.00	0.00		04/11/89
8	1	N/A	4	20	17	0	15.00	0.00		04/11/89
8	1	N/A	5	20	18	0	10.00	0.00		04/11/89
9	1	N/A	1	20	20	0	0.00	0.00		04/11/89
9	1	N/A	2	20	20	0	0.00	0.00		04/11/89
9	1	N/A	3	20	20	0	0.00	0.00		04/11/89
9	1	N/A	4	20	20	0	0.00	0.00		04/11/89
9	1	N/A	5	20	20	0	0.00	0.00		04/11/89
10	1	N/A	1	20	20	0	0.00	0.00		04/11/89
10	1	N/A	2	20	19	0	5.00	0.00		04/11/89
10	1	N/A	3	20	18	0	10.00	0.00		04/11/89
10	1	N/A	4	20	17	4	15.00	2.00		04/11/89
10	1	N/A	5	20	18	0	10.00	0.00		04/11/89
11	1	N/A	1	20	17	0	15.00	0.00		04/11/89
11	1	N/A	2	20	17	0	15.00	0.00		04/11/89
11	1	N/A	3	20	16	1	20.00	0.50		04/11/89
11	1	N/A	4	20	18	0	10.00	0.00		04/11/89
11	1	N/A	5	20	18	0	10.00	0.00		04/11/89
12	1	N/A	1	20	17	0	15.00	0.00		04/11/89
12	1	N/A	2	20	18	1	10.00	0.50		04/11/89
12	1	N/A	3	20	20	0	0.00	0.00		04/11/89
12	1	N/A	4	20	18	0	10.00	0.00		04/11/89
12	1	N/A	5	20	20	0	0.00	0.00		04/11/89

TABLE E-1. (Continued)

Station	Sample	Reference Toxicant Concen-tration	Replicate	Number Tested	Number Survivors	Number Emerged	Percent Mortality	Percent Emergence	Data Qualifier[a]	Analysis Start Date
13	1	N/A	1	20	20	0	0.00	0.00		04/11/89
13	1	N/A	2	20	18	0	10.00	0.00		04/11/89
13	1	N/A	3	20	17	0	15.00	0.00		04/11/89
13	1	N/A	4	20	20	0	0.00	0.00		04/11/89
13	1	N/A	5	20	18	0	10.00	0.00		04/11/89
14	1	N/A	1	20	14	0	30.00	0.00		04/11/89
14	1	N/A	2	20	18	0	10.00	0.00		04/11/89
14	1	N/A	3	20	19	0	5.00	0.00		04/11/89
14	1	N/A	4	20	19	0	5.00	0.00		04/11/89
14	1	N/A	5	20	17	0	15.00	0.00		04/11/89
15	1	N/A	1	20	19	0	5.00	0.00		04/11/89
15	1	N/A	2	20	17	0	15.00	0.00		04/11/89
15	1	N/A	3	20	19	0	5.00	0.00		04/11/89
15	1	N/A	4	20	20	0	0.00	0.00		04/11/89
15	1	N/A	5	20	17	7	15.00	3.50		04/11/89
16	1	N/A	1	20	20	0	0.00	0.00		04/11/89
16	1	N/A	2	20	20	0	0.00	0.00		04/11/89
16	1	N/A	3	20	20	0	0.00	0.00		04/11/89
16	1	N/A	4	20	20	0	0.00	0.00		04/11/89
16	1	N/A	5	20	20	0	0.00	0.00		04/11/89
17	1	N/A	1	20	20	0	0.00	0.00		04/11/89
17	1	N/A	2	20	19	0	5.00	0.00		04/11/89
17	1	N/A	3	20	18	0	10.00	0.00		04/11/89
17	1	N/A	4	20	20	0	0.00	0.00		04/11/89
17	1	N/A	5	20	20	0	0.00	0.00		04/11/89
18	1	N/A	1	20	20	0	0.00	0.00		04/11/89
18	1	N/A	2	20	19	0	5.00	0.00		04/11/89
18	1	N/A	3	20	20	0	0.00	0.00		04/11/89
18	1	N/A	4	20	19	0	5.00	0.00		04/11/89
18	1	N/A	5	20	20	0	0.00	0.00		04/11/89
19	1	N/A	1	20	18	0	10.00	0.00		04/11/89
19	1	N/A	2	20	19	4	5.00	2.00		04/11/89
19	1	N/A	3	20	18	0	10.00	0.00		04/11/89
19	1	N/A	4	20	20	0	0.00	0.00		04/11/89
19	1	N/A	5	20	20	0	0.00	0.00		04/11/89
20	1	N/A	1	20	20	0	0.00	0.00		04/11/89
20	1	N/A	2	20	15	0	25.00	0.00		04/11/89
20	1	N/A	3	20	3	3	85.00	1.50		04/11/89
20	1	N/A	4	20	15	0	25.00	0.00		04/11/89
20	1	N/A	5	20	20	0	0.00	0.00		04/11/89
21	1	N/A	1	20	20	0	0.00	0.00		04/11/89
21	1	N/A	2	20	19	12	5.00	6.00		04/11/89
21	1	N/A	3	20	20	0	0.00	0.00		04/11/89
21	1	N/A	4	20	18	0	10.00	0.00		04/11/89
21	1	N/A	5	20	17	10	15.00	5.00		04/11/89
22	1	N/A	1	20	19	0	5.00	0.00		03/30/89
22	1	N/A	2	20	20	2	0.00	1.00		03/30/89
22	1	N/A	3	20	20	0	0.00	0.00		03/30/89
22	1	N/A	4	20	19	0	5.00	0.00		03/30/89
22	1	N/A	5	20	20	0	0.00	0.00		03/30/89
23	1	N/A	1	20	20	0	0.00	0.00		03/30/89
23	1	N/A	2	20	18	0	10.00	0.00		03/30/89
23	1	N/A	3	20	20	0	0.00	0.00		03/30/89
23	1	N/A	4	20	19	0	5.00	0.00		03/30/89
23	1	N/A	5	20	20	0	0.00	0.00		03/30/89
24	1	N/A	1	20	6	0	70.00	0.00		03/30/89
24	1	N/A	2	20	16	4	20.00	2.00		03/30/89
24	1	N/A	3	20	4	0	80.00	0.00		03/30/89
24	1	N/A	4	20	16	0	20.00	0.00		03/30/89
24	1	N/A	5	20	20	0	0.00	0.00		03/30/89
25	1	N/A	1	20	18	0	10.00	0.00		03/30/89

TABLE E-1. (Continued)

Station	Sample	Reference Toxicant Concen-tration	Replicate	Number Tested	Number Survivors	Number Emerged	Percent Mortality	Percent Emergence	Data Qualifier[a]	Analysis Start Date
25	1	N/A	2	20	18	0	10.00	0.00		03/30/89
25	1	N/A	3	20	20	0	0.00	0.00		03/30/89
25	1	N/A	4	20	20	0	0.00	0.00		03/30/89
25	1	N/A	5	20	20	0	0.00	0.00		03/30/89
26	1	N/A	1	20	18	0	10.00	0.00		03/30/89
26	1	N/A	2	20	18	0	10.00	0.00		03/30/89
26	1	N/A	3	20	20	0	0.00	0.00		03/30/89
26	1	N/A	4	20	20	0	0.00	0.00		03/30/89
26	1	N/A	5	20	16	0	20.00	0.00		03/30/89
27	1	N/A	1	20	19	0	5.00	0.00		03/30/89
27	1	N/A	2	20	20	0	0.00	0.00		03/30/89
27	1	N/A	3	20	18	0	10.00	0.00		03/30/89
27	1	N/A	4	20	20	0	0.00	0.00		03/30/89
27	1	N/A	5	20	20	0	0.00	0.00		03/30/89
28	1	N/A	1	20	19	0	5.00	0.00	E	03/30/89
28	1	N/A	2	20	18	0	10.00	0.00	E	03/30/89
28	1	N/A	3	20	20	0	0.00	0.00	E	03/30/89
28	1	N/A	4	20	19	0	5.00	0.00	E	03/30/89
28	1	N/A	5	20	19	0	5.00	0.00	E	03/30/89
29	1	N/A	1	20	16	0	20.00	0.00		03/30/89
29	1	N/A	2	20	18	0	10.00	0.00		03/30/89
29	1	N/A	3	20	19	0	5.00	0.00		03/30/89
29	1	N/A	4	20	19	0	5.00	0.00		03/30/89
29	1	N/A	5	20	20	0	0.00	0.00		03/30/89
30	1	N/A	1	20	18	20	10.00	10.00		03/25/89
30	1	N/A	2	20	17	0	15.00	0.00		03/25/89
30	1	N/A	3	20	20	0	0.00	0.00		03/25/89
30	1	N/A	4	20	19	0	5.00	0.00		03/25/89
30	1	N/A	5	20	10	69	50.00	34.50		03/25/89
31	1	N/A	1	20	18	0	10.00	0.00		03/25/89
31	1	N/A	2	20	19	10	5.00	5.00		03/25/89
31	1	N/A	3	20	17	0	15.00	0.00		03/25/89
31	1	N/A	4	20	20	0	0.00	0.00		03/25/89
31	1	N/A	5	20	20	0	0.00	0.00		03/25/89
32	1	N/A	1	20	20	0	0.00	0.00		03/30/89
32	1	N/A	2	20	20	0	0.00	0.00		03/30/89
32	1	N/A	3	20	20	0	0.00	0.00		03/30/89
32	1	N/A	4	20	20	0	0.00	0.00		03/30/89
32	1	N/A	5	20	18	0	10.00	0.00		03/30/89
33	1	N/A	1	20	20	0	0.00	0.00		03/25/89
33	1	N/A	2	20	18	0	10.00	0.00		03/25/89
33	1	N/A	3	20	18	16	10.00	8.00		03/25/89
33	1	N/A	4	20	18	11	10.00	5.50		03/25/89
33	1	N/A	5	20	18	6	10.00	3.00		03/25/89
34	1	N/A	1	20	18	0	10.00	0.00		03/30/89
34	1	N/A	2	20	20	0	0.00	0.00		03/30/89
34	1	N/A	3	20	18	0	10.00	0.00		03/30/89
34	1	N/A	4	20	16	0	20.00	0.00		03/30/89
34	1	N/A	5	20	17	0	15.00	0.00		03/30/89
35	1	N/A	1	20	2	0	90.00	0.00		03/30/89
35	1	N/A	2	20	6	0	70.00	0.00		03/30/89
35	1	N/A	3	20	18	0	10.00	0.00		03/30/89
35	1	N/A	4	20	14	0	30.00	0.00		03/30/89
35	1	N/A	5	20	16	0	20.00	0.00		03/30/89
36	1	N/A	1	20	20	0	0.00	0.00		03/25/89
36	1	N/A	2	20	20	0	0.00	0.00		03/25/89
36	1	N/A	3	20	18	0	10.00	0.00		03/25/89
36	1	N/A	4	20	18	0	10.00	0.00		03/25/89
36	1	N/A	5	20	20	0	0.00	0.00		03/25/89
37	1	N/A	1	20	20	0	0.00	0.00		03/25/89
37	1	N/A	2	20	20	0	0.00	0.00		03/25/89

TABLE E-1 (Continued)

Station	Sample	Reference Toxicant Concen-tration	Replicate	Number Tested	Number Survivors	Number Emerged	Percent Mortality	Percent Emergence	Data Qualifier[a]	Analysis Start Date
37	1	N/A	3	20	20	0	0.00	0.00		03/25/89
37	1	N/A	4	20	20	0	0.00	0.00		03/25/89
37	1	N/A	5	20	20	0	0.00	0.00		03/25/89
38	1	N/A	1	20	17	0	15.00	0.00		03/25/89
38	1	N/A	2	20	7	0	65.00	0.00		03/25/89
38	1	N/A	3	20	15	0	25.00	0.00		03/25/89
38	1	N/A	4	20	17	0	15.00	0.00		03/25/89
38	1	N/A	5	20	20	0	0.00	0.00		03/25/89
39	1	N/A	1	20	20	0	0.00	0.00		03/25/89
39	1	N/A	2	20	19	0	5.00	0.00		03/25/89
39	1	N/A	3	20	20	0	0.00	0.00		03/25/89
39	1	N/A	4	20	19	0	5.00	0.00		03/25/89
39	1	N/A	5	20	20	0	0.00	0.00		03/25/89
40	1	N/A	1	20	20	0	0.00	0.00		03/25/89
40	1	N/A	2	20	18	0	10.00	0.00		03/25/89
40	1	N/A	3	20	19	0	5.00	0.00		03/25/89
40	1	N/A	4	20	19	0	5.00	0.00		03/25/89
40	1	N/A	5	20	18	0	10.00	0.00		03/25/89
41	1	N/A	1	20	20	0	0.00	0.00		03/25/89
41	1	N/A	2	20	18	0	10.00	0.00		03/25/89
41	1	N/A	3	20	18	0	10.00	0.00		03/25/89
41	1	N/A	4	20	18	0	10.00	0.00		03/25/89
41	1	N/A	5	20	19	0	5.00	0.00		03/25/89
42	1	N/A	1	20	20	0	0.00	0.00		03/25/89
42	1	N/A	2	20	19	0	5.00	0.00		03/25/89
42	1	N/A	3	20	19	0	5.00	0.00		03/25/89
42	1	N/A	4	20	20	0	0.00	0.00		03/25/89
42	1	N/A	5	20	20	0	0.00	0.00		03/25/89
43	1	N/A	1	20	20	0	0.00	0.00		03/25/89
43	1	N/A	2	20	18	0	10.00	0.00		03/25/89
43	1	N/A	3	20	20	0	0.00	0.00		03/25/89
43	1	N/A	4	20	20	3	0.00	1.50		03/25/89
43	1	N/A	5	20	20	0	0.00	0.00		03/25/89
44	1	N/A	1	20	17	0	15.00	0.00		03/25/89
44	1	N/A	2	20	18	0	10.00	0.00		03/25/89
44	1	N/A	3	20	20	0	0.00	0.00		03/25/89
44	1	N/A	4	20	17	0	15.00	0.00		03/25/89
44	1	N/A	5	20	18	0	10.00	0.00		03/25/89
45	1	N/A	1	20	18	7	10.00	3.50		03/25/89
45	1	N/A	2	20	20	0	0.00	0.00		03/25/89
45	1	N/A	3	20	19	0	5.00	0.00		03/25/89
45	1	N/A	4	20	18	0	10.00	0.00		03/25/89
45	1	N/A	5	20	19	3	5.00	1.50		03/25/89
46	1	N/A	1	20	18	0	10.00	0.00		03/25/89
46	1	N/A	2	20	20	0	0.00	0.00		03/25/89
46	1	N/A	3	20	19	0	5.00	0.00		03/25/89
46	1	N/A	4	20	20	0	0.00	0.00		03/25/89
46	1	N/A	5	20	20	0	0.00	0.00		03/25/89
47	1	N/A	1	20	20	10	0.00	5.00		03/25/89
47	1	N/A	2	20	19	0	5.00	0.00		03/25/89
47	1	N/A	3	20	19	0	5.00	0.00		03/25/89
47	1	N/A	4	20	20	0	0.00	0.00		03/25/89
47	1	N/A	5	20	20	0	0.00	0.00		03/25/89
48	1	N/A	1	20	18	0	10.00	0.00		03/25/89
48	1	N/A	2	20	20	0	0.00	0.00		03/25/89
48	1	N/A	3	20	18	0	10.00	0.00		03/25/89
48	1	N/A	4	20	20	0	0.00	0.00		03/25/89
48	1	N/A	5	20	20	0	0.00	0.00		03/25/89
49	1	N/A	1	20	20	0	0.00	0.00		03/25/89
49	1	N/A	2	20	19	1	5.00	0.50		03/25/89
49	1	N/A	3	20	19	0	5.00	0.00		03/25/89

TABLE E-1. (Continued)

Station	Sample	Reference Toxicant Concen-tration	Replicate	Number Tested	Number Survivors	Number Emerged	Percent Mortality	Percent Emergence	Data Qualifier[a]	Analysis Start Date
49	1	N/A	4	20	17	0	15.00	0.00		03/25/89
49	1	N/A	5	20	20	0	0.00	0.00		03/25/89
50	1	N/A	1	20	18	0	10.00	0.00		03/25/89
50	1	N/A	2	20	20	0	0.00	0.00		03/25/89
50	1	N/A	3	20	18	0	10.00	0.00		03/25/89
50	1	N/A	4	20	20	0	0.00	0.00		03/25/89
50	1	N/A	5	20	20	0	0.00	0.00		03/25/89
WBC1	1	N/A	1	20	20	0	0.00	0.00		03/25/89
WBC1	1	N/A	2	20	20	0	0.00	0.00		03/25/89
WBC1	1	N/A	3	20	19	0	5.00	0.00		03/25/89
WBC1	1	N/A	4	20	20	0	0.00	0.00		03/25/89
WBC1	1	N/A	5	20	20	0	0.00	0.00		03/25/89
WBC2	1	N/A	1	20	20	0	0.00	0.00		03/30/89
WBC2	1	N/A	2	20	20	0	0.00	0.00		03/30/89
WBC2	1	N/A	3	20	20	0	0.00	0.00		03/30/89
WBC2	1	N/A	4	20	20	0	0.00	0.00		03/30/89
WBC2	1	N/A	5	20	20	0	0.00	0.00		03/30/89
WBC3	1	N/A	1	20	20	0	0.00	0.00		04/11/89
WBC3	1	N/A	2	20	20	0	0.00	0.00		04/11/89
WBC3	1	N/A	3	20	19	0	5.00	0.00		04/11/89
WBC3	1	N/A	4	20	20	0	0.00	0.00		04/11/89
WBC3	1	N/A	5	20	20	0	0.00	0.00		04/11/89
P3	1	0.5	1	10	9	N/A	10.00	N/A P3	E	03/25/89
P3	1	1.0	2	10	9	N/A	10.00	N/A P3	E	03/25/89
P3	1	1.5	3	10	5	N/A	50.00	N/A P3	E	03/25/89
P3	1	2.0	4	10	1	N/A	90.00	N/A P3	E	03/25/89
P3	1	3.0	5	10	0	N/A	100.00	N/A P3	E	03/25/89
P3	2	0.5	1	10	10	N/A	0.00	N/A P3	E	03/30/89
P3	2	1.0	2	10	9	N/A	10.00	N/A P3	E	03/30/89
P3	2	1.5	3	10	4	N/A	60.00	N/A P3	E	03/30/89
P3	2	2.0	4	10	0	N/A	100.00	N/A P3	E	03/30/89
P3	2	3.0	5	10	0	N/A	100.00	N/A P3	E	03/30/89
P3	3	0.5	1	10	10	N/A	0.00	N/A P3	E	04/04/89
P3	3	1.0	2	10	8	N/A	20.00	N/A P3	E	04/04/89
P3	3	1.5	3	10	3	N/A	70.00	N/A P3	E	04/04/89
P3	3	2.0	4	10	0	N/A	100.00	N/A P3	E	04/04/89
P3	3	3.0	5	10	0	N/A	100.00	N/A P3	E	04/04/89

[a] E = Estimate.

TABLE E-2 1989 MICROTOX BIOASSAY DATA BY STATION

Station	Relative Concen- tration (percent)	Reference Toxicant Concen- tration	Rep	Gamma Effect	Percent Decrease in Luminescence	Data Qualifier	Analysis Start Date
1	6.250		1	-0.090	-9.89		04/07/89
1	12.500		1	-0.155	-18.34		04/07/89
1	25.000		1	-0.179	-21.80		04/07/89
1	50.000		1	-0.180	-21.95		04/07/89
1	6.250		2	-0.099	-10.99		04/07/89
1	12.500		2	-0.141	-16.41		04/07/89
1	25.000		2	-0.182	-22.25		04/07/89
1	50.000		2	-0.194	-24.07		04/07/89
2	6.250		1	-0.107	-11.98		04/07/89
2	12.500		1	-0.151	-17.79		04/07/89
2	25.000		1	-0.152	-17.92		04/07/89
2	50.000		1	-0.147	-17.23		04/07/89
2	6.250		2	-0.056	-5.93		04/07/89
2	12.500		2	-0.144	-16.82		04/07/89
2	25.000		2	-0.147	-17.23		04/07/89
2	50.000		2	-0.158	-18.76		04/07/89
3	6.250		1	-0.102	-11.36		04/07/89
3	12.500		1	-0.136	-15.74		04/07/89
3	25.000		1	-0.156	-18.48		04/07/89
3	50.000		1	-0.121	-13.77		04/07/89
3	6.250		2	-0.089	-9.77		04/07/89
3	12.500		2	-0.155	-18.34		04/07/89
3	25.000		2	-0.160	-19.05		04/07/89
3	50.000		2	-0.129	-14.81		04/07/89
4	6.250		1	-0.085	-9.29		04/07/89
4	12.500		1	-0.082	-8.93		04/07/89
4	25.000		1	-0.154	-18.20		04/07/89
4	50.000		1	-0.160	-19.05		04/07/89
4	6.250		2	-0.077	-8.34		04/07/89
4	12.500		2	-0.110	-12.36		04/07/89
4	25.000		2	-0.124	-14.16		04/07/89
4	50.000		2	-0.129	-14.81		04/07/89
5	6.250		1	-0.113	-12.74		04/07/89
5	12.500		1	-0.144	-16.82		04/07/89
5	25.000		1	-0.199	-24.84		04/07/89
5	50.000		1	-0.196	-24.38		04/07/89
5	6.250		2	-0.108	-12.11		04/07/89
5	12.500		2	-0.138	-16.01		04/07/89
5	25.000		2	-0.156	-18.48		04/07/89
5	50.000		2	-0.147	-17.23		04/07/89
6	6.250		1	-0.127	-14.55		04/07/89
6	12.500		1	-0.145	-16.96		04/07/89
6	25.000		1	-0.182	-22.25		04/07/89
6	50.000		1	-0.167	-20.05		04/07/89
6	6.250		2	-0.131	-15.07		04/07/89
6	12.500		2	-0.152	-17.92		04/07/89
6	25.000		2	-0.171	-20.63		04/07/89
6	50.000		2	-0.156	-18.48		04/07/89
7	6.250		1	-0.123	-14.03		04/12/89
7	12.500		1	-0.149	-17.51		04/12/89
7	25.000		1	-0.144	-16.82		04/12/89
7	50.000		1	-0.061	-6.50		04/12/89
7	6.250		2	-0.103	-11.48		04/12/89
7	12.500		2	-0.131	-15.07		04/12/89
7	25.000		2	-0.128	-14.68		04/12/89
7	50.000		2	-0.056	-5.93		04/12/89
8	6.250		1	-0.120	-13.64		04/12/89
8	12.500		1	-0.137	-15.87		04/12/89
8	25.000		1	-0.160	-19.05		04/12/89

TABLE E-2. (Continued)

Station	Relative Concen-tration (percent)	Reference Toxicant Concen-tration	Rep	Gamma Effect	Percent Decrease in Luminescence	Data Qualifier	Analysis Start Date
8	50.000		1	-0.135	-15.61		04/12/89
8	6.250		2	-0.098	-10.86		04/12/89
8	12.500		2	-0.131	-15.07		04/12/89
8	25.000		2	-0.139	-16.14		04/12/89
8	50.000		2	-0.144	-16.82		04/12/89
9	6.250		1	-0.110	-12.36		04/12/89
9	12.500		1	-0.123	-14.03		04/12/89
9	25.000		1	-0.137	-15.87		04/12/89
9	50.000		1	-0.062	-6.61		04/12/89
9	6.250		2	-0.098	-10.86		04/12/89
9	12.500		2	-0.123	-14.03		04/12/89
9	25.000		2	-0.102	-11.36		04/12/89
9	50.000		2	-0.095	-10.50		04/12/89
10	6.250		1	-0.092	-10.13		04/12/89
10	12.500		1	-0.139	-16.14		04/12/89
10	25.000		1	-0.101	-11.23		04/12/89
10	50.000		1	-0.054	-5.71		04/12/89
10	6.250		2	-0.068	-7.30		04/12/89
10	12.500		2	-0.108	-12.11		04/12/89
10	25.000		2	-0.116	-13.12		04/12/89
10	50.000		2	-0.031	-3.20		04/12/89
11	6.250		1	-0.097	-10.74		04/12/89
11	12.500		1	-0.144	-16.82		04/12/89
11	25.000		1	-0.231	-30.04		04/12/89
11	50.000		1	-0.200	-25.00		04/12/89
11	6.250		2	-0.094	-10.38		04/12/89
11	12.500		2	-0.163	-19.47		04/12/89
11	25.000		2	-0.191	-23.61		04/12/89
11	50.000		2	-0.200	-25.00		04/12/89
12	6.250		1	-0.082	-8.93		04/12/89
12	12.500		1	-0.117	-13.25		04/12/89
12	25.000		1	-0.171	-20.63		04/12/89
12	50.000		1	-0.149	-17.51		04/12/89
12	6.250		2	-0.087	-9.53		04/12/89
12	12.500		2	-0.134	-15.47		04/12/89
12	25.000		2	-0.182	-22.25		04/12/89
12	50.000		2	-0.152	-17.92		04/12/89
13	6.250		1	-0.163	-19.47		04/12/89
13	12.500		1	-0.173	-20.92		04/12/89
13	25.000		1	-0.170	-20.48		04/12/89
13	50.000		1	-0.147	-17.23		04/12/89
13	6.250		2	-0.130	-14.94		04/12/89
13	12.500		2	-0.162	-19.33		04/12/89
13	25.000		2	-0.159	-18.91		04/12/89
13	50.000		2	-0.126	-14.42		04/12/89
14	6.250		1	-0.116	-13.12		04/13/89
14	12.500		1	-0.136	-15.74		04/13/89
14	25.000		1	-0.142	-16.55		04/13/89
14	50.000		1	-0.130	-14.94		04/13/89
14	6.250		2	-0.137	-15.87		04/13/89
14	12.500		2	-0.185	-22.70		04/13/89
14	25.000		2	-0.165	-19.76		04/13/89
14	50.000		2	-0.142	-16.55		04/13/89
15	6.250		1	-0.118	-13.38		04/13/89
15	12.500		1	-0.128	-14.68		04/13/89
15	25.000		1	-0.107	-11.98		04/13/89
15	50.000		1	-0.020	-2.04		04/13/89
15	6.250		2	-0.129	-14.81		04/13/89
15	12.500		2	-0.155	-18.34		04/13/89
15	25.000		2	-0.128	-14.68		04/13/89

TABLE E-2 (Continued)

Station	Relative Concen-tration (percent)	Reference Toxicant Concen-tration	Rep	Gamma Effect	Percent Decrease in Luminescence	Data Qualifier	Analysis Start Date
15	50.000		2	-0.045	-4.71		04/13/89
16	6.250		1	-0.114	-12.87		04/13/89
16	12.500		1	-0.124	-14.16		04/13/89
16	25.000		1	-0.068	-7.30		04/13/89
16	50.000		1	0.035	3.38		04/13/89
16	6.250		2	-0.116	-13.12		04/13/89
16	12.500		2	-0.125	-14.29		04/13/89
16	25.000		2	-0.084	-9.17		04/13/89
16	50.000		2	0.039	3.75		04/13/89
17	6.250		1	-0.112	-12.61		04/13/89
17	12.500		1	-0.197	-24.53		04/13/89
17	25.000		1	-0.156	-18.48		04/13/89
17	50.000		1	-0.144	-16.82		04/13/89
17	6.250		2	-0.098	-10.86		04/13/89
17	12.500		2	-0.112	-12.61		04/13/89
17	25.000		2	-0.142	-16.55		04/13/89
17	50.000		2	-0.103	-11.48		04/13/89
18	6.250		1	-0.071	-7.64		04/07/89
18	12.500		1	-0.113	-12.74		04/07/89
18	25.000		1	-0.132	-15.21		04/07/89
18	50.000		1	-0.115	-12.99		04/07/89
18	6.250		2	-0.083	-9.05		04/07/89
18	12.500		2	-0.113	-12.74		04/07/89
18	25.000		2	-0.128	-14.68		04/07/89
18	50.000		2	-0.125	-14.29		04/07/89
19	6.250		1	-0.078	-8.46		04/07/89
19	12.500		1	-0.111	-12.49		04/07/89
19	25.000		1	-0.151	-17.79		04/07/89
19	50.000		1	-0.115	-12.99		04/07/89
19	6.250		2	-0.100	-11.11		04/07/89
19	12.500		2	-0.144	-16.82		04/07/89
19	25.000		2	-0.141	-16.41		04/07/89
19	50.000		2	-0.134	-15.47		04/07/89
20	6.250		1	-0.099	-10.99		04/12/89
20	12.500		1	-0.133	-15.34		04/12/89
20	25.000		1	-0.158	-18.76		04/12/89
20	50.000		1	-0.141	-16.41		04/12/89
20	6.250		2	-0.061	-6.50		04/12/89
20	12.500		2	-0.080	-8.70		04/12/89
20	25.000		2	-0.121	-13.77		04/12/89
20	50.000		2	-0.080	-8.70		04/12/89
21	6.250		1	-0.092	-10.13		04/07/89
21	12.500		1	-0.127	-14.55		04/07/89
21	25.000		1	-0.140	-16.28		04/07/89
21	50.000		1	-0.130	-14.94		04/07/89
21	6.250		2	-0.078	-8.46		04/07/89
21	12.500		2	-0.125	-14.29		04/07/89
21	25.000		2	-0.130	-14.94		04/07/89
21	50.000		2	-0.137	-15.87		04/07/89
22	6.250		1	-0.041	-4.28		04/06/89
22	12.500		1	-0.055	-5.82		04/06/89
22	25.000		1	-0.016	-1.63		04/06/89
22	50.000		1	0.053	5.03		04/06/89
22	6.250		2	-0.020	-2.04		04/06/89
22	12.500		2	-0.048	-5.04		04/06/89
22	25.000		2	-0.022	-2.25		04/06/89
22	50.000		2	0.056	5.30		04/06/89
23	6.250		1	-0.088	-9.65		04/06/89
23	12.500		1	-0.105	-11.73		04/06/89
23	25.000		1	-0.099	-10.99		04/06/89

TABLE E-2 (Continued)

Station	Relative Concen-tration (percent)	Reference Toxicant Concen-tration	Rep	Gamma Effect	Percent Decrease in Luminescence	Data Qualifier	Analysis Start Date
23	50.000		1	-0.081	-8.81		04/06/89
23	6.250		2	-0.076	-8.23		04/06/89
23	12.500		2	-0.118	-13.38		04/06/89
23	25.000		2	-0.107	-11.98		04/06/89
23	50.000		2	-0.054	-5.71		04/06/89
24	6.250		1	-0.061	-6.50		04/06/89
24	12.500		1	-0.094	-10.38		04/06/89
24	25.000		1	-0.097	-10.74		04/06/89
24	50.000		1	-0.093	-10.25		04/06/89
24	6.250		2	-0.033	-3.41		04/06/89
24	12.500		2	-0.044	-4.60		04/06/89
24	25.000		2	-0.071	-7.64		04/06/89
24	50.000		2	-0.055	-5.82		04/06/89
25	6.250		1	-0.038	-3.95		04/04/89
25	12.500		1	-0.070	-7.53		04/04/89
25	25.000		1	-0.121	-13.77		04/04/89
25	50.000		1	-0.120	-13.64		04/04/89
25	6.250		2	-0.043	-4.49		04/04/89
25	12.500		2	-0.116	-13.12		04/04/89
25	25.000		2	-0.145	-16.96		04/04/89
25	50.000		2	-0.161	-19.19		04/04/89
26	6.250		1	-0.106	-11.86		04/04/89
26	12.500		1	-0.131	-15.07		04/04/89
26	25.000		1	-0.114	-12.87		04/04/89
26	50.000		1	-0.060	-6.38		04/04/89
26	6.250		2	-0.087	-9.53		04/04/89
26	12.500		2	-0.156	-18.48		04/04/89
26	25.000		2	-0.123	-14.03		04/04/89
26	50.000		2	-0.074	-7.99		04/04/89
27	6.250		1	-0.041	-4.28		04/04/89
27	12.500		1	-0.057	-6.04		04/04/89
27	25.000		1	-0.069	-7.41		04/04/89
27	50.000		1	0.004	0.40		04/04/89
27	6.250		2	-0.052	-5.49		04/04/89
27	12.500		2	-0.034	-3.52		04/04/89
27	25.000		2	-0.048	-5.04		04/04/89
27	50.000		2	-0.016	-1.63		04/04/89
28	6.250		1	-0.130	-14.94		03/31/89
28	12.500		1	-0.173	-20.92		03/31/89
28	25.000		1	-0.174	-21.07		03/31/89
28	50.000		1	-0.162	-19.33		03/31/89
28	6.250		2	-0.148	-17.37		03/31/89
28	12.500		2	-0.179	-21.80		03/31/89
28	25.000		2	-0.181	-22.10		03/31/89
28	50.000		2	-0.171	-20.63		03/31/89
29	6.250		1	-0.069	-7.41		04/06/89
29	12.500		1	-0.110	-12.36		04/06/89
29	25.000		1	-0.084	-9.17		04/06/89
29	50.000		1	-0.090	-9.89		04/06/89
29	6.250		2	-0.083	-9.05		04/06/89
29	12.500		2	-0.088	-9.65		04/06/89
29	25.000		2	-0.074	-7.99		04/06/89
29	50.000		2	-0.044	-4.60		04/06/89
30	6.250		1	-0.060	-6.38		03/31/89
30	12.500		1	-0.110	-12.36		03/31/89
30	25.000		1	-0.125	-14.29		03/31/89
30	50.000		1	-0.132	-15.21		03/31/89
30	6.250		2	-0.085	-9.29		03/31/89
30	12.500		2	-0.120	-13.64		03/31/89
30	25.000		2	-0.144	-16.82		03/31/89

TABLE E-2 (Continued)

Station	Relative Concen-tration (percent)	Reference Toxicant Concen-tration	Rep	Gamma Effect	Percent Decrease in Luminescence	Data Qualifier	Analysis Start Date
30	50.000		2	-0.129	-14.81		03/31/89
31	6.250		1	-0.123	-14.03		03/31/89
31	12.500		1	-0.181	-22.10		03/31/89
31	25.000		1	-0.186	-22.85		03/31/89
31	50.000		1	-0.188	-23.15		03/31/89
31	6.250		2	-0.074	-7.99		03/31/89
31	12.500		2	-0.140	-16.28		03/31/89
31	25.000		2	-0.117	-13.25		03/31/89
31	50.000		2	-0.109	-12.23		03/31/89
32	6.250		1	-0.129	-14.81		03/31/89
32	12.500		1	-0.202	-25.31		03/31/89
32	25.000		1	-0.210	-26.58		03/31/89
32	50.000		1	-0.232	-30.21		03/31/89
32	6.250		2	-0.130	-14.94		03/31/89
32	12.500		2	-0.174	-21.07		03/31/89
32	25.000		2	-0.235	-30.72		03/31/89
32	50.000		2	-0.219	-28.04		03/31/89
33	6.250		1	-0.123	-14.03		03/31/89
33	12.500		1	-0.198	-24.69		03/31/89
33	25.000		1	-0.218	-27.88		03/31/89
33	50.000		1	-0.195	-24.22		03/31/89
33	6.250		2	-0.107	-11.98		03/31/89
33	12.500		2	-0.161	-19.19		03/31/89
33	25.000		2	-0.187	-23.00		03/31/89
33	50.000		2	-0.191	-23.61		03/31/89
34	6.250		1	-0.041	-4.28		04/04/89
34	12.500		1	-0.092	-10.13		04/04/89
34	25.000		1	-0.112	-12.61		04/04/89
34	50.000		1	-0.132	-15.21		04/04/89
34	6.250		2	-0.092	-10.13		04/04/89
34	12.500		2	-0.092	-10.13		04/04/89
34	25.000		2	-0.100	-11.11		04/04/89
34	50.000		2	-0.167	-20.05		04/04/89
35	6.250		1	-0.060	-6.38		04/04/89
35	12.500		1	-0.114	-12.87		04/04/89
35	25.000		1	-0.101	-11.23		04/04/89
35	50.000		1	-0.074	-7.99		04/04/89
35	6.250		2	-0.042	-4.38		04/04/89
35	12.500		2	-0.094	-10.38		04/04/89
35	25.000		2	-0.090	-9.89		04/04/89
35	50.000		2	-0.064	-6.84		04/04/89
36	6.250		1	-0.133	-15.34		03/31/89
36	12.500		1	-0.167	-20.05		03/31/89
36	25.000		1	-0.168	-20.19		03/31/89
36	50.000		1	-0.140	-16.28		03/31/89
36	6.250		2	-0.121	-13.77		03/31/89
36	12.500		2	-0.142	-16.55		03/31/89
36	25.000		2	-0.136	-15.74		03/31/89
36	50.000		2	-0.092	-10.13		03/31/89
37	6.250		1	-0.152	-17.92		03/31/89
37	12.500		1	-0.164	-19.62		03/31/89
37	25.000		1	-0.193	-23.92		03/31/89
37	50.000		1	-0.149	-17.51		03/31/89
37	6.250		2	-0.145	-16.96		03/31/89
37	12.500		2	-0.202	-25.31		03/31/89
37	25.000		2	-0.187	-23.00		03/31/89
37	50.000		2	-0.143	-16.69		03/31/89
38	6.250		1	-0.102	-11.36		03/30/89
38	12.500		1	-0.123	-14.03		03/30/89
38	25.000		1	-0.143	-16.69		03/30/89

TABLE E-2 (Continued)

Station	Relative Concentration (percent)	Reference Toxicant Concentration	Rep	Gamma Effect	Percent Decrease in Luminescence	Data Qualifier	Analysis Start Date
38	50.000		1	-0.131	-15.07		03/30/89
38	6.250		2	-0.088	-9.65		03/30/89
38	12.500		2	-0.109	-12.23		03/30/89
38	25.000		2	-0.127	-14.55		03/30/89
38	50.000		2	-0.134	-15.47		03/30/89
39	6.250		1	-0.088	-9.65		03/30/89
39	12.500		1	-0.142	-16.55		03/30/89
39	25.000		1	-0.186	-22.85		03/30/89
39	50.000		1	-0.154	-18.20		03/30/89
39	6.250		2	-0.089	-9.77		03/30/89
39	12.500		2	-0.123	-14.03		03/30/89
39	25.000		2	-0.169	-20.34		03/30/89
39	50.000		2	-0.123	-14.03		03/30/89
40	6.250		1	-0.089	-9.77		03/30/89
40	12.500		1	-0.120	-13.64		03/30/89
40	25.000		1	-0.136	-15.74		03/30/89
40	50.000		1	-0.160	-19.05		03/30/89
40	6.250		2	-0.095	-10.50		03/30/89
40	12.500		2	-0.124	-14.16		03/30/89
40	25.000		2	-0.138	-16.01		03/30/89
40	50.000		2	-0.064	-6.84		03/30/89
41	6.250		1	-0.051	-5.37		03/30/89
41	12.500		1	-0.088	-9.65		03/30/89
41	25.000		1	-0.109	-12.23		03/30/89
41	50.000		1	-0.048	-5.04		03/30/89
41	6.250		2	-0.037	-3.84		03/30/89
41	12.500		2	-0.084	-9.17		03/30/89
41	25.000		2	-0.079	-8.58		03/30/89
41	50.000		2	-0.007	-0.70		03/30/89
42	6.250		1	-0.135	-15.61		03/30/89
42	12.500		1	-0.191	-23.61		03/30/89
42	25.000		1	-0.179	-21.80		03/30/89
42	50.000		1	-0.198	-24.69		03/30/89
42	6.250		2	-0.106	-11.86		03/30/89
42	12.500		2	-0.155	-18.34		03/30/89
42	25.000		2	-0.185	-22.70		03/30/89
42	50.000		2	-0.176	-21.36		03/30/89
43	6.250		1	-0.073	-7.87		03/29/89
43	12.500		1	-0.140	-16.28		03/29/89
43	25.000		1	-0.154	-18.20		03/29/89
43	50.000		1	-0.114	-12.87		03/29/89
43	6.250		2	-0.085	-9.29		03/29/89
43	12.500		2	-0.116	-13.12		03/29/89
43	25.000		2	-0.162	-19.33		03/29/89
43	50.000		2	-0.120	-13.64		03/29/89
44	6.250		1	-0.141	-16.41		03/29/89
44	12.500		1	-0.183	-22.40		03/29/89
44	25.000		1	-0.201	-25.16		03/29/89
44	50.000		1	-0.197	-24.53		03/29/89
44	6.250		2	-0.125	-14.29		03/29/89
44	12.500		2	-0.162	-19.33		03/29/89
44	25.000		2	-0.201	-25.16		03/29/89
44	50.000		2	-0.189	-23.30		03/29/89
45	6.250		1	-0.103	-11.48		03/30/89
45	12.500		1	-0.154	-18.20		03/30/89
45	25.000		1	-0.168	-20.19		03/30/89
45	50.000		1	-0.175	-21.21		03/30/89
45	6.250		2	-0.082	-8.93		03/30/89
45	12.500		2	-0.120	-13.64		03/30/89
45	25.000		2	-0.166	-19.90		03/30/89

TABLE E-2 (Continued)

Station	Relative Concen-tration (percent)	Reference Toxicant Concen-tration	Rep	Gamma Effect	Percent Decrease in Luminescence	Data Qualifier	Analysis Start Date
45	50.000		2	-0.158	-18.76		03/30/89
46	6.250		1	-0.163	-19.47		03/30/89
46	12.500		1	-0.160	-19.05		03/30/89
46	25.000		1	-0.192	-23.76		03/30/89
46	50.000		1	-0.151	-17.79		03/30/89
46	6.250		2	-0.104	-11.61		03/30/89
46	12.500		2	-0.163	-19.47		03/30/89
46	25.000		2	-0.126	-14.42		03/30/89
46	50.000		2	-0.114	-12.87		03/30/89
47	6.250		1	-0.153	-18.06		03/30/89
47	12.500		1	-0.216	-27.55		03/30/89
47	25.000		1	-0.196	-24.38		03/30/89
47	50.000		1	-0.171	-20.63		03/30/89
47	6.250		2	-0.137	-15.87		03/30/89
47	12.500		2	-0.146	-17.10		03/30/89
47	25.000		2	-0.162	-19.33		03/30/89
47	50.000		2	-0.160	-19.05		03/30/89
48	6.250		1	-0.077	-8.34		03/29/89
48	12.500		1	-0.113	-12.74		03/29/89
48	25.000		1	-0.128	-14.68		03/29/89
48	50.000		1	-0.117	-13.25		03/29/89
48	6.250		2	-0.077	-8.34		03/29/89
48	12.500		2	-0.111	-12.49		03/29/89
48	25.000		2	-0.108	-12.11		03/29/89
48	50.000		2	-0.106	-11.86		03/29/89
49	6.250		1	-0.094	-10.38		03/29/89
49	12.500		1	-0.106	-11.86		03/29/89
49	25.000		1	-0.143	-16.69		03/29/89
49	50.000		1	-0.149	-17.51		03/29/89
49	6.250		2	-0.064	-6.84		03/29/89
49	12.500		2	-0.107	-11.98		03/29/89
49	25.000		2	-0.128	-14.68		03/29/89
49	50.000		2	-0.115	-12.99		03/29/89
50	6.250		1	-0.074	-7.99		03/29/89
50	12.500		1	-0.099	-10.99		03/29/89
50	25.000		1	-0.148	-17.37		03/29/89
50	50.000		1	-0.135	-15.61		03/29/89
50	6.250		2	-0.075	-8.11		03/29/89
50	12.500		2	-0.105	-11.73		03/29/89
50	25.000		2	-0.150	-17.65		03/29/89
50	50.000		2	-0.098	-10.86		03/29/89
P1		12.130	1	0.842	45.71		04/13/89
P1		25.250	1	1.789	64.14		04/13/89
P1		50.500	1	3.164	75.98		04/13/89
P1		101.000	1	7.698	88.50		04/13/89
P1		12.130	2	0.850	45.95		04/13/89
P1		25.250	2	1.623	61.88		04/13/89
P1		50.500	2	2.955	74.72		04/13/89
P1		101.000	2	7.763	88.59		04/13/89
P1		12.130	1	0.912	47.70		04/12/89
P1		25.250	1	1.770	63.90		04/12/89
P1		50.500	1	3.348	77.00		04/12/89
P1		101.000	1	8.909	89.91		04/12/89
P1		12.130	2	0.875	46.67		04/12/89
P1		25.250	2	1.624	61.89		04/12/89
P1		50.500	2	3.717	78.80		04/12/89
P1		101.000	2	7.965	88.85		04/12/89
P1		12.130	1	0.950	48.72		04/07/89
P1		25.250	1	2.200	68.75		04/07/89
P1		50.500	1	4.351	81.31		04/07/89

TABLE E-2. (Continued)

Station	Relative Concen- tration (percent)	Reference Toxicant Concen- tration	Rep	Gamma Effect	Percent Decrease in Luminescence	Data Qualifier	Analysis Start Date
P1		101.000	1	12.035	92.33		04/07/89
P1		12.130	2	1.136	53.18		04/07/89
P1		25.250	2	2.000	66.67		04/07/89
P1		50.500	2	4.055	80.22		04/07/89
P1		101.000	2	11.759	92.16		04/07/89
P1		12.130	1	0.965	49.11		04/04/89
P1		25.250	1	1.963	66.25		04/04/89
P1		50.500	1	4.435	81.60		04/04/89
P1		101.000	1	12.504	92.59		04/04/89
P1		12.130	2	0.991	49.77		04/04/89
P1		25.250	2	1.965	66.27		04/04/89
P1		50.500	2	4.490	81.79		04/04/89
P1		101.000	2	11.485	91.99		04/04/89
P1		12.130	1	1.201	54.57		03/31/89
P1		25.250	1	2.535	71.71		03/31/89
P1		50.500	1	5.910	85.53		03/31/89
P1		101.000	1	15.296	93.86		03/31/89
P1		12.130	2	1.150	53.49		03/31/89
P1		25.250	2	2.244	69.17		03/31/89
P1		50.500	2	5.424	84.43		03/31/89
P1		101.000	2	16.170	94.18		03/31/89
P1		12.130	1	1.114	52.70		03/30/89
P1		25.250	1	2.307	69.76		03/30/89
P1		50.500	1	4.933	83.15		03/30/89
P1		101.000	1	13.433	93.07		03/30/89
P1		12.130	2	1.070	51.69		03/30/89
P1		25.250	2	2.198	68.73		03/30/89
P1		50.500	2	4.737	82.57		03/30/89
P1		101.000	2	12.226	92.44		03/30/89
P1		12.130	1	0.929	48.16	E	03/29/89
P1		25.250	1	2.201	68.76	E	03/29/89
P1		50.500	1	4.216	80.83	E	03/29/89
P1		101.000	1	16.519	94.29	E	03/29/89
P1		12.130	2	1.025	50.62	E	03/29/89
P1		25.250	2	2.233	69.07	E	03/29/89
P1		50.500	2	5.232	83.95	E	03/29/89
P1		101.000	2	13.776	93.23	E	03/29/89
P2		10.000	1	0.645	39.21		04/13/89
P2		20.000	1	1.255	55.65		04/13/89
P2		40.000	1	2.379	70.41		04/13/89
P2		80.000	1	4.001	80.00		04/13/89
P2		10.000	2	0.687	40.72		04/13/89
P2		20.000	2	1.332	57.12		04/13/89
P2		40.000	2	2.479	71.26		04/13/89
P2		80.000	2	4.119	80.46		04/13/89
P2		10.000	1	0.649	39.36		04/12/89
P2		20.000	1	1.283	56.20		04/12/89
P2		40.000	1	2.404	70.62		04/12/89
P2		80.000	1	4.121	80.47		04/12/89
P2		10.000	2	0.677	40.37		04/12/89
P2		20.000	2	1.214	54.83		04/12/89
P2		40.000	2	2.453	71.04		04/12/89
P2		80.000	2	4.184	80.71		04/12/89
P2		10.000	1	0.647	39.28		04/12/89
P2		20.000	1	1.254	55.63		04/12/89
P2		40.000	1	2.320	69.88		04/12/89
P2		80.000	1	3.857	79.41		04/12/89
P2		10.000	2	0.668	40.05		04/12/89
P2		20.000	2	1.219	54.93		04/12/89
P2		40.000	2	2.453	71.04		04/12/89

TABLE E-2 (Continued)

Station	Relative Concen-tration (percent)	Reference Toxicant Concen-tration	Rep	Gamma Effect	Percent Decrease in Luminescence	Data Qualifier	Analysis Start Date
P2		80.000	2	3.940	79.76		04/12/89
P2		10.000	1	0.643	39.14		04/06/89
P2		20.000	1	1.213	54.81		04/06/89
P2		40.000	1	2.427	70.82		04/06/89
P2		80.000	1	4.222	80.85		04/06/89
P2		10.000	2	0.671	40.16		04/06/89
P2		20.000	2	1.235	55.26		04/06/89
P2		40.000	2	2.403	70.61		04/06/89
P2		80.000	2	4.090	80.35		04/06/89
P2		10.000	1	0.652	39.47		04/04/89
P2		20.000	1	1.191	54.36		04/04/89
P2		40.000	1	2.332	69.99		04/04/89
P2		80.000	1	4.075	80.30		04/04/89
P2		10.000	2	0.696	41.04		04/04/89
P2		20.000	2	1.247	55.50		04/04/89
P2		40.000	2	2.443	70.96		04/04/89
P2		80.000	2	4.182	80.70		04/04/89
P2		10.000	1	0.646	39.25		03/31/89
P2		20.000	1	1.249	55.54		03/31/89
P2		40.000	1	2.367	70.30		03/31/89
P2		80.000	1	4.170	80.66		03/31/89
P2		10.000	2	0.641	39.06		03/31/89
P2		20.000	2	1.258	55.71		03/31/89
P2		40.000	2	2.350	70.15		03/31/89
P2		80.000	2	4.029	80.12		03/31/89
P2		10.000	1	0.705	41.35		03/30/89
P2		20.000	1	1.337	57.21		03/30/89
P2		40.000	1	2.582	72.08		03/30/89
P2		80.000	1	4.381	81.42		03/30/89
P2		10.000	2	0.720	41.86		03/30/89
P2		20.000	2	1.332	57.12		03/30/89
P2		40.000	2	2.493	71.37		03/30/89
P2		80.000	2	4.379	81.41		03/30/89
P2		10.000	1	0.694	40.97		03/29/89
P2		20.000	1	1.239	55.34		03/29/89
P2		40.000	1	2.376	70.38		03/29/89
P2		80.000	1	3.996	79.98		03/29/89
P2		10.000	2	0.633	38.76		03/29/89
P2		20.000	2	1.161	53.73		03/29/89
P2		40.000	2	2.254	69.27		03/29/89
P2		80.000	2	3.884	79.52		03/29/89

APPENDIX F

1989 BENTHIC INFAUNA DATA

TABLES

Number		Page
F-1	1989 Benthic infauna data by station and replicate	F-1
F-2	Abundances of major taxonomic groups, pollution-tolerant species, and pollution-sensitive species	F-105
F-3	List of pollution-sensitive and pollution-tolerant species identified in the 1989 MSMT	F-108
F-4	Benthic indices	F-110
F-5	List of benthic infauna species identified in the 1989 MSMT	F-114

TABLE F-1. 1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 1

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43	1	1		2
Hesperonoe complanata	5001021701			1	1
Pholoe minuta	5001060101	6	10	54	70
Nephtys cornuta franciscana	500125010401			2	2
Nephtys rickettsi	5001250106	1		1	2
Nephtys ferruginea	5001250111		1	1	2
Nephtys caecoides	5001250119	1			1
Glycera capitata	5001270101			1	1
Glycinde picta	5001280101	1	2		3
Glycinde armigera	5001280103			1	1
Lumbrineris bicirrata	5001310101			1	1
Lumbrineris luti	5001310109			3	3
Lumbrineris cruzensis	5001310118	23	17	21	61
Oriloneris falcata minor	500133010402	1			1
Levinsenia gracilis	5001410801	1	1	16	18
Prionospio steenstrupi	5001430506	1			1
Prionospio lighti	5001430521	84	16	45	145
Paraprionospio pinnata	5001431702	1	2		3
Armandia brevis	5001580202	1			1
Heteromastus filobranchus	5001600203	1	1	1	3
Oligochaeta	5004			2	2
Rissoidae	510320		2		2
Odostomia sp. A	510801019939	1	3		4
Gastropteron pacificum	5110070101	2			2
Chaetodermatida	5402			2	2
Acila castrensis	5502020101	3	14	37	54
Nucula tenuis	5502020201	1	2	8	11
Yoldia scissurata	5502040504			1	1
Axinopsida serricata	5515020201			1	1
Mysella tumida	5515100102	4	8	15	27
Clinocardium nuttali	5515220102			1	1
Macoma spp.	55153101	2			2
Macoma carlottensis	5515310112		6	3	9
Euphilomedes producta	6111070303			1	1
Calanoida	6118		1	3	4
Eudorella pacifica	6154040202	55	43	24	122
Ampelisca spp.	61690201			1	1
Protomedeia spp.	61692603		10		10
Protomedeia grandimana	6169260303	16	13	9	38
Monoculodes spp.	61693708	1			1
Heterophoxus oculatus	6169420301	25	21	25	71
Callianassa spp.	61830402	2			2
Pinnixa spp.	61890604	39	10	67	116
Amphiuridae	812903	46	54	73	173
Amphiodia spp.	81290301	12	13	37	62
Amphiodia urtica/periercta complex	812903019999	52	47	114	213
Amphiodia occidentalis	8129030302	1	1	2	4
					1258
		385	299	574 Sum	
		13	12	17 Ave	
		447	214	692 Var	
		21	15	26 Sdv	
		1	1	1 Min	
		84	54	114 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 2

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Anthozoa	3740		2	1	3
Nemertea	43		2	3	5
Nematoda	47		1		2
Tenonia priops	5001022302		1		1
Pholoe minuta	5001060101	3	5	3	11
Sthenelais tertiaglabra	5001060305		1		1
Eteone spilotus	5001130299		1		1
Pilargis berkeleyi	5001220301			1	1
Exogone lourei	5001230703			8	8
Sphaerosyllis brandhorsti	5001230806		1		1
Nereis procera	5001240404		1	1	2
Nephtys spp	50012501			1	1
Nephtys cornuta franciscana	500125010401			1	1
Nephtys ferruginea	5001250111			1	1
Glycera capitata	5001270101	1	3	3	7
Lumbrineris bicirrata	5001310101	1			1
Lumbrineris luti	5001310109	5	6	8	19
Lumbrineris cruzensis	5001310118		1		1
Dorvillea caeca	5001360505			1	1
Leitoscoloplos pugettensis	5001400102	1	2	2	5
Allia ramosa	5001410706	34	62	50	146
Levinsenia gracilis	5001410801	28	152	109	289
Acesta lopezi	5001411302	12	21	14	47
Laonice cirrata	5001430201	1	2	6	9
Prionospio lighti	5001430521		8	7	15
Spiophanes berkelyorum	5001431004		1	1	2
Paraprionospio pinnata	5001431702	3	2	6	11
Magelona longicornis	5001440105		2	4	6
Tharyx multifilis	5001500302	2	3	1	6
Cossura longocirrata	5001520101	1	18	10	29
Brada sachalina	5001540199			1	1
Flabellagera affinis	5001540202	15			15
Sternaspis scutata	5001590101	8	3	8	19
Capitella capitata	5001600101	2	2	1	5
Mediomastus ambiseta	5001600401	7	8	3	18
Barantolla americana	5001600601	1			1
Maldanidae	500163	3	1		4
Axiothella rubrocincta	5001630802		2		2
Praxillella spp.	50016309		2	1	3
Praxillella gracilis	5001630901			1	1
Euclymene zonalis	5001631103	25	44	90	159
Myriochele heeri	5001640201			1	1
Ampharete acutifrons	5001670208			2	2
Chone duneri	5001700104		1		1
Oligochaeta	5004		6	1	7
Rissoidae	510320			1	1
Melanella micrans	5103530102		2	1	3
Natica clausa	5103760201		1		1
Mitrella tuberosa	5105030202	2	1		3
Odostomia sp. B	510801019938	1			1
Odostomia sp. A	510801019939	3		1	4
Turbonilla spp.	51080102	1			1
Turbonilla aurantia	5108011134		3	2	5
Turbonilla sp. B	510801119998	3	2	2	7
Cylichna attonsa	5110040205			1	1
Chaetodermatida	5402	1			1
Bivalvia spp.	55		1		1
Acila castrensis	5502020101	1	1	1	3
Nuculana minuta	5502040202	9	7	15	31
Yoldia scissurata	5502040504	7	6	3	16

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 2 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Mytilidae sp.	550701			1	1
Musculus spp.	55070104	1	1	2	4
Parvilucina tenuisculpta	5515010101	1	2	2	5
Axinopsida serricata	5515020201	7	4	5	16
Mysella tumida	5515100102		1		1
Macoma spp	55153101	4		3	7
Macoma elimata	5515310102		1	1	2
Macoma carlottensis	5515310112	3	6	3	12
Compsomyax subdiaphana	5515470301	3	6	4	13
Psephidia lordi	5515470501	3	5	3	11
Pandora filosa	5520020102	3			3
Cardiomya californica	5520100108			1	1
Dentalium sp.	56010101	15	26	23	64
Octopoda rubecens	5708010203			1	1
Cylindroleberididae	611103			1	1
Euphilomedes producta	6111070303	9	8	1	18
Calanoida	6118	5	16	8	29
Eudorella pacifica	6154040202	7	12	7	26
Leptostylis spp.	61540504			1	1
Campylaspis spp	61540701	1	1		2
Leptognathia brevimana	6157020204			3	3
Ampelisca brevisimulata	6169020125			2	2
Ampelisca careyi	6169020135		1	2	3
Westwoodilla caecula	6169371502			2	2
Harpiniopsis fulgens	6169420204	5	8	4	17
Heterophoxus oculatus	6169420301	1	1	1	3
Parathemisto pacifica	6170011003	2	3		5
Natantia sp.	617599			1	1
Golfingia spp.	72000201			2	2
Amphiuridae	812903			1	1
Amphiodia spp.	81290301	1	3	2	6
Amphiodia urtica/periercta complex	812903019999			2	2
Pentamera pseudocalcigera	8172060301			1	1
Leptosynapta sp	81780102			1	1
		252	496	469	Sum
		6	8	7	Ave
		53	461	294	Var
		7	21	17	Sdv
		1	1	1	Min
		34	152	109	Max

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 3

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Harmothoe lunulata	5001020810	1			1
Pholoe minuta	5001060101	56	5	2	63
Phyllodoce spp.	50011314	1			1
Gyptis brevipalpa	5001210102			1	1
Pionosyllis sp. 1	500123029989		1		1
Exgone gemmifera	5001230702			4	4
Exogone lourei	5001230703			4	4
Nephtys spp.	50012501		1		1
Nephtys cornuta franciscana	500125010401	13			13
Nephtys rickettsi	5001250106	1			1
Nephtys ferruginea	5001250111	3	1	4	8
Glycera capitata	5001270101	1			1
Glycinde picta	5001280101	1		2	3
Glycinde armigera	5001280103		1		1
Lumbrineris spp.	50013101			4	4
Lumbrineris bicirrata	5001310101	2	1		3
Lumbrineris luti	5001310109			11	11
Lumbrineris californiensis	5001310132			2	2
Leitoscoloplos pugettensis	5001400102	2			2
Levinsenia gracilis	5001410801	1		3	4
Acesta lopezi	5001411302			1	1
Polydora socialis	5001430402			1	1
Polydora brachycephala	5001430429			4	4
Polydora cardalia	5001430431			1	1
Prionospio steenstrupi	5001430506	107	50	3	160
Prionospio lighti	5001430521	92			92
Spiophanes berkelyorum	5001431004	2	2		4
Paraprionospio pinnata	5001431702			5	5
Magelona longicornis	5001440105			3	3
Cirratulus cirratus	5001500101	1			1
Tharyx multifilis	5001500302			27	27
Chaetozone setosa	5001500401	3			3
Cossura longocirrata	5001520101	56	19		75
Scalibregma inflatum	5001570101	1			1
Armandia brevis	5001580202			2	2
Ophelina acuminata	5001580607			1	1
Heteromastus filobranchus	5001600203			1	1
Notomastus tenuis	5001600302			18	18
Mediomastus californiensis	5001600402			8	8
Nicomache personata	5001630502	1			1
Euclymene zonalis	5001631103			72	72
Galathowenia nr. G. oculata	5001640202			1	1
Ampharete acutifrons	5001670208			1	1
Amphicteis scaphobranchiata	5001670304			1	1
Anobothrus gracilis	5001670701			1	1
Pista cristata	5001680701			9	9
Polycirrus californicus	5001680810	1	1		2
Terebellides stroemi	5001690101			22	22
Oligochaeta	5004	22			22
Solariella varicosa	5102100403	1			1
Natica clausa	5103760201	2		4	6
Bivalvia spp	55			2	2
Yoldia scissurata	5502040504	11	8	7	26
Mytilidae sp.	550701	1			1
Parvilucina tenuisculpta	5515010101		1		1
Macoma spp.	55153101	10		1	11
Macoma calcarea	5515310101	35			35
Calanoida	6118		2		2
Rhachotropis sp.	61692013		1		1

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 3 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Synchelidium shoemakeri	6169371402		1		1
Eobrolgus spinosus	6169420928		1	1	2
Pinnixa spp	61890604		1	3	4
					762
		428	97	237 Sum	
		16	6	7 Ave	
		798	142	157 Var	
		28	12	13 Sdv	
		1	1	1 Min	
		107	50	72 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 4

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Anthozoa	3740	1	6	3	10
Nemertea	43	6	1		7
Tenonia priops	5001022302	1			1
Eteone spilotus	5001130299	1			1
Pilargis berkeleyi	5001220301	1		1	2
Nereis spp.	50012404		1		1
Nereis procera	5001240404			1	1
Nephtys spp	50012501	1			1
Nephtys cornuta franciscana	500125010401		3	1	4
Glycera capitata	5001270101		1	1	2
Glycinde armigera	5001280103	1			1
Goniada maculata	5001280202	1		2	3
Lumbrineris spp.	50013101		2	4	6
Lumbrineris luti	5001310109	7		2	9
Lumbrineris cruzensis	5001310118	7	14	1	22
Dorvillea rudolphi	5001360504			1	1
Levinsenia gracilis	5001410801	74	65	33	172
Acesta lopezi	5001411302	6	4	8	18
Laonice cirrata	5001430201	6	2	3	11
Prionospio steenstrupi	5001430506		3		3
Prionospio lighti	5001430521	4	5	5	14
Spiophanes berkelyorum	5001431004	2	2	1	5
Paraprionospio pinnata	5001431702	9	4	7	20
Trochochaeta multisetosa	5001450102	1			1
Cirratulus cirratus	5001500101	4	15		19
Tharyx multifilis	5001500302	13	9	12	34
Cossura longocirrata	5001520101	30	23	13	66
Brada sachalina	5001540199	1	1	1	3
Travisia pupa	5001580403		1		1
Ophelina acuminata	5001580607	4	1	3	8
Sternaspis scutata	5001590101	2	2		4
Heteromastus filobranchus	5001600203	2	2		4
Mediomastus spp.	50016004	1		3	4
Mediomastus ambiseta	5001600401			1	1
Mediomastus californiensis	5001600402		5		5
Barantolla americana	5001600601			2	2
Maldanidae	500163		1		1
Axiothella rubrocincta	5001630802		1		1
Euclymeninae	5001631	4			4
Ampharetidae	500167			1	1
Ampharete acutifrons	5001670208	1			1
Amphitrite cirrata	5001680101			1	1
Pista cristata	5001680701	1			1
Polycirrus californicus	5001680810	14	8	11	33
Lanassa venusta venusta	500168130201			1	1
Terebellides stroemi	5001690101	10	4	17	31
Chone spp.	50017001	1			1
Alvania spp.	51032001		1		1
Mitrella tuberosa	5105030202			2	2
Odostomia sp. A	510801019939	6	4		10
Turbonilla spp.	51080102		1		1
Cylichna attonsa	5110040205	3	3		6
Chaetodermatida	5402	2	1		3
Bivalvia	55			5	5
Acila castrensis	5502020101	10	15	18	43
Nucula tenuis	5502020201	5	5	1	11
Nuculana minuta	5502040202	2			2
Yoldia scissurata	5502040504	2		1	3
Axinopsida serricata	5515020201	14	29	9	52
Mysella tumida	5515100102	2		1	3

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 4 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Macoma spp.	55153101		3	2	5
Macoma carlottensis	5515310112	2			2
Compsomyax subdiaphana	5515470301	2		1	3
Psephidia lordi	5515470501	2			2
Dentalium spp	56010101	3	3		6
Euphilomedes producta	6111070303	4	8	9	21
Eudorella pacifica	6154040202	17	6	7	30
Protomedeia grandimana	6169260303	16	15	73	104
Synchelidium spp.	61693714		1		1
Westwoodilla caecula	6169371502	2	1		3
Heterophoxus oculatus	6169420301	7	9	13	29
Golfingia spp	72000201	1			1
Amphiuridae	812903		2		2
Amphiodia spp.	81290301	1	3	3	7
Amphiodia urtica/periercta complex	812903019999	5		2	7
					908
		325	296	287 Sum	
		6	7	7 Ave	
		120	114	144 Var	
		11	11	12 Sdv	
		1	1	1 Min	
		74	65	73 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 5

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43			1	1
Pholoe minuta	5001060101			2	2
Micropodarke dubia	5001210801			1	1
Syllis elongata	5001230308		1		1
Glycera capitata	5001270101	1		1	2
Glycinde armigera	5001280103		1	1	2
Lumbrineris luti	5001310109	4	4	9	17
Lumbrineris cruzensis	5001310118	4	3		7
Levinsenia gracilis	5001410801	6	11	7	24
Laonice cirrata	5001430201	1		1	2
Prionospio lighti	5001430521			1	1
Paraprionospio pinnata	5001431702	4	5	5	14
Tharyx multifilis	5001500302		1		1
Cossura longocirrata	5001520101		3		3
Brada sachalina	5001540199	1		1	2
Ophelina acuminata	5001580607	1			1
Sternaspis scutata	5001590101		3	1	4
Heteromastus filobranchus	5001600203	1		2	3
Mediomastus spp.	50016004	1	1	1	3
Mediomastus ambiseta	5001600401		1		1
Pectinaria californiensis	5001660304	1			1
Amage anops	5001670101	1			1
Terebellides stroemi	5001690101		1		1
Oligochaeta	5004		1		1
Rissoidae	510320	3			3
Mitrella tuberosa	5105030202	1			1
Odostomia sp. A	510801019939	6	3	3	12
Turbonilla sp. B	510801119998	4	3	2	9
Cylichna attonsa	5110040205		1		1
Gastropteron pacificum	5110070101		1		1
Acila castrensis	5502020101	9	5	12	26
Nucula tenuis	5502020201	6	3	3	12
Nuculana minuta	5502040202	1	1		2
Yoldia scissurata	5502040504	1			1
Axinopsida serricata	5515020201	32	26	39	97
Mysella tumida	5515100102	2		1	3
Macoma spp.	55153101			4	4
Macoma carlottensis	5515310112	2	3		5
Compsomyax subdiaphana	5515470301	2	1	1	4
Psephidia lordi	5515470501	12	10	12	34
Pandora filosa	5520020102	1		2	3
Dentalium spp	56010101	2	1		3
Euphilomedes producta	6111070303	12	12	3	27
Mysidacea	6151		1		1
Eudorella pacifica	6154040202	50	48	55	153
Campylaspis spp	61540701		1		1
Eusirus sp.	61692099	2			2
Protomedeia spp.	61692603	3	1		4
Lysianassa sp.	61693422	2			2
Monoculodes zernovi	6169370816	1		1	2
Synchelidium rectipalmum	6169371403	1			1
Westwoodilla caecula	6169371502	1			1
Heterophoxus oculatus	6169420301	15	7	14	36
Eobrolgus spinosus	6169420928	2			2
Pinnixa spp.	61890604	20	2	4	26
Nellobia eusoma	7301011401		3	2	5
Phoronida	77	1			1
Amphiuridae	812903	3	10	4	17

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 5 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Amphiodia spp.	81290301	8	11	15	34
Amphiodia urtica/periercta complex	812903019999	17	17	22	56
Eupentacta pseudoquinquesemita	8172060201		1	1	2
					690
		248	208	234 Sum	
		6	6	7 Ave	
		87	78	129 Var	
		9	9	11 Sdv	
		1	1	1 Min	
		50	48	55 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 6

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43	5	3	2	10
Harmothoe lunulata	5001020810	2	2	1	5
Pholoe minuta	5001060101		1		1
Eteone californica	5001130201	1			1
Nereis procera	5001240404	1			1
Nephtys ferruginea	5001250111	1	1		2
Nephtys caecoides	5001250119	1			1
Glycinde picta	5001280101	6	13	2	21
Glycinde armigera	5001280103	1			1
Lumbrineris spp.	50013101		1	2	3
Lumbrineris luti	5001310109	3	3	2	8
Lumbrineris californiensis	5001310132	3		1	4
Leitoscoloplos pugettensis	5001400102	4	8	10	22
Laonice cirrata	5001430201		1		1
Polydora socialis	5001430402			1	1
Prionospio steenstrupi	5001430506	30	23	7	60
Prionospio lighti	5001430521		1		1
Spiophanes bombyx	5001431001	1			1
Spiophanes berkelyorum	5001431004		2	4	6
Paraprionospio pinnata	5001431702	3	2	2	7
Magelona longicornis	5001440105		12		12
Magelona berkeleyi	5001440123	3		3	6
Tharyx multifilis	5001500302	1	6	2	9
Chaetozone spinosa	5001500407	1		1	2
Ophelina acuminata	5001580607	4	6	2	12
Sternaspis scutata	5001590101	2	4	1	7
Heteromastus filobranchus	5001600203	1		2	3
Mediomastus ambiseta	5001600401		6	1	7
Maldanidae	500163		1		1
Maldane glebifex	5001630302	2	3		5
Euclymeninae	5001631		3		3
Euclymene zonalis	5001631103			2	2
Owenia fusiformis	5001640102	2	2	3	7
Galathowenia nr G oculata	5001640202	12	15	2	29
Ampharete arctica	5001670201			1	1
Terebellidae	500168		1		1
Oligochaeta	5004		3		3
Alvania spp	51032001	4	8	3	15
Crepipatella lingulata	5103640301			1	1
Mitrella tuberosa	5105030202	7		2	9
Kurtziella plumbea	5106021107	1			1
Odostomia sp. B	510801019938		3	1	4
Turbonilla aurantia	5108011134	1	2		3
Cylichna attonsa	5110040205		6		6
Diaphana sp.	5110090102	1			1
Acila castrensis	5502020101	7	11	6	24
Nucula tenuis	5502020201	8	3	1	12
Nuculana minuta	5502040202	1			1
Yoldia scissurata	5502040504	1			1
Parvilucina tenuisculpta	5515010101	30	27	13	70
Lucinoma acutilineata	5515010201	2			2
Axinopsida serricata	5515020201	11	19	2	32
Thyasira gouldii	5515020325	2			2
Mysella tumida	5515100102	34	65	14	113
Cyclocardia ventricosa	5515170101		1		1
Clinocardium nuttali	5515220102	4	10	2	16
Macoma carlottensis	5515310112	12			12
Macoma nasuta	5515310114	11	22	7	40
Tellina modesta	5515310204	32	35	20	87
Compsomyax subdiaphana	5515470301	1	8		9

STATION 6 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Psephidia lordi	5515470501	21	20	2	43
Protothaca spp	55154707	3	3	1	7
Mya arenaria	5517010201		1	1	2
Hiatella arctica	5517060201		1		1
Pandora filosa	5520020102	1	2		3
Lyonsia californica	5520050202		4		4
Dentalium spp.	56010101	2			2
Cylindroleberididae	611103		3		3
Euphilomedes carcharodonta	6111070301	6	5	4	15
Diastylis alaskensis	6154050101		1		1
Haliophasma geminata	6160011601	1	2		3
Photis brevipes	6169260201		1		1
Monoculodes zernovi	6169370816	2			2
Synchelidium rectipalmum	6169371403			2	2
Westwoodilla caecula	6169371502	1			1
Pleusymptes subglaber	6169430501		1		1
Pagurus spp.	61830602	1			1
Golfingia spp.	72000201		1		1
Ophiuroida	8120		2		2
Amphiuridae	812903	1	3	2	6
Amphiodia spp.	81290301	3	1		4
Amphiodia urtica/periercta complex	812903019999			1	1
Leptosynapta transgressor	8178010299	14	6		20
					4275
		316	400	139 Sum	
		6	7	3 Ave	
		69	115	16 Var	
		8	11	4 Sdv	
		1	1	1 Min	
		34	65	20 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 7

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Anthozoa	3740		1		1
Anthozoa sp. 1	374000009999	2			2
Pachycerianthus fimbriatus	3743010303	1			1
Nemertea	43	5	15	17	37
Nematoda	47			1	1
Harmothoe lunulata	5001020810		1		1
Pholoides aspera	5001040101		12	7	19
Phyllodoce (Anaitides) groenlandica	5001130102			1	1
Phyllodoce (Aponaitides) hartmanae	5001131402		2		2
Pionisyllis uraga	5001230204			1	1
Syllis hyalina	5001230312		1	2	3
Exogone verugera	5001230706		9	16	25
Sphaerosyllis brandhorsti	5001230806		3		3
Odontosyllis phosphorea	5001231303	1	6	5	12
Ehlersia heterochaeta	5001232201	1	10	12	23
Eunereis wailesi	50012411			1	1
Nephtys ferruginea	5001250111		2		2
Glycera capitata	5001270101	4	1	2	7
Dorvillea pseudorubrovittata	5001360101			3	3
Scoloplos acmeceps	5001400311	1	1	1	3
Aricidea minuta	5001410220	1			1
Cirrophorus lyra	5001410603		2	3	5
Acesta lopezi	5001411302	1			1
Laonice cirrata	5001430201	1	1	1	3
Polydora socialis	5001430402		1	1	2
Spio cirrifera	5001430703		2		2
Spiophanes bombyx	5001431001	218	175	254	647
Spiophanes berkelyorum	5001431004		4		4
Magelona longicornis	5001440105	2	2	2	6
Phyllochaetopterus prolifica	5001490202			4	4
Spiochaetopterus costarum	5001490302			1	1
Tharyx multifilis	5001500302	1	4	4	9
Tharyx tesselata	5001500308	1	6	1	8
Chaetozone setosa	5001500401	3			3
Chaetozone spinosa	5001500407	3	1	4	8
Travisia brevis	5001580401	1		1	2
Travisia pupa	5001580403			1	1
Notomastus lineatus	5001600303			1	1
Mediomastus californiensis	5001600402	1	7	12	20
Maldanidae	500163			4	4
Nicomache personata	5001630502		2	11	13
Notoproctus pacificus	5001630601			11	11
Rhodine bitorquata	5001631001	1	1	5	7
Euclymene zonalis	5001631103	9		1	10
Owenia fusiformis	5001640102	2	1	1	4
Galathowenia nr. G oculata	5001640202	4	5	5	14
Idanthyrsus ornamentatus	5001650101		4	6	10
Sabellaria cementarium	5001650201	1	5	4	10
Ampharete acutifrons	5001670208		2		2
Samytha californiensis	5001671402	1			1
Polycirrus californicus	5001680810		7	15	22
Streblosoma bairdi	5001682502		1		1
Chone duneri	5001700104		6	1	7
Megalomma splendida	5001700401	7		1	8
Potamilla neglecta	5001700601			2	2
Oligochaeta	5004	1		2	3
Alvania spp	51032001		1		1
Bittium sp	51034601		1		1
Plicifusus sp.	51050509	1		1	2
Turbonilla aurantia	5108011134			1	1

