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DEPARTMENT OF
ECOLOGY

Puget Sound Ambient Monitoring Program
Marine Sediment Monitoring Task

Annual Report 1991

June 1994
Publication #94-93
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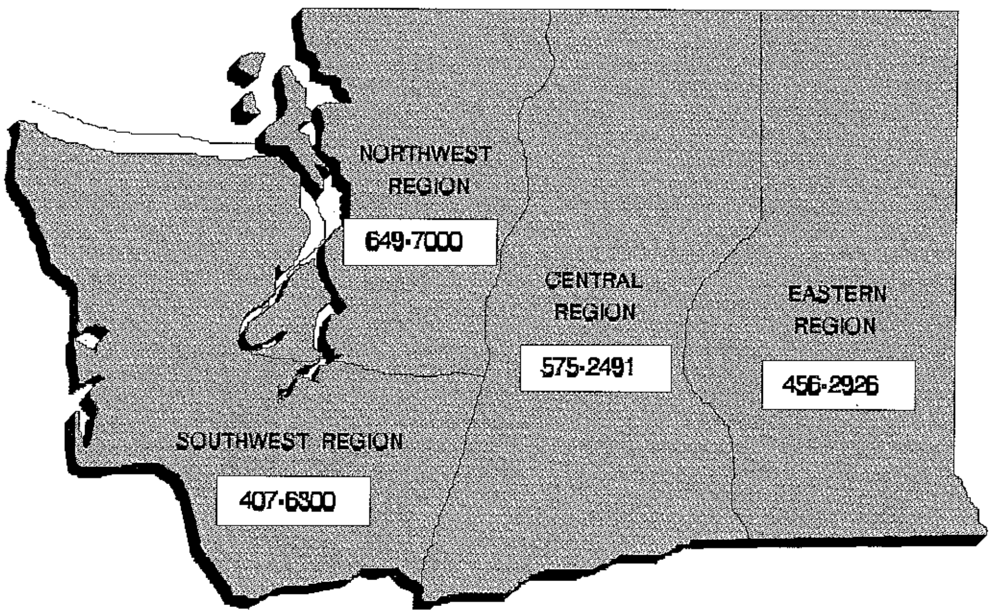

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Marine Sediment Monitoring Program

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Environmental Investigations
and Laboratory Services Program
Ambient Monitoring Section
Washington State Department of Ecology
Post Office Box 47710
Olympia, Washington 98504-7710

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This report was prepared by the Washington State Department of Ecology, Puget Sound Sediment Monitoring Unit. Field sampling, analysis of benthic infauna samples, and all data analysis was performed by Department of Ecology personnel. Analysis of sediment chemistry and bioassay samples was managed by BCI Environmental Services; chemical analyses were performed by Analytical Resources, Inc. and bioassay analyses were performed by Invert Aid.

ABSTRACT

The 1991 Marine Sediment Monitoring Task was conducted by the Washington State Department of Ecology as a component of the Puget Sound Ambient Monitoring Program (PSAMP). The marine sediment monitoring program is designed as a long-term monitoring effort to: 1) characterize baseline conditions, and 2) identify both natural and anthropogenic changes in Puget Sound. This report includes sediment chemistry, amphipod bioassay, and benthic infauna community data from 48 stations throughout Puget Sound.

The top two centimeters of sediment from at least five grab samples at each station were composited and homogenized. Samples were analyzed for toxicity using amphipod bioassays and for the presence of metals, semivolatile and volatile organic compounds (VOC), and chlorinated pesticides/PCBs. Five replicate grab samples were collected and analyzed for benthic infaunal community structure.

Sediments from Stations 34 (Sinclair Inlet), 35 (Dyes Inlet), and 21 (Port Gardner) exceeded state sediment quality standards for mercury. Concentrations of metals from all other stations were below state standards.

The highest concentrations of VOCs were found at Stations 34 (Sinclair Inlet), 35 (Dyes Inlet), and Station 204R (Eastsound, Orcas Island).

Concentrations of low and high molecular weight polycyclic aromatic hydrocarbons (PAH) were highest at Station 40 at the mouth of City Waterway. In contrast to results in 1989 and 1990, when normalized to total organic carbon, the concentration of LPAHs at Station 40 did not exceed state standards. Concentrations of beta-coprostanol were highest at Station 208R (Goose Point, Sequim Bay), followed closely by Station 41, adjacent to the Tacoma wastewater outfall. The polychlorinated biphenyl (PCB) Aroclor 1254 was detected in 25 samples, with the greatest concentration at Stations 35 (Dyes Inlet) and 33 (Elliott Bay). Aroclor 1260 was detected in six samples with the highest concentration at Station 34 in Sinclair Inlet. With the exception of 4,4'-DDT at nine stations and 4,4'-DDE and DDD at one station, no chlorinated pesticides were detected.

Comparison of test results to the negative control showed significantly increased amphipod mortality at only two North Sound and one Central Sound station.

Mean total abundance of benthic infauna ranged from 49.4 individuals per 0.2 m^2 at Station 19 (Saratoga Passage) to 1693.8 at Station 41 (Blair/Sitcum Waterways), and the mean number of taxa ranged from 2.4 at Station 208R (Goose Point, Sequim Bay) to 123.8 at Station 26 (West Central Basin).

INTRODUCTION

This report is the third annual report of the Marine Sediment Monitoring Task (MSMT). Marine sediment monitoring in Puget Sound is conducted by the Washington State Department of Ecology (Ecology) Ambient Monitoring Section and is a major component of the multi-agency Puget Sound Ambient Monitoring Program (PSAMP) (Puget Sound Water Quality Authority, 1988). This report discusses data collected in the 1991 MSMT survey, with some discussion of differences noted from the previous two years of sampling. The data used to prepare this report includes sediment chemistry, amphipod bioassay, and benthic infauna community data from all 48 stations.

The PSAMP was developed by an interdisciplinary committee of water quality professionals known as the Monitoring Management Committee (MMC). The PSAMP was designed to be a long-term monitoring program implemented by several state agencies to provide an exhaustive baseline characterization of the condition of Puget Sound. The PSAMP is coordinated by a steering committee composed of representatives of the lead participating agencies.

The Marine Sediment Monitoring Task (MSMT) was designed to identify both natural and anthropogenic changes in Puget Sound sediments by determining levels of contamination by organic compounds and heavy metals, toxic effects of contaminants on bioassay organisms, and effects of contaminants on benthic macroinvertebrate communities. The MSMT goals and a list of more specific objectives can be found in the implementation plan for the sediment task (Striplin, 1988). The implementation plan is an expanded Quality Assurance Project Plan (QAPP) which describes the rationale, methods, quality assurance/quality control (QA/QC) requirements, and data quality objectives for the sediment task.

Under contract with Ecology, the 1989 program was performed by Tetra Tech, Inc., Bellevue, Washington. In 1990, staff were added within Ecology's Ambient Monitoring Section to manage and carry out the task. Field sampling, benthic infauna sample processing, and all data analysis and report preparation has been completed by Ecology personnel since 1990.

The report prepared by Tetra Tech for the 1989 survey described the program in detail. Because both the 1990 and 1991 efforts were performed in the same manner as the 1989 program, many parts of this report refer to the 1989 report (Tetra Tech, 1990) and to the Implementation Plan (Striplin, 1988) for additional detail.

METHODS

Field Sampling

Field sampling for the 1991 study was conducted from March 25 to April 14, 1991. Samples were collected from the Research Vessel Kittiwake, owned and operated by Mr. Charles Eaton of Seattle, Washington.

For the 1991 study, 48 stations were sampled throughout Puget Sound (Figures 1 and 2). Of these 48 stations, 34 were core stations that are sampled annually. The remaining 14 stations sampled in 1991 were rotating stations located in North Puget Sound and the Strait of Georgia. Rotating stations are sampled once every three years on a rotating basis with South and Central Puget Sound.

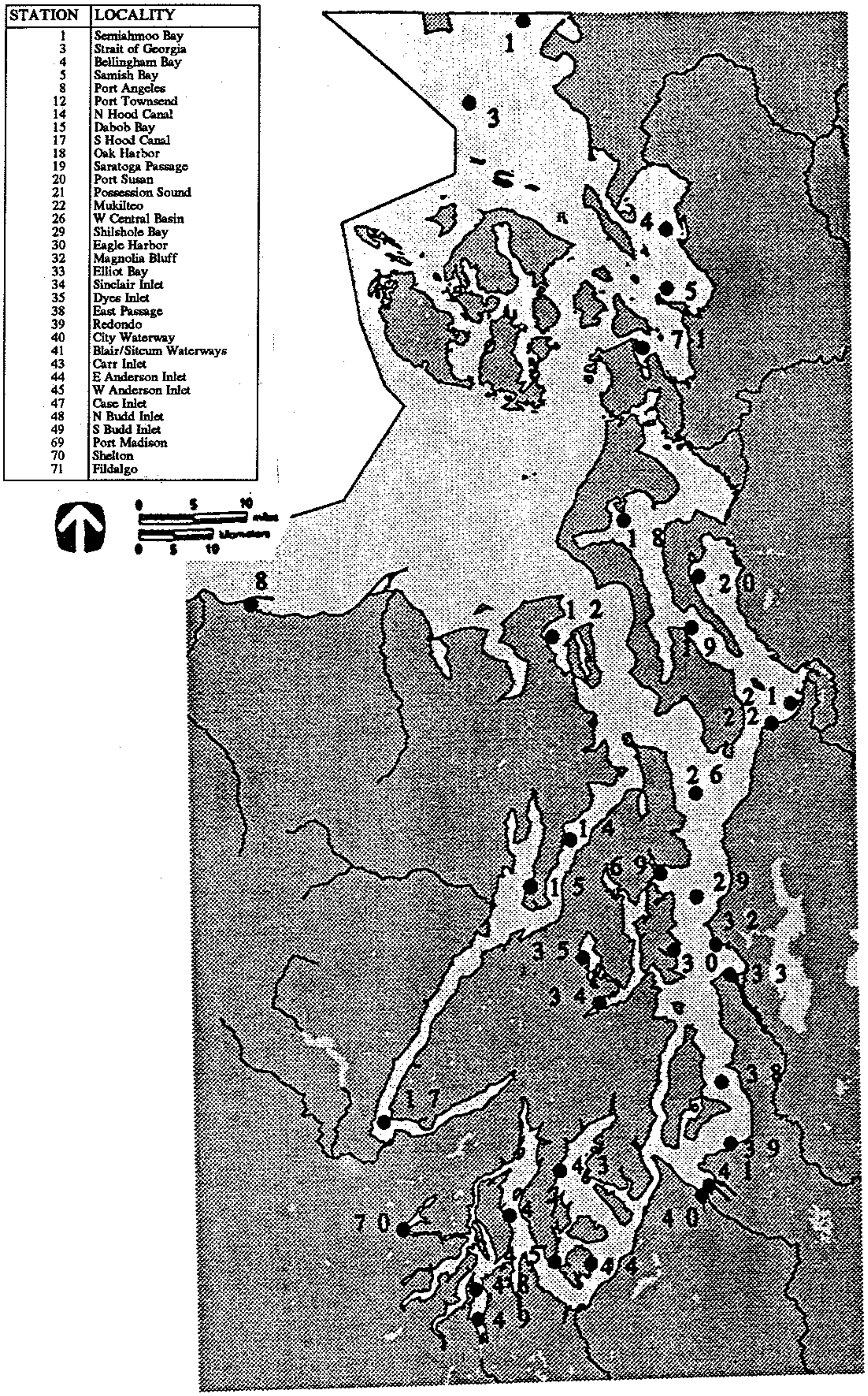
Station positioning followed Puget Sound Protocols (Puget Sound Estuary Program (PSEP), 1986a) and was accomplished using a Global Positioning System (GPS), LORAN C, variable radar ranging, water depth, and line-of-sight fixes on land objects. Latitude and longitude coordinates determined by GPS were used to establish positions of new stations. Positioning data were recorded for all stations and are contained in the cruise summary report (Ecology, 1991) which is provided in Table 2 of Appendix A.

Sediment samples were collected using a double $0.1m^2$ stainless steel modified van Veen grab sampler. Sampling procedures followed the Puget Sound Protocols (PSEP, 1986b) and the MSMT Implementation Plan (Striplin, 1988).

Sampling equipment was decontaminated between stations and between composites at stations where samples were collected for replicate chemistry measurements (environmental variability). With the exception of utensils used to collect sediment for analysis of VOCs, decontamination involved the following steps: an Alconox wash of all equipment at the laboratory; in the field, utensils used for the collection of sediment for the semivolatile organic, heavy metals and conventional parameters were given a methanol rinse and were allowed to air dry. A final rinse with large amounts of on-site seawater was used to rinse off any methanol that may have adhered to the sampling equipment. This procedure varies from that used in previous years when equipment was cleaned with acetone and methylene chloride. The change was made due to concern that the acetone and methylene chloride on board the ship may be contaminating the VOC samples. The utensils used to take sediment samples for analysis of VOCs were washed with Alconox, rinsed with boiling fresh water, and then rinsed with organic free water. The utensils were wrapped with aluminum foil and stored away from organic solvents and the rest of the sample handling equipment.

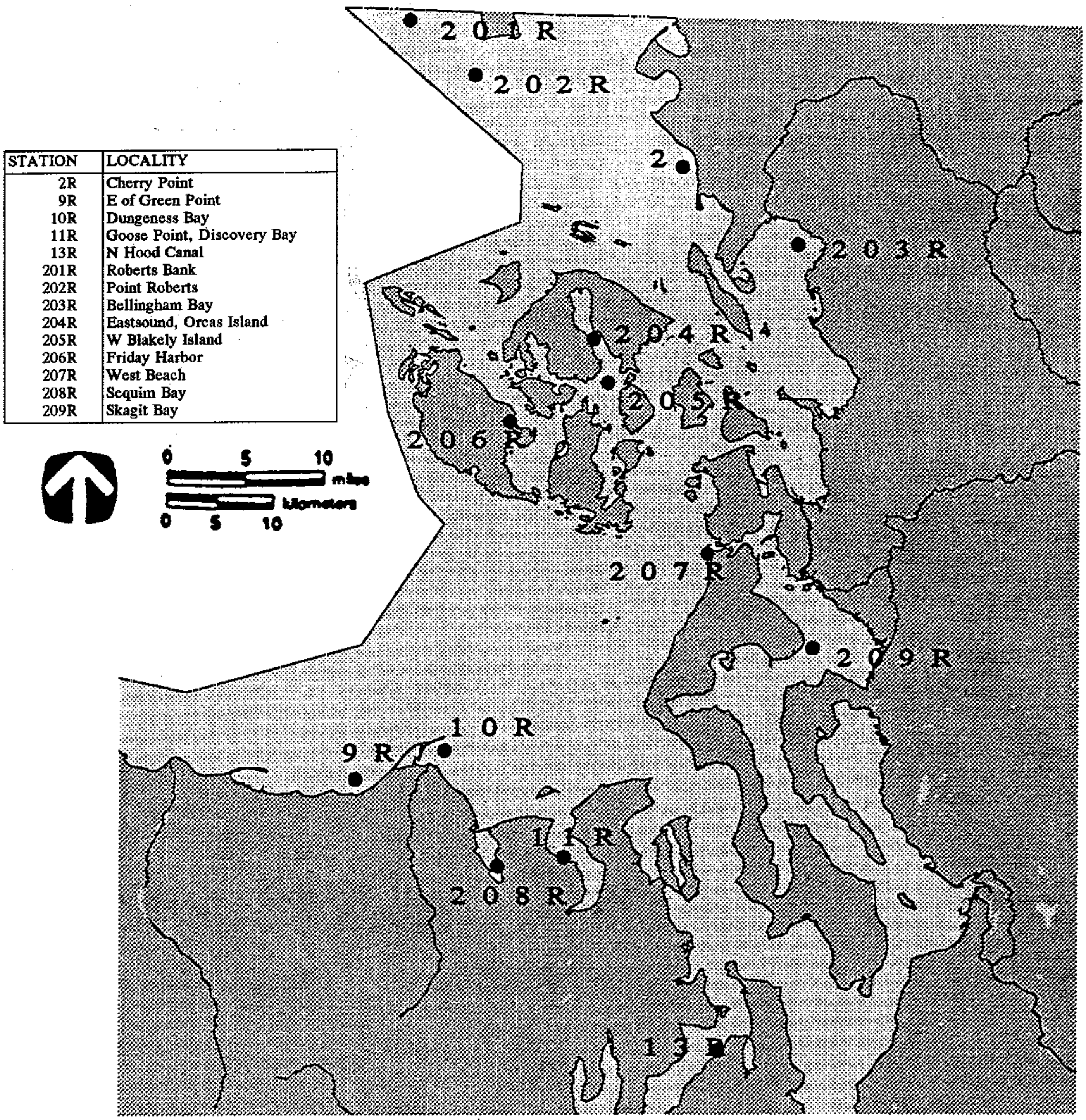
A list of the types of samples taken at each station is provided in Appendix A.

Sediment samples for sediment chemistry and bioassays were collected at all 48 stations. In addition, two types of field generated quality control samples (blind laboratory replicates and blind field replicates) were collected at five stations (Stations 5, 32, 35, 38, and 44). Blind laboratory replicate samples were generated by splitting composited and homogenized sediment from the same group of grab samples; one split was assigned the field station number and the other split was assigned an artificial station number. Blind field replicates were generated by taking two separate sets of composited sediment samples and assigning each set an artificial station number.



STATION	LOCALITY
1	Semiahmoo Bay
3	Strait of Georgia
4	Bellingham Bay
5	Samish Bay
8	Port Angeles
12	Port Townsend
14	N Hood Canal
15	Dabob Bay
17	S Hood Canal
18	Oak Harbor
19	Saratoga Passage
20	Port Susan
21	Possession Sound
22	Mukilteo
26	W Central Basin
29	Shilshole Bay
30	Eagle Harbor
32	Magnolia Bluff
33	Elliot Bay
34	Sinclair Inlet
35	Dyes Inlet
38	East Passage
39	Redondo
40	City Waterway
41	Blair/Sitcum Waterways
43	Carr Inlet
44	E Anderson Inlet
45	W Anderson Inlet
47	Case Inlet
48	N Budd Inlet
49	S Budd Inlet
69	Port Madison
70	Shelton
71	Fildalgo

Figure 1. Locations of the 34 core (fixed) stations in Puget Sound for the 1991 marine sediment monitoring task (MSMT).



STATION	LOCALITY
2R	Cherry Point
9R	E of Green Point
10R	Dungeness Bay
11R	Goose Point, Discovery Bay
13R	N Hood Canal
201R	Roberts Bank
202R	Point Roberts
203R	Bellingham Bay
204R	Eastsound, Orcas Island
205R	W Blakely Island
206R	Friday Harbor
207R	West Beach
208R	Sequim Bay
209R	Skagit Bay

Figure 2. Locations of the 14 rotating stations in Puget Sound for the 1991 marine sediment monitoring task (MSMT).

At each of the replication stations, a small quantity of sediment was collected for laboratory matrix spike (MS) and matrix spike duplicate (MSD) analyses. Archived sediment samples from Sequim Bay were obtained from the Environmental Protection Agency's Manchester Laboratory, transferred to MSMT sample containers, and submitted for analysis as Stations 66, 67, and 68. These Project Comparison Samples (PCS) contain known quantities of the acid/base and neutral (ABN) target chemicals that do not degrade over time and are used each year to measure the accuracy of the laboratory analyses.

Five replicate sediment samples for analysis of benthic infauna were collected at each of the 48 stations. Benthic infauna were sorted and identified to the lowest possible taxonomic level (usually species) from all five replicates.

Laboratory Analysis

Handling and processing of chemical and bioassay samples were contracted out by Ecology to BCI Environmental Services (BCI), Vashon Island, Washington. Chemical laboratory services and bioassay analyses were subcontracted by BCI to Analytical Resources, Inc. (ARI), Seattle, Washington, and Invert Aid of Graham, Washington, respectively.

Sediment chemistry samples were analyzed in accordance with the U.S. Environmental Protection Agency (EPA) Contract Laboratory Program (CLP) methods (U.S. EPA 1986a,b) as modified by the Puget Sound Protocols (PSEP 1986c,d,e) to obtain lower detection limits. The routine EPA CLP purge and trap protocol for analysis of VOCs was modified to use larger sample sizes, smaller final extract volumes, additional extract cleanup, seven initial multi-point calibration concentrations, and seven internal standards.

The method used to analyze total sulfides (TS) was the same used during the 1989 survey (Tetra Tech, 1990). This method provides lower detection limits, higher accuracy, and improved precision.

Sixty-three sediment samples (48 field stations, 5 split blind laboratory replicates, and 10 blind field replicates) were tested for sediment toxicity using the 10-day amphipod (*Rhepoxynius abronius*) bioassay (PSEP, 1986f).

Benthic infaunal samples were processed according to the Puget Sound Protocols (PSEP, 1987) and the MSMT Implementation Plan (Striplin, 1988). All infaunal sample processing and analyses were performed by Ecology ambient monitoring staff. A total of 240 benthic infaunal samples from 48 stations were processed for this report.

Data Management and Analysis

Data collected and produced during the 1991 MSMT were handled according to the procedures outlined in the MSMT Implementation Plan (Striplin, 1988). Numerical field data and laboratory generated data are stored in the sediment task module of the Puget Sound

Ambient Monitoring Program System Database (PSAMP System Database). The dBase IV database software allows users to perform data retrievals, create reports, and to perform simple summary calculations. Data can be retrieved by sample, station, and survey. Standard reports of preselected data can be generated or custom reports can be prepared at the user's request.

A complete description of the data analysis procedures was presented in the 1989 MSMT Report (Tetra Tech, Inc., 1990). The same procedures were used in the analysis of the 1991 MSMT data. Statistical analyses were carried out using SYSTAT, and Lotus 1-2-3 was used for data manipulations. The sediment task module of the PSAMP System Database was used to calculate the ITI, Shannon-Wiener diversity index, Pielou's equability, and the number and abundance of pollution sensitive and tolerant species.

RESULTS AND DISCUSSION

Conventional Variables

Sediment Grain Size

Sediment grain size is a physical measurement of the range of sediment particles that make up a given sample. Grain size directly influences the concentration of chemical contaminants in sediments (sediments with smaller grain sizes tend to have greater chemical concentrations). Grain size also influences the structure and function of the associated benthic infaunal communities.

The distribution of fine grained sediment (*i.e.*, silt plus clay) at each station is shown in Table 1A. Stations with higher percentages of silt and clay (*i.e.*, percent fines) were found in small, shallow embayments and in the deep basins of Puget Sound, while coarser sediments were found in shallow water along the open shorelines. Percent fines ranged from 0.9 percent at Station 9R in the Strait of Juan de Fuca at Green Point, to a high of 97.6 percent at Station 4 in Bellingham Bay.

Apparent differences in percent fines were seen at seven stations among the 1989, 1990, and 1991 surveys (Table 1A). Percent fines appeared to decrease at Stations 18, 30, and 47, and appeared to increase to Stations 3, 21, 22, and 40. It is unclear whether those changes are meaningful or simply the result of random sampling.

Total Organic Carbon

Total organic carbon (TOC) is a measure of the total amount of particulate and non-particulate organic carbon. As with grain size, the amount of TOC can have a significant effect on the concentration of chemical contaminants in sediments and on the type of benthic

Table 1A. Percent fines found during all three MSMT surveys. (NS = Not significant)

STATION	1989	1990	1991	STATION	1989	1990	1991
1	93.3	97.0	95.8	41	81.1	66.0	70.0
3	32.7	45.0	63.8	43	6.3	7.0	5.9
4	93.3	98.0	97.6	44	14.7	14.5	17.1
5	95.7	97.3	95.6	45	55.3	60.0	59.8
8	65.8	64.0	63.7	47	23.5	12.0	9.4
12	90.3	93.0	91.4	48	81.3	92.0	89.8
14	27.6	37.0	37.8	49	88.1	97.0	84.0
15	8.2	5.0	5.8	69	NS	15.0	21.4
17	92.5	98.0	93.7	70	NS	64.0	67.2
18	60.2	92.0	41.8	71	NS	46.0	55.8
19	81.3	83.0	82.0	2R	60.7	NS	57.7
20	94.1	97.0	96.2	9R	1.3	NS	0.9
21	52.2	61.0	80.3	10R	37.2	NS	32.8
22	4.2	5.5	12.9	11R	24.3	NS	29.1
26	15.7	21.0	16.9	13R	9.7	NS	9.8
29	83.1	93.0	83.9	201R	NS	NS	21.9
30	56.0	62.0	23.5	202R	NS	NS	24.4
32	7.2	7.5	6.8	203R	NS	NS	98.7
33	24.0	34.0	31.5	204R	NS	NS	94.1
34	91.6	95.0	92.7	205R	NS	NS	62.1
35	78.9	82.3	79.8	206R	NS	NS	35.6
38	93.3	98.0	94.3	207R	NS	NS	73.4
39	1.7	2.0	2.4	208R	NS	NS	90.1
40	15.6	28.0	33.2	209R	NS	NS	34.0

Table 1B. Percent total organic carbon found during all MSMT surveys

STATION	1989	1990	1991	STATION	1989	1990	1991
1	1.5	1.8	1.7	41	0.8	1.5	1.0
3	1.2	0.8	1.3	43	0.1	0.3	0.1
4	2.0	1.9	2.0	44	0.4	0.5	0.5
5	1.8	2.0	1.8	45	1.0	1.2	1.1
8	3.9	3.4	2.9	47	0.3	0.3	0.3
12	1.5	1.8	1.5	48	2.5	2.2	2.3
14	0.4	0.7	0.7	49	2.7	3.0	3.3
15	0.2	0.2	0.2	69	NS	0.5	0.6
17	1.5	1.7	1.9	70	NS	3.1	3.2
18	0.9	1.5	0.6	71	NS	1.4	1.2
19	1.9	1.8	1.8	2R	0.7	NS	0.8
20	1.0	1.2	1.0	9R	0.1	NS	0.1
21	1.3	1.5	1.3	10R	0.6	NS	0.6
22	0.2	0.2	0.2	11R	0.6	NS	1.2
26	0.4	0.5	0.8	13R	0.2	NS	0.2
29	1.6	1.8	1.4	201R	NS	NS	0.6
30	1.4	1.4	0.7	202R	NS	NS	0.5
32	0.2	0.2	0.1	203R	NS	NS	1.7
33	0.6	1.1	0.9	204R	NS	NS	2.4
34	2.2	2.7	2.3	205R	NS	NS	1.1
35	2.3	3.1	2.4	206R	NS	NS	0.8
38	2.1	2.5	2.1	207R	NS	NS	1.5
39	0.1	0.2	0.1	208R	NS	NS	2.8
40	0.7	1.1	0.9	209R	NS	NS	0.5

infauna present at a station. The TOC concentration in sediment samples ranged from 0.1 to 3.3 percent (Table 1B and Appendix C). Typically, low concentrations occurred in exposed areas where fast tidal currents do not allow organic material and fine particulates to settle. The highest TOC concentrations were found in shallow, calm embayments.

There was an overall correlation between percent fines and percent TOC ($r^2=0.65$; df=46). However, the correlation between the two variables was very different for stations with a percent fines greater than 80 percent. The correlation for those stations was $r^2=0.01$ (df=15) and for stations with percent fines less than 80 percent was $r^2=0.63$ (df=31). There was no significant relationship between either percent fines or TOC with water depth.

Total Sulfides

Sulfides are formed by the anaerobic breakdown of organic material. Their toxicity to infaunal organisms has been much described in the scientific literature (Pearson and Rosenberg, 1978). The concentrations of TS in 1991 ranged from <0.43 mg/kg to a high of 744 mg/kg. The lowest detected value was found at Station 21 (Port Gardner, 0.9 mg/kg) and the highest was found at Station 208 (Goose Point in Sequim Bay).

Metals

Sediments at all stations were examined for 23 metals (Appendix C). The concentrations of pollutant metals at stations located away from known sources of contamination were generally low (Table 2). Of all the metals analyzed in the 1991 survey, only mercury was found at concentrations that exceeded the state sediment quality standards. The three stations that exceeded the standards were Stations 34 (Sinclair Inlet), 35 (Dyes Inlet), and Station 21 (Port Gardner). Sinclair Inlet also had the greatest concentrations of zinc (144 mg/kg), copper (131 mg/kg), and lead (90.5 mg/kg).

The concentrations of copper, cadmium, chromium, lead, mercury, and zinc among the 1989, 1990, and 1991 surveys are displayed in Figures 3 through 8. With few exceptions, the distribution of these metals in 1991 was similar to those in the previous two years.

Organic Compounds

Volatile Organic Compounds

Fourteen VOCs were detected at low concentrations during the 1991 study (Table 2). Acetone was detected (but all results were qualified as "estimates") in all samples analyzed.

The station with the greatest number of detected compounds was Station 34 in Sinclair Inlet (five compounds). These compounds include 2-Butanone, carbon disulfide, 4-Methyl-2-pentanone, tetrachloroethylene, and trichloro-fluoromethane.

Table 2. Concentrations of detected metals and organic compounds found in the 1991 PSAMP sediment survey. Concentrations are in mg/kg dry weight for metals and μg/kg dry weight for organic compounds.

	Range	Frequency of Detection	Station with Highest Conc.	
Metals				
Aluminum	5370-32600	69/69	17	South Hood Canal
Arsenic	1.8-15.8	69/69	204R	Eastsound, Orcas Is.
Barium	10.2-78.8	69/69	201R	Roberts Bank
Beryllium	0.10-0.55	62/69	203R	Bellingham Bay
Cadmium	0.017-2.2	63/69	208R	Goose Bay
Calcium	2240-18300	69/69	47	Case Inlet
Chromium	12.2-126	69/69	20	Port Susan
Cobalt	2.7-24.9	69/69	203R	Bellingham Bay
Copper	3.9-131	69/69	34	Sinclair Inlet
Iron	7190-50700	69/69	17	South Hood Canal
Lead	2.4-90.5	69/69	34	Sinclair Inlet
Magnesium	2870-24600	69/69	203R	Bellingham Bay
Manganese	129-1070	69/69	70	Shelton
Mercury	0.028-0.74	52/69	34	Sinclair Inlet
Nickel	10.3-163	69/69	203R	Bellingham Bay
Potassium	795-4750	69/69	204R	Eastsound, Orcas Is.
Silver	0.021-1.3	63/69	49	South Budd Inlet
Sodium	3050-39000	69/69	208R	Sequim Bay
Thallium	<0.086-0.31	26/69	30	Eagle Harbor
Vanadium	15.9-132	69/69	17	South Hood Canal
Zinc	15.2-144	69/69	34	Sinclair Inlet
Volatile Organic Compounds				
Acetone	4.4-33	23/23	204R	Eastsound, Orcas Is.
Benzene	0.04-0.17	17/23	29	Shilshole
Bromoform	0.03-0.08	3/23	12	Port Townsend
2-Butanone	1.5-12	23/23	34	Sinclair Inlet
Carbon disulfide	0.36-5.3	23/23	34	Sinclair Inlet
4-Dichlorobenzene	<0.03-0.19	7/23	35	Dyes Inlet
Ethylbenzene	0.03-0.11	6/23	3	Strait of Georgia
Methylene chloride	0.47-6.5	23/23	3	Strait of Georgia
4-Methyl-2-pentanone	<0.56-6.3	4/23	34	Sinclair Inlet
Styrene	0.04-0.23	10/23	35	Dyes Inlet
Tetrachloroethylene	0.04-0.11	13/23	34	Sinclair Inlet

Table 2. Continued.

	Range	Frequency of Detection	Station with Highest Conc.	
Xylene	<0.09-0.57	14/23	201R	Roberts Bank
Trichlorofluoromethane	<0.11-0.85	4/23	34	Sinclair Inlet
1,1,2-Trichloro-1,2,2-trifluoroethane	0.22	1/23	8	Port Angeles
Semivolatile Organic Compounds				
Phenol	4-82	51/69	19	Saratoga Passage
4-Methylphenol	<8-21	4/69	203R	Bellingham Bay
Diethyl phthalate	2-18	7/69	69	Port Madison
Di-n-butyl phthalate	<2-30	15/69	35	Dyes Inlet
Butyl benzyl phthalate	5-35	14/69	40	City Waterway
Bis(2-Ethylhexyl) phthalate	<2-290	60/69	41	Blair/Sitcum WW
Di-n-octyl-phthalate	7	1/69	11R	Discovery Bay
Dimethyl phthalate	6	1/69	40	City Waterway
Naphthalene	3-18	48/69	40	City Waterway
Acenaphthalene	2-98	18/69	40	City Waterway
2-Methylnaphthalene	3-18	38/69	40	City Waterway
Acenaphthene	3-99	10/69	40	City Waterway
Fluorene	2-190	38/69	40	City Waterway
Hexachlorobenzene	4	1/69	32	Magnolia Bluff
Phenanthrene	3-800	64/69	40	City Waterway
Anthracene	2-570	53/69	40	City Waterway
Fluoranthene	4-820	63/69	40	City Waterway
Pyrene	3-780	64/69	40	City Waterway
Benze(a)anthracene	3-570	61/69	40	City Waterway
Chrysene	<3-680	50/69	40	City Waterway
Benzo(b=k)fluoranthrene	<5-840	58/69	40	City Waterway
Benzo(a)pyrene	3-400	50/69	40	City Waterway
Indeno(1,2,3,-c,d)pyrene	7-240	25/69	40	City Waterway
Dibenzo(a,h)anthracene	4-170	34/69	40	City Waterway
Benzo(g,h,i)perylene	12-28	5/69	40	City Waterway
Cymene	2-32	11/69	49	South Budd Inlet
Total LPAH	<48-1826	69/69	40	City Waterway
Total HPAH	<44-4500	69/69	40	City Waterway
Aroclor 1254	3.6-47	25/69	35	Dyes Inlet
Aroclor 1260	4.5-30	6/69	34	Sinclair Inlet
4,4'-DDT	0.3-1.0	9/69	29	Shilshole

Table 2. Continued.

	Range	Frequency of Detection	Station with Highest Conc.	
4,4-DDD	0.6	1/69	201R	Roberts Bank
4,4-DDE	3.7	1/69	5	Samish Bay
Benzoic acid	10-98	46/69	35	Dyes Inlet
Dibenzofuran	3-39	22/69	40	City Waterway
b-Coprostanol	39-800	59/69	208R	Sequim Bay
9(H) Carbazole	3-34	20/69	40	City Waterway
Perylene	4-74	46/69	40	City Waterway
Cholesterol	250-3900	66/69	11R	Discovery Bay
B-Sitosterol	<8-4800	63/69	41	Blair/Sitcum WW
Retene	4-1000	58/69	70	Shelton
2-Methoxyphenol (Guaiacol)	1	1/7	41	Blair/Sitcum WW
Pimaric Acid	18-45	3/7	8	Port Angeles
Abietic acid	21-53	6/7	8	Port Angeles
1,4-Chlorodehydro-abietic Acid	22-36	4/7	8	Port Angeles
Dehydroabietic acid	33-420	7/7	8	Port Angeles
Isopimaric acid	38-170	4/7	41	Blair/Sitcum WW
Sandaracopimaric acid	57-130	2/7	8	Port Angeles
Pristane/Phytane Ratio	0.59-10.5	29/69	45	Devil's Head
Carbon Preference Index	1.2-8.2	64-69	209R	Skagit Bay

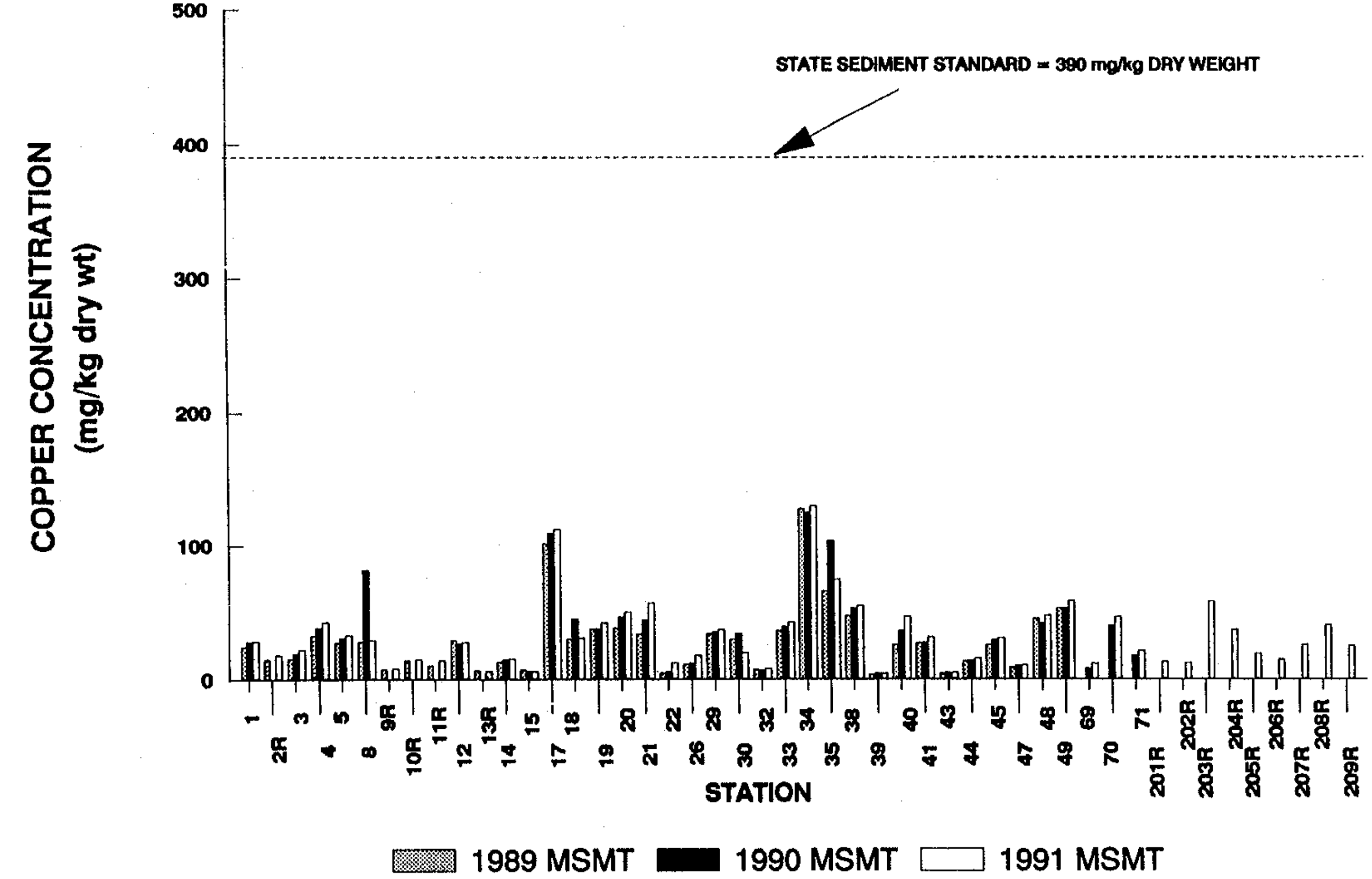


Figure 3. Concentration of copper (mg/kg dry weight) at 1989, 1990, and 1991 stations.

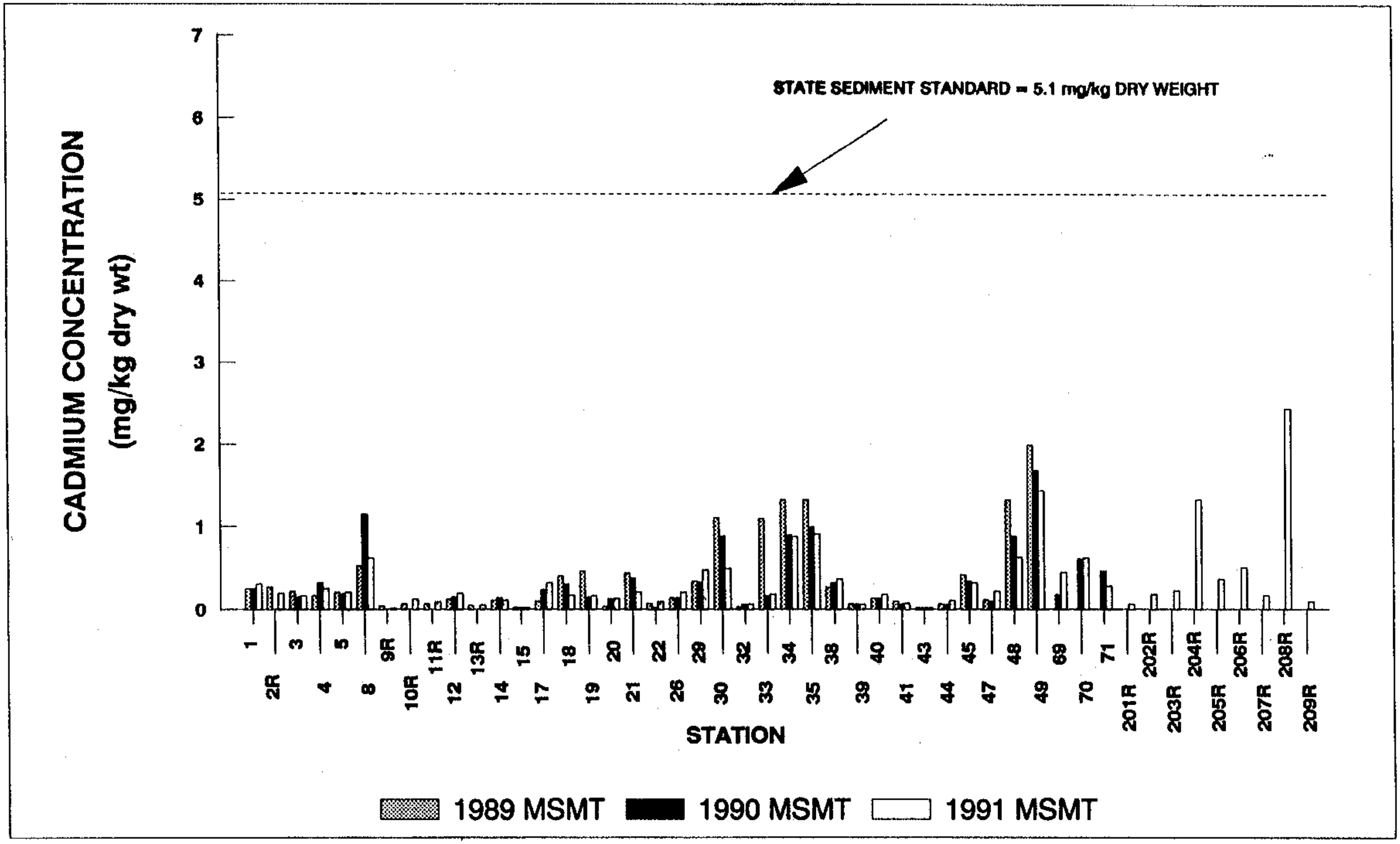


Figure 4. Concentration of cadmium (mg/kg dry weight) at 1989, 1990, and 1991 stations.

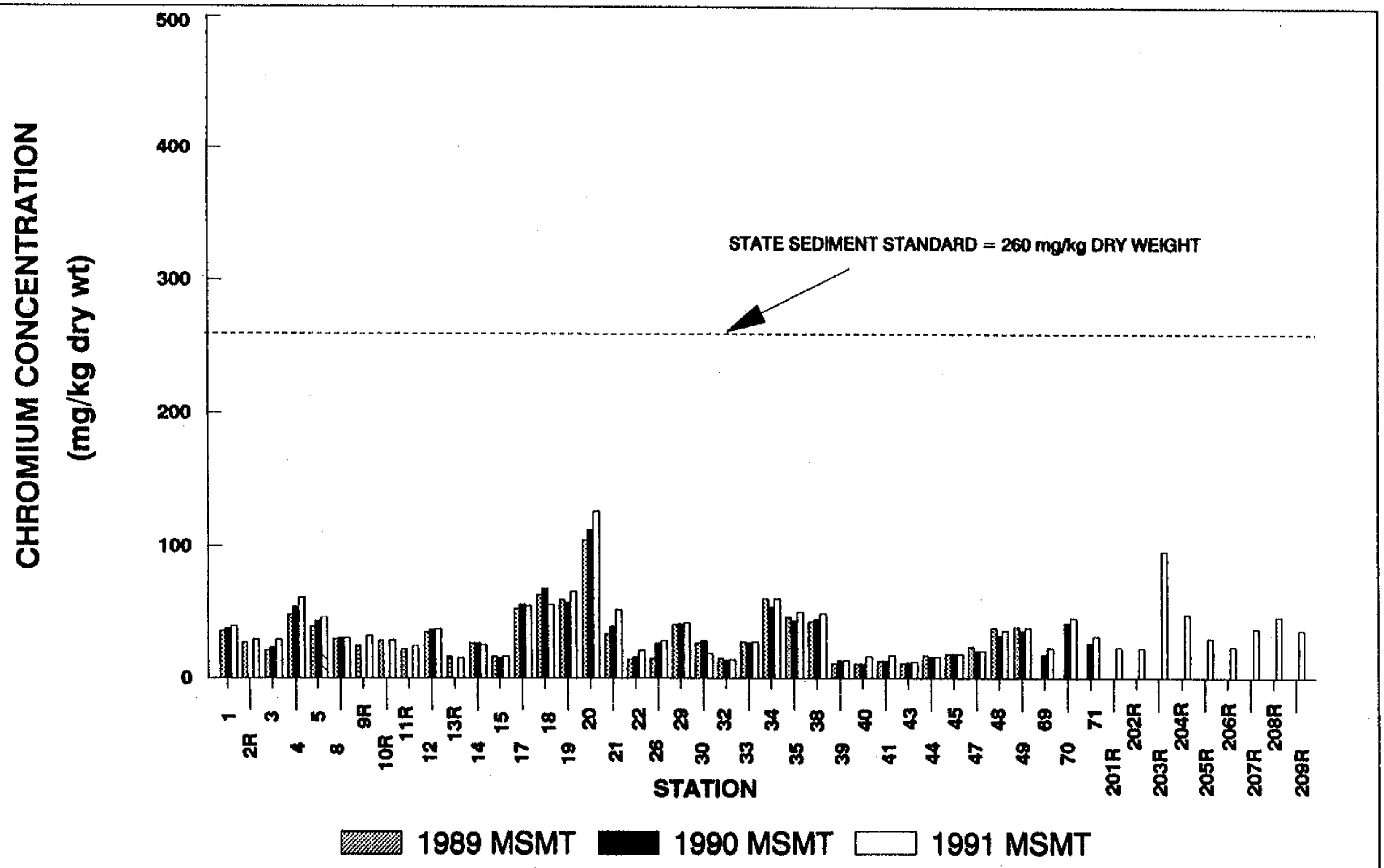


Figure 5. Concentration of chromium (mg/kg dry weight) at 1989, 1990, and 1991 stations.

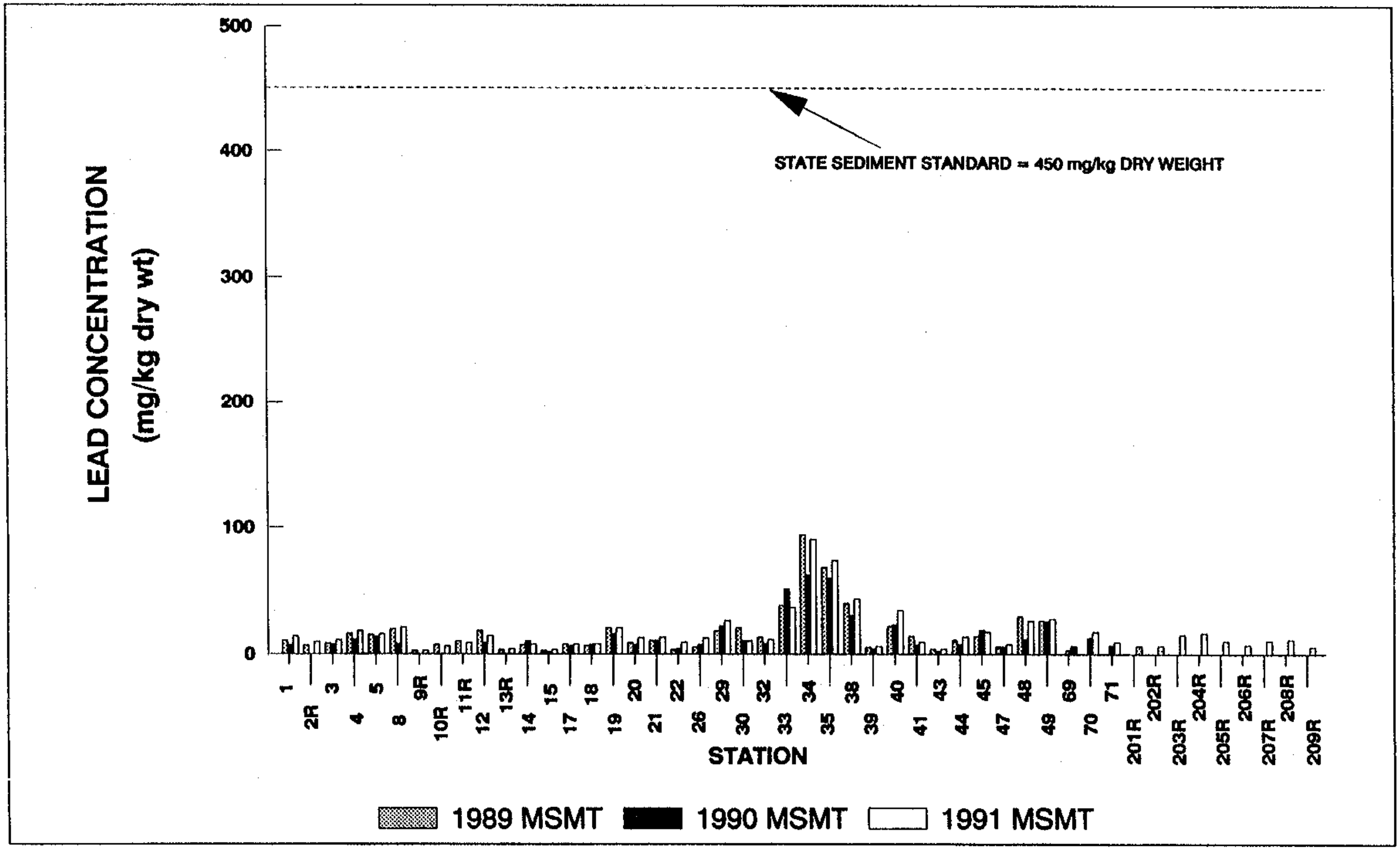


Figure 6. Concentration of lead (mg/kg dry weight) at 1989, 1990, and 1991 stations.

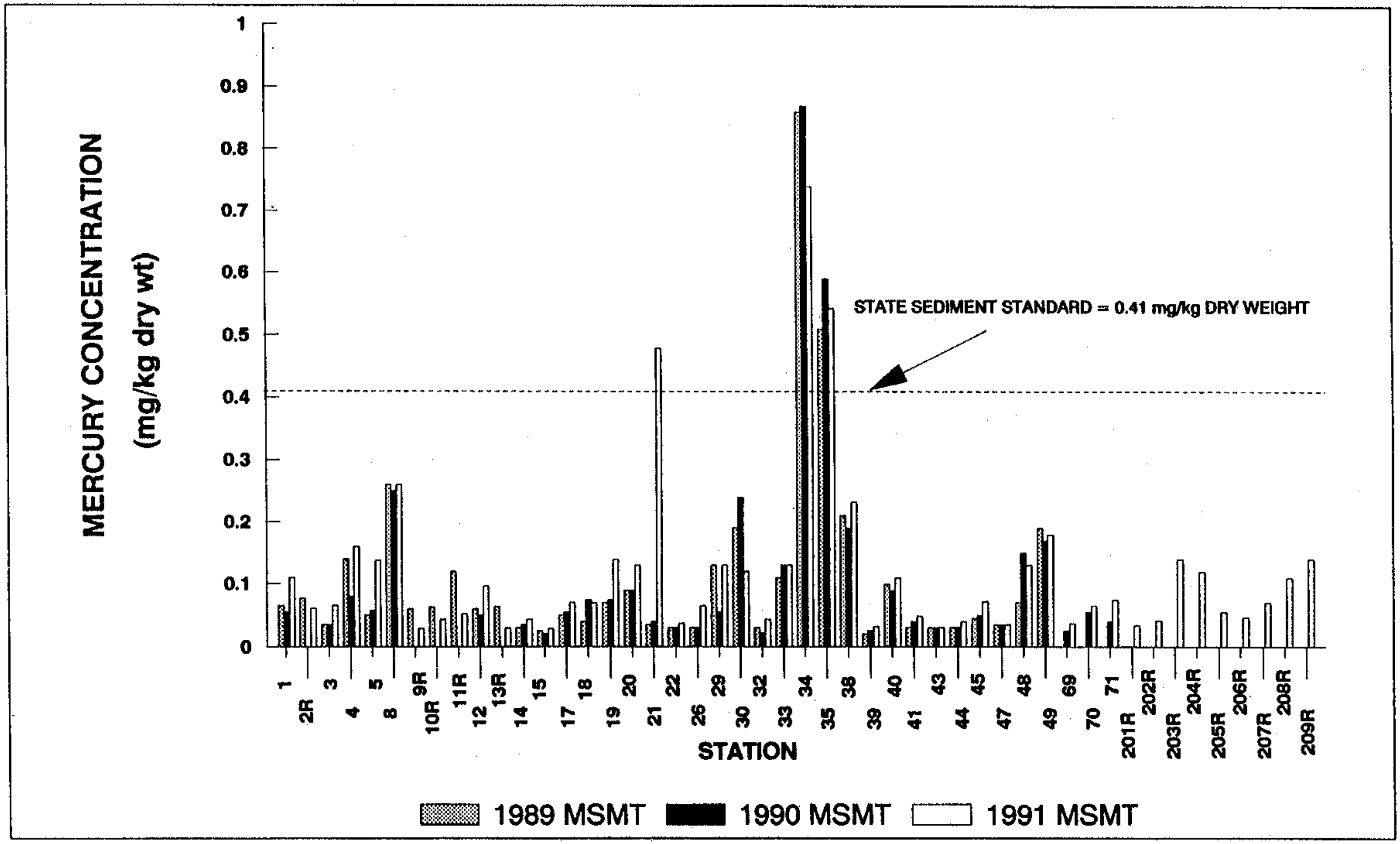


Figure 7. Concentration of mercury (mg/kg dry weight) at 1989, 1990, and 1991 stations.

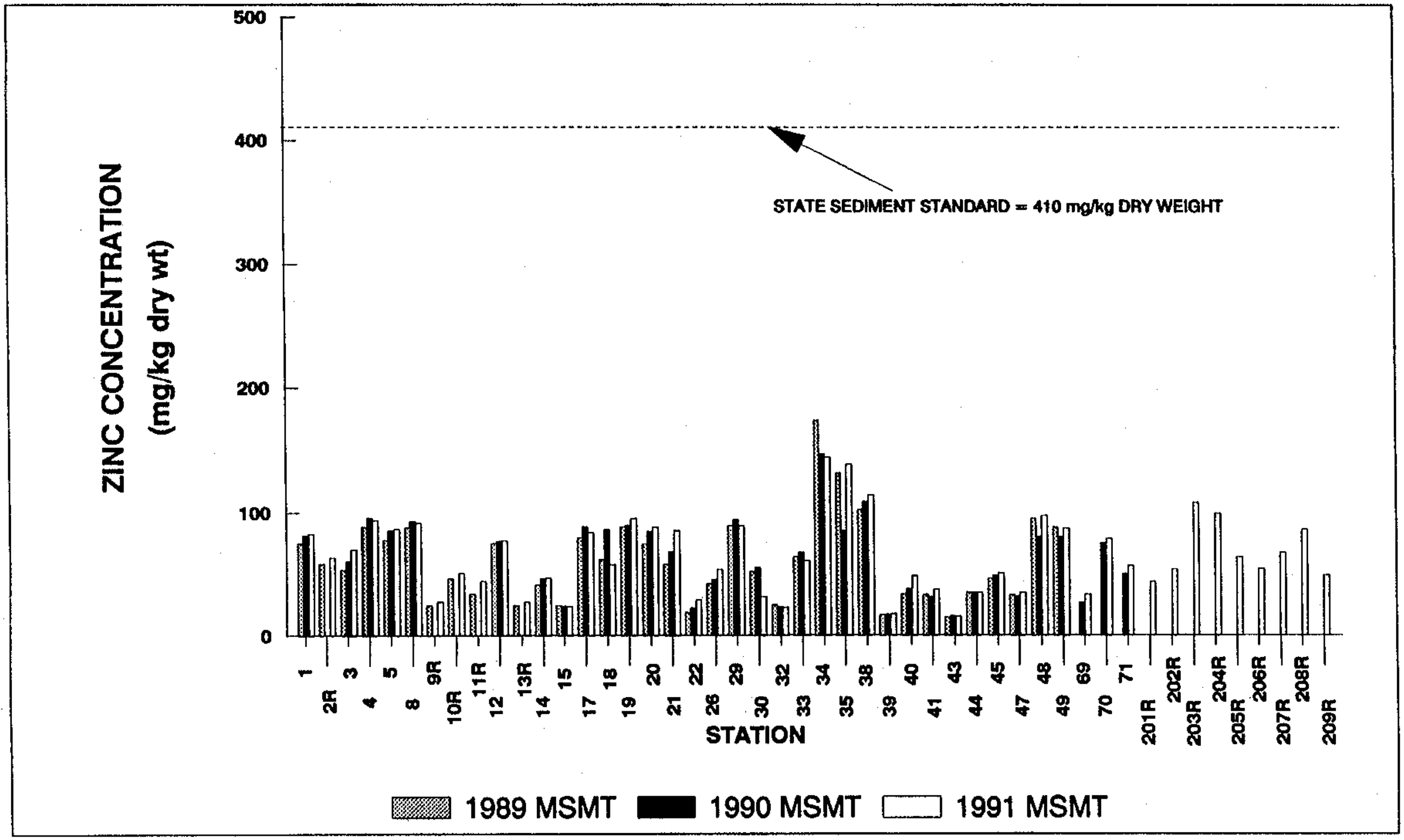


Figure 8. Concentration of zinc (mg/kg dry weight) at 1989, 1990 and 1991 stations.

Semivolatile Organic Compounds

Most of the semivolatile organic compounds were undetected at low parts per billion detection limits. The most frequently detected neutral extractable compounds were the low (LPAH) and high (HPAH) molecular weight PAHs.

One or more of the LPAH compounds were found in all samples analyzed. The most frequently detected LPAH was phenanthrene found in 93 percent of the samples, followed by anthracene in 77 percent of the samples. The station with the highest LPAH concentration was at the mouth of City Waterway (Station 40), at a concentration of 1826 μg/kg dry weight (201 mg/kg carbon, Figure 9A). Of the eight LPAH compounds detected in the 1991 MSMT, the greatest concentration of seven were found at Station 40 (City Waterway).

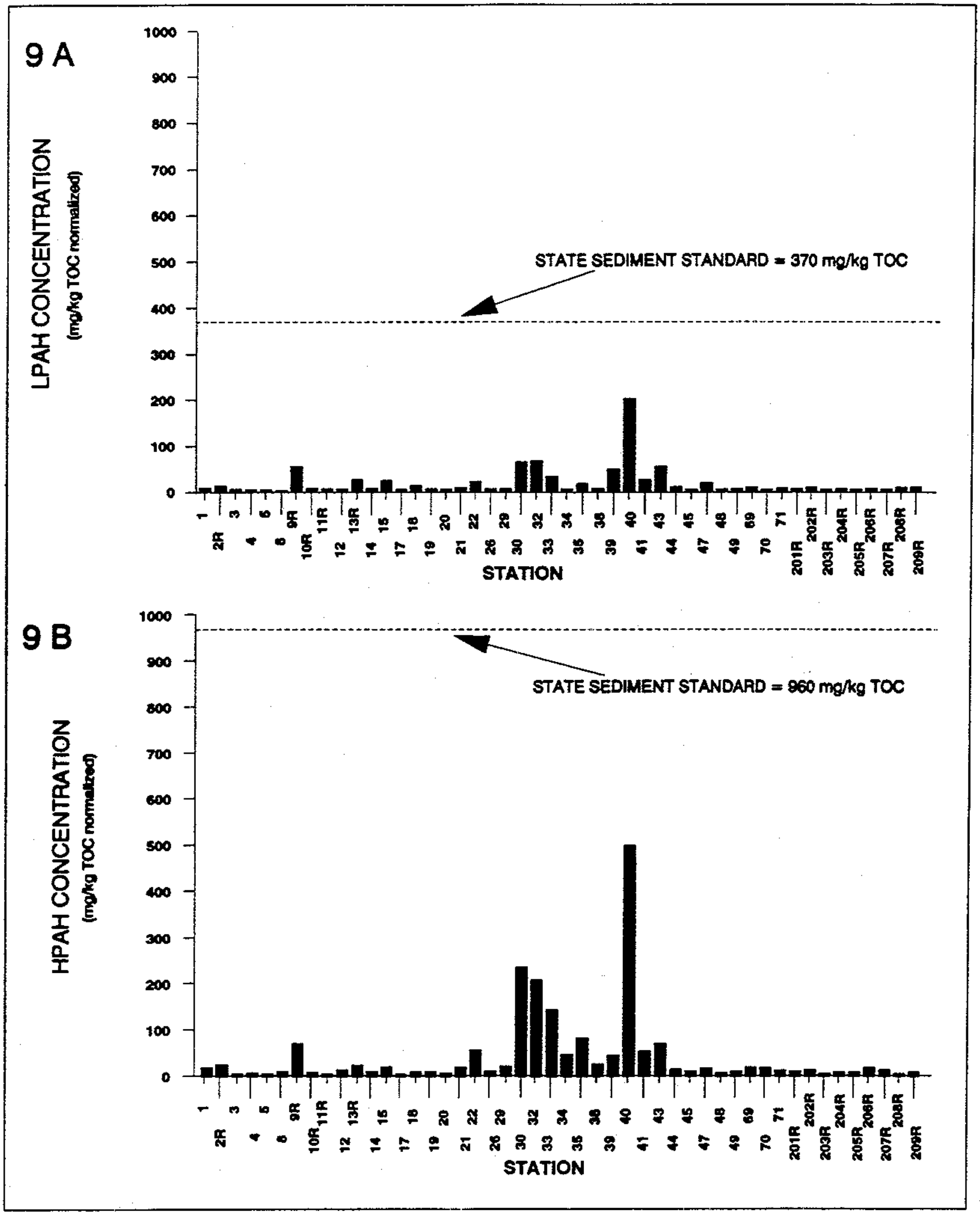
HPAH compounds were also found in all samples analyzed. Station 40 had the highest concentration of HPAH at 4500 μg/kg dry weight (500 mg/kg carbon, Figure 9B). The most frequently detected HPAH was pyrene found in 93 percent of the samples, followed by fluoranthene found in 91 percent of the samples. Of the nine HPAH compounds detected in 1991, all were found at Station 40 (City Waterway).

When the PAH data are normalized to TOC, neither LPAH nor HPAH exceeded the state sediment quality standard (370 mg/kg carbon-LPAH and 960 mg/kg carbon-HPAH; WAC 173-204). This is the first year of sampling that the LPAH concentration for the City Waterway station (40) was below the state sediment standard.

In addition to the PAH compounds, phthalates were also detected at many MSMT stations. The chemical compounds with the highest concentration included diethyl phthalate (Station 69), Di-n-butyl phthalate (Station 35), Butyl benzyl phthalate (Station 40), and bis(2-ethylhexyl) phthalate (Station 41).

The miscellaneous oxygenated compound Beta-coprostanol was detected in 86 percent of the samples. Concentrations ranged from 39 to 800 μg/kg dry weight. This fecal sterol, produced by the bacterial breakdown of cholesterol in the digestive systems of mammals, is a marker for point and nonpoint source sewage effluent (Tetra Tech, 1990). The highest concentration in 1991 was found at Station 208R off Goose Point in Sequim Bay (800 μg/kg dry weight). Other miscellaneous oxygenated compounds detected at MSMT stations include: benzoic acid in Dyes Inlet (Station 35) at a concentration of 98 μg/kg dry weight, dibenzofuran at 39 μg/kg dry weight at Station 40 (City Waterway), and 9(H)carbazole at 34 μg/kg dry weight (Station 40).

Two of the 15 acid extractable compounds analyzed for in 1991 were detected above quantitation limits. The highest concentration of 4-methylphenol occurred in Bellingham Bay at Station 203R (21 μg/kg dry weight). The highest concentration of phenol (82 μg/kg dry weight) was found in Saratoga Passage (Station 19).



Figures 9A and 9B. Concentrations of low and high molecular weight polycyclic aromatic hydrocarbons at 1991 MSMT stations. Data are reported in mg/kg normalized to total organic carbon.

Sediment at seven stations was analyzed for resin acids and guaiacols in 1991. Seven of the 15 chemicals analyzed were detected above quantitation limits. The highest concentration of five of these chemicals were found at Station 8 in Port Angeles Harbor. The remaining two compounds were found at their highest concentration at Station 41 (Blair/Sitcum Waterway). The most frequently detected resin acid was dehydroabeitic acid. It was found at its highest concentration at Station 8 (420 μg/kg dry weight).

Pesticides and Polychlorinated Biphenyls

Aroclor 1254 was detected in 25 of the 69 samples analyzed. The station with the greatest concentration was in Dyes Inlet (Station 35) at 47 μg/kg dry weight followed by Station 33 in Elliott Bay (35 μg/kg dry weight). Aroclor 1260 was found in six samples. The station with the highest concentration was Station 34 in Sinclair Inlet (30 μg/kg dry weight). With the exception of DDT and its breakdown products, no pesticides were detected in 1991. 4,4' DDT was found at nine stations. The station with the greatest concentration was in the main central basin off of Shilshole (Station 29, 1.0 μg/kg dry weight). The concentration of 4,4'DDD at Station 201R (Point Roberts) was 0.6 μg/kg dry weight and the concentration of 4,4'DDE at Station 5 (Samish Bay) was 3.7 μg/kg dry weight.

Sediment Toxicity Test

The mean and range of amphipod mortality (percent) for all stations is shown in Table 3. The core stations had a mean mortality ranging from 1 percent at Stations 49 (South Budd Inlet) and 69 (Port Madison) to 30 percent at Station 18 (Oak Harbor). The North Sound rotating stations had a mean mortality ranging from zero percent at Station R209 (Skagit Bay) to 33 percent at Station R207 (West Beach, Whidbey Island). Mortality exceeded 12.5 percent in the following areas: in North Puget Sound at Stations 1 (16 percent), 2R (25 percent), 18 (30 percent), 21 (23 percent), and 207R (33 percent); in Central Puget Sound at Station 34 (15 percent); and there were no exceedences of 12.5 percent in South Puget Sound.

The above six stations (1, 2R, 18, 21, 34, and R207) with elevated amphipod mortalities, were statistically compared to the mortality in the West Beach reference sediment (negative controls) using Dunnetts Test (Wilkinson, 1990). The results of this test indicated that only at Stations 18, 34, and 207R was the mortality significantly different ($P<0.01$) from the negative controls.

Rhepoxynius abronius (the test organism) occurs naturally, in low abundances, at only six MSMT stations. Test results for these six stations showed low mortality (less than 8 percent). All stations where *R. abronius* occurred had less than 13 percent fines and were in less than 35 meters water depth (Table 4).

Table 3. Results of the 1991 amphipod sediment toxicity tests.

Station	Location	Range of Mortality (Percent) 1991	Mean Mortality (Percent) 1991
1	Semiahmoo Bay	0-45	16
3	Strait of Georgia	0-15	8
4	Bellingham Bay	0-10	6
5	Samish Bay	0-25	4
8	Port Angeles Harbor	5-15	10
12	Port Townsend	0-30	11
14	North Hood Canal	0-15	6
15	Dabob Bay	0-15	5
17	South Hood Canal	5-15	8
18	Oak Harbor	20-45	30
19	Saratoga Passage	0-20	10
20	Port Susan	0-20	6
21	Port Gardner	5-55	23
22	Mukilteo	0-10	5
26	West Central Basin	5-10	8
29	Shilshole	0-15	8
30	Eagle Harbor	5-20	8
32	Magnolia Bluff	0-25	8
33	Elliott Bay	5-15	7
34	Sinclair Inlet	10-20	15
35	Dyes Inlet	0-20	5
38	Point Pully	0-15	4
39	Dash Point	0-10	7
40	City Waterway	0-10	4
41	Blair/Sitcum Waterways	0-15	8
43	Carr Inlet	0-20	5
44	East Anderson Island	0-10	2
45	Devil's Head	0-10	3
47	Case Inlet	0-10	3
48	North Budd Inlet	0-5	4
49	South Budd Inlet	0-5	1
69	Port Madison	0-5	1
70	Shelton	0-15	5
71	Fidalgo Bay	0-25	8
2R	Cherry Point	0-70	25

Table 3. Continued

Station	Location	Range of Mortality (Percent) 1991	Mean Mortality (Percent) 1991
9R	Green Point	0-10	3
10R	Dungeness Spit	0-10	6
11R	Discovery Bay	0-10	4
13R	North Hood Canal	5-15	9
201R	Roberts Bank	0-5	4
202R	Point Roberts	0-25	11
203R	Inner Bellingham Bay	0-25	11
204R	East Sound, Orcas Is.	0-10	4
205R	West Blakely Island	0-15	6
206R	Friday Harbor, San Juan Is.	0-25	8
207R	West Beach, Whidbey Is.	5-70	33
208R	Sequim Bay	0-20	7
209R	Skagit Bay	0	
Control	Group 1	0-5	1
	Group 2	0-10	7
	Group 3	0-5	1

Table 4. Abundance and percent fines at stations where *Rhepoxynius abronius* has been found during past MSMT surveys. (NS = Not significant)

Station	Abundances 89	Abundances 90	Abundances 91	Fines % 89	Fines % 90	Fines % 91	Mortality % 89	Mortality % 90*	Mortality % 91
15	-	12	7	8.2	5.0	6.0	8	NA	5
22	32	25	5	4.2	5.5	13.0	2	NA	5
32	-	4	5	7.2	8.0	5.5	2	NA	8
39	60	50	57	1.7	2.0	2.0	2	NA	7
43	67	2	17	6.3	7.0	5.0	2	NA	5
69	NS	3	2	-	15.0	21.0	NS	NA	1

* The 1990 mortality can not be used for among year comparisons due to numerous QA/QC violations.

Benthic Infauna

The abundance of each species by station and replicate are listed in Appendix E. Table 5 lists mean values of total abundance (per 0.1m^2), number of taxa, Shannon-Weiner (H'; Pielou, 1966), evenness (J'; Pielou, 1966), Infaunal Trophic Index (ITI; Word, 1990), and the number and abundance of pollution sensitive and pollution tolerant species.

There was a total of 99,279 benthic infaunal organisms found in the 240 samples processed. The mean total abundance of infauna ranged from 49 individuals/0.1m^2 at Station 19 (Saratoga Passage) to 1694 individuals/0.1m^2 at Station 41 (Commencement Bay). The mean number of taxa ranged from 2.4 taxa/0.1m^2 at Station 208R (Sequim Bay) to 123.8 taxa/0.1m^2 at Station 26 (Whidbey Basin).

The low abundance and number of taxa at Station 19 (Saratoga Passage) was probably due to sediment characteristics. The percent fines (combined percentages of silt and clay) at that station was 82 percent with a TOC content of 1.9 percent. Station 19 differs from other stations with high percent fines by the amount of clay in the sediment (49.4%). The only other station with the same ratio of percent clay was Station 38 in the East Passage of the Central Puget Sound.

Stations 41 (Blair/Sitcum Waterways in Commencement Bay) and 13R (North Hood Canal) were characterized by having low diversity but high total abundance. The high abundance and low diversity was due to high dominance by the polychaete species *Aphelochaeta multifilis* (the genus name *Tharxy* is now considered a synonym) and the bivalve *Axinopsida serricata*. Other dominant taxa included the bivalve *Macoma carlottensis*, and the ostracod

Table 5. Mean values for selected benthic infauna indices.

Station	Total Mean Sample Abund- ance	Mean No. of Taxa	Mean Diver- sity	Mean Even- ness	Mean ITI	Mean Poll- ution Toler- ant Taxa	Mean Poll- ution Sensi- tive Taxa	Abund- ance of Toler- ant Taxa	Per- cent Toler- ant Taxa
1	395.2	23.2	0.79	0.5784	88.6	3.6	0.4	5.80	1.47
3	173	21.4	1.0686	0.8094	58.6	5.4	0	55.40	32.02
4	225.4	28.6	1.055	0.724	84.4	3.2	0.2	18.40	8.16
5	281.6	39.8	1.2752	0.7974	72.8	5.8	0.8	22.60	8.03
8	267.6	57.4	1.4526	0.8266	74	11.2	1	55.00	20.55
12	377.6	45.8	1.0078	0.607	86.4	5.2	0.8	11.00	2.91
14	197.6	68.4	1.6444	0.9002	78.2	8.2	0.2	20.00	10.12
15	638.6	65.6	0.9142	0.503	69.8	8	0.4	42.00	6.58
17	384.8	20.6	0.4082	0.3092	66.2	3.2	0.4	8.80	2.29
18	561	38.2	0.801	0.507	66.8	4.6	0.8	13.00	2.32
19	49.4	24.8	1.294	0.9308	74.6	2.8	0.4	5.20	10.53
20	183.2	33.2	1.2182	0.8028	75.4	5.6	1	8.00	4.37
21	573.2	40.2	1.0888	0.6798	63.6	9.6	0.8	126.00	21.98
22	391.4	47	1.08	0.6478	60.2	9	0	120.00	30.66
26	1134	123.8	1.6752	0.8022	79.8	10.8	1	65.40	5.77
29	304.6	33.2	0.7496	0.4936	45.2	4.6	0	18.00	5.91
30	335.6	60.2	1.3528	0.7602	77	11	0.4	117.60	35.04
32	494.6	90.2	1.5612	0.7992	67.6	10	0	137.80	27.86
33	611.2	87.4	1.4654	0.755	67	13.2	0	243.80	39.89
34	1016.2	49.6	0.8624	0.511	89.6	6.4	0.6	70.00	6.89
35	525.6	45.2	1.1072	0.672	82.4	7.2	1	41.40	7.88
38	127.4	28	1.047	0.7236	53.8	3	0	15.20	11.93
39	156.8	42	1.3036	0.8052	67	7.4	0	72.40	46.17
40	605	70.2	1.3848	0.7502	68.8	11.4	0.8	222.20	36.73
41	1693.8	45	0.6972	0.422	65.4	9	0	317.20	18.73
43	666.4	63	1.1738	0.6526	86.2	8.4	0	141.60	21.25
44	435	94.4	1.7234	0.8744	75.8	11.2	0.8	86.20	19.82
45	185.8	42.6	1.2846	0.7886	71	6.8	0	37.80	20.34
47	583.4	86.8	1.4854	0.7662	79	11.4	0.2	103.80	17.79
48	167.6	26.4	0.982	0.6914	68.2	3.4	0	18.20	10.86
49	140.4	22	1.0564	0.7892	68.6	5.2	0.2	42.60	30.34
69	503	74.8	1.4922	0.7974	80	11	1	151.20	30.06
70	93.2	18.2	0.9912	0.789	60.8	5.4	0.2	36.20	38.84
71	239.6	50.4	1.4786	0.8694	73.6	10	0.6	45.00	18.78
2 R	253.6	54.6	1.3924	0.8018	70.6	6	0.4	12.40	4.89
9 R	660.2	27.4	0.8222	0.5728	69.2	2.6	0	12.60	1.91
10R	534	79.8	1.3272	0.6992	83.4	10.2	1	78.60	14.72
11R	1448.8	87.2	1.1988	0.6184	89.2	10.2	0.8	117.00	8.08
13R	1108.8	53	0.6602	0.3832	70.8	9.6	0.2	142.80	12.88
201R	888.4	67.6	0.9878	0.5398	73.8	7.2	0.8	72.40	8.15
202R	195.8	46.4	1.363	0.8212	77.2	6.4	0.2	46.40	23.70
203R	258.4	48.2	1.426	0.848	80.6	9.6	0.8	43.40	16.80
204R	219.8	25	1.1394	0.816	64.8	3.6	0.6	18.60	8.46
205R	394.8	51.6	1.0498	0.6132	80.2	5.2	0.4	12.60	3.19
206R	523.6	83.2	1.5368	0.8026	69	14	0.8	92.20	17.61
207R	458.4	57.4	1.0716	0.61	64.6	10	0.2	36.80	8.03
208R	128	2.4	0.0508	0.1348	67	1	0	124.60	97.34
209R	396.2	51.6	1.119	0.6548	69	7.6	0.2	178.00	44.93

Euphilomedes producta. Station 41 is adjacent to and inshore of the city of Tacoma's waste water outfall and is typical of a community affected by organic enrichment.

The Infaunal Trophic Index (ITI) is a measure of the functional characteristics of the benthic community. Values range from 0 (representing a community dominated by subsurface deposit feeding organisms) to 100 (representing a community dominated by organisms that feed in the water column on suspended particulate material). In the 1991 survey, the ITI values ranged from a low of 45.2 at Station 29 (off Shilshole) to a high of 89.6 at Station 34 in Sinclair Inlet. Station 29 is at a water depth of 200 meters with 83.9 percent fines. Station 34 is at a water depth of 12 meters with 92.7 percent fines. The numerically dominant taxa responsible for the low ITI value at Station 24 was *Macoma carlottensis* (193.8/0.1m^2). Station 38 in East Passage is also a very deep water station (198m) and the ITI value was 53.8. This station was also dominated by *Macoma carlottensis*, but at a much lower mean abundance (50.6/0.1m^2). The high ITI value at Station 34 was due to very large abundance of the suspension feeding polychaete *Phyllochaetopterus prolifica*.

The abundance and number of taxa in each taxa group is presented in Table 6. The abundance of arthropods ranged from a mean of 0.8 to 608.4 individuals/0.1m^2. The station with the lowest abundance was Station 208R (Sequim Bay) and the highest abundance was found at Station 11R in Discovery Bay. The abundance of polychaetes ranged from a low of 19.8/0.1m^2 at Station 38 in East Passage to 871/0.1m^2 at Station 26 in the Whidbey Basin. The station with the highest mean abundance of molluscs was Station 41 adjacent to Blair/Sitcum Waterway in Commencement Bay and the lowest was found at Station 208R in Sequim Bay (1201.6/0.1m^2 and 0/0.1m^2, respectively).

Pollution Tolerant Species

Abundance and percent tolerant taxa for all stations sampled in 1991 are listed in Table 5. The tolerant species list used in these calculations was based on a literature review for this project by Tetra Tech for the 1989 survey (Tetra Tech, 1990).

As discussed in the 1990 annual report, some additions or changes to the tolerant species list may be necessary. This revision should be based on the response of these opportunistic species to conditions within Puget Sound. At present, it is difficult to determine whether high abundances of pollution tolerant organisms are the result of natural stress or pollution.

The abundance of pollution tolerant species ranged from 97 percent at Station 208R in Sequim Bay to 1.5 percent at Station 1 in Semiahmoo Bay. With the exception of Station 208R, all stations sampled in the 1991 MSMT survey contained less than 50 percent pollution tolerant species.

- Nineteen stations had < 10 percent pollution tolerant species.

Table 6. Mean abundance and mean number of taxa for total and major taxa groups at the 1991 MSMT stations.

Station	Total Mean Sample Abundance	Total Mean No. of Taxa	Arthropoda		Annelida		Mollusca		Echinodermata		Miscellaneous	
			Mean Abundance	Mean No. of Taxa	Mean Abundance	Mean No. of Taxa	Mean Abundance	Mean No. of Taxa	Mean Abundance	Mean No. of Taxa	Mean Abundance	Mean No. of Taxa
1	395.2	23.2	218.2	5.4	43.8	9.8	17.2	5	114.6	2	1.4	1
3	173	21.4	19.8	4.4	128.6	11.8	31.6	4.2	1.6	0.8	0.2	0.2
4	225.4	28.6	40	3.6	33.2	12.8	76.4	9.2	73.8	1.8	2	1.2
5	281.6	39.8	23.8	4.2	89	17.8	126.6	13.4	43.2	2.6	2.4	1.8
8	267.6	57.4	25	9	203.2	36	38	11.4	2	1	0	0
12	377.6	45.8	29.6	6.2	85	22.6	91.2	14	173	1.8	1	1.2
14	197.6	68.4	38.2	12.4	106.8	36	45	15	2.2	1.8	6.6	2.6
15	638.6	65.6	18	9	158.8	32.6	80.2	21	0.6	0.4	381	2.6
17	384.8	20.6	1.4	1	53.4	14.6	329.8	4.8	0	0	0.2	0.2
18	561	38.2	5.2	3	187.4	23.8	351.4	8.6	0.4	0.4	16.6	2.4
19	49.4	24.8	8	4	29.4	15.4	7.4	3.2	3.6	1.8	1	0.4
20	183.2	33.2	2.4	1.8	138.6	22.4	39.8	8.2	0	0	2.4	1
21	573.2	40.2	105.6	3.8	157.6	22	306.6	12.2	0	0	3.6	1.2
22	391.4	47	116.2	8	45.2	18.8	227.4	18.4	0.2	0.2	2.4	1.6
26	1134	123.8	73.4	18.2	871.4	72.8	131.4	25	15.2	3.6	22.2	4.4
29	304.6	33.2	30	9.2	47.6	13.6	223	8	2.8	1.8	1.2	1
30	335.6	60.2	102	11	188	37.2	42.2	10.2	1.8	0.8	0.6	1
32	494.6	90.2	120.2	12.8	271.8	48.6	71.2	19.6	17.8	5	13.6	4.2
33	611.2	87.4	178.6	12.2	249.2	50.4	171.8	19	7.8	3.4	4	2.4
34	1016.2	49.6	116.4	8.4	858.4	30.6	34.4	7.6	5.2	1.8	1.8	1.2
35	525.6	45.2	181.2	6.2	262	27	35.6	6.4	40.8	2.8	6	2.8
38	127.4	28	45.4	10.6	19.8	9.4	58.6	5.8	2.4	1.2	1.2	1
39	156.8	42	63	9.2	53.6	20	37.2	10.4	0.2	0.2	3.4	2.2
40	605	70.2	150.6	7.2	241.8	43.8	204.6	15.8	1.8	1.4	6.2	2
41	1693.8	45	61.4	4.2	418.8	23.4	1201.6	15.2	9.4	1.2	2.6	1
43	666.4	63	184.2	11.4	223.4	31	59.8	16.4	194.6	2.2	4.4	2
44	435	94.4	54.8	12	283.2	57.6	63	18	11.2	2.8	23	4.2
45	185.8	42.6	34.8	5.4	116.8	24.2	19.4	8	5.2	1.6	9.4	3.4
47	583.4	86.8	42.8	14	313.4	48.8	81	16.4	115	2.6	31.2	5
48	167.6	26.4	86.6	3.6	21.2	9.2	44.2	10.2	7.4	1	4	2.4
49	140.4	22	29.2	4	79.6	10.2	22.4	5.8	3.8	1	5.4	1
69	503	74.8	136.6	13.2	277.2	44.8	51.8	13.6	34.2	1.4	3.4	1.8
70	93.2	18.2	3.6	2.2	34.6	7.6	53.6	7.6	0.2	0.2	1.2	0.6
71	239.6	50.4	46.8	6.4	131	28.4	42.8	12.6	13.4	2	5.6	1
2 R	253.6	54.6	12.6	5.8	148.4	28.4	83.2	17	4.8	1.2	4.8	2.2
9 R	660.2	27.4	13.2	3	463	15	50.6	5.4	103	1.4	36	2.6
10R	534	79.8	49.8	16.8	416.4	52.8	65	9.2	0	0	3.6	1.6
11R	1448.8	87.2	608.4	15.8	687	57.4	130.2	10.4	2.2	0.6	21	3.2
13R	1108.8	53	135.8	12.4	90.2	24.6	877.4	13.6	0.8	0.6	4.8	1.8
201R	888.4	67.6	27	10.4	325.6	41	18	9.2	68.4	9.2	449.4	3.8
202R	195.8	46.4	18.4	6.4	152.6	27.4	18.2	9.8	3.2	1	3.4	1.8
203R	258.4	48.2	54.8	6.6	167	30.6	15.2	6	15.6	2	6	3
204R	219.8	25	52.4	2.8	94.6	13.6	54	6.6	11.4	1	7.4	1
205R	394.8	51.6	20.8	5.4	97.2	29.2	242	14.2	31.4	1.2	2.8	1.6
206R	523.6	83.2	28.6	9	199.6	48.8	274.4	22	8	1.4	13.4	2
207R	458.4	57.4	19.2	7.4	166.6	32.6	267.6	14.8	1.8	1.2	3.8	1.4
208R	128	2.4	0.8	0.8	127	1.4	0	0	0	0	0.2	0.2
209R	396.2	51.6	167.4	8.2	144.2	27.2	75	13.8	3.6	1.6	6	1.2

- Twenty-two stations had 10-35 percent pollution tolerant species.

- Seven stations had > 35% pollution tolerant species.

Stations with abundances of tolerant species of less than ten percent tended to be located away from major population centers. These stations occurred in deep basins, near-shore areas, and within sheltered inlets.

Stations sampled during 1991 with abundances of tolerant species greater than 35 percent were found at Stations 208R (Sequim Bay), 39 (Dash Point), 209R (Skagit Bay), 33 (Elliott Bay), 70 (Shelton), 40 (City Waterway), and 30 (Eagle Harbor).

QUALITY ASSURANCE/QUALITY CONTROL

Sediment chemistry data were validated according to the *Laboratory Data Validation, Functional Guidelines for Evaluating Inorganics Analyses* (U.S. EPA, 1988a) and *Laboratory Data Validation, Functional Guidelines for Evaluating Organics Analyses* (U.S. EPA, 1988b). A statistical analysis of method blanks was the only deviation from the functional guidelines. The QA/QC reviews included assessments of sample holding times, initial and continuing calibration checks and tuning, blank results, interference check samples, accuracy (PCS, MS, MSD, and surrogate recoveries), and precision (using blind laboratory and field replicates). Quality assurance reviews for the conventional variables followed Puget Sound Protocols (PSEP, 1986e). Detailed information regarding quality control and quality assurance as well as procedural information for the 1991 PSAMP sediment chemistry and toxicity data is provided in the *Marine Sediment Monitoring Data Validation Report* (Appendix C).

Data Validation of Benthic Infauna

Quality control of the sorting of the benthic macroinvertebrate samples followed the Puget Sound Protocols (PSEP, 1987). Five replicate samples from 34 core stations and from 14 rotating stations for 1991 were sorted (total: 240 samples). Of those 240 samples, forty-seven failed the initial quality control check. Those samples were re-sorted, and all passed the second quality control check.

Five samples identified by Ecology taxonomists were re-identified by other taxonomists as a quality control measure. These results indicated that there was no difference in the identification of species, except for use of synonyms for six polychaete taxa. In eight samples there were differences in the enumeration of molluscs. These differences were within the bounds identified in the implementation plan (Striplin, 1988) and in the Puget Sound protocols.

SUMMARY

Sediment Chemistry

Data from 69 samples from 48 stations were analyzed for the presence of 134 chemical compounds. An additional 37 VOCs were analyzed at 17 stations and 14 resin acids and guaiacols were analyzed at four of the 48 stations.

Analytical results of conventional parameters showed a good correlation between TOC and percent fine grained sediment. The TOC ranged from 0.1 to 3.3 percent with the lowest value at Stations 39, 43, and 9R and the highest value at Station 49. The distribution of fine grained sediment (percent silt plus clay) at the 1990 stations was typical of what was seen in other studies in Puget Sound. High percent fines are found in small, shallow embayments and in deep basins; and coarser sediments are found along the open shorelines.

Some heavy metals were found at all 48 stations with higher concentrations in the urban embayments. With the exception of mercury, no metal exceeded the state sediment quality standards. The standard for mercury was exceeded at Station 34 in Sinclair Inlet, Station 35 in Dyes Inlet and at Station 21 in Port Gardner. With few exceptions, the concentrations of other pollutant metals were similar to past surveys.

Fourteen VOCs were detected at low concentrations at stations. The highest concentrations of five of these were found at Station 34 in Sinclair Inlet. These compounds included: 2-butanone, carbon disulfide, tetrachloroethylene, and trichlorofluoro-methane. Station 34 was added to the list of stations for volatile organics analysis in 1991. The remaining nine chemicals were found at six stations, including: two at Station 3 (Strait of Georgia), two at Station 35 (Dyes Inlet), two at Station 204R (East Sound, Orcas Island), and one each at Stations 8, 12, and 29 (Port Angeles, Port Townsend, and Shilshole, respectively).

Results of analyses for semivolatile organic compounds indicated that the compounds detected most frequently were the LPAHs and the HPAHs. For the third year, the highest concentrations of both were found at Station 40 located at the mouth of the City Waterway in Commencement Bay. Unlike past years, neither the concentration of LPAH nor HPAH exceeded the state sediment standards.

Thirty-four base/neutrals and acids were detected at stations during the 1991 survey. The highest concentration of 21 of these compounds was detected at Station 40 (City Waterway). No concentrations of any of these compounds were found above the state standards.

The PCB congener Aroclor 1254 was detected at low concentrations in 36 percent of the samples, while Aroclor 1260 was found in nine percent of the samples. The highest concentration of each was found in Dyes and Sinclair Inlets.

Pesticides were largely undetected during the 1991 survey. Small amounts of 4,4-DDT, DDD and DDE were detected at very low concentrations at Stations 29, 71, 201R, and 5. No other pesticides were detected at any other station in the 1991 MSMT survey.

Benthic Infauna

Station 19 had the lowest mean abundance of any 1991 station and a low number of taxa. The unusually high clay content at Station 19 may be responsible for its low abundance. Stations 70 and 208R also had low abundance and number of taxa. High total sulfides are probably the reason for low abundances and number of taxa at these stations. Station 41 had the highest abundance but low diversity. Station 41, located in Commencement Bay near Tacoma's sewer outfall, exemplifies conditions in a benthic community impacted by organic enrichment of sediments.

Pollution Tolerant Species

Using the present list of pollution tolerant species, seven 1991 stations had greater than 35 percent tolerant species. These seven stations occurred either in urban embayments, areas with restricted tidal exchange, or both.

Additional work needs to be done in revision of the pollution tolerant species list, as some pollution tolerant species may have inadvertently been excluded in the past.

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APPENDIX A

1991 Cruise Summary Report

1991 CRUISE REPORT

WASHINGTON STATE DEPARTMENT OF ECOLOGY

PUGET SOUND MARINE SEDIMENT MONITORING PROGRAM
Marine Sediment Chemistry and Benthic Infauna Survey
March 25 to April 14, 1991

Sediment sampling for the 1991 season of the Puget Sound Marine Sediment Monitoring Program took place between March 25 and April 14.

This work was accomplished in 16 working days with approximately one thousand person-hours effort. The average work day was 12.25 hours in length (range 5.25 to 20 hours). A total of 48 stations were sampled at an average of 3 stations per day (range 1 to 5). Sampling was completed in 21 calendar days with 2 days off for Easter weekend. Additionally, two days were spent in Everett Harbor and one day spent in Friday Harbor, when weather conditions precluded sampling.

Time of travel between ports and stations and between stations averaged about 1.3 hours and ranged between 10 minutes and 3.5 hours depending on distance, weather, tides and other factors. Length of time on station collecting samples averaged about 1.5 hours and ranged between 38 minutes and 4 hours depending on depth, weather, and whether or not replicate samples were taken.

Details of field work for the 1991 season are shown in Table 1. Locations of 1991 sampling stations are specified in Table 2.

While sampling techniques and procedures followed the guidelines established in the PSAMP Marine Sediment Quality Implementation Plan (Striplin, 1988), minor variations from this plan are noted as follows:

1. Monitoring began in the last week of March and was completed during a three week period.

2. Water overlying sediments in benthic infauna samples was not removed with a suction device. In chemistry samples, water was manually siphoned as prescribed in the implementation plan.

3. The 2-cm layer of sediment for chemical samples was removed with a stainless steel spatula rather than a stainless steel "cookie cutter".

4. Internal labels for biologic samples were prepared using pencil rather than indelible ink.

5. Three sediment reference materials (Stations 66, 67, and 68) were prepared by Dr. Joe Blazavich (EPA, Manchester Laboratory) and submitted to the chemistry laboratories for analysis.