STATION 7 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Cylichna attonsa	5110040205			1	1
Polyplacophora	5330		2	2	4
Bivalvia spp.	55	1	1	2	4
Nuculana minuta	5502040202	24	2	3	29
Modiolus spp.	55070106		2	1	3
Thyasira gouldii	5515020325			1	1
Astarte willetti	5515190122		1	1	2
Mactridae spp	551525			1	1
Macoma spp.	55153101		1		1
Psephidia lordi	5515470501	2	2		4
Mya arenaria	5517010201			1	1
Hiatella arctica	5517060201		3	1	4
Rutiderma lomae	6111060103	1			1
Calanoida	6118			7	7
Isopoda sp.	6158			1	1
Haliophasma geminata	6160011601			2	2
Synidotea spp	61620202		3		3
Ampelisca spp	61690201	4	14	6	24
Ampelisca agassizi	6169020111		2	1	3
Ampelisca careyi	6169020135			4	4
Byblis millsi	6169020208		9	4	13
Ericthonius sp	61691503			1	1
Photis spp	61692602	2		12	14
Photis brevipes	6169260201	3	6	2	11
Protomédeia spp.	61692603			1	1
Gammaropsis thompsoni	6169260401		1		1
Anonyx sp.	61693403		1		1
Lysianassa holmesi	6169342206			1	1
Synchelidium spp.	61693714		1		1
Synchelidium shoemakeri	6169371402	3		1	4
Phoxocephalidae	616942			1	1
Harpiniopsis fulgens	6169420204			1	1
Heterophoxus oculatus	6169420301		3		3
Eyakia robustus	6169420918			8	8
Eobrolgus spinosus	6169420928			7	7
Foxiphalus sp	61694222	11	4		15
Dyopedos spp	61694499			2	2
Stenothoidae	616948		2	1	3
Caprellidae	617101		1		1
Caprella mendax	6171010719		1		1
Brachyura	6184			2	2
Oregonia spp.	61870101		2		2
Oregonia gracilis	6187010101			1	1
Pugettia spp.	61870105			1	1
Nellobia eusoma	7301011401		3	2	5
Amphipholus pugetanus	8129030201		1	1	2
Holothuroidea	8170	1	1		2
Eupentacta pseudoquinquesemita	8172060201		1	1	2
Pentamera lissoplaca	8172060303		2	1	3
Pentamera trachyplaca	8172060399		5		5
Ascidiacea	8401			1	1
					1227
		327	382	517 Sum	
		9	6	6 Ave	
		1233	464	790 Var	
		35	21	28 Sdv	
		1	1	1 Min	
		218	175	254 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 8

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43	1	1		2
Polynoidae	500102			1	1
Hesperonoe adventor	5001021702	1			1
Tenonia priops	5001022302	1			1
Pholoides aspera	5001040101			1	1
Pholoe minuta	5001060101	1		1	2
Eteone californica	5001130201	1	1		2
Eteone longa	5001130205			1	1
Gyptis brevipalpa	5001210102	1	1	2	4
Ophiodromus pugettensis	5001210401			1	1
Syllis hyalina	5001230312			1	1
Exogone lourei	5001230703	18	21	12	51
Sphaerosyllis brandhorsti	5001230806	1			1
Ehlersia heterochaeta	5001232201		2		2
Nephtys cornuta franciscana	500125010401			2	2
Nephtys ferruginea	5001250111	2	2	3	7
Glycera americana	5001270104	1			1
Glycera sp. 1	500127019999			1	1
Glycinde picta	5001280101	1	1	1	3
Lumbrineris spp.	50013101			3	3
Lumbrineris bicirrata	5001310101	2	4	3	9
Lumbrineris luti	5001310109	11	17	24	52
Lumbrineris cruzensis	5001310118	1			1
Lumbrineris californiensis	5001310132	1			1
Dorvillea pseudorubrovittata	5001360101			1	1
Dorvillea caeca	5001360505	1	1		2
Levinsenia gracilis	5001410801	1	1	2	4
Acesta lopezi	5001411302	1			1
Laonice cirrata	5001430201	2	4	3	9
Polydora socialis	5001430402			2	2
Polydora brachycephala	5001430429	6	5	10	21
Prionospio steenstrupi	5001430506	4	5	2	11
Prionospio lighti	5001430521	2	3		5
Paraprionospio pinnata	5001431702	4		4	8
Magelona longicornis	5001440105	2	3	2	7
Phyllochaetopterus prolifica	5001490202	1		1	2
Cirratulus cirratus	5001500101	1			1
Tharyx multifilis	5001500302	22	23	24	69
Tharyx tesselata	5001500308		1	3	4
Brada sachalina	5001540199	1			1
Armandia brevis	5001580202	4	2	1	7
Ophelina acuminata	5001580607		1	3	4
Sternaspis scutata	5001590101			1	1
Heteromastus filobranchus	5001600203	3	4	1	8
Notomastus lineatus	5001600303			5	5
Mediomastus spp.	50016004	7			7
Mediomastus ambiseta	5001600401	4	6	5	15
Maldanidae	500163	10			10
Axiothella rubrocincta	5001630802	1			1
Praxillella spp.	50016309	13			13
Praxillella gracilis	5001630901	37	31		68
Euclymene zonalis	5001631103	37	56	60	153
Galathowenia nr. G. oculata	5001640202		2	1	3
Melinna elisabethae	5001670503	2		1	3
Pista cristata	5001680701	6	5	2	13
Polycirrus californicus	5001680810	2	1	1	4
Amphitritinae	5001681	1			1
Terebellides stroemi	5001690101	17	16	3	36
Chone spp.	50017001	1			1
Oligochaeta	5004	1			1

STATION 8 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Rissoidae	510320	4	4	25	33
Mitrella tuberosa	5105030202	4	5		9
Odostomia sp A	510801019939			1	1
Turbonilla aurantia	5108011134	2	4	1	7
Chaetodermatida	5402			1	1
Acila castrensis	5502020101	1	1	1	3
Nucula tenuis	5502020201	7	7	8	22
Nuculana minuta	5502040202	1	2	5	8
Yoldia scissurata	5502040504	1	1		2
Megacrenella columbiana	5507010301	2	1	1	4
Adontorhina cyclica	5515020102		1	2	3
Axinopsida serricata	5515020201		2	2	4
Mysella tumida	5515100102	9	11	9	29
Cyclocardia ventricosa	5515170101	2	5		7
Macoma elimata	5515310102	5	2		7
Macoma yoldiformis	5515310111	3	4	2	9
Macoma carlottensis	5515310112	1	2	2	5
Compsomyax subdiaphana	5515470301	3	3	2	8
Psephidia lordi	5515470501	17	45	29	91
Mya arenaria	5517010201			1	1
Pandora filosa	5520020102	1	1	3	5
Lyonsia californica	5520050202			1	1
Cylindroleberididae	611103	1			1
Euphilomedes producta	6111070303	5	3	7	15
Eudorella pacifica	6154040202	7	8	8	23
Leptognathia sp.	61570901	12	5	1	18
Ampelisca spp.	61690201			1	1
Corophium spp.	61691502			3	3
Melita desdichada	6169211008	1	3	10	14
Protomedeia spp.	61692603	2			2
Protomedeia articulata	6169260307		6		6
Prachynella lodo	6169345701			1	1
Monoculodes zernovi	6169370816	1	2	2	5
Heterophoxus oculatus	6169420301	42	55	45	142
Foxiphalus sp	61694222			1	1
Caprellidae	617101			1	1
Callianassa spp	61830402		1		1
Pinnixa spp	61890604	4	1	1	6
Golfingia spp.	72000201	2			2
Priapulus caudatus	7400010101		1		1
Ophiuroida	8120	2		2	4
Amphiuridae	812903			1	1
Amphiodia spp.	81290301	1			1
Amphipholus spp	81290302			2	2
					1164
		381	406	377 Sum	
		5	7	5 Ave	
		69	149	100 Var	
		8	12	10 Sdv	
		1	1	1 Min	
		42	56	60 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 9

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43	1	1	1	3
Hesionura coineaui difficilis	500113090101	4	1	1	6
Hesionidae	500121			1	1
Autolytus cornutus	5001230101		2		2
Pionosyllis uraga	5001230204	2	1		3
Syllis spp	50012303	1			1
Exgone gemmifera	5001230702	2			2
Exogone verugera	5001230706		4		4
Odontosyllis phosphorea	5001231303		6	1	7
Streptosyllis sp A	50012316			1	1
Ehlersia heterochaeta	5001232201		7		7
Nereis procera	5001240404	1			1
Nephtys longosetosa	5001250109	6	5	11	22
Glycera sp. 1	500127019999		3	4	7
Glycinde armigera	5001280103			1	1
Protodorvillea gracilis	5001360201			2	2
Dorvillea caeca	5001360505	1	1		2
Spionidae	500143	1			1
Prionospio steenstrupi	5001430506			2	2
Prionospio lighti	5001430521		1		1
Spiophanes berkelyorum	5001431004	39	27	43	109
Aonides sp. 1	50014322		1	1	2
Phyllochaetopterus prolifica	5001490202		4	2	6
Spiochaetopterus costarum	5001490302		6		6
Mesochaetopterus taylori	5001490401			1	1
Cirratulus cirratus	5001500101	3			3
Caulleriella alata	5001500202	1	8	14	23
Chaetozone spinosa	5001500407	4	1		5
Ophelia limacina	5001580301			2	2
Notomastus lineatus	5001600303	2	2	4	8
Mediomastus spp.	50016004	2			2
Mediomastus californiensis	5001600402	2	10	11	23
Maldanidae	500163	4	3		7
Axiothella rubrocincta	5001630802	5	2	2	9
Euclymeninae	5001631			3	3
Euclymene zonalis	5001631103		1		1
Owenia fusiformis	5001640102	1	1	2	4
Idanthyrsus ornamentatus	5001650101			1	1
Asabellides lineata	5001670804		1		1
Terebellidae	500168		1		1
Polycirrus spp.	50016808		1		1
Polycirrus californicus	5001680810	3	2	7	12
Chone spp.	50017001		1		1
Chone duneri	5001700104	1		4	5
Eudistylia sp	50017003	2	1		3
Potamilla sp	50017006	2			2
Potamilla neglecta	5001700601		2		2
Oligochaeta	5004			1	1
Trochidae spp.	510210	3			3
Margarites pupillus	5102100308		1		1
Solariella varicosa	5102100403	2	4	1	7
Rissoidae	510320		2		2
Calyptraea fastigiata	5103640101		1		1
Crepipatella lingulata	5103640301			2	2
Amphissa sp. A	510503019999	1			1
Mitrella tuberosa	5105030202		2		2
Odostomia sp. B	510801019938		2		2
Polyplacophora	53	1	4	2	7
Bivalvia spp.	55	3			3
Glycymeris sp	55060601		1		1

STATION 9 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Megacrenella columbiana	5507010301	16	11	3	30
Chlamys hastata	5509050101		1		1
Diplodonta sp.	55150501		1		1
Mysella tumida	5515100102	7	18	4	29
Cyclocardia ventricosa	5515170101			3	3
Astarte willetti	5515190122	45	35	49	129
Clinocardium nuttali	5515220102	1		1	2
Tellina nuculoides	5515310202	10	8	8	26
Psephidia lordi	5515470501	11	11	18	40
Protothaca sp.	55154707	1			1
Mya arenaria	5517010201	3	1	8	12
Hiatella arctica	5517060201	1	3		4
Lyonsia californica	5520050202			1	1
Balanus crenatus	6134020104			1	1
Ampelisca spp.	61690201	119	135	209	463
Ampelisca cristata	6169020112	16	48	53	117
Byblis millsi	6169020208		2		2
Corophium crassicorne	6169150203	88	62	33	183
Rhachotropis sp	61692013			1	1
Photis spp	61692602			3	3
Photis brevipes	6169260201	3	6		9
Anonyx lilljeborgi	6169340303			1	1
Synchelidium shoemakeri	6169371402			1	1
Synchelidium rectipalmum	6169371403	3			3
Eualus pusiolus	6179160408		3		3
Heptacarpus flexus	6179160509		1		1
Oregonia spp.	61870101		1		1
Golfingia spp.	72000201	1	2		3
Ophiuroida	8120	1			1
Dendraster excentricus	8155010101	7	2	2	11
Holothuroidea	8170			7	7
Pentamera sp. 1	817206039989	1			1
Leptosynapta transgressor	8178010299	2			2
Ascidiacea	8401		1		1
					1446
		436	476	534 Sum	
		9	8	11 Ave	
		478	406	998 Var	
		22	20	32 Sdv	
		1	1	1 Min	
		119	135	209 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 10

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43		3		3
Gattyana cirrosa	5001020603	1			1
Harmothoe extenuata	5001020803	1			1
Harmothoe imbricata	5001020806			1	1
Harmothoe lunulata	5001020810			1	1
Lepidasthenia berkeleyae	5001021801	1	2		3
Sthenelais tertiaglabra	5001060305		1		1
Eteone californica	5001130201		1		1
Eteone longa	5001130205	1			1
Eulalia (Eumida) sanguinea	5001131101		4	1	5
Syllis hyalina	5001230312	1	2	2	5
Ehlersia heterochaeta	5001232201	7	5	9	21
Platynereis bicanaliculata	5001240501	3	2		5
Nephtys ferruginea	5001250111	2	1	1	4
Glycera capitata	5001270101	1	2	1	4
Glycinde picta	5001280101		4	4	8
Lumbrineris spp.	50013101	22			22
Lumbrineris bicirrata	5001310101	1	2		3
Lumbrineris luti	5001310109		1	2	3
Lumbrineris californiensis	5001310132	2		20	22
Leitoscoloplos pugettensis	5001400102			1	1
Scoloplos acmeceps	5001400311		2		2
Levinsenia gracilis	5001410801	6	2	7	15
Laonice cirrata	5001430201	4	1	3	8
Polydora socialis	5001430402	8	22	13	43
Polydora brachycephala	5001430429	9	35	2	46
Polydora cardalia	5001430431		3	1	4
Prionospio steenstrupi	5001430506	50	47	36	133
Prionospio lighti	5001430521	2	5	4	11
Polydora (Boccardia) pugettensis	5001430812		1		1
Spiophanes berkelyorum	5001431004	3			3
Paraprionospio pinnata	5001431702		11		11
Magelona longicornis	5001440105	8	11	7	26
Phyllochaetopterus prolifica	5001490202	207	252	200	659
Spiochaetopterus costarum	5001490302	4	11		15
Tharyx spp.	50015003	2			2
Tharyx multifilis	5001500302	1		1	2
Tharyx tesselata	5001500308	1	1		2
Chaetozone setosa	5001500401		2		2
Chaetozone spinosa	5001500407	1			1
Cossura longocirrata	5001520101			2	2
Armandia brevis	5001580202	6	3	10	19
Sternaspis scutata	5001590101	6	5	9	20
Capitella capitata	5001600101	1			1
Notomastus lineatus	5001600303		1		1
Mediomastus californiensis	5001600402	48	48	40	136
Maldanidae	500163			1	1
Maldane glebifex	5001630302		5		5
Rhodine bitorquata	5001631001			1	1
Euclymene zonalis	5001631103	29	37	17	83
Galathowenia nr. G. oculata	5001640202	6	6	5	17
Ampharetidae	500167		1		1
Ampharete acutifrons	5001670208			1	1
Melinna cristata	5001670501		1		1
Melinna elisabethae	5001670503			1	1
Asabellides lineata	5001670804	1	2		3
Pista cristata	5001680701		3		3
Polycirrus californicus	5001680810		2	3	5
Streblosoma bairdi	5001682502		4	2	6
Terebellides stroemi	5001690101			1	1

STATION 10 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Megalomma splendida	5001700401	1			1
Myxicola infundibulum	5001700502			1	1
Potamilla myriops	5001700602	1			1
Potamilla intermedia	5001700701	1			1
Spirorbidae sp	500178			1	1
Oligochaeta	5004		1		1
Solariella varicosa	5102100403			1	1
Rissoidae	510320	3			3
Amphissa sp. A	510503019999			1	1
Odostomia sp A	510801019939			1	1
Turbonilla aurantia	5108011134	1			1
Chaetodermatida	5402		1		1
Acila castrensis	5502020101	4	7	1	12
Nucula tenuis	5502020201	1	1	6	8
Yoldia scissurata	5502040504			1	1
Parvilucina tenuisculpta	5515010101	2			2
Adontorhina cyclica	5515020102	1	2		3
Axinopsida serricata	5515020201	34	68	43	145
Mysella tumida	5515100102	3	3		6
Cyclocardia ventricosa	5515170101	1	2	4	7
Macoma elimata	5515310102			2	2
Macoma yoldiformis	5515310111		1		1
Macoma carlottensis	5515310112	3	10	5	18
Macoma nasuta	5515310114	1			1
Cylindroleberididae	611103	1			1
Rutiderma lomae	6111060103	1	2		3
Nebalia spp	61450101	3	5	4	12
Eudorella pacifica	6154040202	6	4	4	14
Diastylopsis tenuis	6154050202		2		2
Leptochelia dubia	6157020103	1			1
Leptognathia gracilis	6157020202		2		2
Leptognathia brevimana	6157020204		4		4
Leptognathia sp	61570901	1		1	2
Haliophasma geminata	6160011601		1		1
Ampelisca spp	61690201		2		2
Ampelisca pugettica	6169020114	2	2		4
Ampelisca lobata	6169020134	2	1		3
Byblis millsi	6169020208		1		1
Corophium spp.	61691502	5	8		13
Melita desdichada	6169211008	2	4		6
Protomedeia spp.	61692603		1		1
Gammaropsis ellisi	6169260499			2	2
Monoculodes zernovi	6169370816			1	1
Westwoodilla caecula	6169371502		1		1
Heterophoxus oculatus	6169420301	30	43	35	108
Metaphoxus frequens	6169420601		1		1
Eyakia robustus	6169420918		1		1
Eobrolgus spinosus	6169420928		6		6
Foxiphalus similis - cognatus complex	616942099999	22		24	46
Rhepoxynius abronuis	6169421504			2	2
Dyopedos spp	61694499	1			1
Hippolytidae	617916		7		7
Eualus pusiolus	6179160408	19	3	12	34
Paguridae	618306			2	2
Pagurus spp	61830602			2	2
Oregonia spp	61870101			2	2
Cancer productus	6188030101	1			1
Cancer oregonensis	6188030106		1		1
Pinnixa spp.	61890604	2	2	5	9

STATION 10 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Golfingia spp.	72000201		2	2	4
Amphiodia urtica/periercta complex	812903019999	1			1
Amphipholus pugetanus	8129030201			4	4
					1938
		603	756	579 Sum	
		9	10	9 Ave	
		732	947	700 Var	
		27	31	26 Sdv	
		1	1	1 Min	
		207	252	200 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 11

Taxon	Code	Rep 1[a]	Rep 3	Rep 5	Total
Nemertea	43	24	25	17	66
Nematoda	47	1	1		2
Gattyana cirrosa	5001020603	1	2	3	6
Harmothoe spp.	50010208			1	1
Harmothoe fragilis	5001020821	1			1
Polyeunoa tuta	5001021601		1		1
Pholoides aspera	5001040101	4	1	19	24
Phyllodoce (Anaitides) groenlandica	5001130102		2	14	16
Anaitides medipapillata	5001130103	1			1
Eulalia (Eumida) sanguinea	5001131101	7	3	14	24
Gyptis brevipalpa	5001210102	1			1
Syllis spp.	50012303			1	1
Syllis hyalina	5001230312		2		2
Exogone lourei	5001230703	5	1	3	9
Exogone verugera	5001230706	1		1	2
Ehlersia heterochaeta	5001232201	1	2	1	4
Nereis procera	5001240404		2		2
Eunereis wailesi	500124119999	1	1		2
Nephtys longosetosa	5001250109	1			1
Nephtys ferruginea	5001250111	1			1
Nephtys caecoides	5001250119	1			1
Glycera capitata	5001270101	7	2	3	12
Glycera americana	5001270104	1			1
Glycera sp. 1	500127019999		1		1
Glycinde picta	5001280101	5	15	1	21
Onuphis iridescens	5001290103			5	5
Lumbrineris spp.	50013101	5	18	1	24
Lumbrineris bicirrata	5001310101		2	2	4
Lumbrineris cruzensis	5001310118		3		3
Lumbrineris limicola	5001310128	21			21
Lumbrineris californiensis	5001310132	32	99	48	179
Drilonerис falcata minor	500133010402		1		1
Dorvillea pseudorubrovittata	5001360101			2	2
Leitoscoloplos pugettensis	5001400102		1		1
Levinsenia gracilis	5001410801	1		2	3
Acesta lopezi	5001411302		1		1
Apistobranchus ornatus	5001420102	1			1
Laonice cirrata	5001430201		1		1
Polydora giardi	5001430401	3		22	25
Polydora socialis	5001430402	5	7	59	71
Prionospio steenstrupi	5001430506	30	33	12	75
Prionospio lighti	5001430521	1	4	3	8
Polydora (Boccardia) pugettensis	5001430812	2	6		8
Spiophanes berkelyorum	5001431004	1	2		3
Paraprionospio pinnata	5001431702	3	4	2	9
Magelona longicornis	5001440105	7	53	15	75
Phyllochaetopterus prolifica	5001490202	177	26	306	509
Spiochaetopterus costarum	5001490302	9	4	2	15
Mesochaetopterus taylori	5001490401	6	5	7	18
Caulleriella alata	5001500202	1			1
Tharyx multifilis	5001500302	1	6	3	10
Tharyx tesselata	5001500308	1	8	5	14
Tharyx secundus	5001500309		1		1
Chaetozone setosa	5001500401	1		1	2
Pherusa plumosa	5001540302	1	1		2
Scalibregma inflatum	5001570101	2	1		3
Asclerocheilus beringianus	5001570201	2			2
Armandia brevis	5001580202	3	3	1	7
Sternaspis scutata	5001590101			2	2
Heteromastus filiformis	5001600201			1	1

STATION 11 (Continued)

Taxon	Code	Rep 1[a]	Rep 3	Rep 5	Total
Heteromastus filobranchus	5001600203	1			1
Notomastus tenuis	5001600302	5	3	4	12
Notomastus lineatus	5001600303	9	13		22
Mediomastus californiensis	5001600402	15	20	2	37
Decamastus gracilis	5001600501	1			1
Barantolla americana	5001600601		10		10
Maldanidae	500163	2	7		9
Praxillella gracilis	5001630901	1			1
Praxillella affinis pacifica	500163090301	1			1
Euclymeninae	5001631			1	1
Rhodine bitorquata	5001631001		16		16
Euclymene zonalis	5001631103	25	11		36
Clymenura columbiana	5001631206	3	2		5
Pectinaria granulata	5001660303		1		1
Ampharetidae	500167		3		3
Ampharete acutifrons	5001670208	2	1		3
Anobothrus gracilis	5001670701	2	3		5
Asabellides lineata	5001670804	14			14
Terebellidae	500168	1	1	1	3
Pista cristata	5001680701	1	2		3
Pista brevibranchiata	5001680710	1		1	2
Polycirrus spp	50016808	3			3
Lanassa venusta venusta	500168130201	2	1		3
Scionella estevanica	5001681803	1			1
Terebellides stroemi	5001690101	3	4	3	10
Myxicola infundibulum	5001700502		1		1
Potamilla occelata	5001700608		2		2
Pseudochitinopoma occidentalis	5001730101	1		1	2
Spirorbis spp	50017305	1			1
Spirorbinae	500178	33	18	43	94
Oligochaeta	5004	1			1
Rissoidae	510320	R	14	17	31
Calyptraeidae spp	510364	R		4	4
Crepipatella lingulata	5103640301	1		18	19
Natica clausa	5103760201	R			0
Amphissa sp. A	510503019999	R	2	5	7
Mitrella tuberosa	5105030202		3		3
Polyplacophora	53	R	2	1	3
Acila castrensis	5502020101	R	1		1
Nucula tenuis	5502020201	R	1		1
Nuculana minuta	5502040202	R	1		1
Megacrenella columbiana	5507010301	R	1		1
Chlamys hastata	5509050101	R		3	3
Parvilucina tenuisculpta	5515010101	R	1		1
Axinopsida serricata	5515020201	R	6	1	7
Thyasira sp	55150203	R	1		1
Thyasira gouldii	5515020325	R	1		1
Mysella tumida	5515100102	R	7	4	11
Cyclocardia ventricosa	5515170101	R	31	38	69
Macoma spp.	55153101	R	1	1	2
Macoma calcarea	5515310101	R			0
Macoma carlottensis	5515310112	R		2	2
Psephidia lordi	5515470501	R	5		5
Protothaca sp	55154707	R		1	1
Mya arenaria	5517010201	R	2	4	6
Lyonsia californica	5520050202	R	2		2
Cylindroleberididae	611103		1		1
Rutiderma lomae	6111060103	2	3	2	7
Nebalia spp.	61450101		1		1
Eudorella pacifica	6154040202	10	8	10	28

STATION 11 (Continued)

Taxon	Code	Rep 1[a]	Rep 3	Rep 5	Total
Leptochelia dubia	6157020103		1		1
Leptognathia gracilis	6157020202		1		1
Leptognathia sp.	61570901	4		1	5
Haliophasma geminata	6160011601	2	1		3
Ampelisca spp.	61690201	247	61	29	337
Ampelisca pugettica	6169020114	140	236	105	481
Ampelisca lobata	6169020134	24	18	12	54
Byblis millsi	6169020208		6		6
Aoroides spp.	61690602	3		1	4
Corophium spp.	61691502	2		19	21
Corophium crassicorne	6169150203			1	1
Melita desdichada	6169211008	5		1	6
Photis spp.	61692602			1	1
Protomedeia articulata	6169260307			41	41
Ischyrocerus sp.	61692702	1			1
Ischyrocerus anguipes complex	6169270202	1		5	6
Monoculodes spp	61693708		1		1
Monoculodes zernovi	6169370816	1		1	2
Westwoodilla caecula	6169371502		1		1
Phoxocephalidae	616942		1		1
Heterophoxus oculatus	6169420301	17	21	11	49
Metaphoxus frequens	6169420601			5	5
Eobrolgus spinosus	6169420928		3		3
Foxiphalus similis - cognatus complex	616942099999	9	3	12	24
Dyopedos spp	61694499	1			1
Caridea	6179	1			1
Spirontocaris sp	61791602	1			1
Eualus spp.	61791604	5			5
Eualus pusiolus	6179160408			5	5
Pandalus danae	6179180107			1	1
Callianassa spp	61830402		1		1
Pagurus spp.	61830602	1	1	1	3
Oregonia spp.	61870101	1		1	2
Pugettia spp	61870105		1		1
Cancer spp.	61880301			1	1
Cancer branneri	6188030103	2			2
Lophopanopeus spp.	61890201	1			1
Lophopanopeus bellus diegensis	618902010102			4	4
Pinnixa spp.	61890604	2	1	1	4
Golfingia spp.	72000201	8	1	3	12
Phoronida	77		5	2	7
Amphipholus pugetanus	8129030201	2		1	3
					2943
		1003	929	1011 Sum	
		9	9	12 Ave	
		942	704	1312 Var	
		31	27	36 Sdv	
		0	0	0 Min	
		247	236	306 Max	

[a] Vial containing molluscs for Station 11 (Replicate 1) was broken in shipment.

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 12

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43	3		1	4
Hesperonoe complanata	5001021701		1		1
Pholoe minuta	5001060101	20	16	24	60
Platynereis bicanaliculata	5001240501		2		2
Nephtys punctata	5001250105		2		2
Nephtys ferruginea	5001250111		1	4	5
Glycera capitata	5001270101			1	1
Glycinde armigera	5001280103		1		1
Lumbrineris spp.	50013101	3		6	9
Lumbrineris luti	5001310109	1	3		4
Lumbrineris californiensis	5001310132		1		1
Allia ramosa	5001410706	4	2	1	7
Levinsenia gracilis	5001410801	2	13	9	24
Acesta lopezi	5001411302			2	2
Laonice cirrata	5001430201			3	3
Polydora socialis	5001430402	1			1
Polydora brachycephala	5001430429	8			8
Prionospio lighti	5001430521	13	8	5	26
Paraprionospio pinnata	5001431702	3	2	4	9
Tharyx multifilis	5001500302		1		1
Cossura longocirrata	5001520101	2	2	2	6
Cossura modica	5001520199	1			1
Travisia pupa	5001580403	1		1	2
Ophelina acuminata	5001580607		5		5
Sternaspis scutata	5001590101	6	5	1	12
Mediomastus spp.	50016004		1		1
Mediomastus californiensis	5001600402	1		2	3
Praxillella spp.	50016309		1		1
Euclymeninae	5001631		1		1
Euclymene zonalis	5001631103	5	3	1	9
Pectinaria californiensis	5001660304	6	3	3	12
Terebellides stroemi	5001690101		1		1
Oligochaeta	5004	2	1		3
Rissoidae	510320	3		2	5
Turbonilla aurantia	5108011134		1		1
Turbonilla sp. B	510801119998	1		2	3
Cephalaspidea	5110			2	2
Cylichna attonsa	5110040205	2	5	1	8
Gastropteron pacificum	5110070101			1	1
Diaphana sp.	5110090102			1	1
Bivalvia	55	1			1
Acila castrensis	5502020101	6	3	1	10
Nucula tenuis	5502020201	12	8	13	33
Nuculana minuta	5502040202	1	1	2	4
Yoldia thraciaeformis	5502040507	1			1
Megacrenella columbiana	5507010301		1		1
Parvilucina tenuisculpta	5515010101	1	2		3
Lucinoma acutilineata	5515010201	1		1	2
Axinopsida serricata	5515020201	4	4	2	10
Mysella tumida	5515100102	39	29	20	88
Clinocardium nuttali	5515220102		1		1
Macoma spp.	55153101	1	5	8	14
Macoma elimata	5515310102		1		1
Macoma carlottensis	5515310112	18	2	4	24
Compsomyax subdiaphana	5515470301	9	4	5	18
Psephidia lordi	5515470501	1			1
Pandora filosa	5520020102	1			1
Lyonsia californica	5520050202	1		1	2
Dentalium sp.	56010101	8	5	3	16
Rutiderma lomae	6111060103			3	3

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 12 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Euphilomedes producta	6111070303	3	1		4
Eudorella pacifica	6154040202	40	40	34	114
Ampelisca spp	61690201			1	1
Ampelisca brevisimulata	6169020125		3		3
Protomedeia spp	61692603	1			1
Prachynella lodo	6169345701		1		1
Westwoodilla caecula	6169371502		1		1
Heterophoxus oculatus	6169420301	15	27	10	52
Pinnixa spp	61890604	4			4
Golfingia spp	72000201	1			1
Ophiuroida	8120	1			1
Amphiuridae	812903	11	4	11	26
Amphiodia spp.	81290301	7	15	9	31
Amphiodia urtica/periercta complex	812903019999	80	108	119	307
Amphiodia occidentalis	8129030302	10		10	20
					1050
		366	348	336 Sum	
		8	7	8 Ave	
		182	283	346 Var	
		13	17	19 Sdv	
		1	1	1 Min	
		80	108	119 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 13

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Anthozoa sp. 1	374000009999			1	1
Nemertea	43	1	4	13	18
Pholoe minuta	5001060101	3	5	11	19
Phyllodocidae	500113		1		1
Phyllodoce (Anaitides) groenlandica	5001130102			1	1
Eteone spilotus	5001130299			1	1
Gyptis brevipalpa	5001210102			1	1
Autolytus cornutus	5001230101	1			1
Syllis hyalina	5001230312		3	4	7
Eusyllis assimilis	5001230601	1			1
Exogone lourei	5001230703	6	1	31	38
Ehlersia heterochaeta	5001232201	1	2	11	14
Platynereis bicanaliculata	5001240501	27		1	28
Nephtys ferruginea	5001250111	3	3		6
Sphaerodoropsis sphaerulifer	5001260103	2		1	3
Glycinde picta	5001280101	2	2	5	9
Onuphis iridescens	5001290103	3	1	6	10
Diopatra ornata	5001290202			1	1
Lumbrineris spp.	50013101	1	1	1	3
Lumbrineris luti	5001310109	2	2	5	9
Lumbrineris californiensis	5001310132	4			4
Notocirrus californiensis	5001330302			1	1
Leitoscoloplos panamensis	5001400101	17			17
Leitoscoloplos pugettensis	5001400102		11	1	12
Scoloplos armiger	5001400301	2		7	9
Orbinia (Phylo) felix	5001400510		1		1
Acesta lopezi	5001411302		1	1	2
Laonice cirrata	5001430201	1		1	2
Polydora socialis	5001430402	11	31	26	68
Prionospio steenstrupi	5001430506			1	1
Prionospio lighti	5001430521			2	2
Spio cirrifera	5001430703			1	1
Polydora (Boccardia) pugettensis	5001430812	23	34	34	91
Spiophanes bombyx	5001431001	2	2	1	5
Paraprionospio pinnata	5001431702	3	2	1	6
Magelona longicornis	5001440105	1			1
Phyllochaetopterus prolifica	5001490202			3	3
Spiochaetopterus costarum	5001490302			6	6
Cirratulidae	500150	1			1
Tharyx multifilis	5001500302		3	1	4
Chaetozone setosa	5001500401			1	1
Ophelina acuminata	5001580607			1	1
Notomastus lineatus	5001600303		3	7	10
Mediomastus californiensis	5001600402	5	125	89	219
Decamastus gracilis	5001600501	5	12	29	46
Barantolla americana	5001600601			3	3
Maldanidae	500163	1	2	3	6
Axiothella rubrocincta	5001630802			2	2
Euclymene zonalis	5001631103		3	5	8
Owenia fusiformis	5001640102			1	1
Lysippe labiata	5001670401		1	2	3
Melinna elisabethae	5001670503			3	3
Terebellidae	500168	1	1		2
Pista cristata	5001680701			1	1
Polycirrus californicus	5001680810	1	3	6	10
Amphitritinae	5001681	1			1
Proclea graffii	5001681702	3	2	4	9
Chone duneri	5001700104			1	1
Rissoidae	510320	62	34	25	121
Mitrella tuberosa	5105030202	13	3	8	24

STATION 13 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Olivella baetica	5105100102	1			1
Odostomia sp. A	510801019939	1			1
Cylichna attonsa	5110040205	1			1
Nucula tenuis	5502020201	2	3	4	9
Yoldia scissurata	5502040504		2	1	3
Mytilidae sp	550701	2		1	3
Megacrenella columbiana	5507010301		1		1
Chlamys hastata	5509050101	3			3
Parvilucina tenuisculpta	5515010101	1	2	4	7
Adontorhina cyclica	5515020102			5	5
Axinopsida serricata	5515020201	44	67	70	181
Mysella tumida	5515100102	6	51	22	79
Clinocardium nuttali	5515220102	3	2	2	7
Solen sicarius	5515290201		5	9	14
Macoma spp.	55153101	7	3	1	11
Macoma elimata	5515310102			1	1
Macoma yoldiformis	5515310111			1	1
Macoma carlottensis	5515310112		1	4	5
Macoma nasuta	5515310114		4	1	5
Tellina nuculoides	5515310202		1		1
Tellina modesta	5515310204	16	20	15	51
Compsomyax subdiaphana	5515470301			1	1
Psephidia lordi	5515470501	967	977	957	2901
Protothaca sp.	55154707			1	1
Mya arenaria	5517010201	1		1	2
Hiatella arctica	5517060201			1	1
Lyonsia californica	5520050202		4	5	9
Cardiomya californica	5520100108			14	14
Cylindroleberididae	611103	1	1	1	3
Rutiderma lomae	6111060103		2	2	4
Euphilomedes carcharodonta	6111070301	85	118	92	295
Euphilomedes producta	6111070303	1		7	8
Cirripedia	6130	44			44
Nebalia spp.	61450101	3	2		5
Eudorella pacifica	6154040202			1	1
Diastylis alaskensis	6154050101			1	1
Campylaspis spp.	61540701	1	2		3
Leptochelia dubia	6157020103	1			1
Haliophasma geminata	6160011601	1		2	3
Ampelisca spp.	61690201	3			3
Ampelisca hancocki	6169020113			1	1
Byblis millsi	6169020208	1			1
Melita desdichada	6169211008	5			5
Photis spp	61692602	2			2
Protomedeia spp.	61692603		2	4	6
Protomedeia grandimana	6169260303	4			4
Protomedeia articulata	6169260307	5			5
Protomedeia prudens	6169260312		6		6
Anonyx lilljeborgi	6169340303	5	2		7
Orchomene pacifica	6169342903			2	2
Synchelidium spp.	61693714	1	1		2
Westwoodilla caecula	6169371502	1			1
Heterophoxus oculatus	6169420301		1		1
Paraphoxus sp.	61694209	1			1
Foxiphalus similis - cognatus complex	616942099999		1		1
Pleustes depressa	6169430408	1			1
Pleustes platypa	6169430409	1			1
Dyopedos spp.	61694499	1			1
Stenothoidae	616948		1		1

STATION 13 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Caprella mendax	6171010719	2		4	6
Callianassa spp	61830402		10	4	14
Pinnixa spp.	61890604	6	8	17	31
Golfingia spp	72000201		2		2
Havelockia sp.	81720402			1	1
					4674
		1441	1601	1632 Sum	
		21	27	19 Ave	
		13369	15881	10734 Var	
		116	126	104 Sdv	
		1	1	1 Min	
		967	977	957 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 14

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Pachycerianthus fimbriatus	3743010303		1		1
Nemertea	43	1	2	3	6
Harmothoe lunulata	5001020810		1		1
Pholoe minuta	5001060101	4	3	3	10
Eteone longa	5001130205			2	2
Kefersteinia cirrata	5001210501			1	1
Autolytus cornutus	5001230101	1			1
Nephtys cornuta franciscana	500125010401			1	1
Nephtys rickettsi	5001250106	1	4	2	7
Nephtys ferruginea	5001250111			3	3
Glycera capitata	5001270101	1	6	1	8
Glycinde armigera	5001280103	1			1
Onuphidae	500129		1		1
Onuphis iridescens	5001290103	1			1
Diopatra ornata	5001290202	1		2	3
Lumbrineris luti	5001310109	1			1
Ninoe gemmea	5001310202	1			1
Driloneris falcata minor	500133010402		1	1	2
Scoloplos acmeceps	5001400311			1	1
Levinsenia gracilis	5001410801	1		1	2
Polydora spp.	50014304	1			1
Polydora socialis	5001430402		5	1	6
Polydora quadrilobata	5001430408		1		1
Polydora brachycephala	5001430429		4	1	5
Polydora cardalia	5001430431			1	1
Prionospio steenstrupi	5001430506	1	2		3
Prionospio lighti	5001430521	6		2	8
Polydora (Boccardia) pugettensis	5001430812			1	1
Spiophanes berkelyorum	5001431004	2		1	3
Paraprionospio pinnata	5001431702	6	1	2	9
Tharyx spp.	50015003		1		1
Chaetozone spp.	50015004	1			1
Chaetozone setosa	5001500401			2	2
Cossura longocirrata	5001520101	7		1	8
Brada sachalina	5001540199	1		2	3
Pherusa plumosa	5001540302		1		1
Armandia brevis	5001580202		1		1
Ophelina acuminata	5001580607			1	1
Sternaspis scutata	5001590101	9	6	10	25
Notomastus lineatus	5001600303		2		2
Mediomastus ambiseta	5001600401	4			4
Mediomastus californiensis	5001600402		4	7	11
Decamastus gracilis	5001600501	1		5	6
Maldanidae	500163	1	2		3
Maldane glebifex	5001630302	1	12	1	14
Praxilliella spp.	50016309			1	1
Euclymeninae	5001631	3		19	22
Rhodine bitorquata	5001631001			1	1
Euclymene zonalis	5001631103		4		4
Pectinaria granulata	5001660303	3			3
Pectinaria californiensis	5001660304	4	2	1	7
Ampharete acutifrons	5001670208	1	1	1	3
Pista cristata	5001680701		1		1
Pista brevibranchiata	5001680710	2	1		3
Polycirrus californicus	5001680810	1		4	5
Streblosoma bairdi	5001682502		1		1
Terebellides stroemi	5001690101	2	2	2	6
Chone duneri	5001700104	1			1
Oligochaeta	5004	4		1	5
Natica clausa	5103760201	1			1

STATION 14 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Mitrella tuberosa	5105030202	6		1	7
Odostomia sp. A	510801019939	1			1
Turbonilla sp. B	510801119998	1			1
Cylichna attonsa	5110040205			1	1
Melanochlamys dimedea	511006999999			1	1
Aplacophora	54	2			2
Nucula tenuis	5502020201	1	1	1	3
Yoldia scissurata	5502040504	4	2	1	7
Adontorhina cyclica	5515020102	2			2
Axinopsida serricata	5515020201	89	73	55	217
Mysella tumida	5515100102	2	3		5
Nemocardium centifilosum	5515220301		2		2
Macoma spp.	55153101		10		10
Macoma calcarea	5515310101	8	1	10	19
Macoma elimata	5515310102		23		23
Macoma carlottensis	5515310112	32	23	41	96
Tellina modesta	5515310204			1	1
Compsomyax subdiaphana	5515470301	7		4	11
Psephidia lordi	5515470501		1		1
Hiatella arctica	5517060201			1	1
Cylindroleberididae	611103	1	1		2
Euphilomedes carcharodonta	6111070301	2			2
Euphilomedes producta	6111070303	29	3		32
Mysidacea	6151		1		1
Eudorella pacifica	6154040202	3			3
Diastylis alaskensis	6154050101	1			1
Oxyurostylis pacifica	6154050802			1	1
Leptognathia sp.	61570901	1			1
Munna spp.	61631201		1		1
Eudorellopsis sp.	61640403			1	1
Ampelisca careyi	6169020135	2	2		4
Gammaridae	616921			1	1
Isaeidae	616926			2	2
Anonyx sp.	61693403	1			1
Anonyx lilljeborgi	6169340303		1		1
Westwoodilla caecula	6169371502		1	1	2
Heterophoxus oculatus	6169420301	2	4	3	9
Dyopedos spp	61694499	1	1	3	5
Stenothoidae	616948		1		1
Callianassidae	618304		1		1
Callianassa spp	61830402	2			2
Pinnixa spp	61890604	5	2	1	8
Golfingia spp.	72000201		2		2
Echiurus spp.	73010202	6		25	31
Phoronida	77	1		2	3
Amphiodia spp.	81290301		1		1
Amphiodia urtica/periercta complex	812903019999		1		1
Axiognathus pugetanus	8129030201	2			2
					772
		291	235	246 Sum	
		5	4	4 Ave	
		147	111	90 Var	
		12	11	9 Sdv	
		1	1	1 Min	
		89	73	55 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 15

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43	6	3	6	15
Polynoidae	500102	1			1
Pholoides aspera	5001040101	3	2		5
Pholoe minuta	5001060101	4	1	3	8
Phyllodoce (Genetyllis) castanea	5001130701		1		1
Phyllodoce (Anaitides) spp	5001131499		1	1	2
Syllis elongata	5001230308		3		3
Exogone lourei	5001230703	6	20	31	57
Exogone verugera	5001230706	12	22	3	37
Ehlersia heterochaeta	5001232201		3	3	6
Platynereis bicanaliculata	5001240501	4	1	3	8
Nephtys ferruginea	5001250111	13	5	4	22
Nephtys caecoides	5001250119		1		1
Nephtys assignis	5001250121		1		1
Glycera capitata	5001270101	2	3	2	7
Glycinde picta	5001280101		1		1
Glycinde armigera	5001280103	1		1	2
Goniada maculata	5001280202	1			1
Onuphis conchylega	5001290101			1	1
Onuphis iridescens	5001290103	1	1		2
Lumbrineris spp.	50013101		2	1	3
Lumbrineris luti	5001310109	11	18	9	38
Lumbrineris cruzensis	5001310118	4	1	3	8
Lumbrineris californiensis	5001310132	25	17	2	44
Notocirrus californiensis	5001330302		1		1
Leitoscoloplos pugettensis	5001400102	8		3	11
Orbinia (Phylo) felix	5001400510	1	1	1	3
Acesta lopezi	5001411302	1	2	1	4
Apistobranchus ornatus	5001420102			4	4
Polydora socialis	5001430402	10	2	5	17
Prionospio steenstrupi	5001430506			1	1
Prionospio lighti	5001430521	5	2	1	8
Spio cirrifera	5001430703		1		1
Paraprionospio pinnata	5001431702		1	1	2
Phyllochaetopterus prolifica	5001490202	34	18	17	69
Tharyx multifilis	5001500302		1	2	3
Tharyx secundus	5001500309	1			1
Chaetozone setosa	5001500401	2	1		3
Flabelligera affinis	5001540202	1			1
Armandia brevis	5001580202	1			1
Travisia brevis	5001580401	1			1
Ophelina acuminata	5001580607		1	1	2
Heteromastus filobranchus	5001600203	1			1
Mediomastus spp.	50016004		1		1
Mediomastus californiensis	5001600402	1	2	2	5
Decamastus gracilis	5001600501	8	12	6	26
Barantolla americana	5001600601			3	3
Maldanidae	500163	3			3
Clymenella complanata	5001630204	1			1
Axiothella rubrocincta	5001630802			2	2
Euclymeninae	5001631	2	4	3	9
Rhodine bitorquata	5001631001			3	3
Clymenura columbiana	5001631206	2	3	3	8
Owenia fusiformis	5001640102		1		1
Myriochele heeri	5001640201		3	3	6
Galathowenia nr. G. oculata	5001640202	3	3		6
Pectinaria granulata	5001660303	2	2	1	5
Ampharete acutifrons	5001670208	3			3
Lysippe labiata	5001670401	1	4	1	6
Asabellides lineata	5001670804			1	1

STATION 15 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Polycirrus spp.	50016808	2	1	1	4
Polycirrus californicus	5001680810	1	3	2	6
Lanassa venusta venusta	500168130201	1	2	2	5
Scionella estevanica	5001681803	1			1
Terebellides stroemi	5001690101	3		1	4
Pseudochitinopoma occidentalis	5001730101	3	1	1	5
Spirorbidae	500178		1	1	2
Rissoidae	510320	9	28	14	51
Bittium spp.	51034601	1			1
Crepipatella lingulata	5103640301	1		1	2
Natica clausa	5103760201		1		1
Mitrella tuberosa	5105030202		3	1	4
Oenopota tabulata	5106020405		1		1
Odostomia sp. A	510801019939		2		2
Turbonilla aurantia	5108011134	2	2	4	8
Turbonilla sp. B	510801119998		3	6	9
Cylichna attonsa	5110040205	1		6	7
Diaphana sp.	5110090102	1			1
Nudibranchia	5127	1			1
Polyplacophora	53	1			1
Nucula tenuis	5502020201	9		3	12
Nuculana minuta	5502040202	26	9	23	58
Yoldia scissurata	5502040504	1	1		2
Mytilidae	550701	1	3	1	5
Megacrenella columbiana	5507010301	5		1	6
Chlamys hastata	5509050101	51	24	9	84
Parvilucina tenuisculpta	5515010101	6	14	12	32
Lucinoma acutilineata	5515010201		1	1	2
Adontorhina cyclica	5515020102	1	4	2	7
Axinopsida serricata	5515020201	9	6	7	22
Thyasira gouldii	5515020325	4	4	2	10
Mysella tumida	5515100102	3	4	2	9
Clinocardium nuttali	5515220102			3	3
Nemocardium centifilosum	5515220301	5	14	14	33
Macoma spp.	55153101	126	30	46	202
Macoma calcarea	5515310101	10	8	3	21
Macoma carlottensis	5515310112	10	13	14	37
Compsomyax subdiaphana	5515470301			3	3
Psephidia lordi	5515470501		4	6	10
Pandora filosa	5520020102		2		2
Lyonsia californica	5520050202	4		2	6
Cardiomya californica	5520100108	3	1	6	10
Dentalium spp.	56010101			4	4
Euphilomedes carcharodonta	6111070301		1	3	4
Euphilomedes producta	6111070303	9	9	5	23
Leptochelia dubia	6157020103	4	10	6	20
Haliophasma geminata	6160011601			2	2
Ampelisca lobata	6169020134	1			1
Ampelisca careyi	6169020135		1		1
Byblis millsi	6169020208		1	1	2
Corophium spp.	61691502	1			1
Rhachotropis sp	61692013			1	1
Protomedeia spp.	61692603		1		1
Opisa tridentata	6169342802			2	2
Monoculodes zernovi	6169370816	1	3	1	5
Westwoodilla caecula	6169371502	4	4	2	10
Heterophoxus oculatus	6169420301	10	2	2	14
Eyakia robustus	6169420918	2			2
Foxiphalus similis - cognatus complex	616942099999		1		1
Foxiphalus sp.	61694222	1			1

STATION 15 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Spirontocaris snyderi	6179160204		1		1
Eualus pusiolus	6179160408	1			1
Callianassa spp	61830402			1	1
Oregonia spp	61870101	1			1
Pinnixa spp.	61890604		1		1
Golfingia spp	72000201	2		1	3
Phoronida	77	2	2	2	6
Amphiodia urtica/periercta complex	812903019999	1			1
Amphipholus spp.	81290302	3	2		5
Amphipholus squamatus	8129030202	4		1	5
Ascidiacea	8401	3	2		5
					1314
		538	404	372 Sum	
		6	5	4 Ave	
		227	42	45 Var	
		15	6	7 Sdv	
		1	1	1 Min	
		126	30	46 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 16

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Anthozoa sp. 1	374000009999	1	2		3
Stylatula elongata	3754010103	1			1
Nemertea	43	7	5	6	18
Nematoda	47			1	1
Pholoides aspera	5001040101	1	3	4	8
Sthenelais tertiaglabra	5001060305		1	1	2
Paleonotus bellis	5001080101	1			1
Phyllodocidae	500113		1		1
Eteone californica	5001130201	1			1
Eulalia (Eumida) sanguinea	5001131101	1	3	5	9
Syllis elongata	5001230308			2	2
Exogone lourei	5001230703	2	1	15	18
Exogone verugera	5001230706		2	10	12
Ehlersia heterochaeta	5001232201	2	1	1	4
Nereis procera	5001240404		2		2
Glycera capitata	5001270101	4	3	3	10
Glycinde picta	5001280101	1	2		3
Onuphidae	500129		2	1	3
Diopatra ornata	5001290202		1		1
Lumbrineris spp.	50013101		2		2
Lumbrineris luti	5001310109	5	5	7	17
Lumbrineris lagunae	5001310129	3			3
Drilonereis longa	5001330103			1	1
Leitoscoloplos pugettensis	5001400102	7	1	3	11
Apistobranchus ornatus	5001420102	1			1
Polydora giardi	5001430401			2	2
Polydora socialis	5001430402	6	17	9	32
Prionospio steenstrupi	5001430506	11	14	9	34
Prionospio lighti	5001430521		3		3
Spiophanes berkelyorum	5001431004	30	32	12	74
Paraprionospio pinnata	5001431702	3	3	4	10
Magelona longicornis	5001440105	2	1	2	5
Phyllochaetopterus prolifica	5001490202		1		1
Spiochaetopterus costarum	5001490302			1	1
Cirratulidae	500150		2		2
Caulleriella alata	5001500202	1		1	2
Tharyx multifilis	5001500302	8	30	6	44
Tharyx tesselata	5001500308		6		6
Chaetozone setosa	5001500401		1		1
Notomastus lineatus	5001600303		3		3
Mediomastus californiensis	5001600402		1		1
Decamastus gracilis	5001600501	4		8	12
Maldanidae	500163			1	1
Euclymeninae	5001631			1	1
Euclymene zonalis	5001631103		2		2
Galathowenia nr. G. oculata	5001640202			2	2
Pectinaria californiensis	5001660304	1		1	2
Amage anops	5001670101	7	15	5	27
Melinna elisabethae	5001670503	1			1
Terebellidae	500168	2	2	1	5
Pista brevibranchiata	5001680710			1	1
Polycirrus sp.	50016808			1	1
Lanassa venusta venusta	500168130201			1	1
Sabellidae	500170		1	3	4
Megalomma splendida	5001700401	4	16	4	24
Sabellinae	5001702			1	1
Rissoidae	510320	3			3
Natica clausa	5103760201			1	1
Mitrella tuberosa	5105030202		8	3	11
Nassarius mendicus	5105080101	1	4	3	8

STATION 16 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Kurtziella plumbea	5106021107		1	1	2
Odostomia sp A	510801019939	2	3	8	13
Turbonilla aurantia	5108011134	4	5	2	11
Rictaxis punctocaelatus	5110010401			1	1
Cylichna attonsa	5110040205		1		1
Bivalvia	55		1		1
Acila castrensis	5502020101		1	1	2
Nucula tenuis	5502020201	2	1	1	4
Nuculana minuta	5502040202			1	1
Yoldia scissurata	5502040504	1			1
Megacrenella columbiana	5507010301	2	1	1	4
Chlamys hastata	5509050101		1	4	5
Parvilucina tenuisculpta	5515010101	4	1	2	7
Axinopsida serricata	5515020201	8	14	4	26
Thyasira gouldii	5515020325	4	3		7
Mysella tumida	5515100102		1	6	7
Nemocardium centifilosum	5515220301	1	1		2
Macoma spp.	55153101	8		10	18
Macoma calcarea	5515310101			1	1
Macoma yoldiformis	5515310111	4			4
Macoma carlottensis	5515310112	4	4	2	10
Compsomyax subdiaphana	5515470301		1		1
Psephidia lordi	5515470501	5	2	2	9
Lyonsia californica	5520050202	2	9	3	14
Thracia trapezoides	5520080203	3			3
Octopoda sp	5708	2	7		9
Euphilomedes producta	6111070303	6		6	12
Mysidacea	6151	1			1
Ampelisca spp.	61690201		1	1	2
Ampelisca careyi	6169020135	1			1
Byblis millsi	6169020208		8	3	11
Westwoodilla caecula	6169371502		1	1	2
Heterophoxus oculatus	6169420301			1	1
Pagurus spp.	61830602	1			1
Golfingia spp.	72000201	21	25	13	59
Phoronida	77	8	1	6	15
Amphiodia spp	81290301			1	1
					734
		216	293	225 Sum	
		4	5	4 Ave	
		25	47	11 Var	
		5	7	3 Sdv	
		1	1	1 Min	
		30	32	15 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 17

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43	2			2
Tenonia priops	5001022302		1		1
Gyptis brevipalpa	5001210102			1	1
Sigambra bassi	5001220204	7	6	6	19
Nephtys spp.	50012501			1	1
Nephtys cornuta franciscana	500125010401	1			1
Nephtys punctata	5001250105	1	2		3
Nephtys ferruginea	5001250111	1	2	2	5
Glycera capitata	5001270101			2	2
Goniada brunnea	5001280203	1	1		2
Onuphis iridescens	5001290103		2		2
Lumbrineris luti	5001310109			1	1
Leitoscoloplos pugettensis	5001400102	2		2	4
Levinsenia gracilis	5001410801	4	2	6	12
Acesta lopezi	5001411302	6	1	20	27
Laonice cirrata	5001430201			1	1
Prionospio steenstrupi	5001430506	6		4	10
Prionospio lighti	5001430521			1	1
Spiophanes berkelyorum	5001431004	8	5	7	20
Paraprionospio pinnata	5001431702		1		1
Cossura modica	5001520199	25	5	16	46
Heteromastus filobranchus	5001600203	1			1
Mediomastus ambiseta	5001600401	1		1	2
Ampharete acutifrons	5001670208	1	1	3	5
Polycirrus californicus	5001680810	1		1	2
Odostomia sp. A	510801019939	1			1
Nucula tenuis	5502020201		1	1	2
Axinopsida serricata	5515020201	65	64	47	176
Mysella tumida	5515100102	1			1
Macoma carlottensis	5515310112	2	2	5	9
Mysidacea	6151			2	2
Eudorella pacifica	6154040202	11	3	6	20
Halicella halona	6169400602		1	3	4
Harpiniopsis sp.	61694202			1	1
Heterophoxus oculatus	6169420301		1	1	2
Eobrolgus sp.	61694219			1	1
Decapoda	6175	2			2
					393
		150	101	142 Sum	
		7	6	5 Ave	
		190	203	90 Var	
		14	14	9 Sdv	
		1	1	1 Min	
		65	64	47 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 18

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43	2	5	4	11
Harmothoe lunulata	5001020810		1	1	2
Pholoe minuta	5001060101	1	1		2
Eteone californica	5001130201	1	2		3
Gyptis brevipalpa	5001210102	1	1	2	4
Sigambra bassi	5001220204			8	8
Syllis elongata	5001230308		1		1
Exogone lourei	5001230703		1	1	2
Nephtys cornuta franciscana	500125010401	3	1	5	9
Nephtys ferruginea	5001250111		2	2	4
Glycera capitata	5001270101	3	1	2	6
Glycinde armigera	5001280103	4	8	8	20
Goniada brunnea	5001280203		1		1
Lumbrineris luti	5001310109	22	63	8	93
Polydora socialis	5001430402	31	43	8	82
Prionospio lighti	5001430521	4	1		5
Spiophanes berkelyorum	5001431004	5	7	4	16
Paraprionospio pinnata	5001431702	3	2	3	8
Trochochaeta multisetosa	5001450102	1	1		2
Phyllochaetopterus prolifica	5001490202	2	10		12
Spiochaetopterus costarum	5001490302	2	12		14
Tharyx multifilis	5001500302	4	9	12	25
Chaetozone spinosa	5001500407	3			3
Sternaspis scutata	5001590101		1		1
Heteromastus filobranchus	5001600203	1		4	5
Mediomastus spp.	50016004			1	1
Barantolla americana	5001600601			3	3
Maldanidae	500163	1			1
Praxillella spp.	50016309	4	2		6
Euclymeninae	5001631		2		2
Pectinaria californiensis	5001660304	25	12	25	62
Amphicteis scaphobranchiata	5001670304			1	1
Polycirrus spp.	50016808		2		2
Polycirrus californicus	5001680810		1		1
Terebellides stroemi	5001690101		1		1
Rictaxis punctocaelatus	5110010401	6	2		8
Cylichna attonsa	5110040205	2	3	5	10
Melanochlamys dimedea	511006999999	2	1	1	4
Nucula tenuis	5502020201	2	1	1	4
Axinopsida serricata	5515020201	212	232	49	493
Mysella tumida	5515100102	37	29	4	70
Macoma spp.	55153101	3			3
Macoma carlottensis	5515310112	16	18	1	35
Compsomyax subdiaphana	5515470301	3			3
Psephidia lordi	5515470501	2	1	1	4
Pandora filosa	5520020102		1	1	2
Euphilomedes producta	6111070303		1		1
Eudorella pacifica	6154040202		2		2
Pinnixa spp	61890604		5	1	6
Phoronida	77	10	24	4	38
					1102
		418	514	170 Sum	
		13	13	6 Ave	
		1359	1357	90 Var	
		37	37	9 Sdv	
		1	1	1 Min	
		212	232	49 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 19

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43	4	2	1	7
Ehlersia heterochaeta	5001232201	1			1
Nephtys cornuta franciscana	500125010401	1			1
Glycera capitata	5001270101			1	1
Onuphis iridescens	5001290103	3	2	5	10
Lumbrineris spp.	50013101		1		1
Lumbrineris luti	5001310109	2		3	5
Lumbrineris cruzensis	5001310118		2		2
Leitoscoloplos pugettensis	5001400102			2	2
Levinsenia gracilis	5001410801	1	1		2
Polydora socialis	5001430402	1	3		4
Prionospio steenstrupi	5001430506	1		1	2
Prionospio lighti	5001430521	2	2		4
Spiophanes berkelyorum	5001431004	3		3	6
Spiochaetopterus costarum	5001490302		2	2	4
Caulleriella alata	5001500202		1		1
Chaetozone setosa	5001500401			1	1
Cossura longocirrata	5001520101	1	2		3
Brada sachalina	5001540199		1		1
Mediomastus californiensis	5001600402			1	1
Pectinaria californiensis	5001660304	9	6	4	19
Terebellides stroemi	5001690101	1			1
Artacamella hancocki	5001690201	3	1	1	5
Gastropoda	51			1	1
Cephalaspidea	5110		1		1
Cylichna alba	5110040203	1			1
Chaetodermatida	5402	5	7	6	18
Yoldia scissurata	5502040504	1			1
Yoldia thraciaeformis	5502040507		2		2
Adontorhina cyclica	5515020102	2			2
Thyasira gouldii	5515020325	1		1	2
Tellinidae	551531			1	1
Holmesiella anomala	6153010901			1	1
Leucon spp	61540401	1			1
Eudorella pacifica	6154040202		1		1
Rhachotropis klemens	6169201309			1	1
Cyphocaris challengeri	6169341101		2	2	4
Heterophoxus oculatus	6169420301		1	1	2
Paraphoxus oculatus	6169420925			6	6
Foxiphalus similis - cognatus complex	616942099999	1			1
Natantia	617599			1	1
Molpadia intermedia	8179010101	2	2	5	9
					140
		47	42	51 Sum	
		2	2	2 Ave	
		3	2	3 Var	
		2	2	2 Sdv	
		1	1	1 Min	
		9	7	6 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 20

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43	4	3	2	9
Polynoidae	500102	1		2	3
Phyllodoce (Anaitides) groenlandica	5001130102		3		3
Nereis brandti	5001240301		1		1
Nereis zonata	5001240406	1			1
Nephtys cornuta franciscana	500125010401		1		1
Nephtys ferruginea	5001250111	5	1	5	11
Sphaerodoropsis sphaerulifer	5001260103		1	2	3
Glycera capitata	5001270101	2	8	5	15
Glycinde picta	5001280101		2		2
Lumbrineris luti	5001310109	69	116	74	259
Dorvillea pseudorubrovittata	5001360101		1		1
Levinsenia gracilis	5001410801			1	1
Acesta lopezi	5001411302		2		2
Polydora cardalia	5001430431	1	1		2
Prionospio steenstrupi	5001430506		1		1
Cirratulidae	500150	2			2
Tharyx multifilis	5001500302		3	2	5
Ophelina acuminata	5001580607		4	2	6
Sternaspis scutata	5001590101		1		1
Notomastus lineatus	5001600303			1	1
Mediomastus californiensis	5001600402		1		1
Maldane glebifex	5001630302		1		1
Euclymene zonalis	5001631103	36	25	20	81
Owenia fusiformis	5001640102		1		1
Pectinaria granulata	5001660303	2			2
Pectinaria californiensis	5001660304	4	10	6	20
Pista cristata	5001680701	52	84	63	199
Terebellides stroemi	5001690101	13	29	32	74
Chone magna	5001700106		1		1
Rissoidae	510320	1		5	6
Mitrella tuberosa	5105030202	9		6	15
Turbonilla aurantia	5108011134	2	5	6	13
Rictaxis punctocaelatus	5110010401	1	2		3
Cylichna attonsa	5110040205	3	1	3	7
Nucula tenuis	5502020201	8	6	3	17
Adontorhina cyclica	5515020102			1	1
Axinopsida serricata	5515020201	20	19	31	70
Mysella tumida	5515100102	4	14	10	28
Clinocardium nuttali	5515220102	3			3
Nemocardium centifilosum	5515220301			4	4
Spisula falcata	5515250104	1			1
Macoma calcarea	5515310101	4			4
Macoma elimata	5515310102		7		7
Macoma carlottensis	5515310112	13	14	21	48
Macoma nasuta	5515310114	8			8
Compsomyax subdiaphana	5515470301	5	7	3	15
Psephidia lordi	5515470501	3	5	6	14
Mya arenaria	5517010201			1	1
Pandora filosa	5520020102	5	2	4	11
Lyonsia californica	5520050202	6	2	3	11
Thracia trapezoides	5520080203			1	1
Euphilomedes producta	6111070303	49	64	70	183
Eudorella pacifica	6154040202	3	9	3	15
Diastylis alaskensis	6154050101	1		1	2
Ampelisca spp.	61690201			1	1
Ampelisca hancocki	6169020113		3		3
Melita desdichada	6169211008	2	1	2	5
Monoculodes zernovi	6169370816		1		1
Synchelidium spp.	61693714		1		1

STATION 20 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Westwoodilla caecula	6169371502	1	1		2
Heterophoxus oculatus	6169420301	31	34	51	116
Pinnixa spp.	61890604			1	1
Priapulus caudatus	7400010101			2	2
					1330
		375	499	456 Sum	
		10	11	12 Ave	
		261	519	388 Var	
		16	23	20 Sdv	
		1	1	1 Min	
		69	116	74 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 21

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43	1	2	1	4
Harmothoe lunulata	5001020810		1		1
Pholoe minuta	5001060101			1	1
Eteone longa	5001130205	1	8	5	14
Phyllodoce (Anaitides) spp	5001131499			2	2
Exogone lourei	5001230703	2			2
Nephtys cornuta franciscana	500125010401	3	2	2	7
Nephtys ferruginea	5001250111	6	12	13	31
Sphaerodoropsis sphaerulifer	5001260103	5	10	6	21
Glycera capitata	5001270101	5	5	5	15
Glycinde picta	5001280101	1	2	2	5
Lumbrineris spp.	50013101	1			1
Lumbrineris luti	5001310109	13	14	12	39
Leitoscoloplos pugettensis	5001400102	23	1	4	28
Polydora socialis	5001430402	5	5	3	13
Prionospio steenstrupi	5001430506	9	5	4	18
Prionospio lighti	5001430521		1		1
Spiophanes berkelyorum	5001431004	1			1
Paraprionospio pinnata	5001431702	1	1		2
Tharyx multifilis	5001500302	17	5	6	28
Chaetozone setosa	5001500401		1		1
Ophelina acuminata	5001580607	2		2	4
Sternaspis scutata	5001590101			1	1
Capitella capitata	5001600101	1		2	3
Heteromastus filobranchus	5001600203	1	12	6	19
Mediomastus californiensis	5001600402	2	3		5
Barantolla americana	5001600601	1			1
Maldanidae	500163		3		3
Euclymeninae	5001631	3	1	3	7
Euclymene zonalis	5001631103		3	9	12
Pectinaria californiensis	5001660304	2	1	2	5
Amphicteis scaphobranchiata	5001670304		1		1
Terebellidae	500168		1		1
Polycirrus spp.	50016808	40	34	46	120
Polycirrus californicus	5001680810	1	5	2	8
Lanassa venusta venusta	500168130201	16	17	8	41
Scionella estevanica	5001681803	1			1
Terebellides stroemi	5001690101	1	1	2	4
Oligochaeta	5004		1		1
Rissoidae	510320	3	4	5	12
Mitrella tuberosa	5105030202		2		2
Nassarius mendicus	5105080101	1			1
Odostomia sp. A	510801019939	2		1	3
Turbonilla aurantia	5108011134		2	3	5
Nucula tenuis	5502020201	2	2	4	8
Mytilidae	550701			1	1
Parvilucina tenuisculpta	5515010101	2	2	2	6
Lucinoma acutilineata	5515010201			1	1
Axinopsida serricata	5515020201	249	190	352	791
Thyasira sp.	55150203	1			1
Mysella tumida	5515100102	3	4	12	19
Astarte willetti	5515190122			1	1
Clinocardium sp.	551522019999	3	2	2	7
Macoma spp.	55153101	5	1		6
Macoma carlottensis	5515310112	172	211	260	643
Tellina modesta	5515310204			1	1
Compsomyax subdiaphana	5515470301		2	2	4
Psephidia lordi	5515470501	14	17	12	43
Cylindroleberididae	611103	4	1	1	6
Euphilomedes carcharodonta	6111070301	138	128	151	417

STATION 21 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Euphilomedes producta	6111070303	98	125	142	365
Leucon spp.	6154040100	1		1	2
Eudorella pacifica	6154040202	5	1		6
Eudorellopsis integra	6154040301	2			2
Diastylis alaskensis	6154050101	6			6
Haliophasma geminata	6160011601	1			1
Edotea sublittoralis	6162020702	1			1
Munna spp	61631201			1	1
Munnogonium sp.	616312030	3	1	1	5
Ampelisca spp	61690201	4			4
Aoroides spp.	61690602	1	1		2
Melita desdichada	6169211008	1			1
Prachynella lodo	6169345701		1		1
Synchelidium shoemakeri	6169371402	2		2	4
Westwoodilla caecula	6169371502			1	1
Heterophoxus oculatus	6169420301	2			2
Metaphoxus frequens	6169420601			1	1
Rhepoxynius spp.	61694215			1	1
Rhepoxynius bicuspidata	6169421503	1	9	6	16
Dyopedos spp	61694499	1			1
Amphiuridae	812903	1			1
					2874
		894	864	1116 Sum	
		15	18	22 Ave	
		1895	2043	4182 Var	
		44	45	65 Sdv	
		1	1	1 Min	
		249	211	352 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 22

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43		1		1
Pholoe minuta	5001060101		2		2
Phyllodoce (Paranaitis) polynoides	5001130803		1		1
Eulalia (Eumida) sanguinea	5001131101			2	2
Exogone lourei	5001230703			1	1
Nephtys ferruginea	5001250111	3	3		6
Nephtys caecoides	5001250119	1			1
Glycinde armigera	5001280103			1	1
Goniada maculata	5001280202	1	1		2
Lumbrineris luti	5001310109		13	1	14
Leitoscoloplos pugettensis	5001400102	9	6	2	17
Prionospio steenstrupi	5001430506	11	12	4	27
Spiochaetopterus costarum	5001490302			1	1
Tharyx secundus	5001500309		1		1
Chaetozone setosa	5001500401	1			1
Ophelina acuminata	5001580607			1	1
Heteromastus filobranchus	5001600203	1			1
Notomastus lineatus	5001600303	3		2	5
Maldanidae	500163		1		1
Euclymene zonalis	5001631103		3		3
Pectinaria granulata	5001660303	2		1	3
Pectinaria californiensis	5001660304		1	3	4
Anobothrus gracilis	5001670701		1		1
Terebellidae	500168		1		1
Polycirrus spp	50016808	3	1	3	7
Lanassa venusta venusta	500168130201			1	1
Scionella estevanica	5001681803		1	1	2
Streblosoma bairdi	5001682502	2	1		3
Rissoidae	510320	6		2	8
Mitrella tuberosa	5105030202		1	1	2
Kurtziella plumbea	5106021107		2		2
Odostomia sp. A	510801019939		1	2	3
Turbonilla sp B	510801119998	32	36	41	109
Cephalaspidea	5110			2	2
Chaetodermatida	5402	1			1
Bivalvia	55	2	1		3
Nucula tenuis	5502020201	4	2	1	7
Nuculana minuta	5502040202			2	2
Solemya reidi	5504010106		2		2
Megacrenella columbiana	5507010301			2	2
Parvilucina tenuisculpta	5515010101		2	1	3
Lucinoma acutilineata	5515010201	1			1
Axinopsida serricata	5515020201	80	121	55	256
Mysella tumida	5515100102		1	1	2
Macoma spp.	55153101			2	2
Macoma calcarea	5515310101	3			3
Macoma nasuta	5515310114		6		6
Tellina modesta	5515310204	1			1
Compsomyax subdiaphana	5515470301	5	1	5	11
Psephidia lordi	5515470501	39	27	28	94
Mya arenaria	5517010201		1		1
Pandora filosa	5520020102			1	1
Lyonsia californica	5520050202	2			2
Cylindroleberididae	611103	2			2
Rutiderma lomae	6111060103	1			1
Euphilomedes carcharodonta	6111070301	63	70	70	203
Euphilomedes producta	6111070303			2	2
Lamprops quadriplicata	6154010105		1		1
Campylaspis spp.	61540701	2	2		4
Leptochelia dubia	6157020103	4	13	2	19

STATION 22 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Ampelisca careyi	6169020135			1	1
Byblis millsi	6169020208	1			1
Aoroides spp.	61690602			1	1
Hippomedon spp.	61693414		1	5	6
Synchelidium shoemakeri	6169371402	2			2
Westwoodilla caecula	6169371502			1	1
Rhepoxynius abronius	6169421504	16	2	14	32
Stenothoidae	616948	2			2
Hyperia sp.	6170010100			1	1
Pinnixa spp	61890604			1	1
Golfingia spp.	72000201	1		1	2
Amphiuridae	812903			1	1
					920
		307	343	270 Sum	
		9	9	7 Ave	
		324	514	218 Var	
		18	23	15 Sdv	
		1	1	1 Min	
		80	121	70 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 23