6. Samples from Stations 4, 8, 12, 41, 78, 79, and 80 were analyzed for resin acids and quaicols.

7. Other variations from the implementation plan have been described previously (Tetra Tech, 1989).

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TABLE 1. SUMMARY OF 1991 CRUISE ACTIVITIES AND EVENTS
WASHINGTON STATE DEPARTMENT OF ECOLOGY, PUGET SOUND MARINE SEDIMENT MONITORING PROGRAM

Day	Month	Year	Course	Travel Time	Time On Station	Abstract of Events	Crew CE	PSM	ST	PS	DD	KC	FS	CJ
25	March	1991	Shilshole to 69 (Port Madison)	2:10	1:31	Met the R/V Kittiwake at the Shilshole Marina at 0820. Weather rough, postponing sampling at unprotected Station 29.								
			69 to 34 (Sinclair Inlet)	1:29	1:40									
			34 to 30 (Eagle Harbor)	1:38	1:01									
			30 to Winslow	0:31										
26	March	1991	Winslow to 29 (mid-channel, Central basin)	1:00	----	Too rough to sample at Station 29. Winds from North 10 to 14 knots with gusts to 18. Better weather predicted next week. Difficulty anchoring at Station 35 due to many Phyllochaetopterus tubes.								
			29 to 35 (Dyes inlet)	1:30	3:05									
			35 to 38 (East Passage)	3:15	4:00									
			38 to Des Moines	1:00										
27	March	1991	Des Moines to 39 (Redondo)	0:35	1:15	Sunny, calm seas enroute to Station 41. Apparently a slight Loran shift approaching Station 40. Met Raliegh Farlow at Rustin Marina. Crew change at Steilicoom ferry terminal.								
			39 to 41 (Commencement Bay)	0:50	0:56									
			41 to 40 (Commencement Bay)	0:22	0:48									
			40 to Rustin Marina	0:44										
			Rustin Marina to 43 (Carr Inlet)	145	1:05									
			43 to Steilacoom											
28	March	1991	Steilacoom to 44 (E. side Anderson island)	0:45	3:03									
			44 to 45 (W. side Anderson island)	0:45	1:18									
			45 to 47 (Case inlet)	0:55	1:32									
			47 to 70 (Inner Shelton Harbor)	1:20	0:46									
			70 to East Bay Marina	2:13										
29	March	1991	East Bay Marina to 49 (lower Budd inlet)	0:45	1:40									
			49 to 48 (outer Budd inlet)	0:25	1:50									
			48 to East Bay Marina	0:35										
30	March	1991	Off Day											
31	March	1991	Off Day											

CE = Charlie Eaton (Skipper), PSM = Pam Sparks-McConkey, ST = Scott Thompson, PS = Pete Striplin,
DD = Dale Davis, KC = Kelly Carruth, FS = Fern Svendsen, CJ = Carol Jansen

TABLE 1. SUMMARY OF 1991 CRUISE ACTIVITIES AND EVENTS
WASHINGTON STATE DEPARTMENT OF ECOLOGY, PUGET SOUND MARINE SEDIMENT MONITORING PROGRAM

Day	Month	Year	Course	Travel Time	Time On Station	Abstract of Events	Crew CE	PSM	ST	PS	DD	KC	FS	CJ
1	April	1991	Shilshole to 32 (N. side Elliot Bay)	0:30	2:35	Weather overcast, seas 1-2 foot chop at Station 32. Seas very calm at Station 33, many sticks in sediment sample.								
			32 to 29 (mid-channel, Central Basin)	0:45	2:20									
			29 to 33 (S. side Elliot Bay)	1:10	1:00									
			33 to Shilshole	1:00										
2	April	1991	Shilshole to 26 (mid-channel, Central Basin)	1:15	----	Float suits donned at Station 26. Seas 3 to 4 feet, Winds S. at 20 knots. unable to complete sample. Unusual sediments at Station 22: light brown above (about 0.5cm)/dark black below. Course to Station 20 abandoned, heading changed to Station 21. Gale force winds predicted for tomorrow.								
			26 to 22 (Mukilteo)	1:10	1:05									
			22 to 21 (Possession Sound)	2:35	1:10									
			21 to Everett Marina	0:30										
3	April	1991	Weather Day											
4	April	1991	Weather Day											
5	April	1991	Everett Marina to 20 (Port Susan)	2:15	1:30	Light wind and chop enroute to Station 20. Flat calm at Station 20. Cool, calm, overcast with some swell at Station 19.								
			20 to 19 (Saratoga Passage)	2:00	1:15									
			19 to 18 (Forbes Point)	1:40	0:50									
			18 to 209R (Skagit Bay)	0:50	0:50									
			209R to Fidalgo Bay	2:35										
6	April	1991	Fidalgo Bay to 207R (West Beach)	2:20	1:10	Winds 15 to 25 knots, swell one foot at Station 207R. Decreased winds at Station 71. Decreased seas at Station 5.								
			207R to 71 (Padilla Bay)	2:00	1:00									
			71 to 5 (Samish Bay)	0:50	3:00									
			5 to Bellingham Bay Marina	1:40										

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DD = Dale Davis, KC = Kelly Carruth, FS = Fern Svendsen, CJ = Carol Jansen

TABLE 1. SUMMARY OF 1991 CRUISE ACTIVITIES AND EVENTS
WASHINGTON STATE DEPARTMENT OF ECOLOGY, PUGET SOUND MARINE SEDIMENT MONITORING PROGRAM

Day	Month	Year	Course	Travel Time	Time On Station	Abstract of Events	Crew CE	PSM	ST	PS	DD	KC	FS	CJ
7	April	1991	Bellingham Bay Marina to 4 (Bellingham Bay)	0:10	2:00	Winds 5 to 10 knots at Station 4. Crew change and offloading of samples in Bellingham. Wind 10 knots, swells 1 to 2 feet, sunny at Station 2R.								
			4 to 203R (Bellingham Bay)	0:50	0:50									
			203R to Bellingham	0:40										
			Bellingham to 2R (Cherry Point)	2:15	1:00									
			2R to Friday Harbor	2:30										
8	April	1991	Friday Harbor to 204R (Eastsound, Orcas Is.)	1:20	1:30	Seas choppy (1 to 2 feet), wind about 25 knots at Station 204R. Station 205R moved 0.8 miles N. and W. of proposed location due to rocks. Seas calm but building at Station 206R, winds shifty. Winds gusting to 30 knots, seas 2 to 3 feet outside breakwater on arrival to Friday Harbor. Gale force winds predicted for tomorrow.								
			204R to 205R (W. side Blakely Island)	0:50	1:00									
			205R to 206R (Friday Harbor)	1:00	1:40									
			206R to Friday Harbor	0:20										
9	April	1991	Weather Day											
10	April	1991	Friday Harbor to 3 (Strait of Georgia)	3:30	----	Winds 10 to 15 knots enroute to Station 3. Seas rough at Station 3 (2 to 3 foot swells) and unable to complete sampling. Samples offloaded in Blaine.								
			3 to 1 (Semiahmoo Bay)	1:20	1:10									
			1 to Blaine Marina	1:00										
			Blaine Marina to Point Roberts	2:00										
11	April	1991	Point Roberts to 201R (Roberts Bank)	0:50	1:45	Seas calm with 1 to 2 foot swells at Station 202R. Light winds, less than 10 knots. Seas increased at Station 3, wind 10 to 15 knots.								
			201R to 202R (Point Roberts)	0:40	1:30									
			202R to 3	0:45	2:00									
			3 to Friday Harbor	3:10										

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TABLE 1. SUMMARY OF 1991 CRUISE ACTIVITIES AND EVENTS
WASHINGTON STATE DEPARTMENT OF ECOLOGY, PUGET SOUND MARINE SEDIMENT MONITORING PROGRAM

Day	Month	Year	Course	Travel Time	Time On Station	Abstract of Events	Crew CE	PSM	ST	PS	DD	KC	FS	CJ
12	April	1991	Friday Harbor to 7R (Juan de Fuca Strait)	2:57	1:50	Dall porpoises riding bow wave at sunrise enroute to Station 7R. Fair weather morning. Samples from Station 7R and 9 unacceptable, all rejected.								
			7R to 9 (Green Point, Juan de Fuca Strait)	1:10	0:46									
			9 to 9R (East of Green Point)	1:12	0:38									
			9R to 8 (Port Angeles)	1:16	0:39									
			8 to Port Angeles	0:15										
13	April	1991	Port Angeles to 7 (7R)	0:45	----	Station 7 not sampled due to 25 knot winds and 8 foot swells. At Station 10R winds 15 knots, little chop, and no swell. Sediments at Station 208R have a 2cm black layer over drab olive sediments with a strong to overwhelming odor of Hydrogen Sulfide. Station 11R samples contain lots of Onuphidae and Chaetopteridae tubes. The surface of these (11R) samples are covered with fiberous tubes (i.e., Amphipod). Crew change in Port Townsend. Winds 15 to 20 knots, light swells at Station 12. Calm, cold, and no wind at Station 26 (2100 to 2400 hrs).								
			7 to 10R (Dungeness Bay)	2:40	1:05									
			10R to 208R (Goose Point)	0:55	0:50									
			208R to 11R (Discovery Bay)	1:15	1:05									
			11R to Port Townsend	0:40										
			Port Townsend to 12 (Port Townsend)	0:20	1:00									
			12 to 26 (S. of Whidbey Is., Central Basin)	1:40	3:00									
			26 to Port Ludlow	2:00										
14	April	1991	Port Ludlow to 13 (North Hood Canal)	0:48	0:43	Flat calm at Stations 13 and 14. Calm and light drizzle at Station 15. Year 3 sampling completed, crew except C. Eaton disembark from R/V Kittiwake at Alderbrook.								
			13 to 14 (Bangor)	0:38	1:02									
			14 to 15 (Dabob Bay)	1:15	0:55									
			15 to 17 (Great Bend of Hood Canal)	3:00	1:15									
			17 to Alderbrook	0:20										

CE = Charlie Eaton (Skipper), PSM = Pam Sparks-McConkey, ST = Scott Thompson, PS = Pete Striplin,
DD = Dale Davis, KC = Kelly Carruth, FS = Fern Svendsen, CJ = Carol Jansen

Table 2. LATITUDE, LONGITUDE, STATE PLANE COORDINATES, DEPTHS, AND RADAR RANGES OF 1991 SEDIMENT MONITORING STATIONS
WASHINGTON STATE DEPARTMENT OF ECOLOGY, PUGET SOUND MARINE SEDIMENT MONITORING PROGRAM

STATION	LATITUDE (DDMMSS.S)	LONGITUDE (DDDMMSS.S)	EAST STATE PLANE COORD- INATE	NORTH STATE PLANE COORD- INATE	WATER DEPTH (METERS)	LOCALITY	VARIABLE RADAR RANGES
1	485928.00	1225141.00	1513061	732762	-23.5	Semiahmoo Bay	1) 2.0 nm to nearest shore on Kwomais Pt. 2) 2.73 nm to nearest E. shore N. of Birch Pt.
3	485214.00	1225841.00	1483831	689551	-223.2	Strait of Georgia	1) 4.9 nm to nearest shore N.W. of Patos Is. 2) 7.5 nm to Pt. Whitehorne 3) 6.5 nm to nearest shore of Pt. Roberts
4	484104.00	1223218.00	1588135	619018	-25.4	Bellingham Bay	1) 1.4 nm to tip of Governors Pt. 2) 1.3 nm to nearest E. shore
5	483551.00	1223206.00	1588239	587288	-20.2	Samish Bay	1) 2.7 nm to nearest E shore of Vendovi Is. 2) 1.0 nm to nearest shore of William Pt. (Samish Is.)
8	480753.00	1232657.00	1361324	423552	-22.1	Port Angeles Harbor	1) 0.3 nm to corner of pilings just S. of green bouy at marina entrance 2) 0.6 nm to tip of dock due W. at paper mill
12	480505.00	1224631.00	1525389	401662	-21.1	Port Townsend	1) 275 degrees C, 0.8 nm to face of docks at pulp mill to W. 2) 190 degrees C, 1.0 nm to tip of small dock 3) 090 degrees C, 1.2 nm to dock at Walan Pt.
14	474704.00	1224346.00	1451870	901666	-113.4	North Hood Canal	1) 0.6 nm to N. edge of pt. on W. shore to S. of station 2) 1.1 nm to tip of big dock at sub base 3) 1.3 nm to nearest E. shore at base of other do
15	474302.00	1224850.00	1430395	877750	-21.8	Dabob Bay	1) 0.2 nm to N. tip of dock bearing 215 degrees C 2) 0.3 nm to corner of shore bearing about 065 de
17	472211.00	1230746.00	1348517	753491	-82.7	South Hood Canal	1) 0.8 nm to nearest shore of Ayres Pt. 2) 1.3 nm to nearest shore point at Union 3) 0.9 nm to point at Potlach

nm = nautical mile, C = compass bearing, true north, M = compass bearing, magnetic north

Table 2. LATITUDE, LONGITUDE, STATE PLANE COORDINATES, DEPTHS, AND RADAR RANGES OF 1991 SEDIMENT MONITORING STATIONS
WASHINGTON STATE DEPARTMENT OF ECOLOGY, PUGET SOUND MARINE SEDIMENT MONITORING PROGRAM

STATION	LATITUDE (DDMMSS.S)	LONGITUDE (DDDMMSS.S)	EAST STATE PLANE COORD-INATE	NORTH STATE PLANE COORD-INATE	WATER DEPTH (METERS)	LOCALITY	VARIABLE RADAR RANGES
18	481522.00	1223725.00	1563904	463266	-19.0	Oak Harbor	1) 1.2 nm to Blowers Bluff 2) 0.8 nm S.W. of Forbes Pt.
19	480552.00	1222816.00	1599816	404694	-122.6	Saratoga Passage	1) 2.3 nm to Mabama 2) 1.6 nm to S. edge of Lowell Pt. 3) 0.8 nm to S. edge of East Pt.
20	481023.00	1222721.00	1604128	432069	-11.8	Port Susan	1) 0.7 nm to both points due W. of station 2) 1.3 nm to Barnum Pt.
21	475907.00	1221434.00	1573118	971910	-20.7	Port Gardner	1) 0.6 nm to marker "4" 2) 0.9 nm to S.W. corner of S. pier
22	475720.00	1221710.00	1562260	961305	-22.5	Mukilteo	1) 0.1 nm to shore (tide up to breakwater) 2) 0.4 nm to tip of fuel dock
26	475108.00	1222730.00	1519124	924617	-266.9	(West) Central Basin	1) 2.0 nm to nearest shore W. 2) 4.0 nm to nearest shore of Scatchet Hd. (Whidb 3) 3.7 nm to nearest shore of Edwards Pt.
29	474206.00	1222713.00	1518923	869678	-199.9	Shilshole	1) 2.0 nm to green bouy "1" off West Pt. 2) 2.5 nm to nearest shore of Meadow Pt. 3) 2.1 nm to nearest shore S. of Pt. Monroe
30	473726.00	1223010.00	1506098	841617	-13.3	Eagle Harbor	1) 0.3 nm to marker "4" 2) 0.2 nm to marker "5" off Wycoff 3) 0.3 nm to tip off Wycoff pier due S.
32	473755.00	1222430.00	1529455	843977	-20.4	Magnolia Bluff	1) 0.2 nm to shore 2) 2.2 nm to green bouy "1" off West Pt. 3) 2.2 nm to Duwamish Head marker "2"
33	473514.00	1222233.00	1537080	827475	-20.8	Elliot Bay	

nm = nautical mile, C = compass bearing, true north, M = compass bearing, magnetic north

Table 2. LATITUDE, LONGITUDE, STATE PLANE COORDINATES, DEPTHS, AND RADAR RANGES OF 1991 SEDIMENT MONITORING STATIONS
WASHINGTON STATE DEPARTMENT OF ECOLOGY, PUGET SOUND MARINE SEDIMENT MONITORING PROGRAM

STATION	LATITUDE (DDMMSS.S)	LONGITUDE (DDDMMSS.S)	EAST STATE PLANE COORD-INATE	NORTH STATE PLANE COORD-INATE	WATER DEPTH (METERS)	LOCALITY	VARIABLE RADAR RANGES
34	473247.00	1223943.00	1466081	814392	-10.6	Sinclair Inlet	1) 0.2 nm to N. shore
							2) 0.8 nm to nearest shore of Pt. Heron
							3) 0.1 nm to mooring bouy A-12
							4) 0.5 nm to nearest shore at point due W. of Por
							5) 0.5 nm to radar ref. "1" on E. shore
35	473648.00	1224155.00	1457709	839054	-13.3	Dyes Inlet	1) 0.4 nm to nearest shore at point E. of Chico B
							2) 0.5 nm to N. edge of point (knob) at Chico
							3) 0.5 nm to nearest shore on knob N. of Chico
38	472542.00	1222335.00	1531439	769633	-198.7	Point Pully	1) 1.8 nm to N. shore of Maury
							2) 1.6 nm to Pt. Heyer
							3) 1.4 nm to Three-Tree Pt. (Pt. Pully)
39	472013.00	1222218.00	1535941	736181	-14.8	Dash Point	1) 0.2 nm to beach
							2) 2.6 nm to Dash Pt.
40	471541.00	1222613.00	1519083	709022	-10.4	Foss (City) Waterway	
41	471632.00	1222513.00	1523346	714086	-21.1	Blair/Sitcum Waterways	1) 0.4 nm to marker "1"
43	471753.00	1224432.00	1443686	724398	-20.8	Carr Inlet	1) 0.2 nm to large triangular marker
							2) 2.0 nm to point due W. of Mayo Cove
44	470941.00	1224025.00	1459331	674093	-21.5	East Anderson Island	1) 0.3 nm to N. end of dock near Sandy Pt.
							2) 0.6 nm to tip of Sandy Pt.
							3) 1.5 nm to nearest shore of Ketron Island
45	470953.00	1224505.00	1440024	675851	-51.3	Devil's Head	1) 0.8 nm to nearest shore of Treble Pt.
							2) 0.8 nm to pt. N. of Devils Hd. near marker "2"
							3) 0.9 nm to nearest shore N. of Amsterdam Bay

nm = nautical mile, C = compass bearing, true north, M = compass bearing, magnetic north

Table 2. LATITUDE, LONGITUDE, STATE PLANE COORDINATES, DEPTHS, AND RADAR RANGES OF 1991 SEDIMENT MONITORING STATIONS
WASHINGTON STATE DEPARTMENT OF ECOLOGY, PUGET SOUND MARINE SEDIMENT MONITORING PROGRAM

STATION	LATITUDE (DDMMSS.S)	LONGITUDE (DDDMMSS.S)	EAST STATE PLANE COORD-INATE	NORTH STATE PLANE COORD-INATE	WATER DEPTH (METERS)	LOCALITY	VARIABLE RADAR RANGES
47	471400.00	1225052.00	1416802	701564	-21.5	Case Inlet	1) 0.3 nm to nearest shore of Fudge Pt. 2) 1.0 nm to S. end of McMicken is. 3) 1.0 nm to nearest E. shore N. of Whiteman Cove
48	470726.00	1225509.00	1397850	662200	-21.3	North Budd Inlet	1) 1.1 nm to Dofflemeyer Pt. 2) 0.3 nm to W. shore
49	470449.00	1225449.00	1398746	646260	-5.6	South Budd Inlet	1) 0.5 nm to notch in shore due E. 2) 0.3 nm to green marker No. "5"
69	474409.00	1223207.00	1499139	882647	-34.4	Port Madison	1) 0.6 nm to nearest W. shore 2) 0.7 nm to tip of dock due N. 3) 1.8 nm to tip of point W. of Pt. Monroe
70	471242.00	1230500.00	1358050	695494	-6.5	Shelton	1) 0.5 nm to Munson Point
71	483033.00	1223513.00	1574937	555352	-7.1	Fidalgo Bay	1) Bearing 275 degrees C, 0.5 nm to Cap Sante Hea 2) 1.3 nm to S.E. point (Guemes island)
R 2	485005.00	1224407.00	1541924	674944	-21.3	Green Point	
R 9	480802.00	1231457.00	1410168	422867	-16.5	E. of Green Point	1) 1.00 nm to edge of point E. of Green Pt. 2) 1.03 nm to shore E. of above
R10	481010.00	1230603.00	1446755	434730	-20.7	Dungeness Bay	
R11	480315.00	1225341.00	1495905	391279	-22.5	Discovery Bay	
R13	475027.00	1223743.00	1477210	921546	-19.3	N. Hood Canal	Used visual range (4/3/89) with bow facing utilit poles
R201	485928.00	1231225.00	1430118	735134	-121.3	Roberts Bank	1) 1.86 nm to W. end of Westshore Terminal (Tsawwasseu)

nm = nautical mile, C = compass bearing, true north, M = compass bearing, magnetic north

Table 2. LATITUDE, LONGITUDE, STATE PLANE COORDINATES, DEPTHS, AND RADAR RANGES OF 1991 SEDIMENT MONITORING STATIONS
WASHINGTON STATE DEPARTMENT OF ECOLOGY, PUGET SOUND MARINE SEDIMENT MONITORING PROGRAM

STATION	LATITUDE (DDMMSS.S)	LONGITUDE (DDDMMSS.S)	EAST STATE PLANE COORD-INATE	NORTH STATE PLANE COORD-INATE	WATER DEPTH (METERS)	LOCALITY	VARIABLE RADAR RANGES
R202	485554.00	1230535.00	1456816	712631	-118.6	Point Roberts	1) 4.46 nm to "QR" 8m at Tsaw. Landing 2) 2.41 nm to S.W. corner of Pt. Roberts
R203	484500.00	1223200.00	1589871	642903	-12.5	Bellingham Bay	1) 0.652 nm to tip of dolphins at end of pipeline W. of marina 2) 1.03 nm to Oc R "2" at entrance to Squalicum H
R204	483818.00	1225234.00	1506111	604188	-31.7	Eastsound, Orcas Is.	1) Bearing 210 degrees M - 0.25 nm to shore 2) Bearing 000 degrees M - 0.307 nm to tip of poi
R205	483522.00	1225057.00	1512157	586186	-31.9	W. side Blakely Is.	1) Bearing approx 033 degrees M - 1.00 nm to poin on Orcas Is. S. of Olga 2) Bearing 112 degrees M - 1.00 nm to N.W. corner of Blakely Is.
R206	483234.00	1230047.00	1472023	570249	-19.4	Friday Harbor	1) 0.104 nm to tip of FHL dock at 000 degrees M 2) 0.145 nm to nearest shore 225 degrees M
R207	482357.00	1224015.00	1553649	515709	-29.9	West Beach	1) 0.432 nm to S. edge of Deception Island 2) Approx. 0.25 nm to W. beach berm
R208	480231.00	1230022.00	1468547	387572	-13.7	Goose Bay	1) 0.120 nm to Goose Pt. 2) 0.603 nm to Schoolhouse Pt.
R209	481743.00	1222918.00	1597158	476813	-19.6	Skagit Bay	1) Marker "3" Strawberry Pt. 0.66 nm 2) Nun bouy "4"

nm = nautical mile, C = compass bearing, true north, M = compass bearing, magnetic north

— Volatile organics — Resin acids / Guaiacols

— MS/MSD — Environmental variability Replication station

O = organics
M = Metals
S = Sulfides

DEPARTMENT OF ECOLOGY

SUMMARY SAMPLING LOG

ECOLOGY MARINE SEDIMENT MONITORING PROGRAM–1991

SURVEY AREA: ______________________

	SAMPLING DATE	STATION	SAMPLE NUMBER	ORG	MET	PEST/PCB	TOC	GS	SULF	VOL	SAL	BA	BEN (1.0)
	4-[illegible]-91	1		✓	✓	✓	✓	✓	✓			✓	✓
	4-[illegible]-91	2R		✓	✓	✓	✓	✓	✓			✓	✓
	4-[illegible]-91	3		✓	✓	✓	✓	✓	✓	✓		✓	✓
73,77,81 O M S	4/[illegible]/91	4		✓	✓	✓	✓	✓	✓			✓	✓
	4/[illegible]/91	5	1	✓	✓	✓	✓	✓	✓	✓		✓	✓
	4/[illegible]/91	51	1R	✓	✓	✓	✓	✓	✓	✓		✓	
	4/[illegible]/91	52	2	✓	✓	✓	✓	✓	✓	✓		✓	
	4/[illegible]/91	53	3	✓	✓	✓	✓	✓	✓	✓		✓	
	4/[illegible]/91	71		✓	✓	✓	✓	✓	✓			✓	✓
S	4/[illegible]/91	13R		✓	✓	✓	✓	✓	✓			✓	✓
	4-12-91	8		✓	✓	✓	✓	✓	✓	✓		✓	✓
	4-12-91	9R		✓	✓	✓	✓	✓	✓			✓	✓
	4-13-91	10R		✓	✓	✓	✓	✓	✓			✓	✓
	4-13-91	11R		✓	✓	✓	✓	✓	✓	✓		✓	✓
	4-13-91	12		✓	✓	✓	✓	✓	✓	✓		✓	✓
	4/[illegible]/91	14		✓	✓	✓	✓	✓	✓			✓	✓
	4/[illegible]/91	15		✓	✓	✓	✓	✓	✓			✓	✓
	4/14/91	17		✓	✓	✓	✓	✓	✓	✓		✓	✓
	4-5-91	18		✓	✓	✓	✓	✓	✓			✓	✓
DUMP VOA	4-5-91	19		✓	✓	✓	✓	✓	✓	✓		✓	✓
	4/5/91	20		✓	✓	✓	✓	✓	✓			✓	✓
	4/[illegible]/91	21		✓	✓	✓	✓	✓	✓			✓	✓

RECORDER: ______________ ORG. CODE: ______________

— Volatile organics

— Resin acids / Guaiacols

— MS/MSD
O = organics
M = Metals

— Environmental variability Replication station

DEPARTMENT OF ECOLOGY

SUMMARY SAMPLING LOG

ECOLOGY MARINE SEDIMENT MONITORING PROGRAM—1991

SURVEY AREA: ____________

	SAMPLING DATE	STATION	SAMPLE NUMBER	ORG	MET	PEST/PCB	TOC	GS	SULF	VOL	SAL	BA	BEN (10)
	4-[illegible]	22		✓	✓	✓	✓	✓	✓			✓	✓
MS/MSD	4-13-91	26		✓	✓	✓	✓	✓	✓	✓		✓	✓
	3-25-91	69		✓	✓	✓	✓	✓	✓			✓	✓
	4-1-91	29		✓	✓	✓	✓	✓	✓	✓		✓	✓
	3-25-91	30		✓	✓	✓	✓	✓	✓			✓	✓
M O	4-1-91	32	1	✓	✓	✓	✓	✓	✓			✓	✓
	4-1-91	57	1R	✓	✓	✓	✓	✓	✓			✓	
	4-1-91	58	2	✓	✓	✓	✓	✓	✓			✓	
	4-1-91	59	3	✓	✓	✓	✓	✓	✓			✓	
	4-1-91	33		✓	✓	✓	✓	✓	✓			✓	✓
	3-25-91	34		✓	✓	✓	✓	✓	✓	✓		✓	✓
M O	3-26-91	35	1	✓	✓	✓	✓	✓	✓	✓		✓	✓
	3-26-91	72	1R	✓	✓	✓	✓	✓	✓			✓	
	3-26-91	73	2	✓	✓	✓	✓	✓	✓			✓	
	3-26-91	74	3	✓	✓	✓	✓	✓	✓			✓	
	3-26-91	38	1	✓	✓	✓	✓	✓	✓	✓		✓	✓
	3-26-91	60	1R	✓	✓	✓	✓	✓	✓	✓		✓	
O M	3-26-91	61	2	✓	✓	✓	✓	✓	✓	✓		✓	
	3-26-91	62	3	✓	✓	✓	✓	✓	✓	✓		✓	
	3-27-91	39		✓	✓	✓	✓	✓	✓			✓	✓
	3-27-91	40		✓	✓	✓	✓	✓	✓			✓	✓
	3-27-91	41		✓	✓	✓	✓	✓	✓			✓	✓

RECORDER: ____________ ORG. CODE: ____________

● – volatile organics , ● – Environmental variability Replication station

– MS/MSD
O = organics
M = Metals

DEPARTMENT OF ECOLOGY

SUMMARY SAMPLING LOG

ECOLOGY MARINE SEDIMENT MONITORING PROGRAM – 1991

SURVEY AREA. ____________________

	SAMPLING DATE	STATION	SAMPLE NUMBER	SAMPLES COLLECTED									
				ORG	MET	PEST/PCB	TOC	GS	SULF	VOL	SAL	BA	BEN (1.0)
	3-27-91	43		✓	✓	✓	✓	✓	✓			✓	✓
● O M	3-27-91	44	1	✓	✓	✓	✓	✓	✓			✓	✓
●	3-28-91	63	1R	✓	✓	✓	✓	✓	✓			✓	
	3-28-91	64	2	✓	✓	✓	✓	✓	✓			✓	
	3-28-91	65	3	✓	✓	✓	✓	✓	✓			✓	
●	3-29-91	45		✓	✓	✓	✓	✓	✓	✓		✓	✓
	3-29-91	47		✓	✓	✓	✓	✓	✓			✓	✓
●	3-2[illegible]-91	48		✓	✓	✓	✓	✓	✓	✓		✓	✓
	[illegible]	49		✓	✓	✓	✓	✓	✓			✓	✓
	3-28-[illegible]	70		✓	✓	✓	✓	✓	✓			✓	✓
V ●	4-11-91	201R		✓	✓	✓	✓	✓	✓	✓		✓	✓
V ●	4-11-91	202R		✓	✓	✓	✓	✓	✓	x		✓	✓
	4/7/91	203R		✓	✓	✓	✓	✓	✓			✓	✓
V ●	4/8/91	204R		✓	✓	✓	✓	✓	✓	✓		✓	✓
	4/8/91	205R		✓	✓	✓	✓	✓	✓			✓	✓
	4/8/91	206R		✓	✓	✓	✓	✓	✓			✓	✓
	4/[illegible]/91	207R		✓	✓	✓	✓	✓	✓			✓	✓
	4-13-91	208R		✓	✓	✓	✓	✓	✓			✓	✓
	[illegible]	209R		✓	✓	✓	✓	✓	✓			✓	✓
	4-[illegible]-91	67 (SRM)		✓	✓	✓	✓						
	3-27-91	66 (SRM)		✓	✓	✓	✓			✓			
		68 (SRM)											

RECORDER: ____________________ ORG. CODE: ____________________

APPENDIX B

Site Descriptions (1989 - 1992)

PSAMP STATIONS SITE DESCRIPTIONS, INTRODUCTION
MARINE SEDIMENT MONITORING TASK

The MSMT includes the monitoring of sediment conditions throughout Puget Sound, Hood Canal, the Strait of Georgia north to the U.S./Canada border, and the Strait of Juan De Fuca west to Port Angeles.

Forty-eight sites are monitored during each annual spring survey. Thirty-four of these sites, or stations, have been sampled each year since the beginning of the program. Stations which include an "R" in their identification number are rotating stations.

Rotating stations are grouped into north, central, and south stations. Rotating stations are sampled once every fourth year. Rotating stations with identifying numbers less than 100 and followed by an "R" were first sampled in 1989 and then used as rotating stations (*i.e.*, 23R).

Some MSMT sample sites are known to have been used in previous studies. This information is noted under the individual site descriptions when available.

Information regarding locations of WTP or other point source outfalls is included where known. Whether or not a point source discharge influences sediment conditions at a sampling station is more related to local currents than proximity of that discharge to the station.

Stations are described individually, however, the following groupings may be of interest:

Whidbey Basin Cross-sound Transect - Rotating Stations 23R, 24R, and 25R along with the Core Station 26, form a cross-sound sampling transect about two miles south of Whidbey Island. Puget Sound is about 6.5 miles wide at this point.

Inlets of the South Sound Terminus - Three annual and eight rotating stations are distributed between Henderson, Budd, Eld, Totten, and Hammersley Inlets in South Puget Sound. This group includes stations; 48, 49, 70, 101R, 102R, 103R, 104R, 105R, 106R, 107R, 109R.

Strait of Georgia Transect - Three stations (Stations 201R, 202R, and 3) underlie the Strait of Georgia at increasing distance from the mouth of the Fraser River in Canada.

Puget Sound Deep Basin - Stations 26, 29, and 38 are located in the deepest portions of the major basins within Puget Sound.

Hood Canal - Two annual and three rotating stations are distributed within Hood Canal including Stations 15, 17, 13R, 304R, and 305R.

PSAMP CORE STATION SITE DESCRIPTIONS
MARINE SEDIMENT MONITORING TASK

STATION 1

Located one mile south of the U.S./Canada border, this station is the northernmost core station. Station 1 is four miles west of Blaine and the Drayton Harbor entrance and is East of Point Roberts.

Station 1 is in 24 meters of water. Sediments at this site were primarily silty. Signs of Pachycerianthus fimbriatus, an animal that may be indicative of clean sediments, were noted in sediment samples from this station.

Outflow from the Fraser River may influence the composition of Station 1 sediments. The shoreline of Boundary Bay and the mouth of the Nicomeki River in Canada lie a few miles north of the station.

STATION 3

This station lies near the center of a 400 square mile body of water which makes up southern portions of the Strait of Georgia. Patos Island and the San Juan Islands archipelago are four miles south of the station. Point Roberts is seven miles from the station in a north by northwesterly direction. The station is about nine miles west of Cherry Point, in Whatcom County.

Station 3 is located in 223 meters of water. Benthic samples taken over a four year period suggest the bottom consists of rippled hardpan in which shell fragments and sediments collect in furrows. Observations of commercial long-line fisheries during 1992 sampling indicate the area is productive for dogfish.

Water and sediment chemical quality is likely influenced by the outflow of the Fraser River to the north. The configuration of bottom sediments is most certainly influenced by the strong currents this area experiences.

STATION 4

Station 4 is located in the southern portion of Bellingham Bay, west of Chuckanut Bay. This station is two miles southwest of Post Point and South Bellingham. Portage and Lummi Islands enclose the western side of Bellingham Bay and are three to four miles west of Station 4.

The water depth at Station 4 is 25 meters. Sediments from this site were silty. Pachycerianthus fimbriatus was collected in some of the benthic samples from this station.

The Nooksack River discharges into the northern portions of Bellingham Bay and may influence the composition of sediments at this station. Historically, several pulp mills were located on shorelines adjacent to Station 4.

STATION 5

Station 5 is located one mile northeast of Williams Point on Samish Island. This site is in the outer, southern portions of Samish Bay.

Station 5 lies in 20 meters of water. Sediments from this location were silty.

The shoreline of Samish Bay and Samish Island are doted with residential and summer homes. Clearcut logging activities were evident on the steep slopes of the Chuckanut Range to the east. This site's sediment composition may be influenced by the Samish River which discharges into Samish Bay southeast of the station.

STATION 8

Station 8 is the westernmost of the core stations. It is located in the western end of Port Angeles. The station lies between Ediz Hook spit to the north and the shoreline of the city of Port Angeles to the south.

Station 8 is in 22 meters of water. Sediments collected from this station consist mainly of silt and wood fragments.

Composition of water and sediments in the vicinity of Station 8 are influenced by the adjacent mills and industrial areas of Port Angeles.

STATION 12

Station 12 lies two miles south of the city of Port Townsend. This station is about one mile east by southeast of Glen Cove. Port Townsend is bordered by the Quimper Peninsula to the west and Indian Island to the east.

Station 12 is in 21 meters of water. Sediments at this station contain silt and clay.

The shoreline east of Station 12 is wooded and part of the U.S. Navy reservation on Indian Island. A few mills, as well as scattered homes and summer residences are found on shores to the west and south of the station.

STATION 14

Station 14 is located in the northern portion of Hood Canal about one and a half miles south of Thorndyke Bay. The town of Vinland is located one mile southeast of the station on the shore of the Kitsap Peninsula.

Station 14 is in 113 meters of water off the east shore of the Toandos Peninsula of Hood Canal. Sediments collected at this station were primarily silt with fine sand and a small amount of clay.

Hood Canal, a fjord, is less than two miles wide in the vicinity of Station 14. With the exception of the Bangor Submarine Base, shorelines in this area consist mostly of wooded slopes and scattered residences.

STATION 15

Station 15 is in outer Dabob Bay, north of its junction with Hood Canal. The station is located about 0.25 miles north of Zelatched Point near the west shore of the Toandos Peninsula. Dabob Bay is roughly nine miles long, running north to south, and opens into Hood Canal at its southern end. Towards the northern end of Dabob Bay, the Bolton Peninsula divides Quilcene Bay to the west from upper Dabob Bay to the east.

Station 15 is located in 22 meters of water. Sediment grab samples at this station contain fine sands.

Lands directly adjacent to Station 15 on the Toandos Peninsula consist of forested slopes owned by the U.S. Navy. A large dock and a few small on-shore structures are noted in the vicinity of the station. The station is exposed to wind fetch from the south and the composition of sediments here may be influenced by wind driven waves.

PSAMP CORE STATION SITE DESCRIPTIONS
MARINE SEDIMENT MONITORING TASK

STATION 17

Station 17 is located in the Great Bend of Hood Canal. The station is about one mile southwest of Ayres Point on the Kitsap Peninsula.

Station 17 is in 83 meters of water. Sediments at this station are silty.

The shallow sediments of the Skokomish River delta extend about one and a half miles out into the Great Bend of Hood Canal from the south. The northern edge of the shallow delta is within a half a mile of Station 17. This station's sediment composition is undoubtedly affected by discharge from the Skokomish River.

STATION 18

Station 18 is located along the east side of Whidbey Island about one mile south of Forbes Point and the northern end of Saratoga Passage. The mouth of Penn Cove on Whidbey Island is two miles to the southwest of the station. The city of Oak Harbor is located just east of Forbes Point and about two miles distant from this station.

Station 18 is in 19 meters of water. Sediments here consisted of sand and some silty material.

Lands north and northeast of Station 18, including Cresent Harbor, are part of a U.S. Navy Reservation and have wooded shorelines. Water and sediment composition at this station are influenced by discharge from the Skagit River.

STATION 19

Station 19 lies within Saratoga Passage one mile east of East Point on Whidbey Island. Saratoga Passage is about two miles wide in this area. The passage itself is bordered by Whidbey Island to the west and Camano Island to the east.

Station 19 is located in 123 meters of water. Sediments at this station are silt.

The shoreline of Whidbey Island in the vicinity of Station 19 consists mostly of forested and bare bluffs with scattered homes.

This site was used in a depositional analysis study by the Army Corp. of Engineers in 1986 and 1987.

PSAMP CORE STATION SITE DESCRIPTIONS
MARINE SEDIMENT MONITORING TASK

STATION 20

Station 20 is located within the northern portion of Port Susan. This station is 0.25 miles offshore of Camano Island and about three and a half miles due west of Warm Beach on the Mainland.

Station 20 is located in 12 meters of water. Sediments here are a mix of silt and clay.

The waters of the Stillaguamish River enter the north end of Port Susan. The shallow waters found in the enclosed northern end of Port Susan become considerably deeper to the south and east of Station 20 towards the open end of Port Susan.

Benthic sampling took place at this site during 1985 and 1986 as part of the Elliot Bay Action Program.

STATION 21

Station 21 is located in Port Gardner, one mile west of South Everett.

Station 21 is in 21 meters of water. Sediments at this station consist of fine sand with some silts.

The Snohomish River mouth is located in Everett. A shallow fan shaped delta extends from the river mouth to more than two miles into Port Gardner. Station 21 is located along the southern edge of this delta.

This site was used in a depositional analysis study by the Army Corp. of Engineers in 1986 and 1987.

STATION 22

Station 22 is located just offshore of the north side of Mukilteo.

Station 22 is in 23 meters of water. Sediments are compact fine sands.

The shoreline adjacent to the station is confined by a concrete block bulkhead. Railroad tracks parallel the shore. A short distance from Station 22 is a large fuel storage facility and fuel dock.

PSAMP CORE STATION SITE DESCRIPTIONS
MARINE SEDIMENT MONITORING TASK

STATION 26

Station 26 is located in the Whidbey Basin under the northbound Puget Sound shipping lane. The station is two miles east of the northern Kitsap Peninsula town of Eglon. Scatchet Head on the south end of Whidbey Island is four miles north of the Station.

Under 267 meters of water, Station 26 is the deepest sample location in the MSMT study. This station is within Whidbey Basin, the deepest part of northern Puget Sound. A shallow shelf (9 to 36 meters water depth) extends about two miles from Satchet Head and Possession Point on Whidbey Island to a short distance north of the station. Changes in sediment composition at this station were noted over a four year period: silt and sand sediments with some shell fragments were found in 1989, silt and sand sediments were found in 1990, a large amount of shell fragments were noted in 1991, and sand and silt were again found in 1992.

Station 26 occupies a deep depression and is thought to act as a natural sink for material washed through Admiralty Inlet during winter storms. Strong currents occur in this area as it is the major entrance to Puget Sound. Waters passing inward over this station tend to loose velocity and drop suspended materials as the narrow passageway through Admiralty Inlet widens.

STATION 29

Station 29 is located north of West Point, two miles east of Point Monroe on Bainbridge Island. The station is in mid-channel of Puget Sound and located in the middle of the shipping lanes.

Station 29 is in 200 meters of water. Sediments at this station are primarily silt.

Shorelines west of the station on Bainbridge Island are mostly forested and residential. East of Station 29, about two miles, is the urbanized shoreline of the city of Seattle.

Fred Nichols began benthic sampling at this site in 1969.

STATION 30

Station 30 is within Eagle Harbor on Bainbridge Island. The station is located along the south shore of Wing Point.

Station 30 is in 13 meters of water. Sediments here are sand with a small amount of silts. A slight odor of hydrogen sulfide was noted during sampling.

PSAMP CORE STATION SITE DESCRIPTIONS
MARINE SEDIMENT MONITORING TASK

An EPA superfund site is located in inner Eagle Harbor as a result of historic creosote and wood processing activities there.

STATION 32

Station 32 is located on the south side of Magnolia Bluff within the northern portions of Elliot Bay. This station is located near-shore and about two miles southeast of West Point.

Station 32 is in 20 meters of water. Sediments at this station were primarily sand.

Shorelines adjacent to Station 32 consist of vegetated and some bare bluffs in the Magnolia District (residential) of Seattle. A sewer outfall is located at West Point. This station is located in-shore of the old Four-Mile-Rock dredge disposal site. A historic point source discharge site was located along the shore to the northwest of the station. Industrial and shipping areas are located one mile east of the station near Interbay.

STATION 33

Station 33 is located along the south shores of Elliot Bay and the city of Seattle and is a half a mile southeast of Duwamish Head.

Station 33 is in 21 meters of water. Sediments found at this site during sampling consist of sand, silt, and shell fragments.

The shoreline in the immediate vicinity of this station is confined by bulkheads constructed of broken concrete. Multi-unit residential housing and a restaurant are located near the station. East of Station 33 lie heavily altered and industrialized areas on Harbor Island and along the mouth of the Duwamish River.

STATION 34

Station 34 is located in Sinclair Inlet on the Kitsap Peninsula. Sinclair Inlet appears as an eastern extension of Port Orchard. The inlet lies between Bainbridge Island and Bremerton to the north and the town of Port Orchard to the south. Station 34 is located just southeast of the U.S. Naval Station in Bremerton.

Station 34 is in 11 meters of water. Sediments here are silt and clay. Phyllochaetopterus tubes and a slight odor of hydrogen sulfide were noted.

Several point source discharges and storm drains are located in the vicinity of station 34.

Benthic sampling was conducted at this station in 1984 by Scott Becker.

STATION 35

Station 35 is located in Dyes Inlet on the Kitsap Peninsula. The station is two miles south of Silverdale and a half a mile northeast of Chico.

Station 35 is in 13 meters of water. Sediments at this station were silty. Phyllochaetopterus tubes and a moderate odor of hydrogen sulfide were noted during sampling.

Water exchange from Dyes Inlet is limited by outlet through the George Washington Narrows, a 0.25 mile wide and three mile long passage. This passage connects Dyes inlet with Sinclair Inlet and Port Orchard.

STATION 38

Station 38 is located in the middle of East Passage, south of Point Pully and about one and a half miles east of Point Heyer on Vashon Island. This station lies in the middle of the Puget Sound shipping lanes.

Station 38 is in 199 meters of water. Sediments at this station are silts.

The majority of tidal waters passing to and from South Puget Sound pass by Station 38 in East Passage. The only other means of exchange for waters south of Vashon Island is through Colvos Passage on the west side of Vashon Island which is only one third as wide and one half as deep as East Passage.

This station was sampled by Fred Nichols in 1969 and 1970.

This station was part of the Seahurst Baseline Study (1982 to 1984).

PSAMP CORE STATION SITE DESCRIPTIONS
MARINE SEDIMENT MONITORING TASK

STATION 39

Station 39 is located near Redondo between Dumas and Poverty Bay. This stretch of shoreline faces East Passage to it's northwest.

Station 39 is in 15 meters of water. Sediments at this station are primarily sand.

Several residential areas and sewer outfalls are located in the vicinity of Station 39.

This station was part of the Seahurst Baseline Study (1982 to 1984).

STATION 40

Station 40 is located in the mouth of City Waterway along the southeast edge of Commencement Bay. Commencement Bay is bounded by Browns Point and Point Defiance and covers about four square miles.

Station 40 is at 10 meters depth and contains silty sand sediments.

Station 40 is surrounded by the city of Tacoma. Sediments at this station are influenced by runoff from Interstate 5, industrial point source discharges, and possibly by outflow from the Puyallup River.

STATION 41

Station 41 is near the mouth of the Blair/Sitcom Waterway along the southeast edge of Commencement Bay.

Station 41 is located in 21 meters of water and sediments found during sampling were mostly silts. Depths in the outer-central portions of Commencement Bay reach more than 146 meters.

The Puyallup River enters Commencement Bay from the southeast. Historically, the Puyallup River delta is said to have been among the most productive systems in the world. Today, Commencement Bay is an urbanized and industrialized bay surrounded by the City of Tacoma. Portions of Commencement Bay are included as an EPA superfund site. Sediments at Station 41 are influenced by the City of Tacoma sewage outfall.

PSAMP CORE STATION SITE DESCRIPTIONS
MARINE SEDIMENT MONITORING TASK

STATION 43

Station 43 is located along the east shore of Case Inlet. This station lies about one and a half miles north of Mayo and Van Geldern Coves on the Key Peninsula.

Station 43 is in 21 meters of water. Sediments here are fine sand and Onuphidae tubes were noted during sample collection.

The shoreline of the Key Peninsula in the vicinity of Station 43 is relatively steep with conifer covered slopes.

STATION 44

Located off-shore of the west side of Anderson Island, Station 44 is 0.25 miles north of Sandy Point. Nisqually Reach passes to the south of the station. Ketron Island and Steilacoom lie one to one and a half miles east of Station 44.

Station 44 is in 22 meters of water. Sediments are sand and silt.

The Nisqually River empties into Nisqually Reach a few miles south of this station. Nisqually Reach is the largest channel for tidal exchange for the more distal portions of South Puget Sound. It is likely that tidal currents passing between Anderson Island and the mainland influence sediment composition at this station.

STATION 45

Station 45 is a half a mile west of Devils Head on the Key Peninsula, located within Drayton Passage. Drayton Passage connects with the western portion of Nisqually Reach just south of this station.

Waters at Station 45 are 51 meters deep. Sediments at this station are sand and silt. A slight odor of hydrogen sulfide was noted in the sediments from Station 45 during sampling.

Sediment and water quality at Station 45 is likely to be influenced by discharge from the Nisqually River. All tidal exchange from the terminal inlets of Puget Sound must pass by the south side of Devils Head and may also influence sediment quality at this station.

Benthic sampling was conducted at this station by the Batelle Institute in 1988.

PSAMP CORE STATION SITE DESCRIPTIONS
MARINE SEDIMENT MONITORING TASK

STATION 47

Located on the west side of Case Inlet, Station 47 lies just offshore of Fudge Point on the east side of Hartstene Island.

Station 47 is in 22 meters of water. Sediments collected at this station consisted of sand with cobbles and shell fragments.

The shoreline of Hartstene Island in the vicinity of Station 47 is mostly forested.

STATION 48

This station is located in outer Budd Inlet. Budd Inlet is one of several finger-like inlets which forms the southern terminus of Puget Sound. Cooper and Dofflemyer Points define the mouth of this inlet to the north. Station 48 is located about 0.25 miles off-shore from the western side of the inlet and one mile south of Cooper Point.

Station 48 is located in 21 meters of water. Silty sediments and the occurrence of Pachycerianthus fimbriatus were noted during sampling of this station.

Shorelines in the vicinity of this station are primarily residential. A wastewater treatment plant discharge near Station 48 is noted on the Puget Sound Environmental Atlas maps.

STATION 49

Station 49 is located in inner Budd Inlet. Budd Inlet is about six miles long and one to one and a half miles wide. The southern end of this inlet divides into East Bay and West Bay and is bordered by the city of Olympia. Station 49 is near the entrance to West Bay, half a mile northwest of the Port of Olympia docks.

Station 49 is in six meters of water. Silty sediments were found at this station.

A variety of factors may influence sediment composition at Station 49. Land uses in the vicinity of this station include residential, wood-products industry, and urban waterfront. Treated wastewater and stormwater are discharged into inner Budd Inlet. The Deschutes River enters Budd Inlet through the Capitol Lake dam at the south end of West Bay. This lake was formerly a marsh/estuary of the Deschutes River. Cascade Pole, a state super-fund site for creosote contamination lies between West and East Bay. The Port of Olympia docks, also located between West and East Bay, are used to store and ship logs.

PSAMP CORE STATION SITE DESCRIPTIONS
MARINE SEDIMENT MONITORING TASK

STATION 69

Station 69 is located in Port Madison a half a mile East of Suquamish. Port Madison is bounded by Bainbridge Island to the south and portions of the northern Kitsap Peninsula to the west and north. The east side of Port Madison opens into the central basin of Puget Sound.

Station 69 is in 34 meters of water. Sediments at this station are sand with some silt.

Shorelines in the vicinity of Station 69 include residential areas. The Puget Sound Environmental Atlas shows an offshore wastewater treatment plant discharge located short distance from the station.

STATION 70

Station 70 is located in Oakland Bay east of Shelton. Oakland Bay attaches to the end of Hammersley Inlet which is the northernmost of the terminal inlets of lower Puget Sound.

Station 70 is located in seven meters of water. Sediments at this station are silty with a strong odor of hydrogen sulfide.

Sediment quality at Station 70 appears to have been influenced by the adjacent wood products industry in Shelton. Restricted tidal exchange of the waters from Oakland Bay through the long and narrow Hammersley Inlet decreases the effects of sediment transport and dispersal.

STATION 71

Station 71 is located one mile west of Anacortes off of the piers of the March Point oil refineries. The station is within Fidalgo Bay just west of Padilla Bay.

Station 71 is in seven meters of water. Sediments found at this station were silt.

Shorelines near Station 71 include urban and industrial areas. Several point source discharges in the vicinity of this station were noted in the Puget Sound Environmental Atlas.

STATION 2R

Station 2R is located one mile south of Cherry Point. This station is about one mile off-shore. Neptune Beach and Sandy Point are a few miles southeast of the station.

PSAMP NORTH SOUND ROTATING STATIONS SITE DESCRIPTIONS
MARINE SEDIMENT MONITORING TASK

Station 2R is in 21 meters of water. Sediments at this station were primarily sand with some silt.

Sediment chemistry at this station may be influenced by waters from the Lummi River which discharges into Lummi Bay west of Sandy Point. The Lummi River is a branch of the Nooksack River.

STATION 9R

Station 9R is one mile off-shore of Green Point in the Strait of Juan De Fuca. The station is about seven miles east of Port Angeles on the northern Olympic Peninsula.

Station 9R is in 17 meters of water. Sediments here were sand with gravel.

Sediment composition at this station is influenced by tidal currents in the Straits of Juan De Fuca.

STATION 10R

Station 10R is located on the eastern edge of Dungeness Bay. The station is one mile south of the end of Dungeness Spit.

Station 10R is in 21 meters of water. Sediments were sand and silt at this station. Phyllochaetopterus tubes were common in sediment samples.

STATION 11R

Station 11R is located just north of Contractors Point in Discovery Bay. Discovery Bay opens to the Straits of Juan De Fuca. It is bounded by the Miller Peninsula to the west and the Quimper Peninsula to the east.

Station 11R is in 23 meters of water. Sediments here were sandy and Phyllochaetopterus tubes were noted during 1991 sample collection.

PSAMP NORTH SOUND ROTATING STATIONS SITE DESCRIPTIONS
MARINE SEDIMENT MONITORING TASK

STATION 13R

Station 13R is located one mile south of the east end of the Hood Canal bridge. This station is near the east shore of Hood Canal.

Station 13R is in 19 meters of water. Sediments found during sampling were sand.

Port Gamble, a historic logging community lies on the east shoreline about two miles north and east of this station. Station 13R is closer to the opening of Hood Canal into Admiralty Inlet than any other station.

STATION 201R

Station 201R is approximately four miles west of Point Roberts near the U.S./Canada border. This station is one and a half miles south of Roberts Bank, in the Strait of Georgia.

Station 201R is in 121 meters of water. Sediments at this station consisted of compact sand with some silt.

Sediment composition at this site may be influenced by the discharge of the Fraser River.

STATION 202R

Station 202R is three miles south of the west point of Point Roberts. This station is within the Strait of Georgia.

Station 202R is in 119 meters of water. Sediments here were sand with some silt.

Sediment composition at this site may be influenced by the discharge of the Fraser River.

STATION 203R

Station 203R is one mile southwest of the city of Bellingham. This station is located within Bellingham Bay.

Station 203R is in 13 meters of water. Sediments at this station were silt and clay.

Several point source discharges and storm drains are located along the Bellingham shoreline. A dredge disposal site is located in the general vicinity of Station 203R.

STATION 204R

Station 204R is located in East Sound between the east and west lobes of Orcas Island. East Sound is enclosed on the north end and opens to the south.

Station 204R is in 32 meters of water. Sediments at this station are silt. A strong odor of hydrogen sulfide was noted during sample collection.

Land uses in the vicinity of this station include residential areas and shellfish beds.

Previous benthic sampling at this station occurred in 1928 and again during 1983 and 1984.

STATION 205R

Station 205R is one mile southeast of Doe Island east of Orcas Island. The station is about a half a mile south of South Peapod Rocks on the west side of the Rosario Strait.

Station 205R is in 32 meters of water. Sediments collected at this station contained silt, some sand, and shell fragments.

STATION 206R

Station 206R is located in Friday Harbor on the east side of San Juan Island. The station is northwest of Brown Island in the northern portion of the harbor.

Station 206R is in 19 meters of water. Sediments here were sand with some silt.

A wastewater treatment plant discharge in the vicinity of Station 206R is noted in the Puget Sound Environmental Atlas.

STATION 207R

Station 207R is offshore of West Point and West Beach on the north end of Whidbey Island. This station is a half miles south of Deception Island near the west end of Deception Pass.

PSAMP NORTH SOUND ROTATING STATIONS SITE DESCRIPTIONS
MARINE SEDIMENT MONITORING TASK

Station 207R is in 30 meters of water. Sediments at this station were silty.

Sediment composition at Station 207R may be affected at times by discharge from Cranberry Lake. The water level in Cranberry Lake and its associated wetlands is controlled with periodic water releases into the waters off West Beach. The (??dam and floodgates??) are managed by the U.S. Army Corps of Engineers.

West Beach, in the vicinity of Station 207R, is the site of amphipod collection for MSMT bioassay studies.

STATION 208R

Station 208R is located just offshore of Goose Point in Sequim Bay. Sequim Bay faces the Strait of Juan De Fuca to the north and lies west of the Quimper Peninsula.

Station 208R is located in 14 meters of water. Sediments are primarily silt at this station. Samples taken here revealed a two centimeter black surface underlain by drab olive sediments. The strong to overwhelming odor of hydrogen sulfide was noted during sample collection.

Tidal exchange from Sequim Bay must pass through a narrow opening between Kiapot Point and Gibson Spit.

STATION 209R

Station 209R is located in Skagit Bay 0.5 miles east of Strawberry Point on Whidbey Island.

Station 209R is in 20 meters of water. Sediments at this station consist of sand and silts.

Sediment quality at this station may be influenced by the discharge of the Skagit River.

STATION 23R

Station 23R is just off-shore of Norma Beach. Norma Beach is located three miles north of Edmonds on the eastern shore of Puget Sound.

Station 23R is in 20 meters of water. Sediment samples collected at this station were sandy.

Railroad tracks parallel shorelines in the vicinity of Station 23R. A wastewater treatment plant discharge is located along the shoreline one mile north of this station.

PSAMP CENTRAL SOUND ROTATING STATIONS SITE DESCRIPTIONS
MARINE SEDIMENT MONITORING TASK

STATION 24R

Station 24R is located one and miles west of Norma Beach. This station is approximately two and a half miles south of Possession Point on Whidbey Island.

Station 24R is located in 180 meters of water. Samples collected at this station were silty.

Sediments at Station 24R are influenced by waters entering Puget Sound from Possession Sound.

STATION 25R

Station 25R lies just off-shore of the Kitsap Peninsula, 0.5 miles south of Eglon.

Station 25R is in 20 meters of water. Sediment samples collected at this station were sandy.

The landscape on the Kitsap Peninsula in the vicinity of Station 25R includes rural areas and forested slopes along the shoreline.

STATION 27R

Station 27R is located near the eastern shores of Puget Sound about one mile south of Richmond Beach.

Station 27R is in 20 meters of water. Sediments at this station were fine sand.

Uplands in the vicinity of this station contain residential neighborhoods as well as some tree or shrub covered slopes. A railroad line parallels the shoreline. Several sewer outfalls are located in the general vicinity of Station 27R.

STATION 36R

Station 36R is located south of Brace Point which is south of West Seattle. The station is a short distance off-shore.

Station 36R is in 15 meters of water. Sediments collected at this station are primarily fine sand.

Uplands in the vicinity of Station 36 are residential.

PSAMP CENTRAL SOUND ROTATING STATIONS SITE DESCRIPTIONS
MARINE SEDIMENT MONITORING TASK

STATION 37R

Station 37R is located near the north end of Vashon Island just south of Dolphin Point.

Station 37R is in 20 meters of water. Sandy sediments were found at this station during sampling.

This station lies along the western edge of the East Passage.

STATION 301R

Station 301R is located near shore in the northern portion of Useless Bay near the south end of Whidbey Island. Useless Bay opens into Admiralty Inlet with Double Bluff to the northwest and Indian Point to the southeast. The bay is about four miles wide at its mouth.

Station 301R is in 20 meters of water. Sediments collected at this station were sandy.

Useless Bay is connected to Deer Lagoon, a backwater area on the north side of the bay. Comparison of present and historic charts indicate that Deer Lagoon has been reduced in size by more than half since 1945. The shoreline of Useless Bay is partially lined with cabins and houses. Slopes and hilltops contain residences, forests, and pasture land. Both Indian Point and Double bluff, which face Admiralty Inlet, have bare erosional bluffs as a major feature. Waters passing through Admiralty Inlet with tidal changes and human activities along the bay affect sediment composition at this station.

STATION 302R

Station 302R is located offshore of the south end of Indian Island in Oak Bay. This station is a short distance to the southeast of the un-named channel that connects Oak Bay with Port Townsend.

Station 302R is in 20 meters of water. Sediments at this station contain sand and silt.

Shorelines north of the station on Indian Island are undeveloped. Uplands in this area are within a U.S. Navy reservation. Shorelines along the west side of Oak Bay contain scattered and grouped residences.

PSAMP CENTRAL SOUND ROTATING STATIONS SITE DESCRIPTIONS
MARINE SEDIMENT MONITORING TASK

STATION 303R

Station 303R is within Quartermaster Harbor which lies between Maury and Vashon Islands. This station is 0.5 miles northwest of Dockton on Maury Island and one half mile south of Burton on Vashon Island. Quartermaster Harbor is closed at its northern end by a spit that connects Maury and Vashon Island. The harbor opens to Dalco Passage to the south.

Station 303R lies under 16 meters of water. Sediments at this station consist of silt with a small amount of sand.

Shorelines in the vicinity of Station 303R contain a mix of forested and residential areas.

Previous benthic sampling occurred at this site during 1982 and 1983 as part of the Seahurst Baseline Study.

STATION 304R

Station 304R is approximately mid-channel in the middle portion of Hood Canal. This station lies 0.5 miles west of Tekiu Point on the Kitsap Peninsula and one mile south of Triton Head on the Olympic Peninsula.

Station 304R is in 173 meters of water. Sediments here are primarily silt.

Hood Canal is slightly more than one mile wide in the vicinity of Station 304R. Both the Hamma Hamma and the Duckabush Rivers empty into Hood Canal within a few miles of this station.

STATION 305R

Station 305R is located near the end of Hood Canal. The station is located in mid-channel near Lynch Cove.

Station 305R is in 20 meters of water. Sediments are silty at this station. A moderate to strong odor of hydrogen sulfide was noted during sampling.

Residences and summer homes line the shore of Hood Canal in the vicinity of this station. Extensive mud flats are exposed at low tide to the northeast of the station in Lynch Cove.

PSAMP CENTRAL SOUND ROTATING STATIONS SITE DESCRIPTIONS
MARINE SEDIMENT MONITORING TASK

STATION 306R

Station 306R is located on the eastern side of East Passage. The station is 0.5 miles west of Seahurst and one mile north of Point Pulley (Three-Tree Point).

Station 306R is in 75 meters of water. Sediments here are primarily sand with some silt.

Shorelines near Station 306R are contain residential areas. Sewer outfalls are noted in the general vicinity of this station on charts.

Benthic sampling was conducted at this site from 1982 to 1984 as part of the Seahurst Baseline Study.

STATION 307R

Station 307R is located in the western side of the outer third of Holmes Harbor on Whidbey Island. The station is less than one mile north of Dines Point. Holmes Harbor is about five miles long and one mile wide. The harbor is oriented north-south with the town of Freeland at its closed end. The northern end of Holmes Harbor opens into Saratoga Passage.

Station 307R is located in 61 meters of water. Sediments at this station are silty. A slight odor of hydrogen sulfide was noted during sample collection.

Shorelines in the vicinity of this station contain homes and summer residences.

STATION 308R

Station 308R lies at the middle of the mouth of Liberty Bay. This station is about 0.5 miles southwest of Point Bolin. Liberty Bay opens into Port Orchard which is enclosed by the Kitsap Peninsula to the west and Bainbridge Island to the east.

Station 308R is in 17 meters of water. Sediments at this station were sand with some silt. Ptilosarcus gurneyi (sea pen) were noted during 1992 sample collection.

Tidal exchange from Liberty Bay and Port Orchard occur through two narrow passages; Agate Passage at the northern end of Bainbridge Island and Rich Passage at the island's southern end. A sewer outfall is noted on charts in the general vicinity of this station.

PSAMP SOUTH SOUND ROTATING STATIONS SITE DESCRIPTIONS
MARINE SEDIMENT MONITORING TASK

STATION 46R

Station 46R is located on the western edge of the Nisqually Flats, about 0.25 miles off-shore. This station is three miles northwest of Nisqually Head.

Sediments collected at Station 46R consisted of silty sand. This station is in 23 meters of water.

Sediment composition at this site is influenced by discharge from the Nisqually River and by tidal exchange passing through Nisqually Reach.

STATION 101R

Station 101R is in Oakland Bay. This station is located just north of the mouth of Chapman Cove. MSMT core Station 70 is one and half miles southwest of Station 101R near the town of Shelton.

Sediments collected at this station were silty. A moderate odor of hydrogen sulfide was noted during sample collection in 1990. At a depth of five meters, this station is the shallowest sample collection site in the study.

Wood products processing facilities are located along the waterfront in Shelton. Portions of Oakland Bay are used for timber storage. A lack of tidal exchange in this distal area is an important factor in the sediment composition of this station.

STATION 102R

Station 102R is located in inner Totten Inlet. Totten Inlet lies southwest of Hope and Hartstene Islands and is one of several terminal inlets of Puget Sound. Station 102R is one mile northeast of Burns Point and about 2.5 miles northeast of the end of Totten Inlet at Oyster Bay.

Sediments at Station 102R were silty and a slight odor of hydrogen sulfide was noted during sample collection. Station 102R is in 13 meters of water.

Totten Inlet receives drainage from several small streams including Schneider Creek, Kennedy Creek, and Skookum Creek (via Little Skookum Inlet). Lands adjacent to Totten Inlet are rural or residential at present. Somewhat restricted tidal exchange is likely an important factor in sediment composition within this inlet.

PSAMP SOUTH SOUND ROTATING STATIONS SITE DESCRIPTIONS
MARINE SEDIMENT MONITORING TASK

STATION 103R

Station 103R is located in outer Totten Inlet. Totten Inlet is about eight miles long and up to one and a half miles wide. The inlet's mouth is a half mile wide, opening between Arcadia Point to the north and Steamboat Island to the south. Station 103R is located just south of Windy Point, one and half miles southwest of Steamboat Island.

Sediments at Station 103R were silty and an odor of hydrogen sulfide was noted in only one sample. Station 103R is in 21 meters of water.

Totten Inlet receives drainage from several small streams including Schneider Creek, Kennedy Creek, and Skookum Creek (via Little Skookum Inlet). Lands adjacent to Totten Inlet are rural or residential at present. Somewhat restricted tidal exchange is likely an important factor in sediment composition within this inlet.

STATION 104R

Station 104R is located near the middle of Eld Inlet. Eld Inlet is a terminal inlet of Puget Sound. The station is about one mile southwest from the tip of Flapjack Point on the west side of the inlet.

Sediments at Station 104R are silty and a strong odor of hydrogen sulfide was noted during sample collection. This station is in 10 meters of water.

Lands adjacent to Eld Inlet are rural or residential at present. Somewhat restricted tidal exchange may be an important factor in sediment composition within this inlet.

STATION 105R

Station 105R is located within Eld Inlet, a terminal inlet of Puget Sound. Eld Inlet is about eight miles long and generally less than one mile wide. The mouth of this inlet lies between Hunter Point to the north and Cooper Point to the south. This station is located near the mouth of Eld Inlet, about one mile southwest of Cooper Point.

Sediments at this station were silty and a "skunky" odor noted during sample collection. Station 105R is in 18 meters of water.

Lands adjacent to Eld Inlet are rural or residential at present. Somewhat restricted tidal exchange may be an important factor in sediment composition within this inlet.

PSAMP SOUTH SOUND ROTATING STATIONS SITE DESCRIPTIONS
MARINE SEDIMENT MONITORING TASK

STATION 106R

Station 106R is located about 0.25 miles east of Tykle Cove near the middle of Budd Inlet. Budd Inlet is a terminal inlet of Puget Sound which also contains PSAMP Core Stations 48 and 49.

Station 106R is in 14 meters of water. Sediments collected at this station were silty and had a slight odor of hydrogen sulfide.

Land uses adjacent to Budd Inlet include residential, industrial, and urban. Sediment composition may also be influenced by discharge of the Deschutes River (via the Capitol Lake Dam) at the southern and terminal end of the inlet.

STATION 108R

Station 108R is located north of Dover Point near Boston Harbor. This station lies near the southwest end of Dana Passage.

Station 108R is in 22 meters of water. Sediments collected at this station contained sand and shell fragments.

Land use in the vicinity of this station includes residential areas and a marina. Tidal currents are strong through Dana Passage and may affect sediment composition at this station.

STATION 109R

Station 109R is located within Henderson Inlet off of Cliff Point. Henderson Inlet is about four miles long and up to one mile wide. The mouth of this inlet is between Dickenson Point and Johnson Point and opens onto the eastern end of Dana Passage.

Station 109R is in 24 meters of water. Sediments at this station were silty. A moderate odor of hydrogen sulfide was noted during sample collection.

A portion of the west side of Henderson Inlet, including Chapman and Woodard Bays, was used as a log dump and storage facility until the 1980's. This area is now a Natural Resources Conservation Area. Other land uses in the inlet include residential and oyster growing. Nautical charts state that Henderson Inlet has a local magnetic disturbance with differences of as much as three degrees from normal variation.

PSAMP SOUTH SOUND ROTATING STATIONS SITE DESCRIPTIONS
MARINE SEDIMENT MONITORING TASK

STATION 110R

Station 110R is located near the terminus of Case Inlet, about 0.5 miles south of Rocky Point. Case Inlet is about 14 miles long and up to three miles wide. The inlet is bordered to the east by the Key Peninsula and to the west by Hartstene Island.

Station 110R is in 21 meters of water. Sediments at this station were silty and smelled strongly of hydrogen sulfide.

STATION 111R

Station 111R is located in mid-Case Inlet, 0.25 miles southwest of Dutcher Cove on the Key Peninsula. The mouth of Case Inlet opens onto the waters around Johnson Point which consist of Dana Passage to the west and Nisqually Reach to the east.

Station 111R is in 22 meters of water. Sediments at this station contained sands and silts.

STATION 112R

Station 112R is located on the edge of Nisqually Flats along Nisqually Reach. This station is about 0.5 miles north of the mouth of the Nisqually River.

Station 112R is in 23 meters of water. Sediments contained sand and woody debris (sticks).

Discharge from the Nisqually River and tidal currents through Nisqually Reach influence sediment composition at Station 112R. Much of the Nisqually River Delta is presently managed by the U.S. Fish and Wildlife Service as a wildlife refuge.

STATION 113R

Station 113R is located in Wollochet Bay, three miles south of Gig Harbor. Wollochet Bay is about two miles long and opens onto Hale Passage north of Fox Island.

Station 113R is in 24 meters of water. Sediments at this station contained sandy silts.

PSAMP SOUTH SOUND ROTATING STATIONS SITE DESCRIPTIONS
MARINE SEDIMENT MONITORING TASK

STATION 114R

Station 114R is located in Henderson Bay in the terminal end of Carr Inlet. The station is about one and a half miles southwest of Purdy.

Station 114R is in 21 meters of water. Sediments at this station were silty and a slight odor of hydrogen sulfide was noted during sampling.

Clams and oysters are grown commercially in Burley Lagoon which lies at the north end of Henderson Bay.

STATION 115R

Station 115R is located near the mouth of Filucy Bay on the southeast end of the Key Peninsula. This station is about 0.25 miles south of Mahnckes Point.

Station 115R is in 19 meters of water. Sediments at this station are silty.

STATION 116R

Station 116R is located near the mouth of Still Harbor on the north side of McNeil Island. This station is just north of Gertrude Island.

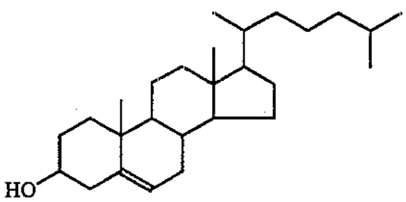
Station 116R is in 21 meters of water. Sediments at this station were silty sand.

APPENDIX C

1991 Quality Assurance Reviews of Chemical and Bioassay Analyses

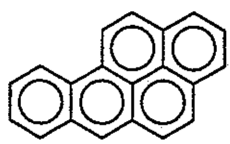
PUGET SOUND AMBIENT MONITORING PROGRAM 1991

MARINE SEDIMENT MONITORING
DATA VALIDATION REPORT

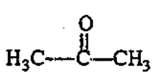


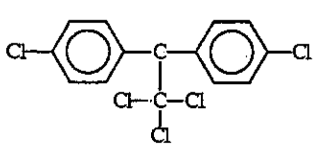
November 1991

Cd Hg Pb



Prepared for:
Washington Department of Ecology
Ambient Monitoring Section
Olympia, WA 98504





Prepared by:
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MARINE SEDIMENT MONITORING

DATA VALIDATION REPORT

November 1991

Prepared for:
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CONTENTS

SUMMARY

The Washington Department of Ecology Ambient Monitoring Section is responsible for implementing the Marine Sediment Monitoring Task (MSMT) of the Puget Sound Ambient Monitoring Program (PSAMP). The purpose of the MSMT is to determine baseline ecological conditions and to assess spatial and temporal trends in sediment quality throughout the sound. To meet these objectives, measurements of sediment chemistry, sediment toxicity, and benthic community structure will occur annually during early spring (March-April). This report presents the results of sediment chemistry and amphipod bioassay testing conducted during the third year of the program. Evaluation of 1991 program data is provided in data validation reports for each parameter group.

Grain size analysis was conducted by Soil Technology, Inc. of Bainbridge, Washington according to Puget Sound Estuary Program (PSEP 1986) guidelines. All reported results were determined to meet program requirements as specified in the *Puget Sound Ambient Monitoring Program: Marine Sediment Quality Implementation Plan* (Striplin, 1988).

Total sulfides analysis was conducted by Analytical Resources, Inc. (ARI) of Seattle, Washington according to Puget Sound Estuary Program (PSEP 1986) guidelines. All reported results were determined to meet program requirements as specified in the *Puget Sound Ambient Monitoring Program: Marine Sediment Quality Implementation Plan* (Striplin, 1988).

Total organic carbon (TOC) analysis was conducted by Analytical Resources, Inc. (ARI) of Seattle, Washington according to Puget Sound Estuary Program (PSEP 1986) guidelines. All reported results were determined to meet program requirements as specified in the *Puget Sound Ambient Monitoring Program: Marine Sediment Quality Implementation Plan* (Striplin, 1988).

Volatile organic compound (VOA) analysis was conducted by Analytical Resources, Inc. (ARI) of Seattle, Washington according to the U.S. EPA Contract Laboratory Program (CLP) Statement of Work (SOW) 2/88. Method modifications included larger sample sizes and employment of additional internal standards and surrogate compounds for improvement of method quantitation limits and precision. All reported results were determined to meet program requirements as specified in the *Puget Sound Ambient Monitoring Program: Marine Sediment Quality Implementation Plan* (Striplin, 1988) and are considered usable for the intended purposes of the program. Some sample results have been qualified as estimates as a consequence of various quality control (QC) criteria not being met.

Base, neutral and acid (BNA) extractable organic compounds, including resin acids and guaiacols, analyses were conducted by Analytical Resources, Inc. (ARI) of Seattle, Washington according to the U.S. EPA Contract Laboratory Program (CLP) Statement of Work (SOW) 2/88. Method modifications included larger sample sizes, compound class fractionation, and employment of additional internal standards and surrogate compounds for improvement of method quantitation limits and precision. Almost all reported results were determined to meet program requirements as specified in the *Puget Sound Ambient Monitoring Program: Marine Sediment Quality Implementation Plan* (Striplin, 1988) and are considered usable for the intended purposes of the program. Some sample results have been qualified as estimates as a consequence of various quality control (QC) criteria not being met. A few samples required qualification of some results as unusable (with "R" descriptor in data field) due to low surrogate and matrix spike compound recoveries ($\leq$ 10% recovery).

Chlorinated pesticide and PCB analyses were conducted by Analytical Resources, Inc. (ARI) of Seattle, Washington according to the U.S. EPA Contract Laboratory Program (CLP) Statement of Work (SOW) 2/88. Method modifications included larger sample sizes and employment of an additional surrogate compound for improvement of method quantitation limits and precision. All reported results were determined to meet program requirements as specified in the *Puget Sound Ambient Monitoring Program: Marine Sediment Quality Implementation Plan* (Striplin, 1988) and are considered usable for the intended purposes of the program. Some sample results have been qualified as estimates as a consequence of various quality control (QC) criteria not being met.

Metals analyses were conducted by Analytical Resources, Inc. (ARI) of Seattle, Washington according to the U.S. EPA Contract Laboratory Program (CLP) Statement of Work (SOW) 390. Method modifications included larger sample sizes and reduced final digestate volumes in order to improve method detection limits. Antimony, arsenic, cadmium, lead, selenium, silver, and thallium were analyzed by Graphite Furnace Atomic Absorption (GFAA) spectrophotometry utilizing the method of standard additions (MSA) in order to improve analytical precision. Almost all reported results were determined to meet program requirements as specified in the *Puget Sound Ambient Monitoring Program: Marine Sediment Quality Implementation Plan* (Striplin, 1988) and are considered usable for the intended purposes of the program. Some sample results have been qualified as estimates as a consequence of various quality control (QC) criteria not being met. All selenium results were determined to be unusable (with "R" descriptor only in data field) due to nonevaluatable spike recoveries and unmeasurable levels in project reference materials (all sample results were initially reported as nondetects).

Amphipod sediment bioassays were conducted by INVERT*AID of Graham, Washington according to Puget Sound Estuary Program (PSEP) guidelines. All reported results were determined to meet program requirements as specified in the *Puget Sound Ambient Monitoring Program: Marine Sediment Quality Implementation Plan* (Striplin, 1988).

September 13, 1991

Data Validation Report
Grain Size Analyses

Site:	Puget Sound
Project :	1991 PSAMP MSMT
Sample Numbers:	1, 2R, 3-5, 8, 9R, 10R, 11R, 12, 13R, 14, 15, 17-22, 26, 29, 30, 32-35, 38-41, 43-45, 47-49, 51-53, 57-65, 69-74, 201R-209R
Samples Collected by:	Ambient Monitoring Section Washington State Department of Ecology

The samples included in this report were analyzed by Soil Technology, Inc., of Bainbridge, Washington, under subcontract to BCI of Vashon, Washington. Funding for this contract is provided by the Ambient Monitoring Section of the Washington State Department of Ecology.

This report is submitted to:	Ambient Monitoring Section Washington State Department of Ecology
Data Evaluated by:	Thomas D. Bowden TDB
Approved by:	Raleigh C. Farlow RCF

BCI
Environmental & Medical Research
and Systems Development

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Data Validation Report - Grain Size Analyses

Site:	Puget Sound
Project:	1991 PSAMP MSMT
Laboratory:	Analytical Resources, Inc. (ARI)
Sample Numbers:	Samples 1, 2R, 3-5, 8, 9R, 10R, 11R, 12, 13R, 14, 15, 17-22, 26, 29, 30, 32-35, 38-41, 43-45, 47-49, 51-53, 57-65, 69-74, 201R-209R
Matrix:	Sediment
Reviewer:	T. D. Bowden
Date:	September 13, 1991

1.0 Introduction

This report summarizes the validation of laboratory data for 63 marine sediment samples submitted to Soil Technology, Inc. of Bainbridge Island, Washington for grain size analyses. The samples were collected from 48 different stations throughout Puget Sound by the Washington State Department of Ecology (Ecology) Ambient Monitoring Section, as part of the 1991 Marine Sediment Monitoring Task (MSMT) of the Puget Sound Ambient Monitoring Program (PSAMP). The samples were analyzed according to guidelines found in "Puget Sound Estuary Program (PSEP) 1986. Recommended protocols for measuring conventional variables in Puget Sound. Prepared for U.S. Environmental Protection Agency, Region 10 by Tetra Tech, Inc. of Bellevue, WA". *Apparent* grain size was determined by not employing the hydrogen peroxide "oxidation" option. The laboratory deviated from the method by not performing triplicate analyses. This report has been prepared in accordance with Ecology's *Puget Sound Ambient Monitoring Program: Marine Sediment Quality Implementation Plan* (Striplin, 1988), using guidelines found in the Washington Department of Ecology document *Data Validation Guidance Manual for Selected Sediment Variables*, Draft version (PTI, 1989).

Samples were collected using a 0.1 m^2 stainless steel Double van Veen sampler. Sediment for grain size analyses was removed from the upper two centimeters of the sampler. The sediment constituting the sample is a homogenized composite of at least five van Veen casts. Samples were held on ice until delivery to the laboratory. Chain-of-Custody documents show that proper chain-of-custody was maintained from the time of sample collection until delivery to and acceptance by the laboratory. The laboratory reported that all samples were received intact. Samples were held at 4° C. at the laboratory until analysis.

Forty-eight of the samples are primary samples from 48 different locations or stations in Puget Sound. Fifteen of the remaining samples are field-generated quality control samples collected at five selected stations to allow determination of total monitoring variability. At each selected station, the field-generated QC samples include one split of the primary sample taken from the same van Veen grab composite (blind laboratory duplicate), and two station replicates taken from different van Veen grabs at the same station (blind field replicates). All field-generated QC samples were assigned surrogate station numbers, as summarized below, and were submitted blind to the laboratory:

Field Station and Primary Sample:	5	32	35	38	44
Duplicate Split:	51	57	72	60	63
Station Replicates:	52, 53	58, 59	73, 74	61, 62	64, 65

Laboratory deliverables were complete and documentation was sufficient to allow evaluation and validation of the associated results.

Results are presented in Tables 1A and 1B. Results in Table 1A are expressed as the percentage of the size fraction reported; sample recoveries also are reported in Table 1A. Results in Table 1B are expressed as the weight in grams for each size class determined; sample weights, recoveries and total solids data also are reported in Table 1B.

2.0 Discussion

2.1. Sample Holding Times/Preservation

The Project Implementation Plan (Striplin, 1988) specifies a maximum holding time of six months prior to grain size analyses, in accordance with PSEP guidelines. Samples were held on ice during transport, and maintained in the laboratory at 4° C. until analysis, per the Project Implementation Plan. All samples were analyzed within 24 days of collection, and therefore no data required qualification. Sample holding times were determined by comparing sampling dates on the Chain-of-Custody documents with dates of analyses reported in the data package. Sample holding times are summarized in Table 2.

2.2. Analytical Procedure

PSEP guidelines for particle size analysis were followed by the laboratory, with the exception that no triplicate analyses were performed. *Apparent* grain size was determined by not employing the hydrogen peroxide "oxidation" option. An evaluation of monitoring variability samples has been substituted for triplicate analyses. PSEP guidelines indicate that the sample size for pipette analysis should be between 5 and 15 grams. With the exception of six samples (9R, 32, 33, 47, 58, 59), all analyses met this requirement. The six samples were all below 5 grams, which the guidelines indicate may result in the introduction of greater experimental error in weighing. Recoveries for these samples were all within recommended guidelines (see Section 2.3), and therefore this deviation does not appear to significantly affect results.

2.3. Sample Recovery

PSEP guidelines for sample recovery specify a 95 to 105% recovery of the combined fraction weights when compared to the initial calculated dry weight of the sample aliquot. Recoveries for all samples analyzed are within these guidelines. Recoveries range from 95.6% to 102.1% (Table 1A). Initial analyses for two samples (21 and 61) were outside acceptance limits, and the samples were reanalyzed until acceptable recoveries were achieved.

2.4. Sample Result Verification

All raw data submitted with the data package are legible and complete. All results for field and QC samples were checked for quantitation and transcription errors. Transcription from the laboratory raw data was confirmed for all samples. Recovery calculations were checked for approximately 20% of the samples. Calculations were checked for all total solids data. No significant transcription or calculation errors were detected. The laboratory reported total solids data to the nearest percent instead of to the nearest 0.1 percent, as required. Total solids data as reported in Table 1B have been recalculated to reflect the required precision. The laboratory also reported size fractions to the nearest percent rather than to the nearest 0.1 percent, as required. Results reported in Table 1A for size fractions have been recalculated to reflect the nearest 0.1 percent.

2.5. Field-Generated QC Samples

Two types of field-generated QC samples were collected from five separate stations. Station duplicate splits were generated by taking two separate aliquots from a composite of at least five Double van Veen casts. One aliquot was assigned to the primary station number, and the second aliquot was assigned a surrogate station number. Two additional, separate station replicates were generated by collecting one sample from each of two separate Double van Veen casts while on station. Station replicates were assigned separate surrogate station numbers.

Grain size results and summary statistics for all replicates are presented in Table 3. The mean value and RPD were first calculated for the station duplicate splits. The CV and mean of all three station replicates were calculated using the mean of the duplicate splits for the first replicate (n=3). RPDs between primary samples and duplicate splits are generally high for the coarser fractions, becoming lower for the finer fractions. In general, the higher percentage in a size class, the lower the RPD for that size class. The primary sample and the duplicate split for Station 32 (Samples 32 and 57) show high variability between the samples in all size classes. Results for the replicates for this station (Samples 58 and 59) are much more comparable to the primary sample. The inconsistencies associated with Sample 57 suggest that the sample may have been switched with another sample at some point in time between collection and analysis. A review of the data further suggests that the results for Sample 33 have been switched with the results of Sample 57. In Table 3, two sets of summary statistics are provided for Station 32, one set with Sample 57 and one set with Sample 33 as associated QC samples.

2.6. Overall Case Assessment

Based on an evaluation of data contained in the laboratory data package, the data quality objectives outlined in Ecology's *Marine Sediment Quality Implementation Plan* were met. Deviations from PSEP guidelines, as discussed above, do not have a significant effect on the data, and therefore, no results required qualification. Results for grain size analyses are acceptable and and the data may be used for the intended purposes of the project.

3.0 Summary of Qualified Data

No sample results associated with this data package required qualification due to QC deficiencies.

Table 1A. Grain Size Analyses - Results by Class Percentage

Sample ID	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)	Percent Sand ((-1)-4 phi)	Percent Silt (4-8 phi)	Percent Clay (>8 phi)	Percent Fines (>4 phi)	%Recovery
1	0.06	0.02	0.10	0.27	0.89	2.9	4.2	69.8	26.0	96.0	98.7
2R	0.06	0.10	0.31	0.65	7.9	33.3	42.3	40.9	16.8	58.0	95.6
3	7.8	1.0	1.1	1.8	7.0	17.6	28.5	42.5	21.3	64.0	95.6
4	0.05	0.05	0.21	0.30	0.87	0.92	2.4	51.8	45.8	98.0	99.6
5	0.13	0.05	0.25	0.47	1.2	2.3	4.3	60.9	34.7	96.0	99.3
8	0.40	0.48	1.9	3.0	12.2	18.3	35.9	46.3	17.4	64.0	96.7
9R	3.4	16.4	39.1	34.0	6.1	0.04	95.6	0.10	0.82	0.92	99.1
10R	0.06	0.09	0.37	1.5	47.9	17.4	67.1	23.0	9.8	33.0	98.1
11R	0.26	3.5	5.7	14.6	42.7	4.1	70.6	17.9	11.2	29.0	97.9
12	0.13	0.04	0.25	0.53	2.1	5.5	8.4	64.6	26.8	91.0	99.1
13R	0.02	1.9	21.1	39.9	18.4	8.8	90.2	6.6	3.2	10.0	99.3
14	0.05	1.3	11.7	20.7	17.7	10.8	62.1	24.1	13.7	38.0	98.8
15	0.07	0.46	5.1	27.0	51.5	10.1	94.1	3.3	2.5	6.0	100.1
17	0.10	0.23	0.68	1.1	2.2	2.1	6.3	61.8	31.9	94.0	99.3
18	0.03	0.09	0.94	25.4	28.7	3.0	58.2	21.0	20.8	42.0	99.8
19	0.04	0.04	0.47	1.5	8.6	7.4	18.0	32.6	49.4	82.0	100.3
20	0.21	0.02	0.05	0.07	0.36	3.1	3.6	60.6	35.6	96.0	97.9
21	0.06	0.13	0.30	0.51	3.2	15.6	19.7	62.6	17.7	80.0	97.2
22	0.13	0.26	2.2	10.9	63.4	10.2	87.0	6.2	6.7	13.0	99.3
26	52.8	3.0	2.5	5.2	15.5	4.2	30.3	9.4	7.5	17.0	96.3
29	0.10	0.17	1.3	2.6	4.2	7.8	16.1	51.3	32.6	84.0	97.9
30	0.06	0.10	1.3	7.1	53.4	14.5	76.5	17.2	6.3	24.0	99.0
32	0.08	0.34	2.8	22.5	64.7	2.6	93.0	3.3	3.6	7.0	99.7
33	0.39	0.27	2.9	23.1	64.2	2.5	93.0	3.2	3.5	7.0	100.5
34	0.06	0.19	0.40	0.71	1.9	4.0	7.2	59.2	33.5	93.0	99.3
35	0.12	0.33	1.5	1.6	6.4	9.4	19.2	47.7	33.0	81.0	98.4
38	0.17	0.04	0.21	0.69	2.0	2.0	4.9	45.7	49.3	95.0	102.1
39	0.20	1.5	12.0	34.4	48.3	1.3	97.4	0.74	1.7	2.0	100.1
40	0.15	1.3	9.6	17.0	30.1	8.6	66.7	24.3	8.9	33.0	98.4
41	0.10	0.04	0.14	0.46	6.9	22.3	29.9	59.6	10.4	70.0	96.7
43	0.02	0.05	2.2	19.0	67.8	5.1	94.1	2.8	3.1	6.0	99.7
44	0.25	1.7	7.3	12.5	46.6	15.0	83.1	8.6	8.0	17.0	100.1

Table 1A. (continued) Grain Size Analyses - Results by Class Percentage

Sample ID	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)	Percent Sand ((-1)-4 phi)	Percent Silt (4-8 phi)	Percent Clay (>8 phi)	Percent Fines (>4 phi)	%Recovery
45	0.03	0.04	0.15	0.42	10.4	29.2	40.3	40.7	19.1	60.0	99.2
47	26.4	4.9	6.4	17.4	33.6	1.9	64.2	4.9	4.5	9.0	99.1
48	0.08	0.11	0.54	0.93	2.9	5.7	10.1	54.9	34.9	90.0	96.8
49	0.11	0.55	3.1	3.0	5.2	4.2	15.9	50.1	33.9	84.0	98.5
51	0.37	0.09	0.37	0.50	1.1	2.2	4.3	60.3	35.0	95.0	99.3
52	0.03	0.16	0.15	0.43	1.2	2.5	4.4	60.7	34.9	96.0	101.3
53	0.02	0.01	0.20	0.47	1.1	2.4	4.2	59.9	35.9	96.0	98.9
57	0.20	0.65	1.6	5.6	36.8	23.7	68.3	24.4	7.1	32.0	96.2
58	0.22	0.25	2.9	22.7	64.2	2.7	92.7	3.4	3.7	7.0	99.9
59	0.12	0.25	3.0	22.6	64.8	2.6	93.3	3.0	3.6	7.0	100.1
60	0.05	0.07	0.13	0.42	1.4	1.8	3.8	44.1	52.1	96.0	100.6
61	0.12	0.06	0.46	2.0	2.5	2.0	7.0	42.5	50.3	93.0	100.6
62	0.02	0.00	0.25	1.1	2.0	2.1	5.4	44.2	50.4	95.0	101.2
63	0.39	1.9	7.2	12.4	46.6	15.2	83.2	8.6	7.8	16.0	99.8
64	0.23	1.4	6.4	12.1	46.0	15.6	81.4	9.7	8.6	18.0	99.6
65	0.44	2.1	6.8	11.7	46.8	15.7	83.1	8.5	7.9	16.0	99.9
69	0.05	0.22	2.6	9.9	50.5	15.4	78.6	15.4	6.0	21.0	99.2
70	0.35	0.41	1.6	1.9	12.2	16.3	32.4	43.4	23.8	67.0	101.1
71	0.04	0.05	0.27	1.1	33.3	9.5	44.3	37.8	18.0	56.0	98.3
72	0.08	0.21	0.74	1.2	6.0	9.5	17.6	49.0	33.3	82.0	100.2
73	0.07	0.19	0.75	1.4	6.5	10.0	18.9	47.9	33.2	81.0	99.1
74	0.07	0.18	1.1	1.7	8.0	12.1	23.1	48.1	28.7	77.0	99.9
201R	0.02	0.57	0.86	12.0	57.1	7.6	78.1	13.5	8.4	22.0	99.1
202R	0.43	0.12	0.30	0.48	38.7	35.7	75.3	16.6	7.8	24.0	98.6
203R	0.06	0.01	0.06	0.16	0.51	0.52	1.3	54.2	44.5	99.0	99.0
204R	0.19	0.31	0.53	0.89	2.1	1.9	5.7	59.4	34.7	94.0	100.0
205R	0.56	0.49	0.60	1.6	13.1	21.6	37.3	43.3	18.8	62.0	95.9
206R	0.06	0.18	0.58	1.3	30.0	32.4	64.4	23.2	12.4	36.0	98.7
207R	0.23	0.09	0.23	0.52	12.0	13.6	26.4	47.9	25.5	73.0	98.9
208R	0.84	0.37	1.3	2.0	3.2	2.2	9.1	50.7	39.4	90.0	99.5
209R	0.04	0.08	0.19	0.29	22.8	42.6	66.0	26.7	7.3	34.0	97.0

Table 1B. Grain Size Analyses - Results by Weight (grams)

Phi:	>-2.25	-2.25 to -1.0	-1.0 to 0.23	0.23 to 1.23	1.23 to 2.0	2.0 to 3.24	3.24 to 3.74	3.74 to 4.0	4.0 to 5.0	5.0 to 6.0	6.0 to 7.0
Microns:	>4750	4750 - 2000	2000 - 850	850 - 425	425 - 250	250 - 106	106 - 75	75 - 62.5	62.5 - 31.2	31.2 - 15.6	15.6 - 7.8
Sample ID											
1	0.0000	0.0085	0.0027	0.0136	0.0364	0.1190	0.1539	0.2328	2.5550	3.3650	2.1600
2R	0.0000	0.0111	0.0184	0.0598	0.1245	1.5285	3.8940	2.5176	4.2650	1.8050	1.0200
3	0.7941	0.5501	0.1768	0.1834	0.3075	1.2188	1.7545	1.3046	3.3200	1.8300	1.2500
4	0.0000	0.0058	0.0050	0.0229	0.0330	0.0956	0.0508	0.0511	0.6100	1.8550	1.5700
5	0.0055	0.0108	0.0064	0.0314	0.0583	0.1488	0.1185	0.1699	1.7150	2.6350	1.7900
8	0.0157	0.0536	0.0837	0.3313	0.5257	2.1173	1.8936	1.2798	3.2150	2.3050	1.4700
9R	0.0814	2.6748	13.1151	31.3137	27.2224	4.8426	0.0252	0.0087	0.0400	-0.0250	0.0500
10R	0.0000	0.0155	0.0211	0.0910	0.3561	11.7683	3.0024	1.2641	2.5500	1.5000	0.8850
11R	0.0122	0.0325	0.6043	0.9815	2.5263	7.3937	0.5103	0.1913	0.5950	1.0850	0.7100
12	0.0000	0.0183	0.0052	0.0352	0.0756	0.3053	0.3738	0.4082	3.0400	2.9350	1.8800
13R	0.0065	0.0032	1.0562	11.6282	21.9691	10.1090	3.2397	1.6096	2.0050	0.7800	0.5150
14	0.0000	0.0116	0.3213	2.9771	5.2610	4.4829	1.7849	0.9487	2.0950	1.6700	1.2800
15	-0.0004	0.0706	0.4398	4.9127	25.7700	49.2676	7.4238	2.2112	2.0500	0.3100	0.4050
17	0.0000	0.0125	0.0289	0.0833	0.1382	0.2697	0.1440	0.1099	0.8000	2.3700	2.5950
18	0.0000	0.0072	0.0204	0.2119	5.7371	6.5021	0.4762	0.2110	0.7050	1.0250	1.4050
19	0.0000	0.0043	0.0041	0.0508	0.1565	0.9264	0.5597	0.2354	0.5250	0.6600	1.0250
20	0.0131	0.0244	0.0039	0.0081	0.0119	0.0629	0.2228	0.3159	2.0400	2.7050	3.1950
21	0.0000	0.0106	0.0242	0.0569	0.0972	0.6049	1.5045	1.4883	4.9200	3.6200	2.0000
22	0.0082	0.0474	0.1065	0.8998	4.5213	26.2161	3.3087	0.8945	0.6900	0.5050	0.6750
26	26.4815	2.7732	1.6480	1.3947	2.8655	8.5755	1.6927	0.6379	1.3450	1.4600	1.1650
29	0.0000	0.0131	0.0232	0.1769	0.3597	0.5697	0.5424	0.5260	1.5500	2.6900	1.5000
30	0.0168	0.0027	0.0323	0.4045	2.2262	16.6722	3.0456	1.4878	2.8600	1.1700	0.7200
32	0.0043	0.0355	0.1746	1.4510	11.5916	33.3047	1.0550	0.3014	0.5650	0.3600	0.4250
33	0.0072	0.1419	0.1049	1.1370	8.9306	24.7721	0.7530	0.2172	0.4250	0.2850	0.2850
34	0.0000	0.0071	0.0233	0.0486	0.0873	0.2321	0.2379	0.2537	1.5700	1.7750	2.2550
35	0.0000	0.0159	0.0416	0.1866	0.2081	0.8114	0.7317	0.4666	1.4300	1.6850	1.5650
38	0.0000	0.0176	0.0039	0.0213	0.0713	0.2012	0.1169	0.0864	0.4100	1.0150	1.5650
39	0.0114	0.1468	1.1490	9.4093	26.8507	37.7379	0.8503	0.1318	0.1500	0.1500	0.1200
40	0.0121	0.0215	0.2996	2.1440	3.8017	6.7203	1.3400	0.5817	1.7000	1.8000	1.0800
41	0.0000	0.0200	0.0087	0.0299	0.0971	1.4610	2.5880	2.0985	6.4150	3.6650	1.4400
43	0.0033	0.0204	0.0392	1.8241	15.7166	56.1681	3.4351	0.7733	0.7950	0.5600	0.4300
44	0.0025	0.0712	0.4966	2.2087	3.7661	14.0225	3.5125	0.9983	1.1500	0.6200	0.4000