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Anthozoa sp. 1	374000009999			1	1
Nemertea	43	1	2	1	4
Phyllodoce (Anaitides) groenlandica	5001130102			1	1
Phyllodoce papillosa	5001130115		1		1
Eteone californica	5001130201	1			1
Eteone spilotus	5001130299			1	1
Phyllodoce (Paranaitis) polynoides	5001130803		1		1
Phyllodoce (Aponaitides) hartmanae	5001131402		2		2
Exogone lourei	5001230703	9	9		18
Platynereis bicanaliculata	5001240501	1			1
Nephtys longosetosa	5001250109		8		8
Nephtys ferruginea	5001250111	3	1		4
Nephtys caecoides	5001250119			5	5
Glycera capitata	5001270101			1	1
Onuphidae	500129	3	1		4
Onuphis iridescens	5001290103	1	1	6	8
Diopatra ornata	5001290202	2			2
Lumbrineris spp.	50013101	1			1
Lumbrineris lagunae	5001310129			1	1
Scoloplos armiger	5001400301	1			1
Scoloplos acmeceps	5001400311		1		1
Aricidea minuta	5001410220		2		2
Prionospio steenstrupi	5001430506	6	7	8	21
Spiophanes bombyx	5001431001	11	17	15	43
Phyllochaetopterus prolifica	5001490202		1		1
Cirratulidae	500150	1			1
Tharyx multifilis	5001500302		4	3	7
Chaetozone spinosa	5001500407	1	1	4	6
Ophelia limacina	5001580301	2			2
Ophelina breviata	5001580604		1		1
Capitella capitata	5001600101		1		1
Heteromastus filobranchus	5001600203		1		1
Notomastus lineatus	5001600303	1	5	1	7
Axiothella rubrocincta	5001630802	4	4		8
Euclymeninae	5001631	2			2
Pectinaria granulata	5001660303	1	1	2	4
Pectinaria californiensis	5001660304	1			1
Terebellidae	500168			1	1
Pista cristata	5001680701	4	2	4	10
Polycirrus spp.	50016808		9		9
Polycirrus californicus	5001680810	11	3	7	21
Streblosoma bairdi	5001682502		1		1
Chone duneri	5001700104		1		1
Solariella varicosa	5102100403		8	6	14
Natica clausa	5103760201	1	1	1	3
Nassarius mendicus	5105080101	1		1	2
Olivella baetica	5105100102	1	3	2	6
Odostomia sp. A	510801019939		1	4	5
Turbonilla sp. B	510801119998	76	88	53	217
Melanochlamys dimedea	511006999999			1	1
Nucula tenuis	5502020201		1	1	2
Nuculana minuta	5502040202	3	1	1	5
Megacrenella columbiana	5507010301	125	99	68	292
Musculus spp.	55070104	4	6	7	17
Parvilucina tenuisculpta	5515010101	4		3	7
Lucinoma acutilineata	5515010201		3		3
Axinopsida serricata	5515020201	4	5	2	11
Mysella tumida	5515100102	3	3	1	7
Astarte esquimalti	5515190108	40	18	26	84
Clinocardium nuttali	5515220102	4		4	8

STATION 23 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemocardium centifilosum	5515220301	1	3	1	5
Spisula falcata	5515250104	1	3	1	5
Solen sicarius	5515290201	4	1	1	6
Macoma spp.	55153101	1		2	3
Macoma calcarea	5515310101	1			1
Macoma obliqua	5515310106	1	1		2
Tellina nuculoides	5515310202	1		1	2
Psephidia lordi	5515470501	60	22	11	93
Protothaca sp	55154707		1		1
Mya arenaria	5517010201	2	2	1	5
Hiatella arctica	5517060201			1	1
Pandora filosa	5520020102		1		1
Lyonsia californica	5520050202	9	10	10	29
Thracia trapezoides	5520080203	1			1
Cardiomya californica	5520100108	7	2	5	14
Dentalium spp.	56010101			1	1
Cylindroleberididae	611103	1	3	2	6
Euphilomedes carcharodonta	6111070301	97	64	55	216
Euphilomedes producta	6111070303		1	1	2
Campylaspis spp.	61540701	2		8	10
Campylaspis hartae	6154070105		6		6
Leptochelia dubia	6157020103		1		1
Leptognathia sp	61570901			1	1
Gammaridea	6169			1	1
Byblis millsi	6169020208	2	1	1	4
Corophium spp.	61691502	1		8	9
Isaeidae	616926	1			1
Hippomedon coecus	6169341411	1	1		2
Orchomene pacifica	6169342903		1		1
Synchelidium spp	61693714			2	2
Metaphoxus frequens	6169420601		2	1	3
Rhepoxynius spp.	61694215			2	2
Rhepoxynius abronius	6169421504	11	15	4	30
Stenothoidae	616948			1	1
Callianassa spp.	61830402			1	1
Phoronida	77		1		1
Amphiodia urtica/periercta complex	812903019999		1	1	2
Ascidiacea	8401	3			3
					1377
		542	468	367 Sum	
		10	8	6 Ave	
		572	325	167 Var	
		24	18	13 Sdv	
		1	1	1 Min	
		125	99	68 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 24

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43		3	2	5
Polynoidae	500102			1	1
Harmothoe lunulata	5001020810		2		2
Hesperonoe adventor	5001021702		2		2
Eulalia levicornuta	5001130310	1			1
Gyptis brevipalpa	5001210102	5	1	3	9
Nephtys cornuta franciscana	500125010401	1	1		2
Nephtys punctata	5001250105	1		1	2
Nephtys ferruginea	5001250111	1	3		4
Glycera capitata	5001270101	1	1		2
Glycinde picta	5001280101			1	1
Goniada brunnea	5001280203		4		4
Onuphis iridescens	5001290103	2	1	3	6
Lumbrineris spp.	50013101			1	1
Lumbrineris californiensis	5001310132	1	1		2
Levinsenia gracilis	5001410801	1	5	2	8
Laonice cirrata	5001430201	1			1
Spiophanes berkelyorum	5001431004			1	1
Paraprionospio pinnata	5001431702	1	1		2
Chaetozone spinosa	5001500407		1	1	2
Cossura modica	5001520199	1			1
Brada sachalina	5001540199		6	1	7
Travisia pupa	5001580403	1		1	2
Sternaspis scutata	5001590101	1			1
Mediomastus spp.	50016004	1		2	3
Mediomastus californiensis	5001600402			2	2
Praxillella spp.	50016309			1	1
Praxillella gracilis	5001630901	1		3	4
Euclymeninae	5001631	1	6		7
Pectinaria californiensis	5001660304	3	6	7	16
Amphicteis mucronata	5001670306		1		1
Anobothrus gracilis	5001670701	1			1
Pista cristata	5001680701	4	1		5
Polycirrus spp.	50016808	1		1	2
Terebellides stroemi	5001690101	4	7	4	15
Natica clausa	5103760201		1	1	2
Turbonilla aurantia	5108011134			1	1
Turbonilla sp B	510801119998	6		5	11
Cylichna attonsa	5110040205	1		1	2
Melanochlamys dimedea	511006999999	1			1
Chaetodermatida	5402	2	4	2	8
Bivalvia	55		1		1
Nucula tenuis	5502020201	1		1	2
Yoldia scissurata	5502040504	2	3	1	6
Axinopsida serricata	5515020201	3	5	5	13
Clinocardium nuttali	5515220102			1	1
Macoma spp.	55153101	6		10	16
Macoma carlottensis	5515310112		13		13
Hiatella arctica	5517060201	1			1
Pandora filosa	5520020102	1	1	2	4
Dentalium spp	56010101	4		1	5
Euphilomedes producta	6111070303	8	12	7	27
Leucon spp.	61540401	1			1
Eudorella pacifica	6154040202	6	10	4	20
Eudorellopsis integra	6154040301	3	7		10
Diastylis alaskensis	6154050101		2		2
Gammaridea	6169			1	1
Corophium spp.	61691502	1			1
Phoxocephalidae	616942	2	2		4
Harpiniopsis sp	61694202	1		3	4

STATION 24 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Harpiniopsis fulgens	6169420204	1			1
Heterophoxus oculatus	6169420301	3	9	10	22
Mandibulophoxus gilesi	6169421201	3	1	2	6
Rhepoxynius spp	61694215			1	1
Crangonidae	617922			1	1
Amphipholus pugetanus	8129030201	1			1
Brisaster latifrons	8162040103		2		2
Molpadia intermedia	8179010101	1	4	2	7
					324
		94	130	100 Sum	
		2	4	3 Ave	
		3	11	5 Var	
		2	3	2 Sdv	
		1	1	1 Min	
		8	13	10 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 25

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43	1			1
Thalenessa spinosa	5001060601		1		1
Eteone californica	5001130201		2		2
Eulalia (Eumida) sanguinea	5001131101		1		1
Syllidae	500123		1		1
Nereis procera	5001240404			1	1
Nephtys caecoides	5001250119		1	1	2
Glycinde armigera	5001280103			2	2
Onuphidae	500129	3		1	4
Onuphis iridescens	5001290103	1	3	3	7
Diopatra ornata	5001290202			1	1
Scoloplos armiger	5001400301			16	16
Polydora cardalia	5001430431			1	1
Prionospio steenstrupi	5001430506	3	3	4	10
Spio butleri	5001430708	1	1		2
Spiophanes bombyx	5001431001	48	106	70	224
Phyllochaetopterus prolifica	5001490202	1			1
Spiochaetopterus costarum	5001490302		1		1
Cirratulus cirratus	5001500101			1	1
Chaetozone spinosa	5001500407	2	1	2	5
Ophelina acuminata	5001580607	1			1
Capitella capitata	5001600101	1			1
Heteromastus filiformis	5001600201	1	1		2
Notomastus lineatus	5001600303	1			1
Mediomastus spp.	50016004	1			1
Mediomastus californiensis	5001600402	1	1	2	4
Maldanidae	500163	2			2
Axiothella rubrocincta	5001630802	1			1
Euclymene zonalis	5001631103	2	5	3	10
Owenia fusiformis	5001640102			2	2
Polycirrus californicus	5001680810	4	4	1	9
Gastropoda	51	1			1
Solariella varicosa	5102100403	4	6	8	18
Rissoidae	510320			2	2
Melanella micrans	5103530102	1		1	2
Polinices pallida	5103760402	3		2	5
Mitrella tuberosa	5105030202	1	1	2	4
Nassarius mendicus	5105080101		2		2
Olivella baetica	5105100102		2	1	3
Turbonilla aurantia	5108011134	1			1
Turbonilla sp B	510801119998	1			1
Nucula tenuis	5502020201		1		1
Megacrenella columbiana	5507010301	1		2	3
Parvilucina tenuisculpta	5515010101			1	1
Axinopsida serricata	5515020201	3	1	5	9
Mysella tumida	5515100102	22	11	32	65
Clinocardium nuttali	5515220102		1	1	2
Spisula falcata	5515250104	1	1		2
Macoma yoldiformis	5515310111			2	2
Tellina nuculoides	5515310202	5	10	2	17
Tellina modesta	5515310204	3	1	17	21
Psephidia lordi	5515470501	23	17	47	87
Mya arenaria	5517010201	1			1
Lyonsia californica	5520050202	2			2
Cylindroleberididae	611103	1	3	4	8
Euphilomedes carcharodonta	6111070301	125	37	133	295
Nebalia spp.	61450101	2			2
Eudorella pacifica	6154040202		1		1
Leptochelia dubia	6157020103			1	1
Ampelisca spp	61690201		2		2

STATION 25 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Ampelisca brevisimulata	6169020125	1			1
Corophium crassicorne	6169150203	2			2
Protomedeia articulata	6169260307			5	5
Anonyx lilljeborgi	6169340303	1	4	3	8
Cyphocaris challengeri	6169341101		1		1
Synchelidium spp.	61693714			1	1
Rhepoxynius spp.	61694215	1			1
Rhepoxynius abronius	6169421504	10	8	38	56
Pinnixa spp	61890604	7	2	1	10
Phoronida	77	2			2
Amphiodia spp.	81290301		2	1	3
Amphiodia urtica/periercta complex	812903019999	2	1	1	4
Amphipholus pugetanus	8129030201			1	1
					974
		302	247	425 Sum	
		7	7	10 Ave	
		383	316	565 Var	
		20	18	24 Sdv	
		1	1	1 Min	
		125	106	133 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 26

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43	1	3		4
Hesperonoe complanata	5001021701			1	1
Pholoe minuta	5001060101	7	12	6	25
Eteone longa	5001130205	1			1
Pionosyllis sp. 1	500123029989		3		3
Odontosyllis phosphorea	5001231303		1		1
Nephtys cornuta franciscana	500125010401	7	6	6	19
Nephtys rickettsi	5001250106	1	2	2	5
Nephtys ferruginea	5001250111	10	8	16	34
Glycera capitata	5001270101	1	6	5	12
Glycinde picta	5001280101	2	4	3	9
Goniada maculata	5001280202	1			1
Onuphidae	500129	1			1
Onuphis iridescens	5001290103			2	2
Lumbrineris spp.	50013101		2		2
Lumbrineris bicirrata	5001310101		1	1	2
Lumbrineris luti	5001310109			11	11
Leitoscoloplos pugettensis	5001400102			1	1
Levinsenia gracilis	5001410801		1		1
Acesta lopezi	5001411302	1			1
Prionospio steenstrupi	5001430506	7	21	6	34
Spiophanes bombyx	5001431001			1	1
Caulleriella alata	5001500202		1		1
Tharyx multifilis	5001500302	1	2		3
Tharyx secundus	5001500309			2	2
Chaetozone setosa	5001500401	2	2	1	5
Cossura longocirrata	5001520101	1	1		2
Pherusa plumosa	5001540302		1		1
Heteromastus filiformis	5001600201			1	1
Heteromastus filobranchus	5001600203	1			1
Notomastus tenuis	5001600302	3	4	9	16
Mediomastus ambiseta	5001600401	5	4	5	14
Decamastus gracilis	5001600501	2	1	1	4
Barantolla americana	5001600601		1		1
Maldanidae	500163	4	2	3	9
Maldane glebifex	5001630302	2	6	14	22
Nicomache personata	5001630502		1		1
Petaloproctus tenuis borealis	500163070101			1	1
Praxillella spp.	50016309			2	2
Euclymeninae	5001631		6	2	8
Euclymene zonalis	5001631103	8	10	9	27
Owenia fusiformis	5001640102	1	2		3
Galathowenia nr. G. oculata	5001640202	1			1
Pectinaria granulata	5001660303		1	1	2
Pectinaria californiensis	5001660304	15	22	18	55
Ampharetidae	500167		1		1
Ampharete acutifrons	5001670208	7	9	8	24
Pista brevibranchiata	5001680710		1		1
Polycirrus spp.	50016808	1	1	2	4
Artacama coniferi	5001681101	1			1
Chone duneri	5001700104			1	1
Oligochaeta	5004		1		1
Gastropoda	51	1			1
Natica clausa	5103760201	1		3	4
Polinices pallida	5103760402		1		1
Amphissa sp. A	510503019999	1			1
Mitrella tuberosa	5105030202	2	1	1	4
Turridae	51060200			1	1
Odostomia sp. A	510801019939	1	1	2	4
Turbonilla sp. B	510801119998	12	1	18	31

STATION 26. (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Cephalaspidea	5110	1			1
Cylichna attonsa	5110040205	6	6	8	20
Melanochlamys dimedea	511006999999		1		1
Diaphana sp.	5110090102		1	1	2
Bivalvia	55		1		1
Acila castrensis	5502020101	2			2
Nucula tenuis	5502020201			1	1
Nuculana minuta	5502040202		1		1
Yoldia scissurata	5502040504	1		1	2
Yoldia thraciaeformis	5502040507	2			2
Megacrenella columbiana	5507010301		1		1
Parvilucina tenuisculpta	5515010101	13	7	9	29
Lucinoma acutilineata	5515010201	2	2		4
Axinopsida serricata	5515020201	6	1	7	14
Mysella tumida	5515100102	4	4	3	11
Clinocardium nuttali	5515220102		2	1	3
Nemocardium centifilosum	5515220301		1		1
Macoma spp.	55153101		10	40	50
Macoma elimata	5515310102		1	4	5
Macoma carlottensis	5515310112	84	49	7	140
Tellina modesta	5515310204	1	2		3
Compsomyax subdiaphana	5515470301	1			1
Mya arenaria	5517010201	1			1
Hiatella arctica	5517060201		2		2
Entodesma saxicolum	5520050101		4		4
Lyonsia californica	5520050202	1		1	2
Cylindroleberididae	611103	6	11	5	22
Euphilomedes producta	6111070303	44	54	42	140
Mysidacea	6151		1		1
Eudorella pacifica	6154040202	8	6	5	19
Diastylis alaskensis	6154050101	3	2	3	8
Leptognathia sp.	61570901	4	5	4	13
Ampelisca spp.	61690201		1		1
Melita desdichada	6169211008		1		1
Photis spp.	61692602	1	1	2	4
Protomedeia spp.	61692603			2	2
Anonyx sp.	61693403			25	25
Anonyx lilljeborgi	6169340303	2	1	2	5
Cyphocaris challengeri	6169341101			1	1
Orchomene pacifica	6169342903	36	31		67
Synchelidium rectipalmum	6169371403			2	2
Westwoodilla caecula	6169371502	6	1	2	9
Heterophoxus oculatus	6169420301			1	1
Rhepoxynius abronius	6169421504	4	18	7	29
Pleusymtes sp.	61694305			4	4
Hyperoche medusarum	6170010702	1			1
Parapasiphae sp.	61790503	1			1
Callianassa spp.	61830402			1	1
Oregonia spp.	61870101		1		1
Pinnixa spp.	61890604			3	3
Amphiodia spp.	81290301		1		1
Amphiodia urtica/periercta complex	812903019999	1	1		2
Holothuroidea	8170			1	1
					1102
		355	386	361 Sum	
		6	5	6 Ave	
		156	90	63 Var	
		12	9	8 Sdv	
		1	1	1 Min	
		84	54	42 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 27

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Anthozoa sp. 1	374000009999		1		1
Turbellaria	3901	1	1		2
Nemertea	43	16	21	5	42
Lepidonotus squamatus	5001021103	2	2		4
Pholoides aspera	5001040101	9	12	9	30
Sthenelais berkeleyi	5001060301		3	2	5
Phyllodoce (Anaitides) groenlandica	5001130102	1			1
Eteone spilotus	5001130299	3			3
Eulalia viridis	5001130301		4		4
Eulalia (Eumida) bilineata	5001130308		1	1	2
Notophyllum tectum	5001130403	1			1
Eulalia (Eumida) sanguinea	5001131101	8	12	9	29
Ophiodromus pugettensis	5001210401	4	4		8
Exgone gemmifera	5001230702	8	1		9
Exogone lourei	5001230703		1		1
Exogone verugera	5001230706			7	7
Sphaerosyllis brandhorsti	5001230806		1		1
Odontosyllis phosphorea	5001231303	5	11	8	24
Ehlersia heterochaeta	5001232201	3	1		4
Platynereis bicanaliculata	5001240501	6	8	6	20
Nephtys caeca	5001250103		1		1
Nephtys ferruginea	5001250111	4	2	1	7
Nephtys caecoides	5001250119			5	5
Glycera capitata	5001270101	1	1	1	3
Glycinde picta	5001280101	2	2	1	5
Glycinde armigera	5001280103			1	1
Onuphidae	500129		2	1	3
Onuphis iridescens	5001290103	1	5	3	9
Diopatra ornata	5001290202	9	8	8	25
Lumbrineris spp.	50013101	3	1		4
Lumbrineris cruzensis	5001310118			6	6
Lumbrineris californiensis	5001310132		6	11	17
Dorvillea pseudorubrovittata	5001360101	5	4	6	15
Scoloplos armiger	5001400301	3			3
Aricidea minuta	5001410220		1		1
Acesta lopezi	5001411302	2			2
Laonice cirrata	5001430201	2			2
Polydora socialis	5001430402		3		3
Polydora armata	5001430419	1	1		2
Prionospio steenstrupi	5001430506	8	4	6	18
Prionospio lighti	5001430521	3	4	1	8
Spiophanes bombyx	5001431001		1	2	3
Phyllochaetopterus prolifica	5001490202	35	74	69	178
Spiochaetopterus costarum	5001490302	1	1	1	3
Cirratulidae	500150		2		2
Caulleriella alata	5001500202			1	1
Tharyx multifilis	5001500302	1			1
Tharyx secundus	5001500309	1			1
Chaetozone setosa	5001500401	2	1		3
Chaetozone spinosa	5001500407	5	4	1	10
Notomastus tenuis	5001600302			3	3
Notomastus lineatus	5001600303	11	10	3	24
Mediomastus californiensis	5001600402	5	8	8	21
Euclymene zonalis	5001631103	2	1		3
Isocirrus longiceps	5001632001		1		1
Sabellaria cementarium	5001650201		7		7
Pectinaria granulata	5001660303	15	35	11	61
Asabellides lineata	5001670804		1		1
Terebellidae	500168	1		1	2

STATION 27 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Pista cristata	5001680701	2	3		5
Pista elongata	5001680703	1	1		2
Polycirrus spp.	50016808			1	1
Polycirrus californicus	5001680810	10	9	5	24
Amphitritinae	5001681	1	1		2
Scionella estevanica	5001681803			6	6
Streblosoma bairdi	5001682502	2			2
Artacamella hancocki	5001690201			1	1
Myxicola infundibulum	5001700502		1		1
Pseudochitinopoma occidentalis	5001730101	2			2
Trochidae	510210	1		1	2
Rissoidae	510320	1		5	6
Crepidula sp. A	510364029999	1			1
Natica clausa	5103760201			2	2
Polinices pallida	5103760402	2			2
Mitrella tuberosa	5105030202		3		3
Nassarius mendicus	5105080101	1			1
Olivella baetica	5105100102	1			1
Odostomia sp. B	510801019938	1			1
Odostomia sp. A	510801019939			1	1
Turbonilla aurantia	5108011134	1			1
Turbonilla sp B	510801119998	21	10	13	44
Melanochlamys dimedea	511006999999			1	1
Bivalvia	55		1	3	4
Nuculana minuta	5502040202	1	1	1	3
Mytilidae	550701	6		4	10
Megacrenella columbiana	5507010301	14	1	11	26
Musculus spp.	55070104	1			1
Modiolus spp.	55070106		1		1
Chlamys hastata	5509050101	8	2	3	13
Parvilucina tenuisculpta	5515010101	3	1	4	8
Axinopsida serricata	5515020201	6	14	4	24
Mysella tumida	5515100102	1	1	4	6
Clinocardium nuttali	5515220102	3	3		6
Nemocardium centifilosum	5515220301		1	1	2
Macoma spp.	55153101		1	1	2
Macoma calcarea	5515310101	4	1	1	6
Macoma obliqua	5515310106		1	1	2
Macoma yoldiformis	5515310111	3	3	6	12
Macoma nasuta	5515310114			1	1
Tellina modesta	5515310204			1	1
Compsomyax subdiaphana	5515470301		1	1	2
Psephidia lordi	5515470501	25	4	19	48
Mya arenaria	5517010201	5	4	3	12
Hiatella arctica	5517060201	1	4	4	9
Lyonsia californica	5520050202	6	5	4	15
Cardiomya californica	5520100108	1	3		4
Pycnogonum sp.	60010801		1		1
Cylindroleberididae	611103	2	2	2	6
Rutiderma lomae	6111060103	3		1	4
Euphilomedes carcharodonta	6111070301	165	234	299	698
Campylaspis spp.	61540701		2		2
Campylaspis hartae	6154070105	1		1	2
Leptochelia dubia	6157020103			2	2
Leptognathia gracilis	6157020202	3		1	4
Leptognathia sp.	61570901		6		6
Eudorellopsis sp	61640403		1		1
Ampelisca spp.	61690201	3	5	2	10
Ampelisca lobata	6169020134			1	1
Byblis millsi	6169020208	12	5	6	23

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 27 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Corophium spp.	61691502	1	1		2
Rhachotropis sp.	61692013		3	1	4
Protomedeia spp.	61692603		2	1	3
Gammaropsis thompsoni	6169260401	2	1	1	4
Hippomedon coecus	6169341411	1	20		21
Lysianassa holmesi	6169342206	2		1	3
Orchomene pacifica	6169342903			1	1
Synchelidium shoemakeri	6169371402	2		1	3
Westwoodilla caecula	6169371502		1		1
Heterophoxus oculatus	6169420301	3	4	2	9
Metaphoxus frequens	6169420601	1		3	4
Eyakia robustus	6169420918	2			2
Rhepoxynius abronius	6169421504	7	2	6	15
Caridea	6179	1			1
Pagurus spp.	61830602	1			1
Cancer gracilis	6188030105	1			1
Pinnixa spp.	61890604	2	1		3
Crossaster sp.	81130101		1		1
Ophiuroida	8120		8		8
Ophiura sarsii	8127010610			1	1
Ophiura lutkeni	8127010607	1			1
Amphipholus pugetanus	8129030201	2		3	5
Amphipholus squamata	8129030202			1	1
Cucumaria spp.	81720601		1		1
Cucumaria piperata	8172060111		1		1
Pentamera spp	81720603		2		2
Pentamera trachyplaca	8172060399		4	1	5
Pentamera sp. 1	817206039989		3		3
Ascidiacea	8401	1	5	6	12
					1872
		545	672	655 Sum	
		6	7	8 Ave	
		311	618	1083 Var	
		18	25	33 Sdv	
		1	1	1 Min	
		165	234	299 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 28

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Turbellaria	3901		2		2
Nemertea	43	5	15	8	28
Polynoidae	500102			1	1
Gattyana cirrosa	5001020603	1		1	2
Harmothoe extenuata	5001020803			2	2
Harmothoe imbricata	5001020806		1		1
Harmothoe lunulata	5001020810	1	3	1	5
Pholoides aspera	5001040101	4	7	4	15
Pholoe minuta	5001060101			2	2
Sthenelais berkeleyi	5001060301		1	1	2
Phyllodoce (Anaitides) groenlandica	5001130102			1	1
Phyllodoce (Anaitides) maculata	5001130106			1	1
Eteone longa	5001130205	1			1
Eulalia (Eumida) bilineata	5001130308	1	1		2
Eulalia (Eumida) sanguinea	5001131101	3	12	4	19
Gyptis brevipalpa	5001210102	1			1
Ophiodromus pugettensis	5001210401	1	3		4
Autolytus cornutus	5001230101	2			2
Pionosyllis uraga	5001230204	1			1
Eusyllis assimilis	5001230601		2		2
Exgone gemmifera	5001230702		1	2	3
Odontosyllis phosphorea	5001231303	2	6	3	11
Ehlersia heterochaeta	5001232201	1	4	2	7
Nephtys spp.	50012501		1	2	3
Nephtys cornuta franciscana	500125010401		3		3
Nephtys longosetosa	5001250109			3	3
Nephtys ferruginea	5001250111	5		4	9
Glycera sp. 1	500127019999	1			1
Glycinde picta	5001280101	3	2		5
Goniada brunnea	5001280203			2	2
Onuphidae	500129			15	15
Onuphis iridescens	5001290103	4	5	4	13
Diopatra ornata	5001290202		2	8	10
Lumbrineris spp.	50013101	1	5	1	7
Lumbrineris californiensis	5001310132	14	8	6	28
Notocirrus californiensis	5001330302			1	1
Dorvillea pseudorubrovittata	5001360101	2	3		5
Leitoscoloplos pugettensis	5001400102	1			1
Orbinia (Phylo) felix	5001400510			1	1
Acesta lopezi	5001411302		2	3	5
Laonice pugettensis	5001430204	1			1
Polydora giardi	5001430401			1	1
Polydora socialis	5001430402	2	2	2	6
Polydora pygidialis	5001430417		1		1
Polydora armata	5001430419		2	1	3
Prionospio steenstrupi	5001430506	16	8	8	32
Prionospio lighti	5001430521	1		1	2
Spio filicornis	5001430701	1			1
Spiophanes bombyx	5001431001	1	2		3
Spiophanes berkelyorum	5001431004	1			1
Magelona longicornis	5001440105			2	2
Phyllochaetopterus prolifica	5001490202	91	368	129	588
Spiochaetopterus costarum	5001490302	3		1	4
Cirratulus cirratus	5001500101	1			1
Caulleriella alata	5001500202			1	1
Tharyx multifilis	5001500302		1	2	3
Tharyx secundus	5001500309	2			2
Chaetozone setosa	5001500401			2	2
Chaetozone spinosa	5001500407	6	4	1	11
Pherusa plumosa	5001540302		2	1	3

STATION 28 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Ophelina acuminata	5001580607	1	2	1	4
Notomastus tenuis	5001600302			5	5
Notomastus lineatus	5001600303	5	3	3	11
Mediomastus californiensis	5001600402	6	1	1	8
Euclymene zonalis	5001631103	1			1
Clymenura columbiana	5001631206			2	2
Isocirrus longiceps	5001632001			1	1
Idanthyrsus ornamentatus	5001650101		1		1
Sabellaria cementarium	5001650201	1	3	1	5
Pectinaria granulata	5001660303	6	4	9	19
Pectinaria californiensis	5001660304	1		1	2
Ampharete spp.	50016702		1	1	2
Ampharete acutifrons	5001670208	1			1
Ariobothrus gracilis	5001670701	3			3
Terebellidae	500168	1		2	3
Nicolea zostericola	5001680601	4			4
Pista cristata	5001680701	1	1	2	4
Pista elongata	5001680703	1			1
Polycirrus californicus	5001680810	22	16	20	58
Streblosoma bairdi	5001682502		2	1	3
Terebellides stroemi	5001690101	2	3		5
Sabellidae	500170			2	2
Potamilla neglecta	5001700601	1			1
Pseudochitinopoma occidentalis	5001730101		2		2
Spirorbis spirillum	5001730602	5	29		34
Spirorbidae	500178			32	32
Margarites pupillus	5102100308	1			1
Solariella varicosa	5102100403		1		1
Rissoidae	510320	7	6	6	19
Petaloconchus spp.	51033505		1		1
Bittium spp.	51034601	2			2
Melanella micrans	5103530102			1	1
Crepipatella lingulata	5103640301	8	12	7	27
Natica clausa	5103760201	1			1
Mitrella tuberosa	5105030202		1		1
Odostomia sp. B	510801019938		1	1	2
Turbonilla aurantia	5108011134	1		1	2
Turbonilla sp. B	510801119998	10	10	10	30
Nudibranchia	5127		2		2
Polyplacophora	53		1		1
Bivalvia	55		1		1
Acila castrensis	5502020101			1	1
Nucula tenuis	5502020201	1	2		3
Nuculana minuta	5502040202	4	1	3	8
Megacrenella columbiana	5507010301	4			4
Chlamys hastata	5509050101	5	18	2	25
Parvilucina tenuisculpta	5515010101	1	1	2	4
Lucinoma acutilineata	5515010201		2		2
Adontorhina cyclica	5515020102			1	1
Axinopsida serricata	5515020201	11	7	4	22
Neaermya compressa	5515090101		1		1
Mysella tumida	5515100102	2	1	2	5
Clinocardium nuttali	5515220102		2	2	4
Nemocardium centifilosum	5515220301		1	2	3
Macoma spp.	55153101	1		7	8
Macoma calcarea	5515310101	4		4	8
Macoma elimata	5515310102	1	6		7
Macoma yoldiformis	5515310111	3	1		4
Macoma carlottensis	5515310112	5	3	3	11
Psephidia lordi	5515470501	34	25	41	100

STATION 28 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Protothaca spp	55154707		1		1
Mya arenaria	5517010201		10	6	16
Hiatella arctica	5517060201		2		2
Panopea generosa	5517060401			1	1
Lyonsia californica	5520050202			2	2
Cardiomya californica	5520100108			1	1
Rutiderma lomae	6111060103		1	1	2
Euphilomedes carcharodonta	6111070301	36	64	52	152
Cirripedia sp.	6130			1	1
Eudorella pacifica	6154040202			2	2
Campylaspis spp.	61540701		1	2	3
Leptochelia dubia	6157020103		3		3
Haliophasma geminata	6160011601	2		1	3
Ampelisca spp.	61690201	7	2	8	17
Ampelisca agassizi	6169020111	2			2
Ampelisca lobata	6169020134			2	2
Ampelisca careyi	6169020135		2		2
Byblis millsi	6169020208	4	2	12	18
Gammaropsis thompsoni	6169260401			1	1
Hippomedon spp.	61693414		4		4
Heterophoxus oculatus	6169420301	2	8	8	18
Eyakia robustus	6169420918	1			1
Rhepoxynius abronius	6169421504	4	6	7	17
Pleustes platypa	6169430409			1	1
Caprellidae	617101			2	2
Eualus lineatus	6179160416	6	2		8
Mesocrangon munitella	6179220115	1	1		2
Callianassa spp.	61830402	1			1
Pagurus spp.	61830602	2			2
Oregonia spp.	61870101	2	1	1	4
Cancer productus	6188030101	1			1
Lophopanopeus bellus	6189020101		1		1
Pinnixa spp.	61890604	6	1	3	10
Golfingia spp.	72000201		1	1	2
Brachiopoda	80		1		1
Amphipholus spp.	81290302		3		3
Amphipholus pugetanus	8129030201	1			1
Amphipholus squamata	8129030202		3		3
Pentamera pseudocalcigera	8172060301			1	1
Pentamera lissoplaca	8172060303			1	1
Pentamera sp. 1	817206039989			1	1
Leptosynapta transgressor	8178010299		1		1
Ascidiacea	8401		3	1	4
Ascidia spp.	84040501		2		2
					1745
		427	780	538 Sum	
		5	8	5 Ave	
		122	1468	212 Var	
		11	38	15 Sdv	
		1	1	1 Min	
		91	368	129 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 29

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43	3	2		5
Harmothoe lunulata	5001020810	2	2	2	6
Hesperonoe complanata	5001021701			1	1
Pholoe minuta	5001060101		2		2
Steggoa sp. 1	500113169999		1	1	2
Gyptis brevipalpa	5001210102		1	1	2
Sigambra bassi	5001220204	1			1
Nephtys cornuta franciscana	500125010401	2	1	5	8
Nephtys punctata	5001250105	1			1
Nephtys longosetosa	5001250109		1		1
Nephtys ferruginea	5001250111			1	1
Glycera capitata	5001270101		3	2	5
Glycinde armigera	5001280103			1	1
Goniada maculata	5001280202			3	3
Onuphis iridescens	5001290103		1	2	3
Levinsenia gracilis	5001410801	4	5	4	13
Acesta lopezi	5001411302		1		1
Prionospio lighti	5001430521		1	2	3
Spiophanes berkelyorum	5001431004	1			1
Tharyx multifilis	5001500302	1			1
Chaetozone spinosa	5001500407	1	3		4
Cossura modica	5001520199		1		1
Brada sachalina	5001540199			4	4
Travisia pupa	5001580403		1	1	2
Heteromastus filobranchus	5001600203	1	1		2
Mediomastus ambiseta	5001600401	1	2	3	6
Barantolla americana	5001600601	5	2	2	9
Praxillella spp	50016309	1	2		3
Euclymeninae	5001631	2			2
Pectinaria californiensis	5001660304	30	21	23	74
Ampharete acutifrons	5001670208	2	5	4	11
Pista brevibranchiata	5001680710		1		1
Odostomia sp. B	510801019938			3	3
Turbonilla sp. B	510801119998	4	4		8
Chaetodermatida	5402			1	1
Acila castrensis	5502020101			1	1
Nucula tenuis	5502020201		1	2	3
Yoldia scissurata	5502040504		2		2
Yoldia thraciaeformis	5502040507		1	1	2
Parvilucina tenuisculpta	5515010101			2	2
Lucinoma acutilineata	5515010201		2		2
Axinopsida serricata	5515020201		6	1	7
Clinocardium nuttali	5515220102			1	1
Macoma carlottensis	5515310112	3	43	51	97
Pandora filosa	5520020102			1	1
Cylindroleberididae	611103		1		1
Euphilomedes producta	6111070303	3	24	37	64
Leucon spp.	61540401		2	1	3
Eudorella pacifica	6154040202	2	24	15	41
Eudorellopsis integra	6154040301		1		1
Diastylis alaskensis	6154050101		3	1	4
Melita desdichada	6169211008	1	2	1	4
Cyphocaris challengeri	6169341101		1		1
Hippomedon coecus	6169341411		1		1
Heterophoxus oculatus	6169420301		3	2	5
Paraphoxus oculatus	6169420925		14	2	16
Rhepoxynius abronius	6169421504		1		1

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 29 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Pinnixa spp	61890604			2	2
Nellobia eusoma	7301011401	1		2	3
Brisaster latifrons	8162040103	1	1	1	3
Molpadia intermedia	8179010101	2		2	4
					464
		75	197	192 Sum	
		3	5	5 Ave	
		33	69	101 Var	
		6	8	10 Sdv	
		1	1	1 Min	
		30	43	51 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 30

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Turbellaria	3901	1		2	3
Nemertea	43	3	2	1	6
Harmothoe lunulata	5001020810			1	1
Lepidasthenia berkeleyae	5001021801	2		1	3
Pholoe minuta	5001060101	4	2	3	9
Eteone spp.	50011302			2	2
Eteone longa	5001130205		1		1
Eteone spilotus	5001130299	4			4
Phyllodoce (Aponaitides) hartmanae	5001131402	1			1
Gyptis brevipalpa	5001210102	2		1	3
Pilargis berkeleyi	5001220301			1	1
Ehlersia heterochaeta	5001232201	5	3	3	11
Nephtys cornuta franciscana	500125010401	6	10	6	22
Nephtys ferruginea	5001250111	8	2	2	12
Nephtys caecoides	5001250119	1			1
Glycera capitata	5001270101		1	1	2
Glycinde picta	5001280101	5	10	3	18
Lumbrineris spp.	50013101	1		1	2
Lumbrineris luti	5001310109	10	8	12	30
Scoloplos acmeceps	5001400311		1		1
Orbinia spp.	50014005		1		1
Polydora spp.	50014304			1	1
Polydora brachycephala	5001430429	1	5	2	8
Prionospio steenstrupi	5001430506		2		2
Prionospio lighti	5001430521	9	1	2	12
Paraprionospio pinnata	5001431702		2	2	4
Spiochaetopterus costarum	5001490302	1		1	2
Tharyx multifilis	5001500302	538	423	176	1137
Armandia brevis	5001580202		1		1
Capitella capitata	5001600101	2			2
Heteromastus filobranchus	5001600203			3	3
Notomastus lineatus	5001600303	37	6	1	44
Mediomastus ambiseta	5001600401			2	2
Mediomastus californiensis	5001600402	79	9	10	98
Praxillella spp.	50016309	2			2
Praxillella affinis pacifica	500163090301			1	1
Euclymeninae	5001631			2	2
Euclymene zonalis	5001631103	3	1	3	7
Pectinaria californiensis	5001660304	12	12	9	33
Amage anops	5001670101	1			1
Polycirrus californicus	5001680810	3	2	1	6
Amphitritinae	5001681		1		1
Streblosoma bairdi	5001682502	1			1
Terebellides stroemi	5001690101			1	1
Sabellidae	500170			1	1
Odostomia sp. A	510801019939	3		R	3
Turbonilla aurantia	5108011134	18	23	R	41
Turbonilla sp. A	510801119999			R	0
Nudibranchia	5127			R	0
Bivalvia	55	2		R	2
Acila castrensis	5502020101		3	R	3
Nucula tenuis	5502020201	1	1	R	2
Parvilucina tenuisculpta	5515010101	2	12	R	14
Lucinoma acutilineata	5515010201		4	R	4
Axinopsida serricata	5515020201	50	43	R	93
Mysella tumida	5515100102	13	5	R	18
Macoma spp.	55153101	2	6	R	8
Macoma carlottensis	5515310112		21	R	21
Compsomyax subdiaphana	5515470301	1		R	1
Psephidia lordi	5515470501	1	3	R	4

STATION 30 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Lyonsia californica	5520050202		1	R	1
Cylindroleberididae	611103	1		1	2
Euphilomedes carcharodonta	6111070301	40	46	28	114
Euphilomedes producta	6111070303	1			1
Eudorella pacifica	6154040202	1	81	50	132
Ampelisca sp. A	616902019989	1			1
Byblis millsi	6169020208		2		2
Aoroides spp.	61690602		2		2
Melita desdichada	6169211008	1			1
Isaeidae	616926			1	1
Photis brevipes	6169260201		1		1
Protomedeia prudens	6169260312	1			1
Hippomedon spp.	61693414	1			1
Heterophoxus oculatus	6169420301	1			1
Eobrolgus spinosus	6169420928	2			2
Dyopedos spp.	61694499		2		2
Caprella sp.	61710107		1		1
Crangon alaskensis	6179220102	2			2
Callianassa spp.	61830402		1		1
Cancer gracilis	6188030105			2	2
Pinnixa spp	61890604	76	14	22	112
Amphiuridae	812903	3		1	4
Amphiodia spp.	81290301	3	3	3	9
Amphiodia urtica/periercta complex	812903019999	9	1	2	12
					2128
		978	782	368 Sum	
		19	17	6 Ave	
		5572	3953	576 Var	
		75	63	24 Sdv	
		1	1	0 Min	
		538	423	176 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 31

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Anthozoa sp 2	374000009998			1	1
Anthozoa sp 1	374000009999		2		2
Nemertea	43	12	14	21	47
Polynoidae	500102		1		1
Harmothoe lunulata	5001020810			2	2
Lepidonotus squamatus	5001021103			2	2
Lepidasthenia longicirrata	5001021805			1	1
Pholoides aspera	5001040101			4	4
Sthenelais berkeleyi	5001060301		1	2	3
Phyllodoce (Anaitides) groenlandica	5001130102			2	2
Eteone longa	5001130205		1		1
Eteone spilotus	5001130299		1	2	3
Eulalia (Eulalia) spp.	50011303	1			1
Eulalia (Eumida) bilineata	5001130308		6		6
Eulalia (Eumida) sanguinea	5001131101	18	10	18	46
Gyptis brevipalpa	5001210102		2		2
Ophiodromus pugettensis	5001210401	1	6	3	10
Micropodarke dubia	5001210801	3			3
Syllidae	500123	1			1
Exgone gemmifera	5001230702		2	5	7
Exogone lourei	5001230703	1			1
Exogone verugera	5001230706	2			2
Odontosyllis phosphorea	5001231303	12	6	29	47
Ehlersia heterochaeta	5001232201		3	2	5
Platynereis bicanaliculata	5001240501		2	2	4
Nephtys spp.	50012501		1		1
Nephtys ferruginea	5001250111	3	3	11	17
Nephtys caecoides	5001250119	1			1
Glycera capitata	5001270101		1		1
Glycinde picta	5001280101	3	3	1	7
Onuphidae	500129	3		3	6
Onuphis iridescens	5001290103	1			1
Diopatra ornata	5001290202	2	5	6	13
Lumbrineris californiensis	5001310132	2	17	4	23
Dorvillea pseudorubrovittata	5001360101	1	1	2	4
Acesta lopezi	5001411302	2	1	2	5
Acmira catherinae	5001411306			1	1
Laonice cirrata	5001430201			1	1
Polydora armata	5001430419			2	2
Prionospio steenstrupi	5001430506	21	23	36	80
Prionispio lighti	5001430521		4	2	6
Magelona longicornis	5001440105		2		2
Phyllochaetopterus prolifica	5001490202	5	32	52	89
Spiochaetopterus costarum	5001490302	2	10	9	21
Cirratulidae	500150		1	5	6
Cirratulus cirratus	5001500101			7	7
Caulleriella alata	5001500202	1			1
Tharyx multifilis	5001500302	1		1	2
Tharyx secundus	5001500309	1	2		3
Chaetozone setosa	5001500401	4			4
Chaetozone spinosa	5001500407		9	5	14
Ophelina breviata	5001580604	1			1
Notomastus tenuis	5001600302	1			1
Notomastus lineatus	5001600303	2	4	4	10
Mediomastus californiensis	5001600402	3		3	6
Praxillella spp.	50016309	1			1
Euclymeninae	5001631	1			1
Euclymene zonalis	5001631103		4	1	5
Owenia fusiformis	5001640102			1	1
Pectinaria granulata	5001660303	2	4	10	16

STATION 31 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Ampharetidae	500167			2	2
Ampharete acutifrons	5001670208	1		1	2
Anobothrus gracilis	5001670701		1		1
Schistocomus hiltoni	5001672501		1		1
Terebellidae	500168		2	1	3
Pista cristata	5001680701		1	5	6
Pista elongata	5001680703	1			1
Polycirrus spp.	50016808	4			4
Polycirrus californicus	5001680810	3	8	13	24
Scionella estevanica	5001681803	2			2
Streblosoma bairdi	5001682502	1	2	2	5
Terebellides stroemi	5001690101	1			1
Megalomma splendida	5001700401			1	1
Potamilla neglecta	5001700601		1		1
Potamilla occelata	5001700608			2	2
Pseudochitinopoma occidentalis	5001730101			1	1
Solariella varicosa	5102100403			1	1
Rissoida	510320		1	3	4
Melanella micrans	5103530102	4	2	19	25
Crepipatella lingulata	5103640301			3	3
Polinices pallida	5103760402	1			1
Mitrella tuberosa	5105030202	2			2
Olivella baetica	5105100102	1	2		3
Turbonilla sp. B	510801119998	2	2	1	5
Chaetodermatida	5402			1	1
Bivalvia	55	1			1
Acila castrensis	5502020101		2	3	5
Mytilidae	550701			3	3
Megacrenella columbiana	5507010301	2	1		3
Modiolus spp.	55070106		1	2	3
Chlamys hastata	5509050101			2	2
Parvilucina tenuisculpta	5515010101	3	3	4	10
Lucinoma acutilineata	5515010201		2	1	3
Adontorhina cyclica	5515020102			1	1
Axinopsida serricata	5515020201	4	1	3	8
Mysella tumida	5515100102	4	1	5	10
Solen sicarius	5515290201	1			1
Macoma spp	55153101	1			1
Macoma calcarea	5515310101		3	2	5
Macoma yoldiformis	5515310111	1	2		3
Tellina nuculoides	5515310202	1			1
Psephidia lordi	5515470501	2		2	4
Mya arenaria	5517010201		1		1
Hiatella arctica	5517060201	1		2	3
Lyonsia californica	5520050202	1	1	6	8
Cardiomya californica	5520100108	1			1
Cylindroleberididae	611103	1			1
Rutiderma lomae	6111060103			6	6
Euphilomedes carcharodonta	6111070301	71	59	142	272
Campylaspis spp.	61540701			1	1
Leptochelia dubia	6157020103		3		3
Eudorellopsis sp.	61640403	1	2	2	5
Gammaridea	6169		1		1
Ampelisca spp.	61690201	2	2		4
Byblis millsi	6169020208	4	5	9	18
Corophium spp.	61691502	1	1		2
Pontogeneia rostrata	6169201208	1			1
Melita spp.	61692110			7	7
Isaeidae	616926		2	1	3
Gammaropsis thompsoni	6169260401	3			3

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 31 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Lysianassidae	616934			2	2
Hippomedon spp.	61693414	10			10
Hippomedon coecus	6169341411	1	2	11	14
Synchelidium spp.	61693714	1		3	4
Westwoodilla caecula	6169371502	3	2	2	7
Heterophoxus oculatus	6169420301		1	5	6
Rhepoxynius abronius	6169421504	17	13	8	38
Dyopedos spp.	61694499			3	3
Stenothoidae	616948	1	1		2
Mesocrangon munitella	6179220115	1			1
Pinnixa spp.	61890604	1	1		2
Nellobia eusoma	7301011401			1	1
Ophiuroida	8120		3	5	8
Amphipholus pugetanus	8129030201	2			2
Holothuroidea	8170	1			1
Cucumaria spp	81720601			1	1
Cucumaria piperata	8172060111	2	2	4	8
Pentamera spp	81720603	1	1		2
Pentamera lissoplaca	8172060303	1	2	6	9
Pentamera trachyplaca	8172060399		1	10	11
Pentamera sp. 2	817206039988		1		1
Pentamera sp. 1	817206039989	2	7	1	10
Ascidiacea	8401	1			1
					1214
		290	337	587 Sum	
		4	4	7 Ave	
		72	66	272 Var	
		8	8	17 Sdv	
		1	1	1 Min	
		71	59	142 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 32

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Anthozoa	3740			2	2
Anthozoa sp. 1	374000009999		1		1
Turbellaria	3901		1		1
Nemertea	43	15	16	12	43
Gattyana cirrosa	5001020603	1		2	3
Harmothoe lunulata	5001020810		1	2	3
Lepidasthenia berkeleyae	5001021801			1	1
Pholoides aspera	5001040101	9	30	33	72
Pholoe minuta	5001060101	1	3	2	6
Sthenelais berkeleyi	5001060301	1			1
Sthenelais tertiaglabra	5001060305		1		1
Paleonotus bellis	5001080101	1	1		2
Phyllodoce (Anaitides) groenlandica	5001130102	1	1		2
Eteone longa	5001130205	1			1
Eteone spilotus	5001130299	2	1		3
Eulalia (Eumida) bilineata	5001130308		2	3	5
Eulalia (Eumida) sanguinea	5001131101	14	7	18	39
Gyptis brevipalpa	5001210102		1		1
Ophiodromus pugettensis	5001210401	2		1	3
Pionosyllis uraga	5001230204	2			2
Exgone gemmifera	5001230702	8	11	9	28
Exogone verugera	5001230706	11			11
Odontosyllis phosphorea	5001231303	10	6	3	19
Ehlersia heterochaeta	5001232201	3	4	1	8
Platynereis bicanaliculata	5001240501	3	1		4
Nephtys longosetosa	5001250109			1	1
Nephtys ferruginea	5001250111	2	7	6	15
Glycera capitata	5001270101		2	2	4
Glycinde picta	5001280101	5	3	3	11
Goniada spp.	50012802	1			1
Onuphidae	500129	3		1	4
Onuphis iridescens	5001290103	2	2	5	9
Diopatra ornata	5001290202	7	2	2	11
Lumbrineris spp.	50013101	2	6	4	12
Lumbrineris luti	5001310109	1			1
Lumbrineris californiensis	5001310132	27	27	23	77
Dorvillea pseudorubrovittata	5001360101	6	10	6	22
Leitoscoloplos pugettensis	5001400102			2	2
Scoloplos acmeceps	5001400311	1			1
Aricidea minuta	5001410220		1		1
Acesta lopezi	5001411302	2	2	2	6
Acmira catherinae	5001411306		1	1	2
Polydora socialis	5001430402		3	3	6
Polydora armata	5001430419		3	2	5
Polydora cardalia	5001430431	1			1
Polydora aggregata	5001430438	1			1
Prionospio steenstrupi	5001430506	46	59	33	138
Prionospio lighti	5001430521	2	10	1	13
Spio filicornis	5001430701	1	1		2
Magelona longicornis	5001440105	1	5	4	10
Phyllochaetopterus prolifica	5001490202	274	197	209	680
Spiochaetopterus costarum	5001490302		8	8	16
Mesochaetopterus taylori	5001490401	2			2
Cirratulus cirratus	5001500101		3		3
Tharyx spp.	50015003	2		4	6
Tharyx multifilis	5001500302	1	6	5	12
Tharyx tesselata	5001500308	1	1	1	3
Tharyx secundus	5001500309		3	2	5
Chaetozone setosa	5001500401			1	1
Chaetozone spinosa	5001500407	2	4	10	16

STATION 32 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Flabelligera affinis	5001540202		1		1
Ophelina acuminata	5001580607			2	2
Notomastus lineatus	5001600303	18	41	25	84
Mediomastus californiensis	5001600402	2	2	3	7
Maldanidae	500163			1	1
Nicomache personata	5001630502		18	26	44
Euclymene zonalis	5001631103			1	1
Owenia fusiformis	5001640102			1	1
Galathowenia nr. G. oculata	5001640202			1	1
Idanthyrsus ornamentatus	5001650101			1	1
Sabellaria cementarium	5001650201	1	1	1	3
Pectinaria granulata	5001660303	5	4	14	23
Ampharete arctica	5001670201			1	1
Ampharete acutifrons	5001670208			4	4
Melinna cristata	5001670501		1		1
Anobothrus gracilis	5001670701	3	4	3	10
Asabellides lineata	5001670804		1		1
Terebellidae	500168		1		1
Pista cristata	5001680701	12	5	11	28
Pista elongata	5001680703		1	5	6
Polycirrus californicus	5001680810	1	2	3	6
Amphitritinae	5001681	2			2
Lanassa venusta venusta	500168130201			1	1
Streblosoma bairdi	5001682502		2	3	5
Lanice conchilega	5001682701	1			1
Sabellidae	500170			1	1
Chone duneri	5001700104			1	1
Megalomma splendida	5001700401			2	2
Rissoidae	510320	1	1		2
Crepipatella lingulata	5103640301		3	2	5
Olivella baetica	5105100102			1	1
Turbonilla spp	51080102	1			1
Turbonilla aurantia	5108011134	1			1
Turbonilla sp. B	510801119998	2			2
Nudibranchia	5127			1	1
Bivalvia	55		1		1
Acila castrensis	5502020101			1	1
Nucula tenuis	5502020201	1			1
Mytilidae	550701	3			3
Megacrenella columbiana	5507010301	3	8	8	19
Musculus spp.	55070104	1	1		2
Modiolus spp.	55070106	1	1	4	6
Chlamys hastata	5509050101	6	2	2	10
Parvilucina tenuisculpta	5515010101	3		1	4
Adontorhina cyclica	5515020102		1	1	2
Axinopsida serricata	5515020201	11	1	1	13
Mysella tumida	5515100102		2		2
Nemocardium centifilosum	5515220301		2	6	8
Macoma spp.	55153101		2		2
Macoma calcarea	5515310101		2	5	7
Macoma elimata	5515310102		2		2
Macoma obliqua	5515310106			5	5
Macoma yoldiformis	5515310111	4	3	2	9
Macoma nasuta	5515310114	1	2		3
Psephidia lordi	5515470501		1		1
Mya arenaria	5517010201	2	1		3
Hiatella arctica	5517060201	5	1	4	10
Lyonsia californica	5520050202	3	2	1	6
Cardiomya californica	5520100108	4		1	5
Pycnogonida	60	1			1

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 32 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Ostracoda	6110		5		5
Rutiderma lomae	6111060103	3		5	8
Euphilomedes carcharodonta	6111070301	78	69	88	235
Calanoida	6118		1		1
Eudorella pacifica	6154040202	1		1	2
Campylaspis spp.	61540701		1		1
Haliophasma geminata	6160011601	2	3	7	12
Eudorellopsis sp	61640403		1		1
Gammaridea	6169		1		1
Ampelisca spp.	61690201		2		2
Ampelisca pugettica	6169020114			1	1
Ampelisca lobata	6169020134	3		4	7
Byblis millsi	6169020208	7	12	8	27
Corophium spp.	61691502	1			1
Ericthonius sp.	61691503		1		1
Hippomedon subrobustus	6169341413	2			2
Allogaussia sp.	61693499	1			1
Monoculodes spp.	61693708	1			1
Monocludes zernovi	6169370816	1	1		2
Westwoodilla caecula	6169371502	1		2	3
Heterophoxus oculatus	6169420301	7	2	4	13
Eyakia robustus	6169420918		1		1
Paraphoxus oculatus	6169420925	1			1
Rhepoxynius variatus	6169420926		1		1
Tritella pilimana	6171010602		2		2
Eualus pusiolus	6179160408		1		1
Mesocrangon munitella	6179220115		1		1
Callianassa spp.	61830402		1		1
Fabia subquadrata	6189060301			1	1
Pinnixa spp.	61890604	1	3	5	9
Arhynchite pugettensis	7301020105			1	1
Phoronida	77		2		2
Brachiopoda	80	2			2
Ophiura spp.	81270106		1		1
Ophiura lutkeni	8127010607	1			1
Amphipholus pugetanus	8129030201		5	6	11
Dendrochirotida	81720			3	3
Pentamera lissoplaca	8172060303	1		1	2
Pentamera trachyplaca	8172060399		1		1
Pentamera sp. 2	817206039988		1		1
Pentamera sp. 1	817206039989	4	3	2	9
Leptosynapta sp.	81780102		2	4	6
Ascidiacea	8401	1	1	2	4
Ascidia spp.	84040501		1		1
					2131
		696	703	732 Sum	
		8	7	8 Ave	
		904	460	539 Var	
		30	21	23 Sdv	
		1	1	1 Min	
		274	197	209 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 33

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Turbellaria	3901	1		1	2
Nemertea	43			4	4
Harmothoe lunulata	5001020810		1		1
Pholoides aspera	5001040101	1			1
Pholoe minuta	5001060101			1	1
Eteone longa	5001130205			1	1
Eteone spilotus	5001130299	3	1		4
Eulalia (Eumida) bilineata	5001130308	2		2	4
Eulalia (Eumida) sanguinea	5001131101	3			3
Phyllodoce (Aponaitides) hartmanae	5001131402		2	1	3
Gyptis brevipalpa	5001210102	1			1
Exogone lourei	5001230703		1	1	2
Ehlersia heterochaeta	5001232201	1	1		2
Platynereis bicanaliculata	5001240501	2	1		3
Nephtys cornuta franciscana	500125010401	5	6	2	13
Nephtys ferruginea	5001250111	6	2	4	12
Nephtys caecoides	5001250119			3	3
Sphaerodoropsis sphaerulifer	5001260103	1		4	5
Glycera capitata	5001270101	11	12	16	39
Glycinde picta	5001280101	2	3		5
Onuphidae	500129		1	1	2
Onuphis iridescens	5001290103	1	3	1	5
Diopatra ornata	5001290202		1	1	2
Lumbrineris spp	50013101		1	1	2
Lumbrineris latreilli	5001310104	1			1
Lumbrineris luti	5001310109	9	7	8	24
Lumbrineris cruzensis	5001310118			1	1
Lumbrineris californiensis	5001310132	4			4
Driloneris falcata minor	500133010402		1		1
Leitoscoloplos pugettensis	5001400102	4	7	8	19
Levinsenia gracilis	5001410801	1	2		3
Acesta lopezi	5001411302	2		3	5
Apistobranchus ornatus	5001420102	10	3	8	21
Laonice cirrata	5001430201			1	1
Prionospio steenstrupi	5001430506	139	148	96	383
Spio cirrifera	5001430703	1	1		2
Polydora (Boccardiella) hamata	5001430806			2	2
Spiophanes berkelyorum	5001431004	1		1	2
Paraprionospio pinnata	5001431702	4	1	6	11
Magelona longicornis	5001440105	7	6	7	20
Trochochaeta multisetosa	5001450102		1		1
Spiochaetopterus costarum	5001490302	2	4	1	7
Tharyx multifilis	5001500302	14	13	13	40
Tharyx tesselata	5001500308	1		2	3
Tharyx secundus	5001500309	5			5
Chaetozone setosa	5001500401	3	2	8	13
Cossura longocirrata	5001520101		1		1
Travisia brevis	5001580401		1		1
Notomastus tenuis	5001600302	44	43	31	118
Mediomastus californiensis	5001600402	6	5	2	13
Nicomache personata	5001630502	2			2
Rhodine bitorquata	5001631001			1	1
Euclymene zonalis	5001631103	3	6		9
Clymenura columbiana	5001631206			5	5
Oweniidae	500164		16		16
Myriochele heeri	5001640201			40	40
Pectinaria granulata	5001660303	29	32	4	65
Pectinaria californiensis	5001660304			29	29
Ampharetidae	500167			1	1
Amage anops	5001670101	1	1	2	4

STATION 33 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Anobothrus gracilis	5001670701	3	1	1	5
Pista cristata	5001680701	1	2		3
Polycirrus californicus	5001680810		1		1
Gastropoda	51			1	1
Kurtziella plumbea	5106021107		1		1
Turbonilla aurantia	5108011134	1			1
Nucula tenuis	5502020201	4	6	11	21
Yoldia scissurata	5502040504		1		1
Megacrenella columbiana	5507010301	14	17	16	47
Modiolus spp.	55070106	1			1
Parvilucina tenuisculpta	5515010101	2	1		3
Lucinoma acutilineata	5515010201		1	3	4
Adontorhina cyclica	5515020102		1	2	3
Axinopsida serricata	5515020201	51	74	95	220
Thyasira sp.	55150203	1	1	2	4
Nemocardium centifilosum	5515220301	1	2	1	4
Macoma spp.	55153101		16	6	22
Macoma elimata	5515310102	2	6	5	13
Macoma yoldiformis	5515310111	1	1		2
Macoma carlottensis	5515310112	7		2	9
Macoma nasuta	5515310114			1	1
Compsomyax subdiaphana	5515470301	4	3	1	8
Lyonsia californica	5520050202	3	4	3	10
Cylindroleberididae	611103	3	4	1	8
Rutiderma lomae	6111060103	7	9	8	24
Euphilomedes carcharodonta	6111070301	160	111	128	399
Euphilomedes producta	6111070303	9	21	9	39
Leucon sp.	61540401		2		2
Eudorella pacifica	6154040202	1	1	1	3
Campylaspis spp.	61540701		2		2
Leptochelia dubia	6157020103	15	4	1	20
Haliophasma geminata	6160011601		3	1	4
Eudorellopsis sp.	61640403		2	1	3
Synchelidium spp.	61693714	1	1	1	3
Heterophoxus oculatus	6169420301	1			1
Pinnixa spp.	61890604	4	7	9	20
Golfingia spp.	72000201	1		5	6
Ophiuroida	8120	1	1	1	3
Amphiuridae	812903			1	1
Amphiodia spp.	81290301			1	1
Amphipholus spp	81290302			1	1
					1919
		632	644	643 Sum	
		10	10	9 Ave	
		721	583	482 Var	
		27	24	22 Sdv	
		1	1	1 Min	
		160	148	128 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 34

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Stylatula elongata	3754010103			1	1
Nemertea	43	1			1
Harmothoe lunulata	5001020810	1			1
Polyeunoa tuta	5001021601	1			1
Lepidasthenia berkeleyae	5001021801		1		1
Pholoe minuta	5001060101			1	1
Eteone longa	5001130205	1	4	4	9
Eulalia (Eumida) sanguinea	5001131101	5	1		6
Phyllodoce (Aponaitides) hartmanae	5001131402			1	1
Gyptis brevipalpa	5001210102	8	1	3	12
Pilargis berkeleyi	5001220301		1		1
Autolytus cornutus	5001230101	1			1
Nereis procera	5001240404	1			1
Nephtys cornuta franciscana	500125010401	1	2		3
Nephtys ferruginea	5001250111	1	1		2
Sphaerodoropsis sphaerulifer	5001260103	1			1
Glycinde picta	5001280101			1	1
Glycinde armigera	5001280103		1		1
Lumbrineris spp.	50013101	8	1		9
Lumbrineris luti	5001310109	32	41	49	122
Lumbrineris cruzensis	5001310118	27	26	22	75
Lumbrineris californiensis	5001310132	2			2
Drilonereis sp C	500133019999	1			1
Leitoscoloplos pugettensis	5001400102		1	1	2
Scoloplos acmeceps	5001400311			1	1
Levinsenia gracilis	5001410801		1	1	2
Polydora giardi	5001430401	2	1	1	4
Polydora socialis	5001430402	3		2	5
Polydora cardalia	5001430431	6	5	2	13
Prionospio steenstrupi	5001430506	25	8	10	43
Prionospio lighti	5001430521		2		2
Spiophanes berkelyorum	5001431004	3	2	3	8
Paraprionospio pinnata	5001431702	33	32	21	86
Phyllochaetopterus prolifica	5001490202	91	30	7	128
Spiochaetopterus costarum	5001490302	3		1	4
Tharyx multifilis	5001500302	39	68	55	162
Tharyx secundus	5001500309	1			1
Chaetozone setosa	5001500401	1	3	2	6
Armandia brevis	5001580202	1			1
Mediomastus ambiseta	5001600401	2	3	2	7
Mediomastus californiensis	5001600402	1			1
Praxillella affinis pacifica	500163090301	4	1	2	7
Pectinaria californiensis	5001660304			2	2
Amphicteis mucronata	5001670306			1	1
Polycirrus spp.	50016808	4			4
Polycirrus californicus	5001680810	2	3	2	7
Terebellides stroemi	5001690101	19	19	21	59
Potamilla myriops	5001700602		2		2
Spirorbidae	500178	6			6
Gastropoda	51	1			1
Rissoidae	510320	9	5		14
Mitrella tuberosa	5105030202	3	1		4
Nassarius mendicus	5105080101		1		1
Odostomia sp B	510801019938		1		1
Odostomia sp A	510801019939	11	25	24	60
Turbonilla aurantia	5108011134	5	1	12	18
Acila castrensis	5502020101	5	15	8	28
Chlamys hastata	5509050101	1	1		2
Axinopsida serricata	5515020201	9		1	10
Mysella tumida	5515100102	5	5		10

STATION 34. (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Clinocardium nuttali	5515220102		1	1	2
Macoma calcarea	5515310101		2		2
Compsomyax subdiaphana	5515470301		1	1	2
Psephidia lordi	5515470501		3	2	5
Lyonsia californica	5520050202		1		1
Cylindroleberididae	611103			1	1
Eudorella pacifica	6154040202	117	89	115	321
Ampelisca careyi	6169020135			5	5
Protomedeia grandimana	6169260303	2			2
Protomedeia articulata	6169260307		1	4	5
Heterophoxus oculatus	6169420301	46	9	4	59
Dyopedos spp.	61694499	3	3		6
Caprella mendax	6171010719	1			1
Crangon alaskensis	6179220102	2	1		3
Mesocrangon munitella	6179220115	1			1
Pinnixa spp.	61890604	40	20	17	77
Amphiuridae	812903	1			1
Amphiodia spp.	81290301	2			2
Amphiodia urtica/periercta complex	812903019999	4		1	5
Ascidiacea	8401			1	1
					1469
		606	447	416 Sum	
		11	10	10 Ave	
		456	309	411 Var	
		21	18	20 Sdv	
		1	1	1 Min	
		117	89	115 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 35

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Anthozoa	3740			4	4
Nemertea	43	3	3	6	12
Lepidasthenia berkeleyae	5001021801	2		3	5
Pholoe minuta	5001060101	5	6	7	18
Eteone longa	5001130205	1			1
Eulalia (Eumida) sanguinea	5001131101		8		8
Gyptis brevipalpa	5001210102	5	5	2	12
Ophiodromus pugettensis	5001210401			5	5
Autolytus cornutus	5001230101		4		4
Eusyllis assimilis	5001230601		1		1
Platynereis bicanaliculata	5001240501		2		2
Nephtys cornuta franciscana	500125010401		7	2	9
Nephtys ferruginea	5001250111		3		3
Glycinde picta	5001280101	1		1	2
Onuphis elegans	5001290111		1		1
Lumbrineris luti	5001310109	7	2	12	21
Lumbrineris cruzensis	5001310118		9		9
Levinsenia gracilis	5001410801	3	1	7	11
Polydora giardi	5001430401		1		1
Polydora socialis	5001430402	2	2	2	6
Polydora brachycephala	5001430429			1	1
Prionospio steenstrupi	5001430506	3			3
Prionospio lighti	5001430521	2	33	8	43
Paraprionospio pinnata	5001431702	2	3	8	13
Phyllochaetopterus prolifica	5001490202	8	488		496
Spiochaetopterus costarum	5001490302	2	4	4	10
Cirratulus cirratus	5001500101	3		4	7
Tharyx multifilis	5001500302	34	66	23	123
Tharyx tesselata	5001500308		1		1
Cossura longocirrata	5001520101		1	2	3
Pherusa plumosa	5001540302	1			1
Notomastus lineatus	5001600303	1			1
Mediomastus californiensis	5001600402			2	2
Euclymene zonalis	5001631103	3		10	13
Pectinaria californiensis	5001660304		1	3	4
Ampharetidae	500167		1		1
Polylcirrus californicus	5001680810	3	2		5
Terebellides stroemi	5001690101	7	20	11	38
Pseudochitinopoma occidentalis	5001730101		2		2
Spirorbis spirillum	5001730602	11		1	12
Spirobidae	500178		63		63
Rissoidae	510320	1	R		1
Mitrella tuberosa	5105030202	2	R		2
Odostomia sp A	510801019939	2	R	5	7
Turbonilla aurantia	5108011134	2	R		2
Mytilidae	550701	1	R		1
Parvilucina tenuisculpta	5515010101		R	1	1
Axinopsida serricata	5515020201		R	1	1
Mysella tumida	5515100102	1	R	1	2
Clinocardium nuttali	5515220102	1	R		1
Macoma spp.	55153101	1	R		1
Macoma calcarea	5515310101	1	R		1
Macoma carlottensis	5515310112		R	4	4
Psephidia lordi	5515470501		R	1	1
Eudorella pacifica	6154040202	80	56	54	190
Ampelisca careyi	6169020135		1	1	2
Ericthonius sp.	61691503			1	1
Erichthonius brasiliensis	6169150302		1		1
Protomedeia prudens	6169260312		3		3
Westwoodilla caecula	6169371502	1			1

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 35 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Heterophoxus oculatus	6169420301	2	12		14
Caprella sp	61710107	1			1
Caprella mendax	6171010719		3		3
Pinnixa spp.	61890604	92	358	144	594
Golfingia spp	72000201			1	1
Amphiodia spp.	81290301	19	17	29	65
Amphiodia urtica/periercta complex	812903019999	16	19	13	48
Amphiodia occidentalis	8129030302	5	4	1	10
					1936
		337	1214	385 Sum	
		9	32	10 Ave	
		364	8991	594 Var	
		19	95	24 Sdv	
		1	1	1 Min	
		92	488	144 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 36

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Turbellaria	3901	1			1
Nemertea	43	6	5	5	16
Harmothoe lunulata	5001020810	1			1
Pholoe minuta	5001060101		3	1	4
Sthenelais berkeleyi	5001060301	1	1		2
Eteone longa	5001130205	3			3
Eteone spilotus	5001130299		3		3
Phyllodoce (Paranaitis) polynoides	5001130803		1		1
Eulalia (Eumida) sanguinea	5001131101	9	5	5	19
Gyptis brevipalpa	5001210102		1	1	2
Ophiodromus pugettensis	5001210401	4			4
Eusyllis assimilis	5001230601	1			1
Exogone verugera	5001230706		1		1
Odontosyllis phosphorea	5001231303	1			1
Platynereis bicanaliculata	5001240501	25	17	21	63
Nephtys caeca	5001250103	1	5		6
Nephtys longosetosa	5001250109		1		1
Nephtys ferruginea	5001250111	6	3	7	16
Glycera capitata	5001270101	2	2	4	8
Glycinde picta	5001280101	4	2	3	9
Onuphidae	500129		2		2
Diopatra ornata	5001290202	11		2	13
Lumbrineris spp.	50013101			1	1
Leitoscoloplos pugettensis	5001400102	3		3	6
Scoloplos acmeceps	5001400311			2	2
Acesta lopezi	5001411302		1	1	2
Prionospio steenstrupi	5001430506	38	63	42	143
Prionospio lighti	5001430521		1		1
Spiophanes berkelyorum	5001431004			1	1
Magelona longicornis	5001440105		1	2	3
Chaetopteridae	500149		1		1
Phyllochaetopterus prolifica	5001490202			9	9
Spiochaetopterus costarum	5001490302	5	3		8
Cirratulidae	500150		1		1
Cirratulus cirratus	5001500101	1			1
Caulleriella alata	5001500202	8		1	9
Tharyx multifilis	5001500302		2		2
Chaetozone setosa	5001500401		2		2
Chaetozone spinosa	5001500407			3	3
Ophelina acuminata	5001580607			1	1
Notomastus tenuis	5001600302			5	5
Notomastus lineatus	5001600303	14	16	10	40
Mediomastus californiensis	5001600402	1	1		2
Maldanidae	500163		1		1
Euclymene zonalis	5001631103		3		3
Pectinaria granulata	5001660303	6	10	5	21
Ampharete arctica	5001670201			1	1
Terebellidae	500168	2	2	7	11
Pista cristata	5001680701		1		1
Polycirrus californicus	5001680810	2	2		4
Gastropoda	51			1	1
Trochidae	510210			1	1
Rissoidae	510320	1			1
Polinices pallida	5103760402	1		2	3
Mitrella tuberosa	5105030202		2	3	5
Nassarius mendicus	5105080101	3	1		4
Olivella baetica	5105100102	3		2	5
Odostomia sp A	510801019939	1			1
Turbonilla aurantia	5108011134		3		3
Bivalvia	55	1			1

STATION 36 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nucula tenuis	5502020201		1		1
Mytilidae	550701		1		1
Megacrenella columbiana	5507010301		1	2	3
Parvilucina tenuisculpta	5515010101	17	34	40	91
Lucinoma acutilineata	5515010201		1		1
Axinopsida serricata	5515020201	7	4	6	17
Mysella tumida	5515100102	7	14	5	26
Clinocardium nuttali	5515220102		1		1
Solen sicarius	5515290201		1	1	2
Macoma spp.	55153101			2	2
Macoma yoldiformis	5515310111	8	4		12
Macoma carlottensis	5515310112	1			1
Tellina modesta	5515310204	8	21	19	48
Saxidomus giganteus	5515470201	1			1
Psephidia lordi	5515470501	5	7	1	13
Hiatella arctica	5517060201			2	2
Lyonsia californica	5520050202	4			4
Cylindroleberididae	611103		1	6	7
Euphilomedes carcharodonta	6111070301	90	174	99	363
Euphilomedes producta	6111070303	3			3
Nebalia spp.	61450101		1	2	3
Diastylis alaskensis	6154050101		1	2	3
Leptochelia dubia	6157020103	1	1	1	3
Ampelisca hancocki	6169020113	1			1
Byblis millsi	6169020208		2	2	4
Melita desdichada	6169211008	3			3
Photis spp.	61692602	1	1		2
Protomedeia spp.	61692603	3	9	7	19
Protomedeia grandimana	6169260303			8	8
Protomedeia penates-prudens complex	616926039999		2		2
Gammaropsis thompsoni	6169260401	7			7
Hippomedon coecus	6169341411		5		5
Monocludes zernovi	6169370816			1	1
Synchelidium shoemakeri	6169371402	1	3		4
Synchelidium rectipalmum	6169371403			3	3
Westwoodilla caecula	6169371502	3	3	6	12
Rhepoxynius spp.	61694215	2			2
Rhepoxynius abronius	6169421504	13	16	16	45
Pinnixa spp	61890604		1		1
Ophiuroida	8120	1			1
Amphiuridae	812903			1	1
Amphiodia urtica/periercta complex	812903019999	1			1
Amphipholus pugetanus	8129030201	1			1
Ascidiacea	8401	1	1		2
					1220
		356	480	384 Sum	
		6	8	7 Ave	
		168	542	233 Var	
		13	23	15 Sdv	
		1	1	1 Min	
		90	174	99 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 37