Table 1B. (continued) Grain Size Analyses - Results by Weight (grams)

Phi: Microns: Sample ID	>-2.25 >4750	-2.25 to -1.0 4750 - 2000	-1.0 to 0.23 2000 - 850	0.23 to 1.23 850 - 425	1.23 to 2.0 425 - 250	2.0 to 3.24 250 - 106	3.24 to 3.74 106 - 75	3.74 to 4.0 75 - 62.5	4.0 to 5.0 62.5 - 31.2	5.0 to 6.0 31.2 - 15.6	6.0 to 7.0 15.6 - 7.8
45	0.0000	0.0063	0.0074	0.0277	0.0785	1.9596	3.1762	2.3140	4.2600	1.6100	0.9250
47	9.7164	2.3398	2.2437	2.9184	7.9599	15.3629	0.6591	0.1887	0.4950	0.7400	0.4650
48	0.0000	0.0083	0.0114	0.0553	0.0957	0.2969	0.2798	0.3010	0.9050	1.6350	1.5450
49	0.0090	0.0017	0.0533	0.2940	0.2858	0.5015	0.2379	0.1625	0.6050	1.0650	1.5950
51	0.0011	0.0447	0.0112	0.0465	0.0622	0.1412	0.1147	0.1623	1.7700	2.6450	1.7850
52	0.0000	0.0032	0.0184	0.0177	0.0498	0.1365	0.1186	0.1713	1.6250	2.3700	1.8200
53	0.0000	0.0028	0.0006	0.0224	0.0532	0.1283	0.1096	0.1594	1.4300	2.3700	1.6300
57	0.0156	0.0458	0.2051	0.4922	1.7446	11.5456	4.8189	2.6303	4.4850	1.6900	0.8500
58	0.0068	0.0888	0.1150	1.3058	10.2759	29.0016	0.9221	0.2856	0.5050	0.3750	0.3650
59	0.0039	0.0558	0.1250	1.4872	11.2483	32.2406	1.0056	0.2887	0.5250	0.3450	0.3250
60	0.0000	0.0042	0.0064	0.0118	0.0380	0.1255	0.0921	0.0730	0.3100	0.8400	1.3700
61	0.0000	0.0118	0.0060	0.0470	0.2056	0.2552	0.1208	0.0850	0.3500	0.9350	1.5050
62	0.0000	0.0017	0.0000	0.0223	0.0937	0.1811	0.1073	0.0761	0.2300	0.9350	1.3150
63	0.0064	0.1446	0.7299	2.7987	4.8337	18.1531	4.5829	1.3260	1.3700	0.7600	0.5550
64	0.0085	0.0801	0.5224	2.4451	4.6735	17.6865	4.6118	1.3903	1.4600	0.8200	0.6600
65	0.0072	0.1488	0.7339	2.4210	4.1578	16.5953	4.3240	1.2317	1.2200	0.6050	0.5350
69	0.0062	0.0080	0.0604	0.7061	2.7338	13.9975	3.0796	1.1863	2.2900	1.0450	0.5700
70	0.0000	0.0571	0.0664	0.2639	0.3047	2.0010	1.7148	0.9487	2.2400	1.9700	2.0000
71	0.0000	0.0078	0.0095	0.0540	0.2214	6.5437	1.2009	0.6740	2.5700	2.4000	1.4650
72	0.0000	0.0088	0.0247	0.0858	0.1374	0.6970	0.6677	0.4347	1.3350	1.6650	1.4600
73	0.0000	0.0080	0.0237	0.0908	0.1725	0.7891	0.7369	0.4835	1.2650	1.7700	1.5200
74	0.0000	0.0080	0.0197	0.1172	0.1838	0.8789	0.8160	0.5139	1.4050	1.4000	1.4450
201R	0.0000	0.0070	0.1879	0.2851	3.9620	18.8390	1.7285	0.7946	1.8550	1.1500	0.7950
202R	0.0834	0.0590	0.0390	0.0986	0.1597	12.9122	8.9776	2.9278	3.3750	1.0200	0.7100
203R	0.0072	0.0013	0.0017	0.0083	0.0208	0.0673	0.0351	0.0340	0.6350	1.6100	2.4750
204R	0.0000	0.0181	0.0294	0.0501	0.0841	0.1951	0.1086	0.0675	0.4450	1.7600	1.8000
205R	0.0187	0.0947	0.0989	0.1205	0.3203	2.6283	2.5182	1.8084	4.4950	2.0450	1.4200
206R	0.0132	0.0025	0.0497	0.1608	0.3503	8.3527	6.4637	2.5524	3.2150	1.5600	0.9450
207R	0.0087	0.0316	0.0159	0.0393	0.0887	2.0529	1.4517	0.8806	2.9650	2.4150	1.6700
208R	0.0176	0.0398	0.0251	0.0881	0.1367	0.2198	0.0954	0.0570	0.2750	0.9600	1.2000
209R	0.0097	0.0001	0.0201	0.0484	0.0743	5.7934	7.6214	3.2049	3.9350	1.2850	0.8900

Table 1B. (continued) Grain Size Analyses - Results by Weight (grams)

Phi: Microns: Sample ID	7.0 to 8.0 7.8 - 3.9	8.0 to 9.0 3.9 - 1.9	9.0 to 10.0 1.9 - 0.9	10.0 to 11.0 0.9 - 0.4	Recovered Total Weight (grams)	Sample Dry weight (grams)	Percent Recovery	Percent Total Solids
1	1.2150	0.9450	0.8500	1.6600	13.3169	13.4939	98.7	37.1
2R	0.7750	0.5050	0.8700	1.8500	19.2439	20.1362	95.6	52.8
3	0.9700	0.7050	1.9000	1.0850	17.3498	18.1402	95.6	47.1
4	1.6900	1.4750	1.2900	2.2950	11.0492	11.0969	99.6	30.6
5	1.3800	1.1950	1.0550	2.0350	12.3546	12.4373	99.3	33.4
8	1.0350	0.6900	0.6900	1.6450	17.3507	17.9514	96.7	46.0
9R	0.0200	-0.0100	0.0750	0.5950	80.0289	80.7522	99.1	80.5
10R	0.7100	0.6050	0.5150	1.3000	24.5835	25.0631	98.1	63.2
11R	0.7150	0.5400	0.3600	1.0450	17.3021	17.6782	97.9	46.5
12	1.3800	1.0300	0.8700	1.9300	14.2866	14.4175	99.1	37.3
13R	0.3200	0.2750	0.4050	1.0850	55.0065	55.3867	99.3	76.6
14	1.0850	0.8250	0.8200	1.8300	25.3925	25.7021	98.8	56.2
15	0.3800	0.4250	0.5450	1.4200	95.6303	95.5148	100.1	74.2
17	1.8500	1.2300	1.0550	1.6450	12.3315	12.4162	99.3	33.6
18	1.6200	1.5050	1.2100	1.9850	22.6209	22.6666	99.8	51.8
19	1.3050	1.4550	1.2050	2.6600	10.7722	10.7380	100.3	28.8
20	2.7600	2.1350	1.4200	2.7250	17.6430	18.0160	97.9	48.0
21	1.4700	0.9750	0.7700	1.6550	19.1966	19.7448	97.2	55.9
22	0.6950	0.6600	0.5950	1.5000	41.3225	41.6322	99.3	72.0
26	1.2500	0.9050	1.0400	2.2000	55.4340	57.5594	96.3	74.5
29	1.2600	1.0750	1.0100	2.3600	13.6560	13.9438	97.9	36.2
30	0.6050	0.4300	0.3300	1.1950	31.1981	31.5065	99.0	63.3
32	0.3600	0.3150	0.4150	1.1250	51.4831	51.6612	99.7	74.4
33	0.2250	0.2300	0.2700	0.8350	38.6189	38.4425	100.5	73.8
34	1.6500	1.2500	0.9800	1.8700	12.2400	12.3216	99.3	34.0
35	1.3950	1.2850	0.9600	1.9600	12.7419	12.9551	98.4	33.0
38	1.7150	1.5100	1.1600	2.4150	10.3086	10.0954	102.1	26.3
39	0.1650	0.2050	0.1850	0.9150	78.1772	78.1196	100.1	76.2
40	0.8400	0.5750	0.4150	0.9900	22.3209	22.6780	98.4	61.2
41	1.0200	0.6600	0.4850	1.0500	21.0382	21.7583	96.7	57.2
43	0.5150	0.5550	0.5800	1.4250	82.8401	83.0876	99.7	75.1
44	0.4300	0.6350	0.5550	1.2250	30.0934	30.0670	100.1	65.0

Table 1B. (continued) Grain Size Analyses - Results by Weight (grams)

Phi: / Microns: / Sample ID	7.0 to 8.0 / 7.8 - 3.9	8.0 to 9.0 / 3.9 - 1.9	9.0 to 10.0 / 1.9 - 0.9	10.0 to 11.0 / 0.9 - 0.4	Recovered Total Weight (grams)	Sample Dry weight (grams)	Percent Recovery	Percent Total Solids
45	0.8450	0.9750	0.7950	1.8100	18.7897	18.9507	99.2	46.9
47	0.5300	0.5450	0.5350	0.9800	45.6789	46.0771	99.1	74.7
48	1.5500	1.1900	0.9200	1.4700	10.2634	10.6027	96.8	28.0
49	1.5700	1.0600	0.7650	1.4400	9.6457	9.7949	98.5	26.0
51	1.3700	1.3000	0.9650	2.1300	12.5489	12.6437	99.3	33.4
52	1.2400	1.1650	0.9200	1.9750	11.6305	11.4776	101.3	33.4
53	1.4100	1.1650	0.9900	1.9450	11.4163	11.5472	98.9	33.2
57	0.6250	0.5400	0.4950	1.1900	31.3731	32.6222	96.2	62.2
58	0.2850	0.2900	0.4000	0.9650	45.1866	45.2134	99.9	74.6
59	0.2900	0.3950	0.3450	1.0600	49.7401	49.6860	100.1	74.7
60	1.4900	1.4100	1.0250	2.3000	9.0960	9.0443	100.6	26.5
61	1.5500	1.4350	1.1650	2.5400	10.2114	10.1463	100.6	27.0
62	1.4750	1.2700	1.0400	2.2050	8.9522	8.8505	101.2	26.4
63	0.6550	0.7100	0.8600	1.4750	38.9603	39.0541	99.8	65.3
64	0.8050	0.7500	0.9400	1.6300	38.4832	38.6468	99.6	62.4
65	0.6600	0.6450	0.7150	1.4450	35.4447	35.4760	99.9	64.9
69	0.3550	0.3800	0.3300	0.9600	27.7079	27.9276	99.2	67.2
70	0.8900	1.1900	0.9650	1.7400	16.3516	16.1814	101.1	35.5
71	0.9900	0.9100	0.7850	1.8350	19.6663	20.0052	98.3	47.1
72	1.2300	1.1550	0.9700	1.7350	11.6061	11.5798	100.2	33.1
73	1.2700	1.1700	1.0200	1.8450	12.1645	12.2735	99.1	33.5
74	1.0300	1.0750	0.7650	1.3100	10.9675	10.9841	99.9	32.7
201R	0.6450	0.6000	0.5900	1.5850	33.0241	33.3092	99.1	66.7
202R	0.4300	0.5100	0.4800	1.5950	33.3773	33.8378	98.6	64.7
203R	2.4850	1.8400	0.3200	3.7500	13.2907	13.4234	99.0	43.3
204R	1.6250	0.9350	0.7650	1.5900	9.4729	9.4712	100.0	27.0
205R	0.7250	0.8200	0.7600	2.2000	20.0730	20.9230	95.9	51.4
206R	0.7550	0.7650	0.7400	1.9400	27.8653	28.2463	98.7	57.8
207R	1.1650	1.0550	0.8950	2.4200	17.1544	17.3449	98.9	43.8
208R	1.0200	0.7900	0.5350	1.3600	6.8195	6.8565	99.5	21.8
209R	0.6750	0.4900	0.4400	0.9300	25.4173	26.2068	97.0	63.9

Table 2. Grain Size Analyses - Sample Holding Times

Station ID	Sample ID	Rep/QC	Lab ID	Date Collected	Date Analyzed	Holding Times (Days)
1	1	1	8041 P	4/10/91	4/19/91	9
2R	2R	1	8041 Q	4/7/91	4/19/91	12
3	3	1	8078 A	4/11/91	4/19/91	8
4	4	1	8041 A	4/7/91	4/12/91	5
5	5	1	8041 B	4/6/91	4/12/91	6
5	51	1	8041 F	4/6/91	4/12/91	13
5	52	2	8041 G	4/6/91	4/12/91	6
5	53	3	8041 H	4/6/91	4/12/91	6
8	8	1	8078 B	4/12/91	4/19/91	7
9R	9R	1	8078 C	4/12/91	4/19/91	7
10R	10R	1	8078 D	4/13/91	4/18/91	5
11R	11R	1	8078 E	4/13/91	4/18/91	5
12	12	1	8078 J	4/13/91	4/18/91	5
13R	13R	1	8078 K	4/14/91	4/19/91	5
14	14	1	8078 L	4/14/91	4/19/91	5
15	15	1	8078 M	4/14/91	4/19/91	5
17	17	1	8078 N	4/14/91	4/19/91	5
18	18	1	8041 C	4/5/91	4/12/91	7
19	19	1	8041 D	4/5/91	4/12/91	7
20	20	1	8041 E	4/5/91	4/12/91	7
21	21	1	8015 A	4/2/91	4/26/91	24
22	22	1	8015 B	4/2/91	4/10/91	8
26	26	1	8078 O	4/13/91	4/19/91	6
29	29	1	8015 C	4/1/91	4/10/91	9
30	30	1	7976 B	3/25/91	4/3/91	9
32	32	1	8015 D	4/1/91	4/10/91	9
32	57	1	8015 F	4/1/91	4/10/91	9
32	58	2	8015 G	4/1/91	4/10/91	9
32	59	3	8015 H	4/1/91	4/10/91	9
33	33	1	8015 E	4/1/91	4/10/91	9
34	34	1	7976 C	3/25/91	4/3/91	9
35	35	1	7976 D	3/26/91	4/3/91	8

Table 2. (continued) Grain Size Analyses - Sample Holding Times

Station ID	Sample ID	Rep/QC	Lab ID	Date Collected	Date Analyzed	Holding Times (Days)
35	72	1	7976 O	3/26/91	4/4/91	9
35	73	2	7976 P	3/26/91	4/4/91	9
35	74	3	7976 Q	3/26/91	4/4/91	9
38	38	1	7976 E	3/26/91	4/3/91	8
38	60	1	7976 J	3/26/91	4/3/91	8
38	61	2	7976 K	3/26/91	4/10/91	15
38	62	3	7976 L	3/26/91	4/4/91	9
39	39	1	7976 F	3/27/91	4/3/91	7
40	40	1	7976 G	3/27/91	4/3/91	7
41	41	1	7976 H	3/27/91	4/3/91	7
43	43	1	7976 I	3/27/91	4/3/91	7
44	44	1	7976 R	3/28/91	4/5/91	8
44	63	1	7976 Y	3/28/91	4/4/91	7
44	64	2	7976 W	3/28/91	4/4/91	7
44	65	3	7976 X	3/28/91	4/4/91	7
45	45	1	7976 S	3/28/91	4/5/91	8
47	47	1	7976 T	3/28/91	4/4/91	7
48	48	1	7976 U	3/29/91	4/4/91	6
49	49	1	7976 V	3/29/91	4/4/91	6
69	69	1	7976 N	3/25/91	4/4/91	10
70	70	1	7976 Z	3/28/91	4/4/91	7
71	71	1	8041 I	4/5/91	4/12/91	7
201R	201R	1	8078 F	4/11/91	4/18/91	7
202R	202R	1	8078 G	4/11/91	4/18/91	7
203R	203R	1	8041 M	4/7/91	4/12/91	5
204R	204R	1	8041 R	4/8/91	4/19/91	11
205R	205R	1	8041 S	4/8/91	4/18/91	10
206R	206R	1	8041 T	4/8/91	4/18/91	10
207R	207R	1	8041 N	4/6/91	4/12/91	6
208R	208R	1	8078 H	4/13/91	4/18/91	5
209R	209R	1	8041 O	4/5/91	4/12/91	7

Table 3. Grain Size Analyses - Monitoring Variability Samples

Station 5

Size Fraction	5 (Primary Sample)	51 (Duplicate Split)	Mean (5 and 51)	RPD (5 and 51)	52 (Replicate)	53 (Replicate)	Station Mean (n=3)	Station CV (n=3)
% Gravel	0.13	0.37	0.25	-96.0	0.03	0.02	0.10	130
% Very Coarse Sand	0.05	0.09	0.07	-57.1	0.16	0.01	0.08	94.4
% Coarse Sand	0.25	0.37	0.31	-38.7	0.15	0.20	0.22	37.2
% Medium Sand	0.47	0.50	0.49	-6.1	0.43	0.47	0.46	6.6
% Fine Sand	1.2	1.1	1.2	5.8	1.2	1.1	1.2	3.4
% Very Fine Sand	2.3	2.2	2.3	6.1	2.5	2.4	2.4	4.0
% Sand	4.3	4.3	4.3	0.5	4.4	4.2	4.3	2.8
% Silt	60.9	60.3	60.6	0.9	60.7	59.9	60.4	0.7
% Clay	34.7	35.0	34.9	-1.0	34.9	35.9	35.2	1.6

Station 35

Size Fraction	35 (Primary Sample)	72 (Duplicate Split)	Mean (35 and 72)	RPD (35 and 72)	73 (Replicate)	74 (Replicate)	Station Mean (n=3)	Station CV (n=3)
% Gravel	0.12	0.08	0.10	40.0	0.07	0.07	0.08	21.7
% Very Coarse Sand	0.33	0.21	0.27	44.4	0.19	0.18	0.21	23.5
% Coarse Sand	1.5	0.74	1.1	65.5	0.75	1.1	0.97	20.0
% Medium Sand	1.6	1.2	1.4	32.1	1.4	1.7	1.5	10.4
% Fine Sand	6.4	6.0	6.2	5.8	6.5	8.0	6.9	14.1
% Very Fine Sand	9.4	9.5	9.5	-1.1	10.0	12.1	10.6	13.1
% Sand	19.2	17.6	18.4	8.4	18.9	23.1	20.1	12.8
% Silt	47.7	49.0	48.4	-2.8	47.9	48.1	48.1	0.5
% Clay	33.0	33.3	33.1	-0.8	33.2	28.7	31.7	8.1

Table 3. (continued) Grain Size Analyses - Monitoring Variability Samples

Station 38

Size Fraction	38 (Primary Sample)	60 (Duplicate Split)	Mean (38 and 60)	RPD (38 and 60)	61 (Replicate)	62 (Replicate)	Station Mean (n=3)	Station CV (n=3)
% Gravel	0.17	0.05	0.11	109	0.12	0.02	0.08	68.8
% Very Coarse Sand	0.04	0.07	0.06	-50.0	0.06	0.00	0.04	86.6
% Coarse Sand	0.21	0.13	0.17	47.1	0.46	0.25	0.29	51.6
% Medium Sand	0.69	0.42	0.56	48.2	2.0	1.1	1.2	61.5
% Fine Sand	2.0	1.4	1.7	33.5	2.5	2.0	2.1	19.2
% Very Fine Sand	2.0	1.8	1.9	8.4	2.0	2.1	2.0	3.9
% Sand	4.9	3.8	4.3	24.4	7.0	5.4	5.6	24.7
% Silt	45.7	44.1	44.9	3.5	42.5	44.2	43.9	2.8
% Clay	49.3	52.1	50.7	-5.4	50.3	50.4	50.5	0.4

Station 44

Size Fraction	44 (Primary Sample)	63 (Duplicate Split)	Mean (44 and 63)	RPD (44 and 63)	64 (Replicate)	65 (Replicate)	Station Mean (n=3)	Station CV (n=3)
% Gravel	0.25	0.39	0.32	-43.8	0.23	0.44	0.33	31.9
% Very Coarse Sand	1.7	1.9	1.8	-12.2	1.4	2.1	1.7	21.1
% Coarse Sand	7.3	7.2	7.3	2.2	6.4	6.8	6.8	7.0
% Medium Sand	12.5	12.4	12.5	0.8	12.1	11.7	12.1	3.2
% Fine Sand	46.6	46.6	46.6	0.0	46.0	46.8	46.5	1.0
% Very Fine Sand	15.0	15.2	15.1	-1.1	15.6	15.7	15.5	2.0
% Sand	83.1	83.2	83.2	-0.1	81.4	83.1	82.6	1.2
% Silt	8.6	8.6	8.6	0.8	9.7	8.5	9.0	7.5
% Clay	8.0	7.8	7.9	2.5	8.6	7.9	8.2	5.1

Table 3. (continued) Grain Size Analyses - Monitoring Variability Samples

Station 32 Comparison of Samples 32, 57, 58, and 59

Size Fraction	32 (Primary Sample)	57 (Duplicate Split)	Mean (32 and 57)	RPD (32 and 57)	58 (Replicate)	59 (Replicate)	Station Mean (n=3)	Station CV (n=3)
% Gravel	0.08	0.20	0.14	-85.7	0.22	0.12	0.16	33.1
% Very Coarse Sand	0.34	0.65	0.50	-62.0	0.25	0.25	0.33	43.7
% Coarse Sand	2.8	1.6	2.2	56.8	2.9	3.0	2.7	15.9
% Medium Sand	22.5	5.6	14.0	121	22.7	22.6	19.8	25.3
% Fine Sand	64.7	36.8	50.7	55.0	64.2	64.8	59.9	13.3
% Very Fine Sand	2.6	23.7	13.2	-160	2.7	2.6	6.2	98.4
% Sand	93.0	68.3	80.7	30.6	92.7	93.3	88.9	8.0
% Silt	3.3	24.4	13.9	-152	3.4	3.0	6.8	91.0
% Clay	3.6	7.1	5.4	-64.4	3.7	3.6	4.2	24.2

Station 32 Comparison of Samples 32, 33, 58, and 59

Size Fraction	32 (Primary Sample)	33 (Duplicate Split)	Mean (32 and 33)	RPD (32 and 33)	58 (Replicate)	59 (Replicate)	Station Mean (n=3)	Station CV (n=3)
% Gravel	0.08	0.39	0.24	-129.2	0.22	0.12	0.19	33.8
% Very Coarse Sand	0.34	0.27	0.31	22.6	0.25	0.25	0.27	12.8
% Coarse Sand	2.8	2.9	2.9	-4.1	2.9	3.0	2.9	1.9
% Medium Sand	22.5	23.1	22.8	-3	22.7	22.6	22.7	0.4
% Fine Sand	64.7	64.2	64.4	0.8	64.2	64.8	64.5	0.5
% Very Fine Sand	2.6	2.5	2.6	5	2.7	2.6	2.6	1.6
% Sand	93.0	93.0	93.0	0.0	92.7	93.3	93.0	0.3
% Silt	3.3	3.2	3.2	5	3.4	3.0	3.2	6.4
% Clay	3.6	3.5	3.5	4.3	3.7	3.6	3.6	2.4

September 13, 1991

Data Validation Report
Total Sulfides Analyses

Site: Puget Sound

Project: 1991 PSAMP MSMT

Sample Numbers: 1, 2R, 3-5, 8, 9R, 10R, 11R, 12, 13R, 14, 15, 17-22, 26, 29, 30, 32-35, 38-41, 43-45, 47-49, 51-53, 57-65, 69-74, 201R-209R

Samples Collected by: Ambient Monitoring Section
Washington State Department of Ecology

The samples included in this report were analyzed by Analytical Resources, Inc., of Seattle, Washington, under subcontract to BCI of Vashon, Washington. Funding for this contract is provided by the Ambient Monitoring Section of the Washington State Department of Ecology.

This report is submitted to: Ambient Monitoring Section
Washington State Department of Ecology

Data Evaluated by: Thomas D. Bowden TDB

Approved by: Raleigh C. Farlow RF

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Data Validation Report - Total Sulfides Analyses

Site:	Puget Sound
Project:	1991 PSAMP MSMT
Laboratory:	Analytical Resources, Inc. (ARI)
Sample Numbers:	Samples 1, 2R, 3-5, 8, 9R, 10R, 11R, 12, 13R, 14, 15, 17-22, 26, 29, 30, 32-35, 38-41, 43-45, 47-49, 51-53, 57-65, 69-74, 201R-209R
Matrix:	Sediment
Reviewer:	T. D. Bowden
Date:	September 13, 1991

1.0 Introduction

This report summarizes the validation of laboratory data for 63 marine sediment samples submitted to Analytical Resources, Inc. of Seattle, Washington for total sulfide analyses. The samples were collected from 48 different stations throughout Puget Sound by the Washington State Department of Ecology (Ecology) Ambient Monitoring Section, as part of the 1991 Marine Sediment Monitoring Task (MSMT) of the Puget Sound Ambient Monitoring Program (PSAMP). The samples were analyzed according to guidelines found in "Puget Sound Estuary Program (PSEP) 1986. Recommended protocols for measuring conventional variables in Puget Sound. Prepared for U.S. Environmental Protection Agency, Region 10 by Tetra Tech, Inc. of Bellevue, WA". This report has been prepared in accordance with Ecology's *Puget Sound Ambient Monitoring Program: Marine Sediment Quality Implementation Plan* (Striplin, 1988), using guidelines found in the Washington Department of Ecology document *Data Validation Guidance Manual for Selected Sediment Variables*, Draft version (PTI, 1989) and USEPA guidance *Laboratory Data Validation: Functional Guidelines for Evaluating Inorganics Analyses* (USEPA, 1988).

Samples were collected using a 0.1 m^2 stainless steel Double van Veen sampler. Sediment for total sulfide analyses was removed from the upper two centimeters of a single grab. The sediment constituting the sample was not composited or homogenized. Samples were preserved with zinc acetate and held on ice, in darkness, until delivery to the laboratory. Chain-of-Custody documents show that proper chain-of-custody was maintained from the time of sample collection until delivery to and acceptance by the laboratory. The laboratory reported that all samples were received intact. Samples were held at 4° C. at the laboratory until analysis.

Forty-eight of the samples are primary samples from 48 different locations or stations in Puget Sound. The remaining 15 samples are field-generated quality control samples collected at five selected stations to allow determination of monitoring variability. At each selected station, the field-generated QC samples included one split of the primary sample taken from the same van Veen grab (blind laboratory duplicate), and two station replicates taken from different van Veen grabs at the same station (blind field replicates). All field-generated QC samples were assigned surrogate station numbers, as summarized below, and were submitted blind to the analytical process:

Field Station and Primary Sample:	5	32	35	38	44
Duplicate Split:	51	57	72	60	63
Station Replicates:	52, 53	58, 59	73, 74	61, 62	64, 65

The laboratory used the following field samples for laboratory QC:

Matrix Spike Analysis	Triplicate Analyses	Duplicate Analysis
Station 5	Station 5	Station 2R
Station 12	Station 59	
Station 26	Station 70	
Station 59	Station 74	
Station 70	Station 208R	
Station 74		

Laboratory deliverables were complete and documentation was sufficient to allow evaluation and validation of the associated results.

Analytical results with associated data qualifiers are presented in Table 1. Results are expressed in mg-S/kg, dry weight.

2.0 Discussion

2.1. Sample Holding Times/Preservation

Technical requirements for maximum sample holding time prior to analysis have been established only for water matrices for total sulfides (7 days from time of collection to time of analysis). The PSEP guidelines recommend applying water matrix holding times to sediments, hence the 7 day holding time has been applied to all samples.

Samples were preserved in the field with 2N zinc acetate, held in darkness on ice during transport, and maintained in the laboratory at 4° C. until preparation and analysis.

Forty-four analyses, representing 27 stations, were performed more than seven days after sample collection. The exceedances in holding times range from 1 to 8 days beyond the 7 day limit. Results associated with samples that exceeded holding times are not expected to be significantly affected since the deviation is minimal. As an example, the laboratory triplicate for Station 74 was analyzed 15 days after collection, whereas the original and the duplicate were analyzed 6 days after collection. The results for these replicate analyses are not significantly different (Coefficient of Variation = 14.4%; see Section 2.4). Results associated with samples that exceeded recommended holding times were not significantly affected, and thus were not qualified.

Sample holding times were determined by comparing sampling dates on the Chain-of-Custody documents with dates of analyses reported in the data package. Sample holding times are summarized in Table 2.

2.2. Standardization and Calibration

Standards were prepared using $Na_2S \cdot 9H_20$. Examination of laboratory bench sheets and discussions with laboratory personnel confirm that standard solutions were prepared and calibrated in accordance with PSEP guidelines. Fresh standards were prepared for each analytical run. The raw data show that the instrument was calibrated for each analytical run by establishing linearity with one blank and five concentrations of standards. PSEP guidelines require one blank and standards at three concentrations. Correlation coefficients (r values) calculated by the laboratory are greater than 0.997 for all analytical runs, and are within limits specified by PSEP guidelines ($r \geq 0.995$). Laboratory linear regression data was confirmed by recalculation from values for standards and absorbances found in the raw data.

A calibration check standard was analyzed at the beginning of each analytical run. Recoveries for check standards ranged from 88.4 to 121%. PSEP guidelines do not specify acceptance criteria for sulfides check standard performance. Comparing calibration check standard recoveries to acceptance limits specified by EPA/CLP for metals (90-110%) shows that 70% of the check standard recoveries were between 110% and 121%. These recoveries compare well with acceptance limits for metals and therefore are determined to be acceptable for all sulfide analytical runs; and no associated results have been qualified.

2.3. Method Blanks

One method blank, in distillate, was analyzed at the beginning of each analytical run. All method blanks were below the method quantitation limit for total sulfides. Method quantitation limits were established by the laboratory at three times the absorbance of the calibration blank. Absorbance values for method blanks are effectively equivalent to absorbance values for calibration blanks. Considering that the linearity of calibration curves is exceptionally good for all analytical runs, method quantitation limits may be conservatively high. The average quantitation limit for the 15 method blanks is 0.053 mg-S/L, which equates to 0.53 mg-S/kg, dry weight, using an average sample weight of 5 grams and assuming 100% total solids.

2.4. Triplicate Sample Analysis

Triplicate sample analysis was performed on five out of a total of 63 samples, which satisfies the PSEP guidelines requirement of a minimum of 5%. An additional sample also was analyzed in duplicate. Sample results and a statistical summary of triplicate analyses are presented in Table 3A. Results for total sulfides greater than quantitation limits were reported for only two of the five samples analyzed in triplicate. Coefficients of Variation (CVs) for each of these two samples were less than 20%, meeting PSEP guidelines. Results for the sample analyzed in duplicate were above method quantitation limits. The Relative Percent Difference (RPD) for these analyses is -32.7%. Triplicate sample analyses are considered acceptable and no associated results required qualification.

Quantitation was confirmed for all triplicate analyses by recalculation of results from raw data. Transcription to the laboratory reporting form was confirmed for all results. Where applicable, CVs were confirmed by recalculation.

2.5. Matrix Spike Analysis

Matrix spike (MS) analysis was performed on six of the 63 samples. Sample results and recoveries for matrix spike analyses are presented in Table 3B. Samples were spiked with

1mL of the stock $Na_2S \cdot 9H_2O$ standard. The average dry weight matrix spike concentration for the six matrix spike samples was 341 mg/kg, which is higher than the requested 2 mg/kg spike level. Since 80% of the sample results reported are less than 10 mg-S/kg, matrix spike analyses at the spike levels employed are not considered representative for the majority of samples analyzed.

PSEP guidelines do not specify acceptance criteria for matrix spike frequencies and matrix spike recoveries. A comparison to USEPA CLP matrix spike acceptance criteria for metals shows that matrix spike samples were analyzed at an appropriate frequency (≥5%); only one of the matrix spike recoveries (Station 12; %R = 74.0%) is marginally outside the CLP acceptance limits (75-125%). All matrix spike recoveries therefore are considered acceptable, and no associated results required qualification.

Quantitation was confirmed for all matrix spike analyses by recalculation from raw data. Transcription to the laboratory reporting form was confirmed for all results. Recoveries of matrix spikes were confirmed by recalculation.

2.6. Sample Result Verification

All raw data submitted with the data package are legible and complete. All results for field and QC samples were checked for quantitation and transcription errors. Quantitation was confirmed by recalculation from the laboratory raw data. No significant errors in quantitation or transcription were found. Several minor transcription errors were noted on reporting forms and have been corrected

Results for total sulfides were normalized using total solids data generated by the analyst during sample preparation. Total solids raw data were included with the laboratory deliverables. Approximately 20% of the total solids results were confirmed by recalculation from the laboratory raw data. All results on reporting forms were checked for transcription errors. No calculation errors were found; two transcription errors were found and corrected.

Sulfide results for sample (station) 70 of < 1.7 mg/kg are inconsistent with the "sulfurous odor" detected in the field during collection. A comparison of laboratory results from the 1990 analyses for those samples analyzed in the same 1991 sample batch suggests that, if any sample mix up occurred in the laboratory during 1991, it may be between samples 49 and 70, which were also in the same delivery and analytical group. Sulfide results for Station 49 in 1991 are reported at 107 mg/kg, compared to nondetectable (< 33 mg/kg) in 1990. Results for Station 70 are reported in the 1991 analyses as < 1.7 mg/kg, compared to 40 mg/kg in 1990.

2.7. Field-Generated Quality Control Samples

Two types of field-generated quality control samples were collected from five separate stations for the purpose of determining monitoring variability. Station duplicate splits were generated by collecting two separate aliquots from the same van Veen grab sample. Two separate station replicates were generated by collecting one sample from each of two additional and separate van Veen grab samples from the same station (blind field replicates). Field-generated QC samples were assigned surrogate station numbers and were submitted blind to the analytical process.

Results and summary statistics for all replicates are presented in Table 4. The mean and Relative Percent Difference (RPD) were calculated for the station duplicate splits. The RPD was not determined if both values were reported as non-detects. The mean and the Coefficient of Variation (CV) were calculated for the station replicates. Since the station duplicate splits were not collected from a homogenized composite,the replicate mean was calculated as the average of all four sample results (n=4), rather than as the average of the duplicate split mean and the two replicates (n=3).

The CVs are a measure of overall monitoring variability for total sulfides at a selected station. The two replicated stations with positive results, Stations 35 and 38, have CVs of 71.8% and 49.8%, respectively (Table 4).

RPDs were calculated for the station duplicate splits from Stations 35, 38, and 44 (RPDs = 17.8%, 1.1%, and 4.5%, respectively; Table 4). Since the splits were not collected from a homogenized composite, the RPDs are not a true measure of sampling and analytical variability but rather a measure of the variability within the van Veen sampler. Although CVs and RPD are not numerically-equivalent calculations, a comparison of CVs and RPDs for equivalent stations suggests significantly higher variability between grabs than within grabs for total sulfides.

2.8. Overall Case Assessment

Based on an evaluation of data contained in the laboratory data package, the data quality objectives outlined in Ecology's *Marine Sediment Quality Implementation Plan* were met. Quality control deviations were minor and no associated sample results required qualification. Total sulfides results for these samples are acceptable and may be used for the intended purposes of the project.

3.0 Summary of Qualified Data

No sample results associated with this data package required qualification because of QC deficiencies.

Table 1. Total Sulfides - Sample Results with Data Qualifiers

Station ID	Sample ID	Replicate	Lab ID	Total Sulfides (mg-S/kg, dry wt.)	Data Qualifier
1	1	1	8041 P	1.1	U
2R	2R	1	8041 Q	1.0	
3	3	1	8078 A	1.1	U
4	4	1	8041 A	2.7	U
5	5	1	8041 B	2.4	U
5	51	1	8041 F	1.8	U
5	52	2	8041 G	1.8	U
5	53	3	8041 H	1.6	U
8	8	1	8078 B	0.9	U
9R	9R	1	8078 C	0.4	U
10R	10R	1	8078 D	0.6	U
11R	11R	1	8078 E	0.8	U
12	12	1	8078 J	1.1	U
13R	13R	1	8078 K	0.6	U
14	14	1	8078 L	0.8	U
15	15	1	8078 M	0.5	U
17	17	1	8078 N	1.3	U
18	18	1	8041 C	1.4	U
19	19	1	8041 D	105	
20	20	1	8041 E	1.2	U
21	21	1	8015 A	0.9	
22	22	1	8015 B	11.0	
26	26	1	8078 O	0.7	U
29	29	1	8015 C	8.0	
30	30	1	7976 B	1.5	U
32	32	1	8015 D	0.7	U
32	57	1	8015 F	0.8	U
32	58	2	8015 G	1.0	U
32	59	3	8015 H	1.0	U
33	33	1	8015 E	1.1	U
34	34	1	7976 C	2.9	U
35	35	1	7976 D	392	
35	72	1	7976 O	186	
35	73	2	7976 P	270	
35	74	3	7976 Q	21.2	
38	38	1	7976 E	33.7	
38	60	1	7976 J	32.3	
38	61	2	7976 K	8.3	
38	62	3	7976 L	42.0	
39	39	1	7976 F	0.6	U
40	40	1	7976 G	0.8	U
41	41	1	7976 H	0.9	U
43	43	1	7976 I	0.6	U
44	44	1	7976 R	1.2	
44	63	1	7976 Y	1.0	U
44	64	2	7976 W	0.6	U
44	65	3	7976 X	0.7	U

Table 1. (cont'd.) **Total Sulfides - Sample Results with Data Qualifiers**

Station ID	Sample ID	Replicate	Lab ID	Total Sulfides (mg-S/kg, dry wt.)	Data Qualifier
45	45	1	7976 S	1.0	
47	47	1	7976 T	0.6	U
48	48	1	7976 U	2.5	
49	49	1	7976 V	107	
69	69	1	7976 N	0.7	U
70	70	1	7976 Z	1.7	U
71	71	1	8041 I	0.7	U
201R	201R	1	8078 F	0.6	U
202R	202R	1	8078 G	0.6	U
203R	203R	1	8041 M	1.0	U
204R	204R	1	8041 R	24	
205R	205R	1	8041 S	1.2	U
206R	206R	1	8041 T	13	
207R	207R	1	8041 N	0.9	U
208R	208R	1	8078 H	744	
209R	209R	1	8041 O	0.6	U

Data Qualifiers:

U: Total sulfides were not reported above the associated value, which is the sample quantitation limit

Table 2. Total Sulfides - Sample Holding Times

Station ID	Sample ID	Rep/QC	Lab ID	Date Collected	Date Lab Received	Date Analyzed	Holding Time (Days)
1	1	1	8041 P	4/10/91	4/11/91	4/16/91	6
2R	2R	1	8041 Q	4/07/91	4/11/91	4/16/91	9
2R	2R	DUP	8041 Q Dup	4/07/91	4/11/91	4/17/91	10
3	3	1	8078 A	4/11/91	4/14/91	4/19/91	8
4	4	1	8041 A	4/07/91	4/08/91	4/12/91	5
5	5	1	8041 B	4/06/91	4/08/91	4/12/91	6
5	5	DUP	8041 B Dup	4/06/91	4/08/91	4/12/91	6
5	5	TRIPL	8041 B Tripl	4/06/91	4/08/91	4/12/91	6
5	5	MS	8041 B Spk	4/06/91	4/08/91	4/12/91	6
5	51	1	8041 F	4/06/91	4/08/91	4/15/91	9
5	52	2	8041 G	4/06/91	4/08/91	4/15/91	9
5	53	3	8041 H	4/06/91	4/08/91	4/15/91	9
8	8	1	8078 B	4/12/91	4/14/91	4/19/91	7
9R	9R	1	8078 C	4/12/91	4/14/91	4/19/91	7
10R	10R	1	8078 D	4/13/91	4/14/91	4/19/91	6
11R	11R	1	8078 E	4/13/91	4/14/91	4/19/91	6
12	12	1	8078 J	4/13/91	4/14/91	4/23/91	10
12	12	MS	8078 J Spk	4/13/91	4/15/91	4/23/91	10
13R	13R	1	8078 K	4/14/91	4/15/91	4/23/91	9
14	14	1	8078 L	4/14/91	4/15/91	4/23/91	9
15	15	1	8078 M	4/14/91	4/15/91	4/23/91	9
17	17	1	8078 N	4/14/91	4/15/91	4/23/91	9
18	18	1	8041 C	4/05/91	4/08/91	4/15/91	10
19	19	1	8041 D	4/05/91	4/08/91	4/15/91	10
20	20	1	8041 E	4/05/91	4/08/91	4/15/91	10
21	21	1	8015 A	4/02/91	4/02/91	4/09/91	7
22	22	1	8015 B	4/02/91	4/02/91	4/09/91	7
26	26	1	8078 O	4/13/91	4/15/91	4/24/91	11
26	26	MS	8078 O Spk	4/13/91	4/15/91	4/24/91	11
29	29	1	8015 C	4/01/91	4/02/91	4/09/91	8
30	30	1	7976 B	3/25/91	3/28/91	3/29/91	4
32	32	1	8015 D	4/01/91	4/02/91	4/09/91	8
32	57	1	8015 F	4/01/91	4/02/91	4/10/91	9
32	58	2	8015 G	4/01/91	4/02/91	4/11/91	10
32	59	3	8015 H	4/01/91	4/02/91	4/11/91	10
32	59	DUP	8015 H Dup	4/01/91	4/02/91	4/11/91	10
32	59	TRIPL	8015 H Tripl	4/01/91	4/02/91	4/11/91	10
32	59	MS	8015 H Spk	4/01/91	4/02/91	4/12/91	11
33	33	1	8015 E	4/01/91	4/02/91	4/10/91	9
34	34	1	7976 C	3/25/91	3/28/91	3/29/91	4
35	35	1	7976 D	3/26/91	3/28/91	3/29/91	3
35	72	1	7976 O	3/26/91	3/28/91	3/30/91	4
35	73	2	7976 P	3/26/91	3/28/91	3/30/91	4
35	74	3	7976 Q	3/26/91	3/28/91	4/01/91	6
35	74	DUP	7976 Q Dup	3/26/91	3/28/91	4/01/91	6
35	74	TRIPL	7976 Q Tripl	3/26/91	3/28/91	4/10/91	15
35	74	MS	7976 Q Spk	3/26/91	3/28/91	4/02/91	7

Table 2. (cont'd.) **Total Sulfides - Sample Holding Times**

Station ID	Sample ID	Rep/QC	Lab ID	Date Collected	Date Lab Received	Date Analyzed	Holding Time (Days)
38	38	1	7976 E	3/26/91	3/28/91	3/29/91	3
38	60	1	7976 J	3/26/91	3/28/91	3/29/91	3
38	61	2	7976 K	3/26/91	3/28/91	3/29/91	3
38	62	3	7976 L	3/26/91	3/28/91	3/30/91	4
39	39	1	7976 F	3/27/91	3/28/91	3/29/91	2
40	40	1	7976 G	3/27/91	3/28/91	3/29/91	2
41	41	1	7976 H	3/27/91	3/28/91	3/29/91	2
43	43	1	7976 I	3/27/91	3/28/91	3/29/91	2
44	44	1	7976 R	3/28/91	3/29/91	4/02/91	5
44	63	1	7976 Y	3/28/91	3/29/91	4/08/91	**11**
44	64	2	7976 W	3/28/91	3/29/91	4/03/91	6
44	65	3	7976 X	3/28/91	3/29/91	4/03/91	6
45	45	1	7976 S	3/28/91	3/29/91	4/03/91	6
47	47	1	7976 T	3/28/91	3/29/91	4/03/91	6
48	48	1	7976 U	3/29/91	3/29/91	4/03/91	5
49	49	1	7976 V	3/29/91	3/29/91	4/03/91	5
69	69	1	7976 N	3/25/91	3/28/91	3/30/91	5
70	70	1	7976 Z	3/28/91	3/29/91	4/08/91	**11**
70	70	DUP	7976 Z Dup	3/28/91	3/29/91	4/08/91	**11**
70	70	TRIPL	7976 Z Tripl	3/28/91	3/29/91	4/08/91	**11**
70	70	MS	7976 Z Spk	3/28/91	3/29/91	4/10/91	**13**
71	71	1	8041 I	4/05/91	4/08/91	4/16/91	**11**
201R	201R	1	8078 F	4/11/91	4/14/91	4/22/91	**11**
202R	202R	1	8078 G	4/11/91	4/14/91	4/22/91	**11**
203R	203R	1	8041 M	4/07/91	4/08/91	4/16/91	**9**
204R	204R	1	8041 R	4/08/91	4/11/91	4/17/91	**9**
205R	205R	1	8041 S	4/08/91	4/11/91	4/17/91	**9**
206R	206R	1	8041 T	4/08/91	4/11/91	4/17/91	**9**
207R	207R	1	8041 N	4/06/91	4/08/91	4/16/91	**10**
208R	208R	1	8078 H	4/13/91	4/14/91	4/22/91	**9**
208R	208R	DUP	8078 H Dup	4/13/91	4/14/91	4/22/91	**9**
208R	208R	TRIPL	8078 H Tripl	4/13/91	4/14/91	4/22/91	**9**
209R	209R	1	8041 O	4/05/91	4/08/91	4/16/91	**11**

Explanation

Holding time represents number of days from collection to analysis of sample
Holding times exceeding PSEP guidelines of seven days are in **bold**

Rep (Replicate Type):

1	Primary sample or duplicate split of primary sample (within same van Veen grab)
2	Second replicate from station (separate van Veen grab)
3	Third replicate from station (separate van Veen grab)

QC:

DUP	Laboratory duplicate sample
TRIPL	Laboratory triplicate sample
MS	Matrix spike sample

Table 3A. Total Sulfides - Triplicate Analyses

Station ID Sample ID	5 5	12 12	26 26	32 59	70 70	35 74	208R 208R
Triplicate Analysis (mg-S/kg, dry weight)							
Primary Result (reported)	2.4 U	-	-	1.0 U	1.7 U	21.2	744
Duplicate Result	2.4 U	-	-	1.0 U	1.8 U	19.6	728
Triplicate Result	2.4 U	-	-	1.0 U	1.7 U	25.8	707
CV (%)	-	-	-	-	-	14.5%	2.6%

Table 3B. Total Sulfides - Matrix Spike Analyses

Matrix Spike Analysis (mg S/kg, dry weight)							
Sample Result	2.4 U	1.1 U	0.7 U	1.0 U	1.7 U	21.2	-
Spike Result	314	278	258	144	318	439	-
Spike Level	382	375	276	167	407	436	-
%Recovery	82.2%	74.1%	93.5%	86.2%	77.7%	95.8%	-

Explanation: U: Sample Quantitation Limit
CV: Coefficient of Variation

Average Spike Level = 341 μg/kg, dry wt.