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Anthozoa sp 1	374000009999	1	1	1	3
Nemertea	43	9	5	28	42
Polynoidae	500102	1			1
Gattyana cirrosa	5001020603	1			1
Harmothoe lunulata	5001020810		1	3	4
Lepidasthenia berkeleyae	5001021801		2		2
Pholoides aspera	5001040101	1	2	7	10
Pholoe minuta	5001060101	3	2	1	6
Sthenelais berkeleyi	5001060301	2			2
Sthenelais tertiaglabra	5001060305		1		1
Paleonotus bellis	5001080101	1			1
Eulalia (Eumida) bilineata	5001130308		1	1	2
Eulalia (Eumida) sanguinea	5001131101	7	4	9	20
Phyllodoce (Aponaitides) hartmanae	5001131402	1			1
Microphthalmus aberrans	5001210202			1	1
Ophiodromus pugettensis	5001210401	1		1	2
Syllis hyalina	5001230312			1	1
Fusyllis assimilis	5001230601			1	1
Exgone gemmifera	5001230702		2	4	6
Exogone verugera	5001230706	10			10
Odontosyllis phosphorea	5001231303	1	3	5	9
Ehlersia heterochaeta	5001232201	13	3		16
Platynereis bicanaliculata	5001240501	4	3	4	11
Nephtys caeca	5001250103		1	1	2
Nephtys longosetosa	5001250109	1			1
Nephtys ferruginea	5001250111	10	3	10	23
Nephtys caecoides	5001250119	2			2
Glycera capitata	5001270101	5	4	1	10
Glycinde picta	5001280101	2	3	2	7
Goniada maculata	5001280202		1		1
Goniada brunnea	5001280203	1			1
Onuphis iridescens	5001290103		2	4	6
Diopatra ornata	5001290202	15	6	9	30
Lumbrineris spp.	50013101		7		7
Lumbrineris cruzensis	5001310118	1	2	2	5
Lumbrineris californiensis	5001310132	14	12	18	44
Drilonereis longa	5001330103	1			1
Dorvillea pseudorubrovittata	5001360101	8	1	13	22
Leitoscoloplos pugettensis	5001400102	3		1	4
Laonice cirrata	5001430201	1	1		2
Polydora giardi	5001430401	1			1
Polydora socialis	5001430402	1			1
Prionospio steenstrupi	5001430506	46	15	18	79
Prionospio lighti	5001430521	12	5	4	21
Spiophanes berkelyorum	5001431004	2		1	3
Paraprionospio pinnata	5001431702	1	1		2
Magelona longicornis	5001440105	1	2	3	6
Phyllochaetopterus prolifica	5001490202	127	54	236	417
Spiochaetopterus costarum	5001490302	16	3	7	26
Mesochaetopterus taylori	5001490401	1	2	2	5
Cirratulus cirratus	5001500101	3			3
Caulleriella alata	5001500202	8			8
Tharyx spp.	50015003	5			5
Tharyx multifilis	5001500302	9	1	1	11
Chaetozone setosa	5001500401	2			2
Chaetozone spinosa	5001500407	1	1	2	4
Pherusa plumosa	5001540302		1		1
Ophelina acuminata	5001580607		1		1
Notomastus tenuis	5001600302	1	17	6	24
Mediomastus californiensis	5001600402	5	2	6	13

STATION 37 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Rhodine bitorquata	5001631001	1			1
Euclymene zonalis	5001631103	2	1	5	8
Clymenura columbiana	5001631206	3			3
Pectinaria granulata	5001660303	4	14	16	34
Pectinaria californiensis	5001660304	1			1
Ampharetidae	500167	1	1		2
Amage anops	5001670101	1			1
Anobothrus gracilis	5001670701	7	4		11
Schistocomus hiltoni	5001672501			1	1
Nicolea zostericola	5001680601			1	1
Pista cristata	5001680701	5		1	6
Pista elongata	5001680703	2	1	1	4
Polycirrus californicus	5001680810	1	2	1	4
Amphitritinae	5001681		1	2	3
Thelepus setosus	5001681004			1	1
Lanassa venusta venusta	500168130201	1			1
Streblosoma bairdi	5001682502	1	4		5
Megalomma splendida	5001700401			1	1
Potamilla myriops	5001700602		1	1	2
Sabella media	5001700802	1			1
Pseudochitinopoma occidentalis	5001730101			2	2
Spirorbis spirillum	5001730602			1	1
Spirorbidae	500178	3			3
Trochidae	510210			1	1
Margarites pupillus	5102100308	1			1
Rissoidae	510320	1		1	2
Bittium spp.	51034601	1	1	1	3
Melanella micrans	5103530102		4	6	10
Crepipatella lingulata	5103640301	5	3	7	15
Polinices pallida	5103760402	1			1
Olivella baetica	5105100102	1	2		3
Kurtziella plumbea	5106021107			1	1
Odostomia sp. B	510801019938	1		5	6
Acila castrensis	5502020101		1		1
Nucula tenuis	5502020201	1	1	2	4
Nuculana minuta	5502040202		1		1
Mytilidae	550701			2	2
Megacrenella columbiana	5507010301	2	3	2	7
Modiolus modiolus	5507010601			1	1
Chalmys hastata	5509050101	3	5	4	12
Parvilucina tenuisculpta	5515010101	4	2		6
Lucinoma acutilineata	5515010201	2			2
Axinopsida serricata	5515020201	6	11	5	22
Thyasira sp.	55150203			1	1
Mysella tumida	5515100102		2	2	4
Clinocardium nuttali	5515220102	1			1
Nemocardium centifilosum	5515220301		1		1
Macoma spp.	55153101	4	2	6	12
Macoma calcarea	5515310101		2		2
Macoma elimata	5515310102	2	1	1	4
Macoma yoldiformis	5515310111	6	5	10	21
Psephidia lordi	5515470501	5	5	3	13
Mya arenaria	5517010201			1	1
Hiatella arctica	5517060201	2	1	1	4
Lyonsia californica	5520050202	1			1
Pycnogonida	60	2			2
Rutiderma lomae	6111060103	3	1	1	5
Euphilomedes carcharodonta	6111070301	64	57	54	175
Nebalia spp.	61450101		1		1
Eudorella pacifica	6154040202	2		1	3

STATION 37 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Gammaridea	6169	3			3
Ampelisca spp.	61690201	6	5	13	24
Ampelisca lobata	6169020134	2	3	2	7
Byblis millsi	6169020208	12	8	4	24
Aoroides spp.	61690602			1	1
Corophium spp.	61691502		1		1
Ericthonius sp.	61691503	3	2		5
Erichthonius brasiliensis	6169150302	1		1	2
Melita desdichada	6169211008			1	1
Hippomedon spp	61693414	1			1
Allogaussia sp.	61693499	1			1
Synchelidium spp	61693714	7			7
Synchelidium shoemakeri	6169371402		2		2
Synchelidium rectipalmum	6169371403			1	1
Westwoodilla caecula	6169371502	5	2		7
Heterophoxus oculatus	6169420301	4	1	1	6
Rhepoxynius variatus	6169420926	1			1
Rhepoxynius abronius	6169421504		1		1
Caridea	6179			1	1
Mesocrangon munitella	6179220115		2		2
Oregonia spp	61870101		2	3	5
Cancer spp.	61880301	1			1
Cancer branneri	6188030103		1		1
Pinnixa spp.	61890604	5	3	4	12
Golfingia spp.	72000201	2			2
Phoronida	77	1			1
Brachiopoda	80		1		1
Ophiura lutkeni	8127010607		1		1
Amphiuridae	812903	1		2	3
Amphiodia spp.	81290301	2	1	1	4
Amphiodia urtica/periercta complex	812903019999	1		1	2
Amphipholus sp.	81290302			1	1
Amphipholus pugetanus	8129030201	1		1	2
Amphipholus squamata	8129030202	2	1		3
Cucumaria spp.	81720601		1		1
Cucumaria piperata	8172060111		1		1
Pentamera lissoplaca	8172060303	3	7	2	12
Pentamera trachyplaca	8172060399	5	18	6	29
Pentamera sp 2	817206039988		1	3	4
Pentamera sp 1	817206039989	2	7		9
Ascidiacea	8401	1		4	5
					1601
		590	391	620 Sum	
		5	4	7 Ave	
		196	71	625 Var	
		14	8	25 Sdv	
		1	1	1 Min	
		127	57	236 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 38

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43	2	1	2	5
Sthenelais tertiaglabra	5001060305	1			1
Gyptis brevipalpa	5001210102	1		1	2
Sigambra bassi	5001220204	2	1		3
Nephtys spp.	50012501	1			1
Nephtys ferruginea	5001250111	2	1		3
Glycera capitata	5001270101			2	2
Glycinde picta	5001280101	1		1	2
Goniada maculata	5001280202	1			1
Onuphis iridescens	5001290103		1		1
Lumbrineris spp.	50013101			1	1
Leitoscoloplos pugettensis	5001400102	1			1
Levinsenia gracilis	5001410801		9		9
Levinsenia gracilis oculata	500141080101	4		5	9
Laonice cirrata	5001430201			1	1
Prionospio lighti	5001430521		1		1
Spiophanes berkelyorum	5001431004		1		1
Paraprionospio pinnata	5001431702	2	3	4	9
Cossura modica	5001520199	3		6	9
Flabelligeridae	500154	2			2
Notomastus lineatus	5001600303			1	1
Mediomastus spp.	50016004		1		1
Pectinaria californiensis	5001660304	16	10	8	34
Melanochlamys dimedea	511006999999	1		2	3
Chaetodermatida	5402	1	2		3
Nucula tenuis	5502020201		1		1
Yoldia scissurata	5502040504		1		1
Yoldia traciaeformis	5502040507		1		1
Parvilucina tenuisculpta	5515010101		1		1
Adontorhina cyclica	5515020102			1	1
Axinopsida serricata	5515020201	2	1	1	4
Macoma spp.	55153101	13	4	6	23
Euphilomedes carcharodonta	6111070301			1	1
Euphilomedes producta	6111070303	46	10	6	62
Mysidacea	6151	1		1	2
Eudorella pacifica	6154040202	11	19	8	38
Eudorellopsis integra	6154040301	14	9	47	70
Diastylis alaskensis	6154050101	1			1
Leptochelia dubia	6157020103		1		1
Aega symmetrica	6161070101	1			1
Rocinella belliceps	6161070202	1			1
Ampelisca careyi	6169020135		1		1
Melita desdichada	6169211008			1	1
Protomedeia prudens	6169260312	10	4	6	20
Heterophoxus oculatus	6169420301	17	7	12	36
Eobrolgus spinosus	6169420928	2			2
Amphiodia spp.	81290301	1			1
Molpadia intermedia	8179010101	1	4	3	8
					384
		162	95	127 Sum	
		5	4	5 Ave	
		81	19	84 Var	
		9	4	9 Sdv	
		1	1	1 Min	
		46	19	47 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 39

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Ptilosarcus gurneyi	3754020201		1	1	2
Nemertea	43		2		2
Tenonia priops	5001022302		1		1
Eteone longa	5001130205	1			1
Eulalia (Eumida) bilineata	5001130308			1	1
Phyllodoce (Paranaitis) polynoides	5001130803			1	1
Eulalia (Eumida) sanguinea	5001131101	2	4		6
Gyptis brevipalpa	5001210102			1	1
Ophiodromus pugettensis	5001210401		2		2
Platynereis bicanaliculata	5001240501	7	11	5	23
Nephtys longosetosa	5001250109			1	1
Nephtys ferruginea	5001250111			1	1
Nephtys caecoides	5001250119		2		2
Glycera capitata	5001270101		2		2
Glycinde picta	5001280101			4	4
Glycinde armigera	5001280103	7			7
Onuphidae	500129	3			3
Onuphis iridescens	5001290103	1	1		2
Diopatra ornata	5001290202		2	2	4
Leitoscoloplos pugettensis	5001400102	1	2		3
Acesta lopezi	5001411302	1			1
Prionospio steenstrupi	5001430506	30	81	40	151
Prionospio lighti	5001430521		2	1	3
Spiophanes berkelyorum	5001431004	1			1
Phyllochaetopterus prolifica	5001490202		2		2
Spiochaetopterus costarum	5001490302	2			2
Cirratulidae	500150	1			1
Chaetozone setosa	5001500401		1		1
Chaetozone spinosa	5001500407	1			1
Notomastus tenuis	5001600302	2	3		5
Notomastus lineatus	5001600303	1	1		2
Mediomastus californiensis	5001600402		1		1
Pectinaria granulata	5001660303		1		1
Terebellidae	500168	1			1
Pista cristata	5001680701			1	1
Polycirrus spp.	50016808		4		4
Polycirrus californicus	5001680810	4			4
Rissoidae	510320	1			1
Melanella micrans	5103530102			2	2
Mitrella tuberosa	5105030202	1	1	2	4
Olivella baetica	5105100102	6	1	1	8
Turbonilla aurantia	5108011134	1	1	1	3
Turbonilla sp. C	510801119997			1	1
Turbonilla sp. B	510801119998	3	1	6	10
Melanochlamys dimedea	511006999999	1			1
Bivalvia	55	1			1
Parvilucina tenuisculpta	5515010101	24	41	15	80
Lucinoma acutilineata	5515010201			1	1
Axinopsida serricata	5515020201	10	8	3	21
Mysella tumida	5515100102	3	8	1	12
Solen sicarius	5515290201		1		1
Macoma spp.	55153101	3	1	1	5
Macoma yoldiformis	5515310111	1	1	2	4
Tellina modesta	5515310204	4	9	7	20
Compsomyax subdiaphana	5515470301	1	2		3
Psephidia lordi	5515470501		1		1
Mya arenaria	5517010201			1	1
Lyonsia californica	5520050202	3	4	1	8
Cylindroleberididae	611103	4	5	4	13
Euphilomedes carcharodonta	6111070301	30	90	52	172

STATION 39 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nebalia spp.	61450101	1	1	2	4
Mysidacea	6151		1		1
Acanthomysis nephrophthalma	6153010105			1	1
Diastylis alaskensis	6154050101		1		1
Campylaspis spp.	61540701	2			2
Leptochelia dubia	6157020103	2	3		5
Ampelisca spp	61690201	1			1
Byblis millsi	6169020208		1	2	3
Rachotropis sp.	61692013		3		3
Protomedeia spp.	61692603	6		4	10
Cheirimedeia zotea	6169261199			1	1
Lysianassidae	616934		3		3
Hippomedon coecus	6169341411		6		6
Hippomedon subrobustus	6169341413			11	11
Westwoodilla caecula	6169371502		3	3	6
Heterophoxus oculatus	6169420301		1		1
Rhepoxynius abronius	6169421504	24	16	20	60
Fabia subquadrata	6189060301			1	1
Phoronida	77		1		1
Amphiodia urtica/periercta complex	812903019999			1	1
					746
		199	341	206 Sum	
		5	7	5 Ave	
		59	307	107 Var	
		8	18	10 Sdv	
		1	1	1 Min	
		30	90	52 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 40

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Anthozoa sp. 1	374000009999	1	3	6	10
Nemertea	43	1	3	8	12
Pholoe minuta	5001060101	3	4		7
Phyllodocidae	500113		1		1
Phyllodoce (Anaitides) groenlandica	5001130102		1		1
Eteone spilotus	5001130299			1	1
Eulalia (Eumida) sanguinea	5001131101	1			1
Phyllodoce (Aponaitides) hartmanae	5001131402		1		1
Pilargis berkeleyi	5001220301		1		1
Nephtys spp	50012501	1			1
Nephtys cornuta franciscana	500125010401		3		3
Nephtys longosetosa	5001250109		2		2
Nephtys ferruginea	5001250111	5	1	6	12
Sphaerodoropsis sphaerulifer	5001260103	1			1
Glycera capitata	5001270101	6	5	5	16
Glycinde picta	5001280101	6	2	3	11
Onuphidae	500129	1			1
Lumbrineris spp.	50013101	14	6	16	36
Lumbrineris luti	5001310109	6	16	12	34
Lumbrineris californiensis	5001310132		16	6	22
Driloneris falcata minor	500133010402		1		1
Leitoscoloplos pugettensis	5001400102	4	5	4	13
Scoloplos acmeceps	5001400311		2		2
Polydora cardalia	5001430431		1		1
Prionospio steenstrupi	5001430506	61	113	65	239
Prionospio lighti	5001430521	1	14	3	18
Spiophanes berkelyorum	5001431004		1	3	4
Paraprionospio pinnata	5001431702			2	2
Spiochaetopterus costarum	5001490302	1			1
Tharyx multifilis	5001500302	96	180	213	489
Chaetozone setosa	5001500401	13		20	33
Chaetozone spinosa	5001500407		11		11
Sternaspis scutata	5001590101		1		1
Notomastus tenuis	5001600302		11		11
Notomastus lineatus	5001600303	7	2	14	23
Mediomastus californiensis	5001600402	1	10	13	24
Praxillella gracilis	5001630901		2		2
Rhodine bitorquata	5001631001			2	2
Euclymene zonalis	5001631103	7	1	6	14
Clymenura columbiana	5001631206	3			3
Pectinaria granulata	5001660303	14	15	19	48
Ampharetidae	500167			1	1
Amage anops	5001670101	1	1		2
Ampharete spp.	50016702	1			1
Anobothrus gracilis	5001670701			1	1
Terebellidae	500168		1	1	2
Pista spp.	50016807		1		1
Pista cristata	5001680701	1	7	1	9
Polycirrus californicus	5001680810			2	2
Streblosoma bairdi	5001682502			1	1
Gastropoda	51			1	1
Polinices pallida	5103760402	1	1	1	3
Mitrella tuberosa	5105030202	6	8	1	15
Kurtziella plumbea	5106021107	1			1
Turbonilla aurantia	5108011134	7	2	1	10
Nucula tenuis	5502020201	2			2
Megacrenella columbiana	5507010301	1			1
Parvilucina tenuisculpta	5515010101	4		1	5
Lucinoma acutilineata	5515010201		2		2
Axinopsida serricata	5515020201	220	118	96	434

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 40 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Mysella tumida	5515100102			2	2
Clinocardium nuttali	5515220102	1			1
Nemocardium centifilosum	5515220301	2	1		3
Macoma spp	55153101	21	3		24
Macoma calcarea	5515310101		1		1
Macoma elimata	5515310102	1	5		6
Macoma yoldiformis	5515310111	22	12	11	45
Macoma carlottensis	5515310112		6	10	16
Macoma nasuta	5515310114	15			15
Compsomyax subdiaphana	5515470301	2	2	1	5
Lyonsia californica	5520050202		1	1	2
Cylindroleberididae	611103		1		1
Euphilomedes carcharodonta	6111070301	54	31	21	106
Euphilomedes producta	6111070303	42	4	2	48
Cirripedia	6130	1		1	2
Tanaidae	615701	2			2
Leptochelia dubia	6157020103		1	3	4
Westwoodilla sp.	61693715	1			1
Paraphoxus oculatus	6169420925		1		1
Callianassa spp.	61830402	3	6	11	20
Pinnixa spp.	61890604	13	3	8	24
Golfingia spp	72000201	1			1
Ophiuroida	8120		2		2
Amphiuridae	812903	8		3	11
Amphiodia spp	81290301	3	2	2	7
Holothuroidea	8170		3		3
					1963
		691	661	611 Sum	
		14	11	13 Ave	
		1157	938	1161 Var	
		34	31	34 Sdv	
		1	1	1 Min	
		220	180	213 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 41

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43	6	5	1	12
Pholoe minuta	5001060101	3			3
Phyllodoce (Anaitides) groenlandica	5001130102		1	2	3
Eteone californica	5001130201		1		1
Eteone longa	5001130205	3		2	5
Eulalia (Eumida) sanguinea	5001131101			4	4
Eunereis wailesi	500124119999			2	2
Sphaerodoropsis sphaerulifer	5001260103	2			2
Glycera capitata	5001270101	9	4	2	15
Glycinde picta	5001280101	2	1		3
Glycinde armigera	5001280103	1	3		4
Goniada brunnea	5001280203	2	1		3
Lumbrineris spp.	50013101			1	1
Lumbrineris bicirrata	5001310101			1	1
Lumbrineris luti	5001310109	45	31	34	110
Lumbrineris californiensis	5001310132			1	1
Polydora pygidialis	5001430417			8	8
Prionospio lighti	5001430521	1			1
Polydora (Boccardiella) hamata	5001430806			185	185
Tharyx multifilis	5001500302	1689	698	156	2543
Chaetozone setosa	5001500401	2			2
Scalibregma inflatum	5001570101	1			1
Sternaspis scutata	5001590101	1	3		4
Capitella capitata	5001600101		6		6
Heteromastus filobranchus	5001600203	12	7	5	24
Notomastus tenuis	5001600302		11	9	20
Praxillella gracilis	5001630901	1		2	3
Euclymeninae	5001631		3		3
Pectinaria californiensis	5001660304	3	1		4
Ampharetidae	500167		1		1
Polycirrus californicus	5001680810	2			2
Polinices pallida	5103760402	1			1
Odostomia sp A	510801019939	1	2	1	4
Turbonilla aurantia	5108011134	1	2	1	4
Rictaxis punctocaelatus	5110010401	2	7		9
Cylichna attonsa	5110040205	1	2	1	4
Melanochlamys dimedea	511006999999	2		1	3
Nucula tenuis	5502020201		1	1	2
Yoldia scissurata	5502040504	1	1		2
Adontorhina cyclica	5515020102		3		3
Axinopsida serricata	5515020201	1055	1353	285	2693
Nemocardium centifilosum	5515220301		1		1
Macoma spp	55153101	8		1	9
Macoma elimata	5515310102	8	5		13
Macoma yoldiformis	5515310111	1		2	3
Macoma nasuta	5515310114	40	38	26	104
Compsomyax subdiaphana	5515470301		4	1	5
Cylindroleberididae	611103		1	1	2
Euphilomedes carcharodonta	6111070301	45	21	23	89
Euphilomedes producta	6111070303	29	48	5	82
Leptochelia dubia	6157020103	1	8	2	11
Eudorellopsis sp	61640403			1	1
Opisa tridentata	6169342802	1			1
Synchelidium shoemakeri	6169371402	1			1
Westwoodilla caecula	6169371502	1			1
Heterophoxus oculatus	6169420301			1	1
Rhepoxynius bicuspidata	6169421503	14	8	1	23
Callianassidae	618304	1			1
Callianassa spp.	61830402	1	1	2	4

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 41 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Pinnixa spp	61890604	8	5	4	17
Ophiura lutkeni	8127010607	1			1
Amphiuridae	812903	14	4	8	26
Amphiodia spp	81290301	16	2	5	23
					6121
		3039	2294	788 Sum	
		71	62	21 Ave	
		87410	58954	3398 Var	
		296	243	58 Sdv	
		1	1	1 Min	
		1689	1353	285 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 42

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43	3	2		5
Harmothoe lunulata	5001020810		1		1
Pholoides aspera	5001040101		1		1
Sthenelais tertiaglabra	5001060305		1		1
Thalenessa spinosa	5001060601	1			1
Phyllodoce (Paranaitis) polynoides	5001130803	1			1
Eulalia (Eumida) sanguinea	5001131101	3	1		4
Gyptis brevipalpa	5001210102	1			1
Exgone gemmifera	5001230702		1		1
Odontosyllis phosphorea	5001231303	2	2		4
Platynereis bicanaliculata	5001240501	1			1
Nephtys spp.	50012501	1			1
Nephtys caeca	5001250103			1	1
Nephtys longosetosa	5001250109		1		1
Nephtys ferruginea	5001250111	2	2	3	7
Glycera capitata	5001270101			1	1
Glycinde picta	5001280101	1			1
Goniada maculata	5001280202		1		1
Onuphidae	500129		1	2	3
Diopatra ornata	5001290202		2		2
Leitoscoloplos panamensis	5001400101			1	1
Acesta lopezi	5001411302			4	4
Prionospio steenstrupi	5001430506	25	28	37	90
Prionospio lighti	5001430521			1	1
Spio filicornis	5001430701			1	1
Spiophanes berkelyorum	5001431004			1	1
Paraprionospio pinnata	5001431702		1		1
Spiochaetopterus costarum	5001490302		1		1
Tharyx multifilis	5001500302			2	2
Chaetozone spinosa	5001500407		1	5	6
Notomastus lineatus	5001600303	1	1		2
Maldanidae	500163		1		1
Ampharetidae	500167			1	1
Amage anops	5001670101	1	2	1	4
Ampharete acutifrons	5001670208		1		1
Anobothrus gracilis	5001670701			1	1
Terebellidae	500168	3			3
Pista elongata	5001680703	1			1
Polycirrus californicus	5001680810	3	5		8
Melanella micrans	5103530102			1	1
Crepipatella lingulata	5103640301		1		1
Mitrella tuberosa	5105030202	1		1	2
Olivella baetica	5105100102	10	3	16	29
Odostomia sp A	510801019939		1		1
Diaphana sp	5110090102		1		1
Bivalvia	55		1		1
Parvilucina tenuisculpta	5515010101		1		1
Lucinoma acutilineata	5515010201			1	1
Axinopsida serricata	5515020201	2			2
Macoma yoldiformis	5515310111	1	2	2	5
Tellina nuculoides	5515310202	2			2
Mya arenaria	5517010201		1		1
Euphilomedes carcharodonta	6111070301	2	1		3
Eudorella pacifica	6154040202			1	1
Leptognathia gracilis	6157020202	1			1
Ampelisca careyi	6169020135	1	3		4
Byblis millsi	6169020208			1	1
Aoroides spp.	61690602	1			1
Hippomedon coecus	6169341411		1	1	2

STATION 42 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Opisa tridentata	6169342802		1		1
Synchelidium shoemakeri	6169371402		6	2	8
Westwoodilla caecula	6169371502		1		1
Metaphoxus frequens	6169420601		1		1
Rhepoxynius daboius	6169421505	9	7	2	18
Stenothoidae	616948			1	1
Tritella pilimana	6171010602		3		3
Golfingia spp.	72000201		1		1
Cucumaria piperata	8172060111	1	1		2
Pentamera lissoplaca	8172060303		1		1
					267
		81	95	91 Sum	
		3	2	4 Ave	
		23	18	54 Var	
		5	4	7 Sdv	
		1	1	1 Min	
		25	28	37 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 43

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Anthozoa sp. 1	374000009999		1		1
Nemertea	43	5	2		7
Polynoidae	500102			2	2
Pholoe minuta	5001060101		4	2	6
Sthenelais berkeleyi	5001060301		1		1
Sthenelais tertiaglabra	5001060305	1	3		4
Phyllodoce (Anaitides) groenlandica	5001130102			1	1
Eulalia (Eumida) sanguinea	5001131101	19	5	8	32
Phyllodoce (Aponaitides) hartmanae	5001131402		2		2
Ophiodromus pugettensis	5001210401	1			1
Autolytus cornutus	5001230101		1		1
Ehlersia heterochaeta	5001232201		1		1
Platynereis bicanaliculata	5001240501	1			1
Nephtys caeca	5001250103			2	2
Nephtys cornuta franciscana	500125010401	1			1
Nephtys longosetosa	5001250109			1	1
Nephtys ferruginea	5001250111		4	1	5
Sphaerodoropsis sphaerulifer	5001260103	2			2
Glycera capitata	5001270101	3	4	6	13
Glycinde picta	5001280101	22	5	12	39
Glycinde armigera	5001280103		1		1
Goniada maculata	5001280202			1	1
Onuphis elegans	5001290111	1	1		2
Lumbrineris spp.	50013101			1	1
Lumbrineris luti	5001310109	2	2	3	7
Leitoscoloplos pugettensis	5001400102	3	9	7	19
Prionospio steenstrupi	5001430506	15	4	1	20
Spiophanes berkelyorum	5001431004	1			1
Paraprionospio pinnata	5001431702		1	1	2
Magelona longicornis	5001440105			3	3
Phyllochaetopterus prolifica	5001490202	23	32	96	151
Spiochaetopterus costarum	5001490302	16	36		52
Mesochaetopterus taylori	5001490401	2	2		4
Scalibregma inflatum	5001570101	3	3	1	7
Capitellidae	500160		1		1
Notomastus lineatus	5001600303			1	1
Maldanidae	500163			3	3
Notoproctus pacificus	5001630601		1		1
Euclymeninae	5001631	2	4		6
Euclymene zonalis	5001631103		1	2	3
Clymenura columbiana	5001631206	6	3		9
Isocirrus longiceps	5001632001		2		2
Pectinaria granulata	5001660303			1	1
Pectinaria californiensis	5001660304	4			4
Amage anops	5001670101	1			1
Anobothrus gracilis	5001670701	1		3	4
Terebellidae	500168		1		1
Pista cristata	5001680701		1		1
Polycirrus spp.	50016808		1		1
Streblosoma bairdi	5001682502		1		1
Mitrella tuberosa	5105030202			1	1
Nassarius mendicus	5105080101			1	1
Cylichna attonsa	5110040205	2	3	2	7
Melanochlamys dimedea	511006999999	1			1
Nucula tenuis	5502020201	7	6	17	30
Megacrenella columbiana	5507010301		2	6	8
Modiolus spp.	55070106			1	1
Parvilucina tenuisculpta	5515010101	4	4	1	9
Axinopsida serricata	5515020201	3	2		5
Thyasira gouldii	5515020325	5	1	3	9

STATION 43 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Mysella tumida	5515100102	3	7	6	16
Macoma spp.	55153101			2	2
Macoma calcarea	5515310101			1	1
Macoma yoldiformis	5515310111	7	4	5	16
Macoma carlottensis	5515310112	7	3		10
Psephidia lordi	5515470501		1		1
Lyonsia pugetensis	5520050205	3	1	2	6
Euphilomedes carcharodonta	6111070301	94	184	155	433
Eudorella pacifica	6154040202	1	1		2
Leptochelia dubia	6157020103	5	1		6
Ampelisca spp	61690201		1		1
Byblis millsi	6169020208	5	6	2	13
Aoroides spp.	61690602		1		1
Corophium spp.	61691502	15		10	25
Protomedeia prudens	6169260312			1	1
Westwoodilla caecula	6169371502	4	5	3	12
Phoxocephalidae	616942			2	2
Heterophoxus oculatus	6169420301	4	5	1	10
Eyakia robustus	6169420918	8	13	16	37
Rhepoxynius abronius	6169421504	22	21	24	67
Pagurus spp.	61830602	1			1
Pinnixa spp.	61890604	10	14	28	52
Golfingia spp.	72000201	3			3
Amphiuridae	812903	15	15	23	53
Amphiodia spp.	81290301	69	70	95	234
Amphiodia urtica/periercta complex	812903019999	34	33	49	116
					1627
		467	544	616 Sum	
		10	10	13 Ave	
		283	676	815 Var	
		17	26	29 Sdv	
		1	1	1 Min	
		94	184	155 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 44

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Anthozoa sp 1	374000009999	3			3
Turbellaria	3901			1	1
Nemertea	43	31	5	18	54
Nematoda	47			1	1
Polynoidae	500102			1	1
Harmothoe spp.	50010208			3	3
Harmothoe extenuata	5001020803	1			1
Harmothoe imbricata	5001020806	1		1	2
Lepidasthenia berkeleyae	5001021801		1		1
Pholoides aspera	5001040101	4	1	10	15
Pholoe minuta	5001060101		1	1	2
Paleonotus bellis	5001080101	1			1
Phyllodoce (Anaitides) groenlandica	5001130102	1			1
Eteone spp.	50011302	1			1
Eteone spilotus	5001130299		1		1
Eulalia (Eumida) bilineata	5001130308	1	1		2
Eulalia (Eumida) sanguinea	5001131101	8	4	6	18
Phyllodoce (Aponaitides) hartmanae	5001131402	1			1
Phyllodoce (Anaitides) spp	5001131499			1	1
Gyptis brevipalpa	5001210102			1	1
Ophiodromus pugettensis	5001210401	4		3	7
Pilargis berkeleyi	5001220301	1			1
Autolytus cornutus	5001230101	1			1
Syllis hyalina	5001230312	5	2		7
Exgone gemmifera	5001230702		1		1
Exogone verugera	5001230706	1			1
Odontosyllis phosphorea	5001231303	5	3	3	11
Ehlersia heterochaeta	5001232201	1		5	6
Platynereis bicanaliculata	5001240501	2	1	8	11
Nephtys spp	50012501	2		3	5
Nephtys caeca	5001250103	1			1
Nephtys cornuta franciscana	500125010401	2			2
Nephtys ferruginea	5001250111	3	1	1	5
Glycera capitata	5001270101	4	5	3	12
Glycera americana	5001270104	1			1
Glycinde picta	5001280101	1	3		4
Glycinde armigera	5001280103			1	1
Onuphidae	500129	1			1
Diopatra ornata	5001290202	4	3	7	14
Lumbrineris bicirrata	5001310101			2	2
Lumbrineris luti	5001310109	2			2
Lumbrineris cruzensis	5001310118	2			2
Lumbrineris californiensis	5001310132	12	7	19	38
Drilonerис falcata minor	500133010402			1	1
Notocirrus californiensis	5001330302	1		1	2
Dorvillea sp.	50013601	1			1
Dorvillea pseudorubrovittata	5001360101			1	1
Leitoscoloplos pugettensis	5001400102	4	4		8
Allia ramosa	5001410706	4		3	7
Levinsenia gracilis	5001410801	4			4
Laonice cirrata	5001430201	2	1	2	5
Polydora spp	50014304	1			1
Polydora giardi	5001430401	1			1
Polydora socialis	5001430402	1		5	6
Prionospio steenstrupi	5001430506	105	46	82	233
Prionospio lighti	5001430521	6	1	1	8
Spiophanes berkelyorum	5001431004	31	10	25	66
Paraprionospio pinnata	5001431702	10	8	1	19
Magelona longicornis	5001440105	1		1	2
Phyllochaetopterus prolifica	5001490202	121	38	82	241

STATION 44 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Spiochaetopterus costarum	5001490302	27	4	24	55
Mesochaetopterus taylori	5001490401	12	1	11	24
Caulleriella alata	5001500202	6		4	10
Tharyx multifilis	5001500302	2		7	9
Armandia brevis	5001580202	1			1
Ophelina acuminata	5001580607	1			1
Notomastus tenuis	5001600302	2		4	6
Notomastus lineatus	5001600303	3		2	5
Mediomastus spp.	50016004	1			1
Mediomastus ambiseta	5001600401	3			3
Mediomastus californiensis	5001600402	13	4	12	29
Maldanidae	500163		1		1
Praxillella gracilis	5001630901			1	1
Rhodine bitorquata	5001631001	1		1	2
Clymenura columbiana	5001631206	5		1	6
Isocirrus longiceps	5001632001			2	2
Sabellaria cementarium	5001650201	16	4	3	23
Pectinaria spp.	50016603		1		1
Pectinaria granulata	5001660303	2		4	6
Anobothrus gracilis	5001670701	2	1	5	8
Polycirrus californicus	5001680810	2		4	6
Artacama coniferi	5001681101			1	1
Lanassa venusta venusta	500168130201	1			1
Terebellides stroemi	5001690101		1	3	4
Megalomma splendida	5001700401	3			3
Crepipatella lingulata	5103640301			4	4
Mitrella tuberosa	5105030202	4			4
Nassarius mendicus	5105080101	1			1
Olivella baetica	5105100102	14	5		19
Odostomia sp A	510801019939	1			1
Turbonilla aurantia	5108011134	1			1
Cylichna attonsa	5110040205		1		1
Acila castrensis	5502020101		4		4
Nucula tenuis	5502020201	3	3	1	7
Mytilidae	550701			2	2
Megacrenella columbiana	5507010301	1		1	2
Musculus spp.	55070104		2		2
Chlamys hastata	550701049999	1		1	2
Parvilucina tenuisculpta	5515010101	3	2	3	8
Lucinoma acutilineata	5515010201	2		1	3
Axinopsida serricata	5515020201	8	13	2	23
Thyasira gouldii	5515020325	1			1
Mysella tumida	5515100102	10	5	2	17
Clinocardium sp.	55152201		1		1
Macoma spp.	55153101	3		1	4
Macoma yoldiformis	5515310111	11	21	10	42
Psephidia lordi	5515470501	1	1	1	3
Bankia setacea	5518020101			1	1
Euphilomedes carcharodonta	6111070301	1	4	4	9
Cirripedia	6130	2	1	1	4
Eudorella pacifica	6154040202	6	7	2	15
Haliophasma geminata	6160011601	1			1
Ampelisca spp.	61690201	1		2	3
Ampelisca lobata	6169020134	3	1	1	5
Byblis millsi	6169020208	3	4		7
Aoroides spp.	61690602	4		1	5
Corophium spp.	61691502	3		2	5
Erichthonius sp.	61691503			4	4
Erichthonius hunteri	6169150301		1	1	2
Erichthonius brasiliensis	6169150302	3		2	5

STATION 44 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Melita desdichada	6169211008	1		1	2
Photis spp.	61692602	1			1
Monocludes zernovi	6169370816			1	1
Synchelidium shoemakeri	6169371402		1		1
Westwoodilla caecula	6169371502		2		2
Heterophoxus oculatus	6169420301	4	5	7	16
Caridea	6179			1	1
Spirontocaris snyderi	6179160204			2	2
Mesocrangon munitella	6179220115			1	1
Pagurus spp	61830602		1		1
Lophopanopeus bellus diegensis	618902010102			3	3
Pinnixa spp.	61890604	28	6	11	45
Golfingia spp.	72000201	12	1	2	15
Phoronida	77	1			1
Ophiura lutkeni	8127010607	1		2	3
Amphiodia spp.	81290301	1	5	3	9
Amphiodia urtica/periercta complex	812903019999	2	1	3	6
Amphipholus pugetanus	8129030201			1	1
Amphipholus squamata	8129030202	1		1	2
Holothuroidea	8170		1		1
Pentamera lissoplaca	8172060303	1	1	1	3
Pentamera (Cucumaria) populifera	8172060304			1	1
Thyone sp	81720605	1			1
					1399
		650	265	484 Sum	
		6	5	5 Ave	
		263	62	155 Var	
		16	8	12 Sdv	
		1	1	1 Min	
		121	46	82 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 45

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Anthozoa sp. 1	374000009999		1		1
Pachycerianthus fimbriatus	3743010303	1	2		3
Turbellaria	3901		1		1
Nemertea	43	3	4	2	9
Nematoda	47	1			1
Polynoidae	500102	2			2
Lepidasthenia berkeleyae	5001021801	3	1	6	10
Tenonia priops	5001022302	1	1	2	4
Pholoe minuta	5001060101	5	4	1	10
Sthenelais tertiaglabra	5001060305	2			2
Eulalia (Eumida) sanguinea	5001131101	1			1
Gyptis brevipalpa	5001210102	1			1
Sigambra bassi	5001220204	18	3	12	33
Pilargis berkeleyi	5001220301			1	1
Pionosyllis uraga	5001230204			1	1
Nereidae	500124	1			1
Nereis procera	5001240404			3	3
Nereis zonata	5001240406	5	2	2	9
Nephtys caeca	5001250103	1			1
Nephtys cornuta franciscana	500125010401	1	4	1	6
Glycera capitata	5001270101	3	2	2	7
Glycinde armigera	5001280103			1	1
Goniada brunnea	5001280203	2		1	3
Diopatra ornata	5001290202	1			1
Lumbrineris spp.	50013101	2	4	1	7
Lumbrineris luti	5001310109	3	1		4
Leitoscoloplos pugettensis	5001400102	1	1		2
Allia ramosa	5001410706	21	38	55	114
Levinsenia gracilis	5001410801	88	104	92	284
Acesta lopezi	5001411302	11	5	8	24
Laonice spp.	50014302		1		1
Laonice cirrata	5001430201	6	5	12	23
Polydora socialis	5001430402	2			2
Polydora cardalia	5001430431			2	2
Prionospio steenstrupi	5001430506		1	1	2
Prionospio lighti	5001430521	1			1
Spiophanes berkelyorum	5001431004	1	6	2	9
Tharyx multifilis	5001500302	1		2	3
Chaetozone setosa	5001500401			3	3
Cossura longocirrata	5001520101	2	1		3
Notomastus lineatus	5001600303			1	1
Mediomastus spp.	50016004		2	1	3
Maldanidae	500163		1		1
Praxillella affinis pacifica	500163090301	1	1	7	9
Euclymeninae	5001631	1	2	7	10
Rhodine bitorquata	5001631001	1	1		2
Euclymene zonalis	5001631103	1			1
Pectinaria californiensis	5001660304	12	5	12	29
Anobothrus gracilis	5001670701	1		1	2
Terebellidae	500168			1	1
Neoamphitrite robusta	5001680401	1			1
Artacama coniferi	5001681101			5	5
Scionella estevanica	5001681803	4		1	5
Nitidiscala tincta	5103509999	3			3
Mitrella tuberosa	5105030202			2	2
Nassarius mendicus	5105080101			1	1
Turbonilla aurantia	5108011134	1			1
Cylichna attonsa	5110040205	2	1	1	4
Melanochlamys dimedea	511006999999		1	1	2
Nudibranchia	5127		2		2

STATION 45 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Yoldia scissurata	5502040504		1		1
Mytilidae	550701	1			1
Parvilucina tenuisculpta	5515010101	2	9	7	18
Lucinoma acutilineata	5515010201	7		2	9
Thyasira gouldii	5515020325		2		2
Mysella tumida	5515100102			1	1
Nemocardium centifilosum	5515220301	1			1
Macoma sp.	55153101		1		1
Macoma yoldiformis	5515310111	1			1
Compsomyax subdiaphana	5515470301			1	1
Ostracoda	6110	3			3
Euphilomedes carcharodonta	6111070301	36	51	27	114
Eudorella pacifica	6154040202		3		3
Photis spp.	61692602	2		1	3
Westwoodilla caecula	6169371502	1		1	2
Heterophoxus oculatus	6169420301	3	2	6	11
Pinnixa spp.	61890604	2		1	3
Golfingia spp.	72000201		3	1	4
Crossaster sp.	81130101		1		1
Ophiuroida	8120	1			1
Amphiuridae	812903		1	1	2
Amphiodia spp.	81290301	4	5		9
Amphiodia urtica/periercta complex	812903019999	4	2	6	12
Holothuroidea	8170	1	1		2
Pentamera trachyplaca	8172060399	1			1
Ascidiacea	8401		1		1
					889
		289	291	309 Sum	
		5	6	6 Ave	
		156	297	231 Var	
		13	17	15 Sdv	
		1	1	1 Min	
		88	104	92 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 46

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Anthozoa sp. 1	374000009999	1	2	2	5
Turbellaria	3901	1			1
Nemertea	43	1	8	7	16
Nematoda	47		1		1
Polynoidae	500102		1	1	2
Harmothoe lunulata	5001020810		3		3
Lepidasthenia berkeleyae	5001021801	1	3	1	5
Tenonia priops	5001022302		1		1
Pholoides aspera	5001040101		1		1
Pholoe minuta	5001060101	5	2	5	12
Sthenelais tertiaglabra	5001060305	2	8	6	16
Paleonotus bellis	5001080101		1	1	2
Eteone longa	5001130205		1	1	2
Eulalia (Eumida) sanguinea	5001131101	2	3	4	9
Phyllodoce (Aponaitides) hartmanae	5001131402			5	5
Gyptis brevipalpa	5001210102		1	1	2
Autolytus cornutus	5001230101		1	2	3
Exgone gemmifera	5001230702	2	5	1	8
Exogone lourei	5001230703		1		1
Exogone verugera	5001230706		7		7
Nereis zonata	5001240406			1	1
Platynereis bicanaliculata	5001240501		2		2
Nephtys ferruginea	5001250111	1	4	5	10
Glycera capitata	5001270101	4	5	6	15
Glycinde picta	5001280101		2	1	3
Onuphidae	500129			4	4
Diopatra ornata	5001290202		5		5
Lumbrineris luti	5001310109	7	4	6	17
Drilonerис falcata minor	500133010402	1			1
Leitoscoloplos pugettensis	5001400102	12	9	14	35
Orbinia (Phylo) felix	5001400510	1			1
Allia ramosa	5001410706	1	4	1	6
Levinsenia gracilis	5001410801			2	2
Laonice cirrata	5001430201	3	4	1	8
Polydora giardi	5001430401		1		1
Polydora socialis	5001430402	1	1		2
Polydora cardalia	5001430431			5	5
Prionospio steenstrupi	5001430506	15	15	20	50
Prionospio lighti	5001430521		3	1	4
Spiophanes berkelyorum	5001431004	23	59	60	142
Paraprionospio pinnata	5001431702	2	6	4	12
Magelona longicornis	5001440105	9	5	15	29
Phyllochaetopterus prolifica	5001490202	2	77		79
Spiochaetopterus costarum	5001490302		4	1	5
Notomastus lineatus	5001600303		1	2	3
Mediomastus californiensis	5001600402	8		6	14
Euclymeninae	5001631			1	1
Euclymene zonalis	5001631103	2	4	6	12
Sabellaria cementarium	5001650201		4		4
Pectinaria californiensis	5001660304		1	1	2
Amage anops	5001670101		1		1
Anobothrus gracilis	5001670701		1	3	4
Terebellidae	500168	3	12	2	17
Neoamphitrite edwardsii	5001680405		1		1
Pista elongata	5001680703		2		2
Streblosoma bairdi	5001682502	1	2	1	4
Terebellides stroemi	5001690101		1	3	4
Megalomma splendida	5001700401			1	1
Bittium spp.	51034601		1		1
Mitrella tuberosa	5105030202	10	9	17	36

STATION 46 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nassarius mendicus	5105080101	5	10	1	16
Kurtziella plumbea	5106021107		1		1
Odostomia sp A	510801019939	1		9	10
Turbonilla aurantia	5108011134			1	1
Cylichna attonsa	5110040205	1		3	4
Nucula tenuis	5502020201	1		3	4
Mytilidae	550701		2		2
Megacrenella columbiana	5507010301	3		2	5
Modiolus spp.	55070106	1	1	1	3
Parvilucina tenuisculpta	5515010101	4	3		7
Lucinoma acutilineata	5515010201			1	1
Axinopsida serricata	5515020201	4		1	5
Mysella tumida	5515100102	1	1	2	4
Clinocardium nuttali	5515220102			1	1
Macoma spp.	55153101	1	1		2
Macoma yoldiformis	5515310111	8	11	22	41
Macoma carlottensis	5515310112		1	2	3
Compsomyax subdiaphana	5515470301		1		1
Psephidia lordi	5515470501			1	1
Hiatella arctica	5517060201	1			1
Cylindroleberididae	611103	1			1
Euphilomedes carcharodonta	6111070301	48	50	58	156
Euphilomedes producta	6111070303	2			2
Eudorella pacifica	6154040202	6	12	6	24
Ampelisca spp.	61690201			1	1
Ampelisca lobata	6169020134		8		8
Ampelisca careyi	6169020135	1			1
Byblis millsi	6169020208			5	5
Erichthonius brasiliensis	6169150302	13	6	1	20
Protomedeia prudens	6169260312	18	9	9	36
Allogaussia sp.	61693499		1		1
Synchelidium shoemakeri	6169371402	1			1
Westwoodilla caecula	6169371502	3	6	5	14
Heterophoxus oculatus	6169420301	1	6		7
Rhepoxynius abronius	6169421504	28	17	19	64
Callianassidae	618304		1		1
Callianassa spp	61830402			1	1
Pagurus spp.	61830602	1	2		3
Oregonia spp.	61870101		1		1
Cancer branneri	6188030103		1		1
Pinnixa spp.	61890604	25	23	30	78
Golfingia spp	72000201	4	3	5	12
Amphiodia spp.	81290301	17	10	13	40
Amphiodia urtica/periercta complex	812903019999	21	14	15	50
					1289
		342	502	445 Sum	
		6	7	7 Ave	
		78	150	118 Var	
		9	12	11 Sdv	
		1	1	1 Min	
		48	77	60 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 47

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Anthozoa sp 1	374000009999	219	60	61	340
Turbellaria	3901			1	1
Nemertea	43	13	11	2	26
Polynoidae	500102			1	1
Gattyana cirrosa	5001020603		1		1
Harmothoe lunulata	5001020810		1		1
Tenonia priops	5001022302			2	2
Pholoides aspera	5001040101	8	5	4	17
Sthenelais tertiaglabra	5001060305	2	1		3
Paleonotus bellis	5001080101	4	1		5
Phyllodoce (Anaitides) groenlandica	5001130102			1	1
Eulalia (Eumida) bilineata	5001130308			1	1
Eulalia (Eumida) sanguinea	5001131101	9	4	4	17
Gyptis brevipalpa	5001210102		1		1
Sigambra bassi	5001220204	1			1
Pilargis berkeleyi	5001220301	1		1	2
Autolytus cornutus	5001230101	1		2	3
Pionosyllis uraga	5001230204	2			2
Syllis hyalina	5001230312			1	1
Exgone gemmifera	5001230702		3		3
Exogone lourei	5001230703	2			2
Exogone molesta	5001230704		1		1
Exogone verugera	5001230706	3			3
Odontosyllis phosphorea	5001231303		2		2
Ehlersia heterochaeta	5001232201		2		2
Nephtys ferruginea	5001250111		1		1
Glycera capitata	5001270101	7	2	3	12
Glycinde picta	5001280101	1	4	3	8
Onuphidae	500129		5	1	6
Onuphis iridescens	5001290103		1		1
Diopatra ornata	5001290202	9	2	1	12
Lumbrineris spp.	50013101	1	2		3
Lumbrineris luti	5001310109	18	13	13	44
Lumbrineris cruzensis	5001310118			1	1
Lumbrineris californiensis	5001310132	11	2	6	19
Leitoscoloplos pugettensis	5001400102	14	20	10	44
Laonice cirrata	5001430201		1		1
Polydora giardi	5001430401	1			1
Polydora socialis	5001430402	1			1
Prionospio steenstrupi	5001430506	17	21	16	54
Prionospio lighti	5001430521			1	1
Spiophanes berkelyorum	5001431004	13	5	9	27
Paraprionospio pinnata	5001431702		1		1
Magelona longicornis	5001440105	12	9	5	26
Phyllochaetopterus prolifica	5001490202	11	12	4	27
Caulleriella alata	5001500202	1			1
Chaetozone setosa	5001500401	1			1
Notomastus tenuis	5001600302	1	2		3
Mediomastus spp.	50016004	6		1	7
Mediomastus ambiseta	5001600401	2			2
Barantolla americana	5001600601			2	2
Maldanidae	500163		1		1
Maldane spp.	50016303		1		1
Maldane glebifex	5001630302	2			2
Notoproctus pacificus	5001630601			1	1
Rhodine bitorquata	5001631001	1			1
Clymenura columbiana	5001631206	1			1
Sabellaria cementarium	5001650201	1		2	3
Pectinaria granulata	5001660303	6	1		7
Pectinaria californiensis	5001660304			1	1

STATION 47 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Amage anops	5001670101	10	46	10	66
Melinna elisabethae	5001670503	1			1
Terebellidae	500168	1	1		2
Terebellides stroemi	5001690101	1			1
Sabellidae	500170			1	1
Rissoidae	510320	1	1		2
Crepipatella lingulata	5103640301	3		7	10
Mitrella tuberosa	5105030202	16	8	7	31
Nassarius mendicus	5105080101	3	1		4
Kurtziella plumbea	5106021107	4	3	6	13
Odostomia sp A	510801019939	4		1	5
Turbonilla aurantia	5108011134		1	2	3
Cylichna attonsa	5110040205	1	1	1	3
Melanochlamys dimedea	511006999999		1		1
Nudibranchia	5127		1	1	2
Bivalvia	55	1			1
Nucula tenuis	5502020201	1			1
Mytilidae	550701	2			2
Megacrenella columbiana	5507010301	1	1	2	4
Parvilucina tenuisculpta	5515010101	7	11	1	19
Lucinoma acutilineata	5515010201	4	3	13	20
Axinopsida serricata	5515020201	1	1		2
Mysella tumida	5515100102	2			2
Clinocardium nuttali	5515220102			1	1
Macoma yoldiformis	5515310111	8	4	6	18
Macoma carlottensis	5515310112			1	1
Hiatella arctica	5517060201	4			4
Pandora filosa	5520020102			1	1
Lyonsia californica	5520050202	2	1		3
Cardiomya californica	5520100108			1	1
Euphilomedes carcharodonta	6111070301	44	13	13	70
Cirripedia	6130	7		14	21
Ampelisca spp.	61690201	1			1
Ampelisca hancocki	6169020113		4		4
Ampelisca lobata	6169020134	16			16
Byblis millsi	6169020208	1	1	1	3
Argissa hamatipes	6169070101		1		1
Ericthonius sp	61691503	1			1
Melita desdichada	6169211008	4			4
Protomedeia spp.	61692603	7	3		10
Protomedeia articulata	6169260307			3	3
Westwoodilla caecula	6169371502	2	5	2	9
Heterophoxus oculatus	6169420301	6	3	3	12
Rhepoxynius dabious	6169421505		1		1
Dyopedos spp.	61694499			1	1
Pagurus spp.	61830602		1	2	3
Cancridae	618803	1			1
Cancer gracilis	6188030105			1	1
Pinnixa spp.	61890604	1		1	2
Golfingia spp.	72000201	6	15	8	29
Ophiuroida	8120			1	1
Amphiuridae	812903	5	5	5	15
Amphiodia spp.	81290301	17	26	54	97

STATION 47 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Amphiodia urtica/periercta complex	812903019999	2	3	6	11
Holothuroidea	8170	6	33	7	46
Eupentacta pseudoquinquesemita	8172060201	1			1
					1352
		609	398	345 Sum	
		8	6	5 Ave	
		644	114	104 Var	
		25	11	10 Sdv	
		1	1	1 Min	
		219	60	61 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 48

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Stylatula elongata	3754010103		2	4	6
Nemertea	43	4	5	2	11
Nematoda	47			1	1
Polynoidae	500102		1		1
Pholoe minuta	5001060101	1			1
Phyllodoce (Aponaitides) hartmanae	5001131402		1		1
Gyptis brevipalpa	5001210102		4	1	5
Sigambra bassi	5001220204	17	3	18	38
Pilargis berkeleyi	5001220301		1	2	3
Nephtys cornuta franciscana	500125010401	10	12	3	25
Nephtys ferruginea	5001250111	1	1		2
Glycera capitata	5001270101	1	2	2	5
Glycinde picta	5001280101	2			2
Lumbrineris spp.	50013101			1	1
Lumbrineris luti	5001310109	2	5	1	8
Leitoscoloplos panamensis	5001400101	1	1		2
Levinsenia gracilis	5001410801		3	3	6
Acesta lopezi	5001411302	2	12	3	17
Laonice cirrata	5001430201		1		1
Polydora brachycephala	5001430429	1			1
Polydora cardalia	5001430431			1	1
Prionospio steenstrupi	5001430506			1	1
Prionospio lighti	5001430521	7	1		8
Spiophanes berkelyorum	5001431004	41	27	13	81
Paraprionospio pinnata	5001431702	2	3	3	8
Heteromastus filobranchus	5001600203	1			1
Maldanidae	500163	1			1
Polycirrus californicus	5001680810	1		1	2
Terebellides stroemi	5001690101		2		2
Nassarius mendicus	5105080101	12			12
Odostomia sp. A	510801019939		1		1
Cylichna attonsa	5110040205	1	3	1	5
Melanochlamys dimedea	511006999999		1		1
Yoldia scissurata	5502040504		6	1	7
Parvilucina tenuisculpta	5515010101	8	16	19	43
Axinopsida serricata	5515020201		2	3	5
Mysella tumida	5515100102	2	2	7	11
Macoma spp	55153101	8		1	9
Macoma calcarea	5515310101	4			4
Macoma carlottensis	5515310112		4		4
Psephidia lordi	5515470501			2	2
Neomysis kadiakensis	6153011504	1			1
Eudorella pacifica	6154040202	191	182	87	460
Ampelisca careyi	6169020135	3	3	3	9
Oedicerotidae	616937	1			1
Westwoodilla caecula	6169371502	1			1
Heterophoxus oculatus	6169420301		5	4	9
Tiron biocellata	6169500503			1	1
Crangon alaskensis	6179220102		1		1
Pinnixa spp.	61890604			2	2
Amphiodia spp	81290301			1	1
					832
		327	313	192 Sum	
		12	10	6 Ave	
		1255	1015	245 Var	
		35	32	16 Sdv	
		1	1	1 Min	
		191	182	87 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 49

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Turbellaria	3901		1		1
Nemertea	43	7	5	8	20
Pholoe minuta	5001060101	3	5	2	10
Eteone spilotus	5001130299	1	4	5	10
Phyllodoce (Aponaitides) hartmanae	5001131402			1	1
Gyptis brevipalpa	5001210102	3	4	6	13
Sigambra bassi	5001220204	12	3	10	25
Pilargis berkeleyi	5001220301	1			1
Nephtys cornuta franciscana	500125010401	4	12	13	29
Glycinde picta	5001280101	2			2
Lumbrineris luti	5001310109			1	1
Scoloplos acmeceps	5001400311			1	1
Prionospio lighti	5001430521	1	1	2	4
Spiophanes berkelyorum	5001431004	9	5	11	25
Paraprionospio pinnata	5001431702	36	20	33	89
Tharyx multifilis	5001500302	6	4	8	18
Mitrella tuberosa	5105030202		2	2	4
Nassarius mendicus	5105080101	2	1	3	6
Odostomia sp. A	510801019939	2	2	4	8
Parvilucina tenuisculpta	5515010101			1	1
Mysella tumida	5515100102	1			1
Macoma calcarea	5515310101	2		1	3
Macoma nasuta	5515310114		2		2
Psephidia lordi	5515470501	2	1		3
Euphilomedes carcharodonta	6111070301			1	1
Alienacanthomysis macropsis	6153013201	2			2
Heterophoxus oculatus	6169420301	1	1		2
Crangon alaskensis	6179220102	1		3	4
Pinnixa spp	61890604	29	49	25	103
Amphiuridae	812903		1		1
Amphiodia spp.	81290301	2	1		3
Amphiodia urtica/periercta complex	812903019999	4	7	2	13
					407
		133	131	143 Sum	
		6	6	7 Ave	
		77	111	65 Var	
		9	11	8 Sdv	
		1	1	1 Min	
		36	49	33 Max	

STATION 50 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Cirripedia	6130	2	3	3	8
Eudorella pacifica	6154040202	2			2
Diastylis alaskensis	6154050101		1		1
Leptochelia dubia	6157020103	18	2	3	23
Eudorellopsis sp	61640403		2		2
Ampelisca spp.	61690201	15	1	7	23
Ampelisca agassizi	6169020111	23	45	5	73
Corophium crassicorne	6169150203	3	1	1	5
Photis spp	61692602		20	1	21
Photis brevipes	6169260201	51	29	35	115
Westwoodilla caecula	6169371502		1		1
Heterophoxus oculatus	6169420301	1			1
Foxiphalus similis - cognatus complex	616942099999		1		1
Dyopedos spp	61694499	31		1	32
Pagurus spp.	61830602		2	1	3
Cancer spp.	61880301			1	1
Cancer gracilis	6188030105	1			1
Pinnixa spp.	61890604		1	1	2
Golfingia spp	72000201	1		1	2
Phoronida	77		1		1
Amphiodia spp	81290301		1	1	2
Amphipholus pugetanus	8129030201	7	4		11
Amphipholus squamata	8129030202	3		3	6
Holothuroidea	8170		2		2
Pentamera pseudopopulifera	8172060305			2	2
Leptosynapta clarki	8178010203			3	3
					1461
		640	440	381 Sum	
		11	7	7 Ave	
		345	118	99 Var	
		19	11	10 Sdv	
		1	1	1 Min	
		88	45	52 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 50

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43	5		1	6
Nematoda	47	1		1	2
Harmothoe lunulata	5001020810			1	1
Pholoides aspera	5001040101		2		2
Paleonotus bellis	5001080101		1	1	2
Eteone spilotus	5001130299	1	1		2
Eulalia (Eumida) sanguinea	5001131101	2		3	5
Ophiodromus pugettensis	5001210401	1	3		4
Sphaerosyllis brandhorsti	5001230806	1			1
Nereis procera	5001240404	1			1
Nephtys cornuta franciscana	500125010401	1	1		2
Nephtys ferruginea	5001250111	4	1	4	9
Glycinde picta	5001280101	9	2	3	14
Lumbrineris luti	5001310109	1		1	2
Lumbrineris cruzensis	5001310118			1	1
Lumbrineris californiensis	5001310132	2	1	1	4
Leitoscoloplos pugettensis	5001400102	9	15	6	30
Polydora spp.	50014304		1		1
Prionospio steenstrupi	5001430506	8	28	28	64
Spiophanes berkelyorum	5001431004	1	1		2
Malacoceros glutaeus	5001431201	2			2
Magelona berkeleyi	5001440123		1		1
Caulleriella alata	5001500202	39	19	18	76
Chaetozone spinosa	5001500407	7	1	2	10
Armandia brevis	5001580202	3	3	1	7
Mediomastus spp.	50016004		7	2	9
Mediomastus ambiseta	5001600401	3	1	2	6
Mediomastus californiensis	5001600402	3		2	5
Decamastus gracilis	5001600501		1		1
Euclymene zonalis	5001631103		2	1	3
Ampharete arctica	5001670201	3	1	3	7
Ampharete labrops	5001670215	1	1	1	3
Polycirrus californicus	5001680810	2	1	2	5
Artacama coniferi	5001681101		1		1
Oligochaeta	5004	8	7	8	23
Rissoidae	510320	32	29	9	70
Mitrella tuberosa	5105030202	14	3	7	24
Nassarius mendicus	5105080101	4	12	12	28
Kurtziella plumbea	5106021107		2	1	3
Odostomia sp. A	510801019939	14	7	21	42
Turbonilla aurantia	5108011134	3	6	6	15
Retusa sp.	51100401	1			1
Mytilidae	550701	1		1	2
Parvilucina tenuisculpta	5515010101	2		1	3
Lucinoma acutilineata	5515010201		3		3
Axinopsida serricata	5515020201		1		1
Mysella tumida	5515100102	84	27	20	131
Clinocardium nuttali	5515220102	3		1	4
Solen sicarius	5515290201		1		1
Macoma spp.	55153101			1	1
Macoma yoldiformis	5515310111	4	15	11	30
Macoma nasuta	5515310114	11	5	14	30
Tellina modesta	5515310204	26	25	23	74
Compsomyax subdiaphana	5515470301			52	52
Psephidia lordi	5515470501	88	29	1	118
Protothaca sp	55154707	8	7	5	20
Mya arenaria	5517010201		1		1
Lyonsia californica	5520050202	18	4	3	25
Pycnogonida	60	1			1
Euphilomedes carcharodonta	6111070301	50	43	30	123

TABLE F-2 (Continued)

Station	Rep	Nema-toda	Poly-chaeta	Oligo-chaeta	Mol-lusca	Arthro-poda	Echino-derms	Misc. taxa	Total abund.	Tol-erant species	Sensi-tive species	Number of taxa
21	1	0	164	0	457	271	1	1	894	304	1	58
21	3	0	155	1	439	267	0	2	864	295	1	49
21	5	0	148	0	659	308	0	1	1116	335	2	51
22	1	0	37	0	176	93	0	1	307	93	0	33
22	3	0	49	0	204	89	0	1	343	101	0	37
22	5	0	24	0	146	98	1	1	270	80	0	41
23	1	0	67	0	355	116	0	4	542	115	0	55
23	3	0	86	0	284	95	1	2	468	88	0	62
23	5	0	60	0	216	88	1	2	367	77	0	59
24	1	0	35	0	28	29	2	0	94	12	4	45
24	3	0	50	0	28	43	6	3	130	17	7	35
24	5	0	36	0	31	29	2	2	100	11	4	40
25	1	0	74	0	75	150	2	1	302	134	0	45
25	3	0	132	0	54	58	3	0	247	46	0	37
25	5	0	111	0	125	186	3	0	425	158	0	42
26	1	0	94	0	143	116	1	1	355	92	0	61
26	3	0	146	1	100	134	2	3	386	107	0	73
26	5	0	141	0	108	111	1	0	361	90	0	65
27	1	0	191	0	118	215	3	18	545	209	0	91
27	3	0	267	0	66	291	20	28	673	265	0	97
27	5	0	206	0	100	332	6	11	655	335	0	84
28	1	0	238	0	106	77	1	5	427	77	2	86
28	3	0	530	0	121	99	7	23	780	99	3	93
28	5	0	311	0	110	104	3	10	538	85	0	99
29	1	0	55	0	7	6	3	4	75	8	0	24
29	3	0	58	0	59	77	1	2	197	28	0	42
29	5	0	62	0	64	61	3	2	192	51	0	39
30	1	0	738	0	93	128	15	4	978	682	0	52
30	3	0	504	0	122	150	4	2	782	517	0	45
30	5	0	255	0	0[a]	104	6	3	368	231	1	41
31	1	0	116	0	33	119	9	13	290	109	1	80
31	3	0	184	0	25	95	17	16	337	105	0	76
31	5	0	271	0	64	202	27	23	587	205	0	87
32	1	0	508	0	56	110	6	16	696	151	0	89
32	3	0	520	0	41	109	13	20	703	161	0	103
32	5	0	527	0	46	126	16	17	732	160	0	96
33	1	0	336	0	92	201	1	2	632	352	0	63
33	3	0	341	0	135	167	1	0	644	318	0	66
33	5	0	320	0	149	160	4	10	643	273	0	70
34	1	0	337	0	49	212	7	1	606	104	19	55
34	3	0	261	0	63	123	0	0	447	121	19	47
34	5	0	218	0	49	146	1	2	416	94	21	42
35	1	0	106	0	12	176	40	3	337	42	7	39
35	3	0	737	0	0[a]	434	40	3	1214	79	20	38
35	5	0	118	0	13	200	43	11	385	42	11	37
36	1	0	149	0	68	128	3	8	356	170	0	56
36	3	0	158	0	96	220	0	6	480	285	0	62
36	5	0	138	0	87	153	1	5	384	195	0	52
37	1	0	386	0	53	121	17	13	590	161	0	110
37	3	0	201	0	54	92	38	6	391	90	0	92
37	5	0	419	0	63	88	17	33	620	108	0	92
38	1	0	37	0	17	104	2	2	162	54	0	30
38	3	0	28	0	11	51	4	1	95	15	0	25
38	5	0	30	0	10	82	3	2	127	12	0	24
39	1	0	66	0	63	70	0	0	199	86	0	40
39	3	0	123	0	81	134	0	3	341	219	0	48
39	5	0	58	0	45	101	1	1	206	114	0	39
40	1	0	255	0	306	116	11	3	691	289	0	51
40	3	0	439	0	162	47	7	6	661	352	0	58
40	5	0	420	0	126	46	5	14	611	330	0	46
41	1	0	1779	0	1121	102	31	6	3039	1808	0	43

TABLE F-2. ABUNDANCES OF MAJOR TAXONOMIC GROUPS, POLLUTION-TOLERANT SPECIES, AND POLLUTION-SENSITIVE SPECIES

Station	Rep	Nematoda	Polychaeta	Oligochaeta	Mollusca	Arthropoda	Echinoderms	Misc. taxa	Total abund.	Tolerant species	Sensitive species	Number of taxa
1	1	0	122	0	13	138	111	1	385	4	0	29
1	3	0	50	0	35	98	115	1	299	5	0	25
1	5	0	148	2	68	130	226	0	574	6	0	33
2	1	0	153	0	68	30	1	0	252	25	0	45
2	3	1	356	6	76	50	3	4	498	34	0	60
2	5	0	346	1	76	33	7	6	469	22	0	72
3	1	0	346	22	60	0	0	0	428	183	0	27
3	3	0	82	0	9	6	0	0	97	53	0	17
3	5	0	219	0	14	4	0	0	237	50	22	36
4	1	0	210	0	55	46	6	8	325	32	10	52
4	3	0	179	0	65	40	5	7	296	34	4	45
4	5	0	137	0	40	102	5	3	287	37	17	43
5	1	0	26	0	85	109	28	0	248	17	0	42
5	3	0	35	1	58	72	39	3	208	20	1	37
5	5	0	33	0	79	77	42	3	234	8	0	34
6	1	0	85	0	197	11	18	5	316	99	0	54
6	3	0	117	3	251	13	12	4	400	123	0	56
6	5	0	52	0	76	6	3	2	139	51	0	41
7	1	0	265	1	28	24	1	8	327	3	0	37
7	3	0	287	0	16	50	10	19	382	15	0	64
7	5	1	408	2	16	67	3	20	517	23	0	80
8	1	0	236	1	63	75	3	3	381	45	17	72
8	3	0	219	0	101	84	0	2	406	43	16	56
8	5	0	195	0	96	81	5	0	377	55	3	71
9	1	0	89	0	105	229	11	2	436	13	0	47
9	3	0	106	0	106	258	2	4	476	17	0	58
9	5	0	121	1	100	302	9	1	534	33	0	47
10	1	0	449	0	54	99	1	0	603	108	0	64
10	3	0	551	1	95	104	0	5	756	113	0	75
10	5	0	412	0	65	96	4	2	579	83	1	61
11	1	1	483	1	0[a]	483	2	32	1003	58	3	93
11	3	1	444	0	87	371	0	26	929	84	4	99
11	5	0	618	0	101	271	1	20	1011	28	3	81
12	1	0	77	2	111	63	109	4	366	10	0	48
12	3	0	75	1	72	73	127	0	348	15	1	47
12	5	0	69	0	69	48	149	1	336	10	0	42
13	1	0	134	0	1130	176	0	1	1441	103	0	69
13	3	0	258	0	1180	157	0	6	1601	271	0	60
13	5	0	325	0	1154	138	1	14	1632	211	0	85
14	1	0	71	4	157	50	2	7	291	54	2	61
14	3	0	70	0	139	19	2	5	235	13	2	53
14	5	0	85	1	119	13	0	28	246	27	2	56
15	1	0	191	0	291	35	8	13	538	48	3	85
15	3	0	178	0	184	35	2	5	404	45	0	85
15	5	0	140	0	198	26	1	7	372	37	1	84
16	1	0	109	0	68	9	0	30	216	41	0	52
16	3	0	180	0	71	10	0	32	293	54	0	61
16	5	1	129	0	63	12	1	19	225	31	0	64
17	1	0	66	0	69	13	0	2	150	12	0	22
17	3	0	29	0	67	5	0	0	101	5	0	18
17	5	0	75	0	53	14	0	0	142	10	0	26
18	1	0	121	0	295	0	0	2	418	11	0	32
18	3	0	189	0	312	8	0	5	514	17	1	41
18	5	0	98	0	67	1	0	4	170	22	0	29
19	1	0	29	0	10	2	2	4	47	2	1	22
19	3	0	24	0	10	4	2	2	42	0	0	20
19	5	0	24	0	9	12	5	1	51	4	0	23
20	1	0	188	0	96	87	0	4	375	67	13	36
20	3	0	298	0	84	114	0	3	499	79	29	44
20	5	0	215	0	108	129	0	4	456	80	32	38

TABLE F-2. (Continued)

Station	Rep	Nema-toda	Poly-chaeta	Oligo-chaeta	Mol-lusca	Arthro-poda	Echino-derms	Misc. taxa	Total abund.	Tol-erant species	Sensi-tive species	Number of taxa
41	3	0	772	0	1419	92	6	5	2294	813	0	37
41	5	0	414	0	320	40	13	1	788	212	0	37
42	1	0	47	0	16	14	1	3	81	31	0	27
42	3	0	55	0	11	24	2	3	95	36	0	41
42	5	0	62	0	21	8	0	0	91	44	0	26
43	1	0	130	0	42	169	118	8	467	140	0	48
43	3	0	137	0	34	252	118	3	544	211	0	57
43	5	0	159	0	48	242	167	0	616	183	0	49
44	1	0	470	0	66	61	7	46	650	156	0	103
44	3	0	160	0	58	33	8	6	265	72	1	58
44	5	1	373	0	30	47	12	21	484	117	3	90
45	1	1	208	0	18	47	11	4	289	47	0	57
45	3	0	196	0	17	56	10	12	291	68	0	45
45	5	0	247	0	16	36	7	3	309	43	0	48
46	1	0	108	0	41	148	38	7	342	92	0	55
46	3	1	279	0	42	143	24	13	502	90	1	76
46	5	0	201	0	67	135	28	14	445	110	3	68
47	1	0	184	0	65	91	31	238	609	85	1	75
47	3	0	175	0	38	32	67	86	398	71	0	63
47	5	0	108	0	51	41	73	72	345	43	0	63
48	1	0	91	0	35	197	0	4	327	27	0	28
48	3	0	80	0	35	191	0	7	313	32	2	31
48	5	1	53	0	34	97	1	6	192	26	0	30
49	1	0	78	0	9	33	6	7	133	50	0	23
49	3	0	58	0	8	50	9	6	131	38	0	21
49	5	0	93	0	11	29	2	8	143	57	0	22
50	1	1	104	8	314	197	10	6	640	110	0	56
50	3	0	96	7	178	152	7	0	440	107	0	60
50	5	1	83	8	189	89	9	2	381	98	0	58

[a] Mollusca vials were broken.

TABLE F-3. LIST OF POLLUTION-SENSITIVE AND POLLUTION-TOLERANT SPECIES IDENTIFIED IN THE 1989 MARINE SEDIMENT MONITORING TASK

NODC Taxonomic Code	Taxonomic Name	Pollution Sensitive Species	Pollution Tolerant Species	Identified in MSMT[a]
5001010105	Aphrodita aculeata	X		
50011302	Eteone spp.		X	X
5001130201	Eteone californica		X	X
5001130203	Eteone pacifica		X	
5001130205	Eteone longa		X	X
5001210401	Ophiodromus pugettensis		X	X
5001240301	Nereis brandti		X	X
5001240302	Nereis (neanthes) virens		X	
5001240303	Nereis limnicola		X	
50012404	Nereis spp.		X	X
5001240404	Nereis procera		X	X
5001240406	Nereis zonata		X	X
50012501	Nephtys spp.		X	X
5001250102	Nephtys ciliata		X	
5001250103	Nephtys caeca		X	X
5001250104	Nephtys cornuta		X	X
500125010401	Nephtys cornuta franciscana		X	X
500125010402	Nephtys cornuta cornuta		X	
5001250105	Nephtys punctata		X	X
5001250109	Nephtys longosetosa		X	X
5001250111	Nephtys ferruginea		X	X
5001250113	Nephtys californiensis		X	X
5001250119	Nephtys caecoides		X	X
5001250121	Nephtys assignis		X	
5001250197	Nephtys sp A (Commencement Bay only)		X	
5001280101	Glycinde picta		X	X
5001280202	Goniada maculata		X	X
5001310104	Lumbrineris latreilli		X	X
500136	Dorvilleidae		X	X
5001360101	Dorvillea pseudorubrovittata		X	X
50013604	Ophryotrocha spp.		X	
50013605	Dorvillea spp		X	X
5001360504	Dorvillea rudolphi		X	X
5001360505	Dorvillea caeca		X	X
5001360507	Dorvillea japonica		X	
5001400102	Leitoscoloplos pugettensis		X	X
5001400301	Scoloplos armiger		X	X
5001430411	Polydora cornuta		X	
50014305	Prionospio spp.		X	X
5001430502	Prionospio cirrifera		X	
5001430506	Prionospio steenstrupi		X	X
5001431302	Pygospio elegans		X	
500143150101	Pseudopolydora kempi		X	
5001431702	Paraprionospio pinnata		X	X
50015003	Tharyx spp.		X	X
5001500302	Tharyx multifilis		X	X
5001580607	Ophelina acuminata		X	X
5001600101	Capitella capitata		X	X
5001600201	Heteromastus filiformis		X	X
5001600401	Mediomastus ambiseta		X	X
5001600402	Mediomastus californiensis		X	X
5001690101	Terebellides stroemi	X		X
5004	Oligochaeta		X	X
500901	Enchytraeidae		X	NA
500902	Tubificidae		X	NA
5009020706	Limnodriloides victoriensis		X	NA
5009020908	Tubificoides bakeri		X	NA
5009021801	Tectidrilus diversus		X	NA

TABLE F-3 (Continued)

NODC Taxonomic Code	Taxonomic Name	Pollution Sensitive Species	Pollution Tolerant Species	Identified in MSMT[a]
55040101	Solemya spp		X	X
5504010103	Solemya johnsoni		X	
5507010101	Mytilus edulis		X	
5515010101	Parvilucina tenuisculpta		X	X
5515020301	Thyasira flexuosa		X	
5515310101	Macoma calcarea		X	X
5515310114	Macoma nasuta		X	X
5515310116	Macoma balthica		X	
5515310124	Macoma inconspicua		X	
5517010201	Mya arenaria		X	X
5517010203	Mya truncata		X	
6111070301	Euphilomedes carcharodonta		X	X
6111070302	Euphilomedes longiseta		X	
6111070303	Euphilomedes producta		X	X
6153010301	Archaeomysis grebnitzkii	X		
6169150201	Corophium acherusicum		X	
6169421703	Grandifoxus grandis	X		
616948	Stenothoidae		X	X

[a] Oligochaetes were not identified to the lowest possible taxonomic level in the 1989 Marine Sediment Monitoring Task

TABLE F-4. BENTHIC INDICES

Station	Sample	Total Abundance	Number of Taxa	Shannon-Weiner Diversity	Swartz's Dominance	Equita-bility (J)	Dominance (I-J)	Infaunal Trophic Index
01	1	385.00	29.00	1.04	5.51	0.713	0.287	77.95
01	3	299.00	25.00	1.13	7.94	0.811	0.189	80.49
01	5	574.00	33.00	1.14	7.14	0.747	0.253	84.15
01	AVG	419.33	29.00	1.10	6.86	0.757	0.243	80.86
02	1	252.00	45.00	1.40	14.20	0.848	0.152	70.16
02	3	497.00	59.00	1.25	10.72	0.706	0.294	71.81
02	5	469.00	72.00	1.31	12.25	0.705	0.295	79.57
02	AVG	406.00	58.67	1.32	12.39	0.753	0.247	73.85
03	1	428.00	28.00	0.97	4.37	0.668	0.332	59.93
03	3	97.00	17.00	0.74	2.47	0.599	0.401	63.14
03	5	237.00	36.00	1.17	8.75	0.755	0.245	81.84
03	AVG	254.00	27.00	0.96	5.20	0.674	0.326	68.30
04	1	325.00	52.00	1.40	15.63	0.813	0.187	70.17
04	3	296.00	45.00	1.34	13.00	0.813	0.187	69.81
04	5	287.00	43.00	1.28	10.91	0.781	0.219	73.15
04	AVG	302.67	46.67	1.34	13.18	0.802	0.198	71.04
05	1	248.00	42.00	1.30	10.83	0.801	0.199	72.47
05	3	208.00	37.00	1.25	9.80	0.799	0.201	72.26
05	5	234.00	34.00	1.18	7.72	0.767	0.233	75.46
05	AVG	230.00	37.67	1.24	9.45	0.789	0.211	73.40
06	1	316.00	54.00	1.44	14.33	0.828	0.172	57.63
06	3	400.00	56.00	1.45	15.67	0.830	0.170	61.57
06	5	139.00	41.00	1.41	17.13	0.875	0.125	62.25
06	AVG	285.00	50.33	1.43	15.71	0.844	0.156	60.48
07	1	327.00	37.00	0.72	2.30	0.456	0.544	67.54
07	3	383.00	65.00	1.19	14.05	0.657	0.343	72.24
07	5	517.00	80.00	1.16	12.82	0.609	0.391	72.65
07	AVG	409.00	60.67	1.02	9.72	0.574	0.426	70.81
08	1	381.00	72.00	1.53	18.55	0.826	0.174	82.87
08	3	406.00	56.00	1.39	13.50	0.794	0.206	80.82
08	5	377.00	71.00	1.46	15.35	0.788	0.212	77.54
08	AVG	388.00	66.33	1.46	15.80	0.803	0.197	80.41
09	1	436.00	47.00	1.13	6.36	0.677	0.323	88.04
09	3	476.00	58.00	1.23	9.00	0.699	0.301	89.45
09	5	534.00	47.00	1.06	5.75	0.637	0.363	89.90
09	AVG	482.00	50.67	1.14	7.04	0.671	0.329	89.13
10	1	603.00	65.00	1.22	8.54	0.670	0.330	85.19
10	3	756.00	75.00	1.26	9.36	0.671	0.329	84.40
10	5	579.00	61.00	1.22	9.52	0.686	0.314	85.75
10	AVG	646.00	67.00	1.23	9.14	0.676	0.324	85.11
11	1	1003.00	93.00	1.28	9.96	0.649	0.351	93.68
11	3	929.00	99.00	1.43	15.48	0.716	0.284	85.87
11	5	1011.00	81.00	1.32	12.66	0.690	0.310	90.08
11	AVG	981.00	91.00	1.34	12.70	0.685	0.315	89.88
12	1	366.00	48.00	1.32	11.94	0.782	0.218	75.32
12	3	348.00	47.00	1.20	8.63	0.718	0.282	82.91
12	5	336.00	42.00	1.16	9.22	0.717	0.283	83.06
12	AVG	350.00	45.67	1.23	9.93	0.739	0.261	80.43
13	1	1441.00	69.00	0.73	2.46	0.396	0.604	67.06
13	3	1601.00	60.00	0.77	2.84	0.433	0.567	66.78
13	5	1632.00	85.00	0.91	4.47	0.470	0.530	67.33
13	AVG	1558.00	71.33	0.80	3.26	0.433	0.567	67.06
14	1	291.00	61.00	1.31	14.06	0.732	0.268	62.48
14	3	235.00	53.00	1.28	12.56	0.740	0.260	67.65
14	5	246.00	56.00	1.30	11.50	0.743	0.257	63.64
14	AVG	257.33	56.67	1.29	12.71	0.738	0.262	64.59
15	1	538.00	85.00	1.49	20.25	0.772	0.228	70.32
15	3	404.00	85.00	1.65	24.50	0.857	0.143	69.86
15	5	372.00	84.00	1.65	29.00	0.860	0.140	66.85
15	AVG	438.00	84.67	1.60	24.58	0.830	0.170	69.01

F-4 (Continued)

Station	Sample	Total Abundance	Number of Taxa	Shannon-Weiner Diversity	Swartz's Dominance	Equita-bility (J)	Dominance (1-J)	Infaunal Trophic Index
16	1	216.00	52.00	1.52	20.25	0.883	0.117	67.68
16	3	293.00	61.00	1.50	16.94	0.839	0.161	73.00
16	5	225.00	64.00	1.64	24.58	0.909	0.091	71.31
16	AVG	244.67	59.00	1.55	20.59	0.877	0.123	70.67
17	1	150.00	22.00	0.90	4.50	0.670	0.330	66.67
17	3	101.00	18.00	0.70	3.15	0.558	0.442	67.06
17	5	142.00	26.00	1.06	6.75	0.750	0.250	67.05
17	AVG	131.00	22.00	0.89	4.80	0.659	0.341	66.93
18	1	418.00	32.00	0.89	4.39	0.594	0.406	65.70
18	3	514.00	41.00	0.96	4.77	0.594	0.406	66.52
18	5	170.00	29.00	1.15	8.90	0.788	0.212	66.41
18	AVG	367.33	34.00	1.00	6.02	0.659	0.341	66.21
19	1	47.00	22.00	1.22	10.25	0.910	0.090	70.67
19	3	42.00	20.00	1.21	10.75	0.929	0.071	68.26
19	5	51.00	23.00	1.25	10.25	0.917	0.083	80.95
19	AVG	46.67	21.67	1.23	10.42	0.918	0.082	73.29
20	1	375.00	36.00	1.21	7.87	0.775	0.225	77.30
20	3	499.00	44.00	1.17	7.23	0.711	0.289	75.96
20	5	456.00	38.00	1.19	7.00	0.751	0.249	76.46
20	AVG	443.33	39.33	1.19	7.37	0.746	0.254	76.57
21	1	894.00	60.00	1.06	4.35	0.597	0.403	62.17
21	3	864.00	50.00	1.03	3.95	0.607	0.393	60.79
21	5	1116.00	52.00	0.94	3.52	0.549	0.451	60.49
21	AVG	958.00	54.00	1.01	3.94	0.584	0.416	61.15
22	1	307.00	34.00	1.06	5.02	0.693	0.307	68.61
22	3	343.00	37.00	0.98	4.25	0.624	0.376	67.02
22	5	270.00	41.00	1.07	4.61	0.666	0.334	69.09
22	AVG	306.67	37.33	1.04	4.63	0.661	0.339	68.24
23	1	542.00	55.00	1.15	5.77	0.661	0.339	71.25
23	3	468.00	62.00	1.26	10.00	0.705	0.295	73.90
23	5	367.00	59.00	1.32	11.89	0.746	0.254	71.08
23	AVG	459.00	58.67	1.25	9.22	0.704	0.296	72.08
24	1	94.00	45.00	1.53	21.50	0.926	0.074	76.61
24	3	130.00	35.00	1.40	13.88	0.904	0.096	68.50
24	5	100.00	40.00	1.46	17.50	0.910	0.090	78.74
24	AVG	108.00	40.00	1.46	17.63	0.913	0.087	74.62
25	1	302.00	45.00	1.02	4.85	0.619	0.381	69.76
25	3	247.00	37.00	1.00	5.53	0.640	0.360	70.20
25	5	425.00	42.00	1.06	4.96	0.651	0.349	71.19
25	AVG	324.67	41.33	1.03	5.11	0.637	0.363	70.38
26	1	355.00	61.00	1.36	14.38	0.761	0.239	57.45
26	3	386.00	73.00	1.49	17.58	0.802	0.198	66.92
26	5	361.00	65.00	1.54	19.95	0.848	0.152	72.02
26	AVG	367.33	66.33	1.46	17.30	0.804	0.196	65.46
27	1	545.00	92.00	1.47	21.75	0.747	0.253	74.47
27	3	673.00	98.00	1.36	17.63	0.682	0.318	75.62
27	5	655.00	84.00	1.18	14.54	0.614	0.386	73.43
27	AVG	624.33	91.33	1.34	17.97	0.681	0.319	74.51
28	1	427.00	87.00	1.53	23.31	0.790	0.210	81.12
28	3	780.00	93.00	1.17	11.75	0.595	0.405	90.73
28	5	538.00	99.00	1.50	20.90	0.752	0.248	85.69
28	AVG	581.67	93.00	1.40	18.65	0.712	0.288	85.85
29	1	75.00	24.00	1.07	9.13	0.774	0.226	68.00
29	3	197.00	42.00	1.25	9.58	0.769	0.231	62.48
29	5	192.00	39.00	1.16	8.33	0.727	0.273	56.94
29	AVG	154.67	35.00	1.16	9.01	0.757	0.243	62.47
30	1	978.00	52.00	0.86	3.81	0.501	0.499	67.46
30	3	782.00	45.00	0.87	3.85	0.529	0.471	65.58
30	5	368.00	41.00	0.93	4.00	0.578	0.422	68.04
30	AVG	709.33	46.00	0.89	3.89	0.536	0.464	67.02
31	1	290.00	81.00	1.50	23.75	0.788	0.212	75.24

F-4. (Continued)

Station	Sample	Total Abundance	Number of Taxa	Shannon-Weiner Diversity	Swartz's Dominance	Equita-bility (J)	Dominance (I-J)	Infaunal Trophic Index
31	3	337.00	77.00	1.55	22.25	0.821	0.179	78.15
31	5	587.00	88.00	1.50	22.05	0.773	0.227	77.03
31	AVG	404.67	82.00	1.52	22.68	0.794	0.206	76.80
32	1	696.00	89.00	1.24	11.67	0.634	0.366	86.46
32	3	703.00	103	1.41	15.61	0.700	0.300	83.23
32	5	732.00	96.00	1.42	18.17	0.717	0.283	85.56
32	AVG	710.33	96.00	1.35	15.15	0.683	0.317	85.08
33	1	632.00	63.00	1.21	8.73	0.674	0.326	66.67
33	3	644.00	66.00	1.26	9.38	0.695	0.305	67.33
33	5	643.00	70.00	1.31	10.81	0.709	0.291	66.86
33	AVG	639.67	66.33	1.26	9.64	0.692	0.308	66.96
34	1	606.00	55.00	1.29	9.24	0.742	0.258	77.45
34	3	447.00	47.00	1.23	8.22	0.735	0.265	71.00
34	5	416.00	42.00	1.15	7.29	0.711	0.289	69.01
34	AVG	489.67	48.00	1.22	8.25	0.729	0.271	72.49
35	1	337.00	39.00	1.09	6.09	0.687	0.313	77.33
35	3	1214.00	38.00	0.83	2.98	0.524	0.476	91.60
35	5	385.00	37.00	1.08	7.28	0.687	0.313	75.69
35	AVG	645.33	38.00	1.00	5.45	0.633	0.367	81.54
36	1	356.00	56.00	1.36	14.83	0.778	0.222	68.42
36	3	480.00	62.00	1.18	8.50	0.660	0.340	66.00
36	5	384.00	52.00	1.30	12.50	0.759	0.241	66.02
36	AVG	406.67	56.67	1.28	11.94	0.732	0.268	66.82
37	1	590.00	110	1.58	27.10	0.772	0.228	80.52
37	3	391.00	93.00	1.61	27.42	0.819	0.181	79.31
37	5	620.00	93.00	1.32	17.33	0.672	0.328	86.52
37	AVG	533.67	98.67	1.50	23.95	0.754	0.246	82.11
38	1	162.00	30.00	1.12	6.45	0.757	0.243	72.37
38	3	95.00	25.00	1.17	7.81	0.838	0.162	69.05
38	5	127.00	24.00	1.05	7.38	0.761	0.239	71.07
38	AVG	128.00	26.33	1.11	7.21	0.785	0.215	70.83
39	1	199.00	40.00	1.28	10.31	0.797	0.203	69.07
39	3	341.00	48.00	1.13	6.97	0.672	0.328	64.94
39	5	206.00	39.00	1.17	7.70	0.734	0.266	69.29
39	AVG	248.67	42.33	1.19	8.33	0.734	0.266	67.77
40	1	691.00	51.00	1.14	7.15	0.669	0.331	67.46
40	3	661.00	58.00	1.15	7.48	0.652	0.348	67.32
40	5	611.00	46.00	1.10	7.59	0.664	0.336	67.05
40	AVG	654.33	51.67	1.13	7.41	0.662	0.338	67.28
41	1	3039.00	43.00	0.52	1.56	0.318	0.682	67.04
41	3	2294.00	37.00	0.53	1.53	0.335	0.665	66.69
41	5	788.00	37.00	0.83	2.78	0.532	0.468	67.04
41	AVG	2040.33	39.00	0.63	1.95	0.395	0.605	66.92
42	1	81.00	27.00	1.14	9.38	0.796	0.204	78.85
42	3	95.00	41.00	1.32	17.25	0.818	0.182	80.43
42	5	91.00	26.00	1.00	6.63	0.704	0.296	69.84
42	AVG	89.00	31.33	1.15	11.08	0.773	0.227	76.37
43	1	467.00	48.00	1.33	11.63	0.788	0.212	82.68
43	3	544.00	57.00	1.19	8.23	0.676	0.324	80.93
43	5	616.00	49.00	1.14	6.65	0.677	0.323	84.93
43	AVG	542.33	51.33	1.22	8.84	0.714	0.286	82.85
44	1	650.00	103	1.51	20.10	0.752	0.248	78.46
44	3	265.00	58.00	1.44	18.19	0.816	0.184	76.61
44	5	484.00	90.00	1.51	21.25	0.774	0.226	79.30
44	AVG	466.33	83.67	1.49	19.85	0.781	0.219	78.13
45	1	290.00	57.00	1.28	12.13	0.728	0.272	71.80
45	3	291.00	45.00	1.08	7.05	0.652	0.348	67.27
45	5	309.00	48.00	1.18	8.96	0.702	0.298	72.70
45	AVG	296.67	50.00	1.18	9.38	0.694	0.306	70.59
46	1	342.00	55.00	1.44	14.21	0.828	0.172	76.11
46	3	502.00	77.00	1.52	20.42	0.805	0.195	80.28

F-4. (Continued)

Station	Sample	Total Abundance	Number of Taxa	Shannon-Weiner Diversity	Swartz's Dominance	Equita-bility (J)	Dominance (I-J)	Infaunal Trophic Index
46	5	445.00	69.00	1.50	18.29	0.814	0.186	74.03
46	AVG	429.67	67.00	1.49	17.64	0.816	0.184	76.81
47	1	609.00	75.00	1.33	16.97	0.710	0.290	76.04
47	3	398.00	63.00	1.44	14.10	0.800	0.200	81.75
47	5	345.00	63.00	1.44	16.79	0.800	0.200	83.03
47	AVG	450.67	67.00	1.40	15.95	0.770	0.230	80.27
48	1	327.00	28.00	0.76	2.78	0.522	0.478	64.91
48	3	313.00	31.00	0.82	3.81	0.548	0.452	64.47
48	5	216.00	30.00	1.00	5.00	0.680	0.320	64.27
48	AVG	285.33	29.67	0.86	3.86	0.583	0.417	64.55
49	1	133.00	23.00	1.05	6.19	0.773	0.227	69.12
49	3	131.00	21.00	0.98	6.05	0.743	0.257	71.70
49	5	143.00	22.00	1.10	6.91	0.817	0.183	65.79
49	AVG	135.67	22.00	1.04	6.38	0.778	0.222	68.87
50	1	650.00	56.00	1.39	12.89	0.796	0.204	69.08
50	3	440.00	60.00	1.43	12.50	0.805	0.195	70.14
50	5	382.00	58.00	1.43	13.79	0.814	0.186	65.68
50	AVG	490.67	58.00	1.42	13.06	0.805	0.195	68.30

TABLE F-5. LIST OF BENTHIC INFAUNA SPECIES IDENTIFIED IN THE 1989 MSMT

NODC Taxonomic Code	Taxonomic Name
3740	Anthozoa
374000009998	Anthozoa sp. 2
374000009999	Anthozoa sp. 1
3743010303	Pachycerionthus fimbriatus
3754010103	Stylatula elongata
3754020201	Ptilosarcus gurneyi
3901	Turbellaria
43	Nemertea
47	Nematoda
500102	Polynoidae
5001020603	Gattyana cirrosa
50010208	Harmothoe spp.
5001020803	Harmothoe extenuata
5001020806	Harmothoe imbricata
5001020810	Harmothoe lunulata
5001020821	Harmothoe fragilis
5001021103	Lepidonotus squamatus
5001021601	Polyeunoa tuta
5001021701	Hesperonoe complanata
5001021702	Hesperonoe adventor
5001021801	Lepidasthenia berkeleyae
5001021805	Lepidasthenia longicirrata
5001022302	Tenonia priops
5001040101	Pholoides aspera
5001060101	Pholoe minuta
5001060301	Sthenelais berkeleyi
5001060305	Sthenelais tertiaglabra
5001060601	Thalenessa spinosa
5001080101	Paleonotus bellis
500113	Phyllodocidae
5001130102	Phyllodoce (Anaitides) groenlandica
5001130103	Anaitides medipapillata
5001130106	Phyllodoce (Anaitides) maculata
5001130115	Phyllodoce papillosa
50011302	Eteone spp.
5001130201	Eteone californica
5001130205	Eteone longa
5001130299	Eteone spilotus
50011303	Eulalia (Eulalia) spp.
5001130301	Eulalia viridis
5001130308	Eulalia (Eumida) bilineata
5001130310	Eulalia levicornuta
5001130403	Notophyllum tectum
5001130701	Phyllodoce (Genetyllis) castanea
5001130803	Phyllodoce (Paranaitis) polynoides
500113090101	Hesionura coineaui difficilis
5001131101	Eulalia (Eumida) sanguinea
50011314	Phyllodoce spp.
5001131402	Phyllodoce (Aponaitides) hartmanae
5001131499	Phyllodoce (Anaitides) spp.
500113169999	Steggoa sp. 1
500121	Hesionidae
5001210102	Gyptis brevipalpa
5001210202	Microphthalmus aberrans
5001210401	Ophiodromus pugettensis
5001210501	Kefersteinia cirrata
5001210801	Micropodarke dubia
5001220204	Sigambra bassi
5001220301	Pilargis berkeleyi
500123	Syllidae

TABLE F-5 (Continued)

NODC Taxonomic Code	Taxonomic Name
5001230101	Autolytus cornutus
5001230204	Pionosyllis uraga
500123029989	Pionosyllis sp. 1
50012303	Syllis spp.
5001230308	Syllis elongata
5001230312	Syllis hyalina
5001230601	Eusyllis assimilis
5001230702	Exogone gemmifera
5001230703	Exogone lourei
5001230704	Exogone molesta
5001230706	Exogone verugera
5001230806	Sphaerosyllis brandhorsti
5001231303	Odontosyllis phosphorea
50012316	Streptosyllis sp. A
5001232201	Ehlersia heterochaeta
500124	Nereidae
5001240301	Nereis brandti
50012404	Nereis spp.
5001240404	Nereis procera
5001240406	Nereis zonata
5001240501	Platynereis bicanaliculata
500124119999	Eunereis wailesi
50012501	Nephtys spp.
5001250103	Nephtys caeca
500125010401	Nephtys cornuta franciscana
5001250105	Nephtys punctata
5001250106	Nephtys rickettsi
5001250109	Nephtys longosetosa
5001250111	Nephtys ferruginea
5001250119	Nephtys caecoides
5001250121	Nephtys assignis
5001260103	Sphaerodoropsis sphaerulifer
5001270101	Glycera capitata
5001270104	Glycera americana
500127019999	Glycera sp. 1
5001280101	Glycinde picta
5001280103	Glycinde armigera
50012802	Goniada spp.
5001280202	Goniada maculata
5001280203	Goniada brunnea
500129	Onuphidae
5001290101	Onuphis conchylega
5001290103	Onuphis iridescens
5001290111	Onuphis elegans
5001290202	Diopatra ornata
50013101	Lumbrineris spp.
5001310101	Lumbrineris bicirrata
5001310104	Lumbrineris latreilli
5001310109	Lumbrineris luti
5001310118	Lumbrineris cruzensis
5001310128	Lumbrineris limicola
5001310129	Lumbrineris lagunae
5001310132	Lumbrineris californiensis
5001310202	Ninoe gemmea
5001330103	Drilonereis longa
500133010402	Drilonerис falcata minor
500133019999	Drilonereis sp. C
5001330302	Notocirrus californiensis
50013601	Dorvillea sp.
5001360101	Dorvillea pseudorubrovittata
5001360201	Protodorvillea gracilis
5001360504	Dorvillea rudolphi

TABLE F-5. (Continued)

NODC Taxonomic Code	Taxonomic Name
5001360505	Dorvillea caeca
5001400101	Leitoscoloplos panamensis
5001400102	Leitoscoloplos pugettensis
5001400301	Scoloplos armiger
5001400311	Scoloplos acmeceps
50014005	Orbinia sp.
5001400510	Orbinia (Phylo) felix
5001410220	Aricidea minuta
5001410603	Cirrophorus lyra
5001410706	Allia ramosa
5001410801	Levinsenia gracilis
500141080101	Levinsenia gracilis oculata
5001411302	Acesta lopezi
5001411306	Acmira catherinae
5001420102	Apistobranchus ornatus
500143	Spionidae
50014302	Laonice spp.
5001430201	Laonice cirrata
5001430204	Laonice pugettensis
50014304	Polydora spp
5001430401	Polydora giardi
5001430402	Polydora socialis
5001430408	Polydora quadrilobata
5001430417	Polydora pygidialis
5001430419	Polydora armata
5001430429	Polydora brachycephala
5001430431	Polydora cardalia
5001430438	Polydora aggregata
5001430506	Prionospio steenstrupi
5001430599	Prionospio lighti
5001430701	Spio filicornis
5001430703	Spio cirrifera
5001430708	Spio butleri
5001430806	Polydora (Boccardiella) hamata
5001430812	Polydora (Boccardia) pugettensis
5001431001	Spiophanes bombyx
5001431004	Spiophanes berkelyorum
5001431201	Malacoceros glutaeus
5001431702	Paraprionospio pinnata
50014322	Aonides sp. 1
5001440105	Magelona longicornis
5001440123	Magelona berkeleyi
5001450102	Trochochaeta multisetosa
500149	Chaetopteridae
5001490202	Phyllochaetopterus prolifica
5001490302	Spiochaetopterus costarum
5001490401	Mesochaetopterus taylori
500150	Cirratulidae
5001500101	Cirratulus cirratus
5001500202	Caulleriella alata
50015003	Tharyx spp.
5001500302	Tharyx multifilis
5001500308	Tharyx tesselata
5001500309	Tharyx secundus
50015004	Chaetozone spp.
5001500401	Chaetozone setosa
5001500406	Chaetozone spinosa
5001500407	Chaetozone spinosa
5001520101	Cossura longocirrata
5001520199	Cossura modica
500154	Flabelligeridae
5001540199	Brada sachalina

TABLE F-5. (Continued)

NODC Taxonomic Code	Taxonomic Name
5001540202	Flabelligera affinis
5001540302	Pherusa plumosa
5001570101	Scalibregma inflatum
5001570201	Asclerocheilus beringianus
5001580202	Armandia brevis
5001580301	Ophelia limacina
5001580401	Travisia brevis
5001580403	Travisia pupa
5001580604	Ophelina breviata
5001580606	Ophelina acuminata
5001580607	Ophelina acuminata
5001590101	Sternaspis scutata
500160	Capitellidae
5001600101	Capitella capitata
5001600201	Heteromastus filiformis
5001600203	Heteromastus filobranchus
5001600302	Notomastus tenuis
5001600303	Notomastus lineatus
50016004	Mediomastus spp.
5001600401	Mediomastus ambiseta
5001600402	Mediomastus californiensis
5001600501	Decamastus gracilis
5001600601	Barantolla americana
500163	Maldanidae
5001630204	Clymenella complanata
50016303	Maldane spp.
5001630302	Maldane glebifex
5001630502	Nicomache personata
5001630601	Notoproctus pacificus
500163070101	Petaloproctus tenuis borealis
5001630802	Axiothella rubrocincta
50016309	Praxillella spp.
5001630901	Praxillella gracilis
500163090301	Praxillella affinis pacifica
5001631	Euclymeninae
5001631001	Rhodine bitorquata
5001631103	Euclymene zonalis
5001631206	Clymenura columbiana
5001632001	Isocirrus longiceps
500164	Oweniidae
5001640102	Owenia fusiformis
5001640201	Myriochele heeri
5001640202	Galathowenia nr. G. oculata
5001650101	Idanthyrsus ornamentatus
5001650201	Sabellaria cementarium
50016603	Pectinaria spp.
5001660303	Pectinaria granulata
5001660304	Pectinaria californiensis
500167	Ampharetidae
5001670101	Amage anops
50016702	Ampharete spp.
5001670201	Ampharete arctica
5001670208	Ampharete acutifrons
5001670215	Ampharete labrops
5001670304	Amphicteis scaphobranchiata
5001670306	Amphicteis mucronata
5001670401	Lysippe labiata
5001670501	Melinna cristata
5001670503	Melinna elisabethae
5001670701	Anobothrus gracilis
5001670804	Asabellides lineata
5001671402	Samytha californiensis

TABLE F-5. (Continued)

NODC Taxonomic Code	Taxonomic Name
5001672501	Schistocomus hiltoni
500168	Terebellidae
5001680101	Amphitrite cirrata
5001680401	Neoamphitrite robusta
5001680405	Neoamphitrite edwardsii
5001680601	Nicolea zostericola
50016807	Pista spp.
5001680701	Pista cristata
5001680703	Pista elongata
5001680710	Pista brevibranchiata
50016808	Polycirrus sp.
5001680810	Polycirrus californicus
5001681	Amphitritinae
5001681004	Thelepus setosus
5001681101	Artacama coniferi
500168130201	Lanassa venusta venusta
5001681702	Proclea graffii
5001681803	Scionella estevanica
5001682502	Streblosoma bairdi
5001682701	Lanice conchilega
5001690101	Terebellides stroemi
5001690201	Artacamella hancocki
500170	Sabellidae
50017001	Chone spp.
5001700104	Chone duneri
5001700106	Chone magna
50017003	Eudistylia sp.
5001700401	Megalomma splendida
5001700502	Myxicola infundibulum
50017006	Potamilla sp.
5001700601	Potamilla neglecta
5001700602	Potamilla myriops
5001700608	Potamilla occelata
5001700701	Potamilla intermedia
5001700802	Sabella media
5001702	Sabellinae
5001730101	Pseudochitinopoma occidentalis
50017305	Spirorbis spp.
5001730602	Spirorbis spirillum
500178	Spirorbidae
5004	Oligochaeta
51	Gastropoda
510210	Trochidae
5102100308	Margarites pupillus
5102100403	Solariella varicosa
510320	Rissoidae
51032001	Alvania spp.
510320019999	Alvania sp. A
51033505	Petaloconchus sp.
51034601	Bittium spp
5103509999	Nitidiscala tincta
5103530102	Melanella micrans
510364	Calyptraeidae
5103640101	Calyptraea fastigiata
510364029999	Crepidula sp. A
5103640301	Crepipatella lingulata
5103760201	Natica clausa
5103760402	Polinices pallida
510503019999	Amphissa sp. A
5105030202	Mitrella tuberosa
51050509	Plicifusus sp.
5105080101	Nassarius mendicus

TABLE F-5 (Continued)

NODC Taxonomic Code	Taxonomic Name
5105100102	Olivella baetica
510602	Turridae
5106020405	Oenopota tabulata
5106021106	Kurtziella plumbea
5106021107	Kurtziella plumbea
510801019938	Odostomia sp B
510801019939	Odostomia sp. A
51080102	Turbonilla spp.
5108011134	Turbonilla aurantia
510801119997	Turbonilla sp C
510801119998	Turbonilla sp B
5110	Cephalaspidea
5110010401	Rictaxis punctocaelatus
51100401	Retusa sp.
5110040203	Cylichna alba
5110040205	Cylichna attonsa
511006999999	Melanochlamys dimedea
5110070101	Gastropteron pacificum
5110090102	Diaphana sp.
5127	Nudibranchia
53	Polyplacophora
5330	Polyplacophora sp.
54	Aplacophora
5402	Chaetodermatida
55	Bivalvia
5502020101	Acila castrensis
5502020201	Nucula tenuis
5502040202	Nuculana minuta
5502040504	Yoldia scissurata
5502040507	Yoldia thraciaeformis
5504010106	Solemya reidi
55060601	Glycymeris sp.
550701	Mytilidae
5507010301	Megacrenella columbiana
55070104	Musculus spp
55070106	Modiolus spp.
5507010601	Modiolus modiolus
5509050101	Chlamys hastata
5515010101	Parvilucina tenuisculpta
5515010201	Lucinoma acutilineata
5515020102	Adontorhina cyclica
5515020201	Axinopsida serricata
55150203	Thyasira sp.
5515020325	Thyasira gouldii
55150501	Diplodonta sp.
5515090101	Neaeromya compressa
5515100102	Mysella tumida
5515170101	Cyclocardia ventricosa
5515190108	Astarte esquimalti
5515190122	Astarte willetti
55152201	Clinocardium spp.
5515220102	Clinocardium nuttali
551522019999	Clinocardium sp.
5515220301	Nemocardium centifilosum
551525	Mactridae
5515250104	Spisula falcata
5515290201	Solen sicarius
551531	Tellinidae
55153101	Macoma spp.
5515310101	Macoma calcarea
5515310102	Macoma elimata
5515310106	Macoma obliqua

APPENDIX G

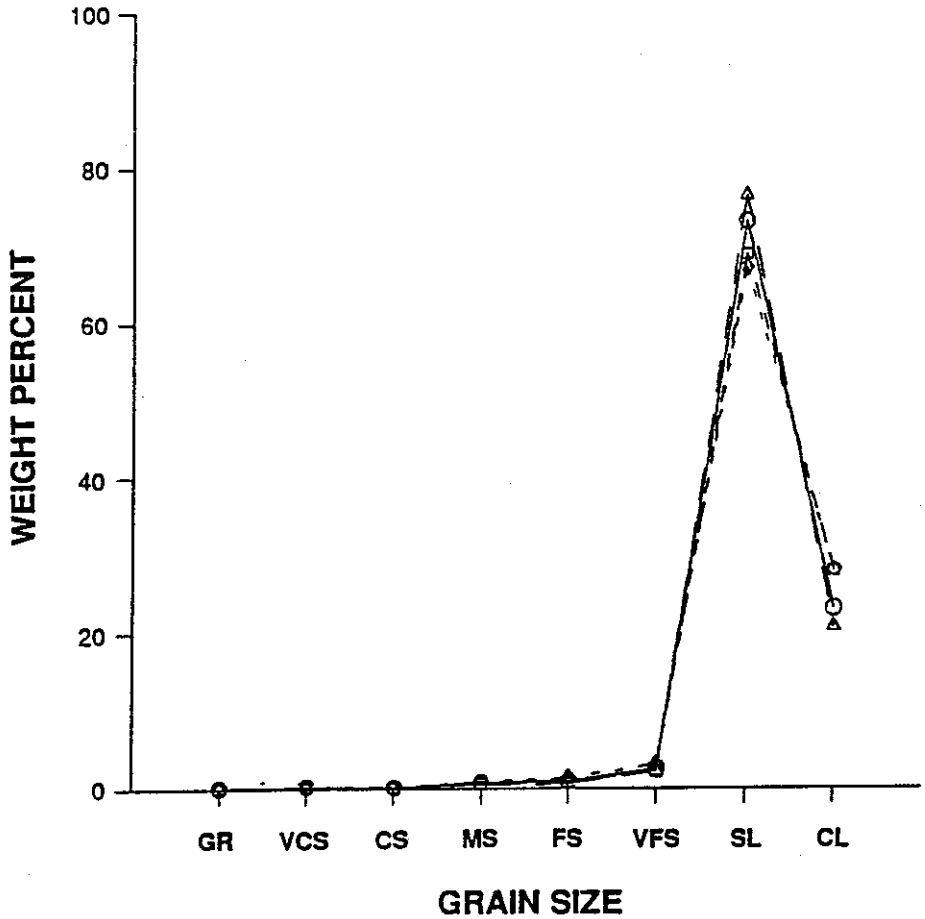
MISCELLANEOUS SEDIMENT CHEMISTRY TABLES AND FIGURES

FIGURES

Number		Page
G-1	Grain size distribution for replicates at Station 5	G-1
G-2	Grain size distribution for replicates at Station 26	G-2
G-3	Grain size distribution for replicates at Station 32	G-3
G-4	Grain size distribution for replicates at Station 38	G-4
G-5	Grain size distribution for replicates at Station 44	G-5

TABLES

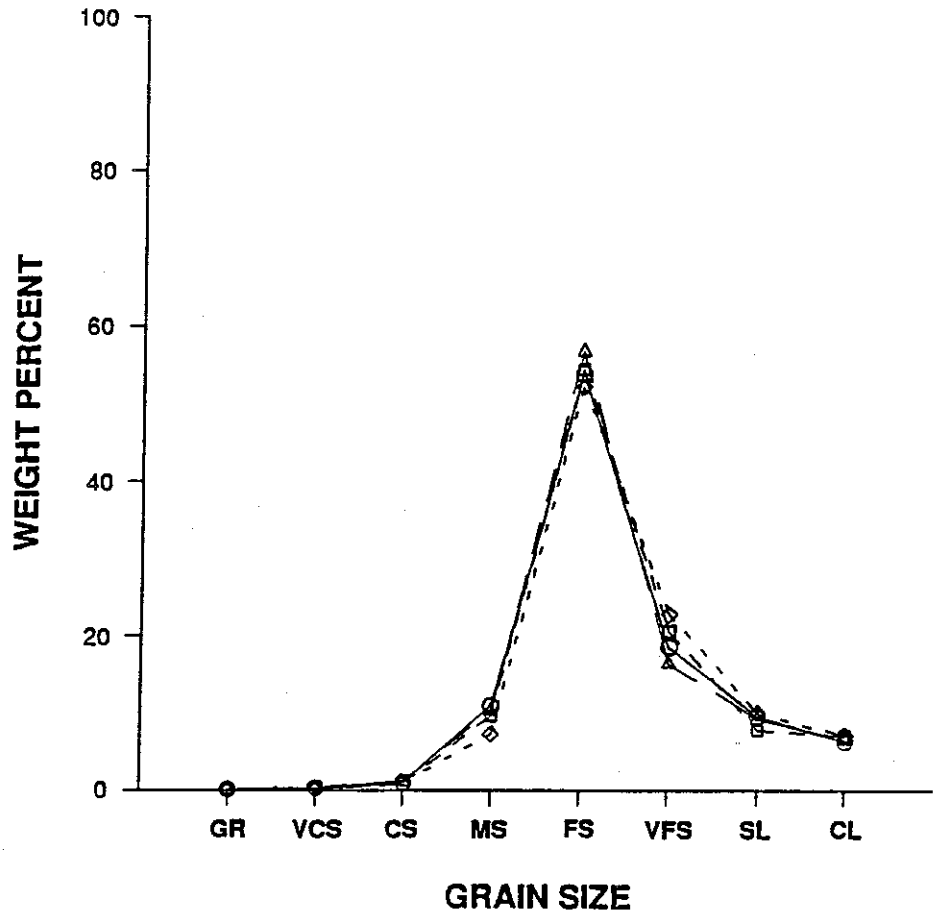
Number		Page
G-1	Comparison of concentrations of total organic carbon at MSMT stations with Puget Sound atlas stations	G-6
G-2	Intercept and slope values that define the mean relationships between fines content and metal concentrations in sediments at MSMT stations	G-7
G-3	Characteristics of stations in Groups A-I as defined in Figure 4	G-8
G-4	Summary of analytical methods	G-13



LEGEND

○	Sample 1	**GR**	Gravel	(<1 phi)	**FS**	Fine Sand	(2 - 3 phi)
△	Sample 1R	**VCS**	Very Coarse Sand	(-1 - 0 phi)	**VFS**	Very Fine Sand	(3 - 4 phi)
□	Sample 2	**CS**	Coarse Sand	(0 - 1 phi)	**SL**	Silt	(4 - 8 phi)
◇	Sample 3	**MS**	Medium Sand	(1 - 2 phi)	**CL**	Clay	(> 8 phi)

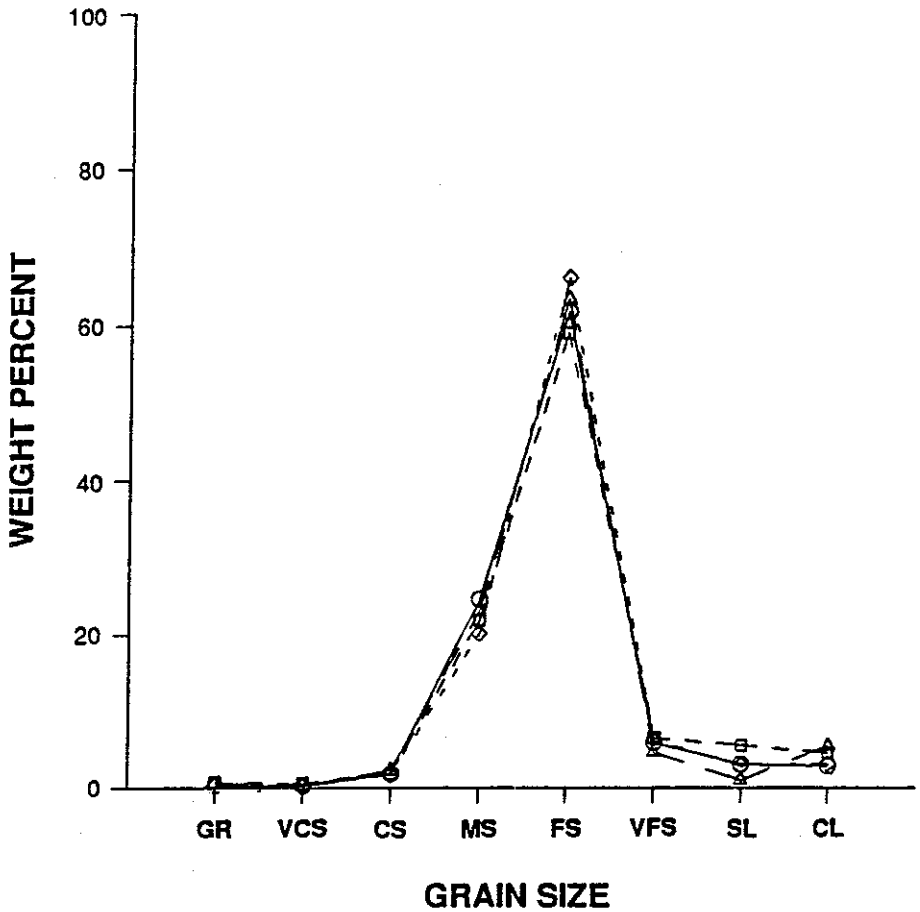
Figure G-1. Grain size distribution for replicates at Station 5.



LEGEND

○	Sample 1	**GR**	Gravel	(<1 phi)	**FS**	Fine Sand	(2 - 3 phi)
△	Sample 1R	**VCS**	Very Coarse Sand	(-1 - 0 phi)	**VFS**	Very Fine Sand	(3 - 4 phi)
□	Sample 2	**CS**	Coarse Sand	(0 - 1 phi)	**SL**	Silt	(4 - 8 phi)
◇	Sample 3	**MS**	Medium Sand	(1 - 2 phi)	**CL**	Clay	(> 8 phi)

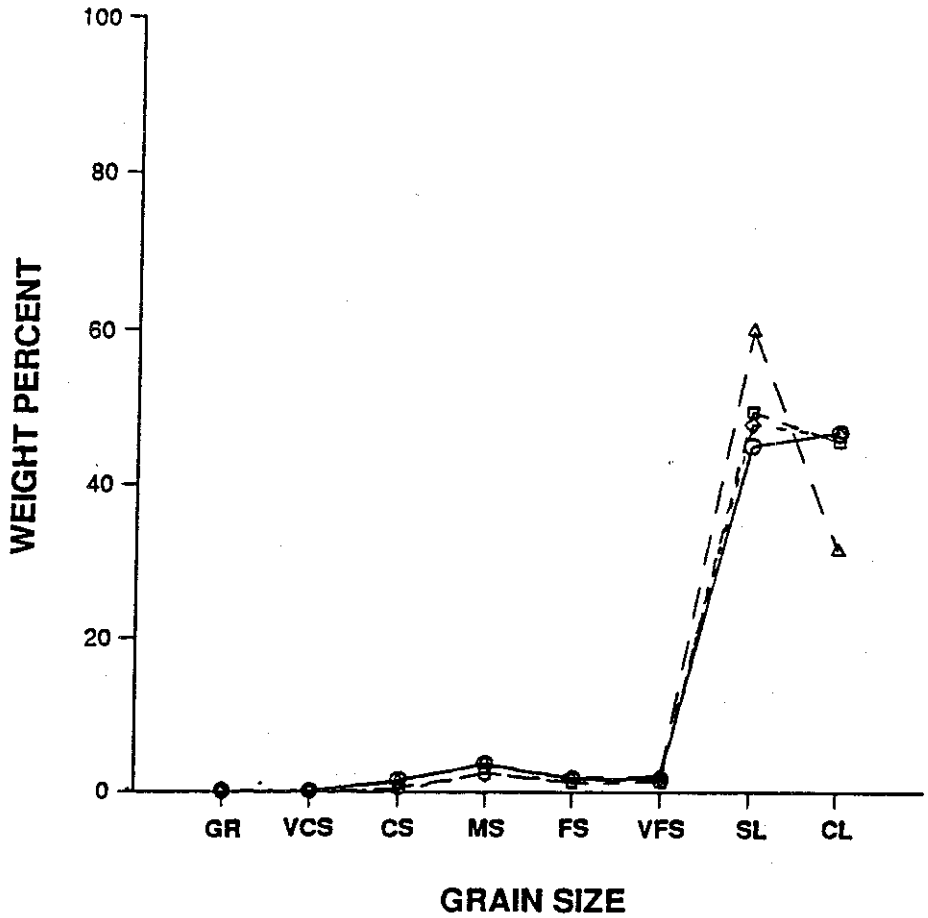
Figure G-2. Grain size distribution for replicates at Station 26.



LEGEND

○	Sample 1	**GR**	Gravel	(<1 phi)	**FS**	Fine Sand	(2 - 3 phi)
△	Sample 1R	**VCS**	Very Coarse Sand	(-1 - 0 phi)	**VFS**	Very Fine Sand	(3 - 4 phi)
□	Sample 2	**CS**	Coarse Sand	(0 - 1 phi)	**SL**	Silt	(4 - 8 phi)
◇	Sample 3	**MS**	Medium Sand	(1 - 2 phi)	**CL**	Clay	(> 8 phi)

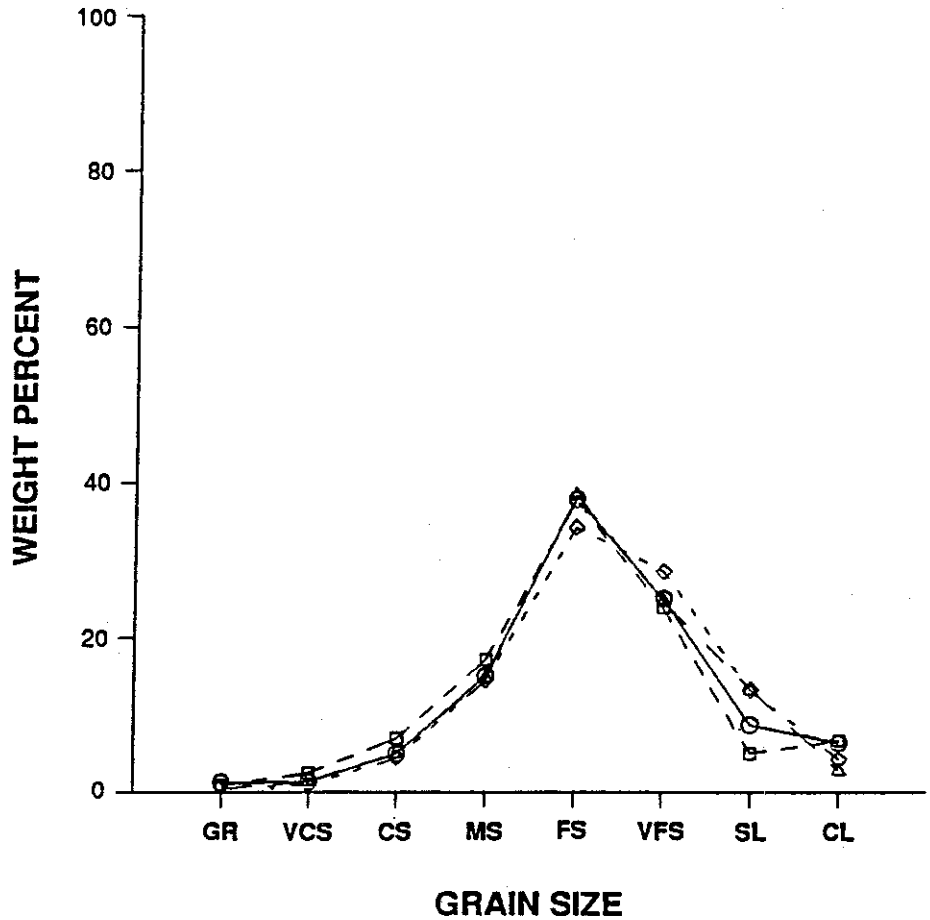
Figure G-3. Grain size distribution for replicates at Station 32.



LEGEND

○	Sample 1	**GR**	Gravel	(<1 phi)	**FS**	Fine Sand	(2 - 3 phi)
△	Sample 1R	**VCS**	Very Coarse Sand	(-1 - 0 phi)	**VFS**	Very Fine Sand	(3 - 4 phi)
□	Sample 2	**CS**	Coarse Sand	(0 - 1 phi)	**SL**	Silt	(4 - 8 phi)
◇	Sample 3	**MS**	Medium Sand	(1 - 2 phi)	**CL**	Clay	(> 8 phi)

Figure G-4. Grain size distribution for replicates at Station 38.



LEGEND

○	Sample 1	**GR**	Gravel	(<1 phi)	**FS**	Fine Sand	(2 - 3 phi)
△	Sample 1R	**VCS**	Very Coarse Sand	(-1 - 0 phi)	**VFS**	Very Fine Sand	(3 - 4 phi)
□	Sample 2	**CS**	Coarse Sand	(0 - 1 phi)	**SL**	Silt	(4 - 8 phi)
◇	Sample 3	**MS**	Medium Sand	(1 - 2 phi)	**CL**	Clay	(> 8 phi)

Figure G-5. Grain size distribution for replicates at Station 44.

TABLE G-1. COMPARISON OF CONCENTRATIONS OF TOTAL ORGANIC CARBON AT MSMT STATIONS WITH PUGET SOUND ATLAS STATIONS

MSMT Station	MSMT TOC (Percent)	Atlas TOC (Percent)
3	1.20	0.5-0.8
4	2.00	Approx. 2.4
5	E1.7-E1.9	1.2
6	E0.25	0.7-1.2
8	E3.90	Approx. 4.7
12	E1.50	1.0
17	E1.50	2.4
19	E1.90	2.2
20	E1.00	1.6
21	E1.30	1.3
24	1.70	2.4
26	0.35-0.56	1.2
27	0.12	0.1-0.4
28	0.15	0.6-1.3
29	1.60	1.0-2.0
30	1.40	1.8
31	0.15	0.3-0.9
32	0.11-0.22	0.2-0.7
33	0.64	0.9
34	2.20	3.0
36	0.13	0.2-0.4
38	2.00-2.20	2.1
39	0.09	0.1-0.2
40	0.70	1.2
42	0.09	0.3-0.6
44	0.40-0.44	Approx. 0.5
48	2.50	3.3
49	2.70	2.1-3.4

TABLE G-2. INTERCEPT AND SLOPE VALUES THAT DEFINE THE MEAN RELATIONSHIPS BETWEEN FINES CONTENT AND METAL CONCENTRATIONS IN SEDIMENTS AT MSMT STATIONS[a]

Linear Relationships: Y = a + b (X)						
Y	X	Intercept, (a)	Slope, (b)	R	N	Excluded Stations
TOC	%Fines	0.11	1.99×10^{-2}	0.87	61	8, 20, 41, 49
Al	%Fines	6267	1.47×10^{2}	0.90	63	17, 41
As	%Fines	2.9	5.3×10^{-2}	0.76	59	34, 38, 42
Ba	%Fines	12	3.7×10^{-1}	0.88	62	17, 24, 33
Cd	%Fines	0.06	1.5×10^{-3}	0.76	56	8, 19, 21, 30, 33, 34, 35, 48, 49
Ca	%Fines	3580	28.1	0.72	61	3, 6, 17, 35
Cr	%Fines	15	3.0×10^{-1}	0.89	61	16, 18, 20, 41
Co	%Fines	4.7	5.0×10^{-2}	0.73	62	17, 19, 20
Cu	%Fines	6.6	3.3×10^{-1}	0.86	62	17, 34, 35
Fe	%Fines	1.0×10^{4}	2.1×10^{2}	0.93	62	16, 17, 41
Pb	%Fines	6.5	1.1×10^{-1}	0.59	58	33, 34, 35, 38
Mg	%Fines	4277	83.4	0.89	62	17, 20, 41
Hg	%Fines	0.05	1.0×10^{-3}	0.75	62	8, 34, 35
Ni	%Fines	17.6	2.2×10^{-1}	0.70	63	20, 41
K	%Fines	849	30.5	0.95	63	20, 41
Ag	%Fines	0.04	2.5×10^{-3}	0.67	63	34, 35
Na	%Fines	2303	2.2×10^{2}	0.96	63	20, 41
V	%Fines	21.2	3.7×10^{-1}	0.92	63	16, 17
Zn	%Fines	24	6.9×10^{-1}	0.93	62	34, 35, 41

[a] Fines content was not significantly ($P>0.001$) correlated with antimony, beryllium, manganese, selenium, and thallium concentrations; see Table 13.

TABLE G-3. CHARACTERISTICS OF STATIONS IN GROUPS A-I AS DEFINED IN FIGURE 5.

Station	Characteristics
	GROUP A
1	22 m depth, level topography, adjacent to urban embayment (City of Blaine, Semiahmoo Bay).
4	24 m depth, level topography, 1-3 cm/sec currents, urban (City of Bellingham) embayment that receives Nooksack, Sumas, and Samish Rivers effluents.
5	20 m depth, level topography within Samish Bay that receives Samish River effluent.
12	20 m depth, level topography, approximately 1 cm/sec currents, urban (Port Townsend) embayment; wood chips observed in sediments.
20	11 m depth, fairly level topography, approximately 1 cm/sec net currents, embayment (Port Susan) receives Stillaguamish River effluent.
34	9 m depth, fairly level topography within Sinclair Inlet (an urban embayment adjacent to City of Bremerton and Puget Sound Naval Ship Yard), generally low net currents.
35	14 m depth, within Dyes Inlet, an embayment with generally low net current flow.
41	20 m depth, within Commencement Bay between Sitcum and Blair Waterways, near Puyallup River effluent.
48	20 m depth, flat topography, approximately 1 cm/sec net current, within Budd Inlet which receives Deschutes River effluent.
49	6 m depth, flat topography, approximately 1 cm/sec net current, within Budd Inlet which receives Deschutes River effluent.

Table G-3. (Continued)

Station	Characteristics
	GROUP B
17	79 m depth, off of Skokomish River delta in south Hood Canal (Annas Bay), low net bottom current.
19	121 m depth, mid-channel in Saratoga Passage (Whidbey Basin), low net current, contains highest clay content (47 percent) of all MSMT stations suggesting considerable distance from primary fluvial sources and sediment.
	GROUP C
24	180 m depth, mid-channel in Possession Sound, low net current flow to the southwest; passage of primary discharge from Whidbey Basin (and associated riverine discharges) into Central Basin of Puget Sound.
29	195 m depth, mid-channel in Central Basin, north of West Point and northwest of Shilshole Bay, fairly level topography, 0.4-8 cm/sec net bottom current to the south.
38	195 m depth, mid-channel in East Passage (Central Basin) off Point Pully, fairly level topography, 2-5 cm/sec net bottom current to the southeast.
	GROUP D
2	20 m depth, fairly flat topography distant from identifiable solids sources and river discharges, 0.4-4 cm/sec net currents.
8	21 m depth, intermediate slope within Port Angeles Harbor, net current velocity unknown; wood chips found in sediment.
10	20 m depth, intermediate slope in mouth of Dungeness Bay which receives Dungeness River effluent.
18	20 m depth, fairly flat topography in mouth of Oak Harbor, within Whidbey Basin across channel from major regional riverine discharges, generally low net currents.

Table G-3. (Continued)

Station	Characteristics
21	20 m depth, located on level area on edge of steep slope outside mouth of Port Gardner/Everett Harbor, 0.6-3.5 cm/sec net currents.
30	13 m depth, flat topography, in Eagle Harbor (City of Winslow and ferry terminal), possibly turbulent flows due to ferry traffic.
	GROUP E
45	53 meters, mid-channel in Drayton Passage, west of Anderson Island and northwest of the Nisqually River delta. Bottom topography is level and bottom currents have been measured in the range of 4 to 8 cm/sec.
	GROUP G
6	20 m depth, east of Anacortes, approximately 60 cm/sec net current.
9	21 m depth, along shoreline, no local solids discharges, fairly level topography, 1-8 cm/sec net current.
11	20 m depth, nonurban embayment (Discovery Bay), flat topography, no local solids discharges, low net current.
13	20 m depth, north Hood Canal, generally steep slope, 4-10 cm/sec net current.
15	20 m depth, Dabob Bay, generally steep slope, no local solids discharges, low net current.
16	20 m depth, South Hood Canal, fairly steep slope, low net current.
22	21 m depth, steep slope in Possession Sound, near shore, generally low net currents.
23	20 m depth, in Possession Sound, steep slope, generally low net currents.

Table G-3. (Continued)

Station	Characteristics
25	20 m depth, West Central Basin, steep slope, no local solids discharges, 6-7 cm/sec net currents.
27	20 m depth, steep slope off Richmond Beach wastewater treatment plant.
28	20 m depth, edge of slope that receives no local discharges, outside mouth of Port Madison.
31	22 m depth, at top edge of slope that receives no major local discharges, considerably outside mouth of Elliott Bay near West Point.
32	20 m depth, at top edge of slope that receives no major local discharges, outside mouth of Elliott Bay along Magnolia Buff.
33	20 m depth, on slope inside Elliott Bay southeast of Duwamish Head, low net current.
36	15 m depth, at Brace Point, steep slope, no major local discharges.
37	20 m depth, on slope, no major local discharges.
39	14 m depth, on slope, no local riverine influence, near Dash Point outfall.
40	10 m depth, entrance to City Waterway in Commencement Bay, gravel and wood chips and elevated organics concentrations in sediments suggests disturbed (nonnatural sorting) environment by either dredging and/or high flow scouring (erosion).
42	39 m depth, on slope outside mouth of Commencement Bay near Ruston, off of ASARCO smelter.
43	20 m depth, on slope of Carr Inlet, low net current, no local riverine influence.
44	20 m depth, east side of Anderson Island, very steep slope, 4-5 cm/sec net current.
46	22 m depth, on near-shore slope, no local solids discharges, low net currents.

Table G-3. (Continued)

Station	Characteristics
47	20 m depth, on slope of Case Inlet, approximately 5 cm/sec net current.
50	7 m depth, flat topography, in Oakland Bay (City of Shelton), sediment texture suggests high local (and possibly turbulent) current flows.
	GROUP H
7	133 m depth, mid-channel in the Strait of Juan de Fuca, 8-34 cm/sec net currents (high bottom flow to the east), contains 22 percent gravel.
14	115 m depth, deep hole in Hood Canal, no major local sources of solids, approximately 2 cm/sec net current.
	GROUP I
3	218 m depth, mid-channel in Strait of Georgia west of Cherry Point, generally distant from major sources of solids, bottom currents estimated at 4 to 20 cm/sec, contains 34 percent gravel (highest gravel content of all stations).
26	262 m depth, deepest MSMT station, located between the Central and Whidbey Basins in a canyon south of Admiralty Inlet, high southward bottom current velocities (8-18 cm/sec), contains 54 percent fine sand.

Summary of Analytical Methods

All options and modifications to PSEP recommended protocols (Tetra Tech 1986) are indicated

Particle Size (apparent; includes organic plus inorganic particles)
Consistent with the PSEP recommended protocol (Tetra Tech 1986); option for organics oxidation not employed, 8 class fractions analyzed.

TOC
Consistent with the PSEP recomended protocol (Tetra Tech 1986); sample pretreatment with HCl to rid inorganic carbon, sediment oxidized at 850° C and liberated CO_2 measured by infrared spectrophotometry. Reported in terms of carbon per dry weight of the unacidified sample.

Total Sulfides Consistent with the PSEP recommended protocol (Tetra Tech 1986); representing acid-soluble H_2S, HS^- and S^{2-}. Acid-labile sulfide is distilled and measured spectrophotometrically by a methylene blue method.

Metals
Consistent with the PSEP recommended protocol (Tetra Tech 1986), employing the selected options:

1. Digestion
   - Hydrofluoric acid
   - Hydrofluoric acid/aqua regia
   - Perchloric acid
   - Nitric acid
   - Nitric/hydrochloric acids
   - Nitric acid/hydrogen peroxide; U.S. EPA CLP

2. Instrumental analysis
   - Cold vapor atomic absorption (CVAA) for Hg; U.S. EPA CLP
   - Inductively-coupled plasma atomic emission spectroscopy (ICP-AES) for Cu, Ni and Zn
   - Graphite furnace atomic absorption (GFAA) for Sb, As, Cd, Pb, Se and Ag
   - X-ray fluorescence (XRF)
   - Flame atomic absorption (FAA)
   - Modifications employed for the MSMT due to requirements for increased precision and expanded list of metal analytes are:
     a. GFAA employing Method of Standard Addition (MSA) for Sb, As, Cd, Pb, Se, Ag and Tl
     b. ICP-AES for Al, Ba, Be, Ca, Cr, Co, Cu, Fe, Mg, Mn, Ni, K, Na, V and Zn; U.S. EPA CLP

VOA's

Consistent with the PSEP recommended protocol (Tetra Tech 1986) with modifications for expanded list of target analytes and increased sensitivities and precisions described in Appendix B, VOA's QA memo.

1. Addition of surrogates and internal standards to sediment (MSMT employed an expanded group of check compounds for QC purposes)
2. Sample preparation
   - Purge & Trap; U.S. EPA CLP
   - Vacuum extraction/Purge & Trap
3. Instrumental analysis; GC/MS; U.S. EPA CLP

Extractable Organics

Consistent with the PSEP recommended protocol (Tetra Tech 1986), employing the selected options:

1. Addition of surrogates to sediment (MSMT employed an expanded group of check compounds for QC purposes as described in Appendix B, BNA QA memo)
2. Extraction (BNA = 100 gm sample; Pest/PCB's = 50 gm sample)
   - Shaker/Roller technique
   - Soxhlet; U.S. EPA M 3550
   - Sonication; U.S. EPA CLP, M 3550
3. Extract Dehydration
   - Anhydrous Na_2SO_4; U.S. EPA CLP, and/or
   - Backextract with nonpolar solvent
4. Extract concentration
   - Kuderna-Danish technique
   - Rotary evaporation
5. Extract cleanup
   a. Elemental sulfur (S_x) removal
      - Metallic mercury
      - Act'd copper
      - MSMT modification included S_x removal during next step, not as a separate step here

   b. Gel Permeation Chromatography (GPC); U.S. EPA CLP; also accomplishes S_x removal from extract. Followed by solvent exchange and concentration.

   c. Adsorption/Partition chromatography
      - Reverse-phase chromatography
      - Normal-phase chromatography for ABN and RA's/guaiacols
      - Alumina column chromatography for Pest/PCB's; U.S. EPA CLP

TABLE G-4. (Continued)

6. Extract concentration
   - Kuderna-Danish technique
   - Rotary evaporation

7. MSMT modification includes splitting the acid fraction from step 5 c, above for methyl ether and ester formation of guaiacols and resin acids (RA's), respectively, by reaction with diazomethane in hexane/methylene chloride

8. Addition of internal standards to all fractions, with exception of Pest/PCB's

9. Instrumental analysis
   - GC/FID
   - GC/ECD for Pest/PCB's; U.S. EPA CLP
   - GC/MS; U.S. EPA CLP; for two ABN fractions and a derivatized acid fraction

TABLE G-4. (Continued)

Summary of Holding Times

Analytical Parameter	Max Holding Time/Preservation	PSEP Recommended Max Holding Time/Preservation
Particle Size	50 days / 4° C	180 days / 4° C
TOC	19 days / 4° C	180 days / frozen (-20° C)
Total Sulfides	8 days/4° C, darkness, $Zn(C_2H_3O_2)_2$	7 days/4° C, darkness, $Zn(C_2H_3O_2)_2$
Metals	Hg: 23 days / 4° C All other metals: 51 days / 4° C	180 days / frozen (-20° C) 180 days / frozen (-20° C)
VOA's	8 days / 4° C	14 days / 4° C
Extractable Organics	9 days / 4° C (extract = 37 days)	1 year / frozen (-20° C) (extract = 40 days)

STATION 16 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Kurtziella plumbea	5106021107		1	1	2
Odostomia sp A	510801019939	2	3	8	13
Turbonilla aurantia	5108011134	4	5	2	11
Rictaxis punctocaelatus	5110010401			1	1
Cylichna attonsa	5110040205		1		1
Bivalvia	55		1		1
Acila castrensis	5502020101		1	1	2
Nucula tenuis	5502020201	2	1	1	4
Nuculana minuta	5502040202			1	1
Yoldia scissurata	5502040504	1			1
Megacrenella columbiana	5507010301	2	1	1	4
Chlamys hastata	5509050101		1	4	5
Parvilucina tenuisculpta	5515010101	4	1	2	7
Axinopsida serricata	5515020201	8	14	4	26
Thyasira gouldii	5515020325	4	3		7
Mysella tumida	5515100102		1	6	7
Nemocardium centifilosum	5515220301	1	1		2
Macoma spp.	55153101	8		10	18
Macoma calcarea	5515310101			1	1
Macoma yoldiformis	5515310111	4			4
Macoma carlottensis	5515310112	4	4	2	10
Compsomyax subdiaphana	5515470301		1		1
Psephidia lordi	5515470501	5	2	2	9
Lyonsia californica	5520050202	2	9	3	14
Thracia trapezoides	5520080203	3			3
Octopoda sp	5708	2	7		9
Euphilomedes producta	6111070303	6		6	12
Mysidacea	6151	1			1
Ampelisca spp.	61690201		1	1	2
Ampelisca careyi	6169020135	1			1
Byblis millsi	6169020208		8	3	11
Westwoodilla caecula	6169371502		1	1	2
Heterophoxus oculatus	6169420301			1	1
Pagurus spp.	61830602	1			1
Golfingia spp.	72000201	21	25	13	59
Phoronida	77	8	1	6	15
Amphiodia spp	81290301			1	1
					734
		216	293	225 Sum	
		4	5	4 Ave	
		25	47	11 Var	
		5	7	3 Sdv	
		1	1	1 Min	
		30	32	15 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 17

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43	2			2
Tenonia priops	5001022302		1		1
Gyptis brevipalpa	5001210102			1	1
Sigambra bassi	5001220204	7	6	6	19
Nephtys spp.	50012501			1	1
Nephtys cornuta franciscana	500125010401	1			1
Nephtys punctata	5001250105	1	2		3
Nephtys ferruginea	5001250111	1	2	2	5
Glycera capitata	5001270101			2	2
Goniada brunnea	5001280203	1	1		2
Onuphis iridescens	5001290103		2		2
Lumbrineris luti	5001310109			1	1
Leitoscoloplos pugettensis	5001400102	2		2	4
Levinsenia gracilis	5001410801	4	2	6	12
Acesta lopezi	5001411302	6	1	20	27
Laonice cirrata	5001430201			1	1
Prionospio steenstrupi	5001430506	6		4	10
Prionospio lighti	5001430521			1	1
Spiophanes berkelyorum	5001431004	8	5	7	20
Paraprionospio pinnata	5001431702		1		1
Cossura modica	5001520199	25	5	16	46
Heteromastus filobranchus	5001600203	1			1
Mediomastus ambiseta	5001600401	1		1	2
Ampharete acutifrons	5001670208	1	1	3	5
Polycirrus californicus	5001680810	1		1	2
Odostomia sp. A	510801019939	1			1
Nucula tenuis	5502020201		1	1	2
Axinopsida serricata	5515020201	65	64	47	176
Mysella tumida	5515100102	1			1
Macoma carlottensis	5515310112	2	2	5	9
Mysidacea	6151			2	2
Eudorella pacifica	6154040202	11	3	6	20
Halicella halona	6169400602		1	3	4
Harpiniopsis sp.	61694202			1	1
Heterophoxus oculatus	6169420301		1	1	2
Eobrolgus sp.	61694219			1	1
Decapoda	6175	2			2
					393
		150	101	142 Sum	
		7	6	5 Ave	
		190	203	90 Var	
		14	14	9 Sdv	
		1	1	1 Min	
		65	64	47 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 18

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43	2	5	4	11
Harmothoe lunulata	5001020810		1	1	2
Pholoe minuta	5001060101	1	1		2
Eteone californica	5001130201	1	2		3
Gyptis brevipalpa	5001210102	1	1	2	4
Sigambra bassi	5001220204			8	8
Syllis elongata	5001230308		1		1
Exogone lourei	5001230703		1	1	2
Nephtys cornuta franciscana	500125010401	3	1	5	9
Nephtys ferruginea	5001250111		2	2	4
Glycera capitata	5001270101	3	1	2	6
Glycinde armigera	5001280103	4	8	8	20
Goniada brunnea	5001280203		1		1
Lumbrineris luti	5001310109	22	63	8	93
Polydora socialis	5001430402	31	43	8	82
Prionospio lighti	5001430521	4	1		5
Spiophanes berkelyorum	5001431004	5	7	4	16
Paraprionospio pinnata	5001431702	3	2	3	8
Trochochaeta multisetosa	5001450102	1	1		2
Phyllochaetopterus prolifica	5001490202	2	10		12
Spiochaetopterus costarum	5001490302	2	12		14
Tharyx multifilis	5001500302	4	9	12	25
Chaetozone spinosa	5001500407	3			3
Sternaspis scutata	5001590101		1		1
Heteromastus filobranchus	5001600203	1		4	5
Mediomastus spp.	50016004			1	1
Barantolla americana	5001600601			3	3
Maldanidae	500163	1			1
Praxillella spp.	50016309	4	2		6
Euclymeninae	5001631		2		2
Pectinaria californiensis	5001660304	25	12	25	62
Amphicteis scaphobranchiata	5001670304			1	1
Polycirrus spp.	50016808		2		2
Polycirrus californicus	5001680810		1		1
Terebellides stroemi	5001690101		1		1
Rictaxis punctocaelatus	5110010401	6	2		8
Cylichna attonsa	5110040205	2	3	5	10
Melanochlamys dimedea	511006999999	2	1	1	4
Nucula tenuis	5502020201	2	1	1	4
Axinopsida serricata	5515020201	212	232	49	493
Mysella tumida	5515100102	37	29	4	70
Macoma spp.	55153101	3			3
Macoma carlottensis	5515310112	16	18	1	35
Compsomyax subdiaphana	5515470301	3			3
Psephidia lordi	5515470501	2	1	1	4
Pandora filosa	5520020102		1	1	2
Euphilomedes producta	6111070303		1		1
Eudorella pacifica	6154040202		2		2
Pinnixa spp	61890604		5	1	6
Phoronida	77	10	24	4	38
					1102
		418	514	170 Sum	
		13	13	6 Ave	
		1359	1357	90 Var	
		37	37	9 Sdv	
		1	1	1 Min	
		212	232	49 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 19

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43	4	2	1	7
Ehlersia heterochaeta	5001232201	1			1
Nephtys cornuta franciscana	500125010401	1			1
Glycera capitata	5001270101			1	1
Onuphis iridescens	5001290103	3	2	5	10
Lumbrineris spp.	50013101		1		1
Lumbrineris luti	5001310109	2		3	5
Lumbrineris cruzensis	5001310118		2		2
Leitoscoloplos pugettensis	5001400102			2	2
Levinsenia gracilis	5001410801	1	1		2
Polydora socialis	5001430402	1	3		4
Prionospio steenstrupi	5001430506	1		1	2
Prionospio lighti	5001430521	2	2		4
Spiophanes berkelyorum	5001431004	3		3	6
Spiochaetopterus costarum	5001490302		2	2	4
Caulleriella alata	5001500202		1		1
Chaetozone setosa	5001500401			1	1
Cossura longocirrata	5001520101	1	2		3
Brada sachalina	5001540199		1		1
Mediomastus californiensis	5001600402			1	1
Pectinaria californiensis	5001660304	9	6	4	19
Terebellides stroemi	5001690101	1			1
Artacamella hancocki	5001690201	3	1	1	5
Gastropoda	51			1	1
Cephalaspidea	5110		1		1
Cylichna alba	5110040203	1			1
Chaetodermatida	5402	5	7	6	18
Yoldia scissurata	5502040504	1			1
Yoldia thraciaeformis	5502040507		2		2
Adontorhina cyclica	5515020102	2			2
Thyasira gouldii	5515020325	1		1	2
Tellinidae	551531			1	1
Holmesiella anomala	6153010901			1	1
Leucon spp	61540401	1			1
Eudorella pacifica	6154040202		1		1
Rhachotropis klemens	6169201309			1	1
Cyphocaris challengeri	6169341101		2	2	4
Heterophoxus oculatus	6169420301		1	1	2
Paraphoxus oculatus	6169420925			6	6
Foxiphalus similis - cognatus complex	616942099999	1			1
Natantia	617599			1	1
Molpadia intermedia	8179010101	2	2	5	9
					140
		47	42	51 Sum	
		2	2	2 Ave	
		3	2	3 Var	
		2	2	2 Sdv	
		1	1	1 Min	
		9	7	6 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 20

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43	4	3	2	9
Polynoidae	500102	1		2	3
Phyllodoce (Anaitides) groenlandica	5001130102		3		3
Nereis brandti	5001240301		1		1
Nereis zonata	5001240406	1			1
Nephtys cornuta franciscana	500125010401		1		1
Nephtys ferruginea	5001250111	5	1	5	11
Sphaerodoropsis sphaerulifer	5001260103		1	2	3
Glycera capitata	5001270101	2	8	5	15
Glycinde picta	5001280101		2		2
Lumbrineris luti	5001310109	69	116	74	259
Dorvillea pseudorubrovittata	5001360101		1		1
Levinsenia gracilis	5001410801			1	1
Acesta lopezi	5001411302		2		2
Polydora cardalia	5001430431	1	1		2
Prionospio steenstrupi	5001430506		1		1
Cirratulidae	500150	2			2
Tharyx multifilis	5001500302		3	2	5
Ophelina acuminata	5001580607		4	2	6
Sternaspis scutata	5001590101		1		1
Notomastus lineatus	5001600303			1	1
Mediomastus californiensis	5001600402		1		1
Maldane glebifex	5001630302		1		1
Euclymene zonalis	5001631103	36	25	20	81
Owenia fusiformis	5001640102		1		1
Pectinaria granulata	5001660303	2			2
Pectinaria californiensis	5001660304	4	10	6	20
Pista cristata	5001680701	52	84	63	199
Terebellides stroemi	5001690101	13	29	32	74
Chone magna	5001700106		1		1
Rissoidae	510320	1		5	6
Mitrella tuberosa	5105030202	9		6	15
Turbonilla aurantia	5108011134	2	5	6	13
Rictaxis punctocaelatus	5110010401	1	2		3
Cylichna attonsa	5110040205	3	1	3	7
Nucula tenuis	5502020201	8	6	3	17
Adontorhina cyclica	5515020102			1	1
Axinopsida serricata	5515020201	20	19	31	70
Mysella tumida	5515100102	4	14	10	28
Clinocardium nuttali	5515220102	3			3
Nemocardium centifilosum	5515220301			4	4
Spisula falcata	5515250104	1			1
Macoma calcarea	5515310101	4			4
Macoma elimata	5515310102		7		7
Macoma carlottensis	5515310112	13	14	21	48
Macoma nasuta	5515310114	8			8
Compsomyax subdiaphana	5515470301	5	7	3	15
Psephidia lordi	5515470501	3	5	6	14
Mya arenaria	5517010201			1	1
Pandora filosa	5520020102	5	2	4	11
Lyonsia californica	5520050202	6	2	3	11
Thracia trapezoides	5520080203			1	1
Euphilomedes producta	6111070303	49	64	70	183
Eudorella pacifica	6154040202	3	9	3	15
Diastylis alaskensis	6154050101	1		1	2
Ampelisca spp.	61690201			1	1
Ampelisca hancocki	6169020113		3		3
Melita desdichada	6169211008	2	1	2	5
Monoculodes zernovi	6169370816		1		1
Synchelidium spp.	61693714		1		1