Table 4. **Field-Generated Quality Control Samples - Analytical Results and Summary Statistics.**

Sample ID	Rep	Total Sulfides (mg-S/kg, dry wt.)		Sample Duplicate Mean (a)	Sample Duplicate RPD	Station Replicates Mean (b)	Station Replicates CV
5	1	2.4	U	2.1 U	NC	1.9 U	NC
51	D	1.8	U				
52	2	1.8	U				
53	3	1.6	U				
32	1	0.7	U	0.8 U	NC	0.9 U	NC
57	D	0.8	U				
58	2	1.0	U				
59	3	1.0	U				
35	1	392		289	71.3%	217	71.8%
72	D	186					
73	2	270					
74	3	21.2					
38	1	33.7		33.0	4.2%	29.1	49.8%
60	D	32.3					
61	2	8.3					
62	3	42.0					
44	1	1.2		1.1 U	18.2%	0.9 U	NC
63	D	1.0	U				
64	2	0.6	U				
65	3	0.7	U				

Explanation
Primary field station numbers for each set of replicates are listed in **bold**.
Rep (Replicate Type):
- 1 Primary sample
- D Duplicate split of primary sample (separate aliquot from within same van Veen grab as primary sample)
- 2 Second replicate from station (separate van Veen grab)
- 3 Third replicate from station (separate van Veen grab)

RPD: Relative Percent Difference
CV: Coefficient of Variation (% Standard Deviation)
Mean (a): Average of primary sample and duplicate split
Mean (b): Average of primary sample, duplicate split, and both replicates (n=4)
U: Sample quantitation limit
NC: CV not calculated because of non-detects
RPD calculated only if one or both values are above quantitation limit

September 13, 1991

Data Validation Report
Total Organic Carbon Analyses

Site:	Puget Sound
Project:	1991 PSAMP MSMT
Sample Numbers:	1, 2R, 3-5, 8, 9R, 10R, 11R, 12, 13R, 14, 15, 17-22, 26, 29, 30, 32-35, 38-41, 43-45, 47-49, 51-53, 57-74, 201R-209R
Samples Collected by:	Ambient Monitoring Section Washington State Department of Ecology

The samples included in this report were analyzed by Analytical Resources, Inc., of Seattle, Washington, under subcontract to BCI of Vashon, Washington. Funding for this contract is provided by the Ambient Monitoring Section of the Washington State Department of Ecology.

This report is submitted to:	Ambient Monitoring Section Washington State Department of Ecology

Data Evaluated by:	Thomas D. Bowden TDB
Approved by:	Raleigh C. Farlow RF

BCI
Environmental & Medical Research
and Systems Development

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Data Validation Report - Total Organic Carbon Analyses

Site:	Puget Sound
Project:	1991 PSAMP MSMT
Laboratory:	Analytical Resources, Inc. (ARI)
Sample Numbers:	Samples 1, 2R, 3-5, 8, 9R, 10R, 11R, 12, 13R, 14, 15, 17-22, 26, 29, 30, 32-35, 38-41, 43-45, 47-49, 51-53, 57-74, 201R-209R
Matrix:	Sediment
Reviewer:	T. D. Bowden
Date:	September 13, 1991

1.0 Introduction

This report summarizes the validation of laboratory data for 66 marine sediment samples submitted to Analytical Resources, Inc. of Seattle, Washington for total organic carbon analyses. The samples were collected from 48 different stations throughout Puget Sound by the Washington State Department of Ecology (Ecology) Ambient Monitoring Section, as part of the 1991 Marine Sediment Monitoring Task (MSMT) of the Puget Sound Ambient Monitoring Program (PSAMP). The samples were analyzed according to guidelines found in "Puget Sound Estuary Program (PSEP) 1986. Recommended protocols for measuring conventional variables in Puget Sound. Prepared for U.S. Environmental Protection Agency, Region 10 by Tetra Tech, Inc. of Bellevue, WA". The laboratory deviated from the method by weighing the sample aliquot after purging inorganic carbon rather than before. Consequently, initial results reported by the laboratory did not include %TOC relative to total sample weight including inorganic carbon content. This reporting deviation is consistent with the reporting of TOC results in the 1989 and 1990 monitoring programs.

This report has been prepared in accordance with Ecology's *Puget Sound Ambient Monitoring Program: Marine Sediment Quality Implementation Plan* (Striplin, 1988), using guidelines found in the Washington Department of Ecology document entitled *Data Validation Guidance Manual for Selected Sediment Variables*, Draft version (PTI, 1989) and USEPA guidance *Laboratory Data Validation: Functional Guidelines for Evaluating Inorganics Analyses*, (USEPA, 1988).

Samples were collected using a 0.1 m^2 stainless steel Double van Veen sampler. Sediment for total organic carbon and extractable organic compound (BNA and Pesticides/PCBs) analyses was removed from the upper two centimeters of the sampler. The sediment constituting the sample is a homogenized composite consisting of at least five Double van Veen casts. Samples were held on ice until delivery to the laboratory. Chain-of-Custody documents show that proper chain-of-custody was maintained from the time of sample collection until delivery to and acceptance by the laboratory. The laboratory reported that all samples were received intact.

Forty-eight of the samples are primary samples from 48 different locations or stations in Puget Sound. Fifteen of the remaining samples are field-generated quality control samples collected at five selected stations to allow determination of monitoring variability. At each selected station, the field-generated QC samples include one split of the primary sample taken from the same van Veen grab composite (blind laboratory duplicate), and two station replicates taken from different van Veen grabs at the same station (blind field replicates). All field-generated QC samples were assigned surrogate station numbers, as summarized below, and were submitted blind to the laboratory:

Field Station and Primary Sample:	5	32	35	38	44
Duplicate Split:	51	57	72	60	63
Station Replicates:	52, 53	58, 59	73, 74	61, 62	64, 65

Samples 66, 67, and 68 are Project Comparison Samples (PCSs), consisting of organic compound fortified Sequim Bay sediment. This fortified sample material also was analyzed during the 1989 and 1990 PSAMP.

The laboratory used the following field samples for laboratory QC:

Matrix Spike Analysis	Triplicate Analyses
Station 5	Station 5
Station 13R	Station 13R
Station 32	Station 32
Station 35	Station 35
Station 44	Station 44
Station 61	Station 61

Laboratory deliverables were complete and documentation was sufficient to allow evaluation and validation of the associated results.

Analytical results with associated data qualifiers are presented in Table 1. Results are expressed as TOC, ppm (mg/kg) and percent, dry weight.

2.0 Discussion

2.1. Sample Holding Times/Preservation

The Project Implementation Plan (Striplin, 1988) specifies a maximum holding time of six months prior to TOC analyses, consistent with PSEP guidelines. Samples were held on ice during transport, and maintained in the laboratory at -20° C. until preparation and analysis, per the Implementation Plan. All samples were analyzed within 43 days of collection, and therefore no data required qualification. Sample holding times were determined by comparing sampling dates on the Chain-of-Custody documents with dates of analyses reported in the laboratory data package. Sample holding times are summarized in Table 2.

2.2. Standardization and Calibration

Instrumental calibration data demonstrating the linearity of the calibration curve were not part of the laboratory deliverables, and therefore instrumental linearity could not be verified. Initial calibration and continuing calibration checks were performed at an appropriate frequency using a check standard solution at a concentration of 2,000 mg/L. Results of check standard analyses are presented on the laboratory reporting form as the average recovery for all check standards analyzed during an analytical run. All check standard results have been blank-corrected using an average of all initial and continuing calibration blank results (see Section 2.3). Average recoveries for calibration checks ranged between 89.0% and 113% for the eight analytical runs. PSEP guidelines do not specify acceptance criteria for check standard performance. Comparing check standard average recoveries to acceptance limits specified by USEPA CLP for metals (90-110%) shows that only two check standards marginally exceeded the CLP acceptance limits. Coefficients of variation (CVs) for check standards were evaluated and found to be acceptable. Standards performance is determined to be acceptable for all analytical runs, and no associated results have been qualified.

Results for calibration checks are presented below:

Date of Analysis	Average Recovery (%)	CV (%)	Number Analyzed
4/24/91	94.8	4.8	10
4/26/91	94.9	1.4	7
4/30/91	91.5	11.8	10
5/01/91	93.0	3.3	7
5/07/91	89.0	4.5	8
5/08/91	112.7	10.4	9
5/10/91	100.9	5.9	6
5/13/91	101.0	5.5	7

Transcription of data from laboratory bench sheets to reporting forms was verified for all check standards. Transcription errors were corrected on the reporting form. All average recoveries were verified by recalculation from laboratory raw data.

2.3. Method Blanks

Silica gel method blanks were analyzed at an appropriate frequency during each analytical run. The laboratory procedure included subtracting the average for all method blanks analyzed during an instrumental run from all results as a blank correction. CVs for blank results were evaluated and found to be acceptable. The Method Quantitation Limit for TOC was established as the average blank concentration for each run. Method blank performance is determined to be acceptable for all analytical runs and no associated results required qualification.

Results for method blanks are:

Data of Analysis	Average Value (ppm TOC)	CV	Number Analyzed
4/24/91	263	21.3	10
4/26/91	220	35.5	7
4/30/91	259	35.5	10
5/01/91	232	13.4	7
5/07/91	261	20.3	8
5/08/91	220	28.3	6
5/10/91	225	13.3	5
5/13/91	250	26.0	7

Transcription of data from laboratory bench sheets to reporting forms was verified for all method blank results. Transcription errors were corrected on the reporting form. All method blank averages were verified by recalculation from laboratory raw data.

2.4. Triplicate Sample Analysis

Triplicate sample analyses were performed on six samples out of a total of 63 samples, which satisfied the frequency requirement of 5% recommended in the PSEP guidelines. Sample results and a statistical summary of triplicate analyses are presented in Table 3A.

Variability among results for triplicate analyses is considered low, with CVs ranging from 2.0% to 13.3%. Triplicate analyses are considered acceptable for all samples and no associated results required qualification.

Quantitation was confirmed for all triplicate analyses by recalculation from laboratory raw data. Transcription to the laboratory reporting form was confirmed for all results. Transcription errors were corrected on the reporting form. CVs were confirmed by recalculation.

2.5. Matrix Spike Analysis

Matrix spike (MS) analysis was performed on six of the 66 samples. Sample results and recoveries for matrix spike analyses are presented in Table 3B. Samples were spiked with 10 µl of a stock 2000 mg/L standard (equivalent to 20 ng).

PSEP guidelines do not recommend matrix spike recoveries and frequencies of analysis. A comparison to USEPA CLP matrix spike acceptance criteria for metals suggests that matrix spike samples were analyzed at an appropriate frequency (≥5%), and that only one of the matrix spike recoveries (Sample 35, %R=126.5%) is marginally outside the CLP acceptance limits (75-125%). All matrix spike recoveries therefore are considered acceptable, and no associated results required qualification.

Quantitation was confirmed for all matrix spike analyses by recalculation from raw data. Transcription to the laboratory reporting form was confirmed for all results. Transcription errors were corrected on the reporting form. Recoveries were confirmed by recalculation. All matrix spike samples with the exception of Sample 13R also were analyzed in triplicate. In calculating matrix spike recoveries, the laboratory has used the mean for the triplicate analyses as the reported sample result.

2.6. Sample Result Verification

A deviation in the laboratory preparation procedure for TOC analysis was discovered by inquiry. The laboratory did not follow PSEP guidelines and standard TOC analytical protocol during sample preparation. The samples were purged of inorganic carbon with 10% HCl and then dried at 70°C. before the sample aliquot was weighed for analysis. This procedure results in a dry weight concentration for TOC that does not reflect inorganic carbon content. If the sample contained significant carbonate content, reported results for TOC may be biased high. However, in order to significantly affect results, the content of inorganic carbon (carbonate) would have to constitute a major portion of the total sample weight. Carbonate in the form of shell fragments was not determined to be a significant fraction of any samples inspected visually by laboratory personnel. This procedure is consistent with that used during the 1989 and 1990 programs.

Analytical results for total organic carbon presented in Table 1 do not account for any inorganic carbon contained in the sample. Overall, this deviation from PSEP guidelines is not expected to have a significant effect on the data, since TOC results are generally low (≤3.3%) and inorganic content would have to very high to significantly affect the results. No data were qualified due to this inconsistency with the analytical protocol.

All raw data submitted with the data package are legible and complete. All results for field and QC samples were checked for quantitation and transcription errors. Quantitation was confirmed by recalculation from the laboratory raw data. No significant errors in quantitation were detected. Several transcription errors were noted on reporting forms, and have been corrected.

Percent Total Solids data were included with the laboratory deliverables. Approximately 20% of the total solids results were confirmed by recalculation from the laboratory raw data. All %Total Solids results on reporting forms were checked for transcription errors. No calculation errors were found; several transcription errors were detected and corrected.

2.7. Other Performance Data

Field-Generated QC Samples: Two types of field-generated QC samples were collected from five separate stations. Station duplicate splits were generated by taking two separate aliquots from a composite of at least five Double van Veen casts. One aliquot was assigned to the primary station number, and the second aliquot was assigned a surrogate station number. Two additional, separate station replicates were generated by collecting one sample from each of two separate Double van Veen casts while on station. Station replicates were assigned separate surrogate station numbers.

Analytical results and summary statistics for all replicates are presented in Table 4. The mean value and RPD were first calculated for the station duplicate splits. The CV and mean results for the four samples were calculated using the mean of the duplicate splits as the first of three replicates (n=3). RPDs between primary samples and duplicate splits ranged from 5.6% to 49.8%, the highest value being associated with Station 32. This station showed similar high variability in 1989 (48.0%). CVs range from 1.3% to 17.9%, the highest variability again associated with Station 32. In general, the results show more variability within grabs than between grabs at a station.

Project Comparison Samples (PCS): Homogenized archived sediment from Sequim Bay was submitted for analysis as Samples 66, 67, and 68. This material was acquired from the Office of Coastal Waters, USEPA Region X, and consists of a composited marine sediment that had been prepared as a fortified sample by the NOAA National Marine Fisheries Laboratory, under contract to EPA Region X. Analytical results and summary statistics for these samples are:

Sample ID	1991 TOC (%, dry wt.)
66	0.78
67	0.77
68	0.83
Mean	0.79
CV	4.7%

This material was also analyzed for the 1989 and 1990 programs:

Sample ID	1989 TOC (%, dry wt.)	1990 TOC (%, dry wt.)	Three Year Mean	Three Year CV
66	0.88	0.89	**0.83**	**9.6%**
67	0.92	0.74		
68	0.72	0.93		
Mean	0.84	0.85		
CV	12.6	11.2		

Results from the 1991 program show lower variability than those from the previous two years.

2.8. Overall Case Assessment

Based on an evaluation of data provided in the laboratory data package, the data quality objectives outlined in Ecology's *Marine Sediment Quality Implementation Plan* were met. Deviations from PSEP guidelines discussed in Section 2.6 do not appear to have a significant effect on the data. Total organic carbon results for these samples are acceptable and may be used for the intended purposes of the project.

3.0 Summary of Qualified Data

No sample results associated with this data package required qualification because of QC deficiencies.

Table 1. Total Organic Carbon Analyses (TOC) - Qualified Results

Sample ID	%TS	TOC (ppm)[a] (dry weight)	Percent TOC	Sample ID	%TS	TOC (ppm)[a] (dry weight)	Percent TOC
1	42.75	16,687	1.7	47	76.55	2,602	0.3
2R	57.50	8,444	0.8	48	31.29	22,914	2.3
3	47.92	13,208	1.3	49	33.80	32,923	3.3
4	32.09	20,333	2.0	51	33.69	18,180	1.8
5	70.68	20,990	2.1	52	33.94	17,352	1.7
8	49.78	29,456	2.9	53	38.20	17,905	1.8
9R	81.17	662	0.1	57	74.07	2,228	0.2
10R	62.44	5,617	0.6	58	74.78	1,316	0.1
11R	43.93	12,215	1.2	59	80.24	1,334	0.1
12	42.80	15,298	1.5	60	32.44	22,073	2.2
13R	76.63	1,700	0.2	61	34.73	21,773	2.2
14	55.44	6,765	0.7	62	31.10	21,403	2.1
15	73.88	2,028	0.2	63	72.71	4,614	0.5
17	34.89	18,675	1.9	64	62.26	5,472	0.5
18	58.82	5,927	0.6	65	72.92	4,501	0.5
19	29.03	17,677	1.8	66	69.38	7,753	0.8
20	55.97	10,091	1.0	67	59.80	7,664	0.8
21	54.72	12,794	1.3	68	59.07	8,349	0.8
22	71.87	2,367	0.2	69	73.25	6,185	0.6
26	57.54	7,506	0.8	70	39.59	31,561	3.2
29	37.49	14,025	1.4	71	54.66	12,414	1.2
30	70.96	6,953	0.7	72	38.05	24,085	2.4
32	74.08	1,339	0.1	73	37.37	24,792	2.5
33	33.33	9,077	0.9	74	39.05	23,949	2.4
34	37.81	23,295	2.3	201R	66.36	5,675	0.6
35	38.03	25,479	2.5	202R	64.25	4,709	0.5
38	30.62	20,385	2.0	203R	43.00	17,041	1.7
39	81.70	837	0.1	204R	30.69	24,308	2.4
40	69.59	9,387	0.9	205R	54.03	10,767	1.1
41	65.92	9,669	1.0	206R	62.24	8,195	0.8
43	81.38	1,212	0.1	207R	44.54	14,613	1.5
44	75.08	5,807	0.6	208R	21.84	27,905	2.8
45	54.07	11,277	1.1	209R	71.68	4,553	0.5

a: Results reported in ppm, dry weight remaining following carbonate and water removal; inorganic carbon (carbonate) removed with HCl before sample weighed for analysis.

Table 2. Total Organic Carbon (TOC) - Sample Holding Times

Station ID	Sample ID	Rep/QC	Lab ID	Date Collected	Date Analyzed	Holding Time (Days)
1	1	1	8041 P	4/10/91	5/8/91	28
2R	2R	1	8041 Q	4/7/91	5/8/91	31
3	3	1	8078 A	4/11/91	5/10/91	29
4	4	1	8041 A	4/7/91	4/25/91	18
5	5	1	8041 B	4/6/91	4/25/91	19
5	5	DUP	8041 B Dup	4/6/91	4/25/91	19
5	5	TRIPL	8041 B Tripl	4/6/91	4/26/91	20
5	5	MS	8041 B Spk	4/6/91	4/26/91	20
5	51	1	8041 F	4/6/91	5/8/91	32
5	52	2	8041 G	4/6/91	5/8/91	32
5	53	3	8041 H	4/6/91	5/8/91	32
8	8	1	8078 B	4/12/91	5/1/91	19
9R	9R	1	8078 C	4/12/91	5/1/91	19
10R	10R	1	8078 D	4/13/91	5/10/91	27
11R	11R	1	8078 E	4/13/91	5/10/91	27
12	12	1	8078 J	4/13/91	5/10/91	27
13R	13R	1	8078 K	4/14/91	5/13/91	29
13R	13R	DUP	8078 K Dup	4/14/91	5/13/91	29
13R	13R	TRIPL	8078 K Tripl	4/14/91	5/13/91	29
13R	13R	MS	8078 K Spk	4/14/91	5/13/91	29
14	14	1	8078 L	4/14/91	5/1/91	17
15	15	1	8078 M	4/14/91	5/1/91	17
17	17	1	8078 N	4/14/91	5/13/91	29
18	18	1	8041 C	4/5/91	4/26/91	21
19	19	1	8041 D	4/5/91	4/30/91	25
20	20	1	8041 E	4/5/91	4/30/91	25
21	21	1	8015 A	4/2/91	5/7/91	35
22	22	1	8015 B	4/2/91	4/26/91	24
26	26	1	8078 O	4/13/91	5/10/91	27
29	29	1	8015 C	4/1/91	5/7/91	36
30	30	1	7976 B	3/25/91	4/24/91	30
32	32	1	8015 D	4/1/91	4/26/91	25
32	32	DUP	8015 D Dup	4/1/91	4/26/91	25
32	32	TRIPL	8015 D Tripl	4/1/91	4/26/91	25
32	32	MS	8015 D Spk	4/1/91	4/26/91	25
32	57	1	8015 F	4/1/91	5/7/91	36
32	58	2	8015 G	4/1/91	4/30/91	29
32	59	3	8015 E	4/1/91	4/30/91	29
33	33	1	8015 H	4/1/91	4/30/91	29
34	34	1	7976 C	3/25/91	5/7/91	43
35	35	1	7976 D	3/26/91	5/7/91	42
35	35	DUP	7976 D Dup	3/26/91	5/7/91	42
35	35	TRIPL	7976 D Tripl	3/26/91	5/7/91	42
35	35	MS	7976 D Spk	3/26/91	5/7/91	42
35	72	1	7976 O	3/26/91	5/7/91	42
35	73	2	7976 P	3/26/91	5/7/91	42
35	74	3	7976 Q	3/26/91	5/7/91	42
38	38	1	7976 E	3/26/91	5/7/91	42

Table 2. (cont'd.) **Total Organic Carbon (TOC) - Sample Holding Times**

Station ID	Sample ID	Rep/QC	Lab ID	Date Collected	Date Analyzed	Holding Time (Days)
38	60	1	7976 J	3/26/91	4/25/91	30
38	61	2	7976 K	3/26/91	4/25/91	30
38	61	DUP	7976 K Dup	3/26/91	4/25/91	30
38	61	TRIPL	7976 K Trpl	3/26/91	4/25/91	30
38	61	MS	7976 K Spk	3/26/91	4/25/91	30
38	62	3	7976 L	3/26/91	4/25/91	30
39	39	1	7976 F	3/27/91	4/24/91	28
40	40	1	7976 G	3/27/91	4/30/91	34
41	41	1	7976 H	3/27/91	4/30/91	34
43	43	1	7976 I	3/27/91	4/24/91	28
44	44	1	7976 R	3/28/91	4/24/91	27
44	44	DUP	7976 R Dup	3/28/91	4/24/91	27
44	44	TRIPL	7976 R Trpl	3/28/91	4/25/91	28
44	44	MS	7976 R Spk	3/28/91	4/24/91	27
44	63	1	7976 Y	3/28/91	4/25/91	28
44	64	2	7976 W	3/28/91	4/25/91	28
44	65	3	7976 X	3/28/91	4/30/91	33
45	45	1	7976 S	3/28/91	4/25/91	28
47	47	1	7976 T	3/28/91	5/7/91	40
48	48	1	7976 U	3/29/91	4/30/91	32
49	49	1	7976 V	3/29/91	4/25/91	27
66	66	PCS	7976M	3/27/91	4/24/91	28
67	67	PCS	8015L	4/2/91	4/30/91	28
68	68	PCS	8078P	4/11/91	5/1/91	20
69	69	1	7976 N	3/25/91	4/30/91	36
70	70	1	7976 Z	3/28/91	4/30/91	33
71	71	1	8041 I	4/5/91	4/30/91	25
201R	201R	1	8078 F	4/11/91	5/1/91	20
202R	202R	1	8078 G	4/11/91	5/10/91	29
203R	203R	1	8041 M	4/7/91	4/30/91	23
204R	204R	1	8041 R	4/8/91	4/30/91	22
205R	205R	1	8041 S	4/8/91	5/8/91	30
206R	206R	1	8041 T	4/8/91	5/8/91	30
207R	207R	1	8041 N	4/6/91	5/8/91	32
208R	208R	1	8078 H	4/13/91	5/13/91	30
209R	209R	1	8041 O	4/5/91	4/30/91	25

Explanation

Holding time represents number of days from collection to analysis of sample.
Rep (Replicate Type):

	1	Primary sample
	D	Duplicate split of primary sample
	2	Second replicate from station (separate van Veen grab)
	3	Third replicate from station (separate van Veen grab)
QC:	DUP	Laboratory duplicate sample
	TRIP	Laboratory triplicate sample
	MS	Matrix spike sample
	PCS	Project comparison sample

Table 3A. Total Organic Carbon (TOC) - Triplicate Analyses

Station ID Sample ID	5 5	13R 13R	32 32	35 35	38 61	44 44
Triplicate Analysis (PPM TOC)						
Primary Result [a]	20,900	1700	1339	25,479	21,773	5807
Duplicate Result	19,407	1766	1274	25,055	22,553	6065
Triplicate Result	20,524	1367	1357	24,342	21,837	7018
CV (%)	4.0%	13.3%	3.3%	2.3%	2.0%	10.1%

Table 3B. Total Organic Carbon (TOC) - Matrix Spike Analyses

Matrix Spike Analysis (PPM TOC)						
Sample Result [b]	20,307	1611	1323	24,949	22,054	6297
Spike Result	30,387	10,419	8280	37,492	31,727	10,739
Spike Level	9262	8493	6972	9916	9394	4281
%Recovery	108.8%	103.7%	99.8%	126.5%	103.0%	103.8%

Explanation:

a: All analytical results reported in this table are reported normalized to dry weight remaining following removal of carbonate and water (see Section 2.6).
b: Sample result used is the average of the triplicate analyses.
CV: Coefficient of Variation

Table 4. **Total Organic Carbon (TOC) - Field-Generated Quality Control Samples Analytical Results and Summary Statistics.**

Sample ID	Rep	Total Organic Carbon (ppm dry wt.)	Sample Duplicate		Station Replicates	
			Mean [a]	RPD	Mean [b]	CV
5	1	20,990	19,585	14.3	18,281	6.4
51	D	18,180				
52	2	17,352				
53	3	17,905				
32	1	1,339	1,784	-49.8	1,478	17.9
57	D	2,228				
58	2	1,316				
59	3	1,334				
35	1	25,479	24,782	5.6	24,508	2.0
72	D	24,085				
73	2	24,792				
74	3	23,949				
38	1	20,385	21,229	-8.0	21,468	1.3
60	D	22,073				
61	2	21,773				
62	3	21,403				
44	1	5,807	5,211	22.9	5,061	9.9
63	D	4,614				
64	2	5,472				
65	3	4,501				

Explanation

Primary field station numbers for each set of replicates are listed in **bold**

Rep (Replicate Type):

- 1 Primary sample
- D Duplicate split of primary sample (separate aliquot from composite)
- 2 Second replicate from station (separate van Veen grab)
- 3 Third replicate from station (separate van Veen grab)

a: Average of primary sample and duplicate split

b: Average of duplicate mean and both replicates (n=3)

RPD: Relative Percent Difference

CV: Coefficient of Variation (% Standard Deviation)

September 13, 1991

Data Validation Report
Volatile Organics Analyses

Site:	Puget Sound
Project :	1991 PSAMP MSMT
Sample Numbers:	3, 8, 11R, 12, 17, 26, 29, 34, 35, 38, 45, 48, 60, 61, 62, 66, 68, 75, 76, 77, 201R, 202R, 204R
Samples Collected by:	Ambient Monitoring Section Washington State Department of Ecology

The samples included in this report were analyzed by Analytical Resources, Inc., of Seattle, Washington, under subcontract to BCI of Vashon, Washington. Funding for this contract is provided by the Ambient Monitoring Section of the Washington State Department of Ecology.

This report is submitted to:	Ambient Monitoring Section Washington State Department of Ecology

Data Evaluated by:	Thomas D. Bowden TDB
Approved by:	Raleigh C. Farlow RCF

BCI
Environmental & Medical Research
and Systems Development

13908 SW Caster Road, Vashon, WA 98070 (206) 463-6223

Site:	Puget Sound
Project:	1991 PSAMP MSMT
Laboratory:	Analytical Resources, Inc. (ARI)
Sample Numbers:	Samples 3, 8, 11R, 12, 17, 26, 29, 34, 35, 38, 45, 48, 60, 61, 62, 66, 68, 75, 76, 77, 201R, 202R, 204R
Matrix:	Sediment
Reviewer:	T. D. Bowden
Date:	September 13, 1991

1.0 Introduction

This report summarizes the validation of laboratory data for 23 marine sediment samples submitted to Analytical Resources, Inc. of Seattle, Washington for volatile organics analyses. Twenty-one of the samples were collected from 15 different stations throughout Puget Sound by the Washington State Department of Ecology (Ecology) Ambient Monitoring Section, as part of the 1991 Marine Sediment Monitoring Task (MSMT) of the Puget Sound Ambient Monitoring Program (PSAMP). The samples were analyzed employing a protocol modified after USEPA CLP SOW 2/88, in order to decrease Method Quantitation Levels and to improve precision at low levels. These modifications included larger sample sizes (approximately 60 gm, wet weight) and certain instrumental modifications to allow increased sensitivities. A total of seven Internal Standards were employed for quantitation compared to the three Internal Standards required by the CLP SOW. Additional compounds added to the USEPA Target Compound List (TCL) include 1,1,2-Trichloro-1,2,2-trifluoroethane and Trichlorofluoromethane.

This report has been prepared in accordance with USEPA guidance *Laboratory Data Validation: Functional Guidelines for Evaluating Organics Analyses* (USEPA, 1988). Data validation criteria applied for these analyses are found in the USEPA *Functional Guidelines*, and in Ecology's *Puget Sound Ambient Monitoring Program: Marine Sediment Quality Implementation Plan* (Striplin, 1988).

Samples were collected using a 0.1 m^2 stainless steel van Veen sampler. Sediment for volatile organics analyses was removed from the upper two centimeters of a single grab. The sediment constituting the sample was not composited or homogenized. Samples were held on ice until delivery to the laboratory. Chain-of-Custody documents show that proper chain-of-custody was maintained from the time of sample collection until delivery to and acceptance by the laboratory. The laboratory reported that all samples were received intact. Samples were held at 4° C. at the laboratory until analysis.

Fifteen of the samples are primary samples from 15 different locations or stations in Puget Sound. Six of the remaining samples are field-generated quality control samples collected at two selected stations to allow evaluation of monitoring variability. At each selected station, the field-generated QC samples include one split of the primary sample taken from the same van Veen grab (blind laboratory duplicate), and two station replicates taken from different van Veen grabs at the same station (blind field replicates). All field-generated QC samples were assigned surrogate station numbers and were submitted blind to the laboratory. The surrogate station numbers correspond to the Sample ID as reported in Tables 1 and 2. Sample IDs for field-generated QC samples are summarized below:

Field Station and Primary Sample:	38	29
Duplicate Split:	60	75
Station Replicates:	61, 62	76, 77

Samples 66 and 68 are Project Comparison Samples (PCS) consisting of organic compound fortified Sequim Bay sediment. This fortified sample material also was analyzed during the 1989 PSAMP.

The laboratory performed Matrix Spike/Matrix Spike Duplicate analyses on Samples 25 and 61, and Matrix Spike analysis on Sample 29.

Laboratory deliverables were complete and documentation was sufficient to allow evaluation and validation of the associated results.

Analytical results with associated data qualifiers are presented in Table 1. Results are expressed in µg/kg, dry weight.

2.0 Discussion

2.1. Sample Holding Times/Preservation

USEPA CLP technical requirements for maximum sample holding time prior to volatile organics analysis have been established only for water matrices (7 days from time of collection to time of analysis). Ecology's Project Implementation Plan specifies a maximum sample holding time of 14 days for volatile organics analyses in sediments, which was applied here.

Samples were held on ice in the field and during transport, and maintained in the laboratory at 4° C until analysis. No preservative was added to the samples. All analyses for volatile organics were performed within 14 days after sample collection (Table 2). Therefore, no results required qualification for exceedance of recommended holding time limits.

Sample holding times were determined by comparing sampling dates on the Chain-of-Custody documents with dates of analyses reported in the data package.

2.2. GC/MS Tuning

The GC/MS tune performance was checked with Bromofluorobenzene (BFB) prior to all initial calibration runs and all subsequent sample analytical runs. All sample analyses were performed within 12 hours of BFB analyses. All ion abundances and relative ion abundances meet CLP acceptance criteria. Mass spectral plots and associated mass listings supplied with the raw data were compared, and transcription of mass data to the GC/MS Tuning and Mass Calibration summary form (Form V) were checked. No inconsistencies or transcription errors were found.

2.3. Initial Calibration

Initial multipoint calibration was established at concentrations of 0.10, 0.25, 0.50, 0.75, 1.0, 2.0, and 5.0 µg/L (ppb)(4/01/91), and 0.10, 0.25, 0.50, 1.0, 2.0, and 5.0 µg/L (4/11/91; 4/22/91) for all target analytes and surrogate compounds. Calibration concentrations are lower than required by the CLP (20, 50, 100, 150, and 100 µg/L).

The USEPA CLP *Functional Guidelines* specify that all Average Relative Response Factors (Average RRFs) must be ≥0.05, and that all Coefficients of Variation (CVs) must be ≤30% for TCL compounds. Compounds not meeting these criteria are listed below:

Initial Calibration Date	Compound	Average RRF	CV
4/01/91	Acetone		58.0
"	2-Butanone	0.037	
"			
4/11/91	2-Butanone	0.022	
"	Methylene chloride		33.0
"			
4/22/91	2-Butanone	0.042	

All analytical samples quantitated relative to each initial calibration date have positive hits for those compounds not meeting acceptance criteria on that date. These positive hits have been qualified "E" (estimated) in accordance with the CLP *Functional Guidelines* and the project Implementation Plan. A summary of qualified data is presented in Section 3.0.

All RRFs were confirmed by recalculation from raw data for all detected compounds, one surrogate compound, Chloromethane, Vinyl chloride, and Trichloroethene. The Average RRFs and CVs were confirmed by recalculation for the same compounds. Several minor calculation or transcription errors were found, most of which were insignificant. Two errors requiring correction were found, and the corrected values have been reported.

Samples with detected TCL compounds were quantitated relative to the initial calibration runs as summarized below:

Date	Sample ID
4/01/91	34, 34 RE*, 35, 35 RE, 38, 45, 48, 60, 61, 62, 66, 75, 76, 77
4/11/91	29, 204R, 204R RE
4/22/91	3, 8, 11R, 12, 17, 26, 68, 68 RE, 201R, 202R

* RE indicates a reanalysis of the sample.

2.4. Continuing Calibration

Continuing calibration was established for six separate analytical runs for all target analytes and surrogate compounds. Instrumentation runs were calibrated and checked at a concentration of 0.5 µg/L, compared to the CLP requirement of 50 µg/L.

The USEPA CLP *Functional Guidelines* specify that all continuing calibration RRFs must be ≥0.05 and that all Percent Differences (%Ds) between the Average RRF and the continuing calibration RRF must be ≤25% for all TCL compounds. Target analytes and surrogate compounds not meeting these criteria are listed below:

Initial Calibration Date	Continuing Calibration Date	Compound	RRF	%D	Samples with Positive Hits
4/01/91	4/02/91	Acetone		-29.0	All Samples*
"	"	2-Butanone	0.026	29.7	"
"	"	4-Methyl-2-pentanone		25.2	34, 34RE, 35, 35RE
"	"	2-Hexanone		35.0	None
"	4/03/91	Methylene chloride		-50.9	All Samples
"	"	Acetone		-53.5	"
"	"	2-Butanone	0.043		"
"	4/04/91	Acetone		-83.9	All Samples
"	"	2-Butanone	0.035		"
"	"	2-Hexanone		28.8	None
4/11/91	4/12/91	Vinyl chloride		-26.2	None
"	"	Acetone		-40.5	All Samples
"	"	Carbon tetrachloride		-27.0	None
"	"	2-Butanone	0.020		All Samples
4/22/91	4/23/91	Acetone		-41.1	All Samples
"	"	2-Butanone		-28.6	All Samples
"	4/24/91	Acetone		-37.4	All Samples
"	"	2-Butanone	0.045		All Samples
"	"	4-Methyl-2-pentanone		-26.3	68RE
"	"	2-Hexanone		28.0	68RE

* All Samples = compound found in all samples quantitated on the given date.

For the exceptions listed above, positive results for all associated samples that do not meet acceptance limits for %D or the RRF on the given date have been qualified "E" (estimated) in accordance with the CLP *Functional Guidelines* and the Project Implementation Plan. A summary of qualified data is presented in Section 3.0.

All RRFs were confirmed by recalculation from the raw data for all detected compounds and one surrogate compound, Chloromethane, Vinyl chloride, and Trichloroethene. The %Ds were confirmed by recalculation for the same compounds. No significant calculation or transcription errors were found.

Samples with associated TCL responses were quantitated relative to the continuing calibration dates and are summarized as follows:

Continuing Calibration Date	Sample ID
4/02/91	34, 34 RE, 35, 35 RE
4/03/92	38, 60, 61, 62, 66
4/04/91	45, 48, 75, 76, 77
4/12/91	29, 204R, 204 RE
4/23/91	3, 8, 11R, 12, 17, 201R, 202R
4/24/91	26, 68, 68 RE

2.5. Method and Trip Blank Analyses

Method blank analyses were performed at the required frequency (once per 12 hour time period per analytical group). Two method blanks were analyzed for the analytical group run on 4/23/91, one at the beginning and one at the end of the run. Results for compounds with positive hits in method blanks and trip blanks are summarized in Table 3. An evaluation of blank results has been performed in order to determine the significance of reported results that may be affected by the presence of target analytes in both method and trip blanks. Seven method blanks and 4 trip blanks have been used in this evaluation (see Table 3). Trip blanks consist of organic-free water carried to the field and back to the laboratory.

An upper 95%ile value has been calculated using the arithmetic mean for those compounds with reported results in 9 or more blanks (Methylene chloride, Acetone, Toluene, Total Xylenes). All reported results for these compounds in field samples have been evaluated relative to this 95%ile value, and if the reported result is less than that value, the result has been assigned the "U" qualifier. For compounds with reported results in less than 9 blanks, the highest blank value reported similarly has been used in assigning the "U" qualifier. The majority of reported blank results are below the method quantitation limit reported by the laboratory. A summary of qualified data is presented in Section 3.0.

2.6. Surrogate Recovery

The USEPA CLP-specified surrogate compounds were added to all samples including method blanks. Surrogate compounds were added at 50 ng to all samples (the CLP-specified level is 50 µg). The three surrogates added are d_8-Toluene, Bromofluorobenzene, and d_4-1,2-Dichloroethane. The surrogate spike level was 2.01 µg/kg, dry weight, based on the average dry weight for all field samples analyzed (24.9 gm). Complete surrogate compound results are presented in Table 4.

All surrogate recoveries (%R) are within the project-specified acceptance limits of ≥50% (Striplin, 1988). All data were verified by examination of Reconstructed Ion Chromatograms (RICs) and quantitation reports. All recoveries were confirmed by recalculation. No significant errors were found. Although the surrogate spike level for these analyses is a factor of 10^{-3} of the CLP-specified spike level, recoveries compare well to CLP acceptance criteria (Table 4).

2.7. Matrix Spike/Matrix Spike Duplicate Analysis

Matrix spike (MS)/matrix spike duplicate (MSD) analyses were performed on samples associated with Stations 29, 35, and 61. As specified in the Project Implementation Plan, MS/MSD samples were spiked with all of the CLP target compounds. Matrix spike compounds were added at 50 ng, as compared to the CLP-specified level of 50 μg. Equivalent dry weight concentrations for each sample are as follows:

Sample ID	Spike Level (μg/kg, dry weight)		
	MS	MSD[1]	MSR[2]
29	2.56	-	
35	3.07	3.18	2.99
61	3.07	3.03	

[1] MSD not analyzed for Sample 29 due to loss of sample on GC, and insufficient sample volume.
[2] Matrix spike reanalysis (MSD not reanalyzed)

Complete MS/MSD results are presented in Table 5.

The laboratory narrative indicates that the MS for Sample 35 was reanalyzed because surrogate recoveries were not within CLP acceptance limits. However, the deviations were not significant and surrogate recoveries were within project-specified acceptance limits. Matrix spike performance is slightly better for the first analysis of the sample, and those results have been reported in Table 5.

The Project Implementation Plan specifies control limits of %R≥50% for CLP-specified matrix spike compound recoveries and ±100% RPD (Relative Percent Difference) between the matrix spike and the matrix spike duplicate analyses. Although all TCL compounds have been spiked, the project Implementation Plan requires corrective action when the USEPA CLP-specified matrix spike compounds control limits are exceeded. CLP-specified matrix spike compounds are:

1,1-Dichloroethene
Trichloroethene
Chlorobenzene
Toluene
Benzene

Recoveries and RPDs for all CLP-specified matrix spike compounds are within the acceptance limits specified in the Project Implementation Plan. No sample results required qualification. Non-CLP compound recoveries are also reported in Table 5.

All %Rs and RPDs were confirmed by recalculation. Quantitation was verified for all MS/MSD compounds by recalculation from raw data. Transcription of sample results from Form I to Form III (MS/MSD Recovery) was verified for all compounds on all MS/MSD samples. Several minor errors were detected, and the laboratory subsequently submitted corrected reporting forms.

2.8. Internal Standards Performance

Four additional compounds to the three CLP-specified internal standards were employed as internal standards for this project, as summarized below:

CLP Internal Standards	Additional Internal Standards
Bromochloromethane (BCM)	d_3-Iodomethane (IM)
1,4-Difluorobenzene (DFB)	2,2,2-d_3-1,1-Dichloroethane (DCE)
d_5-Chlorobenzene (CBZ)	d_7-Iodopropane (IP)
	d_5-Bromobenzene (BB)

Internal standards were added to all samples at a concentration of 0.5 ng/mL (ppb), or an average of 2.01 µg/kg, dry weight, for all samples, as compared to the CLP-specified level of 50 ng/mL.

Retention Times (RT) for all internal standards in all samples are within acceptance limits (±30 seconds). Internal standard areas for all samples are within CLP-specified acceptance limits (0.5 to 2 times the 12-hour calibration standard area) with exception of the following samples:

Sample ID	Internal Standard	Internal Standard Area: 12-Hour Standard	Internal Standard Area: Sample	Sample Factor[1]
34	IM	142578	33181	0.23
"	DFB	198055	96016	0.48
"	IP	49244	17762	0.36
"	CBZ	164916	63594	0.39
"	BB	160906	54863	0.34
35	IM	142578	58370	0.41
35MSR[2]	BCM	31744	73888	2.3
204R	IM	128208	34089	0.27

1 Acceptance criteria within 0.5 to 2 times the 12-hour standard.
2 Matrix spike reanalysis.

All of the above samples were reanalyzed using lower sample weights, with the exception of 35 MSR. Internal standards for all reanalyses met acceptance criteria. Results reported in Table 1 for Sample 34 are from the reanalysis; five internal standards did not meet acceptance criteria for the first analysis. Results reported in Table 1 for Sample 35 and 204R include results associated with the internal standards from the first analysis that were within acceptance limits. Results from the reanalysis were used for those analytes and associated internal standards that were within acceptance criteria.

Since all results were reported with internal standards that met acceptance criteria, and the deviation for Sample 35 MSR is considered insignificant, no associated results required qualification.

Transcription accuracy from quantitation reports to the Internal Standard Area Summary form (Form VIII) was checked and verified for all 12-hour standards, and approximately 20% of the samples. Very few errors were found, none of which affected reported results.

2.9. TCL Compound Identification

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

2.10. Compound Quantitation and Reported Detection Limits

Quantitation calculations were verified by recalculation from raw data for all reported target analytes and surrogate compounds for each sample The appropriate internal standard, quantitation ion, and RRF were used in quantitating all compounds. Transcription of results from quantitation reports to Form I, and proper dry weight conversion were checked and verified for all reported compounds. Very few transcription errors were noted and corrected results are reported in Table 1. Average quantitation limits are given in Table 6. Results reported as positive hits by the laboratory, but below the laboratory Method Quantitation Limit, have been qualified "E" (estimated).

Analysis of Sample 66, a Project Comparison Sample, resulted in overloading of the GC because of the high levels of fortified analytes in the sample. This sample was not reanalyzed, and those analytes reported as above the limit of the calibration curve have been qualified as estimates ("E"). A second aliquot of the Project Comparison Sample (Sample 68) was initially analyzed at a much reduced sample weight (1.9 gm, dry weight) in order to avoid overloading analytical instrumentation. Sample 68 subsequently was reanalyzed at an increased sample weight (45.8 gm, dry weight). Results for this reanalysis that were not over the calibration curve have been reported in Table 1. Analytes that are over calibration are reported from the initial analysis of Sample 68. Acetone is the only reported analyte in the reduced weight analysis of this sample that is over calibration. Consequently, the Acetone result has been qualified as estimated ("E").

2.11. Tentatively Identified Compounds

Tentatively identified compounds are summarized in Table 7 for each sample, including method blanks and trip blanks, by number identified, average concentration, and maximum concentration.

2.12. System Performance

Examination of raw data indicated no 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 were observed.

2.13. Other Performance Data

Field-Generated Quality Control Samples: Two types of field-generated quality control samples were collected from five separate stations. Station duplicate splits were generated by collecting two separate aliquots from the same van Veen grab sample. One aliquot was assigned to the primary station number, and the second aliquot was assigned a surrogate station number. Two additional, separate station replicates were generated by collecting one sample from each of two additional van Veen grab samples while on station. Station replicates were assigned separate surrogate station numbers.

Analytical results and summary statistics for all duplicates and replicates are presented in Table 8. The mean value and Relative Percent Difference (RPD) were calculated for the station duplicate splits. The RPD was not calculated if both values were reported as non-detects. The station mean and the Coefficient of Variation (CV) were calculated for all station replicates. These statistics were calculated using all four samples (n=4), rather than using the mean of the station duplicates and the remaining two replicates (n=3), considering the station duplicate splits were not collected from a homogenized composite.

Project Comparison Samples (PCS): Homogenized archived sediment from Sequim Bay was submitted for analysis as Samples 66 and 68. This material was acquired from the Office of Coastal Waters, USEPA Region X, and consists of a composited marine sediment that had been prepared as a fortified sample by the NOAA National Marine Fisheries Laboratory, under contract to EPA Region X. No reference VOAs have been performed for these sediment samples. Analytical results and summary statistics for the samples are presented in Table 9. This material was also analyzed during the 1989 PSAMP. Comparison of results for 1989 and 1991 indicates high variability for compounds used as diluent solvents during sample fortification of extracted organic compounds. Diluent solvents showed high concentrations in the PCS that generally exceeded the instrument calibration range.

Chlorinated Butadienes: Table 10 summarizes quantitation for estimated concentrations of Trichlorobutadiene and Tetrachlorobutadiene. The internal standard used in quantitation was d_5-Bromobenzene. An estimated relative response factor was calculated based on the ratio of the response factor for Hexachlorobutadiene and 1,4-Dichlorobenzene (BNA analyses). The HCBD/DCB ratio was then multiplied by the VOA RRF for 1,4-Dichlorobenzene. The result is an estimated RRF for VOA chlorinated butadienes based on the response of HCBD during BNA calibration. BNA analytical runs show tentative identifications (nonspecific for isomers) for tri- and tetrachlorobutadienes, which are also indicated in Table 10.

2.14. Overall Case Assessment

The level of effort exhibited by the laboratory for this data package is considered high for a commercial contract facility. All data quality objectives outlined in Ecology's *Marine Sediment Quality Implementation Plan* were met. The quantitation levels achieved are significantly lower than CLP and some of the MSMT requirements. All deliverables required by the project are present. Data reporting forms in the data package requiring corrections due to minor transcription or calculation errors have been corrected. Clarification, where required, was obtained from the laboratory. Overall, the data is considered usable for the intended purposes.