STATION 20 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Westwoodilla caecula	6169371502	1	1		2
Heterophoxus oculatus	6169420301	31	34	51	116
Pinnixa spp.	61890604			1	1
Priapulus caudatus	7400010101			2	2
					1330
		375	499	456 Sum	
		10	11	12 Ave	
		261	519	388 Var	
		16	23	20 Sdv	
		1	1	1 Min	
		69	116	74 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 21

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43	1	2	1	4
Harmothoe lunulata	5001020810		1		1
Pholoe minuta	5001060101			1	1
Eteone longa	5001130205	1	8	5	14
Phyllodoce (Anaitides) spp	5001131499			2	2
Exogone lourei	5001230703	2			2
Nephtys cornuta franciscana	500125010401	3	2	2	7
Nephtys ferruginea	5001250111	6	12	13	31
Sphaerodoropsis sphaerulifer	5001260103	5	10	6	21
Glycera capitata	5001270101	5	5	5	15
Glycinde picta	5001280101	1	2	2	5
Lumbrineris spp.	50013101	1			1
Lumbrineris luti	5001310109	13	14	12	39
Leitoscoloplos pugettensis	5001400102	23	1	4	28
Polydora socialis	5001430402	5	5	3	13
Prionospio steenstrupi	5001430506	9	5	4	18
Prionospio lighti	5001430521		1		1
Spiophanes berkelyorum	5001431004	1			1
Paraprionospio pinnata	5001431702	1	1		2
Tharyx multifilis	5001500302	17	5	6	28
Chaetozone setosa	5001500401		1		1
Ophelina acuminata	5001580607	2		2	4
Sternaspis scutata	5001590101			1	1
Capitella capitata	5001600101	1		2	3
Heteromastus filobranchus	5001600203	1	12	6	19
Mediomastus californiensis	5001600402	2	3		5
Barantolla americana	5001600601	1			1
Maldanidae	500163		3		3
Euclymeninae	5001631	3	1	3	7
Euclymene zonalis	5001631103		3	9	12
Pectinaria californiensis	5001660304	2	1	2	5
Amphicteis scaphobranchiata	5001670304		1		1
Terebellidae	500168		1		1
Polycirrus spp.	50016808	40	34	46	120
Polycirrus californicus	5001680810	1	5	2	8
Lanassa venusta venusta	500168130201	16	17	8	41
Scionella estevanica	5001681803	1			1
Terebellides stroemi	5001690101	1	1	2	4
Oligochaeta	5004		1		1
Rissoidae	510320	3	4	5	12
Mitrella tuberosa	5105030202		2		2
Nassarius mendicus	5105080101	1			1
Odostomia sp. A	510801019939	2		1	3
Turbonilla aurantia	5108011134		2	3	5
Nucula tenuis	5502020201	2	2	4	8
Mytilidae	550701			1	1
Parvilucina tenuisculpta	5515010101	2	2	2	6
Lucinoma acutilineata	5515010201			1	1
Axinopsida serricata	5515020201	249	190	352	791
Thyasira sp.	55150203	1			1
Mysella tumida	5515100102	3	4	12	19
Astarte willetti	5515190122			1	1
Clinocardium sp.	551522019999	3	2	2	7
Macoma spp.	55153101	5	1		6
Macoma carlottensis	5515310112	172	211	260	643
Tellina modesta	5515310204			1	1
Compsomyax subdiaphana	5515470301		2	2	4
Psephidia lordi	5515470501	14	17	12	43
Cylindroleberididae	611103	4	1	1	6
Euphilomedes carcharodonta	6111070301	138	128	151	417

STATION 21 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Euphilomedes producta	6111070303	98	125	142	365
Leucon spp.	6154040100	1		1	2
Eudorella pacifica	6154040202	5	1		6
Eudorellopsis integra	6154040301	2			2
Diastylis alaskensis	6154050101	6			6
Haliophasma geminata	6160011601	1			1
Edotea sublittoralis	6162020702	1			1
Munna spp	61631201			1	1
Munnogonium sp.	616312030	3	1	1	5
Ampelisca spp	61690201	4			4
Aoroides spp.	61690602	1	1		2
Melita desdichada	6169211008	1			1
Prachynella lodo	6169345701		1		1
Synchelidium shoemakeri	6169371402	2		2	4
Westwoodilla caecula	6169371502			1	1
Heterophoxus oculatus	6169420301	2			2
Metaphoxus frequens	6169420601			1	1
Rhepoxynius spp.	61694215			1	1
Rhepoxynius bicuspidata	6169421503	1	9	6	16
Dyopedos spp	61694499	1			1
Amphiuridae	812903	1			1
					2874
		894	864	1116 Sum	
		15	18	22 Ave	
		1895	2043	4182 Var	
		44	45	65 Sdv	
		1	1	1 Min	
		249	211	352 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 22

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43		1		1
Pholoe minuta	5001060101		2		2
Phyllodoce (Paranaitis) polynoides	5001130803		1		1
Eulalia (Eumida) sanguinea	5001131101			2	2
Exogone lourei	5001230703			1	1
Nephtys ferruginea	5001250111	3	3		6
Nephtys caecoides	5001250119	1			1
Glycinde armigera	5001280103			1	1
Goniada maculata	5001280202	1	1		2
Lumbrineris luti	5001310109		13	1	14
Leitoscoloplos pugettensis	5001400102	9	6	2	17
Prionospio steenstrupi	5001430506	11	12	4	27
Spiochaetopterus costarum	5001490302			1	1
Tharyx secundus	5001500309		1		1
Chaetozone setosa	5001500401	1			1
Ophelina acuminata	5001580607			1	1
Heteromastus filobranchus	5001600203	1			1
Notomastus lineatus	5001600303	3		2	5
Maldanidae	500163		1		1
Euclymene zonalis	5001631103		3		3
Pectinaria granulata	5001660303	2		1	3
Pectinaria californiensis	5001660304		1	3	4
Anobothrus gracilis	5001670701		1		1
Terebellidae	500168		1		1
Polycirrus spp	50016808	3	1	3	7
Lanassa venusta venusta	500168130201			1	1
Scionella estevanica	5001681803		1	1	2
Streblosoma bairdi	5001682502	2	1		3
Rissoidae	510320	6		2	8
Mitrella tuberosa	5105030202		1	1	2
Kurtziella plumbea	5106021107		2		2
Odostomia sp. A	510801019939		1	2	3
Turbonilla sp B	510801119998	32	36	41	109
Cephalaspidea	5110			2	2
Chaetodermatida	5402	1			1
Bivalvia	55	2	1		3
Nucula tenuis	5502020201	4	2	1	7
Nuculana minuta	5502040202			2	2
Solemya reidi	5504010106		2		2
Megacrenella columbiana	5507010301			2	2
Parvilucina tenuisculpta	5515010101		2	1	3
Lucinoma acutilineata	5515010201	1			1
Axinopsida serricata	5515020201	80	121	55	256
Mysella tumida	5515100102		1	1	2
Macoma spp.	55153101			2	2
Macoma calcarea	5515310101	3			3
Macoma nasuta	5515310114		6		6
Tellina modesta	5515310204	1			1
Compsomyax subdiaphana	5515470301	5	1	5	11
Psephidia lordi	5515470501	39	27	28	94
Mya arenaria	5517010201		1		1
Pandora filosa	5520020102			1	1
Lyonsia californica	5520050202	2			2
Cylindroleberididae	611103	2			2
Rutiderma lomae	6111060103	1			1
Euphilomedes carcharodonta	6111070301	63	70	70	203
Euphilomedes producta	6111070303			2	2
Lamprops quadriplicata	6154010105		1		1
Campylaspis spp.	61540701	2	2		4
Leptochelia dubia	6157020103	4	13	2	19

STATION 22 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Ampelisca careyi	6169020135			1	1
Byblis millsi	6169020208	1			1
Aoroides spp.	61690602			1	1
Hippomedon spp.	61693414		1	5	6
Synchelidium shoemakeri	6169371402	2			2
Westwoodilla caecula	6169371502			1	1
Rhepoxynius abronius	6169421504	16	2	14	32
Stenothoidae	616948	2			2
Hyperia sp.	6170010100			1	1
Pinnixa spp	61890604			1	1
Golfingia spp.	72000201	1		1	2
Amphiuridae	812903			1	1
					920
		307	343	270 Sum	
		9	9	7 Ave	
		324	514	218 Var	
		18	23	15 Sdv	
		1	1	1 Min	
		80	121	70 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 23

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Anthozoa sp. 1	374000009999			1	1
Nemertea	43	1	2	1	4
Phyllodoce (Anaitides) groenlandica	5001130102			1	1
Phyllodoce papillosa	5001130115		1		1
Eteone californica	5001130201	1			1
Eteone spilotus	5001130299			1	1
Phyllodoce (Paranaitis) polynoides	5001130803		1		1
Phyllodoce (Aponaitides) hartmanae	5001131402		2		2
Exogone lourei	5001230703	9	9		18
Platynereis bicanaliculata	5001240501	1			1
Nephtys longosetosa	5001250109		8		8
Nephtys ferruginea	5001250111	3	1		4
Nephtys caecoides	5001250119			5	5
Glycera capitata	5001270101			1	1
Onuphidae	500129	3	1		4
Onuphis iridescens	5001290103	1	1	6	8
Diopatra ornata	5001290202	2			2
Lumbrineris spp.	50013101	1			1
Lumbrineris lagunae	5001310129			1	1
Scoloplos armiger	5001400301	1			1
Scoloplos acmeceps	5001400311		1		1
Aricidea minuta	5001410220		2		2
Prionospio steenstrupi	5001430506	6	7	8	21
Spiophanes bombyx	5001431001	11	17	15	43
Phyllochaetopterus prolifica	5001490202		1		1
Cirratulidae	500150	1			1
Tharyx multifilis	5001500302		4	3	7
Chaetozone spinosa	5001500407	1	1	4	6
Ophelia limacina	5001580301	2			2
Ophelina breviata	5001580604		1		1
Capitella capitata	5001600101		1		1
Heteromastus filobranchus	5001600203		1		1
Notomastus lineatus	5001600303	1	5	1	7
Axiothella rubrocincta	5001630802	4	4		8
Euclymeninae	5001631	2			2
Pectinaria granulata	5001660303	1	1	2	4
Pectinaria californiensis	5001660304	1			1
Terebellidae	500168			1	1
Pista cristata	5001680701	4	2	4	10
Polycirrus spp.	50016808		9		9
Polycirrus californicus	5001680810	11	3	7	21
Streblosoma bairdi	5001682502		1		1
Chone duneri	5001700104		1		1
Solariella varicosa	5102100403		8	6	14
Natica clausa	5103760201	1	1	1	3
Nassarius mendicus	5105080101	1		1	2
Olivella baetica	5105100102	1	3	2	6
Odostomia sp. A	510801019939		1	4	5
Turbonilla sp. B	510801119998	76	88	53	217
Melanochlamys dimedea	511006999999			1	1
Nucula tenuis	5502020201		1	1	2
Nuculana minuta	5502040202	3	1	1	5
Megacrenella columbiana	5507010301	125	99	68	292
Musculus spp.	55070104	4	6	7	17
Parvilucina tenuisculpta	5515010101	4		3	7
Lucinoma acutilineata	5515010201		3		3
Axinopsida serricata	5515020201	4	5	2	11
Mysella tumida	5515100102	3	3	1	7
Astarte esquimalti	5515190108	40	18	26	84
Clinocardium nuttali	5515220102	4		4	8

STATION 23 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemocardium centifilosum	5515220301	1	3	1	5
Spisula falcata	5515250104	1	3	1	5
Solen sicarius	5515290201	4	1	1	6
Macoma spp.	55153101	1		2	3
Macoma calcarea	5515310101	1			1
Macoma obliqua	5515310106	1	1		2
Tellina nuculoides	5515310202	1		1	2
Psephidia lordi	5515470501	60	22	11	93
Protothaca sp	55154707		1		1
Mya arenaria	5517010201	2	2	1	5
Hiatella arctica	5517060201			1	1
Pandora filosa	5520020102		1		1
Lyonsia californica	5520050202	9	10	10	29
Thracia trapezoides	5520080203	1			1
Cardiomya californica	5520100108	7	2	5	14
Dentalium spp.	56010101			1	1
Cylindroleberididae	611103	1	3	2	6
Euphilomedes carcharodonta	6111070301	97	64	55	216
Euphilomedes producta	6111070303		1	1	2
Campylaspis spp.	61540701	2		8	10
Campylaspis hartae	6154070105		6		6
Leptochelia dubia	6157020103		1		1
Leptognathia sp	61570901			1	1
Gammaridea	6169			1	1
Byblis millsi	6169020208	2	1	1	4
Corophium spp.	61691502	1		8	9
Isaeidae	616926	1			1
Hippomedon coecus	6169341411	1	1		2
Orchomene pacifica	6169342903		1		1
Synchelidium spp	61693714			2	2
Metaphoxus frequens	6169420601		2	1	3
Rhepoxynius spp.	61694215			2	2
Rhepoxynius abronius	6169421504	11	15	4	30
Stenothoidae	616948			1	1
Callianassa spp.	61830402			1	1
Phoronida	77		1		1
Amphiodia urtica/periercta complex	812903019999		1	1	2
Ascidiacea	8401	3			3
					1377
		542	468	367 Sum	
		10	8	6 Ave	
		572	325	167 Var	
		24	18	13 Sdv	
		1	1	1 Min	
		125	99	68 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 24

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43		3	2	5
Polynoidae	500102			1	1
Harmothoe lunulata	5001020810		2		2
Hesperonoe adventor	5001021702		2		2
Eulalia levicornuta	5001130310	1			1
Gyptis brevipalpa	5001210102	5	1	3	9
Nephtys cornuta franciscana	500125010401	1	1		2
Nephtys punctata	5001250105	1		1	2
Nephtys ferruginea	5001250111	1	3		4
Glycera capitata	5001270101	1	1		2
Glycinde picta	5001280101			1	1
Goniada brunnea	5001280203		4		4
Onuphis iridescens	5001290103	2	1	3	6
Lumbrineris spp.	50013101			1	1
Lumbrineris californiensis	5001310132	1	1		2
Levinsenia gracilis	5001410801	1	5	2	8
Laonice cirrata	5001430201	1			1
Spiophanes berkelyorum	5001431004			1	1
Paraprionospio pinnata	5001431702	1	1		2
Chaetozone spinosa	5001500407		1	1	2
Cossura modica	5001520199	1			1
Brada sachalina	5001540199		6	1	7
Travisia pupa	5001580403	1		1	2
Sternaspis scutata	5001590101	1			1
Mediomastus spp.	50016004	1		2	3
Mediomastus californiensis	5001600402			2	2
Praxillella spp.	50016309			1	1
Praxillella gracilis	5001630901	1		3	4
Euclymeninae	5001631	1	6		7
Pectinaria californiensis	5001660304	3	6	7	16
Amphicteis mucronata	5001670306		1		1
Anobothrus gracilis	5001670701	1			1
Pista cristata	5001680701	4	1		5
Polycirrus spp.	50016808	1		1	2
Terebellides stroemi	5001690101	4	7	4	15
Natica clausa	5103760201		1	1	2
Turbonilla aurantia	5108011134			1	1
Turbonilla sp B	510801119998	6		5	11
Cylichna attonsa	5110040205	1		1	2
Melanochlamys dimedea	511006999999	1			1
Chaetodermatida	5402	2	4	2	8
Bivalvia	55		1		1
Nucula tenuis	5502020201	1		1	2
Yoldia scissurata	5502040504	2	3	1	6
Axinopsida serricata	5515020201	3	5	5	13
Clinocardium nuttali	5515220102			1	1
Macoma spp.	55153101	6		10	16
Macoma carlottensis	5515310112		13		13
Hiatella arctica	5517060201	1			1
Pandora filosa	5520020102	1	1	2	4
Dentalium spp	56010101	4		1	5
Euphilomedes producta	6111070303	8	12	7	27
Leucon spp.	61540401	1			1
Eudorella pacifica	6154040202	6	10	4	20
Eudorellopsis integra	6154040301	3	7		10
Diastylis alaskensis	6154050101		2		2
Gammaridea	6169			1	1
Corophium spp.	61691502	1			1
Phoxocephalidae	616942	2	2		4
Harpiniopsis sp	61694202	1		3	4

STATION 24 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Harpiniopsis fulgens	6169420204	1			1
Heterophoxus oculatus	6169420301	3	9	10	22
Mandibulophoxus gilesi	6169421201	3	1	2	6
Rhepoxynius spp	61694215			1	1
Crangonidae	617922			1	1
Amphipholus pugetanus	8129030201	1			1
Brisaster latifrons	8162040103		2		2
Molpadia intermedia	8179010101	1	4	2	7
					324
		94	130	100 Sum	
		2	4	3 Ave	
		3	11	5 Var	
		2	3	2 Sdv	
		1	1	1 Min	
		8	13	10 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 25

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43	1			1
Thalenessa spinosa	5001060601		1		1
Eteone californica	5001130201		2		2
Eulalia (Eumida) sanguinea	5001131101		1		1
Syllidae	500123		1		1
Nereis procera	5001240404			1	1
Nephtys caecoides	5001250119		1	1	2
Glycinde armigera	5001280103			2	2
Onuphidae	500129	3		1	4
Onuphis iridescens	5001290103	1	3	3	7
Diopatra ornata	5001290202			1	1
Scoloplos armiger	5001400301			16	16
Polydora cardalia	5001430431			1	1
Prionospio steenstrupi	5001430506	3	3	4	10
Spio butleri	5001430708	1	1		2
Spiophanes bombyx	5001431001	48	106	70	224
Phyllochaetopterus prolifica	5001490202	1			1
Spiochaetopterus costarum	5001490302		1		1
Cirratulus cirratus	5001500101			1	1
Chaetozone spinosa	5001500407	2	1	2	5
Ophelina acuminata	5001580607	1			1
Capitella capitata	5001600101	1			1
Heteromastus filiformis	5001600201	1	1		2
Notomastus lineatus	5001600303	1			1
Mediomastus spp.	50016004	1			1
Mediomastus californiensis	5001600402	1	1	2	4
Maldanidae	500163	2			2
Axiothella rubrocincta	5001630802	1			1
Euclymene zonalis	5001631103	2	5	3	10
Owenia fusiformis	5001640102			2	2
Polycirrus californicus	5001680810	4	4	1	9
Gastropoda	51	1			1
Solariella varicosa	5102100403	4	6	8	18
Rissoidae	510320			2	2
Melanella micrans	5103530102	1		1	2
Polinices pallida	5103760402	3		2	5
Mitrella tuberosa	5105030202	1	1	2	4
Nassarius mendicus	5105080101		2		2
Olivella baetica	5105100102		2	1	3
Turbonilla aurantia	5108011134	1			1
Turbonilla sp B	510801119998	1			1
Nucula tenuis	5502020201		1		1
Megacrenella columbiana	5507010301	1		2	3
Parvilucina tenuisculpta	5515010101			1	1
Axinopsida serricata	5515020201	3	1	5	9
Mysella tumida	5515100102	22	11	32	65
Clinocardium nuttali	5515220102		1	1	2
Spisula falcata	5515250104	1	1		2
Macoma yoldiformis	5515310111			2	2
Tellina nuculoides	5515310202	5	10	2	17
Tellina modesta	5515310204	3	1	17	21
Psephidia lordi	5515470501	23	17	47	87
Mya arenaria	5517010201	1			1
Lyonsia californica	5520050202	2			2
Cylindroleberididae	611103	1	3	4	8
Euphilomedes carcharodonta	6111070301	125	37	133	295
Nebalia spp.	61450101	2			2
Eudorella pacifica	6154040202		1		1
Leptochelia dubia	6157020103			1	1
Ampelisca spp	61690201		2		2

STATION 25 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Ampelisca brevisimulata	6169020125	1			1
Corophium crassicorne	6169150203	2			2
Protomedeia articulata	6169260307			5	5
Anonyx lilljeborgi	6169340303	1	4	3	8
Cyphocaris challengeri	6169341101		1		1
Synchelidium spp.	61693714			1	1
Rhepoxynius spp.	61694215	1			1
Rhepoxynius abronius	6169421504	10	8	38	56
Pinnixa spp	61890604	7	2	1	10
Phoronida	77	2			2
Amphiodia spp.	81290301		2	1	3
Amphiodia urtica/periercta complex	812903019999	2	1	1	4
Amphipholus pugetanus	8129030201			1	1
					974
		302	247	425 Sum	
		7	7	10 Ave	
		383	316	565 Var	
		20	18	24 Sdv	
		1	1	1 Min	
		125	106	133 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 26

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43	1	3		4
Hesperonoe complanata	5001021701			1	1
Pholoe minuta	5001060101	7	12	6	25
Eteone longa	5001130205	1			1
Pionosyllis sp. 1	500123029989		3		3
Odontosyllis phosphorea	5001231303		1		1
Nephtys cornuta franciscana	500125010401	7	6	6	19
Nephtys rickettsi	5001250106	1	2	2	5
Nephtys ferruginea	5001250111	10	8	16	34
Glycera capitata	5001270101	1	6	5	12
Glycinde picta	5001280101	2	4	3	9
Goniada maculata	5001280202	1			1
Onuphidae	500129	1			1
Onuphis iridescens	5001290103			2	2
Lumbrineris spp.	50013101		2		2
Lumbrineris bicirrata	5001310101		1	1	2
Lumbrineris luti	5001310109			11	11
Leitoscoloplos pugettensis	5001400102			1	1
Levinsenia gracilis	5001410801		1		1
Acesta lopezi	5001411302	1			1
Prionospio steenstrupi	5001430506	7	21	6	34
Spiophanes bombyx	5001431001			1	1
Caulleriella alata	5001500202		1		1
Tharyx multifilis	5001500302	1	2		3
Tharyx secundus	5001500309			2	2
Chaetozone setosa	5001500401	2	2	1	5
Cossura longocirrata	5001520101	1	1		2
Pherusa plumosa	5001540302		1		1
Heteromastus filiformis	5001600201			1	1
Heteromastus filobranchus	5001600203	1			1
Notomastus tenuis	5001600302	3	4	9	16
Mediomastus ambiseta	5001600401	5	4	5	14
Decamastus gracilis	5001600501	2	1	1	4
Barantolla americana	5001600601		1		1
Maldanidae	500163	4	2	3	9
Maldane glebifex	5001630302	2	6	14	22
Nicomache personata	5001630502		1		1
Petaloproctus tenuis borealis	500163070101			1	1
Praxillella spp.	50016309			2	2
Euclymeninae	5001631		6	2	8
Euclymene zonalis	5001631103	8	10	9	27
Owenia fusiformis	5001640102	1	2		3
Galathowenia nr. G. oculata	5001640202	1			1
Pectinaria granulata	5001660303		1	1	2
Pectinaria californiensis	5001660304	15	22	18	55
Ampharetidae	500167		1		1
Ampharete acutifrons	5001670208	7	9	8	24
Pista brevibranchiata	5001680710		1		1
Polycirrus spp.	50016808	1	1	2	4
Artacama coniferi	5001681101	1			1
Chone duneri	5001700104			1	1
Oligochaeta	5004		1		1
Gastropoda	51	1			1
Natica clausa	5103760201	1		3	4
Polinices pallida	5103760402		1		1
Amphissa sp. A	510503019999	1			1
Mitrella tuberosa	5105030202	2	1	1	4
Turridae	51060200			1	1
Odostomia sp. A	510801019939	1	1	2	4
Turbonilla sp. B	510801119998	12	1	18	31

STATION 26. (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Cephalaspidea	5110	1			1
Cylichna attonsa	5110040205	6	6	8	20
Melanochlamys dimedea	511006999999		1		1
Diaphana sp.	5110090102		1	1	2
Bivalvia	55		1		1
Acila castrensis	5502020101	2			2
Nucula tenuis	5502020201			1	1
Nuculana minuta	5502040202		1		1
Yoldia scissurata	5502040504	1		1	2
Yoldia thraciaeformis	5502040507	2			2
Megacrenella columbiana	5507010301		1		1
Parvilucina tenuisculpta	5515010101	13	7	9	29
Lucinoma acutilineata	5515010201	2	2		4
Axinopsida serricata	5515020201	6	1	7	14
Mysella tumida	5515100102	4	4	3	11
Clinocardium nuttali	5515220102		2	1	3
Nemocardium centifilosum	5515220301		1		1
Macoma spp.	55153101		10	40	50
Macoma elimata	5515310102		1	4	5
Macoma carlottensis	5515310112	84	49	7	140
Tellina modesta	5515310204	1	2		3
Compsomyax subdiaphana	5515470301	1			1
Mya arenaria	5517010201	1			1
Hiatella arctica	5517060201		2		2
Entodesma saxicolum	5520050101		4		4
Lyonsia californica	5520050202	1		1	2
Cylindroleberididae	611103	6	11	5	22
Euphilomedes producta	6111070303	44	54	42	140
Mysidacea	6151		1		1
Eudorella pacifica	6154040202	8	6	5	19
Diastylis alaskensis	6154050101	3	2	3	8
Leptognathia sp.	61570901	4	5	4	13
Ampelisca spp.	61690201		1		1
Melita desdichada	6169211008		1		1
Photis spp.	61692602	1	1	2	4
Protomedeia spp.	61692603			2	2
Anonyx sp.	61693403			25	25
Anonyx lilljeborgi	6169340303	2	1	2	5
Cyphocaris challengeri	6169341101			1	1
Orchomene pacifica	6169342903	36	31		67
Synchelidium rectipalmum	6169371403			2	2
Westwoodilla caecula	6169371502	6	1	2	9
Heterophoxus oculatus	6169420301			1	1
Rhepoxynius abronius	6169421504	4	18	7	29
Pleusymtes sp.	61694305			4	4
Hyperoche medusarum	6170010702	1			1
Parapasiphae sp.	61790503	1			1
Callianassa spp.	61830402			1	1
Oregonia spp.	61870101		1		1
Pinnixa spp.	61890604			3	3
Amphiodia spp.	81290301		1		1
Amphiodia urtica/periercta complex	812903019999	1	1		2
Holothuroidea	8170			1	1
					1102
		355	386	361 Sum	
		6	5	6 Ave	
		156	90	63 Var	
		12	9	8 Sdv	
		1	1	1 Min	
		84	54	42 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 27

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Anthozoa sp. 1	374000009999		1		1
Turbellaria	3901	1	1		2
Nemertea	43	16	21	5	42
Lepidonotus squamatus	5001021103	2	2		4
Pholoides aspera	5001040101	9	12	9	30
Sthenelais berkeleyi	5001060301		3	2	5
Phyllodoce (Anaitides) groenlandica	5001130102	1			1
Eteone spilotus	5001130299	3			3
Eulalia viridis	5001130301		4		4
Eulalia (Eumida) bilineata	5001130308		1	1	2
Notophyllum tectum	5001130403	1			1
Eulalia (Eumida) sanguinea	5001131101	8	12	9	29
Ophiodromus pugettensis	5001210401	4	4		8
Exgone gemmifera	5001230702	8	1		9
Exogone lourei	5001230703		1		1
Exogone verugera	5001230706			7	7
Sphaerosyllis brandhorsti	5001230806		1		1
Odontosyllis phosphorea	5001231303	5	11	8	24
Ehlersia heterochaeta	5001232201	3	1		4
Platynereis bicanaliculata	5001240501	6	8	6	20
Nephtys caeca	5001250103		1		1
Nephtys ferruginea	5001250111	4	2	1	7
Nephtys caecoides	5001250119			5	5
Glycera capitata	5001270101	1	1	1	3
Glycinde picta	5001280101	2	2	1	5
Glycinde armigera	5001280103			1	1
Onuphidae	500129		2	1	3
Onuphis iridescens	5001290103	1	5	3	9
Diopatra ornata	5001290202	9	8	8	25
Lumbrineris spp.	50013101	3	1		4
Lumbrineris cruzensis	5001310118			6	6
Lumbrineris californiensis	5001310132		6	11	17
Dorvillea pseudorubrovittata	5001360101	5	4	6	15
Scoloplos armiger	5001400301	3			3
Aricidea minuta	5001410220		1		1
Acesta lopezi	5001411302	2			2
Laonice cirrata	5001430201	2			2
Polydora socialis	5001430402		3		3
Polydora armata	5001430419	1	1		2
Prionospio steenstrupi	5001430506	8	4	6	18
Prionospio lighti	5001430521	3	4	1	8
Spiophanes bombyx	5001431001		1	2	3
Phyllochaetopterus prolifica	5001490202	35	74	69	178
Spiochaetopterus costarum	5001490302	1	1	1	3
Cirratulidae	500150		2		2
Caulleriella alata	5001500202			1	1
Tharyx multifilis	5001500302	1			1
Tharyx secundus	5001500309	1			1
Chaetozone setosa	5001500401	2	1		3
Chaetozone spinosa	5001500407	5	4	1	10
Notomastus tenuis	5001600302			3	3
Notomastus lineatus	5001600303	11	10	3	24
Mediomastus californiensis	5001600402	5	8	8	21
Euclymene zonalis	5001631103	2	1		3
Isocirrus longiceps	5001632001		1		1
Sabellaria cementarium	5001650201		7		7
Pectinaria granulata	5001660303	15	35	11	61
Asabellides lineata	5001670804		1		1
Terebellidae	500168	1		1	2

STATION 27 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Pista cristata	5001680701	2	3		5
Pista elongata	5001680703	1	1		2
Polycirrus spp.	50016808			1	1
Polycirrus californicus	5001680810	10	9	5	24
Amphitritinae	5001681	1	1		2
Scionella estevanica	5001681803			6	6
Streblosoma bairdi	5001682502	2			2
Artacamella hancocki	5001690201			1	1
Myxicola infundibulum	5001700502		1		1
Pseudochitinopoma occidentalis	5001730101	2			2
Trochidae	510210	1		1	2
Rissoidae	510320	1		5	6
Crepidula sp. A	510364029999	1			1
Natica clausa	5103760201			2	2
Polinices pallida	5103760402	2			2
Mitrella tuberosa	5105030202		3		3
Nassarius mendicus	5105080101	1			1
Olivella baetica	5105100102	1			1
Odostomia sp. B	510801019938	1			1
Odostomia sp. A	510801019939			1	1
Turbonilla aurantia	5108011134	1			1
Turbonilla sp B	510801119998	21	10	13	44
Melanochlamys dimedea	511006999999			1	1
Bivalvia	55		1	3	4
Nuculana minuta	5502040202	1	1	1	3
Mytilidae	550701	6		4	10
Megacrenella columbiana	5507010301	14	1	11	26
Musculus spp.	55070104	1			1
Modiolus spp.	55070106		1		1
Chlamys hastata	5509050101	8	2	3	13
Parvilucina tenuisculpta	5515010101	3	1	4	8
Axinopsida serricata	5515020201	6	14	4	24
Mysella tumida	5515100102	1	1	4	6
Clinocardium nuttali	5515220102	3	3		6
Nemocardium centifilosum	5515220301		1	1	2
Macoma spp.	55153101		1	1	2
Macoma calcarea	5515310101	4	1	1	6
Macoma obliqua	5515310106		1	1	2
Macoma yoldiformis	5515310111	3	3	6	12
Macoma nasuta	5515310114			1	1
Tellina modesta	5515310204			1	1
Compsomyax subdiaphana	5515470301		1	1	2
Psephidia lordi	5515470501	25	4	19	48
Mya arenaria	5517010201	5	4	3	12
Hiatella arctica	5517060201	1	4	4	9
Lyonsia californica	5520050202	6	5	4	15
Cardiomya californica	5520100108	1	3		4
Pycnogonum sp.	60010801		1		1
Cylindroleberididae	611103	2	2	2	6
Rutiderma lomae	6111060103	3		1	4
Euphilomedes carcharodonta	6111070301	165	234	299	698
Campylaspis spp.	61540701		2		2
Campylaspis hartae	6154070105	1		1	2
Leptochelia dubia	6157020103			2	2
Leptognathia gracilis	6157020202	3		1	4
Leptognathia sp.	61570901		6		6
Eudorellopsis sp	61640403		1		1
Ampelisca spp.	61690201	3	5	2	10
Ampelisca lobata	6169020134			1	1
Byblis millsi	6169020208	12	5	6	23

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 27 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Corophium spp.	61691502	1	1		2
Rhachotropis sp.	61692013		3	1	4
Protomedeia spp.	61692603		2	1	3
Gammaropsis thompsoni	6169260401	2	1	1	4
Hippomedon coecus	6169341411	1	20		21
Lysianassa holmesi	6169342206	2		1	3
Orchomene pacifica	6169342903			1	1
Synchelidium shoemakeri	6169371402	2		1	3
Westwoodilla caecula	6169371502		1		1
Heterophoxus oculatus	6169420301	3	4	2	9
Metaphoxus frequens	6169420601	1		3	4
Eyakia robustus	6169420918	2			2
Rhepoxynius abronius	6169421504	7	2	6	15
Caridea	6179	1			1
Pagurus spp.	61830602	1			1
Cancer gracilis	6188030105	1			1
Pinnixa spp.	61890604	2	1		3
Crossaster sp.	81130101		1		1
Ophiuroida	8120		8		8
Ophiura sarsii	8127010610			1	1
Ophiura lutkeni	8127010607	1			1
Amphipholus pugetanus	8129030201	2		3	5
Amphipholus squamata	8129030202			1	1
Cucumaria spp.	81720601		1		1
Cucumaria piperata	8172060111		1		1
Pentamera spp	81720603		2		2
Pentamera trachyplaca	8172060399		4	1	5
Pentamera sp. 1	817206039989		3		3
Ascidiacea	8401	1	5	6	12
					1872
		545	672	655 Sum	
		6	7	8 Ave	
		311	618	1083 Var	
		18	25	33 Sdv	
		1	1	1 Min	
		165	234	299 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 28

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Turbellaria	3901		2		2
Nemertea	43	5	15	8	28
Polynoidae	500102			1	1
Gattyana cirrosa	5001020603	1		1	2
Harmothoe extenuata	5001020803			2	2
Harmothoe imbricata	5001020806		1		1
Harmothoe lunulata	5001020810	1	3	1	5
Pholoides aspera	5001040101	4	7	4	15
Pholoe minuta	5001060101			2	2
Sthenelais berkeleyi	5001060301		1	1	2
Phyllodoce (Anaitides) groenlandica	5001130102			1	1
Phyllodoce (Anaitides) maculata	5001130106			1	1
Eteone longa	5001130205	1			1
Eulalia (Eumida) bilineata	5001130308	1	1		2
Eulalia (Eumida) sanguinea	5001131101	3	12	4	19
Gyptis brevipalpa	5001210102	1			1
Ophiodromus pugettensis	5001210401	1	3		4
Autolytus cornutus	5001230101	2			2
Pionosyllis uraga	5001230204	1			1
Eusyllis assimilis	5001230601		2		2
Exgone gemmifera	5001230702		1	2	3
Odontosyllis phosphorea	5001231303	2	6	3	11
Ehlersia heterochaeta	5001232201	1	4	2	7
Nephtys spp.	50012501		1	2	3
Nephtys cornuta franciscana	500125010401		3		3
Nephtys longosetosa	5001250109			3	3
Nephtys ferruginea	5001250111	5		4	9
Glycera sp. 1	500127019999	1			1
Glycinde picta	5001280101	3	2		5
Goniada brunnea	5001280203			2	2
Onuphidae	500129			15	15
Onuphis iridescens	5001290103	4	5	4	13
Diopatra ornata	5001290202		2	8	10
Lumbrineris spp.	50013101	1	5	1	7
Lumbrineris californiensis	5001310132	14	8	6	28
Notocirrus californiensis	5001330302			1	1
Dorvillea pseudorubrovittata	5001360101	2	3		5
Leitoscoloplos pugettensis	5001400102	1			1
Orbinia (Phylo) felix	5001400510			1	1
Acesta lopezi	5001411302		2	3	5
Laonice pugettensis	5001430204	1			1
Polydora giardi	5001430401			1	1
Polydora socialis	5001430402	2	2	2	6
Polydora pygidialis	5001430417		1		1
Polydora armata	5001430419		2	1	3
Prionospio steenstrupi	5001430506	16	8	8	32
Prionospio lighti	5001430521	1		1	2
Spio filicornis	5001430701	1			1
Spiophanes bombyx	5001431001	1	2		3
Spiophanes berkelyorum	5001431004	1			1
Magelona longicornis	5001440105			2	2
Phyllochaetopterus prolifica	5001490202	91	368	129	588
Spiochaetopterus costarum	5001490302	3		1	4
Cirratulus cirratus	5001500101	1			1
Caulleriella alata	5001500202			1	1
Tharyx multifilis	5001500302		1	2	3
Tharyx secundus	5001500309	2			2
Chaetozone setosa	5001500401			2	2
Chaetozone spinosa	5001500407	6	4	1	11
Pherusa plumosa	5001540302		2	1	3

STATION 28 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Ophelina acuminata	5001580607	1	2	1	4
Notomastus tenuis	5001600302			5	5
Notomastus lineatus	5001600303	5	3	3	11
Mediomastus californiensis	5001600402	6	1	1	8
Euclymene zonalis	5001631103	1			1
Clymenura columbiana	5001631206			2	2
Isocirrus longiceps	5001632001			1	1
Idanthyrsus ornamentatus	5001650101		1		1
Sabellaria cementarium	5001650201	1	3	1	5
Pectinaria granulata	5001660303	6	4	9	19
Pectinaria californiensis	5001660304	1		1	2
Ampharete spp.	50016702		1	1	2
Ampharete acutifrons	5001670208	1			1
Ariobothrus gracilis	5001670701	3			3
Terebellidae	500168	1		2	3
Nicolea zostericola	5001680601	4			4
Pista cristata	5001680701	1	1	2	4
Pista elongata	5001680703	1			1
Polycirrus californicus	5001680810	22	16	20	58
Streblosoma bairdi	5001682502		2	1	3
Terebellides stroemi	5001690101	2	3		5
Sabellidae	500170			2	2
Potamilla neglecta	5001700601	1			1
Pseudochitinopoma occidentalis	5001730101		2		2
Spirorbis spirillum	5001730602	5	29		34
Spirorbidae	500178			32	32
Margarites pupillus	5102100308	1			1
Solariella varicosa	5102100403		1		1
Rissoidae	510320	7	6	6	19
Petaloconchus spp.	51033505		1		1
Bittium spp.	51034601	2			2
Melanella micrans	5103530102			1	1
Crepipatella lingulata	5103640301	8	12	7	27
Natica clausa	5103760201	1			1
Mitrella tuberosa	5105030202		1		1
Odostomia sp. B	510801019938		1	1	2
Turbonilla aurantia	5108011134	1		1	2
Turbonilla sp. B	510801119998	10	10	10	30
Nudibranchia	5127		2		2
Polyplacophora	53		1		1
Bivalvia	55		1		1
Acila castrensis	5502020101			1	1
Nucula tenuis	5502020201	1	2		3
Nuculana minuta	5502040202	4	1	3	8
Megacrenella columbiana	5507010301	4			4
Chlamys hastata	5509050101	5	18	2	25
Parvilucina tenuisculpta	5515010101	1	1	2	4
Lucinoma acutilineata	5515010201		2		2
Adontorhina cyclica	5515020102			1	1
Axinopsida serricata	5515020201	11	7	4	22
Neaermya compressa	5515090101		1		1
Mysella tumida	5515100102	2	1	2	5
Clinocardium nuttali	5515220102		2	2	4
Nemocardium centifilosum	5515220301		1	2	3
Macoma spp.	55153101	1		7	8
Macoma calcarea	5515310101	4		4	8
Macoma elimata	5515310102	1	6		7
Macoma yoldiformis	5515310111	3	1		4
Macoma carlottensis	5515310112	5	3	3	11
Psephidia lordi	5515470501	34	25	41	100

STATION 28 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Protothaca spp	55154707		1		1
Mya arenaria	5517010201		10	6	16
Hiatella arctica	5517060201		2		2
Panopea generosa	5517060401			1	1
Lyonsia californica	5520050202			2	2
Cardiomya californica	5520100108			1	1
Rutiderma lomae	6111060103		1	1	2
Euphilomedes carcharodonta	6111070301	36	64	52	152
Cirripedia sp.	6130			1	1
Eudorella pacifica	6154040202			2	2
Campylaspis spp.	61540701		1	2	3
Leptochelia dubia	6157020103		3		3
Haliophasma geminata	6160011601	2		1	3
Ampelisca spp.	61690201	7	2	8	17
Ampelisca agassizi	6169020111	2			2
Ampelisca lobata	6169020134			2	2
Ampelisca careyi	6169020135		2		2
Byblis millsi	6169020208	4	2	12	18
Gammaropsis thompsoni	6169260401			1	1
Hippomedon spp.	61693414		4		4
Heterophoxus oculatus	6169420301	2	8	8	18
Eyakia robustus	6169420918	1			1
Rhepoxynius abronius	6169421504	4	6	7	17
Pleustes platypa	6169430409			1	1
Caprellidae	617101			2	2
Eualus lineatus	6179160416	6	2		8
Mesocrangon munitella	6179220115	1	1		2
Callianassa spp.	61830402	1			1
Pagurus spp.	61830602	2			2
Oregonia spp.	61870101	2	1	1	4
Cancer productus	6188030101	1			1
Lophopanopeus bellus	6189020101		1		1
Pinnixa spp.	61890604	6	1	3	10
Golfingia spp.	72000201		1	1	2
Brachiopoda	80		1		1
Amphipholus spp.	81290302		3		3
Amphipholus pugetanus	8129030201	1			1
Amphipholus squamata	8129030202		3		3
Pentamera pseudocalcigera	8172060301			1	1
Pentamera lissoplaca	8172060303			1	1
Pentamera sp. 1	817206039989			1	1
Leptosynapta transgressor	8178010299		1		1
Ascidiacea	8401		3	1	4
Ascidia spp.	84040501		2		2
					1745
		427	780	538 Sum	
		5	8	5 Ave	
		122	1468	212 Var	
		11	38	15 Sdv	
		1	1	1 Min	
		91	368	129 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 29

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43	3	2		5
Harmothoe lunulata	5001020810	2	2	2	6
Hesperonoe complanata	5001021701			1	1
Pholoe minuta	5001060101		2		2
Steggoa sp. 1	500113169999		1	1	2
Gyptis brevipalpa	5001210102		1	1	2
Sigambra bassi	5001220204	1			1
Nephtys cornuta franciscana	500125010401	2	1	5	8
Nephtys punctata	5001250105	1			1
Nephtys longosetosa	5001250109		1		1
Nephtys ferruginea	5001250111			1	1
Glycera capitata	5001270101		3	2	5
Glycinde armigera	5001280103			1	1
Goniada maculata	5001280202			3	3
Onuphis iridescens	5001290103		1	2	3
Levinsenia gracilis	5001410801	4	5	4	13
Acesta lopezi	5001411302		1		1
Prionospio lighti	5001430521		1	2	3
Spiophanes berkelyorum	5001431004	1			1
Tharyx multifilis	5001500302	1			1
Chaetozone spinosa	5001500407	1	3		4
Cossura modica	5001520199		1		1
Brada sachalina	5001540199			4	4
Travisia pupa	5001580403		1	1	2
Heteromastus filobranchus	5001600203	1	1		2
Mediomastus ambiseta	5001600401	1	2	3	6
Barantolla americana	5001600601	5	2	2	9
Praxillella spp	50016309	1	2		3
Euclymeninae	5001631	2			2
Pectinaria californiensis	5001660304	30	21	23	74
Ampharete acutifrons	5001670208	2	5	4	11
Pista brevibranchiata	5001680710		1		1
Odostomia sp. B	510801019938			3	3
Turbonilla sp. B	510801119998	4	4		8
Chaetodermatida	5402			1	1
Acila castrensis	5502020101			1	1
Nucula tenuis	5502020201		1	2	3
Yoldia scissurata	5502040504		2		2
Yoldia thraciaeformis	5502040507		1	1	2
Parvilucina tenuisculpta	5515010101			2	2
Lucinoma acutilineata	5515010201		2		2
Axinopsida serricata	5515020201		6	1	7
Clinocardium nuttali	5515220102			1	1
Macoma carlottensis	5515310112	3	43	51	97
Pandora filosa	5520020102			1	1
Cylindroleberididae	611103		1		1
Euphilomedes producta	6111070303	3	24	37	64
Leucon spp.	61540401		2	1	3
Eudorella pacifica	6154040202	2	24	15	41
Eudorellopsis integra	6154040301		1		1
Diastylis alaskensis	6154050101		3	1	4
Melita desdichada	6169211008	1	2	1	4
Cyphocaris challengeri	6169341101		1		1
Hippomedon coecus	6169341411		1		1
Heterophoxus oculatus	6169420301		3	2	5
Paraphoxus oculatus	6169420925		14	2	16
Rhepoxynius abronius	6169421504		1		1

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 29 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Pinnixa spp	61890604			2	2
Nellobia eusoma	7301011401	1		2	3
Brisaster latifrons	8162040103	1	1	1	3
Molpadia intermedia	8179010101	2		2	4
					464
		75	197	192 Sum	
		3	5	5 Ave	
		33	69	101 Var	
		6	8	10 Sdv	
		1	1	1 Min	
		30	43	51 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 30

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Turbellaria	3901	1		2	3
Nemertea	43	3	2	1	6
Harmothoe lunulata	5001020810			1	1
Lepidasthenia berkeleyae	5001021801	2		1	3
Pholoe minuta	5001060101	4	2	3	9
Eteone spp.	50011302			2	2
Eteone longa	5001130205		1		1
Eteone spilotus	5001130299	4			4
Phyllodoce (Aponaitides) hartmanae	5001131402	1			1
Gyptis brevipalpa	5001210102	2		1	3
Pilargis berkeleyi	5001220301			1	1
Ehlersia heterochaeta	5001232201	5	3	3	11
Nephtys cornuta franciscana	500125010401	6	10	6	22
Nephtys ferruginea	5001250111	8	2	2	12
Nephtys caecoides	5001250119	1			1
Glycera capitata	5001270101		1	1	2
Glycinde picta	5001280101	5	10	3	18
Lumbrineris spp.	50013101	1		1	2
Lumbrineris luti	5001310109	10	8	12	30
Scoloplos acmeceps	5001400311		1		1
Orbinia spp.	50014005		1		1
Polydora spp.	50014304			1	1
Polydora brachycephala	5001430429	1	5	2	8
Prionospio steenstrupi	5001430506		2		2
Prionospio lighti	5001430521	9	1	2	12
Paraprionospio pinnata	5001431702		2	2	4
Spiochaetopterus costarum	5001490302	1		1	2
Tharyx multifilis	5001500302	538	423	176	1137
Armandia brevis	5001580202		1		1
Capitella capitata	5001600101	2			2
Heteromastus filobranchus	5001600203			3	3
Notomastus lineatus	5001600303	37	6	1	44
Mediomastus ambiseta	5001600401			2	2
Mediomastus californiensis	5001600402	79	9	10	98
Praxillella spp.	50016309	2			2
Praxillella affinis pacifica	500163090301			1	1
Euclymeninae	5001631			2	2
Euclymene zonalis	5001631103	3	1	3	7
Pectinaria californiensis	5001660304	12	12	9	33
Amage anops	5001670101	1			1
Polycirrus californicus	5001680810	3	2	1	6
Amphitritinae	5001681		1		1
Streblosoma bairdi	5001682502	1			1
Terebellides stroemi	5001690101			1	1
Sabellidae	500170			1	1
Odostomia sp. A	510801019939	3		R	3
Turbonilla aurantia	5108011134	18	23	R	41
Turbonilla sp. A	510801119999			R	0
Nudibranchia	5127			R	0
Bivalvia	55	2		R	2
Acila castrensis	5502020101		3	R	3
Nucula tenuis	5502020201	1	1	R	2
Parvilucina tenuisculpta	5515010101	2	12	R	14
Lucinoma acutilineata	5515010201		4	R	4
Axinopsida serricata	5515020201	50	43	R	93
Mysella tumida	5515100102	13	5	R	18
Macoma spp.	55153101	2	6	R	8
Macoma carlottensis	5515310112		21	R	21
Compsomyax subdiaphana	5515470301	1		R	1
Psephidia lordi	5515470501	1	3	R	4

STATION 30 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Lyonsia californica	5520050202		1	R	1
Cylindroleberididae	611103	1		1	2
Euphilomedes carcharodonta	6111070301	40	46	28	114
Euphilomedes producta	6111070303	1			1
Eudorella pacifica	6154040202	1	81	50	132
Ampelisca sp. A	616902019989	1			1
Byblis millsi	6169020208		2		2
Aoroides spp.	61690602		2		2
Melita desdichada	6169211008	1			1
Isaeidae	616926			1	1
Photis brevipes	6169260201		1		1
Protomedeia prudens	6169260312	1			1
Hippomedon spp.	61693414	1			1
Heterophoxus oculatus	6169420301	1			1
Eobrolgus spinosus	6169420928	2			2
Dyopedos spp.	61694499		2		2
Caprella sp.	61710107		1		1
Crangon alaskensis	6179220102	2			2
Callianassa spp.	61830402		1		1
Cancer gracilis	6188030105			2	2
Pinnixa spp	61890604	76	14	22	112
Amphiuridae	812903	3		1	4
Amphiodia spp.	81290301	3	3	3	9
Amphiodia urtica/periercta complex	812903019999	9	1	2	12
					2128
		978	782	368 Sum	
		19	17	6 Ave	
		5572	3953	576 Var	
		75	63	24 Sdv	
		1	1	0 Min	
		538	423	176 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 31

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Anthozoa sp 2	374000009998			1	1
Anthozoa sp 1	374000009999		2		2
Nemertea	43	12	14	21	47
Polynoidae	500102		1		1
Harmothoe lunulata	5001020810			2	2
Lepidonotus squamatus	5001021103			2	2
Lepidasthenia longicirrata	5001021805			1	1
Pholoides aspera	5001040101			4	4
Sthenelais berkeleyi	5001060301		1	2	3
Phyllodoce (Anaitides) groenlandica	5001130102			2	2
Eteone longa	5001130205		1		1
Eteone spilotus	5001130299		1	2	3
Eulalia (Eulalia) spp.	50011303	1			1
Eulalia (Eumida) bilineata	5001130308		6		6
Eulalia (Eumida) sanguinea	5001131101	18	10	18	46
Gyptis brevipalpa	5001210102		2		2
Ophiodromus pugettensis	5001210401	1	6	3	10
Micropodarke dubia	5001210801	3			3
Syllidae	500123	1			1
Exgone gemmifera	5001230702		2	5	7
Exogone lourei	5001230703	1			1
Exogone verugera	5001230706	2			2
Odontosyllis phosphorea	5001231303	12	6	29	47
Ehlersia heterochaeta	5001232201		3	2	5
Platynereis bicanaliculata	5001240501		2	2	4
Nephtys spp.	50012501		1		1
Nephtys ferruginea	5001250111	3	3	11	17
Nephtys caecoides	5001250119	1			1
Glycera capitata	5001270101		1		1
Glycinde picta	5001280101	3	3	1	7
Onuphidae	500129	3		3	6
Onuphis iridescens	5001290103	1			1
Diopatra ornata	5001290202	2	5	6	13
Lumbrineris californiensis	5001310132	2	17	4	23
Dorvillea pseudorubrovittata	5001360101	1	1	2	4
Acesta lopezi	5001411302	2	1	2	5
Acmira catherinae	5001411306			1	1
Laonice cirrata	5001430201			1	1
Polydora armata	5001430419			2	2
Prionospio steenstrupi	5001430506	21	23	36	80
Prionispio lighti	5001430521		4	2	6
Magelona longicornis	5001440105		2		2
Phyllochaetopterus prolifica	5001490202	5	32	52	89
Spiochaetopterus costarum	5001490302	2	10	9	21
Cirratulidae	500150		1	5	6
Cirratulus cirratus	5001500101			7	7
Caulleriella alata	5001500202	1			1
Tharyx multifilis	5001500302	1		1	2
Tharyx secundus	5001500309	1	2		3
Chaetozone setosa	5001500401	4			4
Chaetozone spinosa	5001500407		9	5	14
Ophelina breviata	5001580604	1			1
Notomastus tenuis	5001600302	1			1
Notomastus lineatus	5001600303	2	4	4	10
Mediomastus californiensis	5001600402	3		3	6
Praxillella spp.	50016309	1			1
Euclymeninae	5001631	1			1
Euclymene zonalis	5001631103		4	1	5
Owenia fusiformis	5001640102			1	1
Pectinaria granulata	5001660303	2	4	10	16

STATION 31 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Ampharetidae	500167			2	2
Ampharete acutifrons	5001670208	1		1	2
Anobothrus gracilis	5001670701		1		1
Schistocomus hiltoni	5001672501		1		1
Terebellidae	500168		2	1	3
Pista cristata	5001680701		1	5	6
Pista elongata	5001680703	1			1
Polycirrus spp.	50016808	4			4
Polycirrus californicus	5001680810	3	8	13	24
Scionella estevanica	5001681803	2			2
Streblosoma bairdi	5001682502	1	2	2	5
Terebellides stroemi	5001690101	1			1
Megalomma splendida	5001700401			1	1
Potamilla neglecta	5001700601		1		1
Potamilla occelata	5001700608			2	2
Pseudochitinopoma occidentalis	5001730101			1	1
Solariella varicosa	5102100403			1	1
Rissoida	510320		1	3	4
Melanella micrans	5103530102	4	2	19	25
Crepipatella lingulata	5103640301			3	3
Polinices pallida	5103760402	1			1
Mitrella tuberosa	5105030202	2			2
Olivella baetica	5105100102	1	2		3
Turbonilla sp. B	510801119998	2	2	1	5
Chaetodermatida	5402			1	1
Bivalvia	55	1			1
Acila castrensis	5502020101		2	3	5
Mytilidae	550701			3	3
Megacrenella columbiana	5507010301	2	1		3
Modiolus spp.	55070106		1	2	3
Chlamys hastata	5509050101			2	2
Parvilucina tenuisculpta	5515010101	3	3	4	10
Lucinoma acutilineata	5515010201		2	1	3
Adontorhina cyclica	5515020102			1	1
Axinopsida serricata	5515020201	4	1	3	8
Mysella tumida	5515100102	4	1	5	10
Solen sicarius	5515290201	1			1
Macoma spp	55153101	1			1
Macoma calcarea	5515310101		3	2	5
Macoma yoldiformis	5515310111	1	2		3
Tellina nuculoides	5515310202	1			1
Psephidia lordi	5515470501	2		2	4
Mya arenaria	5517010201		1		1
Hiatella arctica	5517060201	1		2	3
Lyonsia californica	5520050202	1	1	6	8
Cardiomya californica	5520100108	1			1
Cylindroleberididae	611103	1			1
Rutiderma lomae	6111060103			6	6
Euphilomedes carcharodonta	6111070301	71	59	142	272
Campylaspis spp.	61540701			1	1
Leptochelia dubia	6157020103		3		3
Eudorellopsis sp.	61640403	1	2	2	5
Gammaridea	6169		1		1
Ampelisca spp.	61690201	2	2		4
Byblis millsi	6169020208	4	5	9	18
Corophium spp.	61691502	1	1		2
Pontogeneia rostrata	6169201208	1			1
Melita spp.	61692110			7	7
Isaeidae	616926		2	1	3
Gammaropsis thompsoni	6169260401	3			3

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 31 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Lysianassidae	616934			2	2
Hippomedon spp.	61693414	10			10
Hippomedon coecus	6169341411	1	2	11	14
Synchelidium spp.	61693714	1		3	4
Westwoodilla caecula	6169371502	3	2	2	7
Heterophoxus oculatus	6169420301		1	5	6
Rhepoxynius abronius	6169421504	17	13	8	38
Dyopedos spp.	61694499			3	3
Stenothoidae	616948	1	1		2
Mesocrangon munitella	6179220115	1			1
Pinnixa spp.	61890604	1	1		2
Nellobia eusoma	7301011401			1	1
Ophiuroida	8120		3	5	8
Amphipholus pugetanus	8129030201	2			2
Holothuroidea	8170	1			1
Cucumaria spp	81720601			1	1
Cucumaria piperata	8172060111	2	2	4	8
Pentamera spp	81720603	1	1		2
Pentamera lissoplaca	8172060303	1	2	6	9
Pentamera trachyplaca	8172060399		1	10	11
Pentamera sp. 2	817206039988		1		1
Pentamera sp. 1	817206039989	2	7	1	10
Ascidiacea	8401	1			1
					1214
		290	337	587 Sum	
		4	4	7 Ave	
		72	66	272 Var	
		8	8	17 Sdv	
		1	1	1 Min	
		71	59	142 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 32

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Anthozoa	3740			2	2
Anthozoa sp. 1	374000009999		1		1
Turbellaria	3901		1		1
Nemertea	43	15	16	12	43
Gattyana cirrosa	5001020603	1		2	3
Harmothoe lunulata	5001020810		1	2	3
Lepidasthenia berkeleyae	5001021801			1	1
Pholoides aspera	5001040101	9	30	33	72
Pholoe minuta	5001060101	1	3	2	6
Sthenelais berkeleyi	5001060301	1			1
Sthenelais tertiaglabra	5001060305		1		1
Paleonotus bellis	5001080101	1	1		2
Phyllodoce (Anaitides) groenlandica	5001130102	1	1		2
Eteone longa	5001130205	1			1
Eteone spilotus	5001130299	2	1		3
Eulalia (Eumida) bilineata	5001130308		2	3	5
Eulalia (Eumida) sanguinea	5001131101	14	7	18	39
Gyptis brevipalpa	5001210102		1		1
Ophiodromus pugettensis	5001210401	2		1	3
Pionosyllis uraga	5001230204	2			2
Exgone gemmifera	5001230702	8	11	9	28
Exogone verugera	5001230706	11			11
Odontosyllis phosphorea	5001231303	10	6	3	19
Ehlersia heterochaeta	5001232201	3	4	1	8
Platynereis bicanaliculata	5001240501	3	1		4
Nephtys longosetosa	5001250109			1	1
Nephtys ferruginea	5001250111	2	7	6	15
Glycera capitata	5001270101		2	2	4
Glycinde picta	5001280101	5	3	3	11
Goniada spp.	50012802	1			1
Onuphidae	500129	3		1	4
Onuphis iridescens	5001290103	2	2	5	9
Diopatra ornata	5001290202	7	2	2	11
Lumbrineris spp.	50013101	2	6	4	12
Lumbrineris luti	5001310109	1			1
Lumbrineris californiensis	5001310132	27	27	23	77
Dorvillea pseudorubrovittata	5001360101	6	10	6	22
Leitoscoloplos pugettensis	5001400102			2	2
Scoloplos acmeceps	5001400311	1			1
Aricidea minuta	5001410220		1		1
Acesta lopezi	5001411302	2	2	2	6
Acmira catherinae	5001411306		1	1	2
Polydora socialis	5001430402		3	3	6
Polydora armata	5001430419		3	2	5
Polydora cardalia	5001430431	1			1
Polydora aggregata	5001430438	1			1
Prionospio steenstrupi	5001430506	46	59	33	138
Prionospio lighti	5001430521	2	10	1	13
Spio filicornis	5001430701	1	1		2
Magelona longicornis	5001440105	1	5	4	10
Phyllochaetopterus prolifica	5001490202	274	197	209	680
Spiochaetopterus costarum	5001490302		8	8	16
Mesochaetopterus taylori	5001490401	2			2
Cirratulus cirratus	5001500101		3		3
Tharyx spp.	50015003	2		4	6
Tharyx multifilis	5001500302	1	6	5	12
Tharyx tesselata	5001500308	1	1	1	3
Tharyx secundus	5001500309		3	2	5
Chaetozone setosa	5001500401			1	1
Chaetozone spinosa	5001500407	2	4	10	16

STATION 32 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Flabelligera affinis	5001540202		1		1
Ophelina acuminata	5001580607			2	2
Notomastus lineatus	5001600303	18	41	25	84
Mediomastus californiensis	5001600402	2	2	3	7
Maldanidae	500163			1	1
Nicomache personata	5001630502		18	26	44
Euclymene zonalis	5001631103			1	1
Owenia fusiformis	5001640102			1	1
Galathowenia nr. G. oculata	5001640202			1	1
Idanthyrsus ornamentatus	5001650101			1	1
Sabellaria cementarium	5001650201	1	1	1	3
Pectinaria granulata	5001660303	5	4	14	23
Ampharete arctica	5001670201			1	1
Ampharete acutifrons	5001670208			4	4
Melinna cristata	5001670501		1		1
Anobothrus gracilis	5001670701	3	4	3	10
Asabellides lineata	5001670804		1		1
Terebellidae	500168		1		1
Pista cristata	5001680701	12	5	11	28
Pista elongata	5001680703		1	5	6
Polycirrus californicus	5001680810	1	2	3	6
Amphitritinae	5001681	2			2
Lanassa venusta venusta	500168130201			1	1
Streblosoma bairdi	5001682502		2	3	5
Lanice conchilega	5001682701	1			1
Sabellidae	500170			1	1
Chone duneri	5001700104			1	1
Megalomma splendida	5001700401			2	2
Rissoidae	510320	1	1		2
Crepipatella lingulata	5103640301		3	2	5
Olivella baetica	5105100102			1	1
Turbonilla spp	51080102	1			1
Turbonilla aurantia	5108011134	1			1
Turbonilla sp. B	510801119998	2			2
Nudibranchia	5127			1	1
Bivalvia	55		1		1
Acila castrensis	5502020101			1	1
Nucula tenuis	5502020201	1			1
Mytilidae	550701	3			3
Megacrenella columbiana	5507010301	3	8	8	19
Musculus spp.	55070104	1	1		2
Modiolus spp.	55070106	1	1	4	6
Chlamys hastata	5509050101	6	2	2	10
Parvilucina tenuisculpta	5515010101	3		1	4
Adontorhina cyclica	5515020102		1	1	2
Axinopsida serricata	5515020201	11	1	1	13
Mysella tumida	5515100102		2		2
Nemocardium centifilosum	5515220301		2	6	8
Macoma spp.	55153101		2		2
Macoma calcarea	5515310101		2	5	7
Macoma elimata	5515310102		2		2
Macoma obliqua	5515310106			5	5
Macoma yoldiformis	5515310111	4	3	2	9
Macoma nasuta	5515310114	1	2		3
Psephidia lordi	5515470501		1		1
Mya arenaria	5517010201	2	1		3
Hiatella arctica	5517060201	5	1	4	10
Lyonsia californica	5520050202	3	2	1	6
Cardiomya californica	5520100108	4		1	5
Pycnogonida	60	1			1

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 32 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Ostracoda	6110		5		5
Rutiderma lomae	6111060103	3		5	8
Euphilomedes carcharodonta	6111070301	78	69	88	235
Calanoida	6118		1		1
Eudorella pacifica	6154040202	1		1	2
Campylaspis spp.	61540701		1		1
Haliophasma geminata	6160011601	2	3	7	12
Eudorellopsis sp	61640403		1		1
Gammaridea	6169		1		1
Ampelisca spp.	61690201		2		2
Ampelisca pugettica	6169020114			1	1
Ampelisca lobata	6169020134	3		4	7
Byblis millsi	6169020208	7	12	8	27
Corophium spp.	61691502	1			1
Ericthonius sp.	61691503		1		1
Hippomedon subrobustus	6169341413	2			2
Allogaussia sp.	61693499	1			1
Monoculodes spp.	61693708	1			1
Monocludes zernovi	6169370816	1	1		2
Westwoodilla caecula	6169371502	1		2	3
Heterophoxus oculatus	6169420301	7	2	4	13
Eyakia robustus	6169420918		1		1
Paraphoxus oculatus	6169420925	1			1
Rhepoxynius variatus	6169420926		1		1
Tritella pilimana	6171010602		2		2
Eualus pusiolus	6179160408		1		1
Mesocrangon munitella	6179220115		1		1
Callianassa spp.	61830402		1		1
Fabia subquadrata	6189060301			1	1
Pinnixa spp.	61890604	1	3	5	9
Arhynchite pugettensis	7301020105			1	1
Phoronida	77		2		2
Brachiopoda	80	2			2
Ophiura spp.	81270106		1		1
Ophiura lutkeni	8127010607	1			1
Amphipholus pugetanus	8129030201		5	6	11
Dendrochirotida	81720			3	3
Pentamera lissoplaca	8172060303	1		1	2
Pentamera trachyplaca	8172060399		1		1
Pentamera sp. 2	817206039988		1		1
Pentamera sp. 1	817206039989	4	3	2	9
Leptosynapta sp.	81780102		2	4	6
Ascidiacea	8401	1	1	2	4
Ascidia spp.	84040501		1		1
					2131
		696	703	732 Sum	
		8	7	8 Ave	
		904	460	539 Var	
		30	21	23 Sdv	
		1	1	1 Min	
		274	197	209 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 33

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Turbellaria	3901	1		1	2
Nemertea	43			4	4
Harmothoe lunulata	5001020810		1		1
Pholoides aspera	5001040101	1			1
Pholoe minuta	5001060101			1	1
Eteone longa	5001130205			1	1
Eteone spilotus	5001130299	3	1		4
Eulalia (Eumida) bilineata	5001130308	2		2	4
Eulalia (Eumida) sanguinea	5001131101	3			3
Phyllodoce (Aponaitides) hartmanae	5001131402		2	1	3
Gyptis brevipalpa	5001210102	1			1
Exogone lourei	5001230703		1	1	2
Ehlersia heterochaeta	5001232201	1	1		2
Platynereis bicanaliculata	5001240501	2	1		3
Nephtys cornuta franciscana	500125010401	5	6	2	13
Nephtys ferruginea	5001250111	6	2	4	12
Nephtys caecoides	5001250119			3	3
Sphaerodoropsis sphaerulifer	5001260103	1		4	5
Glycera capitata	5001270101	11	12	16	39
Glycinde picta	5001280101	2	3		5
Onuphidae	500129		1	1	2
Onuphis iridescens	5001290103	1	3	1	5
Diopatra ornata	5001290202		1	1	2
Lumbrineris spp	50013101		1	1	2
Lumbrineris latreilli	5001310104	1			1
Lumbrineris luti	5001310109	9	7	8	24
Lumbrineris cruzensis	5001310118			1	1
Lumbrineris californiensis	5001310132	4			4
Driloneris falcata minor	500133010402		1		1
Leitoscoloplos pugettensis	5001400102	4	7	8	19
Levinsenia gracilis	5001410801	1	2		3
Acesta lopezi	5001411302	2		3	5
Apistobranchus ornatus	5001420102	10	3	8	21
Laonice cirrata	5001430201			1	1
Prionospio steenstrupi	5001430506	139	148	96	383
Spio cirrifera	5001430703	1	1		2
Polydora (Boccardiella) hamata	5001430806			2	2
Spiophanes berkelyorum	5001431004	1		1	2
Paraprionospio pinnata	5001431702	4	1	6	11
Magelona longicornis	5001440105	7	6	7	20
Trochochaeta multisetosa	5001450102		1		1
Spiochaetopterus costarum	5001490302	2	4	1	7
Tharyx multifilis	5001500302	14	13	13	40
Tharyx tesselata	5001500308	1		2	3
Tharyx secundus	5001500309	5			5
Chaetozone setosa	5001500401	3	2	8	13
Cossura longocirrata	5001520101		1		1
Travisia brevis	5001580401		1		1
Notomastus tenuis	5001600302	44	43	31	118
Mediomastus californiensis	5001600402	6	5	2	13
Nicomache personata	5001630502	2			2
Rhodine bitorquata	5001631001			1	1
Euclymene zonalis	5001631103	3	6		9
Clymenura columbiana	5001631206			5	5
Oweniidae	500164		16		16
Myriochele heeri	5001640201			40	40
Pectinaria granulata	5001660303	29	32	4	65
Pectinaria californiensis	5001660304			29	29
Ampharetidae	500167			1	1
Amage anops	5001670101	1	1	2	4

STATION 33 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Anobothrus gracilis	5001670701	3	1	1	5
Pista cristata	5001680701	1	2		3
Polycirrus californicus	5001680810		1		1
Gastropoda	51			1	1
Kurtziella plumbea	5106021107		1		1
Turbonilla aurantia	5108011134	1			1
Nucula tenuis	5502020201	4	6	11	21
Yoldia scissurata	5502040504		1		1
Megacrenella columbiana	5507010301	14	17	16	47
Modiolus spp.	55070106	1			1
Parvilucina tenuisculpta	5515010101	2	1		3
Lucinoma acutilineata	5515010201		1	3	4
Adontorhina cyclica	5515020102		1	2	3
Axinopsida serricata	5515020201	51	74	95	220
Thyasira sp.	55150203	1	1	2	4
Nemocardium centifilosum	5515220301	1	2	1	4
Macoma spp.	55153101		16	6	22
Macoma elimata	5515310102	2	6	5	13
Macoma yoldiformis	5515310111	1	1		2
Macoma carlottensis	5515310112	7		2	9
Macoma nasuta	5515310114			1	1
Compsomyax subdiaphana	5515470301	4	3	1	8
Lyonsia californica	5520050202	3	4	3	10
Cylindroleberididae	611103	3	4	1	8
Rutiderma lomae	6111060103	7	9	8	24
Euphilomedes carcharodonta	6111070301	160	111	128	399
Euphilomedes producta	6111070303	9	21	9	39
Leucon sp.	61540401		2		2
Eudorella pacifica	6154040202	1	1	1	3
Campylaspis spp.	61540701		2		2
Leptochelia dubia	6157020103	15	4	1	20
Haliophasma geminata	6160011601		3	1	4
Eudorellopsis sp.	61640403		2	1	3
Synchelidium spp.	61693714	1	1	1	3
Heterophoxus oculatus	6169420301	1			1
Pinnixa spp.	61890604	4	7	9	20
Golfingia spp.	72000201	1		5	6
Ophiuroida	8120	1	1	1	3
Amphiuridae	812903			1	1
Amphiodia spp.	81290301			1	1
Amphipholus spp	81290302			1	1
					1919
		632	644	643 Sum	
		10	10	9 Ave	
		721	583	482 Var	
		27	24	22 Sdv	
		1	1	1 Min	
		160	148	128 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 34

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Stylatula elongata	3754010103			1	1
Nemertea	43	1			1
Harmothoe lunulata	5001020810	1			1
Polyeunoa tuta	5001021601	1			1
Lepidasthenia berkeleyae	5001021801		1		1
Pholoe minuta	5001060101			1	1
Eteone longa	5001130205	1	4	4	9
Eulalia (Eumida) sanguinea	5001131101	5	1		6
Phyllodoce (Aponaitides) hartmanae	5001131402			1	1
Gyptis brevipalpa	5001210102	8	1	3	12
Pilargis berkeleyi	5001220301		1		1
Autolytus cornutus	5001230101	1			1
Nereis procera	5001240404	1			1
Nephtys cornuta franciscana	500125010401	1	2		3
Nephtys ferruginea	5001250111	1	1		2
Sphaerodoropsis sphaerulifer	5001260103	1			1
Glycinde picta	5001280101			1	1
Glycinde armigera	5001280103		1		1
Lumbrineris spp.	50013101	8	1		9
Lumbrineris luti	5001310109	32	41	49	122
Lumbrineris cruzensis	5001310118	27	26	22	75
Lumbrineris californiensis	5001310132	2			2
Drilonereis sp C	500133019999	1			1
Leitoscoloplos pugettensis	5001400102		1	1	2
Scoloplos acmeceps	5001400311			1	1
Levinsenia gracilis	5001410801		1	1	2
Polydora giardi	5001430401	2	1	1	4
Polydora socialis	5001430402	3		2	5
Polydora cardalia	5001430431	6	5	2	13
Prionospio steenstrupi	5001430506	25	8	10	43
Prionospio lighti	5001430521		2		2
Spiophanes berkelyorum	5001431004	3	2	3	8
Paraprionospio pinnata	5001431702	33	32	21	86
Phyllochaetopterus prolifica	5001490202	91	30	7	128
Spiochaetopterus costarum	5001490302	3		1	4
Tharyx multifilis	5001500302	39	68	55	162
Tharyx secundus	5001500309	1			1
Chaetozone setosa	5001500401	1	3	2	6
Armandia brevis	5001580202	1			1
Mediomastus ambiseta	5001600401	2	3	2	7
Mediomastus californiensis	5001600402	1			1
Praxillella affinis pacifica	500163090301	4	1	2	7
Pectinaria californiensis	5001660304			2	2
Amphicteis mucronata	5001670306			1	1
Polycirrus spp.	50016808	4			4
Polycirrus californicus	5001680810	2	3	2	7
Terebellides stroemi	5001690101	19	19	21	59
Potamilla myriops	5001700602		2		2
Spirorbidae	500178	6			6
Gastropoda	51	1			1
Rissoidae	510320	9	5		14
Mitrella tuberosa	5105030202	3	1		4
Nassarius mendicus	5105080101		1		1
Odostomia sp B	510801019938		1		1
Odostomia sp A	510801019939	11	25	24	60
Turbonilla aurantia	5108011134	5	1	12	18
Acila castrensis	5502020101	5	15	8	28
Chlamys hastata	5509050101	1	1		2
Axinopsida serricata	5515020201	9		1	10
Mysella tumida	5515100102	5	5		10

STATION 34. (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Clinocardium nuttali	5515220102		1	1	2
Macoma calcarea	5515310101		2		2
Compsomyax subdiaphana	5515470301		1	1	2
Psephidia lordi	5515470501		3	2	5
Lyonsia californica	5520050202		1		1
Cylindroleberididae	611103			1	1
Eudorella pacifica	6154040202	117	89	115	321
Ampelisca careyi	6169020135			5	5
Protomedeia grandimana	6169260303	2			2
Protomedeia articulata	6169260307		1	4	5
Heterophoxus oculatus	6169420301	46	9	4	59
Dyopedos spp.	61694499	3	3		6
Caprella mendax	6171010719	1			1
Crangon alaskensis	6179220102	2	1		3
Mesocrangon munitella	6179220115	1			1
Pinnixa spp.	61890604	40	20	17	77
Amphiuridae	812903	1			1
Amphiodia spp.	81290301	2			2
Amphiodia urtica/periercta complex	812903019999	4		1	5
Ascidiacea	8401			1	1
					1469
		606	447	416 Sum	
		11	10	10 Ave	
		456	309	411 Var	
		21	18	20 Sdv	
		1	1	1 Min	
		117	89	115 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 35

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Anthozoa	3740			4	4
Nemertea	43	3	3	6	12
Lepidasthenia berkeleyae	5001021801	2		3	5
Pholoe minuta	5001060101	5	6	7	18
Eteone longa	5001130205	1			1
Eulalia (Eumida) sanguinea	5001131101		8		8
Gyptis brevipalpa	5001210102	5	5	2	12
Ophiodromus pugettensis	5001210401			5	5
Autolytus cornutus	5001230101		4		4
Eusyllis assimilis	5001230601		1		1
Platynereis bicanaliculata	5001240501		2		2
Nephtys cornuta franciscana	500125010401		7	2	9
Nephtys ferruginea	5001250111		3		3
Glycinde picta	5001280101	1		1	2
Onuphis elegans	5001290111		1		1
Lumbrineris luti	5001310109	7	2	12	21
Lumbrineris cruzensis	5001310118		9		9
Levinsenia gracilis	5001410801	3	1	7	11
Polydora giardi	5001430401		1		1
Polydora socialis	5001430402	2	2	2	6
Polydora brachycephala	5001430429			1	1
Prionospio steenstrupi	5001430506	3			3
Prionospio lighti	5001430521	2	33	8	43
Paraprionospio pinnata	5001431702	2	3	8	13
Phyllochaetopterus prolifica	5001490202	8	488		496
Spiochaetopterus costarum	5001490302	2	4	4	10
Cirratulus cirratus	5001500101	3		4	7
Tharyx multifilis	5001500302	34	66	23	123
Tharyx tesselata	5001500308		1		1
Cossura longocirrata	5001520101		1	2	3
Pherusa plumosa	5001540302	1			1
Notomastus lineatus	5001600303	1			1
Mediomastus californiensis	5001600402			2	2
Euclymene zonalis	5001631103	3		10	13
Pectinaria californiensis	5001660304		1	3	4
Ampharetidae	500167		1		1
Polylcirrus californicus	5001680810	3	2		5
Terebellides stroemi	5001690101	7	20	11	38
Pseudochitinopoma occidentalis	5001730101		2		2
Spirorbis spirillum	5001730602	11		1	12
Spirobidae	500178		63		63
Rissoidae	510320	1	R		1
Mitrella tuberosa	5105030202	2	R		2
Odostomia sp A	510801019939	2	R	5	7
Turbonilla aurantia	5108011134	2	R		2
Mytilidae	550701	1	R		1
Parvilucina tenuisculpta	5515010101		R	1	1
Axinopsida serricata	5515020201		R	1	1
Mysella tumida	5515100102	1	R	1	2
Clinocardium nuttali	5515220102	1	R		1
Macoma spp.	55153101	1	R		1
Macoma calcarea	5515310101	1	R		1
Macoma carlottensis	5515310112		R	4	4
Psephidia lordi	5515470501		R	1	1
Eudorella pacifica	6154040202	80	56	54	190
Ampelisca careyi	6169020135		1	1	2
Ericthonius sp.	61691503			1	1
Erichthonius brasiliensis	6169150302		1		1
Protomedeia prudens	6169260312		3		3
Westwoodilla caecula	6169371502	1			1

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 35 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Heterophoxus oculatus	6169420301	2	12		14
Caprella sp	61710107	1			1
Caprella mendax	6171010719		3		3
Pinnixa spp.	61890604	92	358	144	594
Golfingia spp	72000201			1	1
Amphiodia spp.	81290301	19	17	29	65
Amphiodia urtica/periercta complex	812903019999	16	19	13	48
Amphiodia occidentalis	8129030302	5	4	1	10
					1936
		337	1214	385 Sum	
		9	32	10 Ave	
		364	8991	594 Var	
		19	95	24 Sdv	
		1	1	1 Min	
		92	488	144 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 36

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Turbellaria	3901	1			1
Nemertea	43	6	5	5	16
Harmothoe lunulata	5001020810	1			1
Pholoe minuta	5001060101		3	1	4
Sthenelais berkeleyi	5001060301	1	1		2
Eteone longa	5001130205	3			3
Eteone spilotus	5001130299		3		3
Phyllodoce (Paranaitis) polynoides	5001130803		1		1
Eulalia (Eumida) sanguinea	5001131101	9	5	5	19
Gyptis brevipalpa	5001210102		1	1	2
Ophiodromus pugettensis	5001210401	4			4
Eusyllis assimilis	5001230601	1			1
Exogone verugera	5001230706		1		1
Odontosyllis phosphorea	5001231303	1			1
Platynereis bicanaliculata	5001240501	25	17	21	63
Nephtys caeca	5001250103	1	5		6
Nephtys longosetosa	5001250109		1		1
Nephtys ferruginea	5001250111	6	3	7	16
Glycera capitata	5001270101	2	2	4	8
Glycinde picta	5001280101	4	2	3	9
Onuphidae	500129		2		2
Diopatra ornata	5001290202	11		2	13
Lumbrineris spp.	50013101			1	1
Leitoscoloplos pugettensis	5001400102	3		3	6
Scoloplos acmeceps	5001400311			2	2
Acesta lopezi	5001411302		1	1	2
Prionospio steenstrupi	5001430506	38	63	42	143
Prionospio lighti	5001430521		1		1
Spiophanes berkelyorum	5001431004			1	1
Magelona longicornis	5001440105		1	2	3
Chaetopteridae	500149		1		1
Phyllochaetopterus prolifica	5001490202			9	9
Spiochaetopterus costarum	5001490302	5	3		8
Cirratulidae	500150		1		1
Cirratulus cirratus	5001500101	1			1
Caulleriella alata	5001500202	8		1	9
Tharyx multifilis	5001500302		2		2
Chaetozone setosa	5001500401		2		2
Chaetozone spinosa	5001500407			3	3
Ophelina acuminata	5001580607			1	1
Notomastus tenuis	5001600302			5	5
Notomastus lineatus	5001600303	14	16	10	40
Mediomastus californiensis	5001600402	1	1		2
Maldanidae	500163		1		1
Euclymene zonalis	5001631103		3		3
Pectinaria granulata	5001660303	6	10	5	21
Ampharete arctica	5001670201			1	1
Terebellidae	500168	2	2	7	11
Pista cristata	5001680701		1		1
Polycirrus californicus	5001680810	2	2		4
Gastropoda	51			1	1
Trochidae	510210			1	1
Rissoidae	510320	1			1
Polinices pallida	5103760402	1		2	3
Mitrella tuberosa	5105030202		2	3	5
Nassarius mendicus	5105080101	3	1		4
Olivella baetica	5105100102	3		2	5
Odostomia sp A	510801019939	1			1
Turbonilla aurantia	5108011134		3		3
Bivalvia	55	1			1

STATION 36 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nucula tenuis	5502020201		1		1
Mytilidae	550701		1		1
Megacrenella columbiana	5507010301		1	2	3
Parvilucina tenuisculpta	5515010101	17	34	40	91
Lucinoma acutilineata	5515010201		1		1
Axinopsida serricata	5515020201	7	4	6	17
Mysella tumida	5515100102	7	14	5	26
Clinocardium nuttali	5515220102		1		1
Solen sicarius	5515290201		1	1	2
Macoma spp.	55153101			2	2
Macoma yoldiformis	5515310111	8	4		12
Macoma carlottensis	5515310112	1			1
Tellina modesta	5515310204	8	21	19	48
Saxidomus giganteus	5515470201	1			1
Psephidia lordi	5515470501	5	7	1	13
Hiatella arctica	5517060201			2	2
Lyonsia californica	5520050202	4			4
Cylindroleberididae	611103		1	6	7
Euphilomedes carcharodonta	6111070301	90	174	99	363
Euphilomedes producta	6111070303	3			3
Nebalia spp.	61450101		1	2	3
Diastylis alaskensis	6154050101		1	2	3
Leptochelia dubia	6157020103	1	1	1	3
Ampelisca hancocki	6169020113	1			1
Byblis millsi	6169020208		2	2	4
Melita desdichada	6169211008	3			3
Photis spp.	61692602	1	1		2
Protomedeia spp.	61692603	3	9	7	19
Protomedeia grandimana	6169260303			8	8
Protomedeia penates-prudens complex	616926039999		2		2
Gammaropsis thompsoni	6169260401	7			7
Hippomedon coecus	6169341411		5		5
Monocludes zernovi	6169370816			1	1
Synchelidium shoemakeri	6169371402	1	3		4
Synchelidium rectipalmum	6169371403			3	3
Westwoodilla caecula	6169371502	3	3	6	12
Rhepoxynius spp.	61694215	2			2
Rhepoxynius abronius	6169421504	13	16	16	45
Pinnixa spp	61890604		1		1
Ophiuroida	8120	1			1
Amphiuridae	812903			1	1
Amphiodia urtica/periercta complex	812903019999	1			1
Amphipholus pugetanus	8129030201	1			1
Ascidiacea	8401	1	1		2
					1220
		356	480	384 Sum	
		6	8	7 Ave	
		168	542	233 Var	
		13	23	15 Sdv	
		1	1	1 Min	
		90	174	99 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 37

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Anthozoa sp 1	374000009999	1	1	1	3
Nemertea	43	9	5	28	42
Polynoidae	500102	1			1
Gattyana cirrosa	5001020603	1			1
Harmothoe lunulata	5001020810		1	3	4
Lepidasthenia berkeleyae	5001021801		2		2
Pholoides aspera	5001040101	1	2	7	10
Pholoe minuta	5001060101	3	2	1	6
Sthenelais berkeleyi	5001060301	2			2
Sthenelais tertiaglabra	5001060305		1		1
Paleonotus bellis	5001080101	1			1
Eulalia (Eumida) bilineata	5001130308		1	1	2
Eulalia (Eumida) sanguinea	5001131101	7	4	9	20
Phyllodoce (Aponaitides) hartmanae	5001131402	1			1
Microphthalmus aberrans	5001210202			1	1
Ophiodromus pugettensis	5001210401	1		1	2
Syllis hyalina	5001230312			1	1
Fusyllis assimilis	5001230601			1	1
Exgone gemmifera	5001230702		2	4	6
Exogone verugera	5001230706	10			10
Odontosyllis phosphorea	5001231303	1	3	5	9
Ehlersia heterochaeta	5001232201	13	3		16
Platynereis bicanaliculata	5001240501	4	3	4	11
Nephtys caeca	5001250103		1	1	2
Nephtys longosetosa	5001250109	1			1
Nephtys ferruginea	5001250111	10	3	10	23
Nephtys caecoides	5001250119	2			2
Glycera capitata	5001270101	5	4	1	10
Glycinde picta	5001280101	2	3	2	7
Goniada maculata	5001280202		1		1
Goniada brunnea	5001280203	1			1
Onuphis iridescens	5001290103		2	4	6
Diopatra ornata	5001290202	15	6	9	30
Lumbrineris spp.	50013101		7		7
Lumbrineris cruzensis	5001310118	1	2	2	5
Lumbrineris californiensis	5001310132	14	12	18	44
Drilonereis longa	5001330103	1			1
Dorvillea pseudorubrovittata	5001360101	8	1	13	22
Leitoscoloplos pugettensis	5001400102	3		1	4
Laonice cirrata	5001430201	1	1		2
Polydora giardi	5001430401	1			1
Polydora socialis	5001430402	1			1
Prionospio steenstrupi	5001430506	46	15	18	79
Prionospio lighti	5001430521	12	5	4	21
Spiophanes berkelyorum	5001431004	2		1	3
Paraprionospio pinnata	5001431702	1	1		2
Magelona longicornis	5001440105	1	2	3	6
Phyllochaetopterus prolifica	5001490202	127	54	236	417
Spiochaetopterus costarum	5001490302	16	3	7	26
Mesochaetopterus taylori	5001490401	1	2	2	5
Cirratulus cirratus	5001500101	3			3
Caulleriella alata	5001500202	8			8
Tharyx spp.	50015003	5			5
Tharyx multifilis	5001500302	9	1	1	11
Chaetozone setosa	5001500401	2			2
Chaetozone spinosa	5001500407	1	1	2	4
Pherusa plumosa	5001540302		1		1
Ophelina acuminata	5001580607		1		1
Notomastus tenuis	5001600302	1	17	6	24
Mediomastus californiensis	5001600402	5	2	6	13

STATION 37 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Rhodine bitorquata	5001631001	1			1
Euclymene zonalis	5001631103	2	1	5	8
Clymenura columbiana	5001631206	3			3
Pectinaria granulata	5001660303	4	14	16	34
Pectinaria californiensis	5001660304	1			1
Ampharetidae	500167	1	1		2
Amage anops	5001670101	1			1
Anobothrus gracilis	5001670701	7	4		11
Schistocomus hiltoni	5001672501			1	1
Nicolea zostericola	5001680601			1	1
Pista cristata	5001680701	5		1	6
Pista elongata	5001680703	2	1	1	4
Polycirrus californicus	5001680810	1	2	1	4
Amphitritinae	5001681		1	2	3
Thelepus setosus	5001681004			1	1
Lanassa venusta venusta	500168130201	1			1
Streblosoma bairdi	5001682502	1	4		5
Megalomma splendida	5001700401			1	1
Potamilla myriops	5001700602		1	1	2
Sabella media	5001700802	1			1
Pseudochitinopoma occidentalis	5001730101			2	2
Spirorbis spirillum	5001730602			1	1
Spirorbidae	500178	3			3
Trochidae	510210			1	1
Margarites pupillus	5102100308	1			1
Rissoidae	510320	1		1	2
Bittium spp.	51034601	1	1	1	3
Melanella micrans	5103530102		4	6	10
Crepipatella lingulata	5103640301	5	3	7	15
Polinices pallida	5103760402	1			1
Olivella baetica	5105100102	1	2		3
Kurtziella plumbea	5106021107			1	1
Odostomia sp. B	510801019938	1		5	6
Acila castrensis	5502020101		1		1
Nucula tenuis	5502020201	1	1	2	4
Nuculana minuta	5502040202		1		1
Mytilidae	550701			2	2
Megacrenella columbiana	5507010301	2	3	2	7
Modiolus modiolus	5507010601			1	1
Chalmys hastata	5509050101	3	5	4	12
Parvilucina tenuisculpta	5515010101	4	2		6
Lucinoma acutilineata	5515010201	2			2
Axinopsida serricata	5515020201	6	11	5	22
Thyasira sp.	55150203			1	1
Mysella tumida	5515100102		2	2	4
Clinocardium nuttali	5515220102	1			1
Nemocardium centifilosum	5515220301		1		1
Macoma spp.	55153101	4	2	6	12
Macoma calcarea	5515310101		2		2
Macoma elimata	5515310102	2	1	1	4
Macoma yoldiformis	5515310111	6	5	10	21
Psephidia lordi	5515470501	5	5	3	13
Mya arenaria	5517010201			1	1
Hiatella arctica	5517060201	2	1	1	4
Lyonsia californica	5520050202	1			1
Pycnogonida	60	2			2
Rutiderma lomae	6111060103	3	1	1	5
Euphilomedes carcharodonta	6111070301	64	57	54	175
Nebalia spp.	61450101		1		1
Eudorella pacifica	6154040202	2		1	3

STATION 37 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Gammaridea	6169	3			3
Ampelisca spp.	61690201	6	5	13	24
Ampelisca lobata	6169020134	2	3	2	7
Byblis millsi	6169020208	12	8	4	24
Aoroides spp.	61690602			1	1
Corophium spp.	61691502		1		1
Ericthonius sp.	61691503	3	2		5
Erichthonius brasiliensis	6169150302	1		1	2
Melita desdichada	6169211008			1	1
Hippomedon spp	61693414	1			1
Allogaussia sp.	61693499	1			1
Synchelidium spp	61693714	7			7
Synchelidium shoemakeri	6169371402		2		2
Synchelidium rectipalmum	6169371403			1	1
Westwoodilla caecula	6169371502	5	2		7
Heterophoxus oculatus	6169420301	4	1	1	6
Rhepoxynius variatus	6169420926	1			1
Rhepoxynius abronius	6169421504		1		1
Caridea	6179			1	1
Mesocrangon munitella	6179220115		2		2
Oregonia spp	61870101		2	3	5
Cancer spp.	61880301	1			1
Cancer branneri	6188030103		1		1
Pinnixa spp.	61890604	5	3	4	12
Golfingia spp.	72000201	2			2
Phoronida	77	1			1
Brachiopoda	80		1		1
Ophiura lutkeni	8127010607		1		1
Amphiuridae	812903	1		2	3
Amphiodia spp.	81290301	2	1	1	4
Amphiodia urtica/periercta complex	812903019999	1		1	2
Amphipholus sp.	81290302			1	1
Amphipholus pugetanus	8129030201	1		1	2
Amphipholus squamata	8129030202	2	1		3
Cucumaria spp.	81720601		1		1
Cucumaria piperata	8172060111		1		1
Pentamera lissoplaca	8172060303	3	7	2	12
Pentamera trachyplaca	8172060399	5	18	6	29
Pentamera sp 2	817206039988		1	3	4
Pentamera sp 1	817206039989	2	7		9
Ascidiacea	8401	1		4	5
					1601
		590	391	620 Sum	
		5	4	7 Ave	
		196	71	625 Var	
		14	8	25 Sdv	
		1	1	1 Min	
		127	57	236 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 38

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43	2	1	2	5
Sthenelais tertiaglabra	5001060305	1			1
Gyptis brevipalpa	5001210102	1		1	2
Sigambra bassi	5001220204	2	1		3
Nephtys spp.	50012501	1			1
Nephtys ferruginea	5001250111	2	1		3
Glycera capitata	5001270101			2	2
Glycinde picta	5001280101	1		1	2
Goniada maculata	5001280202	1			1
Onuphis iridescens	5001290103		1		1
Lumbrineris spp.	50013101			1	1
Leitoscoloplos pugettensis	5001400102	1			1
Levinsenia gracilis	5001410801		9		9
Levinsenia gracilis oculata	500141080101	4		5	9
Laonice cirrata	5001430201			1	1
Prionospio lighti	5001430521		1		1
Spiophanes berkelyorum	5001431004		1		1
Paraprionospio pinnata	5001431702	2	3	4	9
Cossura modica	5001520199	3		6	9
Flabelligeridae	500154	2			2
Notomastus lineatus	5001600303			1	1
Mediomastus spp.	50016004		1		1
Pectinaria californiensis	5001660304	16	10	8	34
Melanochlamys dimedea	511006999999	1		2	3
Chaetodermatida	5402	1	2		3
Nucula tenuis	5502020201		1		1
Yoldia scissurata	5502040504		1		1
Yoldia traciaeformis	5502040507		1		1
Parvilucina tenuisculpta	5515010101		1		1
Adontorhina cyclica	5515020102			1	1
Axinopsida serricata	5515020201	2	1	1	4
Macoma spp.	55153101	13	4	6	23
Euphilomedes carcharodonta	6111070301			1	1
Euphilomedes producta	6111070303	46	10	6	62
Mysidacea	6151	1		1	2
Eudorella pacifica	6154040202	11	19	8	38
Eudorellopsis integra	6154040301	14	9	47	70
Diastylis alaskensis	6154050101	1			1
Leptochelia dubia	6157020103		1		1
Aega symmetrica	6161070101	1			1
Rocinella belliceps	6161070202	1			1
Ampelisca careyi	6169020135		1		1
Melita desdichada	6169211008			1	1
Protomedeia prudens	6169260312	10	4	6	20
Heterophoxus oculatus	6169420301	17	7	12	36
Eobrolgus spinosus	6169420928	2			2
Amphiodia spp.	81290301	1			1
Molpadia intermedia	8179010101	1	4	3	8
					384
		162	95	127 Sum	
		5	4	5 Ave	
		81	19	84 Var	
		9	4	9 Sdv	
		1	1	1 Min	
		46	19	47 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 39

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Ptilosarcus gurneyi	3754020201		1	1	2
Nemertea	43		2		2
Tenonia priops	5001022302		1		1
Eteone longa	5001130205	1			1
Eulalia (Eumida) bilineata	5001130308			1	1
Phyllodoce (Paranaitis) polynoides	5001130803			1	1
Eulalia (Eumida) sanguinea	5001131101	2	4		6
Gyptis brevipalpa	5001210102			1	1
Ophiodromus pugettensis	5001210401		2		2
Platynereis bicanaliculata	5001240501	7	11	5	23
Nephtys longosetosa	5001250109			1	1
Nephtys ferruginea	5001250111			1	1
Nephtys caecoides	5001250119		2		2
Glycera capitata	5001270101		2		2
Glycinde picta	5001280101			4	4
Glycinde armigera	5001280103	7			7
Onuphidae	500129	3			3
Onuphis iridescens	5001290103	1	1		2
Diopatra ornata	5001290202		2	2	4
Leitoscoloplos pugettensis	5001400102	1	2		3
Acesta lopezi	5001411302	1			1
Prionospio steenstrupi	5001430506	30	81	40	151
Prionospio lighti	5001430521		2	1	3
Spiophanes berkelyorum	5001431004	1			1
Phyllochaetopterus prolifica	5001490202		2		2
Spiochaetopterus costarum	5001490302	2			2
Cirratulidae	500150	1			1
Chaetozone setosa	5001500401		1		1
Chaetozone spinosa	5001500407	1			1
Notomastus tenuis	5001600302	2	3		5
Notomastus lineatus	5001600303	1	1		2
Mediomastus californiensis	5001600402		1		1
Pectinaria granulata	5001660303		1		1
Terebellidae	500168	1			1
Pista cristata	5001680701			1	1
Polycirrus spp.	50016808		4		4
Polycirrus californicus	5001680810	4			4
Rissoidae	510320	1			1
Melanella micrans	5103530102			2	2
Mitrella tuberosa	5105030202	1	1	2	4
Olivella baetica	5105100102	6	1	1	8
Turbonilla aurantia	5108011134	1	1	1	3
Turbonilla sp. C	510801119997			1	1
Turbonilla sp. B	510801119998	3	1	6	10
Melanochlamys dimedea	511006999999	1			1
Bivalvia	55	1			1
Parvilucina tenuisculpta	5515010101	24	41	15	80
Lucinoma acutilineata	5515010201			1	1
Axinopsida serricata	5515020201	10	8	3	21
Mysella tumida	5515100102	3	8	1	12
Solen sicarius	5515290201		1		1
Macoma spp.	55153101	3	1	1	5
Macoma yoldiformis	5515310111	1	1	2	4
Tellina modesta	5515310204	4	9	7	20
Compsomyax subdiaphana	5515470301	1	2		3
Psephidia lordi	5515470501		1		1
Mya arenaria	5517010201			1	1
Lyonsia californica	5520050202	3	4	1	8
Cylindroleberididae	611103	4	5	4	13
Euphilomedes carcharodonta	6111070301	30	90	52	172

STATION 39 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nebalia spp.	61450101	1	1	2	4
Mysidacea	6151		1		1
Acanthomysis nephrophthalma	6153010105			1	1
Diastylis alaskensis	6154050101		1		1
Campylaspis spp.	61540701	2			2
Leptochelia dubia	6157020103	2	3		5
Ampelisca spp	61690201	1			1
Byblis millsi	6169020208		1	2	3
Rachotropis sp.	61692013		3		3
Protomedeia spp.	61692603	6		4	10
Cheirimedeia zotea	6169261199			1	1
Lysianassidae	616934		3		3
Hippomedon coecus	6169341411		6		6
Hippomedon subrobustus	6169341413			11	11
Westwoodilla caecula	6169371502		3	3	6
Heterophoxus oculatus	6169420301		1		1
Rhepoxynius abronius	6169421504	24	16	20	60
Fabia subquadrata	6189060301			1	1
Phoronida	77		1		1
Amphiodia urtica/periercta complex	812903019999			1	1
					746
		199	341	206 Sum	
		5	7	5 Ave	
		59	307	107 Var	
		8	18	10 Sdv	
		1	1	1 Min	
		30	90	52 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 40

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Anthozoa sp. 1	374000009999	1	3	6	10
Nemertea	43	1	3	8	12
Pholoe minuta	5001060101	3	4		7
Phyllodocidae	500113		1		1
Phyllodoce (Anaitides) groenlandica	5001130102		1		1
Eteone spilotus	5001130299			1	1
Eulalia (Eumida) sanguinea	5001131101	1			1
Phyllodoce (Aponaitides) hartmanae	5001131402		1		1
Pilargis berkeleyi	5001220301		1		1
Nephtys spp	50012501	1			1
Nephtys cornuta franciscana	500125010401		3		3
Nephtys longosetosa	5001250109		2		2
Nephtys ferruginea	5001250111	5	1	6	12
Sphaerodoropsis sphaerulifer	5001260103	1			1
Glycera capitata	5001270101	6	5	5	16
Glycinde picta	5001280101	6	2	3	11
Onuphidae	500129	1			1
Lumbrineris spp.	50013101	14	6	16	36
Lumbrineris luti	5001310109	6	16	12	34
Lumbrineris californiensis	5001310132		16	6	22
Driloneris falcata minor	500133010402		1		1
Leitoscoloplos pugettensis	5001400102	4	5	4	13
Scoloplos acmeceps	5001400311		2		2
Polydora cardalia	5001430431		1		1
Prionospio steenstrupi	5001430506	61	113	65	239
Prionospio lighti	5001430521	1	14	3	18
Spiophanes berkelyorum	5001431004		1	3	4
Paraprionospio pinnata	5001431702			2	2
Spiochaetopterus costarum	5001490302	1			1
Tharyx multifilis	5001500302	96	180	213	489
Chaetozone setosa	5001500401	13		20	33
Chaetozone spinosa	5001500407		11		11
Sternaspis scutata	5001590101		1		1
Notomastus tenuis	5001600302		11		11
Notomastus lineatus	5001600303	7	2	14	23
Mediomastus californiensis	5001600402	1	10	13	24
Praxillella gracilis	5001630901		2		2
Rhodine bitorquata	5001631001			2	2
Euclymene zonalis	5001631103	7	1	6	14
Clymenura columbiana	5001631206	3			3
Pectinaria granulata	5001660303	14	15	19	48
Ampharetidae	500167			1	1
Amage anops	5001670101	1	1		2
Ampharete spp.	50016702	1			1
Anobothrus gracilis	5001670701			1	1
Terebellidae	500168		1	1	2
Pista spp.	50016807		1		1
Pista cristata	5001680701	1	7	1	9
Polycirrus californicus	5001680810			2	2
Streblosoma bairdi	5001682502			1	1
Gastropoda	51			1	1
Polinices pallida	5103760402	1	1	1	3
Mitrella tuberosa	5105030202	6	8	1	15
Kurtziella plumbea	5106021107	1			1
Turbonilla aurantia	5108011134	7	2	1	10
Nucula tenuis	5502020201	2			2
Megacrenella columbiana	5507010301	1			1
Parvilucina tenuisculpta	5515010101	4		1	5
Lucinoma acutilineata	5515010201		2		2
Axinopsida serricata	5515020201	220	118	96	434

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 40 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Mysella tumida	5515100102			2	2
Clinocardium nuttali	5515220102	1			1
Nemocardium centifilosum	5515220301	2	1		3
Macoma spp	55153101	21	3		24
Macoma calcarea	5515310101		1		1
Macoma elimata	5515310102	1	5		6
Macoma yoldiformis	5515310111	22	12	11	45
Macoma carlottensis	5515310112		6	10	16
Macoma nasuta	5515310114	15			15
Compsomyax subdiaphana	5515470301	2	2	1	5
Lyonsia californica	5520050202		1	1	2
Cylindroleberididae	611103		1		1
Euphilomedes carcharodonta	6111070301	54	31	21	106
Euphilomedes producta	6111070303	42	4	2	48
Cirripedia	6130	1		1	2
Tanaidae	615701	2			2
Leptochelia dubia	6157020103		1	3	4
Westwoodilla sp.	61693715	1			1
Paraphoxus oculatus	6169420925		1		1
Callianassa spp.	61830402	3	6	11	20
Pinnixa spp.	61890604	13	3	8	24
Golfingia spp	72000201	1			1
Ophiuroida	8120		2		2
Amphiuridae	812903	8		3	11
Amphiodia spp	81290301	3	2	2	7
Holothuroidea	8170		3		3
					1963
		691	661	611 Sum	
		14	11	13 Ave	
		1157	938	1161 Var	
		34	31	34 Sdv	
		1	1	1 Min	
		220	180	213 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 41

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43	6	5	1	12
Pholoe minuta	5001060101	3			3
Phyllodoce (Anaitides) groenlandica	5001130102		1	2	3
Eteone californica	5001130201		1		1
Eteone longa	5001130205	3		2	5
Eulalia (Eumida) sanguinea	5001131101			4	4
Eunereis wailesi	500124119999			2	2
Sphaerodoropsis sphaerulifer	5001260103	2			2
Glycera capitata	5001270101	9	4	2	15
Glycinde picta	5001280101	2	1		3
Glycinde armigera	5001280103	1	3		4
Goniada brunnea	5001280203	2	1		3
Lumbrineris spp.	50013101			1	1
Lumbrineris bicirrata	5001310101			1	1
Lumbrineris luti	5001310109	45	31	34	110
Lumbrineris californiensis	5001310132			1	1
Polydora pygidialis	5001430417			8	8
Prionospio lighti	5001430521	1			1
Polydora (Boccardiella) hamata	5001430806			185	185
Tharyx multifilis	5001500302	1689	698	156	2543
Chaetozone setosa	5001500401	2			2
Scalibregma inflatum	5001570101	1			1
Sternaspis scutata	5001590101	1	3		4
Capitella capitata	5001600101		6		6
Heteromastus filobranchus	5001600203	12	7	5	24
Notomastus tenuis	5001600302		11	9	20
Praxillella gracilis	5001630901	1		2	3
Euclymeninae	5001631		3		3
Pectinaria californiensis	5001660304	3	1		4
Ampharetidae	500167		1		1
Polycirrus californicus	5001680810	2			2
Polinices pallida	5103760402	1			1
Odostomia sp A	510801019939	1	2	1	4
Turbonilla aurantia	5108011134	1	2	1	4
Rictaxis punctocaelatus	5110010401	2	7		9
Cylichna attonsa	5110040205	1	2	1	4
Melanochlamys dimedea	511006999999	2		1	3
Nucula tenuis	5502020201		1	1	2
Yoldia scissurata	5502040504	1	1		2
Adontorhina cyclica	5515020102		3		3
Axinopsida serricata	5515020201	1055	1353	285	2693
Nemocardium centifilosum	5515220301		1		1
Macoma spp	55153101	8		1	9
Macoma elimata	5515310102	8	5		13
Macoma yoldiformis	5515310111	1		2	3
Macoma nasuta	5515310114	40	38	26	104
Compsomyax subdiaphana	5515470301		4	1	5
Cylindroleberididae	611103		1	1	2
Euphilomedes carcharodonta	6111070301	45	21	23	89
Euphilomedes producta	6111070303	29	48	5	82
Leptochelia dubia	6157020103	1	8	2	11
Eudorellopsis sp	61640403			1	1
Opisa tridentata	6169342802	1			1
Synchelidium shoemakeri	6169371402	1			1
Westwoodilla caecula	6169371502	1			1
Heterophoxus oculatus	6169420301			1	1
Rhepoxynius bicuspidata	6169421503	14	8	1	23
Callianassidae	618304	1			1
Callianassa spp.	61830402	1	1	2	4

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 41 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Pinnixa spp	61890604	8	5	4	17
Ophiura lutkeni	8127010607	1			1
Amphiuridae	812903	14	4	8	26
Amphiodia spp	81290301	16	2	5	23
					6121
		3039	2294	788 Sum	
		71	62	21 Ave	
		87410	58954	3398 Var	
		296	243	58 Sdv	
		1	1	1 Min	
		1689	1353	285 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 42

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43	3	2		5
Harmothoe lunulata	5001020810		1		1
Pholoides aspera	5001040101		1		1
Sthenelais tertiaglabra	5001060305		1		1
Thalenessa spinosa	5001060601	1			1
Phyllodoce (Paranaitis) polynoides	5001130803	1			1
Eulalia (Eumida) sanguinea	5001131101	3	1		4
Gyptis brevipalpa	5001210102	1			1
Exgone gemmifera	5001230702		1		1
Odontosyllis phosphorea	5001231303	2	2		4
Platynereis bicanaliculata	5001240501	1			1
Nephtys spp.	50012501	1			1
Nephtys caeca	5001250103			1	1
Nephtys longosetosa	5001250109		1		1
Nephtys ferruginea	5001250111	2	2	3	7
Glycera capitata	5001270101			1	1
Glycinde picta	5001280101	1			1
Goniada maculata	5001280202		1		1
Onuphidae	500129		1	2	3
Diopatra ornata	5001290202		2		2
Leitoscoloplos panamensis	5001400101			1	1
Acesta lopezi	5001411302			4	4
Prionospio steenstrupi	5001430506	25	28	37	90
Prionospio lighti	5001430521			1	1
Spio filicornis	5001430701			1	1
Spiophanes berkelyorum	5001431004			1	1
Paraprionospio pinnata	5001431702		1		1
Spiochaetopterus costarum	5001490302		1		1
Tharyx multifilis	5001500302			2	2
Chaetozone spinosa	5001500407		1	5	6
Notomastus lineatus	5001600303	1	1		2
Maldanidae	500163		1		1
Ampharetidae	500167			1	1
Amage anops	5001670101	1	2	1	4
Ampharete acutifrons	5001670208		1		1
Anobothrus gracilis	5001670701			1	1
Terebellidae	500168	3			3
Pista elongata	5001680703	1			1
Polycirrus californicus	5001680810	3	5		8
Melanella micrans	5103530102			1	1
Crepipatella lingulata	5103640301		1		1
Mitrella tuberosa	5105030202	1		1	2
Olivella baetica	5105100102	10	3	16	29
Odostomia sp A	510801019939		1		1
Diaphana sp	5110090102		1		1
Bivalvia	55		1		1
Parvilucina tenuisculpta	5515010101		1		1
Lucinoma acutilineata	5515010201			1	1
Axinopsida serricata	5515020201	2			2
Macoma yoldiformis	5515310111	1	2	2	5
Tellina nuculoides	5515310202	2			2
Mya arenaria	5517010201		1		1
Euphilomedes carcharodonta	6111070301	2	1		3
Eudorella pacifica	6154040202			1	1
Leptognathia gracilis	6157020202	1			1
Ampelisca careyi	6169020135	1	3		4
Byblis millsi	6169020208			1	1
Aoroides spp.	61690602	1			1
Hippomedon coecus	6169341411		1	1	2

STATION 42 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Opisa tridentata	6169342802		1		1
Synchelidium shoemakeri	6169371402		6	2	8
Westwoodilla caecula	6169371502		1		1
Metaphoxus frequens	6169420601		1		1
Rhepoxynius daboius	6169421505	9	7	2	18
Stenothoidae	616948			1	1
Tritella pilimana	6171010602		3		3
Golfingia spp.	72000201		1		1
Cucumaria piperata	8172060111	1	1		2
Pentamera lissoplaca	8172060303		1		1
					267
		81	95	91 Sum	
		3	2	4 Ave	
		23	18	54 Var	
		5	4	7 Sdv	
		1	1	1 Min	
		25	28	37 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 43

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Anthozoa sp. 1	374000009999		1		1
Nemertea	43	5	2		7
Polynoidae	500102			2	2
Pholoe minuta	5001060101		4	2	6
Sthenelais berkeleyi	5001060301		1		1
Sthenelais tertiaglabra	5001060305	1	3		4
Phyllodoce (Anaitides) groenlandica	5001130102			1	1
Eulalia (Eumida) sanguinea	5001131101	19	5	8	32
Phyllodoce (Aponaitides) hartmanae	5001131402		2		2
Ophiodromus pugettensis	5001210401	1			1
Autolytus cornutus	5001230101		1		1
Ehlersia heterochaeta	5001232201		1		1
Platynereis bicanaliculata	5001240501	1			1
Nephtys caeca	5001250103			2	2
Nephtys cornuta franciscana	500125010401	1			1
Nephtys longosetosa	5001250109			1	1
Nephtys ferruginea	5001250111		4	1	5
Sphaerodoropsis sphaerulifer	5001260103	2			2
Glycera capitata	5001270101	3	4	6	13
Glycinde picta	5001280101	22	5	12	39
Glycinde armigera	5001280103		1		1
Goniada maculata	5001280202			1	1
Onuphis elegans	5001290111	1	1		2
Lumbrineris spp.	50013101			1	1
Lumbrineris luti	5001310109	2	2	3	7
Leitoscoloplos pugettensis	5001400102	3	9	7	19
Prionospio steenstrupi	5001430506	15	4	1	20
Spiophanes berkelyorum	5001431004	1			1
Paraprionospio pinnata	5001431702		1	1	2
Magelona longicornis	5001440105			3	3
Phyllochaetopterus prolifica	5001490202	23	32	96	151
Spiochaetopterus costarum	5001490302	16	36		52
Mesochaetopterus taylori	5001490401	2	2		4
Scalibregma inflatum	5001570101	3	3	1	7
Capitellidae	500160		1		1
Notomastus lineatus	5001600303			1	1
Maldanidae	500163			3	3
Notoproctus pacificus	5001630601		1		1
Euclymeninae	5001631	2	4		6
Euclymene zonalis	5001631103		1	2	3
Clymenura columbiana	5001631206	6	3		9
Isocirrus longiceps	5001632001		2		2
Pectinaria granulata	5001660303			1	1
Pectinaria californiensis	5001660304	4			4
Amage anops	5001670101	1			1
Anobothrus gracilis	5001670701	1		3	4
Terebellidae	500168		1		1
Pista cristata	5001680701		1		1
Polycirrus spp.	50016808		1		1
Streblosoma bairdi	5001682502		1		1
Mitrella tuberosa	5105030202			1	1
Nassarius mendicus	5105080101			1	1
Cylichna attonsa	5110040205	2	3	2	7
Melanochlamys dimedea	511006999999	1			1
Nucula tenuis	5502020201	7	6	17	30
Megacrenella columbiana	5507010301		2	6	8
Modiolus spp.	55070106			1	1
Parvilucina tenuisculpta	5515010101	4	4	1	9
Axinopsida serricata	5515020201	3	2		5
Thyasira gouldii	5515020325	5	1	3	9

STATION 43 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Mysella tumida	5515100102	3	7	6	16
Macoma spp.	55153101			2	2
Macoma calcarea	5515310101			1	1
Macoma yoldiformis	5515310111	7	4	5	16
Macoma carlottensis	5515310112	7	3		10
Psephidia lordi	5515470501		1		1
Lyonsia pugetensis	5520050205	3	1	2	6
Euphilomedes carcharodonta	6111070301	94	184	155	433
Eudorella pacifica	6154040202	1	1		2
Leptochelia dubia	6157020103	5	1		6
Ampelisca spp	61690201		1		1
Byblis millsi	6169020208	5	6	2	13
Aoroides spp.	61690602		1		1
Corophium spp.	61691502	15		10	25
Protomedeia prudens	6169260312			1	1
Westwoodilla caecula	6169371502	4	5	3	12
Phoxocephalidae	616942			2	2
Heterophoxus oculatus	6169420301	4	5	1	10
Eyakia robustus	6169420918	8	13	16	37
Rhepoxynius abronius	6169421504	22	21	24	67
Pagurus spp.	61830602	1			1
Pinnixa spp.	61890604	10	14	28	52
Golfingia spp.	72000201	3			3
Amphiuridae	812903	15	15	23	53
Amphiodia spp.	81290301	69	70	95	234
Amphiodia urtica/periercta complex	812903019999	34	33	49	116
					1627
		467	544	616 Sum	
		10	10	13 Ave	
		283	676	815 Var	
		17	26	29 Sdv	
		1	1	1 Min	
		94	184	155 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 44

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Anthozoa sp 1	374000009999	3			3
Turbellaria	3901			1	1
Nemertea	43	31	5	18	54
Nematoda	47			1	1
Polynoidae	500102			1	1
Harmothoe spp.	50010208			3	3
Harmothoe extenuata	5001020803	1			1
Harmothoe imbricata	5001020806	1		1	2
Lepidasthenia berkeleyae	5001021801		1		1
Pholoides aspera	5001040101	4	1	10	15
Pholoe minuta	5001060101		1	1	2
Paleonotus bellis	5001080101	1			1
Phyllodoce (Anaitides) groenlandica	5001130102	1			1
Eteone spp.	50011302	1			1
Eteone spilotus	5001130299		1		1
Eulalia (Eumida) bilineata	5001130308	1	1		2
Eulalia (Eumida) sanguinea	5001131101	8	4	6	18
Phyllodoce (Aponaitides) hartmanae	5001131402	1			1
Phyllodoce (Anaitides) spp	5001131499			1	1
Gyptis brevipalpa	5001210102			1	1
Ophiodromus pugettensis	5001210401	4		3	7
Pilargis berkeleyi	5001220301	1			1
Autolytus cornutus	5001230101	1			1
Syllis hyalina	5001230312	5	2		7
Exgone gemmifera	5001230702		1		1
Exogone verugera	5001230706	1			1
Odontosyllis phosphorea	5001231303	5	3	3	11
Ehlersia heterochaeta	5001232201	1		5	6
Platynereis bicanaliculata	5001240501	2	1	8	11
Nephtys spp	50012501	2		3	5
Nephtys caeca	5001250103	1			1
Nephtys cornuta franciscana	500125010401	2			2
Nephtys ferruginea	5001250111	3	1	1	5
Glycera capitata	5001270101	4	5	3	12
Glycera americana	5001270104	1			1
Glycinde picta	5001280101	1	3		4
Glycinde armigera	5001280103			1	1
Onuphidae	500129	1			1
Diopatra ornata	5001290202	4	3	7	14
Lumbrineris bicirrata	5001310101			2	2
Lumbrineris luti	5001310109	2			2
Lumbrineris cruzensis	5001310118	2			2
Lumbrineris californiensis	5001310132	12	7	19	38
Drilonerис falcata minor	500133010402			1	1
Notocirrus californiensis	5001330302	1		1	2
Dorvillea sp.	50013601	1			1
Dorvillea pseudorubrovittata	5001360101			1	1
Leitoscoloplos pugettensis	5001400102	4	4		8
Allia ramosa	5001410706	4		3	7
Levinsenia gracilis	5001410801	4			4
Laonice cirrata	5001430201	2	1	2	5
Polydora spp	50014304	1			1
Polydora giardi	5001430401	1			1
Polydora socialis	5001430402	1		5	6
Prionospio steenstrupi	5001430506	105	46	82	233
Prionospio lighti	5001430521	6	1	1	8
Spiophanes berkelyorum	5001431004	31	10	25	66
Paraprionospio pinnata	5001431702	10	8	1	19
Magelona longicornis	5001440105	1		1	2
Phyllochaetopterus prolifica	5001490202	121	38	82	241

STATION 44 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Spiochaetopterus costarum	5001490302	27	4	24	55
Mesochaetopterus taylori	5001490401	12	1	11	24
Caulleriella alata	5001500202	6		4	10
Tharyx multifilis	5001500302	2		7	9
Armandia brevis	5001580202	1			1
Ophelina acuminata	5001580607	1			1
Notomastus tenuis	5001600302	2		4	6
Notomastus lineatus	5001600303	3		2	5
Mediomastus spp.	50016004	1			1
Mediomastus ambiseta	5001600401	3			3
Mediomastus californiensis	5001600402	13	4	12	29
Maldanidae	500163		1		1
Praxillella gracilis	5001630901			1	1
Rhodine bitorquata	5001631001	1		1	2
Clymenura columbiana	5001631206	5		1	6
Isocirrus longiceps	5001632001			2	2
Sabellaria cementarium	5001650201	16	4	3	23
Pectinaria spp.	50016603		1		1
Pectinaria granulata	5001660303	2		4	6
Anobothrus gracilis	5001670701	2	1	5	8
Polycirrus californicus	5001680810	2		4	6
Artacama coniferi	5001681101			1	1
Lanassa venusta venusta	500168130201	1			1
Terebellides stroemi	5001690101		1	3	4
Megalomma splendida	5001700401	3			3
Crepipatella lingulata	5103640301			4	4
Mitrella tuberosa	5105030202	4			4
Nassarius mendicus	5105080101	1			1
Olivella baetica	5105100102	14	5		19
Odostomia sp A	510801019939	1			1
Turbonilla aurantia	5108011134	1			1
Cylichna attonsa	5110040205		1		1
Acila castrensis	5502020101		4		4
Nucula tenuis	5502020201	3	3	1	7
Mytilidae	550701			2	2
Megacrenella columbiana	5507010301	1		1	2
Musculus spp.	55070104		2		2
Chlamys hastata	550701049999	1		1	2
Parvilucina tenuisculpta	5515010101	3	2	3	8
Lucinoma acutilineata	5515010201	2		1	3
Axinopsida serricata	5515020201	8	13	2	23
Thyasira gouldii	5515020325	1			1
Mysella tumida	5515100102	10	5	2	17
Clinocardium sp.	55152201		1		1
Macoma spp.	55153101	3		1	4
Macoma yoldiformis	5515310111	11	21	10	42
Psephidia lordi	5515470501	1	1	1	3
Bankia setacea	5518020101			1	1
Euphilomedes carcharodonta	6111070301	1	4	4	9
Cirripedia	6130	2	1	1	4
Eudorella pacifica	6154040202	6	7	2	15
Haliophasma geminata	6160011601	1			1
Ampelisca spp.	61690201	1		2	3
Ampelisca lobata	6169020134	3	1	1	5
Byblis millsi	6169020208	3	4		7
Aoroides spp.	61690602	4		1	5
Corophium spp.	61691502	3		2	5
Erichthonius sp.	61691503			4	4
Erichthonius hunteri	6169150301		1	1	2
Erichthonius brasiliensis	6169150302	3		2	5

STATION 44 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Melita desdichada	6169211008	1		1	2
Photis spp.	61692602	1			1
Monocludes zernovi	6169370816			1	1
Synchelidium shoemakeri	6169371402		1		1
Westwoodilla caecula	6169371502		2		2
Heterophoxus oculatus	6169420301	4	5	7	16
Caridea	6179			1	1
Spirontocaris snyderi	6179160204			2	2
Mesocrangon munitella	6179220115			1	1
Pagurus spp	61830602		1		1
Lophopanopeus bellus diegensis	618902010102			3	3
Pinnixa spp.	61890604	28	6	11	45
Golfingia spp.	72000201	12	1	2	15
Phoronida	77	1			1
Ophiura lutkeni	8127010607	1		2	3
Amphiodia spp.	81290301	1	5	3	9
Amphiodia urtica/periercta complex	812903019999	2	1	3	6
Amphipholus pugetanus	8129030201			1	1
Amphipholus squamata	8129030202	1		1	2
Holothuroidea	8170		1		1
Pentamera lissoplaca	8172060303	1	1	1	3
Pentamera (Cucumaria) populifera	8172060304			1	1
Thyone sp	81720605	1			1
					1399
		650	265	484 Sum	
		6	5	5 Ave	
		263	62	155 Var	
		16	8	12 Sdv	
		1	1	1 Min	
		121	46	82 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 45

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Anthozoa sp. 1	374000009999		1		1
Pachycerianthus fimbriatus	3743010303	1	2		3
Turbellaria	3901		1		1
Nemertea	43	3	4	2	9
Nematoda	47	1			1
Polynoidae	500102	2			2
Lepidasthenia berkeleyae	5001021801	3	1	6	10
Tenonia priops	5001022302	1	1	2	4
Pholoe minuta	5001060101	5	4	1	10
Sthenelais tertiaglabra	5001060305	2			2
Eulalia (Eumida) sanguinea	5001131101	1			1
Gyptis brevipalpa	5001210102	1			1
Sigambra bassi	5001220204	18	3	12	33
Pilargis berkeleyi	5001220301			1	1
Pionosyllis uraga	5001230204			1	1
Nereidae	500124	1			1
Nereis procera	5001240404			3	3
Nereis zonata	5001240406	5	2	2	9
Nephtys caeca	5001250103	1			1
Nephtys cornuta franciscana	500125010401	1	4	1	6
Glycera capitata	5001270101	3	2	2	7
Glycinde armigera	5001280103			1	1
Goniada brunnea	5001280203	2		1	3
Diopatra ornata	5001290202	1			1
Lumbrineris spp.	50013101	2	4	1	7
Lumbrineris luti	5001310109	3	1		4
Leitoscoloplos pugettensis	5001400102	1	1		2
Allia ramosa	5001410706	21	38	55	114
Levinsenia gracilis	5001410801	88	104	92	284
Acesta lopezi	5001411302	11	5	8	24
Laonice spp.	50014302		1		1
Laonice cirrata	5001430201	6	5	12	23
Polydora socialis	5001430402	2			2
Polydora cardalia	5001430431			2	2
Prionospio steenstrupi	5001430506		1	1	2
Prionospio lighti	5001430521	1			1
Spiophanes berkelyorum	5001431004	1	6	2	9
Tharyx multifilis	5001500302	1		2	3
Chaetozone setosa	5001500401			3	3
Cossura longocirrata	5001520101	2	1		3
Notomastus lineatus	5001600303			1	1
Mediomastus spp.	50016004		2	1	3
Maldanidae	500163		1		1
Praxillella affinis pacifica	500163090301	1	1	7	9
Euclymeninae	5001631	1	2	7	10
Rhodine bitorquata	5001631001	1	1		2
Euclymene zonalis	5001631103	1			1
Pectinaria californiensis	5001660304	12	5	12	29
Anobothrus gracilis	5001670701	1		1	2
Terebellidae	500168			1	1
Neoamphitrite robusta	5001680401	1			1
Artacama coniferi	5001681101			5	5
Scionella estevanica	5001681803	4		1	5
Nitidiscala tincta	5103509999	3			3
Mitrella tuberosa	5105030202			2	2
Nassarius mendicus	5105080101			1	1
Turbonilla aurantia	5108011134	1			1
Cylichna attonsa	5110040205	2	1	1	4
Melanochlamys dimedea	511006999999		1	1	2
Nudibranchia	5127		2		2

STATION 45 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Yoldia scissurata	5502040504		1		1
Mytilidae	550701	1			1
Parvilucina tenuisculpta	5515010101	2	9	7	18
Lucinoma acutilineata	5515010201	7		2	9
Thyasira gouldii	5515020325		2		2
Mysella tumida	5515100102			1	1
Nemocardium centifilosum	5515220301	1			1
Macoma sp.	55153101		1		1
Macoma yoldiformis	5515310111	1			1
Compsomyax subdiaphana	5515470301			1	1
Ostracoda	6110	3			3
Euphilomedes carcharodonta	6111070301	36	51	27	114
Eudorella pacifica	6154040202		3		3
Photis spp.	61692602	2		1	3
Westwoodilla caecula	6169371502	1		1	2
Heterophoxus oculatus	6169420301	3	2	6	11
Pinnixa spp.	61890604	2		1	3
Golfingia spp.	72000201		3	1	4
Crossaster sp.	81130101		1		1
Ophiuroida	8120	1			1
Amphiuridae	812903		1	1	2
Amphiodia spp.	81290301	4	5		9
Amphiodia urtica/periercta complex	812903019999	4	2	6	12
Holothuroidea	8170	1	1		2
Pentamera trachyplaca	8172060399	1			1
Ascidiacea	8401		1		1
					889
		289	291	309 Sum	
		5	6	6 Ave	
		156	297	231 Var	
		13	17	15 Sdv	
		1	1	1 Min	
		88	104	92 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 46

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Anthozoa sp. 1	374000009999	1	2	2	5
Turbellaria	3901	1			1
Nemertea	43	1	8	7	16
Nematoda	47		1		1
Polynoidae	500102		1	1	2
Harmothoe lunulata	5001020810		3		3
Lepidasthenia berkeleyae	5001021801	1	3	1	5
Tenonia priops	5001022302		1		1
Pholoides aspera	5001040101		1		1
Pholoe minuta	5001060101	5	2	5	12
Sthenelais tertiaglabra	5001060305	2	8	6	16
Paleonotus bellis	5001080101		1	1	2
Eteone longa	5001130205		1	1	2
Eulalia (Eumida) sanguinea	5001131101	2	3	4	9
Phyllodoce (Aponaitides) hartmanae	5001131402			5	5
Gyptis brevipalpa	5001210102		1	1	2
Autolytus cornutus	5001230101		1	2	3
Exgone gemmifera	5001230702	2	5	1	8
Exogone lourei	5001230703		1		1
Exogone verugera	5001230706		7		7
Nereis zonata	5001240406			1	1
Platynereis bicanaliculata	5001240501		2		2
Nephtys ferruginea	5001250111	1	4	5	10
Glycera capitata	5001270101	4	5	6	15
Glycinde picta	5001280101		2	1	3
Onuphidae	500129			4	4
Diopatra ornata	5001290202		5		5
Lumbrineris luti	5001310109	7	4	6	17
Drilonerис falcata minor	500133010402	1			1
Leitoscoloplos pugettensis	5001400102	12	9	14	35
Orbinia (Phylo) felix	5001400510	1			1
Allia ramosa	5001410706	1	4	1	6
Levinsenia gracilis	5001410801			2	2
Laonice cirrata	5001430201	3	4	1	8
Polydora giardi	5001430401		1		1
Polydora socialis	5001430402	1	1		2
Polydora cardalia	5001430431			5	5
Prionospio steenstrupi	5001430506	15	15	20	50
Prionospio lighti	5001430521		3	1	4
Spiophanes berkelyorum	5001431004	23	59	60	142
Paraprionospio pinnata	5001431702	2	6	4	12
Magelona longicornis	5001440105	9	5	15	29
Phyllochaetopterus prolifica	5001490202	2	77		79
Spiochaetopterus costarum	5001490302		4	1	5
Notomastus lineatus	5001600303		1	2	3
Mediomastus californiensis	5001600402	8		6	14
Euclymeninae	5001631			1	1
Euclymene zonalis	5001631103	2	4	6	12
Sabellaria cementarium	5001650201		4		4
Pectinaria californiensis	5001660304		1	1	2
Amage anops	5001670101		1		1
Anobothrus gracilis	5001670701		1	3	4
Terebellidae	500168	3	12	2	17
Neoamphitrite edwardsii	5001680405		1		1
Pista elongata	5001680703		2		2
Streblosoma bairdi	5001682502	1	2	1	4
Terebellides stroemi	5001690101		1	3	4
Megalomma splendida	5001700401			1	1
Bittium spp.	51034601		1		1
Mitrella tuberosa	5105030202	10	9	17	36

STATION 46 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nassarius mendicus	5105080101	5	10	1	16
Kurtziella plumbea	5106021107		1		1
Odostomia sp A	510801019939	1		9	10
Turbonilla aurantia	5108011134			1	1
Cylichna attonsa	5110040205	1		3	4
Nucula tenuis	5502020201	1		3	4
Mytilidae	550701		2		2
Megacrenella columbiana	5507010301	3		2	5
Modiolus spp.	55070106	1	1	1	3
Parvilucina tenuisculpta	5515010101	4	3		7
Lucinoma acutilineata	5515010201			1	1
Axinopsida serricata	5515020201	4		1	5
Mysella tumida	5515100102	1	1	2	4
Clinocardium nuttali	5515220102			1	1
Macoma spp.	55153101	1	1		2
Macoma yoldiformis	5515310111	8	11	22	41
Macoma carlottensis	5515310112		1	2	3
Compsomyax subdiaphana	5515470301		1		1
Psephidia lordi	5515470501			1	1
Hiatella arctica	5517060201	1			1
Cylindroleberididae	611103	1			1
Euphilomedes carcharodonta	6111070301	48	50	58	156
Euphilomedes producta	6111070303	2			2
Eudorella pacifica	6154040202	6	12	6	24
Ampelisca spp.	61690201			1	1
Ampelisca lobata	6169020134		8		8
Ampelisca careyi	6169020135	1			1
Byblis millsi	6169020208			5	5
Erichthonius brasiliensis	6169150302	13	6	1	20
Protomedeia prudens	6169260312	18	9	9	36
Allogaussia sp.	61693499		1		1
Synchelidium shoemakeri	6169371402	1			1
Westwoodilla caecula	6169371502	3	6	5	14
Heterophoxus oculatus	6169420301	1	6		7
Rhepoxynius abronius	6169421504	28	17	19	64
Callianassidae	618304		1		1
Callianassa spp	61830402			1	1
Pagurus spp.	61830602	1	2		3
Oregonia spp.	61870101		1		1
Cancer branneri	6188030103		1		1
Pinnixa spp.	61890604	25	23	30	78
Golfingia spp	72000201	4	3	5	12
Amphiodia spp.	81290301	17	10	13	40
Amphiodia urtica/periercta complex	812903019999	21	14	15	50
					1289
		342	502	445 Sum	
		6	7	7 Ave	
		78	150	118 Var	
		9	12	11 Sdv	
		1	1	1 Min	
		48	77	60 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 47

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Anthozoa sp 1	374000009999	219	60	61	340
Turbellaria	3901			1	1
Nemertea	43	13	11	2	26
Polynoidae	500102			1	1
Gattyana cirrosa	5001020603		1		1
Harmothoe lunulata	5001020810		1		1
Tenonia priops	5001022302			2	2
Pholoides aspera	5001040101	8	5	4	17
Sthenelais tertiaglabra	5001060305	2	1		3
Paleonotus bellis	5001080101	4	1		5
Phyllodoce (Anaitides) groenlandica	5001130102			1	1
Eulalia (Eumida) bilineata	5001130308			1	1
Eulalia (Eumida) sanguinea	5001131101	9	4	4	17
Gyptis brevipalpa	5001210102		1		1
Sigambra bassi	5001220204	1			1
Pilargis berkeleyi	5001220301	1		1	2
Autolytus cornutus	5001230101	1		2	3
Pionosyllis uraga	5001230204	2			2
Syllis hyalina	5001230312			1	1
Exgone gemmifera	5001230702		3		3
Exogone lourei	5001230703	2			2
Exogone molesta	5001230704		1		1
Exogone verugera	5001230706	3			3
Odontosyllis phosphorea	5001231303		2		2
Ehlersia heterochaeta	5001232201		2		2
Nephtys ferruginea	5001250111		1		1
Glycera capitata	5001270101	7	2	3	12
Glycinde picta	5001280101	1	4	3	8
Onuphidae	500129		5	1	6
Onuphis iridescens	5001290103		1		1
Diopatra ornata	5001290202	9	2	1	12
Lumbrineris spp.	50013101	1	2		3
Lumbrineris luti	5001310109	18	13	13	44
Lumbrineris cruzensis	5001310118			1	1
Lumbrineris californiensis	5001310132	11	2	6	19
Leitoscoloplos pugettensis	5001400102	14	20	10	44
Laonice cirrata	5001430201		1		1
Polydora giardi	5001430401	1			1
Polydora socialis	5001430402	1			1
Prionospio steenstrupi	5001430506	17	21	16	54
Prionospio lighti	5001430521			1	1
Spiophanes berkelyorum	5001431004	13	5	9	27
Paraprionospio pinnata	5001431702		1		1
Magelona longicornis	5001440105	12	9	5	26
Phyllochaetopterus prolifica	5001490202	11	12	4	27
Caulleriella alata	5001500202	1			1
Chaetozone setosa	5001500401	1			1
Notomastus tenuis	5001600302	1	2		3
Mediomastus spp.	50016004	6		1	7
Mediomastus ambiseta	5001600401	2			2
Barantolla americana	5001600601			2	2
Maldanidae	500163		1		1
Maldane spp.	50016303		1		1
Maldane glebifex	5001630302	2			2
Notoproctus pacificus	5001630601			1	1
Rhodine bitorquata	5001631001	1			1
Clymenura columbiana	5001631206	1			1
Sabellaria cementarium	5001650201	1		2	3
Pectinaria granulata	5001660303	6	1		7
Pectinaria californiensis	5001660304			1	1

STATION 47 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Amage anops	5001670101	10	46	10	66
Melinna elisabethae	5001670503	1			1
Terebellidae	500168	1	1		2
Terebellides stroemi	5001690101	1			1
Sabellidae	500170			1	1
Rissoidae	510320	1	1		2
Crepipatella lingulata	5103640301	3		7	10
Mitrella tuberosa	5105030202	16	8	7	31
Nassarius mendicus	5105080101	3	1		4
Kurtziella plumbea	5106021107	4	3	6	13
Odostomia sp A	510801019939	4		1	5
Turbonilla aurantia	5108011134		1	2	3
Cylichna attonsa	5110040205	1	1	1	3
Melanochlamys dimedea	511006999999		1		1
Nudibranchia	5127		1	1	2
Bivalvia	55	1			1
Nucula tenuis	5502020201	1			1
Mytilidae	550701	2			2
Megacrenella columbiana	5507010301	1	1	2	4
Parvilucina tenuisculpta	5515010101	7	11	1	19
Lucinoma acutilineata	5515010201	4	3	13	20
Axinopsida serricata	5515020201	1	1		2
Mysella tumida	5515100102	2			2
Clinocardium nuttali	5515220102			1	1
Macoma yoldiformis	5515310111	8	4	6	18
Macoma carlottensis	5515310112			1	1
Hiatella arctica	5517060201	4			4
Pandora filosa	5520020102			1	1
Lyonsia californica	5520050202	2	1		3
Cardiomya californica	5520100108			1	1
Euphilomedes carcharodonta	6111070301	44	13	13	70
Cirripedia	6130	7		14	21
Ampelisca spp.	61690201	1			1
Ampelisca hancocki	6169020113		4		4
Ampelisca lobata	6169020134	16			16
Byblis millsi	6169020208	1	1	1	3
Argissa hamatipes	6169070101		1		1
Ericthonius sp	61691503	1			1
Melita desdichada	6169211008	4			4
Protomedeia spp.	61692603	7	3		10
Protomedeia articulata	6169260307			3	3
Westwoodilla caecula	6169371502	2	5	2	9
Heterophoxus oculatus	6169420301	6	3	3	12
Rhepoxynius dabious	6169421505		1		1
Dyopedos spp.	61694499			1	1
Pagurus spp.	61830602		1	2	3
Cancridae	618803	1			1
Cancer gracilis	6188030105			1	1
Pinnixa spp.	61890604	1		1	2
Golfingia spp.	72000201	6	15	8	29
Ophiuroida	8120			1	1
Amphiuridae	812903	5	5	5	15
Amphiodia spp.	81290301	17	26	54	97

STATION 47 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Amphiodia urtica/periercta complex	812903019999	2	3	6	11
Holothuroidea	8170	6	33	7	46
Eupentacta pseudoquinquesemita	8172060201	1			1
					1352
		609	398	345 Sum	
		8	6	5 Ave	
		644	114	104 Var	
		25	11	10 Sdv	
		1	1	1 Min	
		219	60	61 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 48

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Stylatula elongata	3754010103		2	4	6
Nemertea	43	4	5	2	11
Nematoda	47			1	1
Polynoidae	500102		1		1
Pholoe minuta	5001060101	1			1
Phyllodoce (Aponaitides) hartmanae	5001131402		1		1
Gyptis brevipalpa	5001210102		4	1	5
Sigambra bassi	5001220204	17	3	18	38
Pilargis berkeleyi	5001220301		1	2	3
Nephtys cornuta franciscana	500125010401	10	12	3	25
Nephtys ferruginea	5001250111	1	1		2
Glycera capitata	5001270101	1	2	2	5
Glycinde picta	5001280101	2			2
Lumbrineris spp.	50013101			1	1
Lumbrineris luti	5001310109	2	5	1	8
Leitoscoloplos panamensis	5001400101	1	1		2
Levinsenia gracilis	5001410801		3	3	6
Acesta lopezi	5001411302	2	12	3	17
Laonice cirrata	5001430201		1		1
Polydora brachycephala	5001430429	1			1
Polydora cardalia	5001430431			1	1
Prionospio steenstrupi	5001430506			1	1
Prionospio lighti	5001430521	7	1		8
Spiophanes berkelyorum	5001431004	41	27	13	81
Paraprionospio pinnata	5001431702	2	3	3	8
Heteromastus filobranchus	5001600203	1			1
Maldanidae	500163	1			1
Polycirrus californicus	5001680810	1		1	2
Terebellides stroemi	5001690101		2		2
Nassarius mendicus	5105080101	12			12
Odostomia sp. A	510801019939		1		1
Cylichna attonsa	5110040205	1	3	1	5
Melanochlamys dimedea	511006999999		1		1
Yoldia scissurata	5502040504		6	1	7
Parvilucina tenuisculpta	5515010101	8	16	19	43
Axinopsida serricata	5515020201		2	3	5
Mysella tumida	5515100102	2	2	7	11
Macoma spp	55153101	8		1	9
Macoma calcarea	5515310101	4			4
Macoma carlottensis	5515310112		4		4
Psephidia lordi	5515470501			2	2
Neomysis kadiakensis	6153011504	1			1
Eudorella pacifica	6154040202	191	182	87	460
Ampelisca careyi	6169020135	3	3	3	9
Oedicerotidae	616937	1			1
Westwoodilla caecula	6169371502	1			1
Heterophoxus oculatus	6169420301		5	4	9
Tiron biocellata	6169500503			1	1
Crangon alaskensis	6179220102		1		1
Pinnixa spp.	61890604			2	2
Amphiodia spp	81290301			1	1
					832
		327	313	192 Sum	
		12	10	6 Ave	
		1255	1015	245 Var	
		35	32	16 Sdv	
		1	1	1 Min	
		191	182	87 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 49

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Turbellaria	3901		1		1
Nemertea	43	7	5	8	20
Pholoe minuta	5001060101	3	5	2	10
Eteone spilotus	5001130299	1	4	5	10
Phyllodoce (Aponaitides) hartmanae	5001131402			1	1
Gyptis brevipalpa	5001210102	3	4	6	13
Sigambra bassi	5001220204	12	3	10	25
Pilargis berkeleyi	5001220301	1			1
Nephtys cornuta franciscana	500125010401	4	12	13	29
Glycinde picta	5001280101	2			2
Lumbrineris luti	5001310109			1	1
Scoloplos acmeceps	5001400311			1	1
Prionospio lighti	5001430521	1	1	2	4
Spiophanes berkelyorum	5001431004	9	5	11	25
Paraprionospio pinnata	5001431702	36	20	33	89
Tharyx multifilis	5001500302	6	4	8	18
Mitrella tuberosa	5105030202		2	2	4
Nassarius mendicus	5105080101	2	1	3	6
Odostomia sp. A	510801019939	2	2	4	8
Parvilucina tenuisculpta	5515010101			1	1
Mysella tumida	5515100102	1			1
Macoma calcarea	5515310101	2		1	3
Macoma nasuta	5515310114		2		2
Psephidia lordi	5515470501	2	1		3
Euphilomedes carcharodonta	6111070301			1	1
Alienacanthomysis macropsis	6153013201	2			2
Heterophoxus oculatus	6169420301	1	1		2
Crangon alaskensis	6179220102	1		3	4
Pinnixa spp	61890604	29	49	25	103
Amphiuridae	812903		1		1
Amphiodia spp.	81290301	2	1		3
Amphiodia urtica/periercta complex	812903019999	4	7	2	13
					407
		133	131	143 Sum	
		6	6	7 Ave	
		77	111	65 Var	
		9	11	8 Sdv	
		1	1	1 Min	
		36	49	33 Max	

STATION 50 (Continued)

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Cirripedia	6130	2	3	3	8
Eudorella pacifica	6154040202	2			2
Diastylis alaskensis	6154050101		1		1
Leptochelia dubia	6157020103	18	2	3	23
Eudorellopsis sp	61640403		2		2
Ampelisca spp.	61690201	15	1	7	23
Ampelisca agassizi	6169020111	23	45	5	73
Corophium crassicorne	6169150203	3	1	1	5
Photis spp	61692602		20	1	21
Photis brevipes	6169260201	51	29	35	115
Westwoodilla caecula	6169371502		1		1
Heterophoxus oculatus	6169420301	1			1
Foxiphalus similis - cognatus complex	616942099999		1		1
Dyopedos spp	61694499	31		1	32
Pagurus spp.	61830602		2	1	3
Cancer spp.	61880301			1	1
Cancer gracilis	6188030105	1			1
Pinnixa spp.	61890604		1	1	2
Golfingia spp	72000201	1		1	2
Phoronida	77		1		1
Amphiodia spp	81290301		1	1	2
Amphipholus pugetanus	8129030201	7	4		11
Amphipholus squamata	8129030202	3		3	6
Holothuroidea	8170		2		2
Pentamera pseudopopulifera	8172060305			2	2
Leptosynapta clarki	8178010203			3	3
					1461
		640	440	381 Sum	
		11	7	7 Ave	
		345	118	99 Var	
		19	11	10 Sdv	
		1	1	1 Min	
		88	45	52 Max	

1989 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 50

Taxon	Code	Rep 1	Rep 3	Rep 5	Total
Nemertea	43	5		1	6
Nematoda	47	1		1	2
Harmothoe lunulata	5001020810			1	1
Pholoides aspera	5001040101		2		2
Paleonotus bellis	5001080101		1	1	2
Eteone spilotus	5001130299	1	1		2
Eulalia (Eumida) sanguinea	5001131101	2		3	5
Ophiodromus pugettensis	5001210401	1	3		4
Sphaerosyllis brandhorsti	5001230806	1			1
Nereis procera	5001240404	1			1
Nephtys cornuta franciscana	500125010401	1	1		2
Nephtys ferruginea	5001250111	4	1	4	9
Glycinde picta	5001280101	9	2	3	14
Lumbrineris luti	5001310109	1		1	2
Lumbrineris cruzensis	5001310118			1	1
Lumbrineris californiensis	5001310132	2	1	1	4
Leitoscoloplos pugettensis	5001400102	9	15	6	30
Polydora spp.	50014304		1		1
Prionospio steenstrupi	5001430506	8	28	28	64
Spiophanes berkelyorum	5001431004	1	1		2
Malacoceros glutaeus	5001431201	2			2
Magelona berkeleyi	5001440123		1		1
Caulleriella alata	5001500202	39	19	18	76
Chaetozone spinosa	5001500407	7	1	2	10
Armandia brevis	5001580202	3	3	1	7
Mediomastus spp.	50016004		7	2	9
Mediomastus ambiseta	5001600401	3	1	2	6
Mediomastus californiensis	5001600402	3		2	5
Decamastus gracilis	5001600501		1		1
Euclymene zonalis	5001631103		2	1	3
Ampharete arctica	5001670201	3	1	3	7
Ampharete labrops	5001670215	1	1	1	3
Polycirrus californicus	5001680810	2	1	2	5
Artacama coniferi	5001681101		1		1
Oligochaeta	5004	8	7	8	23
Rissoidae	510320	32	29	9	70
Mitrella tuberosa	5105030202	14	3	7	24
Nassarius mendicus	5105080101	4	12	12	28
Kurtziella plumbea	5106021107		2	1	3
Odostomia sp. A	510801019939	14	7	21	42
Turbonilla aurantia	5108011134	3	6	6	15
Retusa sp.	51100401	1			1
Mytilidae	550701	1		1	2
Parvilucina tenuisculpta	5515010101	2		1	3
Lucinoma acutilineata	5515010201		3		3
Axinopsida serricata	5515020201		1		1
Mysella tumida	5515100102	84	27	20	131
Clinocardium nuttali	5515220102	3		1	4
Solen sicarius	5515290201		1		1
Macoma spp.	55153101			1	1
Macoma yoldiformis	5515310111	4	15	11	30
Macoma nasuta	5515310114	11	5	14	30
Tellina modesta	5515310204	26	25	23	74
Compsomyax subdiaphana	5515470301			52	52
Psephidia lordi	5515470501	88	29	1	118
Protothaca sp	55154707	8	7	5	20
Mya arenaria	5517010201		1		1
Lyonsia californica	5520050202	18	4	3	25
Pycnogonida	60	1			1
Euphilomedes carcharodonta	6111070301	50	43	30	123

TABLE F-2 (Continued)

Station	Rep	Nema-toda	Poly-chaeta	Oligo-chaeta	Mol-lusca	Arthro-poda	Echino-derms	Misc. taxa	Total abund.	Tol-erant species	Sensi-tive species	Number of taxa
21	1	0	164	0	457	271	1	1	894	304	1	58
21	3	0	155	1	439	267	0	2	864	295	1	49
21	5	0	148	0	659	308	0	1	1116	335	2	51
22	1	0	37	0	176	93	0	1	307	93	0	33
22	3	0	49	0	204	89	0	1	343	101	0	37
22	5	0	24	0	146	98	1	1	270	80	0	41
23	1	0	67	0	355	116	0	4	542	115	0	55
23	3	0	86	0	284	95	1	2	468	88	0	62
23	5	0	60	0	216	88	1	2	367	77	0	59
24	1	0	35	0	28	29	2	0	94	12	4	45
24	3	0	50	0	28	43	6	3	130	17	7	35
24	5	0	36	0	31	29	2	2	100	11	4	40
25	1	0	74	0	75	150	2	1	302	134	0	45
25	3	0	132	0	54	58	3	0	247	46	0	37
25	5	0	111	0	125	186	3	0	425	158	0	42
26	1	0	94	0	143	116	1	1	355	92	0	61
26	3	0	146	1	100	134	2	3	386	107	0	73
26	5	0	141	0	108	111	1	0	361	90	0	65
27	1	0	191	0	118	215	3	18	545	209	0	91
27	3	0	267	0	66	291	20	28	673	265	0	97
27	5	0	206	0	100	332	6	11	655	335	0	84
28	1	0	238	0	106	77	1	5	427	77	2	86
28	3	0	530	0	121	99	7	23	780	99	3	93
28	5	0	311	0	110	104	3	10	538	85	0	99
29	1	0	55	0	7	6	3	4	75	8	0	24
29	3	0	58	0	59	77	1	2	197	28	0	42
29	5	0	62	0	64	61	3	2	192	51	0	39
30	1	0	738	0	93	128	15	4	978	682	0	52
30	3	0	504	0	122	150	4	2	782	517	0	45
30	5	0	255	0	0[a]	104	6	3	368	231	1	41
31	1	0	116	0	33	119	9	13	290	109	1	80
31	3	0	184	0	25	95	17	16	337	105	0	76
31	5	0	271	0	64	202	27	23	587	205	0	87
32	1	0	508	0	56	110	6	16	696	151	0	89
32	3	0	520	0	41	109	13	20	703	161	0	103
32	5	0	527	0	46	126	16	17	732	160	0	96
33	1	0	336	0	92	201	1	2	632	352	0	63
33	3	0	341	0	135	167	1	0	644	318	0	66
33	5	0	320	0	149	160	4	10	643	273	0	70
34	1	0	337	0	49	212	7	1	606	104	19	55
34	3	0	261	0	63	123	0	0	447	121	19	47
34	5	0	218	0	49	146	1	2	416	94	21	42
35	1	0	106	0	12	176	40	3	337	42	7	39
35	3	0	737	0	0[a]	434	40	3	1214	79	20	38
35	5	0	118	0	13	200	43	11	385	42	11	37
36	1	0	149	0	68	128	3	8	356	170	0	56
36	3	0	158	0	96	220	0	6	480	285	0	62
36	5	0	138	0	87	153	1	5	384	195	0	52
37	1	0	386	0	53	121	17	13	590	161	0	110
37	3	0	201	0	54	92	38	6	391	90	0	92
37	5	0	419	0	63	88	17	33	620	108	0	92
38	1	0	37	0	17	104	2	2	162	54	0	30
38	3	0	28	0	11	51	4	1	95	15	0	25
38	5	0	30	0	10	82	3	2	127	12	0	24
39	1	0	66	0	63	70	0	0	199	86	0	40
39	3	0	123	0	81	134	0	3	341	219	0	48
39	5	0	58	0	45	101	1	1	206	114	0	39
40	1	0	255	0	306	116	11	3	691	289	0	51
40	3	0	439	0	162	47	7	6	661	352	0	58
40	5	0	420	0	126	46	5	14	611	330	0	46
41	1	0	1779	0	1121	102	31	6	3039	1808	0	43

TABLE F-2. ABUNDANCES OF MAJOR TAXONOMIC GROUPS, POLLUTION-TOLERANT SPECIES, AND POLLUTION-SENSITIVE SPECIES

Station	Rep	Nematoda	Polychaeta	Oligochaeta	Mollusca	Arthropoda	Echinoderms	Misc. taxa	Total abund.	Tolerant species	Sensitive species	Number of taxa
1	1	0	122	0	13	138	111	1	385	4	0	29
1	3	0	50	0	35	98	115	1	299	5	0	25
1	5	0	148	2	68	130	226	0	574	6	0	33
2	1	0	153	0	68	30	1	0	252	25	0	45
2	3	1	356	6	76	50	3	4	498	34	0	60
2	5	0	346	1	76	33	7	6	469	22	0	72
3	1	0	346	22	60	0	0	0	428	183	0	27
3	3	0	82	0	9	6	0	0	97	53	0	17
3	5	0	219	0	14	4	0	0	237	50	22	36
4	1	0	210	0	55	46	6	8	325	32	10	52
4	3	0	179	0	65	40	5	7	296	34	4	45
4	5	0	137	0	40	102	5	3	287	37	17	43
5	1	0	26	0	85	109	28	0	248	17	0	42
5	3	0	35	1	58	72	39	3	208	20	1	37
5	5	0	33	0	79	77	42	3	234	8	0	34
6	1	0	85	0	197	11	18	5	316	99	0	54
6	3	0	117	3	251	13	12	4	400	123	0	56
6	5	0	52	0	76	6	3	2	139	51	0	41
7	1	0	265	1	28	24	1	8	327	3	0	37
7	3	0	287	0	16	50	10	19	382	15	0	64
7	5	1	408	2	16	67	3	20	517	23	0	80
8	1	0	236	1	63	75	3	3	381	45	17	72
8	3	0	219	0	101	84	0	2	406	43	16	56
8	5	0	195	0	96	81	5	0	377	55	3	71
9	1	0	89	0	105	229	11	2	436	13	0	47
9	3	0	106	0	106	258	2	4	476	17	0	58
9	5	0	121	1	100	302	9	1	534	33	0	47
10	1	0	449	0	54	99	1	0	603	108	0	64
10	3	0	551	1	95	104	0	5	756	113	0	75
10	5	0	412	0	65	96	4	2	579	83	1	61
11	1	1	483	1	0[a]	483	2	32	1003	58	3	93
11	3	1	444	0	87	371	0	26	929	84	4	99
11	5	0	618	0	101	271	1	20	1011	28	3	81
12	1	0	77	2	111	63	109	4	366	10	0	48
12	3	0	75	1	72	73	127	0	348	15	1	47
12	5	0	69	0	69	48	149	1	336	10	0	42
13	1	0	134	0	1130	176	0	1	1441	103	0	69
13	3	0	258	0	1180	157	0	6	1601	271	0	60
13	5	0	325	0	1154	138	1	14	1632	211	0	85
14	1	0	71	4	157	50	2	7	291	54	2	61
14	3	0	70	0	139	19	2	5	235	13	2	53
14	5	0	85	1	119	13	0	28	246	27	2	56
15	1	0	191	0	291	35	8	13	538	48	3	85
15	3	0	178	0	184	35	2	5	404	45	0	85
15	5	0	140	0	198	26	1	7	372	37	1	84
16	1	0	109	0	68	9	0	30	216	41	0	52
16	3	0	180	0	71	10	0	32	293	54	0	61
16	5	1	129	0	63	12	1	19	225	31	0	64
17	1	0	66	0	69	13	0	2	150	12	0	22
17	3	0	29	0	67	5	0	0	101	5	0	18
17	5	0	75	0	53	14	0	0	142	10	0	26
18	1	0	121	0	295	0	0	2	418	11	0	32
18	3	0	189	0	312	8	0	5	514	17	1	41
18	5	0	98	0	67	1	0	4	170	22	0	29
19	1	0	29	0	10	2	2	4	47	2	1	22
19	3	0	24	0	10	4	2	2	42	0	0	20
19	5	0	24	0	9	12	5	1	51	4	0	23
20	1	0	188	0	96	87	0	4	375	67	13	36
20	3	0	298	0	84	114	0	3	499	79	29	44
20	5	0	215	0	108	129	0	4	456	80	32	38

TABLE F-2. (Continued)

Station	Rep	Nema-toda	Poly-chaeta	Oligo-chaeta	Mol-lusca	Arthro-poda	Echino-derms	Misc. taxa	Total abund.	Tol-erant species	Sensi-tive species	Number of taxa
41	3	0	772	0	1419	92	6	5	2294	813	0	37
41	5	0	414	0	320	40	13	1	788	212	0	37
42	1	0	47	0	16	14	1	3	81	31	0	27
42	3	0	55	0	11	24	2	3	95	36	0	41
42	5	0	62	0	21	8	0	0	91	44	0	26
43	1	0	130	0	42	169	118	8	467	140	0	48
43	3	0	137	0	34	252	118	3	544	211	0	57
43	5	0	159	0	48	242	167	0	616	183	0	49
44	1	0	470	0	66	61	7	46	650	156	0	103
44	3	0	160	0	58	33	8	6	265	72	1	58
44	5	1	373	0	30	47	12	21	484	117	3	90
45	1	1	208	0	18	47	11	4	289	47	0	57
45	3	0	196	0	17	56	10	12	291	68	0	45
45	5	0	247	0	16	36	7	3	309	43	0	48
46	1	0	108	0	41	148	38	7	342	92	0	55
46	3	1	279	0	42	143	24	13	502	90	1	76
46	5	0	201	0	67	135	28	14	445	110	3	68
47	1	0	184	0	65	91	31	238	609	85	1	75
47	3	0	175	0	38	32	67	86	398	71	0	63
47	5	0	108	0	51	41	73	72	345	43	0	63
48	1	0	91	0	35	197	0	4	327	27	0	28
48	3	0	80	0	35	191	0	7	313	32	2	31
48	5	1	53	0	34	97	1	6	192	26	0	30
49	1	0	78	0	9	33	6	7	133	50	0	23
49	3	0	58	0	8	50	9	6	131	38	0	21
49	5	0	93	0	11	29	2	8	143	57	0	22
50	1	1	104	8	314	197	10	6	640	110	0	56
50	3	0	96	7	178	152	7	0	440	107	0	60
50	5	1	83	8	189	89	9	2	381	98	0	58

[a] Mollusca vials were broken.