3.0 Summary of Qualified Data

3.1. The following analytical results have been qualified "E" (estimated) because the Average Relative Response Factor (RRF) or the Coefficient of Variation (CV) for Average RRFs did not meet acceptance criteria, as discussed in Section 2.3:

Methylene chloride	Samples 29 and 204R
Acetone	Samples 34, 35, 38, 45, 48, 60, 61, 62, 66, 75, 76, 77
2-Butanone	All Samples

3.2. The following analytical results have been qualified "E" (estimated) because the continuing calibration RRF or the Percent Difference (%D) between the Average RRF and the associated continuing calibration RRF did not meet acceptance criteria, as discussed in Section 2.4:

Methylene Chloride	Samples 38, 60, 61, 62, 66
Acetone	All Samples
2-Butanone	All Samples
4-Methyl-2-pentanone	Samples 34, 35, 68
2-Hexanone	Sample 68

3.3. The following analytical results have been assigned the "U" qualifier in order to decrease the significance of the reported value based on an evaluation of positive hits in method and trip blanks, as discussed in Section 2.5:

Chloroform	Samples 3, 8, 12, 26, 29, 45, 75, 76, 77, 201R
Toluene	All samples except 66 and 68
Total Xylenes	Samples 17, 26, 45, 48, 60, 61, 62, 202R, 204R
1,4-Dichlorobenzene	Samples 12, 26, 29, 45, 48, 61, 62, 75, 76, 77, 201R, 202R
Trichlorofluoromethane	Samples 8, 12, 35, 38, 48, 60, 61, 62, 202R, 204R

3.4. The following analytical results have been qualified "E" (estimated) because the sample result exceeded the calibrated range of the instrument, as discussed in Section 2.10:

Acetone	Samples 66 and 68
Carbon disulfide	Sample 66
2-Butanone	Sample 66
Trichlorofluoromethane	Sample 66

3.5. The following analytical results were reported as positive hits by the laboratory, but are below the Method Quantitation Limit and have been qualified "E" (estimated), as discussed in Section 2.10:

Methylene chloride	Samples 8, 12, 17, 26
Benzene	Samples 3, 8, 26, 29, 68, 77
Tetrachloroethene	Samples 26, 29, 34, 38, 60, 62
Styrene	Samples 26 and 68
Total Xylenes	Samples 3, 11R, 29, 34, 35, 38, 75, 76, 77
1,4-Dichlorobenzene	Samples 3, 38, 60

Table 1. Volatile Organics Analyses (VOAs)- Qualified Results

CAS Number	Target Parameter (values in µg/kg, dry weight)	Station 3 Sample 3 8078A	Station 8 Sample 8 8078B	Station 11R Sample 11R 8078E	Station 12 Sample 12 8078J	Station 17 Sample 17 8078N	Station 26 Sample 26 8078O	Station 29 Sample 29 8015C	Station 29 Sample 75 8015I
74-87-3	Chloromethane	1.0 U	0.92 U	1.0 U	1.1 U	1.1 U	0.62 U	1.4 U	1.1 U
74-83-9	Bromomethane	1.0 U	0.92 U	1.0 U	1.1 U	1.1 U	0.62 U	1.4 U	1.1 U
75-01-4	Vinyl chloride	1.0 U	0.92 U	1.0 U	1.1 U	1.1 U	0.62 U	1.4 U	1.1 U
75-00-3	Chloroethane	1.0 U	0.92 U	1.0 U	1.1 U	1.1 U	0.62 U	1.4 U	1.1 U
75-09-2	Methylene chloride	**6.5**	**1.2 E**	**0.86**	**1.2 E**	**1.5 E**	**0.51 E**	**1.5 E**	**2.8**
67-64-1	Acetone	**9.3 E**	**8.6 E**	**20 E**	**9.2 E**	**8.0 E**	**6.0 E**	**16 E**	**7.4 E**
75-15-0	Carbon disulfide	**0.84**	**1.7**	**1.6**	**2.4**	**2.0**	**0.81**	**3.0**	**1.4**
75-35-4	1,1-Dichloroethene	0.41 U	0.37 U	0.39 U	0.44 U	0.46 U	0.25 U	0.56 U	0.45 U
75-34-3	1,1-Dichloroethane	0.41 U	0.37 U	0.39 U	0.44 U	0.46 U	0.25 U	0.56 U	0.45 U
156-60-5	trans-1,2-Dichloroethene	0.41 U	0.37 U	0.39 U	0.44 U	0.46 U	0.25 U	0.56 U	0.45 U
156-59-2	cis-1,2-Dichloroethene	0.41 U	0.37 U	0.39 U	0.44 U	0.46 U	0.25 U	0.56 U	0.45 U
67-66-3	Chloroform	0.12 U	0.10 U	0.39 U	0.06 U	0.46 U	0.07 U	0.13 U	0.06 U
107-06-2	1,2-Dichloroethane	0.41 U	0.37 U	0.39 U	0.44 U	0.46 U	0.25 U	0.56 U	0.45 U
78-93-3	2-Butanone	**3.7 E**	**1.8 E**	**6.7 E**	**3.0 E**	**2.2 E**	**2.7 E**	**5.5 E**	**4.1 E**
71-55-6	1,1,1-Trichloroethane	0.41 U	0.37 U	0.39 U	0.44 U	0.46 U	0.25 U	0.56 U	0.45 U
56-23-5	Carbon tetrachloride	0.41 U	0.37 U	0.39 U	0.44 U	0.46 U	0.25 U	0.56 U	0.45 U
108-05-4	Vinyl acetate	0.41 U	0.37 U	0.39 U	0.44 U	0.46 U	0.25 U	0.56 U	0.45 U
75-27-4	Bromodichloromethane	1.0 U	0.92 U	1.0 U	1.1 U	1.1 U	0.62 U	1.4 U	1.1 U
78-87-5	1,2-Dichloropropane	0.41 U	0.37 U	0.39 U	0.44 U	0.46 U	0.25 U	0.56 U	0.45 U
10061-02-6	trans-1,3-Dichloropropene	1.0 U	0.92 U	1.0 U	1.1 U	1.1 U	0.62 U	1.4 U	1.1 U
79-01-6	Trichloroethene	0.41 U	0.37 U	0.39 U	0.44 U	0.46 U	0.25 U	0.56 U	0.45 U

Table 1. (continued) Volatile Organics Analyses (VOAs)- Qualified Results

CAS Number	Target Parameter (values in µg/kg, dry weight)	Station 3 Sample 3 8078A	Station 8 Sample 8 8078B	Station 11R Sample 11R 8078E	Station 12 Sample 12 8078J	Station 17 Sample 17 8078N	Station 26 Sample 26 8078O	Station 29 Sample 29 8015C	Station 29 Sample 75 8015I
124-48-1	Dibromochloromethane	0.41 U	0.37 U	0.39 U	0.44 U	0.46 U	0.25 U	0.56 U	0.45 U
79-00-5	1,1,2-Trichloroethane	1.0 U	0.92 U	1.0 U	1.1 U	1.1 U	0.62 U	1.4 U	1.1 U
71-43-2	Benzene	**0.15 E**	**0.11 E**	**0.07 N**	**0.10 N**	**0.06 N**	**0.05 E**	**0.17 E**	**0.15 N**
10061-01-5	cis-1,3-Dichloropropene	1.0 U	0.92 U	1.0 U	1.1 U	1.1 U	0.62 U	1.4 U	1.1 U
110-75-8	2-Chloroethylvinylether	1.0 U	0.92 U	1.0 U	1.1 U	1.1 U	0.62 U	1.4 U	1.1 U
75-25-2	Bromoform	0.41 U	0.37 U	**0.07 N**	**0.08 N**	0.46 U	**0.03 N**	0.56 U	0.45 U
108-10-1	4-Methyl-2-pentanone	1.0 U	0.92 U	1.0 U	1.1 U	1.1 U	0.62 U	0.56 U	1.1 U
591-78-6	2-Hexanone	1.0 U	0.92 U	1.0 U	1.1 U	1.1 U	0.62 U	1.4 U	1.1 U
127-18-4	Tetrachloroethene	**0.10 N**	0.37 U	0.4 U	**0.08 N**	0.46 U	**0.04 E**	**0.09 E**	**0.05 N**
79-34-5	1,1,2,2-Tetrachloroethane	1.0 U	0.92 U	1.0 U	1.1 U	1.1 U	0.62 U	1.4 U	1.1 U
108-88-3	Toluene	0.62 U	0.36 U	1.3 U	0.26 U	0.14 U	0.66 U	0.35 U	0.45 U
108-90-7	Chlorobenzene	0.41 U	0.37 U	0.39 U	0.44 U	0.46 U	0.25 U	0.56 U	0.45 U
100-41-4	Ethylbenzene	**0.11 N**	**0.07 N**	0.39 U	0.44 U	0.46 U	**0.03 N**	0.56 U	0.45 U
100-42-5	Styrene	1.0 U	0.92 U	1.0 U	**0.05 N**	1.1 U	**0.04 E**	**0.13 N**	**0.09 N**
1330-20-7	Total Xylenes	**0.48 E**	**0.28 N**	**0.26 E**	**0.26 N**	0.09 U	0.14 U	**0.39 E**	**0.35 E**
541-73-1	1,3-Dichlorobenzene	0.41 U	0.37 U	0.39 U	0.44 U	0.46 U	0.25 U	0.56 U	0.45 U
106-46-7	1,4-Dichlorobenzene	**0.11 E**	0.37 U	0.39 U	0.07 U	0.46 U	0.05 U	0.11 U	0.08 U
95-50-1	1,2-Dichlorobenzene	0.41 U	0.37 U	0.39 U	0.44 U	0.46 U	0.25 U	0.56 U	0.45 U
75-69-4	Trichlorofluoromethane	0.41 U	0.17 U	0.39 U	0.19 U	0.46 U	0.25 U	**0.66 N**	0.45 U
	1,1,2-Cl-1,2,2-F-ethane	0.41 U	**0.22 N**	0.39 U	0.44 U	0.46 U	0.25 U	0.56 U	0.45 U

Table 1. (continued) Volatile Organics Analyses (VOAs)- Qualified Results

CAS Number	Target Parameter (values in µg/kg, dry weight)	Station 29 Sample 76 8015J	Station 29 Sample 77 8015K	Station 34 Sample 34 7976C	Station 35 Sample 35 7976D	Station 38 Sample 38 7976E	Station 38 Sample 60 7976J	Station 38 Sample 61 7976K	Station 38 Sample 62 7976L
74-87-3	Chloromethane	1.1 U	1.1 U	1.4 U	1.2 U	1.2 U	1.3 U	1.4 U	1.5 U
74-83-9	Bromomethane	1.1 U	1.1 U	1.4 U	1.2 U	1.2 U	1.3 U	1.4 U	1.5 U
75-01-4	Vinyl chloride	1.1 U	1.1 U	1.4 U	1.2 U	1.2 U	1.3 U	1.4 U	1.5 U
75-00-3	Chloroethane	1.1 U	1.1 U	1.4 U	1.2 U	1.2 U	1.3 U	1.4 U	1.5 U
75-09-2	Methylene chloride	**1.9**	**1.6**	**2.1**	**2.4**	**1.7 E**	**2.0 E**	**3.6 E**	**2.2 E**
67-64-1	Acetone	**5.9 E**	**11 E**	**21 E**	**18 E**	**20 E**	**17 E**	**10 E**	**9.0 E**
75-15-0	Carbon disulfide	**2.0**	**3.0**	**5.3**	**3.6**	**2.0**	**2.4**	**0.8**	**2.1**
75-35-4	1,1-Dichloroethene	0.42 U	0.43 U	0.56 U	0.47 U	0.50 U	0.53 U	0.56 U	0.59 U
75-34-3	1,1-Dichloroethane	0.42 U	0.43 U	0.56 U	0.47 U	0.50 U	0.53 U	0.56 U	0.59 U
156-60-5	trans-1,2-Dichloroethene	0.42 U	0.43 U	0.56 U	0.47 U	0.50 U	0.53 U	0.56 U	0.59 U
156-59-2	cis-1,2-Dichloroethene	0.42 U	0.43 U	0.56 U	0.47 U	0.50 U	0.53 U	0.56 U	0.59 U
67-66-3	Chloroform	0.09 U	0.10 U	0.56 U	0.47 U	0.50 U	0.53 U	0.56 U	0.59 U
107-06-2	1,2-Dichloroethane	0.42 U	0.43 U	0.56 U	0.47 U	0.50 U	0.53 U	0.56 U	0.59 U
78-93-3	2-Butanone	**3.6 E**	**4.7 E**	**12 E**	**9.7 E**	**6.9 E**	**5.5 E**	**3.8 E**	**3.5 E**
71-55-6	1,1,1-Trichloroethane	0.42 U	0.43 U	0.56 U	0.47 U	0.50 U	0.53 U	0.56 U	0.59 U
56-23-5	Carbon tetrachloride	0.42 U	0.43 U	0.56 U	0.47 U	0.50 U	0.53 U	0.56 U	0.59 U
108-05-4	Vinyl acetate	0.42 U	0.43 U	0.56 U	0.47 U	0.50 U	0.53 U	0.56 U	0.59 U
75-27-4	Bromodichloromethane	1.1 U	1.1 U	1.4 U	1.2 U	1.2 U	1.3 U	1.4 U	1.5 U
78-87-5	1,2-Dichloropropane	0.42 U	0.43 U	0.56 U	0.47 U	0.50 U	0.53 U	0.56 U	0.59 U
10061-02-6	trans-1,3-Dichloropropene	1.1 U	1.1 U	1.4 U	1.2 U	1.2 U	1.3 U	1.4 U	1.5 U
79-01-6	Trichloroethene	0.42 U	0.43 U	0.56 U	0.47 U	0.50 U	0.53 U	0.56 U	0.59 U

Table 1. (continued) Volatile Organics Analyses (VOAs)- Qualified Results

CAS Number	Target Parameter (values in µg/kg, dry weight)	Station 29 Sample 76 8015J	Station 29 Sample 77 8015K	Station 34 Sample 34 7976C	Station 35 Sample 35 7976D	Station 38 Sample 38 7976E	Station 38 Sample 60 7976J	Station 38 Sample 61 7976K	Station 38 Sample 62 7976L
124-48-1	Dibromochloromethane	0.42 U	0.43 U	0.56 U	0.47 U	0.50 U	0.53 U	0.56 U	0.59 U
79-00-5	1,1,2-Trichloroethane	1.1 U	1.1 U	1.4 U	1.2 U	1.2 U	1.3 U	1.4 U	1.5 U
71-43-2	Benzene	**0.11 N**	**0.17 E**	0.31 U	0.47 U	1.2 U	1.3 U	1.4 U	1.5 U
10061-01-5	cis-1,3-Dichloropropene	1.1 U	1.1 U	1.4 U	1.2 U	1.2 U	1.3 U	1.4 U	1.5 U
110-75-8	2-Chloroethylvinylether	1.1 U	1.1 U	1.4 U	1.2 U	1.2 U	1.3 U	1.4 U	1.5 U
75-25-2	Bromoform	0.42 U	0.43 U	0.56 U	0.47 U	0.50 U	0.53 U	0.56 U	0.59 U
108-10-1	4-Methyl-2-pentanone	1.1 U	1.1 U	**6.3 E**	**2.0 E**	1.2 U	1.3 U	1.4 U	1.5 U
591-78-6	2-Hexanone	1.1 U	1.1 U	1.4 U	1.2 U	1.2 U	1.3 U	1.4 U	1.5 U
127-18-4	Tetrachloroethene	**0.07 N**	**0.07 N**	**0.11 E**	0.47 U	**0.08 E**	**0.09 E**	0.56 U	**0.08 E**
79-34-5	1,1,2,2-Tetrachloroethane	1.1 U	1.1 U	1.4 U	1.2 U	1.2 U	1.3 U	1.4 U	1.5 U
108-88-3	Toluene	0.45 U	0.51 U	0.32 U	0.25 U	0.28 U	0.20 U	0.25 U	0.24 U
108-90-7	Chlorobenzene	0.42 U	0.43 U	0.56 U	0.47 U	0.50 U	0.53 U	0.56 U	0.59 U
100-41-4	Ethylbenzene	0.42 U	**0.08 N**	0.56 U	0.47 U	0.50 U	0.53 U	0.56 U	0.59 U
100-42-5	Styrene	**0.11 N**	**0.11 N**	**0.14 N**	**0.23 N**	1.2 U	1.3 U	1.4 U	1.5 U
1330-20-7	Total Xylenes	**0.34 E**	**0.43 E**	**0.57 E**	**0.38 E**	**0.33 E**	0.28 U	0.27 U	0.28 U
541-73-1	1,3-Dichlorobenzene	0.42 U	0.43 U	0.56 U	0.47 U	0.50 U	0.53 U	0.56 U	0.59 U
106-46-7	1,4-Dichlorobenzene	0.08 U	0.08 U	**0.18 N**	**0.19**	**0.14 E**	**0.14 E**	0.10 U	0.12 U
95-50-1	1,2-Dichlorobenzene	0.42 U	0.43 U	0.56 U	0.47 U	0.50 U	0.53 U	0.56 U	0.59 U
75-69-4	Trichlorofluoromethane	0.42 U	0.43 U	**0.85 N**	0.30 U	0.37 U	0.29 U	0.38 U	0.42 U
	1,1,2-Cl-1,2,2-F-ethane	0.42 U	0.43 U	0.56 U	0.47 U	0.50 U	0.53 U	0.56 U	0.59 U

Table 1. (continued) Volatile Organics Analyses (VOAs)- Qualified Results

CAS Number	Target Parameter (values in µg/kg, dry weight)	Station 45 Sample 45 7976S	Station 48 Sample 48 7976U	Station 66 Sample 66 7976M	Station 68 Sample 68 8078P	Station 201R Sample 201R 8078F	Station 202R Sample 202R 8078G	Station 204R Sample 204R 8041R
74-87-3	Chloromethane	0.70 U	1.3 U	0.59 U	0.55 U	0.57 U	0.63 U	1.2 U
74-83-9	Bromomethane	0.70 U	1.3 U	0.59 U	0.55 U	0.57 U	0.63 U	1.2 U
75-01-4	Vinyl chloride	0.70 U	1.3 U	0.59 U	0.55 U	0.57 U	0.63 U	1.2 U
75-00-3	Chloroethane	0.70 U	1.3 U	0.59 U	0.55 U	0.57 U	0.63 U	1.2 U
75-09-2	Methylene chloride	**1.6**	**4.1**	**7.7 E**	**27**	**0.47**	**1.1**	**3.2 E**
67-64-1	Acetone	**7.0 E**	**11 E**	**1100 E**	**4600 E**	**5.5 E**	**4.4 E**	**33 E**
75-15-0	Carbon disulfide	**3.5**	**3.1**	**30 E**	**8.7**	**0.50**	**0.36**	**5.3**
75-35-4	1,1-Dichloroethene	0.28 U	0.52 U	0.24 U	0.22 U	0.23 U	0.25 U	0.46 U
75-34-3	1,1-Dichloroethane	0.28 U	0.52 U	0.24 U	0.22 U	0.23 U	0.25 U	0.46 U
156-60-5	trans-1,2-Dichloroethene	0.28 U	0.52 U	0.24 U	0.22 U	0.23 U	0.25 U	0.46 U
156-59-2	cis-1,2-Dichloroethene	0.28 U	0.52 U	0.24 U	0.22 U	0.23 U	0.25 U	0.46 U
67-66-3	Chloroform	0.04 U	0.52 U	**0.46**	**0.88**	0.03 U	0.25 U	0.46 U
107-06-2	1,2-Dichloroethane	0.28 U	0.52 U	0.24 U	0.22 U	0.23 U	0.25 U	0.46 U
78-93-3	2-Butanone	**3.3 E**	**3.8 E**	**290 E**	**120 E**	**1.8 E**	**1.5 E**	**2.8 E**
71-55-6	1,1,1-Trichloroethane	0.28 U	0.52 U	0.24 U	0.22 U	0.23 U	0.25 U	0.46 U
56-23-5	Carbon tetrachloride	0.28 U	0.52 U	0.24 U	0.22 U	0.23 U	0.25 U	0.46 U
108-05-4	Vinyl acetate	0.28 U	0.52 U	0.24 U	0.22 U	0.23 U	0.25 U	0.46 U
75-27-4	Bromodichloromethane	0.70 U	1.3 U	0.59 U	0.55 U	0.57 U	0.63 U	1.2 U
78-87-5	1,2-Dichloropropane	0.28 U	0.52 U	0.24 U	0.22 U	0.23 U	0.25 U	0.46 U
10061-02-6	trans-1,3-Dichloropropene	0.70 U	1.3 U	0.59 U	0.55 U	0.57 U	0.63 U	1.2 U
79-01-6	Trichloroethene	0.28 U	0.52 U	0.24 U	0.22 U	0.23 U	0.25 U	0.46 U

Table 1. (continued) Volatile Organics Analyses (VOAs)- Qualified Results

CAS Number	Target Parameter (values in μg/kg, dry weight)	Station 45 Sample 45 7976S	Station 48 Sample 48 7976U	Station 66 Sample 66 7976M	Station 68 Sample 68 8078P	Station 201R Sample 201R 8078F	Station 202R Sample 202R 8078G	Station 204R Sample 204R 8041R
124-48-1	Dibromochloromethane	0.28 U	0.52 U	0.24 U	0.22 U	0.23 U	0.25 U	0.46 U
79-00-5	1,1,2-Trichloroethane	0.70 U	1.3 U	0.59 U	0.55 U	0.57 U	0.63 U	1.2 U
71-43-2	Benzene	**0.06 N**	**0.10 N**	**0.58 E**	**0.50 E**	**0.04 N**	**0.05 N**	**0.13 N**
10061-01-5	cis-1,3-Dichloropropene	0.70 U	1.3 U	0.59 U	0.55 U	0.57 U	0.63 U	1.2 U
110-75-8	2-Chloroethylvinylether	0.70 U	1.3 U	0.59 U	0.55 U	0.57 U	0.63 U	1.2 U
75-25-2	Bromoform	0.28 U	0.52 U	0.24 U	0.22 U	0.23 U	0.25 U	0.46 U
108-10-1	4-Methyl-2-pentanone	0.70 U	1.3 U	**0.71**	**0.92 E**	0.57 U	0.63 U	1.2 U
591-78-6	2-Hexanone	0.70 U	1.3 U	**6.4**	**3.5 E**	0.57 U	0.63 U	1.2 U
127-18-4	Tetrachloroethene	**0.04 N**	0.52 U	0.24 U	**0.03 N**	0.23 U	0.25 U	0.46 U
79-34-5	1,1,2,2-Tetrachloroethane	0.70 U	1.3 U	0.59 U	0.55 U	0.57 U	0.63 U	1.2 U
108-88-3	Toluene	0.13 U	0.25 U	**3.8**	**3.8**	0.87 U	0.31 U	1.0 U
108-90-7	Chlorobenzene	0.28 U	0.52 U	0.24 U	**0.04 N**	0.23 U	0.25 U	0.46 U
100-41-4	Ethylbenzene	0.28 U	0.52 U	**1.1**	**1.3**	0.23 U	0.25 U	0.46 U
100-42-5	Styrene	0.70 U	1.3 U	**0.33 N**	**0.24 E**	0.57 U	0.63 U	0.46 U
1330-20-7	Total Xylenes	0.12 U	0.13 U	**6.8**	**7.1**	**0.14**	0.13 U	0.17 U
541-73-1	1,3-Dichlorobenzene	0.28 U	0.52 U	**10**	**8.5**	0.23 U	0.25 U	0.46 U
106-46-7	1,4-Dichlorobenzene	0.06 U	0.07 U	**5.3**	**4.7**	0.03 U	0.03 U	0.46 U
95-50-1	1,2-Dichlorobenzene	0.28 U	0.52 U	**9.8**	**8.4**	0.23 U	0.25 U	0.46 U
75-69-4	Trichlorofluoromethane	0.28 U	0.32 U	**21 E**	**11**	0.23 U	0.11 U	0.22 U
	1,1,2-Cl-1,2,2-F-ethane	0.28 U	0.52 U	3.8 U	0.22 U	0.23 U	0.25 U	0.46 U

Data Qualifiers:

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 2. Volatile Organics Analyses (VOAs) - Sample Holding Times

Station ID	Sample ID	Rep/QC	Lab ID	Date Collected	Date Analyzed	Holding Time (Days)
3	3	1	8078 A	4/11/91	4/23/91	12
8	8	1	8078 B	4/12/91	4/23/91	11
11R	11R	1	8078 E	4/13/91	4/23/91	10
12	12	1	8078 J	4/13/91	4/23/91	10
17	17	1	8078 N	4/14/91	4/23/91	9
26	26	1	8078 O	4/13/91	4/24/91	11
29	29	1	8015 C	4/1/91	4/12/91	11
29	29	MS	8015 CMS	4/1/91	4/12/91	11
29	75	1	8015 I	4/1/91	4/4/91	3
29	76	2	8015 I	4/1/91	4/4/91	3
29	77	3	8015 K	4/1/91	4/4/91	3
34	34	1	7976 C	3/25/91	4/2/91	8
34	34 RE	1	7976 CDUP	3/25/91	4/2/91	8
35	35	1	7976 D	3/26/91	4/2/91	7
35	35 RE	1	7976 DDUP	3/26/91	4/2/91	7
35	35	MS	7976 DMS	3/26/91	4/2/91	7
35	35	MSD	7976 DMSD	3/26/91	4/2/91	7
35	35	MSR	7976 DMSR	3/26/91	4/2/91	7
38	38	1	7976 E	3/26/91	4/3/91	8
38	60	1	7976 J	3/26/91	4/3/91	8
38	61	2	7976 K	3/26/91	4/3/91	8
38	61	MS	7976 KMS	3/26/91	4/4/91	9
38	61	MSD	7976 KMSD	3/26/91	4/4/91	9
38	62	3	7976 L	3/26/91	4/3/91	8
45	45	1	7976 S	3/28/91	4/4/91	7
48	48	1	7976 U	3/29/91	4/4/91	6
66	66	PCS	7976 M	3/27/91	4/3/91	7
68	68	PCS	8078 P	4/11/91	4/24/91	13
68	68 RE	PCS	8078 PR	4/11/91	4/24/91	13
201R	201R	1	8078 F	4/11/91	4/23/91	12
202R	202R	1	8078 G	4/11/91	4/23/91	12
204R	204R	1	8041 R	4/8/91	4/12/91	4
204R	204R RE	1	8041 RD	4/8/91	4/12/91	4

All samples meet project-recommended holding times

Explanation

Holding time represents number of days from collection to analysis of sample

Sample ID:

	RE	Reanalysis of sample

Rep (Replicate Type):

	1	Primary sample or duplicate split of primary sample
	2	Second replicate from station (separate van Veen grab)
	3	Third replicate from station (separate van Veen grab)
QC:	MS	Matrix spike sample
	MSD	Matrix spike duplicate sample
	MSR	Matrix spike sample reanalysis
	PCS	Project Comparison Sample

Table 3. Volatile Organics Analyses (VOAs) - Blank Evaluation

Compound	Lab ID: MQL	MB0402	MB0403	MB0404	MB0412	MB0423	MB20423	MB0424	7976AA	7976AATB	8078 I	8078 Q	Mean	Standard Deviation	95%ile Value
		Method Blanks (All values in µg/L)							Trip Blanks (All values in µg/L)						
Methylene Chloride	0.25 U	0.15	0.08	0.16	0.03	0.10	0.14	0.05	0.08	0.08	**0.17**	0.10	0.10	0.045	0.17
Acetone	0.50 U	0.27	0.35	0.27	0.24	0.23	0.20	0.31	0.46	**0.84**	0.33	0.35	0.35	0.178	0.64
Carbon disulfide	0.10 U									0.05					
Chloroform	0.10 U											**0.10**			
1,1,1-Trichlorethane	0.10 U										**0.03**				
Benzene	0.25 U					**0.01**	**0.01**	**0.01**		**0.02**	**0.01**	**0.01**			
Toluene	0.10 U	0.02			0.02	0.02	0.03	0.01	0.05	0.07	**0.39**	0.04	0.07	0.121	0.27
Total Xylenes	0.20 U	0.01	**0.06**		0.02	0.03	0.03	0.03	0.02	0.02	0.03	0.03	0.03	0.012	0.05
1,3-Dichlorobenzene	0.10 U	0.01							**0.02**						
1,4-Dichlorobenzene	0.10 U	0.01							**0.02**						
1,2-Dichlorobenzene	0.10 U	0.01							**0.02**						
Trichlorofluoromethane	0.10 U									0.10	0.07	0.02			
1,1,2-Cl-1,2,2-F-ethane	0.10 U			0.04				**0.04**							

MQL = Method Quantitation Limit reported by laboratory, based on lower limit of calibration curve.
All reported values, above, are for detected analytes. All values less than the MQL are considered estimates.
Values at or above the method quantitation limit are underlined.
Highest value or values for an analyte are highlighted in bold.
95%ile value calculated for analytes with ≥9 reported detects; for other analytes, the highest value reported is used in the evaluation (see Section 2.5).

Table 4. Volatile Organics Analyses (VOAs) - Surrogate Recoveries (%R)

Sample ID	S1 (TOL)	S2 (BFB)	S3 (DCE)
		(% Recovery)	
Sample 3	114	79 4	94 4
Sample 8	122	77 0	98 4
Sample 11R	122	90 2	95.4
Sample 12	115	81 4	89 0
Sample 17	105	84 4	90.0
Sample 26	114	89 0	94.0
Sample 29	99 0	73 2	99 8
Sample 34	114	82 0	103
Sample 34 RE	110	91 8	99.6
Sample 35	126	95 2	97 8
Sample 35 RE	119	91 4	97 0
Sample 38	117	88 8	111
Sample 45	103	88 6	104
Sample 48	113	87 4	101
Sample 60	118	87 8	104
Sample 61	126	94 2	114
Sample 62	109	93 4	106
Sample 66	107	101	112
Sample 68	107	105	94.4
Sample 68 RE	115	89.8	97.6
Sample 75	109	83 2	97 2
Sample 76	117	85.2	91.0
Sample 77	110	85 0	98 8
Sample 201R	112	88 8	94 0
Sample 202R	109	87 0	90 4
Sample 204R	106	78 2	108
Sample 204R RE	103	80 4	104

Sample ID	S1 (TOL)	S2 (BFB)	S3 (DCE)
		(% Recovery)	
Method Blanks			
MB0402	102	96 0	97 0
MB0403	95.8	99 6	109
MB0404	96 6	91.0	98 4
MB0412	100	94 6	101
MB0423	105	99 0	90.0
MB20423	99 4	92.8	86 8
MB0424	113	96.0	90.0
Trip Blanks			
7976AA	104	102	103
7976AATB	88 8	91 8	96 4
8078 I	99.2	91.8	84 6
8078Q	102	104	95 8
MS/MSD Samples			
Sample 35 MS	121	96 6	76 0
Sample 35 MSD	133	99.2	66 2
Sample 35 MSR	135	96 4	69 0
Sample 61 MS	111	85 2	76 2
Sample 61 MSD	116	86 4	72.6

Surrogate	CLP Acceptance Limits
TOL = d8-Toluene	81-117%
BFB = Bromofluorobenzene	74-121
DCE = d4-1,2-Dichloroethane	70-121

Table 5. Volatile Organics Analyses (VOAs) - MS/MSD Summary

Compound	Sample 29 MS % REC	Sample 35 MS % REC	Sample 35 MSD % REC	Sample 35 % RPD	Sample 61 MS % REC	Sample 61 MSD % REC	Sample 61 % RPD
Chloromethane	190	109	116	-6.2	132	139	-5.2
Bromomethane	153	122	126	-3.2	119	112	6.1
Vinyl Chloride	124	159	161	-1.3	141	131	7.4
Chloroethane	139	154	190	-20.9	112	119	-6.1
Methylene Chloride	154	162	334	-69.4	60.2	56.8	5.8
Acetone	139	208	466	-76.6	55.0	**11.4**	**131**
Carbon Disulfide	**37.0**	64.6	163	-86.5	102	108	-5.7
1,1-Dichloroethene	133	164	192	-15.7	125	128	-2.4
1,1-Dichloroethane	96.4	94.8	94.4	0.4	91.4	94.4	-3.2
trans-1,2-Dichloroethene	82.8	95.2	92.2	3.2	83.4	84.8	-1.7
Chloroform	77.3	77.4	73.2	5.6	73.2	73.0	0.3
1,2-Dichloroethane	85.0	74.2	66.2	11.4	71.2	67.4	5.5
1,1,1-Trichloroethane	70.8	63.6	57.8	9.6	64.0	64.6	-0.9
2-Butanone	159	237	297	-22.5	204	206	-1.0
Vinyl Acetate	**14.6**	**14.8**	**14.4**	2.7	**17.6**	**12.6**	33.1
Carbon Tetrachloride	**13.2**	**16.6**	**6.0**	93.8	**9.4**	**5.8**	47.4
Bromodichloromethane	72.2	51.4	**40.4**	24	**42.8**	**40.2**	6.3
1,2-Dichloropropane	117	123	137	-10.8	119	117	1.7
trans-1,3-Dichloropropene	84.2	80.0	88.4	-10	74.0	73.6	0.5
Trichloroethene	102	112	123	-9.4	99.0	101	-2.0
Benzene	94.4	103	104	-1.0	98.2	101	-2.8
Dibromochloromethane	**45.4**	**25.2**	**15.2**	49.5	**23.4**	**22.0**	6.2
1,1,2-Trichloroethane	123	144	172	-17.7	118	115	2.6
cis-1,3-Dichloropropene	83.0	75.4	76.6	-1.6	82.6	78.2	5.5
2-Chloroethylvinylether	124	146	173	-16.9	130	123	5.5
Bromoform	**41.4**	**16.6**	**8.8**	61.4	**16.6**	**14.6**	12.8
4-Methyl-2-pentanone	150	189	230	-19.6	149	141	5.5
2-Hexanone	176	216	273	-23.3	201	181	10.5
Tetrachloroethene	80.7	96.0	89.6	6.9	76.8	84.4	-9.4
1,1,2,2-Tetrachloroethane	111	126	132	-4.7	107	110	-2.8
Toluene	112	115	136	-16.7	104	110	-5.6
Chlorobenzene	87.0	101	102	-1.0	89	95.0	-6.5
Ethylbenzene	88.4	99.8	97.6	2.2	87.9	93.8	-6.5
Styrene	80.9	107	104	2.8	84.7	91.2	-7.4
Total Xylenes	92.7	101	99.1	1.9	91.6	95.1	-3.7
cis-1,2-Dichloroethane	79.0	76.2	68.8	10.2	73.8	73.6	0.3
Trichlorofluoromethane	112	142	168	-16.8	100	104	-3.9
1,1,2-Trichloro-1,2,2-trifluoroethane	133	164	190	-14.7	116	123	-5.9
1,2-Dichlorobenzene	79.4	75.6	77.2	-2.1	68.2	75.4	-10.0
1,3-Dichlorobenzene	68.0	73.4	70.2	4.5	61.4	66.2	-7.5
1,4-Dichlorobenzene	65.9	69.5	67.3	3.2	61.5	64.1	-4.1

CLP matrix spike compounds are highlighted in bold; Compounds with %Rs <50% are highlighted in bold

Table 6. Volatile Organics Analyses (VOAs) - Average Quantitation Limits

CAS Number	Compound	Number of Non-detects	Quantitation Limit Average (µg/kg, dry weight)	Quantitation Limit Lowest (µg/kg, dry weight)
74-87-3	Chloromethane	23	1.0	0.55
74-83-9	Bromomethane	23	1.0	0.55
75-01-4	Vinyl chloride	23	1.0	0.55
75-00-3	Chloroethane	23	1.0	0.55
75-09-2	Methylene chloride	0	-	-
67-64-1	Acetone	0	-	-
75-15-0	Carbon disulfide	0	-	-
75-35-4	1,1-Dichloroethene	23	0.42	0.22
75-34-3	1,1-Dichloroethane	23	0.42	0.22
156-60-5	trans-1,2-Dichloroethene	23	0.42	0.22
156-59-2	cis-1,2-Dichloroethene	23	0.42	0.22
67-66-3	Chloroform	21	0.29	0.03
107-06-2	1,2-Dichloroethane	23	0.42	0.22
78-93-3	2-Butanone	0	-	-
71-55-6	1,1,1-Trichloroethane	23	0.42	0.22
56-23-5	Carbon tetrachloride	23	0.42	0.22
108-05-4	Vinyl acetate	23	0.42	0.22
75-27-4	Bromodichloromethane	23	1.0	0.55
78-87-5	1,2-Dichloropropane	23	0.42	0.22
10061-02-6	trans-1,3-Dichloropropene	23	1.0	0.55
79-01-6	Trichloroethene	23	0.42	0.22
124-48-1	Dibromochloromethane	23	0.42	0.22
79-00-5	1,1,2-Trichloroethane	23	1.0	0.55
71-43-2	Benzene	6	1.0	0.31
10061-01-5	cis-1,3-Dichloropropene	23	1.0	0.55
110-75-8	2-Chloroethylvinylether	23	1.0	0.55
75-25-2	Bromoform	20	0.43	0.22
108-10-1	4-Methyl-2-pentanone	19	1.0	0.56
591-78-6	2-Hexanone	21	1.1	0.57
127-18-4	Tetrachloroethene	10	0.4	0.23
79-34-5	1,1,2,2-Tetrachloroethane	23	1.0	0.55
108-88-3	Toluene	21	0.44	0.13
108-90-7	Chlorobenzene	22	0.43	0.23
100-41-4	Ethylbenzene	17	0.45	0.23
100-42-5	Styrene	13	1.0	0.46
1330-20-7	Total Xylenes	9	0.18	0.09
541-73-1	1,3-Dichlorobenzene	21	0.43	0.23
106-46-7	1,4-Dichlorobenzene	16	0.16	0.03
95-50-1	1,2-Dichlorobenzene	21	0.43	0.23
75-69-4	Trichlorofluoromethane	18	0.33	0.11
-	1,1,2-Trichloro-1,2,2-Trifluoroethane	22	0.58	0.22

Total N = 23

Table 7. Volatile Organics Analyses (VOAs) - Tentatively Identified Compounds Summary

Sample ID	Number of TICs Identified	Concentration (µg/kg, dry weight) Average	Maximum
3	14	2.8	34
8	12	1.1	3.5
11R	14	28	160
12	13	0.95	4.9
17	12	2.1	9.7
26	15	0.58	5.5
29	7	2.2	5.7
34	10	2.6	17
34 RE	15	3.5	23
35	16	2.1	9.5
35 RE	14	1.1	7.3
38	12	1.6	6.2
45	15	0.55	3.8
48	10	6.6	28
60	11	1.6	6.3
61	9	1.2	4.2
62	7	1.7	6.6
66	15	20	100
68	18	104	1300
68 RE	27	18	230
75	13	1.2	5.2
76	12	9.6	100
77	16	8.0	100
201 R	13	2.2	10
202 R	9	2.0	13
204 R	10	20	160
204 R RE	9	18	83
Method Blanks			
MB0402	2	0.15	0.24
MB0403	8	0.07	0.24
MB0404	7	0.08	0.23
MB0412	7	0.11	0.45
MB0423	5	0.07	0.19
MB20423	7	0.12	0.29
MB0424	8	0.07	0.14
Trip Blanks			
7976AA	6	0.13	0.35
7976AATB	6	0.08	0.33
8078I	7	0.11	0.25
8078Q	9	0.06	0.16

RE (in sample ID field) = Sample reanalysis

Table 8. Volatile Organic Analyses (VOAs) - Monitoring Variability Samples

STATION 29

Target Parameter (µg/kg, dry wt.)	29 (Primary Sample)	75 (Duplicate Split)	Mean (29 and 75)	RPD (29 and 75)	76 (Replicate)	77 (Replicate)	Station Mean (n=4)	Station CV (n=4)
Chloromethane	1.4 U	1.1 U	1.3 U		1.1 U	1.1 U	1.2 U	
Bromomethane	1.4 U	1.1 U	1.3 U		1.1 U	1.1 U	1.2 U	
Vinyl chloride	1.4 U	1.1 U	1.3 U		1.1 U	1.1 U	1.2 U	
Chloroethane	1.4 U	1.1 U	1.3 U		1.1 U	1.1 U	1.2 U	
Methylene chloride	**1.5 E**	**2.8**	**2.2**	-60.5	**1.9**	**1.6**	**2.0**	29.6
Acetone	**16 E**	**7.4 E**	**12 E**	73.5	**5.9 E**	**11 E**	**10 E**	44.9
Carbon disulfide	**3.0**	**1.4**	**2.2**	72.7	**2.0**	**3.0**	**2.4**	32.9
1,1-Dichloroethene	0.56 U	0.45 U	0.51 U		0.42 U	0.43 U	0.47 U	
1,1-Dichloroethane	0.56 U	0.45 U	0.51 U		0.42 U	0.43 U	0.47 U	
trans-1,2-Dichloroethene	0.56 U	0.45 U	0.51 U		0.42 U	0.43 U	0.47 U	
cis-1,2-Dichloroethene	0.56 U	0.45 U	0.51 U		0.42 U	0.43 U	0.47 U	
Chloroform	0.13 U	0.06 U	0.10 U		0.09 U	0.10 U	0.10 U	
1,2-Dichloroethane	0.56 U	0.45 U	0.51 U		0.42 U	0.43 U	0.47 U	
2-Butanone	**5.5 E**	**4.1 E**	**4.8 E**	29.2	**3.6 E**	**4.7 E**	**4.5 E**	18.2
1,1,1-Trichloroethane	0.56 U	0.45 U	0.51 U		0.42 U	0.43 U	0.47 U	
Carbon tetrachloride	0.56 U	0.45 U	0.51 U		0.42 U	0.43 U	0.47 U	
Vinyl acetate	0.56 U	0.45 U	0.51 U		0.42 U	0.43 U	0.47 U	
Bromodichloromethane	1.4 U	1.1 U	1.3 U		1.1 U	1.1 U	1.2 U	
1,2-Dichloropropane	0.56 U	0.45 U	0.51 U		0.42 U	0.43 U	0.47 U	
trans-1,3-Dichloropropene	1.4 U	1.1 U	1.3 U		1.1 U	1.1 U	1.2 U	
Trichloroethene	0.56 U	0.45 U	0.51 U		0.42 U	0.43 U	0.47 U	
Dibromochloromethane	0.56 U	0.45 U	0.51 U		0.42 U	0.43 U	0.47 U	
1,1,2-Trichloroethane	1.4 U	1.1 U	1.3 U		1.1 U	1.1 U	1.2 U	
Benzene	**0.17 E**	**0.15 N**	**0.16 N**	12.5	**0.11 N**	**0.17 E**	**0.15 N**	18.9
cis-1,3-Dichloropropene	1.4 U	1.1 U	1.3 U		1.1 U	1.1 U	1.2 U	
2-Chloroethylvinylether	1.4 U	1.1 U	1.3 U		1.1 U	1.1 U	1.2 U	
Bromoform	0.56 U	0.45 U	0.51 U		0.42 U	0.43 U	0.47 U	
4-Methyl-2-pentanone	0.56 U	1.1 U	0.83 U		1.1 U	1.1 U	1.0 U	
2-Hexanone	1.4 U	1.1 U	1.3 U		1.1 U	1.1 U	1.2 U	
Tetrachloroethene	**0.09 E**	**0.05 N**	**0.07 N**	57.1	**0.07 N**	**0.07 N**	**0.07 N**	28.6
1,1,2,2-Tetrachloroethane	1.4 U	1.1 U	1.3 U		1.1 U	1.1 U	1.2 U	
Toluene	0.35 U	0.45 U	0.40 U		0.45 U	0.51 U	0.44 U	
Chlorobenzene	0.56 U	0.45 U	0.51 U		0.42 U	0.43 U	0.47 U	
Ethylbenzene	0.56 U	0.45 U	0.51 U		0.42 U	**0.08 N**	0.38 U	
Styrene	**0.13 N**	**0.09 N**	**0.11 N**	36.4	**0.11 N**	**0.11 N**	**0.11 N**	18.2
Total Xylenes	**0.39 E**	**0.35 E**	**0.37 E**	10.8	**0.34 E**	**0.43 E**	**0.38 E**	10.5
1,3-Dichlorobenzene	0.56 U	0.45 U	0.51 U		0.42 U	0.43 U	0.47 U	
1,4-Dichlorobenzene	0.11 U	0.08 U	0.10 U		0.08 U	0.08 U	0.09 U	
1,2-Dichlorobenzene	0.56 U	0.45 U	0.51 U		0.42 U	0.43 U	0.47 U	
Trichlorofluoromethane	**0.66 N**	0.45 U	0.56 U		0.42 U	0.43 U	0.49 U	
1,1,2-Cl-1,2,2-F-ethane	0.56 U	0.45 U	0.51 U		0.42 U	0.43 U	0.47 U	

Table 8. (continued) Volatile Organic Analyses (VOAs) - Monitoring Variability Samples

STATION 38

Target Parameter (µg/kg, dry wt.)	38 (Primary Sample)	60 (Duplicate Split)	Mean (38 and 60)	RPD (38 and 60)	61 (Replicate)	62 (Replicate)	Station Mean (n=4)	Station CV (n=4)
Chloromethane	1.2 U	1.3 U	1.3 U		1.4 U	1.5 U	1.4 U	
Bromomethane	1.2 U	1.3 U	1.3 U		1.4 U	1.5 U	1.4 U	
Vinyl chloride	1.2 U	1.3 U	1.3 U		1.4 U	1.5 U	1.4 U	
Chloroethane	1.2 U	1.3 U	1.3 U		1.4 U	1.5 U	1.4 U	
Methylene chloride	1.7 E	2.0 E	1.9 E	-16.2	3.6 E	2.2 E	2.4 E	35.1
Acetone	20 E	17 E	19 E	16.2	10 E	9.0 E	14 E	38.2
Carbon disulfide	2.0	2.4	2.2	-18.2	0.8	2.1	1.8	39.1
1,1-Dichloroethene	0.50 U	0.53 U	0.52 U		0.56 U	0.59 U	0.55 U	
1,1-Dichloroethane	0.50 U	0.53 U	0.52 U		0.56 U	0.59 U	0.55 U	
trans-1,2-Dichloroethene	0.50 U	0.53 U	0.52 U		0.56 U	0.59 U	0.55 U	
cis-1,2-Dichloroethene	0.50 U	0.53 U	0.52 U		0.56 U	0.59 U	0.55 U	
Chloroform	0.50 U	0.53 U	0.52 U		0.56 U	0.59 U	0.55 U	
1,2-Dichloroethane	0.50 U	0.53 U	0.52 U		0.56 U	0.59 U	0.55 U	
2-Butanone	6.9 E	5.5 E	6.2 E	22.6	3.8 E	3.5 E	4.9 E	32.3
1,1,1-Trichloroethane	0.50 U	0.53 U	0.52 U		0.56 U	0.59 U	0.55 U	
Carbon tetrachloride	0.50 U	0.53 U	0.52 U		0.56 U	0.59 U	0.55 U	
Vinyl acetate	0.50 U	0.53 U	0.52 U		0.56 U	0.59 U	0.55 U	
Bromodichloromethane	1.2 U	1.3 U	1.3 U		1.4 U	1.5 U	1.4 U	
1,2-Dichloropropane	0.50 U	0.53 U	0.52 U		0.56 U	0.59 U	0.55 U	
trans-1,3-Dichloropropene	1.2 U	1.3 U	1.3 U		1.4 U	1.5 U	1.4 U	
Trichloroethene	0.50 U	0.53 U	0.52 U		0.56 U	0.59 U	0.55 U	
Dibromochloromethane	0.50 U	0.53 U	0.52 U		0.56 U	0.59 U	0.55 U	
1,1,2-Trichloroethane	1.2 U	1.3 U	1.3 U		1.4 U	1.5 U	1.4 U	
Benzene	1.2 U	1.3 U	1.3 U		1.4 U	1.5 U	1.4 U	
cis-1,3-Dichloropropene	1.2 U	1.3 U	1.3 U		1.4 U	1.5 U	1.4 U	
2-Chloroethylvinylether	1.2 U	1.3 U	1.3 U		1.4 U	1.5 U	1.4 U	
Bromoform	0.50 U	0.53 U	0.52 U		0.56 U	0.59 U	0.55 U	
4-Methyl-2-pentanone	1.2 U	1.3 U	1.3 U		1.4 U	1.5 U	1.4 U	
2-Hexanone	1.2 U	1.3 U	1.3 U		1.4 U	1.5 U	1.4 U	
Tetrachloroethene	0.08 E	0.09 E	0.09 E	-11.8	0.56 U	0.08 E	0.08 E *	7.2 *
1,1,2,2-Tetrachloroethane	1.2 U	1.3 U	1.3 U		1.4 U	1.5 U	1.4 U	
Toluene	0.28 U	0.20 U	0.24 U		0.25 U	0.24 U	0.24 U	13.8
Chlorobenzene	0.50 U	0.53 U	0.52 U		0.56 U	0.59 U	0.55 U	
Ethylbenzene	0.50 U	0.53 U	0.52 U		0.56 U	0.59 U	0.55 U	
Styrene	1.2 U	1.3 U	1.3 U		1.4 U	1.5 U	1.4 U	
Total Xylenes	0.33 E	0.28 U	0.31 U		0.27 U	0.28 U	0.29 U	
1,3-Dichlorobenzene	0.50 U	0.53 U	0.52 U		0.56 U	0.59 U	0.55 U	
1,4-Dichlorobenzene	0.14 E	0.14 E	0.14 E		0.10 U	0.12 U	0.13 U	
1,2-Dichlorobenzene	0.50 U	0.53 U	0.52 U		0.56 U	0.59 U	0.55 U	
Trichlorofluoromethane	0.37 U	0.29 U	0.33 U		0.38 U	0.42 U	0.37 U	
1,1,2-Cl-1,2,2-F-ethane	0.50 U	0.53 U	0.52 U		0.56 U	0.59 U	0.55 U	

* N=3

Table 9. Volatile Organics Analyses (VOAs) - Project Comparison Sample Summary

	1991 Project Comparison Sample Results (all values in µg/kg, dry weight)				1989 Project Comparison Sample Results (all values in µg/kg, dry weight)				Summary Statistics 1989, 1991*	
Target Parameter	Sample 66	Sample 68	Mean	RPD	Sample 66	Sample 67	Mean	RPD	Two Year Mean	Two Year CV
Chloromethane	0.59 U	0.55 U	0.57 U		0.02 U	0.19 U	0.11 U		0.34 U	
Bromomethane	0.59 U	0.55 U	0.57 U		0.10 U	0.090 U	0.10 U		0.33 U	
Vinyl chloride	0.59 U	0.55 U	0.57 U		0.20 U	0.19 U	0.20 U		0.38 U	
Chloroethane	0.59 U	0.55 U	0.57 U		0.20 U	0.19 U	0.20 U		0.38 U	
Methylene chloride	**7.7 E**	**27**	**17 E**	-111	**170 E**	**120 E**	**145 E**	34.5	**81 E**	94.9
Acetone	**1100 E**	**4600 E**	**2850 E**	-123	**14000 E**	**22000 E**	**18000 E**	-44.4	**10400 E**	90.8
Carbon disulfide	**30 E**	**8.7**	**19 E**	110	**91 E**	**76**	**84 E**	18.0	**51 E**	
1,1-Dichloroethene	0.24 U	0.22 U	0.23 U		0.020 U	0.019 U	0.020 U		0.12 U	
1,1-Dichloroethane	0.24 U	0.22 U	0.23 U		0.020 U	0.019 U	0.020 U		0.12 U	
trans-1,2-Dichloroethene	0.24 U	0.22 U	0.23 U		0.040 U	0.037 U	0.039 U		0.13 U	
cis-1,2-Dichloroethene	0.24 U	0.22 U	0.23 U		0.040 U	0.037 U	0.039 U		0.13 U	
Chloroform	**0.46**	**0.88**	**0.67**	-62.7	**2.4**	**1.7**	**2.1**	34.1	**1.4**	61.7
1,2-Dichloroethane	0.24 U	0.22 U	0.23 U		0.040 U	0.037 U	0.039 U		0.13 U	
2-Butanone	**290 E**	**120 E**	**205 E**	82.9	0.10 U	0.093 U	0.097 U		(a)	
1,1,1-Trichloroethane	0.24 U	0.22 U	0.23 U		0.020 U	0.019 U	0.020 U		0.12 U	
Carbon tetrachloride	0.24 U	0.22 U	0.23 U		0.020 U	0.019 U	0.020 U		0.12 U	
Vinyl acetate	0.24 U	0.22 U	0.23 U		0.040 U	0.040 U	0.040 U		0.14 U	
Bromodichloromethane	0.59 U	0.55 U	0.57 U		0.040 U	0.037 U	0.039 U		0.30 U	
1,2-Dichloropropane	0.24 U	0.22 U	0.23 U		0.080 U	0.075 U	0.078 U		0.15 U	
trans-1,3-Dichloropropene	0.59 U	0.55 U	0.57 U		0.040 U	0.037 U	0.039 U		0.30 U	
Trichloroethene	0.24 U	0.22 U	0.23 U		**0.020**	**0.013 N**	**0.017 N**	42.4	0.12 U	

(a) Mean not calculated due to highly variable results between years.
* PCS samples not analyzed for volatile organics in 1990.