TABLE F-3. LIST OF POLLUTION-SENSITIVE AND POLLUTION-TOLERANT SPECIES IDENTIFIED IN THE 1989 MARINE SEDIMENT MONITORING TASK

NODC Taxonomic Code	Taxonomic Name	Pollution Sensitive Species	Pollution Tolerant Species	Identified in MSMT[a]
5001010105	Aphrodita aculeata	X		
50011302	Eteone spp.		X	X
5001130201	Eteone californica		X	X
5001130203	Eteone pacifica		X	
5001130205	Eteone longa		X	X
5001210401	Ophiodromus pugettensis		X	X
5001240301	Nereis brandti		X	X
5001240302	Nereis (neanthes) virens		X	
5001240303	Nereis limnicola		X	
50012404	Nereis spp.		X	X
5001240404	Nereis procera		X	X
5001240406	Nereis zonata		X	X
50012501	Nephtys spp.		X	X
5001250102	Nephtys ciliata		X	
5001250103	Nephtys caeca		X	X
5001250104	Nephtys cornuta		X	X
500125010401	Nephtys cornuta franciscana		X	X
500125010402	Nephtys cornuta cornuta		X	
5001250105	Nephtys punctata		X	X
5001250109	Nephtys longosetosa		X	X
5001250111	Nephtys ferruginea		X	X
5001250113	Nephtys californiensis		X	X
5001250119	Nephtys caecoides		X	X
5001250121	Nephtys assignis		X	
5001250197	Nephtys sp A (Commencement Bay only)		X	
5001280101	Glycinde picta		X	X
5001280202	Goniada maculata		X	X
5001310104	Lumbrineris latreilli		X	X
500136	Dorvilleidae		X	X
5001360101	Dorvillea pseudorubrovittata		X	X
50013604	Ophryotrocha spp.		X	
50013605	Dorvillea spp		X	X
5001360504	Dorvillea rudolphi		X	X
5001360505	Dorvillea caeca		X	X
5001360507	Dorvillea japonica		X	
5001400102	Leitoscoloplos pugettensis		X	X
5001400301	Scoloplos armiger		X	X
5001430411	Polydora cornuta		X	
50014305	Prionospio spp.		X	X
5001430502	Prionospio cirrifera		X	
5001430506	Prionospio steenstrupi		X	X
5001431302	Pygospio elegans		X	
500143150101	Pseudopolydora kempi		X	
5001431702	Paraprionospio pinnata		X	X
50015003	Tharyx spp.		X	X
5001500302	Tharyx multifilis		X	X
5001580607	Ophelina acuminata		X	X
5001600101	Capitella capitata		X	X
5001600201	Heteromastus filiformis		X	X
5001600401	Mediomastus ambiseta		X	X
5001600402	Mediomastus californiensis		X	X
5001690101	Terebellides stroemi	X		X
5004	Oligochaeta		X	X
500901	Enchytraeidae		X	NA
500902	Tubificidae		X	NA
5009020706	Limnodriloides victoriensis		X	NA
5009020908	Tubificoides bakeri		X	NA
5009021801	Tectidrilus diversus		X	NA

TABLE F-3 (Continued)

NODC Taxonomic Code	Taxonomic Name	Pollution Sensitive Species	Pollution Tolerant Species	Identified in MSMT[a]
55040101	Solemya spp		X	X
5504010103	Solemya johnsoni		X	
5507010101	Mytilus edulis		X	
5515010101	Parvilucina tenuisculpta		X	X
5515020301	Thyasira flexuosa		X	
5515310101	Macoma calcarea		X	X
5515310114	Macoma nasuta		X	X
5515310116	Macoma balthica		X	
5515310124	Macoma inconspicua		X	
5517010201	Mya arenaria		X	X
5517010203	Mya truncata		X	
6111070301	Euphilomedes carcharodonta		X	X
6111070302	Euphilomedes longiseta		X	
6111070303	Euphilomedes producta		X	X
6153010301	Archaeomysis grebnitzkii	X		
6169150201	Corophium acherusicum		X	
6169421703	Grandifoxus grandis	X		
616948	Stenothoidae		X	X

[a] Oligochaetes were not identified to the lowest possible taxonomic level in the 1989 Marine Sediment Monitoring Task

TABLE F-4. BENTHIC INDICES

Station	Sample	Total Abundance	Number of Taxa	Shannon-Weiner Diversity	Swartz's Dominance	Equita-bility (J)	Dominance (I-J)	Infaunal Trophic Index
01	1	385.00	29.00	1.04	5.51	0.713	0.287	77.95
01	3	299.00	25.00	1.13	7.94	0.811	0.189	80.49
01	5	574.00	33.00	1.14	7.14	0.747	0.253	84.15
01	AVG	419.33	29.00	1.10	6.86	0.757	0.243	80.86
02	1	252.00	45.00	1.40	14.20	0.848	0.152	70.16
02	3	497.00	59.00	1.25	10.72	0.706	0.294	71.81
02	5	469.00	72.00	1.31	12.25	0.705	0.295	79.57
02	AVG	406.00	58.67	1.32	12.39	0.753	0.247	73.85
03	1	428.00	28.00	0.97	4.37	0.668	0.332	59.93
03	3	97.00	17.00	0.74	2.47	0.599	0.401	63.14
03	5	237.00	36.00	1.17	8.75	0.755	0.245	81.84
03	AVG	254.00	27.00	0.96	5.20	0.674	0.326	68.30
04	1	325.00	52.00	1.40	15.63	0.813	0.187	70.17
04	3	296.00	45.00	1.34	13.00	0.813	0.187	69.81
04	5	287.00	43.00	1.28	10.91	0.781	0.219	73.15
04	AVG	302.67	46.67	1.34	13.18	0.802	0.198	71.04
05	1	248.00	42.00	1.30	10.83	0.801	0.199	72.47
05	3	208.00	37.00	1.25	9.80	0.799	0.201	72.26
05	5	234.00	34.00	1.18	7.72	0.767	0.233	75.46
05	AVG	230.00	37.67	1.24	9.45	0.789	0.211	73.40
06	1	316.00	54.00	1.44	14.33	0.828	0.172	57.63
06	3	400.00	56.00	1.45	15.67	0.830	0.170	61.57
06	5	139.00	41.00	1.41	17.13	0.875	0.125	62.25
06	AVG	285.00	50.33	1.43	15.71	0.844	0.156	60.48
07	1	327.00	37.00	0.72	2.30	0.456	0.544	67.54
07	3	383.00	65.00	1.19	14.05	0.657	0.343	72.24
07	5	517.00	80.00	1.16	12.82	0.609	0.391	72.65
07	AVG	409.00	60.67	1.02	9.72	0.574	0.426	70.81
08	1	381.00	72.00	1.53	18.55	0.826	0.174	82.87
08	3	406.00	56.00	1.39	13.50	0.794	0.206	80.82
08	5	377.00	71.00	1.46	15.35	0.788	0.212	77.54
08	AVG	388.00	66.33	1.46	15.80	0.803	0.197	80.41
09	1	436.00	47.00	1.13	6.36	0.677	0.323	88.04
09	3	476.00	58.00	1.23	9.00	0.699	0.301	89.45
09	5	534.00	47.00	1.06	5.75	0.637	0.363	89.90
09	AVG	482.00	50.67	1.14	7.04	0.671	0.329	89.13
10	1	603.00	65.00	1.22	8.54	0.670	0.330	85.19
10	3	756.00	75.00	1.26	9.36	0.671	0.329	84.40
10	5	579.00	61.00	1.22	9.52	0.686	0.314	85.75
10	AVG	646.00	67.00	1.23	9.14	0.676	0.324	85.11
11	1	1003.00	93.00	1.28	9.96	0.649	0.351	93.68
11	3	929.00	99.00	1.43	15.48	0.716	0.284	85.87
11	5	1011.00	81.00	1.32	12.66	0.690	0.310	90.08
11	AVG	981.00	91.00	1.34	12.70	0.685	0.315	89.88
12	1	366.00	48.00	1.32	11.94	0.782	0.218	75.32
12	3	348.00	47.00	1.20	8.63	0.718	0.282	82.91
12	5	336.00	42.00	1.16	9.22	0.717	0.283	83.06
12	AVG	350.00	45.67	1.23	9.93	0.739	0.261	80.43
13	1	1441.00	69.00	0.73	2.46	0.396	0.604	67.06
13	3	1601.00	60.00	0.77	2.84	0.433	0.567	66.78
13	5	1632.00	85.00	0.91	4.47	0.470	0.530	67.33
13	AVG	1558.00	71.33	0.80	3.26	0.433	0.567	67.06
14	1	291.00	61.00	1.31	14.06	0.732	0.268	62.48
14	3	235.00	53.00	1.28	12.56	0.740	0.260	67.65
14	5	246.00	56.00	1.30	11.50	0.743	0.257	63.64
14	AVG	257.33	56.67	1.29	12.71	0.738	0.262	64.59
15	1	538.00	85.00	1.49	20.25	0.772	0.228	70.32
15	3	404.00	85.00	1.65	24.50	0.857	0.143	69.86
15	5	372.00	84.00	1.65	29.00	0.860	0.140	66.85
15	AVG	438.00	84.67	1.60	24.58	0.830	0.170	69.01

F-4 (Continued)

Station	Sample	Total Abundance	Number of Taxa	Shannon-Weiner Diversity	Swartz's Dominance	Equita-bility (J)	Dominance (1-J)	Infaunal Trophic Index
16	1	216.00	52.00	1.52	20.25	0.883	0.117	67.68
16	3	293.00	61.00	1.50	16.94	0.839	0.161	73.00
16	5	225.00	64.00	1.64	24.58	0.909	0.091	71.31
16	AVG	244.67	59.00	1.55	20.59	0.877	0.123	70.67
17	1	150.00	22.00	0.90	4.50	0.670	0.330	66.67
17	3	101.00	18.00	0.70	3.15	0.558	0.442	67.06
17	5	142.00	26.00	1.06	6.75	0.750	0.250	67.05
17	AVG	131.00	22.00	0.89	4.80	0.659	0.341	66.93
18	1	418.00	32.00	0.89	4.39	0.594	0.406	65.70
18	3	514.00	41.00	0.96	4.77	0.594	0.406	66.52
18	5	170.00	29.00	1.15	8.90	0.788	0.212	66.41
18	AVG	367.33	34.00	1.00	6.02	0.659	0.341	66.21
19	1	47.00	22.00	1.22	10.25	0.910	0.090	70.67
19	3	42.00	20.00	1.21	10.75	0.929	0.071	68.26
19	5	51.00	23.00	1.25	10.25	0.917	0.083	80.95
19	AVG	46.67	21.67	1.23	10.42	0.918	0.082	73.29
20	1	375.00	36.00	1.21	7.87	0.775	0.225	77.30
20	3	499.00	44.00	1.17	7.23	0.711	0.289	75.96
20	5	456.00	38.00	1.19	7.00	0.751	0.249	76.46
20	AVG	443.33	39.33	1.19	7.37	0.746	0.254	76.57
21	1	894.00	60.00	1.06	4.35	0.597	0.403	62.17
21	3	864.00	50.00	1.03	3.95	0.607	0.393	60.79
21	5	1116.00	52.00	0.94	3.52	0.549	0.451	60.49
21	AVG	958.00	54.00	1.01	3.94	0.584	0.416	61.15
22	1	307.00	34.00	1.06	5.02	0.693	0.307	68.61
22	3	343.00	37.00	0.98	4.25	0.624	0.376	67.02
22	5	270.00	41.00	1.07	4.61	0.666	0.334	69.09
22	AVG	306.67	37.33	1.04	4.63	0.661	0.339	68.24
23	1	542.00	55.00	1.15	5.77	0.661	0.339	71.25
23	3	468.00	62.00	1.26	10.00	0.705	0.295	73.90
23	5	367.00	59.00	1.32	11.89	0.746	0.254	71.08
23	AVG	459.00	58.67	1.25	9.22	0.704	0.296	72.08
24	1	94.00	45.00	1.53	21.50	0.926	0.074	76.61
24	3	130.00	35.00	1.40	13.88	0.904	0.096	68.50
24	5	100.00	40.00	1.46	17.50	0.910	0.090	78.74
24	AVG	108.00	40.00	1.46	17.63	0.913	0.087	74.62
25	1	302.00	45.00	1.02	4.85	0.619	0.381	69.76
25	3	247.00	37.00	1.00	5.53	0.640	0.360	70.20
25	5	425.00	42.00	1.06	4.96	0.651	0.349	71.19
25	AVG	324.67	41.33	1.03	5.11	0.637	0.363	70.38
26	1	355.00	61.00	1.36	14.38	0.761	0.239	57.45
26	3	386.00	73.00	1.49	17.58	0.802	0.198	66.92
26	5	361.00	65.00	1.54	19.95	0.848	0.152	72.02
26	AVG	367.33	66.33	1.46	17.30	0.804	0.196	65.46
27	1	545.00	92.00	1.47	21.75	0.747	0.253	74.47
27	3	673.00	98.00	1.36	17.63	0.682	0.318	75.62
27	5	655.00	84.00	1.18	14.54	0.614	0.386	73.43
27	AVG	624.33	91.33	1.34	17.97	0.681	0.319	74.51
28	1	427.00	87.00	1.53	23.31	0.790	0.210	81.12
28	3	780.00	93.00	1.17	11.75	0.595	0.405	90.73
28	5	538.00	99.00	1.50	20.90	0.752	0.248	85.69
28	AVG	581.67	93.00	1.40	18.65	0.712	0.288	85.85
29	1	75.00	24.00	1.07	9.13	0.774	0.226	68.00
29	3	197.00	42.00	1.25	9.58	0.769	0.231	62.48
29	5	192.00	39.00	1.16	8.33	0.727	0.273	56.94
29	AVG	154.67	35.00	1.16	9.01	0.757	0.243	62.47
30	1	978.00	52.00	0.86	3.81	0.501	0.499	67.46
30	3	782.00	45.00	0.87	3.85	0.529	0.471	65.58
30	5	368.00	41.00	0.93	4.00	0.578	0.422	68.04
30	AVG	709.33	46.00	0.89	3.89	0.536	0.464	67.02
31	1	290.00	81.00	1.50	23.75	0.788	0.212	75.24

F-4. (Continued)

Station	Sample	Total Abundance	Number of Taxa	Shannon-Weiner Diversity	Swartz's Dominance	Equita-bility (J)	Dominance (I-J)	Infaunal Trophic Index
31	3	337.00	77.00	1.55	22.25	0.821	0.179	78.15
31	5	587.00	88.00	1.50	22.05	0.773	0.227	77.03
31	AVG	404.67	82.00	1.52	22.68	0.794	0.206	76.80
32	1	696.00	89.00	1.24	11.67	0.634	0.366	86.46
32	3	703.00	103	1.41	15.61	0.700	0.300	83.23
32	5	732.00	96.00	1.42	18.17	0.717	0.283	85.56
32	AVG	710.33	96.00	1.35	15.15	0.683	0.317	85.08
33	1	632.00	63.00	1.21	8.73	0.674	0.326	66.67
33	3	644.00	66.00	1.26	9.38	0.695	0.305	67.33
33	5	643.00	70.00	1.31	10.81	0.709	0.291	66.86
33	AVG	639.67	66.33	1.26	9.64	0.692	0.308	66.96
34	1	606.00	55.00	1.29	9.24	0.742	0.258	77.45
34	3	447.00	47.00	1.23	8.22	0.735	0.265	71.00
34	5	416.00	42.00	1.15	7.29	0.711	0.289	69.01
34	AVG	489.67	48.00	1.22	8.25	0.729	0.271	72.49
35	1	337.00	39.00	1.09	6.09	0.687	0.313	77.33
35	3	1214.00	38.00	0.83	2.98	0.524	0.476	91.60
35	5	385.00	37.00	1.08	7.28	0.687	0.313	75.69
35	AVG	645.33	38.00	1.00	5.45	0.633	0.367	81.54
36	1	356.00	56.00	1.36	14.83	0.778	0.222	68.42
36	3	480.00	62.00	1.18	8.50	0.660	0.340	66.00
36	5	384.00	52.00	1.30	12.50	0.759	0.241	66.02
36	AVG	406.67	56.67	1.28	11.94	0.732	0.268	66.82
37	1	590.00	110	1.58	27.10	0.772	0.228	80.52
37	3	391.00	93.00	1.61	27.42	0.819	0.181	79.31
37	5	620.00	93.00	1.32	17.33	0.672	0.328	86.52
37	AVG	533.67	98.67	1.50	23.95	0.754	0.246	82.11
38	1	162.00	30.00	1.12	6.45	0.757	0.243	72.37
38	3	95.00	25.00	1.17	7.81	0.838	0.162	69.05
38	5	127.00	24.00	1.05	7.38	0.761	0.239	71.07
38	AVG	128.00	26.33	1.11	7.21	0.785	0.215	70.83
39	1	199.00	40.00	1.28	10.31	0.797	0.203	69.07
39	3	341.00	48.00	1.13	6.97	0.672	0.328	64.94
39	5	206.00	39.00	1.17	7.70	0.734	0.266	69.29
39	AVG	248.67	42.33	1.19	8.33	0.734	0.266	67.77
40	1	691.00	51.00	1.14	7.15	0.669	0.331	67.46
40	3	661.00	58.00	1.15	7.48	0.652	0.348	67.32
40	5	611.00	46.00	1.10	7.59	0.664	0.336	67.05
40	AVG	654.33	51.67	1.13	7.41	0.662	0.338	67.28
41	1	3039.00	43.00	0.52	1.56	0.318	0.682	67.04
41	3	2294.00	37.00	0.53	1.53	0.335	0.665	66.69
41	5	788.00	37.00	0.83	2.78	0.532	0.468	67.04
41	AVG	2040.33	39.00	0.63	1.95	0.395	0.605	66.92
42	1	81.00	27.00	1.14	9.38	0.796	0.204	78.85
42	3	95.00	41.00	1.32	17.25	0.818	0.182	80.43
42	5	91.00	26.00	1.00	6.63	0.704	0.296	69.84
42	AVG	89.00	31.33	1.15	11.08	0.773	0.227	76.37
43	1	467.00	48.00	1.33	11.63	0.788	0.212	82.68
43	3	544.00	57.00	1.19	8.23	0.676	0.324	80.93
43	5	616.00	49.00	1.14	6.65	0.677	0.323	84.93
43	AVG	542.33	51.33	1.22	8.84	0.714	0.286	82.85
44	1	650.00	103	1.51	20.10	0.752	0.248	78.46
44	3	265.00	58.00	1.44	18.19	0.816	0.184	76.61
44	5	484.00	90.00	1.51	21.25	0.774	0.226	79.30
44	AVG	466.33	83.67	1.49	19.85	0.781	0.219	78.13
45	1	290.00	57.00	1.28	12.13	0.728	0.272	71.80
45	3	291.00	45.00	1.08	7.05	0.652	0.348	67.27
45	5	309.00	48.00	1.18	8.96	0.702	0.298	72.70
45	AVG	296.67	50.00	1.18	9.38	0.694	0.306	70.59
46	1	342.00	55.00	1.44	14.21	0.828	0.172	76.11
46	3	502.00	77.00	1.52	20.42	0.805	0.195	80.28

F-4. (Continued)

Station	Sample	Total Abundance	Number of Taxa	Shannon-Weiner Diversity	Swartz's Dominance	Equita-bility (J)	Dominance (I-J)	Infaunal Trophic Index
46	5	445.00	69.00	1.50	18.29	0.814	0.186	74.03
46	AVG	429.67	67.00	1.49	17.64	0.816	0.184	76.81
47	1	609.00	75.00	1.33	16.97	0.710	0.290	76.04
47	3	398.00	63.00	1.44	14.10	0.800	0.200	81.75
47	5	345.00	63.00	1.44	16.79	0.800	0.200	83.03
47	AVG	450.67	67.00	1.40	15.95	0.770	0.230	80.27
48	1	327.00	28.00	0.76	2.78	0.522	0.478	64.91
48	3	313.00	31.00	0.82	3.81	0.548	0.452	64.47
48	5	216.00	30.00	1.00	5.00	0.680	0.320	64.27
48	AVG	285.33	29.67	0.86	3.86	0.583	0.417	64.55
49	1	133.00	23.00	1.05	6.19	0.773	0.227	69.12
49	3	131.00	21.00	0.98	6.05	0.743	0.257	71.70
49	5	143.00	22.00	1.10	6.91	0.817	0.183	65.79
49	AVG	135.67	22.00	1.04	6.38	0.778	0.222	68.87
50	1	650.00	56.00	1.39	12.89	0.796	0.204	69.08
50	3	440.00	60.00	1.43	12.50	0.805	0.195	70.14
50	5	382.00	58.00	1.43	13.79	0.814	0.186	65.68
50	AVG	490.67	58.00	1.42	13.06	0.805	0.195	68.30

TABLE F-5. LIST OF BENTHIC INFAUNA SPECIES IDENTIFIED IN THE 1989 MSMT

NODC Taxonomic Code	Taxonomic Name
3740	Anthozoa
374000009998	Anthozoa sp. 2
374000009999	Anthozoa sp. 1
3743010303	Pachycerionthus fimbriatus
3754010103	Stylatula elongata
3754020201	Ptilosarcus gurneyi
3901	Turbellaria
43	Nemertea
47	Nematoda
500102	Polynoidae
5001020603	Gattyana cirrosa
50010208	Harmothoe spp.
5001020803	Harmothoe extenuata
5001020806	Harmothoe imbricata
5001020810	Harmothoe lunulata
5001020821	Harmothoe fragilis
5001021103	Lepidonotus squamatus
5001021601	Polyeunoa tuta
5001021701	Hesperonoe complanata
5001021702	Hesperonoe adventor
5001021801	Lepidasthenia berkeleyae
5001021805	Lepidasthenia longicirrata
5001022302	Tenonia priops
5001040101	Pholoides aspera
5001060101	Pholoe minuta
5001060301	Sthenelais berkeleyi
5001060305	Sthenelais tertiaglabra
5001060601	Thalenessa spinosa
5001080101	Paleonotus bellis
500113	Phyllodocidae
5001130102	Phyllodoce (Anaitides) groenlandica
5001130103	Anaitides medipapillata
5001130106	Phyllodoce (Anaitides) maculata
5001130115	Phyllodoce papillosa
50011302	Eteone spp.
5001130201	Eteone californica
5001130205	Eteone longa
5001130299	Eteone spilotus
50011303	Eulalia (Eulalia) spp.
5001130301	Eulalia viridis
5001130308	Eulalia (Eumida) bilineata
5001130310	Eulalia levicornuta
5001130403	Notophyllum tectum
5001130701	Phyllodoce (Genetyllis) castanea
5001130803	Phyllodoce (Paranaitis) polynoides
500113090101	Hesionura coineaui difficilis
5001131101	Eulalia (Eumida) sanguinea
50011314	Phyllodoce spp.
5001131402	Phyllodoce (Aponaitides) hartmanae
5001131499	Phyllodoce (Anaitides) spp.
500113169999	Steggoa sp. 1
500121	Hesionidae
5001210102	Gyptis brevipalpa
5001210202	Microphthalmus aberrans
5001210401	Ophiodromus pugettensis
5001210501	Kefersteinia cirrata
5001210801	Micropodarke dubia
5001220204	Sigambra bassi
5001220301	Pilargis berkeleyi
500123	Syllidae

TABLE F-5 (Continued)

NODC Taxonomic Code	Taxonomic Name
5001230101	Autolytus cornutus
5001230204	Pionosyllis uraga
500123029989	Pionosyllis sp. 1
50012303	Syllis spp.
5001230308	Syllis elongata
5001230312	Syllis hyalina
5001230601	Eusyllis assimilis
5001230702	Exogone gemmifera
5001230703	Exogone lourei
5001230704	Exogone molesta
5001230706	Exogone verugera
5001230806	Sphaerosyllis brandhorsti
5001231303	Odontosyllis phosphorea
50012316	Streptosyllis sp. A
5001232201	Ehlersia heterochaeta
500124	Nereidae
5001240301	Nereis brandti
50012404	Nereis spp.
5001240404	Nereis procera
5001240406	Nereis zonata
5001240501	Platynereis bicanaliculata
500124119999	Eunereis wailesi
50012501	Nephtys spp.
5001250103	Nephtys caeca
500125010401	Nephtys cornuta franciscana
5001250105	Nephtys punctata
5001250106	Nephtys rickettsi
5001250109	Nephtys longosetosa
5001250111	Nephtys ferruginea
5001250119	Nephtys caecoides
5001250121	Nephtys assignis
5001260103	Sphaerodoropsis sphaerulifer
5001270101	Glycera capitata
5001270104	Glycera americana
500127019999	Glycera sp. 1
5001280101	Glycinde picta
5001280103	Glycinde armigera
50012802	Goniada spp.
5001280202	Goniada maculata
5001280203	Goniada brunnea
500129	Onuphidae
5001290101	Onuphis conchylega
5001290103	Onuphis iridescens
5001290111	Onuphis elegans
5001290202	Diopatra ornata
50013101	Lumbrineris spp.
5001310101	Lumbrineris bicirrata
5001310104	Lumbrineris latreilli
5001310109	Lumbrineris luti
5001310118	Lumbrineris cruzensis
5001310128	Lumbrineris limicola
5001310129	Lumbrineris lagunae
5001310132	Lumbrineris californiensis
5001310202	Ninoe gemmea
5001330103	Drilonereis longa
500133010402	Drilonerис falcata minor
500133019999	Drilonereis sp. C
5001330302	Notocirrus californiensis
50013601	Dorvillea sp.
5001360101	Dorvillea pseudorubrovittata
5001360201	Protodorvillea gracilis
5001360504	Dorvillea rudolphi

TABLE F-5. (Continued)

NODC Taxonomic Code	Taxonomic Name
5001360505	Dorvillea caeca
5001400101	Leitoscoloplos panamensis
5001400102	Leitoscoloplos pugettensis
5001400301	Scoloplos armiger
5001400311	Scoloplos acmeceps
50014005	Orbinia sp.
5001400510	Orbinia (Phylo) felix
5001410220	Aricidea minuta
5001410603	Cirrophorus lyra
5001410706	Allia ramosa
5001410801	Levinsenia gracilis
500141080101	Levinsenia gracilis oculata
5001411302	Acesta lopezi
5001411306	Acmira catherinae
5001420102	Apistobranchus ornatus
500143	Spionidae
50014302	Laonice spp.
5001430201	Laonice cirrata
5001430204	Laonice pugettensis
50014304	Polydora spp
5001430401	Polydora giardi
5001430402	Polydora socialis
5001430408	Polydora quadrilobata
5001430417	Polydora pygidialis
5001430419	Polydora armata
5001430429	Polydora brachycephala
5001430431	Polydora cardalia
5001430438	Polydora aggregata
5001430506	Prionospio steenstrupi
5001430599	Prionospio lighti
5001430701	Spio filicornis
5001430703	Spio cirrifera
5001430708	Spio butleri
5001430806	Polydora (Boccardiella) hamata
5001430812	Polydora (Boccardia) pugettensis
5001431001	Spiophanes bombyx
5001431004	Spiophanes berkelyorum
5001431201	Malacoceros glutaeus
5001431702	Paraprionospio pinnata
50014322	Aonides sp. 1
5001440105	Magelona longicornis
5001440123	Magelona berkeleyi
5001450102	Trochochaeta multisetosa
500149	Chaetopteridae
5001490202	Phyllochaetopterus prolifica
5001490302	Spiochaetopterus costarum
5001490401	Mesochaetopterus taylori
500150	Cirratulidae
5001500101	Cirratulus cirratus
5001500202	Caulleriella alata
50015003	Tharyx spp.
5001500302	Tharyx multifilis
5001500308	Tharyx tesselata
5001500309	Tharyx secundus
50015004	Chaetozone spp.
5001500401	Chaetozone setosa
5001500406	Chaetozone spinosa
5001500407	Chaetozone spinosa
5001520101	Cossura longocirrata
5001520199	Cossura modica
500154	Flabelligeridae
5001540199	Brada sachalina

TABLE F-5. (Continued)

NODC Taxonomic Code	Taxonomic Name
5001540202	Flabelligera affinis
5001540302	Pherusa plumosa
5001570101	Scalibregma inflatum
5001570201	Asclerocheilus beringianus
5001580202	Armandia brevis
5001580301	Ophelia limacina
5001580401	Travisia brevis
5001580403	Travisia pupa
5001580604	Ophelina breviata
5001580606	Ophelina acuminata
5001580607	Ophelina acuminata
5001590101	Sternaspis scutata
500160	Capitellidae
5001600101	Capitella capitata
5001600201	Heteromastus filiformis
5001600203	Heteromastus filobranchus
5001600302	Notomastus tenuis
5001600303	Notomastus lineatus
50016004	Mediomastus spp.
5001600401	Mediomastus ambiseta
5001600402	Mediomastus californiensis
5001600501	Decamastus gracilis
5001600601	Barantolla americana
500163	Maldanidae
5001630204	Clymenella complanata
50016303	Maldane spp.
5001630302	Maldane glebifex
5001630502	Nicomache personata
5001630601	Notoproctus pacificus
500163070101	Petaloproctus tenuis borealis
5001630802	Axiothella rubrocincta
50016309	Praxillella spp.
5001630901	Praxillella gracilis
500163090301	Praxillella affinis pacifica
5001631	Euclymeninae
5001631001	Rhodine bitorquata
5001631103	Euclymene zonalis
5001631206	Clymenura columbiana
5001632001	Isocirrus longiceps
500164	Oweniidae
5001640102	Owenia fusiformis
5001640201	Myriochele heeri
5001640202	Galathowenia nr. G. oculata
5001650101	Idanthyrsus ornamentatus
5001650201	Sabellaria cementarium
50016603	Pectinaria spp.
5001660303	Pectinaria granulata
5001660304	Pectinaria californiensis
500167	Ampharetidae
5001670101	Amage anops
50016702	Ampharete spp.
5001670201	Ampharete arctica
5001670208	Ampharete acutifrons
5001670215	Ampharete labrops
5001670304	Amphicteis scaphobranchiata
5001670306	Amphicteis mucronata
5001670401	Lysippe labiata
5001670501	Melinna cristata
5001670503	Melinna elisabethae
5001670701	Anobothrus gracilis
5001670804	Asabellides lineata
5001671402	Samytha californiensis

TABLE F-5. (Continued)

NODC Taxonomic Code	Taxonomic Name
5001672501	Schistocomus hiltoni
500168	Terebellidae
5001680101	Amphitrite cirrata
5001680401	Neoamphitrite robusta
5001680405	Neoamphitrite edwardsii
5001680601	Nicolea zostericola
50016807	Pista spp.
5001680701	Pista cristata
5001680703	Pista elongata
5001680710	Pista brevibranchiata
50016808	Polycirrus sp.
5001680810	Polycirrus californicus
5001681	Amphitritinae
5001681004	Thelepus setosus
5001681101	Artacama coniferi
500168130201	Lanassa venusta venusta
5001681702	Proclea graffii
5001681803	Scionella estevanica
5001682502	Streblosoma bairdi
5001682701	Lanice conchilega
5001690101	Terebellides stroemi
5001690201	Artacamella hancocki
500170	Sabellidae
50017001	Chone spp.
5001700104	Chone duneri
5001700106	Chone magna
50017003	Eudistylia sp.
5001700401	Megalomma splendida
5001700502	Myxicola infundibulum
50017006	Potamilla sp.
5001700601	Potamilla neglecta
5001700602	Potamilla myriops
5001700608	Potamilla occelata
5001700701	Potamilla intermedia
5001700802	Sabella media
5001702	Sabellinae
5001730101	Pseudochitinopoma occidentalis
50017305	Spirorbis spp.
5001730602	Spirorbis spirillum
500178	Spirorbidae
5004	Oligochaeta
51	Gastropoda
510210	Trochidae
5102100308	Margarites pupillus
5102100403	Solariella varicosa
510320	Rissoidae
51032001	Alvania spp.
510320019999	Alvania sp. A
51033505	Petaloconchus sp.
51034601	Bittium spp
5103509999	Nitidiscala tincta
5103530102	Melanella micrans
510364	Calyptraeidae
5103640101	Calyptraea fastigiata
510364029999	Crepidula sp. A
5103640301	Crepipatella lingulata
5103760201	Natica clausa
5103760402	Polinices pallida
510503019999	Amphissa sp. A
5105030202	Mitrella tuberosa
51050509	Plicifusus sp.
5105080101	Nassarius mendicus

TABLE F-5 (Continued)

NODC Taxonomic Code	Taxonomic Name
5105100102	Olivella baetica
510602	Turridae
5106020405	Oenopota tabulata
5106021106	Kurtziella plumbea
5106021107	Kurtziella plumbea
510801019938	Odostomia sp B
510801019939	Odostomia sp. A
51080102	Turbonilla spp.
5108011134	Turbonilla aurantia
510801119997	Turbonilla sp C
510801119998	Turbonilla sp B
5110	Cephalaspidea
5110010401	Rictaxis punctocaelatus
51100401	Retusa sp.
5110040203	Cylichna alba
5110040205	Cylichna attonsa
511006999999	Melanochlamys dimedea
5110070101	Gastropteron pacificum
5110090102	Diaphana sp.
5127	Nudibranchia
53	Polyplacophora
5330	Polyplacophora sp.
54	Aplacophora
5402	Chaetodermatida
55	Bivalvia
5502020101	Acila castrensis
5502020201	Nucula tenuis
5502040202	Nuculana minuta
5502040504	Yoldia scissurata
5502040507	Yoldia thraciaeformis
5504010106	Solemya reidi
55060601	Glycymeris sp.
550701	Mytilidae
5507010301	Megacrenella columbiana
55070104	Musculus spp
55070106	Modiolus spp.
5507010601	Modiolus modiolus
5509050101	Chlamys hastata
5515010101	Parvilucina tenuisculpta
5515010201	Lucinoma acutilineata
5515020102	Adontorhina cyclica
5515020201	Axinopsida serricata
55150203	Thyasira sp.
5515020325	Thyasira gouldii
55150501	Diplodonta sp.
5515090101	Neaeromya compressa
5515100102	Mysella tumida
5515170101	Cyclocardia ventricosa
5515190108	Astarte esquimalti
5515190122	Astarte willetti
55152201	Clinocardium spp.
5515220102	Clinocardium nuttali
551522019999	Clinocardium sp.
5515220301	Nemocardium centifilosum
551525	Mactridae
5515250104	Spisula falcata
5515290201	Solen sicarius
551531	Tellinidae
55153101	Macoma spp.
5515310101	Macoma calcarea
5515310102	Macoma elimata
5515310106	Macoma obliqua

APPENDIX G

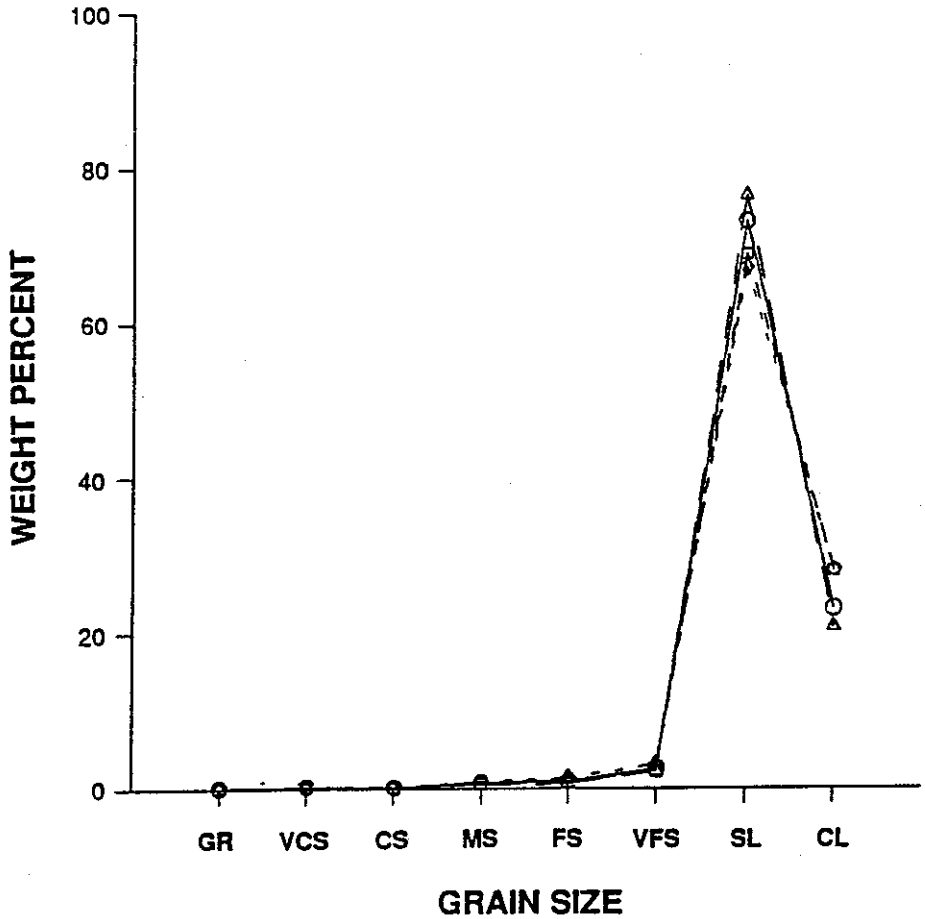
MISCELLANEOUS SEDIMENT CHEMISTRY TABLES AND FIGURES

FIGURES

Number		Page
G-1	Grain size distribution for replicates at Station 5	G-1
G-2	Grain size distribution for replicates at Station 26	G-2
G-3	Grain size distribution for replicates at Station 32	G-3
G-4	Grain size distribution for replicates at Station 38	G-4
G-5	Grain size distribution for replicates at Station 44	G-5

TABLES

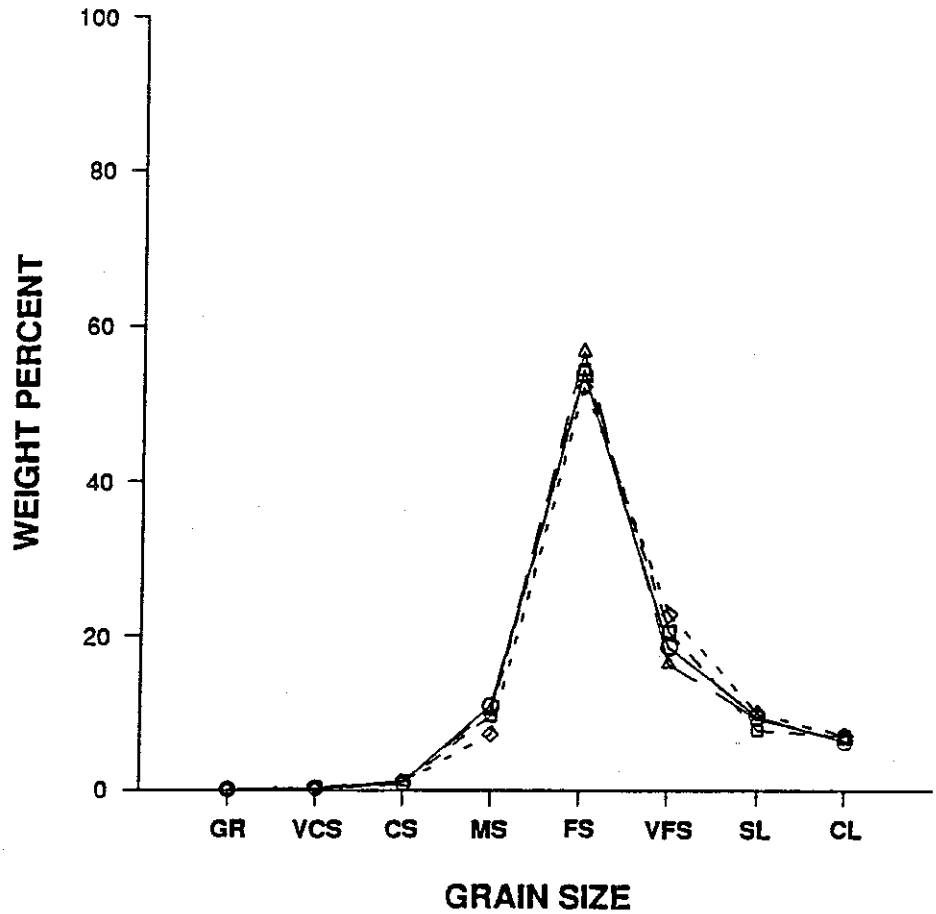
Number		Page
G-1	Comparison of concentrations of total organic carbon at MSMT stations with Puget Sound atlas stations	G-6
G-2	Intercept and slope values that define the mean relationships between fines content and metal concentrations in sediments at MSMT stations	G-7
G-3	Characteristics of stations in Groups A-I as defined in Figure 4	G-8
G-4	Summary of analytical methods	G-13



LEGEND

○	Sample 1	**GR**	Gravel	(<1 phi)	**FS**	Fine Sand	(2 - 3 phi)
△	Sample 1R	**VCS**	Very Coarse Sand	(-1 - 0 phi)	**VFS**	Very Fine Sand	(3 - 4 phi)
□	Sample 2	**CS**	Coarse Sand	(0 - 1 phi)	**SL**	Silt	(4 - 8 phi)
◇	Sample 3	**MS**	Medium Sand	(1 - 2 phi)	**CL**	Clay	(> 8 phi)

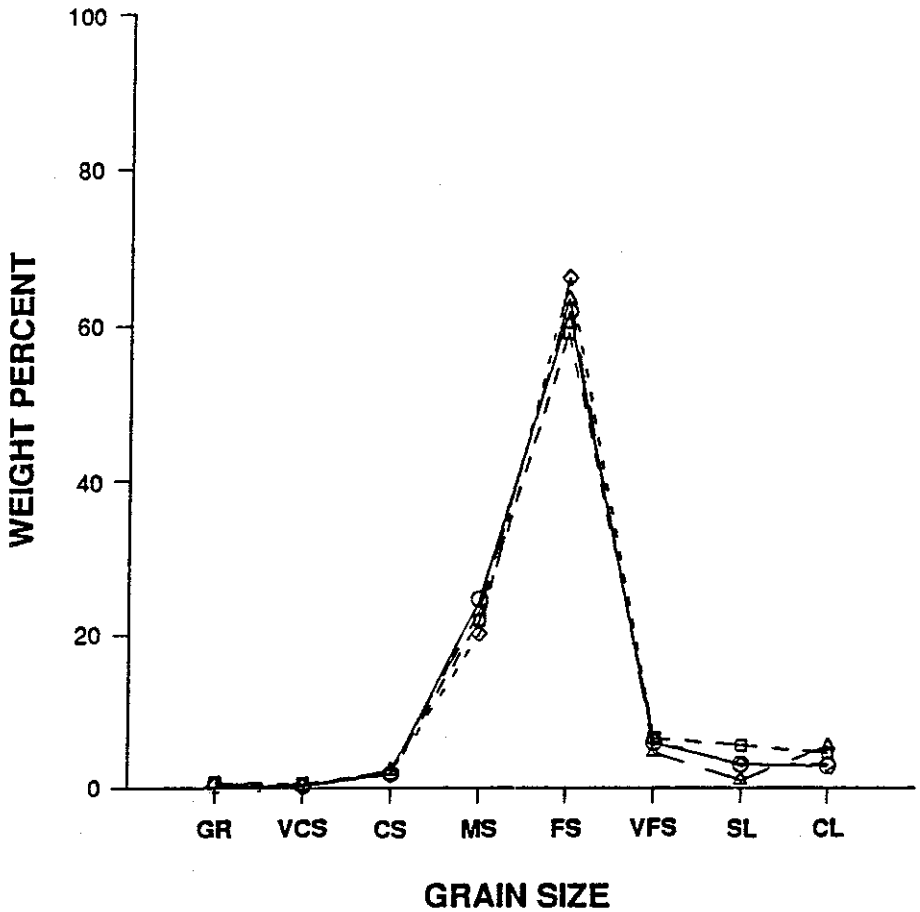
Figure G-1. Grain size distribution for replicates at Station 5.



LEGEND

○	Sample 1	**GR**	Gravel	(<1 phi)	**FS**	Fine Sand	(2 - 3 phi)
△	Sample 1R	**VCS**	Very Coarse Sand	(-1 - 0 phi)	**VFS**	Very Fine Sand	(3 - 4 phi)
□	Sample 2	**CS**	Coarse Sand	(0 - 1 phi)	**SL**	Silt	(4 - 8 phi)
◇	Sample 3	**MS**	Medium Sand	(1 - 2 phi)	**CL**	Clay	(> 8 phi)

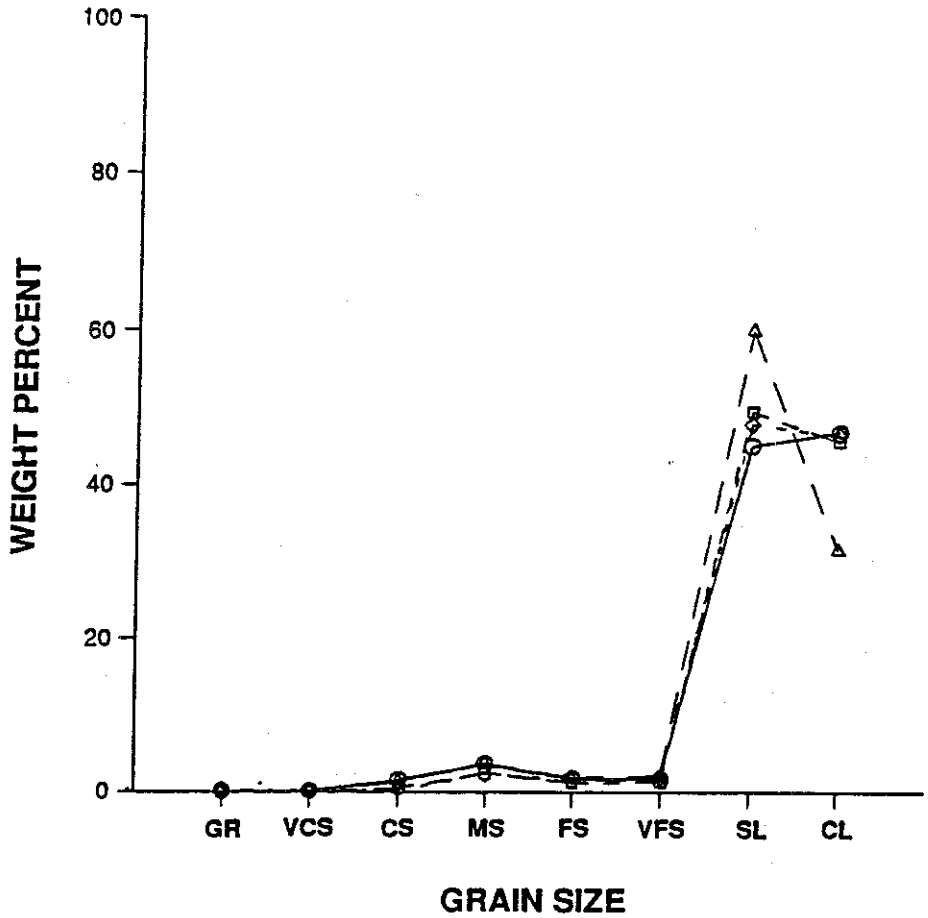
Figure G-2. Grain size distribution for replicates at Station 26.



LEGEND

○	Sample 1	**GR**	Gravel	(<1 phi)	**FS**	Fine Sand	(2 - 3 phi)
△	Sample 1R	**VCS**	Very Coarse Sand	(-1 - 0 phi)	**VFS**	Very Fine Sand	(3 - 4 phi)
□	Sample 2	**CS**	Coarse Sand	(0 - 1 phi)	**SL**	Silt	(4 - 8 phi)
◇	Sample 3	**MS**	Medium Sand	(1 - 2 phi)	**CL**	Clay	(> 8 phi)

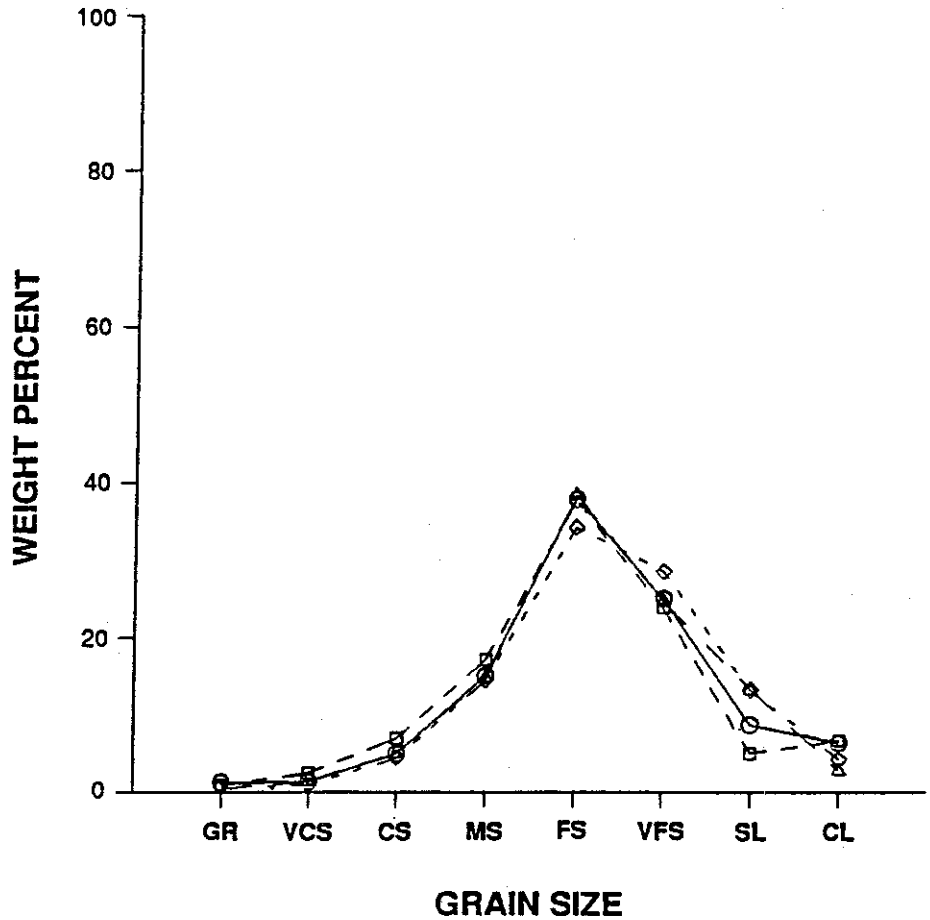
Figure G-3. Grain size distribution for replicates at Station 32.



LEGEND

○	Sample 1	**GR**	Gravel	(<1 phi)	**FS**	Fine Sand	(2 - 3 phi)
△	Sample 1R	**VCS**	Very Coarse Sand	(-1 - 0 phi)	**VFS**	Very Fine Sand	(3 - 4 phi)
□	Sample 2	**CS**	Coarse Sand	(0 - 1 phi)	**SL**	Silt	(4 - 8 phi)
◇	Sample 3	**MS**	Medium Sand	(1 - 2 phi)	**CL**	Clay	(> 8 phi)

Figure G-4. Grain size distribution for replicates at Station 38.



LEGEND

○	Sample 1	**GR**	Gravel	(<1 phi)	**FS**	Fine Sand	(2 - 3 phi)
△	Sample 1R	**VCS**	Very Coarse Sand	(-1 - 0 phi)	**VFS**	Very Fine Sand	(3 - 4 phi)
□	Sample 2	**CS**	Coarse Sand	(0 - 1 phi)	**SL**	Silt	(4 - 8 phi)
◇	Sample 3	**MS**	Medium Sand	(1 - 2 phi)	**CL**	Clay	(> 8 phi)

Figure G-5. Grain size distribution for replicates at Station 44.

TABLE G-1. COMPARISON OF CONCENTRATIONS OF TOTAL ORGANIC CARBON AT MSMT STATIONS WITH PUGET SOUND ATLAS STATIONS

MSMT Station	MSMT TOC (Percent)	Atlas TOC (Percent)
3	1.20	0.5-0.8
4	2.00	Approx. 2.4
5	E1.7-E1.9	1.2
6	E0.25	0.7-1.2
8	E3.90	Approx. 4.7
12	E1.50	1.0
17	E1.50	2.4
19	E1.90	2.2
20	E1.00	1.6
21	E1.30	1.3
24	1.70	2.4
26	0.35-0.56	1.2
27	0.12	0.1-0.4
28	0.15	0.6-1.3
29	1.60	1.0-2.0
30	1.40	1.8
31	0.15	0.3-0.9
32	0.11-0.22	0.2-0.7
33	0.64	0.9
34	2.20	3.0
36	0.13	0.2-0.4
38	2.00-2.20	2.1
39	0.09	0.1-0.2
40	0.70	1.2
42	0.09	0.3-0.6
44	0.40-0.44	Approx. 0.5
48	2.50	3.3
49	2.70	2.1-3.4

TABLE G-2. INTERCEPT AND SLOPE VALUES THAT DEFINE THE MEAN RELATIONSHIPS BETWEEN FINES CONTENT AND METAL CONCENTRATIONS IN SEDIMENTS AT MSMT STATIONS[a]

Linear Relationships: Y = a + b (X)						
Y	X	Intercept, (a)	Slope, (b)	R	N	Excluded Stations
TOC	%Fines	0.11	1.99×10^{-2}	0.87	61	8, 20, 41, 49
Al	%Fines	6267	1.47×10^{2}	0.90	63	17, 41
As	%Fines	2.9	5.3×10^{-2}	0.76	59	34, 38, 42
Ba	%Fines	12	3.7×10^{-1}	0.88	62	17, 24, 33
Cd	%Fines	0.06	1.5×10^{-3}	0.76	56	8, 19, 21, 30, 33, 34, 35, 48, 49
Ca	%Fines	3580	28.1	0.72	61	3, 6, 17, 35
Cr	%Fines	15	3.0×10^{-1}	0.89	61	16, 18, 20, 41
Co	%Fines	4.7	5.0×10^{-2}	0.73	62	17, 19, 20
Cu	%Fines	6.6	3.3×10^{-1}	0.86	62	17, 34, 35
Fe	%Fines	1.0×10^{4}	2.1×10^{2}	0.93	62	16, 17, 41
Pb	%Fines	6.5	1.1×10^{-1}	0.59	58	33, 34, 35, 38
Mg	%Fines	4277	83.4	0.89	62	17, 20, 41
Hg	%Fines	0.05	1.0×10^{-3}	0.75	62	8, 34, 35
Ni	%Fines	17.6	2.2×10^{-1}	0.70	63	20, 41
K	%Fines	849	30.5	0.95	63	20, 41
Ag	%Fines	0.04	2.5×10^{-3}	0.67	63	34, 35
Na	%Fines	2303	2.2×10^{2}	0.96	63	20, 41
V	%Fines	21.2	3.7×10^{-1}	0.92	63	16, 17
Zn	%Fines	24	6.9×10^{-1}	0.93	62	34, 35, 41

[a] Fines content was not significantly ($P>0.001$) correlated with antimony, beryllium, manganese, selenium, and thallium concentrations; see Table 13.

TABLE G-3. CHARACTERISTICS OF STATIONS IN GROUPS A-I AS DEFINED IN FIGURE 5.

Station	Characteristics
	GROUP A
1	22 m depth, level topography, adjacent to urban embayment (City of Blaine, Semiahmoo Bay).
4	24 m depth, level topography, 1-3 cm/sec currents, urban (City of Bellingham) embayment that receives Nooksack, Sumas, and Samish Rivers effluents.
5	20 m depth, level topography within Samish Bay that receives Samish River effluent.
12	20 m depth, level topography, approximately 1 cm/sec currents, urban (Port Townsend) embayment; wood chips observed in sediments.
20	11 m depth, fairly level topography, approximately 1 cm/sec net currents, embayment (Port Susan) receives Stillaguamish River effluent.
34	9 m depth, fairly level topography within Sinclair Inlet (an urban embayment adjacent to City of Bremerton and Puget Sound Naval Ship Yard), generally low net currents.
35	14 m depth, within Dyes Inlet, an embayment with generally low net current flow.
41	20 m depth, within Commencement Bay between Sitcum and Blair Waterways, near Puyallup River effluent.
48	20 m depth, flat topography, approximately 1 cm/sec net current, within Budd Inlet which receives Deschutes River effluent.
49	6 m depth, flat topography, approximately 1 cm/sec net current, within Budd Inlet which receives Deschutes River effluent.

Table G-3. (Continued)

Station	Characteristics
	GROUP B
17	79 m depth, off of Skokomish River delta in south Hood Canal (Annas Bay), low net bottom current.
19	121 m depth, mid-channel in Saratoga Passage (Whidbey Basin), low net current, contains highest clay content (47 percent) of all MSMT stations suggesting considerable distance from primary fluvial sources and sediment.
	GROUP C
24	180 m depth, mid-channel in Possession Sound, low net current flow to the southwest; passage of primary discharge from Whidbey Basin (and associated riverine discharges) into Central Basin of Puget Sound.
29	195 m depth, mid-channel in Central Basin, north of West Point and northwest of Shilshole Bay, fairly level topography, 0.4-8 cm/sec net bottom current to the south.
38	195 m depth, mid-channel in East Passage (Central Basin) off Point Pully, fairly level topography, 2-5 cm/sec net bottom current to the southeast.
	GROUP D
2	20 m depth, fairly flat topography distant from identifiable solids sources and river discharges, 0.4-4 cm/sec net currents.
8	21 m depth, intermediate slope within Port Angeles Harbor, net current velocity unknown; wood chips found in sediment.
10	20 m depth, intermediate slope in mouth of Dungeness Bay which receives Dungeness River effluent.
18	20 m depth, fairly flat topography in mouth of Oak Harbor, within Whidbey Basin across channel from major regional riverine discharges, generally low net currents.

Table G-3. (Continued)

Station	Characteristics
21	20 m depth, located on level area on edge of steep slope outside mouth of Port Gardner/Everett Harbor, 0.6-3.5 cm/sec net currents.
30	13 m depth, flat topography, in Eagle Harbor (City of Winslow and ferry terminal), possibly turbulent flows due to ferry traffic.
	GROUP E
45	53 meters, mid-channel in Drayton Passage, west of Anderson Island and northwest of the Nisqually River delta. Bottom topography is level and bottom currents have been measured in the range of 4 to 8 cm/sec.
	GROUP G
6	20 m depth, east of Anacortes, approximately 60 cm/sec net current.
9	21 m depth, along shoreline, no local solids discharges, fairly level topography, 1-8 cm/sec net current.
11	20 m depth, nonurban embayment (Discovery Bay), flat topography, no local solids discharges, low net current.
13	20 m depth, north Hood Canal, generally steep slope, 4-10 cm/sec net current.
15	20 m depth, Dabob Bay, generally steep slope, no local solids discharges, low net current.
16	20 m depth, South Hood Canal, fairly steep slope, low net current.
22	21 m depth, steep slope in Possession Sound, near shore, generally low net currents.
23	20 m depth, in Possession Sound, steep slope, generally low net currents.

Table G-3. (Continued)

Station	Characteristics
25	20 m depth, West Central Basin, steep slope, no local solids discharges, 6-7 cm/sec net currents.
27	20 m depth, steep slope off Richmond Beach wastewater treatment plant.
28	20 m depth, edge of slope that receives no local discharges, outside mouth of Port Madison.
31	22 m depth, at top edge of slope that receives no major local discharges, considerably outside mouth of Elliott Bay near West Point.
32	20 m depth, at top edge of slope that receives no major local discharges, outside mouth of Elliott Bay along Magnolia Buff.
33	20 m depth, on slope inside Elliott Bay southeast of Duwamish Head, low net current.
36	15 m depth, at Brace Point, steep slope, no major local discharges.
37	20 m depth, on slope, no major local discharges.
39	14 m depth, on slope, no local riverine influence, near Dash Point outfall.
40	10 m depth, entrance to City Waterway in Commencement Bay, gravel and wood chips and elevated organics concentrations in sediments suggests disturbed (nonnatural sorting) environment by either dredging and/or high flow scouring (erosion).
42	39 m depth, on slope outside mouth of Commencement Bay near Ruston, off of ASARCO smelter.
43	20 m depth, on slope of Carr Inlet, low net current, no local riverine influence.
44	20 m depth, east side of Anderson Island, very steep slope, 4-5 cm/sec net current.
46	22 m depth, on near-shore slope, no local solids discharges, low net currents.

Table G-3. (Continued)

Station	Characteristics
47	20 m depth, on slope of Case Inlet, approximately 5 cm/sec net current.
50	7 m depth, flat topography, in Oakland Bay (City of Shelton), sediment texture suggests high local (and possibly turbulent) current flows.
	GROUP H
7	133 m depth, mid-channel in the Strait of Juan de Fuca, 8-34 cm/sec net currents (high bottom flow to the east), contains 22 percent gravel.
14	115 m depth, deep hole in Hood Canal, no major local sources of solids, approximately 2 cm/sec net current.
	GROUP I
3	218 m depth, mid-channel in Strait of Georgia west of Cherry Point, generally distant from major sources of solids, bottom currents estimated at 4 to 20 cm/sec, contains 34 percent gravel (highest gravel content of all stations).
26	262 m depth, deepest MSMT station, located between the Central and Whidbey Basins in a canyon south of Admiralty Inlet, high southward bottom current velocities (8-18 cm/sec), contains 54 percent fine sand.

Summary of Analytical Methods

All options and modifications to PSEP recommended protocols (Tetra Tech 1986) are indicated

Particle Size (apparent; includes organic plus inorganic particles)
Consistent with the PSEP recommended protocol (Tetra Tech 1986); option for organics oxidation not employed, 8 class fractions analyzed.

TOC
Consistent with the PSEP recomended protocol (Tetra Tech 1986); sample pretreatment with HCl to rid inorganic carbon, sediment oxidized at 850° C and liberated CO_2 measured by infrared spectrophotometry. Reported in terms of carbon per dry weight of the unacidified sample.

Total Sulfides Consistent with the PSEP recommended protocol (Tetra Tech 1986); representing acid-soluble H_2S, HS^- and S^{2-}. Acid-labile sulfide is distilled and measured spectrophotometrically by a methylene blue method.

Metals
Consistent with the PSEP recommended protocol (Tetra Tech 1986), employing the selected options:

1. Digestion
   - Hydrofluoric acid
   - Hydrofluoric acid/aqua regia
   - Perchloric acid
   - Nitric acid
   - Nitric/hydrochloric acids
   - Nitric acid/hydrogen peroxide; U.S. EPA CLP

2. Instrumental analysis
   - Cold vapor atomic absorption (CVAA) for Hg; U.S. EPA CLP
   - Inductively-coupled plasma atomic emission spectroscopy (ICP-AES) for Cu, Ni and Zn
   - Graphite furnace atomic absorption (GFAA) for Sb, As, Cd, Pb, Se and Ag
   - X-ray fluorescence (XRF)
   - Flame atomic absorption (FAA)
   - Modifications employed for the MSMT due to requirements for increased precision and expanded list of metal analytes are:
     a. GFAA employing Method of Standard Addition (MSA) for Sb, As, Cd, Pb, Se, Ag and Tl
     b. ICP-AES for Al, Ba, Be, Ca, Cr, Co, Cu, Fe, Mg, Mn, Ni, K, Na, V and Zn; U.S. EPA CLP

VOA's

Consistent with the PSEP recommended protocol (Tetra Tech 1986) with modifications for expanded list of target analytes and increased sensitivities and precisions described in Appendix B, VOA's QA memo.

1. Addition of surrogates and internal standards to sediment (MSMT employed an expanded group of check compounds for QC purposes)
2. Sample preparation
   - Purge & Trap; U.S. EPA CLP
   - Vacuum extraction/Purge & Trap
3. Instrumental analysis; GC/MS; U.S. EPA CLP

Extractable Organics

Consistent with the PSEP recommended protocol (Tetra Tech 1986), employing the selected options:

1. Addition of surrogates to sediment (MSMT employed an expanded group of check compounds for QC purposes as described in Appendix B, BNA QA memo)
2. Extraction (BNA = 100 gm sample; Pest/PCB's = 50 gm sample)
   - Shaker/Roller technique
   - Soxhlet; U.S. EPA M 3550
   - Sonication; U.S. EPA CLP, M 3550
3. Extract Dehydration
   - Anhydrous Na_2SO_4; U.S. EPA CLP, and/or
   - Backextract with nonpolar solvent
4. Extract concentration
   - Kuderna-Danish technique
   - Rotary evaporation
5. Extract cleanup
   a. Elemental sulfur (S_x) removal
      - Metallic mercury
      - Act'd copper
      - MSMT modification included S_x removal during next step, not as a separate step here

   b. Gel Permeation Chromatography (GPC); U.S. EPA CLP; also accomplishes S_x removal from extract. Followed by solvent exchange and concentration.

   c. Adsorption/Partition chromatography
      - Reverse-phase chromatography
      - Normal-phase chromatography for ABN and RA's/guaiacols
      - Alumina column chromatography for Pest/PCB's; U.S. EPA CLP

TABLE G-4. (Continued)

6. Extract concentration
   - Kuderna-Danish technique
   - Rotary evaporation

7. MSMT modification includes splitting the acid fraction from step 5 c, above for methyl ether and ester formation of guaiacols and resin acids (RA's), respectively, by reaction with diazomethane in hexane/methylene chloride

8. Addition of internal standards to all fractions, with exception of Pest/PCB's

9. Instrumental analysis
   - GC/FID
   - GC/ECD for Pest/PCB's; U.S. EPA CLP
   - GC/MS; U.S. EPA CLP; for two ABN fractions and a derivatized acid fraction

TABLE G-4. (Continued)

Summary of Holding Times

Analytical Parameter	Max Holding Time/Preservation	PSEP Recommended Max Holding Time/Preservation
Particle Size	50 days / 4° C	180 days / 4° C
TOC	19 days / 4° C	180 days / frozen (-20° C)
Total Sulfides	8 days/4° C, darkness, $Zn(C_2H_3O_2)_2$	7 days/4° C, darkness, $Zn(C_2H_3O_2)_2$
Metals	Hg: 23 days / 4° C All other metals: 51 days / 4° C	180 days / frozen (-20° C) 180 days / frozen (-20° C)
VOA's	8 days / 4° C	14 days / 4° C
Extractable Organics	9 days / 4° C (extract = 37 days)	1 year / frozen (-20° C) (extract = 40 days)