NA = Not Analyzed

Table 9. (continued) Volatile Organics Analyses (VOAs) - Project Comparison Sample Summary

	1991 Project Comparison Sample Results (all values in µg/kg, dry weight)				1989 Project Comparison Sample Results (all values in µg/kg, dry weight)				Summary Statistics 1989, 1991*	
Target Parameter	**Sample 66**	**Sample 68**	**Mean**	**RPD**	**Sample 66**	**Sample 67**	**Mean**	**RPD**	**Two Year Mean**	**Two Year CV**
Dibromochloromethane	0.24 U	0.22 U	0.23 U		0.020 U	0.019 U	0.020 U		0.12 U	
1,1,2-Trichloroethane	0.59 U	0.55 U	0.57 U		0.040 U	0.037 U	0.039 U		0.30 U	
Benzene	**0.58 E**	**0.50 E**	**0.54 E**	14.8	**0.66**	**0.53**	**0.60**	21.8	**0.57 E**	12.3
cis-1,3-Dichloropropene	0.59 U	0.55 U	0.57 U		0.040 U	0.037 U	0.039 U		0.30 U	
2-Chloroethylvinylether	0.59 U	0.55 U	0.57 U		0.10 U	0.090 U	0.095 U		0.33 U	
Bromoform	0.24 U	0.22 U	0.23 U		0.040 U	0.037 U	0.039 U		0.13 U	
4-Methyl-2-pentanone	**0.71**	**0.92 E**	**0.82 E**	-25.8	**0.36**	**0.64 E**	**0.50 E**	-56.0	**0.66 E**	35.0
2-Hexanone	**6.4**	**3.5 E**	**5.0 E**	58.6	**0.91 E**	**4.3**	**2.6 E**	-130	**3.8 E**	60.0
Tetrachloroethene	0.24 U	**0.03 N**	0.14 U		**0.044**	**0.034**	**0.039**	25.6	0.087 U	
1,1,2,2-Tetrachloroethane	0.59 U	0.55 U	0.57 U		0.040 U	0.037 U	0.039 U		0.30 U	
Toluene	**3.8**	**3.8**	**3.8**	0	**5.0**	**5.0**	**5.0**	0	**4.4**	15.7
Chlorobenzene	0.24 U	**0.04 N**	0.14 U	143	0.020 U	**0.041**	0.031 U	-68.9	0.085 U	
Ethylbenzene	**1.1**	**1.3**	**1.2**	-16.7	**2.9**	**1.3**	**2.1**	76.2	**1.7**	49.3
Styrene	**0.33 N**	**0.24 E**	**0.29 N**	31.6	0.020 U	0.019 U	0.020 U		0.15 U	
Total Xylenes	**6.8**	**7.1**	**7.0**	-4.3	**12**	**9.9**	**11**	19.2	**9.0**	27.6
1,3-Dichlorobenzene	**10**	**8.5**	**9.3**	16.2	NA					
1,4-Dichlorobenzene	**5.3**	**4.7**	**5.0**	12.0	NA					
1,2-Dichlorobenzene	**9.8**	**8.4**	**9.1**	15.4	NA					
Trichlorofluoromethane	**21 E**	**11**	**16 E**	62.5	NA					
1,1,2-Cl-1,2,2-F ethane	3.8 U	0.22 U	2.0 U		0.040 U	0.037 U	0.039 U		1.0 U	

* PCS samples not analyzed for volatile organics in 1990.

NA = Not Analyzed

Table 10. Volatile Organics Analyses (VOAs) - Chlorinated Butadiene Quantitation

Station ID	Sample ID	Trichlorobutadiene (QM m/z = 121)					Tetrachlorobutadiene (QM m/z = 155)		IS Area (d5-Bromobenzene)	IS Concentration (ng)	RRF*	Dry Weight (gm)
		A/B Isomers	C/D Isomers	E Isomer	F Isomer		D Isomer					
		EICP Areas					EICP Area					
38	38	602	1016	621	1524		377		119080	50	0.525	20.2
45	45	2386	2468	1063	1584		595		140910	50	0.581	35.6
38	60	834	1560	934	1540		279		112642	50	0.525	18.8
		Estimated Concentration (µg/kg, dry weight)					Estimated Concentration (µg/kg, dry weight)					
38	38	0.024	0.040	0.025	0.060	–	0.015	TD				
44	44					TD		TD				
45	45	0.041	0.042	0.018	0.027	TD	0.010	TD				
47	47					–		TD				
38	60	0.038	0.070	0.042	0.069	–	0.013	TD				

* Ratio of RRF(HCBD) to RRF(DCB)

TD = tentative detection in extractables (BNA) fraction (at unknown concentration); not detected in all other samples analyzed for BNAs
Note: VOAs not analyzed in samples 44 and 47

September 13, 1991

Data Validation Report
BNA Analyses

Site:	Puget Sound
Project :	1991 PSAMP MSMT
Sample Numbers:	1, 2R, 3-5, 8, 9R, 10R, 11R, 12, 13R, 14, 15, 17-22, 26, 29, 30, 32-35, 38-41, 43-45, 47-49, 51-53, 57-74, 201R-209R
Samples Collected by:	Ambient Monitoring Section Washington State Department of Ecology

The samples included in this report were analyzed by Analytical Resources, Inc., of Seattle, Washington, under subcontract to BCI of Vashon, Washington. Funding for this contract is provided by the Ambient Monitoring Section of the Washington State Department of Ecology.

This report is submitted to:	Ambient Monitoring Section Washington State Department of Ecology
Data Evaluated by:	Thomas D. Bowden TDB
Approved by:	Raleigh C. Farlow RF

BCI
Environmental & Medical Research
and Systems Development

13908 SW Caster Road, Vashon, WA 98070 (206) 463-6223

Site:	Puget Sound
Project:	1991 PSAMP MSMT
Laboratory:	Analytical Resources, Inc. (ARI)
Sample Numbers:	Samples 1, 2R, 3-5, 8, 9R, 10R, 11R, 12, 13R, 14, 15, 17-22, 26, 29, 30, 32-35, 38-41, 43-45, 47-49, 51-53, 57-74, 201R-209R
Matrix:	Sediment
Reviewer:	T. D. Bowden
Date:	September 13, 1991

1.0 Introduction

This report summarizes the validation of laboratory data for 69 marine sediment samples submitted to Analytical Resources, Inc. of Seattle, Washington for BNA and Guaiacol/Substituted Resin Acid analyses. The samples were collected from 48 different stations throughout Puget Sound by the Washington State Department of Ecology (Ecology) Ambient Monitoring Section, as part of the 1991 Marine Sediment Monitoring Task (MSMT) of the Puget Sound Ambient Monitoring Program (PSAMP). The samples were analyzed employing a protocol modified after USEPA CLP SOW 2/88 (including the GPC option), in order to decrease Method Quantitation Levels and to improve precision at low levels. These modifications included larger sample sizes (approximately 150 gm, wet weight), class fractionation (SPE-Silica Gel Column) and subsequent analysis of non-polar (F1) and polar (F2) fractions on selected samples. Two samples (40 and 41) were further fractionated (cleaned up) following initial instrumental analysis in order to separate aliphatic hydrocarbons from target parameters. This fractionation required elution of the F1 fraction through a LOBAR® silica gel column to yield chemical noninterference and lower detection limits for target parameters in the two samples that exhibited high hydrocarbon background. Data quality was independent of the level of sample clean up. Precision was improved at low levels in all samples by increasing the number of internal standards and surrogate compounds relative to the CLP SOW. Almost all target parameters were evaluated in matrix spike analyses. Internal standards, surrogate compound spikes, and matrix spike compounds were added at levels comparable to native levels in the sediments, rather than higher CLP-specified levels.

Several additional analytical parameters were added to the USEPA Target Compound List (TCL) for this project:

Cymene	ß-Coprostanol
Caffeine	Cholesterol
9H-Carbazole	ß-Sitosterol
Perylene	Retene
Pristane/Phytane ratio	n-Alkane CPI (Carbon Preference Index) $[= (C_{21}+C_{23}+\ldots C_{31})/(C_{22}+C_{24}+\ldots C_{32})]$

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

Additional Surrogate Compounds	CLP Surrogate Compounds
d_4-1,2-Dichlorobenzene	2-Fluorophenol
d_4-2,3,5,6-*p*-Cresol	d_5-Phenol
d_{10}-Anthracene	d_5-Nitrobenzene
d_9-Acridine	2-Fluorobiphenyl
d_{10}-Fluoranthene	2,4,6-Tribromophenol
d_{14}-Dibenzo(a,h)anthracene	d_{14}-Terphenyl

In addition, seven samples were analyzed for 10 resin acids, guaiacol, and 4 chlorinated guaiacols:

Resin Acids	Guaiacols
Pimaric acid	2-Methoxyphenol (Guaiacol)
Sandaracopimaric acid	4,5-Dichloroguaiacol
Isopimaric acid	4,5,6-Trichloroguaiacol
Palustric acid	3,4,5-Trichloroguaiacol
Dehydroabietic acid	Tetrachloroguaiacol
Abietic acid	
Neoabietic acid	
12-Chlorodehydroabietic acid	
14-Chlorodehydroabietic acid	
Dichlorodehydroabietic acid	

This report has been prepared in accordance with Ecology's *Puget Sound Ambient Monitoring Program: Marine Sediment Quality Implementation Plan* (Striplin, 1988), using guidelines found in the USEPA guidance *Laboratory Data Validation: Functional Guidelines for Evaluating Organics Analyses* (USEPA, 1988), and the Washington Department of Ecology document entitled *Data Validation Guidance Manual for Selected Sediment Variables*, Draft version (PTI, 1989).

Samples were collected using a 0.1 m^2 stainless steel Double van Veen grab sampler. Sediment for BNA analyses was removed from the upper two centimeters in the sampler. The sediment constituting the sample is a homogenized composite of at least five Double van Veen casts. Sufficient material was collected to fill two 16 ounce glass jars for each sample. Samples were held on ice until delivery to the laboratory. Chain-of-Custody documents show that proper chain-of-custody was maintained from the time of sample collection until delivery to and acceptance by the laboratory. The laboratory reported that all samples were received intact.

Forty-eight of the samples are primary samples from 48 different locations or stations in Puget Sound. Eighteen of the remaining samples are field-generated quality control samples collected at six selected stations to allow determination of monitoring variability. At each selected station, the field-generated QC samples include one split of the primary sample taken from the same van Veen grab composite (blind laboratory duplicate), and two station replicates taken from different van Veen grabs at the same station (blind field replicates). All field-generated QC samples were assigned surrogate station numbers and were submitted blind to the laboratory, as follows:

Field Station and Primary Sample:	5	32	35	38	44	4
Duplicate Split:	51	57	72	60	63	78
Station Replicates:	52, 53	58, 59	73, 74	61, 62	64, 65	79, 80

The three station replicates collected at Station 4 were analyzed for Guaiacols and Resin Acids only. The surrogate station numbers correspond to the Sample ID as reported in Tables 1 and 2.

Samples 66, 67, and 68 are Project Comparison Samples (PCSs), consisting of organic compound fortified Sequim Bay sediment. This fortified sample material also was analyzed during the 1989 and 1990 PSAMP.

The laboratory performed MS/MSD analyses on Samples 5, 32, 35, and 44. In addition, the Sample 4 was employed for MS/MSD analysis for Resin Acids only.

Laboratory deliverables were complete and documentation was sufficient to allow evaluation and validation of the associated results.

Analytical results with associated data qualifiers are presented in Table 1. Results are expressed in µg/kg, dry weight.

2.0 Discussion

2.1. BNA Analyses

2.1.1. Sample Holding Times

MSMT contractual maximum holding times were the same as the technical requirements for maximum sample and extract holding times for water matrices for BNA analyses (extraction of samples held at 4°C. within 7 days of collection; instrumental analysis of extract within 40 days of collection). PSEP recommended maximum holding times are one year for frozen samples.

Two 16 ounce jars for each sample were preserved after collection by holding on ice during transport. One of the two 16 ounce sample jars was held at 4° C. in the laboratory until extraction. The second sample jar was archived by freezing at -20°C. All sediment samples submitted for BNA analyses were initially extracted within 7 days with the exception of Sample 2R (8 days). Results associated with this sample have not been qualified for exceedance of target holding times since the deviation is slight and is not expected to affect data quality.

The first sample delivery group submitted to the laboratory was reextracted and reanalyzed because the method blank (0329MB) extracted with this sample group contained low levels of target analytes. The low levels of these contaminants in the blank most likely are a result of carryover during SPE fractionation. Frozen archive samples were extracted for this batch within 18 days of collection. PSEP-recommended holding times for frozen samples are 1 year. Therefore, no associated results have been qualified for exceedance of target holding times. Results from the first batch and the reextracted batch are comparable. All sample extracts, including dilutions, were analyzed within the required 40 day period.

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. Sample holding times are summarized in Table 2.

2.1.2. GC/MS Tuning

The GC/MS tune performance was checked with Decafluorotriphenylphosphine (DFTPP) prior to initial calibration and all subsequent sample analytical runs. All ion abundances and relative ion abundances met CLP acceptance criteria. Mass spectral plots and associated mass listings were compared, and transcription of mass data to the GC/MS Tuning and Mass Calibration summary form were checked. No inconsistencies or transcription errors were found.

All sample analyses were performed within 12 hours of DFTPP analyses with two exceptions: Sample 74 and Sample 61 (Dup2) were analyzed at 12:09 hours and 12:05 hours, respectively, after injection. This deviation is not considered significant enough to limit the usefulness of associated analytical results.

2.1.3. Initial Calibration

Initial multipoint calibration was established on 4/05/91 at concentrations of 2, 5, 10, 25, and 50 ng/μL (ppm) for most target analytes and surrogate compounds. Some analytes were calibrated through a different range of concentrations:

5, 10, 25, 50, and 80 ng/μL	10, 25, 50, 80, and 100 ng/μL
Benzoic acid	2,4-Dinitrophenol
4-Nitroaniline	Cholesterol
Pentachlorophenol	ß-Sitosterol
ß-Coprostanol	

Concentrations of initial calibration standards generally are lower than those used for the 1989 and 1990 program to verify the linearities and response of analytes within the dynamic range of concern for this program. Calibration levels in 1989 and 1990 followed CLP protocol, and initial calibration was established at 20, 50, 80, 120, and 160 ng/μL (ppm).

The USEPA CLP *Functional Guidelines* specify that all Average Relative Response Factors (Average RRFs) must be ≥0.05, and that all Coefficients of Variation (CVs) must be ≤30% for TCL compounds. Average RRFs for these analyses were ≥0.05 for all target analytes and surrogate compounds with the exception of Cholesterol and ß-Sitosterol. An exception to the acceptance criteria has been made for sterols as presented in Section 2.1.4, "Continuing Calibration." All CVs for these analyses were ≤30% for all compounds.

RRFs were confirmed by recalculation from raw data at each concentration for eight selected TCL compounds and two additional non-CLP target compounds. Average RRFs and CVs were confirmed by recalculation for all target compounds. No significant errors in transcription or calculation were found.

Average RRFs and CVs were calculated from the raw data for all surrogate compounds and were confirmed to meet acceptance criteria. RRFs were confirmed for six of the 12 surrogates by recalculation.

2.1.4. Continuing Calibration

Continuing calibration was established on all instrumental analyses for all target analytes and surrogate compounds. Instrumental continuing calibrations were checked at a concentration of 25 ng/µL (ppm). Continuing calibration for the 1989 and 1990 programs was performed according to CLP protocol at a concentration of 50 ng/µL (ppm).

The USEPA CLP *Functional Guidelines* specify that all continuing calibration RRFs must be ≥0.05 and that all Percent Differences (%Ds) between the Average RRF and the continuing calibration RRF must be ≤25% for all TCL compounds. The acceptance criteria for Cholesterol and ß-Sitosterol in this program is %D ≤30% and the minimum RRF is not specified. Because of the high degree of molecular fragmentation associated with these compounds, and the consequent use of characteristic and minor ions in quantitation, greater analytical variability is expected relative to the major ions used for the other TCL compounds. Target analytes and surrogate compounds not meeting these criteria are identified in Table 3.

For the exceptions listed in Table 3, positive results for all associated samples that do not meet acceptance limits for %D on the given date have been qualified "E" (estimated). A summary of qualified data is presented in Section 3.0

RRFs were recalculated and confirmed for the same compounds selected for confirmation under initial calibration. %D was recalculated for all compounds. No significant errors in transcription or calculation were found. All analyses were completed within the required 12 hour time limit for each analytical group, with the exceptions noted under Section 2.1.2, "GC/MS Tuning."

RRFs were confirmed by calculation from raw data for 3 of the 12 surrogate compounds. %Ds were calculated from raw data for all surrogate compounds. Some surrogates did not meet acceptance criteria for %D (≤25%):

Continuing Calibration Date:	4/17/91	4/18/91	4/23/91	4/30/91	5/02/91
Surrogate Compound			%D		
2-Fluorophenol					-27.6%
2,4,6-Tribromophenol	-40.5%			-31.3%	
d_{14}-Dibenz(a,h)anthracene		26.7%	30.9%		

Surrogate compound performance for associated samples on these dates is satisfactory and no results require qualification.

2.1.5. Method Blank Analysis

Method blank analysis was performed at the required frequency (one per extraction batch). In all, eleven method blanks were extracted on six different dates. On each extraction date, selected field samples were separated into polar and nonpolar fractions by SPE. With the exception of the first extraction batch (SDG 7976, 4/01/91), one of the two method blanks extracted on a given date was also fractionated by SPE.

No target analytes were detected above program-established quantitation limits in any method blank. The laboratory reported eight different compounds below the method quantitation limit of 1.0 ng/µL in various method blanks, as summarized in Table 4. Since all compounds detected in method blanks were below this limit, a statistical evaluation for purposes of adjusting quantitation limits on associated samples was not considered. Instead, all sample results reported for these compounds that are below the highest reported value for a blank have been assigned the "U" qualifier. Sample results that have been qualified are summarized in Section 3.0.

In general, method blank performance has improved for the 1991 program as compared to 1989 and 1990.

2.1.6. Surrogate Recovery

The USEPA CLP-specified surrogate compounds and additional project-specified surrogates were added to all samples including method blanks. Surrogate compounds were added at a final extract concentration of 25 ng/µL, as compared to CLP-specified levels of 50 and 100 ng/µL. The average equivalent dry weight concentration for surrogate spikes is 301 µg/kg, based on an average dry weight of 83.1 gm for 66 samples. This concentration is representative of native concentrations of target compounds in project samples. Surrogate compound recoveries are summarized in Table 5.

Project-specified acceptance limits for surrogate recoveries (%R) have been established at ≥50% (Striplin, 1988). Project-specific criteria employed in 1989 included modifications to CLP criteria because of the increased number of surrogates. In 1989, for any sample, if ≥3 surrogates associated with either the acid fraction or the neutral fraction were <50%R, the positive hits for the sample within the appropriate fraction were qualified "E" (estimated); if ≥2 surrogates in either fraction were <10%R, non-detects in the appropriate fraction were qualified "R" (unusable).

Overall surrogate performance is comparable to 1989 in terms of percentage of surrogate analyses within acceptance limits. However, in part due to lower spike levels, surrogate recoveries are generally lower this year for those surrogate compounds with highest vapor pressures. As a result, a more detailed, surrogate-specific evaluation has been employed for evaluating data quality based on surrogate recoveries.

The GC/MS scan number for a surrogate compound is directly related to and positively correlates with the compound's boiling point and vapor pressure; surrogate recoveries were found to relate to the compound's volatility:

Surrogate Compound	Boiling Point °C.	GC Scan # [a]	Surrogate Recovery [b] (%R)
Acid Fraction			
2-Fluorophenol	124		11.0
d_5-Phenol	182	438	22.5
d_4-p-2,3,5,6-Cresol	201.8	574	41.4
2,4,6-Tribromophenol	244	1165	42.2
d_9-Acridine	346	1302	66.4
Linear Correlation Coefficient (r^2) (vs. Boiling Point)		0.79	0.94

Neutral Fraction			
d_4-1,2-Dichlorobenzene	180.5	499	27.4
d_5-Nitrobenzene	210.5	576	29.6
2-Fluorobiphenyl	272		47.9
d_{10}-Anthracene	342	1291	98.1
d_{10}-Fluoranthene	404	1500	
Linear Correlation Coefficient (r^2) (vs. Boiling Point)		**0.99**	**0.95**

a: GC scan number from initial calibration standard (25 ng/µL).
b: Average surrogate recovery for each surrogate compound calculated using a 5-20% window of the lowest surrogate recoveries for all samples (n=12)

By grouping surrogate compounds and target compounds on a basis of their relative volatility, recoveries for individual surrogate compounds can be associated with specific groups of target compounds. Therefore, to evaluate surrogate performance for the 1991 program, surrogate compounds and project target compounds were grouped as acids or neutral compounds. Second, the compounds have been ordered by their scan number, and thus their vapor pressures, in the 25 ng/µL initial calibration standard. Third, target compounds were selected and grouped with individual surrogate compounds with the nearest scan number (Table 6). Acceptance criteria for surrogate recovery have been applied to those compounds grouped with a particular surrogate. For each sample, if an individual surrogate recovery is below 50%, positive results for compounds within the associated surrogate group have been qualified "E" (estimated). If surrogate recovery is below 10%, non-detects within the surrogate group have been qualified "R" (unusable). The surrogate 2-Fluorophenol has been excluded from this analysis since other surrogates were more closely associated with target analytes. A summary of qualified data is presented in Section 3.0.

For each sample, quantitation was verified for 20% of the surrogate compounds by recalculation of results from raw data. Fifty percent of surrogate recoveries for each sample were confirmed by recalculation. Transcription of surrogate recoveries from Form I (Organics Analysis Data Sheet) to Form II (Surrogate Recovery) was confirmed for all surrogate analyses. Several minor errors were detected and the correct values are reported in Table 5.

2.1.7. Matrix Spike/Matrix Spike Duplicate Analysis

MS/MSD analysis was performed on samples associated with four stations, Stations 5, 32, 35, and 44. MS/MSD samples were spiked with all of the CLP TCL compounds and two additional non-CLP target compounds (Cholesterol and 9H-Carbazole) at a concentration of 25 ng/µL, in the final extract. Equivalent dry weight concentrations for each sample are as follows:

Sample ID	Concentration (µg/kg, dry weight)	
	MS	MSD
Sample 5	437	439
Sample 32	205	205
Sample 35	466	465
Sample 44	231	230

The spike level employed is lower than the CLP-specified levels (100 ng/µL for base/neutrals and 200 ng/µL for acids in final extracts) and is similar to native concentrations found in project samples. Also, the CLP requires spikes for only eleven target compounds. MS/MSD recoveries, means, and Coefficient of Variations (CVs) are summarized in Table 7.

MS/MSD analysis also was requested for Station 61, but the laboratory did not add spike compounds to the MS/MSD aliquots prior to analysis. The results for this sample have been submitted as duplicate analyses, and are summarized in Table 8.

MS/MSD performance was evaluated for all program target compounds. As in 1989 and 1990, MS/MSD analyses were not performed for each extraction batch, because the MS/MSD samples were station-designated rather than batch-designated. Evaluation of analytical performance by extraction batch is not appropriate since all extraction batches did not have MS/MSD analyses. To test an alternative method of evaluation, the CV between all MS and MSD recoveries (n=8) was calculated for each compound. The CV is significantly below the target limit of 50% for all but three TCL compounds. The arithmetic mean recoveries for all compounds evaluated in eight MS and MSD analyses have been used to determine analytical performance for the entire 1991 program.

For all samples, if the average MS/MSD recovery for a compound is below 50%, all positive results for that compound have been qualified "E" (estimated). If the average MS/MSD recovery for a compound is below 10%, all non-detects for that compound have been qualified "R" (unusable).

Quantitation was verified for 20% of the MS/MSD compounds in each sample by recalculation of results from raw data. All MS/MSD recoveries for each sample were confirmed by recalculation. Transcription of sample results from Form I to Form III (MS/MSD Recovery) was verified for all compounds on all MS/MSD samples. Several minor errors were detected and the correct values are reported in Table 7. The reported RPD was incorrectly calculated by the lab, and corrected values for the RPD are reported in Table 7.

2.1.8. Internal Standards Performance

CLP-specified internal standards were added to all sample extracts at a concentration of 20 ng/µL, which corresponds to an average equivalent dry weight concentration of 241 µg/kg. CLP protocol specifies an internal standard concentration of 40 ng/µL.

Retention Times (RT) for all internal standards in all samples are within acceptance limits (±30 seconds). With one exception, all internal standard areas for all samples are within CLP-specified acceptance limits (0.5 to 2 times the area of the 12-hour calibration standard). The internal standard area for d_{12}-Perylene in Sample 34 is 0.47 times the area of the 12-hour standard area. This deviation is not considered significant, and no results have been qualified.

Transcription accuracy from quantitation reports to Form VIII (Internal Standard Area Summary) was checked and verified for all 12-hour standards, and approximately 20% of the samples. Very few errors were found, none of which affected reported results.

2.1.9. TCL Compound Identification

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

2.1.10. Compound Quantitation and Reported Detection Limits

Quantitation calculations were verified by recalculation of results from raw data for target analytes and surrogate compounds for about 20 to 30% of the compounds reported for each sample. The appropriate internal standard, quantitation ion, and RRF were used in quantitating all compounds. Transcription of results from quantitation reports to Form I, and proper dry weight conversion were checked and verified for all reported compounds. Very few transcription errors were noted and have been corrected as reported in Table 1. Average quantitation limits are given in Table 9. Results reported as positive hits by the laboratory, but below the laboratory Method Quantitation Limit, have been qualified "E" (estimated).

Cholesterol results for Samples 34 and 47, and the ß-Sitosterol result for Sample 40 exceeded 120% of the highest initial calibration standard. As a consequence, these results have been qualified "E" (estimated). Thresholds for reporting alkane quantitations were established at 5000 counts by GC/MS for determination of Pristane/Phytane ratios and n-Alkane CPIs.

2.1.11. Tentatively Identified Compounds

Tentatively identified compounds are summarized in Table 10 for each sample including blanks, by number identified, average concentration, and maximum concentration.

2.1.12. System Performance

Examination of raw data did not reveal any evidence of significant degradation in 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 were observed.

2.1.13. Other Performance Data

Field-Generated QC Samples: Two types of field-generated QC samples were collected from five separate stations. Station duplicate splits were generated by taking two separate aliquots from a composite of at least two van Veen grab samples. One aliquot was assigned to the primary station number, and the second aliquot was assigned a surrogate station number. Two additional, separate station replicates were generated by collecting one sample from each of two separate van Veen grabs while on station. Station replicates were assigned separate surrogate station numbers.

Analytical results and summary statistics for all duplicates and replicates are presented in Table 11. The mean value and RPD were first calculated for the station duplicate splits. The CV and mean of all three station replicates were calculated using the mean of the duplicate splits for the first replicate (n=3).

Project Comparison Samples (PCS): Homogenized archived sediment from Sequim Bay was submitted for analysis as Samples 66, 67, and 68. This material was acquired from the Office of Coastal Waters, USEPA Region X, and consists of a composited marine sediment that had been prepared as a fortified sample by the NOAA National Marine Fisheries Laboratory, under contract to EPA Region X. Analytical results and summary statistics for these samples are presented in Table 12. This material was also analyzed during the 1989 and 1990 PSAMP.

2.2. Substituted Guaiacol and Resin Acid Analyses

2.2.1. Introduction

Seven samples (4, 8, 12, 41, 78, 79, and 80) were analyzed by GC/MS for ten resin acids, guaiacol, and four chlorinated guaiacols. MS/MSD analyses were performed on Station 4 for resin acids only. GPC (Gel Permeation Chromatography) cleanup was employed per the CLP protocol prior to analysis. Resin acid analyses were accomplished with 100 gram (wet weight) sample aliquots. Guaiacol and chlorinated guaiacol analyses on Samples 78, 79, and 80 were performed with 100 gram (wet weight) sample aliquots, and on Samples 4, 8, 12, and 41 with 150 gram (wet weight) sample aliquots. Analytical results for guaiacols and resin acids are presented in Table 1 with BNA results.

Samples 4, 8, 12, and 41 were analyzed for guaiacols in the BNA extracts. Sample 41 guaiacol quantitation was reported relative to the first batch of BNA extractions (0329MB). Surrogate compounds for the guaiacols were the BNA phenol surrogates (see Table 5). Samples 78, 79, and 80 are replicates of Station 4, and were analyzed separately from other BNA analyses

Samples 4, 8, 12, 41, 78, 79, and 80 all were analyzed for resin acids on the same date. A single surrogate, O-Methylpodocarpic acid, was added to all samples.

Resin acids were derivatized to methyl esters in order to increase target compound vapor pressures, which in turn yields enhancements in detection limits and sensitivities for GC/MS analyses. Derivatization was accomplished by reaction of diazomethane with the sample extracts. An excess of diazomethane is added to the 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.

2.2.2. Sample Holding Times

Guaiacols analyzed with the BNAs in the acid/phenol fraction were extracted within the 7 day holding time. Samples 78, 79, and 80 (guaiacols) and all samples analyzed for resin acids were extracted from the frozen archive within 24 days. No associated results required qualification. Recommended holding times for analysis of extracts (40 days from collection) were met for all samples. Sample holding times are summarized in Table 13A and 13B.

2.2.3. GC/MS Tuning

The GC/MS tune performance was checked with Decafluorotriphenylphosphine (DFTPP) prior to initial calibration and all subsequent sample analytical runs. All ion abundances and relative ion abundances meet CLP acceptance criteria. Mass spectral plots and associated mass listings were compared, and transcription of mass data to the GC/MS Tuning and Mass Calibration summary form were checked. No inconsistencies or transcription errors were found.

2.2.4. Initial Calibration

Initial multipoint calibration was established at concentrations of 2, 5, 10, 25, and 50 ng/μL for guaiacols, and at 25, 50, and 100 ng/μL for the methyl esters of resin acids. All average RRFs for both guaiacols and resin acids were ≥0.05, and all CVs were ≤30%. RRFs, Average RRFs and CVs were confirmed by recalculation for all compounds at all concentrations. CVs for resin acid were incorrectly calculated by the laboratory. The corrected values were all within acceptance limits.

2.2.5. Continuing Calibration

Continuing calibration was established for all instrumental analyses for substituted guaiacols at a concentration of 25 ng/μL. All RRFs were ≥0.05, and all %Ds were ≤25% with the exception of 3,4,5-Trichloroguaiacol, which were:

Calibration Date:	4/17/91	4/19/91	4/23/91	4/25/91	5/02/91
%D:	-46.6	-26.1	-28.4	-33.5	-26.1

No positive results have been reported for this compound, thus qualification of results was not required. All resin acid analyses were performed during the same instrumental run as the initial calibration standards. Samples were quantitated for resin acids relative to the 50 ng/μL initial calibration standard.

2.2.6. Method Blank Analysis

Method blanks associated with Samples 4, 8, 12, and 41 guaiacol analyses were reported with the BNA analyses. Examination of raw data for the blanks associated with each of these samples shows no guaiacols detected above the laboratory detection limit (1.0 ng/μL in the final extract). Results for the method blank associated with Samples 78, 79, and 80 guaiacol analyses, and resin acid analyses for all seven samples show no detected target compounds above the laboratory detection limit (1.0 ng/μL). Laboratory IDs for method blanks are given below. The laboratory ID for the method blank includes the extraction date:

Sample ID	Resin Acids	Substituted Guaiacols
4	0420MB	0411MB
8	0420MB	0416MB
12	0420MB	0416MB
41	0420MB	0329MB
78, 79, 80	0420MB	0420MB

2.2.7. Surrogate Recovery

Surrogate performance for Samples 4, 8, 12, and 41 guaiacol analyses was evaluated relative to BNA acid fraction surrogate compounds (see Table 6). Acid surrogate compound recoveries for these samples were all ≥50% and no associated results required qualification. Surrogate compounds were not added for guaiacols to Samples 78, 79, and 80. Surrogate performance for resin acids was evaluated using recoveries for O-Methylpodocarpic acid, which was added to all samples:

Sample ID	Surrogate Recovery (%R) S8 (CRE)	S6 (TBP)	S10 (ACR)	O-Methyl-podocarpic acid
4	76.9%	52.9%	99.5%	92.5%
8	65.2	63.8	102	100
12	70.8	69.0	103	92.0
41	51.7	50.9	92.1	69.7
78	NA	NA	NA	92.3
79	NA	NA	NA	65.9
80	NA	NA	NA	**19.6**

S6 (TBP) = 2,4,6-Tribromophenol
S8 (CRE) = d_4-2,3,5,6-*p*-Cresol
S10 (ACR) = d_9-Acridine

Recoveries for O-Methylpodocarpic acid are all ≥50% with the exception of Sample 80, which was 19.6%. Positive results for resin acids in Sample 80 have been qualified "E" (estimated).

For each sample, quantitation for all surrogate compounds was verified by recalculation of results from raw data. All surrogate recoveries were confirmed by recalculation. Transcription of surrogate recoveries from Form I (Organics Analysis Data Sheet) to Form II (Surrogate Recovery) was confirmed for all resin acid surrogate analyses. No errors were detected with the exception that Sample 12 was reported as Sample 71 on Form II.

2.2.8. MS/MSD Analysis

MS/MSD analyses were performed on the Sample 4, but only for resin acids. Both the MS and MSD samples were spiked with all resin acid target compounds at a concentration of 25 ng/µL (in the final extract), which corresponds to an equivalent dry weight concentration of 670 µg/kg for the MS sample and 672 µg/kg for the MSD sample. MS/MSD results are summarized below:

Target Analyte	MS % Recovery	MSD % Recovery	% RPD	Average % Recovery
Pimaric acid	98.9	96.1	2.9	97.5
Sandaracopimaric acid	94.4	85.7	9.7	90.1
Isopimaric acid	100	103	-3.1	102
Palustric acid	5.0	6.6	-27.6	***5.8***
Dehydroabietic acid	103	99.9	2.6	101
Abietic acid	97.4	97.0	0.4	97.2
Neoabietic acid	29.5	31.4	-6.1	**30.5**
12-Chlorodehydroabietic acid	99.1	88.4	11.4	93.7
14-Chlorodehydroabietic acid	103	95.5	7.8	99.4
Dichlorodehydroabietic acid	105	91.5	13.8	98.3

MS/MSD results were evaluated by comparing the average recovery for the MS and MSD samples with project-specified acceptance limits (see Section 2.1.7). The average MS/MSD recovery for Palustric acid (5.8%) is <10%, and all samples with non-detects for this compound have been qualified "R" (unusable). The average MS/MSD recovery for Neoabietic acid (30.5%) is <50%. However, the compound was not reported in any samples, and no results have been qualified. All RPDs are within acceptance limits (>-100% and <+100%).

For each sample, quantitation for all MS/MSD compounds was verified by recalculation of results from raw data. All MS/MSD recoveries for each sample were confirmed by recalculation. Transcription of sample results from Form I to Form III (MS/MSD Recovery) was verified for all compounds. No errors were found. The RPD was incorrectly calculated by the lab. The corrected values are presented above.

2.2.9. Internal Standards Performance

Internal standards applied to the resin acid/substituted guaiacol analyses were d_8-Naphthalene (guaiacol) and d_{12}-Chrysene (resin acids). All RTs and internal standard areas were within CLP-specified acceptance limits, as discussed in Section 2.1.8.

Transcription accuracy from quantitation reports to Form VIII (Internal Standard Area Summary) was checked and verified for all 12-hour standards and all of the samples. No errors were found.

2.2.10. Compound Identification/Quantitation

RRTs for all reported target compounds were within acceptance limits. Ion relative abundances were checked against reference spectra and were found to be acceptable. Quantitation calculations were verified for all detected compounds. Average quantitation limits are presented in Table 9.

2.2.11. Other Performance Data

Field-Generated QC Samples: Station duplicate splits and station replicates from Station 4 were analyzed for guaiacols and resin acids. Analytical results and summary statistics for these duplicates and replicates are presented in Table 14. Sampling methods and statistical methods are discussed in Section 2.1.13.

2.3. Overall Case Assessment

A high level of effort was exhibited by the laboratory for this project. All deliverables required by the project are present and the data package is complete. The quantitation levels achieved are significantly lower than CLP requirements. The general quality of the data is very good. The data is considered to be usable for the intended purposes.

3.0 Summary of Qualified Data

3.1. The following analytical results have been qualified "E" (estimated) because the Percent Difference (%D) between the Average Relative Response Factor and the associated continuing calibration Relative Response Factor did not meet acceptance criteria, as discussed in Section 2.1.4:

Isophorone	Sample	68
Benzoic acid	Samples	1, 8, 10R, 12, 17, 35, 61, 62, 66, 68, 69, 71, 72, 201R, 202R, 203R
2-Methylnaphthalene	Sample	74

Anthracene	Samples	1, 8, 12, 68, 201R, 203R
Butylbenzylphthalate	Sample	8
bis(2-Ethylhexyl)phthalate	Samples	1, 8, 12, 17, 18, 19, 20, 21, 29, 33, 67, 68, 69, 201R, 202R, 203R
Benzo(g,h,i)perylene	Samples	35, 66, 72
ß-Coprostanol	Samples	1, 8, 10R, 12, 17, 18, 19, 20, 21, 22, 29, 32, 33, 40, 41, 45, 47, 48, 49, 57, 58, 59, 60, 63, 64, 65, 67, 68, 69, 70, 74, 201R, 202R, 203R
Cholesterol	Samples	1, 8, 12, 17, 29, 30, 34, 38, 40, 41, 45, 47, 60, 63, 64, 65, 68, 69, 74, 201R, 202R, 203R
ß-Sitosterol	Samples	1, 8, 10R, 12, 17, 44, 45, 47, 48, 49, 60, 63, 64, 65, 68, 70, 201R, 202R, 203R
Retene	Samples	10R, 11R, 35, 61, 62, 66, 72, 73

3.2. The following analytical results have been assigned the "U" qualifier in order to decrease the significance of the reported value based on an evaluation of positive hits in method blanks, as discussed in Section 2.1.5:

Di-n-butylphthalate	Samples	11R, 17, 32, 65, 67, 68, 201R
bis(2-Ethylhexyl)phthalate	Samples	9R, 13R, 201R, 205R
Chrysene	Samples	10R, 11R, 13R, 15, 17, 18, 20, 39, 47, 53, 201R, 202R, 208R, 209R
Benzo(b+k)fluoranthene	Samples	11R, 15, 18, 20, 39, 209R

3.3. The following analytical results have been qualified "R" (unusable) because associated surrogate recoveries did not meet acceptance criteria, as discussed in Section 2.1.6:

Phenol	Samples	48, 49, 70
bis(2-Chloroethyl)ether	Sample	70
2-Chlorophenol	Samples	48, 49, 70
1,3-Dichlorobenzene	Sample	70
1,4-Dichlorobenzene	Sample	70
Benzyl alcohol	Sample	70
1,2-Dichlorobenzene	Sample	70
bis(2-Chloroisopropyl)ether	Sample	70
N-Nitroso-di-n-propylamine	Sample	70
Hexachloroethane	Sample	70
Nitrobenzene	Sample	70
Isophorone	Sample	70
Benzoic acid	Sample	70
bis(2-Chloroethoxy)methane	Sample	70
1,2,4-Trichlorobenzene	Sample	70
Naphthalene	Sample	70

4-Chloroaniline	Sample	70
Cymene	Sample	70

3.4. The following analytical results have been qualified "E" (estimated) because associated surrogate recoveries did not meet acceptance criteria, as discussed in Sections 2.1.6 and 2.2.7:

Phenol	Samples	8, 10R, 12, 30, 32, 34, 35, 40, 41, 51, 52, 57, 59, 60, 61, 62, 66, 67, 68, 71, 72, 73, 74, 201R, 202R, 205R, 206R
1,3-Dichlorobenzene	Samples	66, 67, 68
1,4-Dichlorobenzene	Samples	66, 67, 68
1,2-Dichlorobenzene	Samples	67, 68
4-Methylphenol	Samples	67, 68
Isophorone	Sample	66, 67, 68
Benzoic Acid	Samples	1, 2R, 4, 5, 8, 12, 17, 35, 41, 49, 51, 61, 62, 66, 67, 68, 71, 72, 73, 74, 201R, 205R, 206R
Naphthalene	Samples	1, 2R, 4, 5, 8, 12, 21, 29, 30, 33 ,34, 35, 38, 40, 41, 49, 51, 52, 53, 59, 60, 61, 62, 66, 67, 68, 71, 72, 201R, 205R, 206R
2-Methylnaphthalene	Samples	21, 29, 33, 67, 72
Acenaphthylene	Samples	33, 67, 72
Acenaphthene	Samples	21, 33, 67
Dibenzofuran	Samples	21, 33, 49, 72
Cymene	Samples	8, 21, 40, 41, 49
Dehydroabietic acid	Sample	80

3.5. The following analytical results have been qualified "R" (unusable) because matrix spike and/or matrix spike duplicate recoveries did not meet acceptance criteria, as discussed in Sections 2.1.7 and 2.2.8:

4-Chloroaniline	All Samples
Hexachlorocyclopentadiene	All Samples
3,3'-Dichlorobenzidine	All Samples
Benzo(g,h,i)perylene	All Samples except 33, 40, 66, 67, 68, 72
Palustric acid	Samples 4, 8, 12, 41, 78, 79, 80

3.6. The following analytical results have been qualified "E" (estimated) because matrix spike and/or matrix spike duplicate recoveries did not meet acceptance criteria, as discussed in Sections 2.1.7 and 2.2.8:

1,3-Dichlorobenzene	Samples	66, 67, 68
1,4-Dichlorobenzene	Samples	66, 67, 68
1,2-Dichlorobenzene	Samples	67, 68
Isophorone	Samples	66, 67, 68

Benzoic acid	Samples	1, 2R, 3, 4, 5, 8, 10R, 11R, 12, 13R, 14, 15, 17, 18, 19, 20, 26, 35, 41, 43, 44, 45, 47, 49, 51, 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, 72, 73, 74, 201R, 202R, 203R, 204R, 205R, 206R, 207R, 208R
2-Methylnaphthalene	Samples	1, 2R, 3, 4, 5, 8, 10R, 11R, 12, 14, 20, 21, 26, 29, 30, 33, 35, 40, 41, 45, 51, 52, 53, 61, 62, 66, 67, 68, 71, 72, 74, 201R, 202R, 203R, 204R, 205R, 206R, 207R
Pentachlorophenol	Samples	66, 67, 68
Benzo(a)pyrene	Samples	1, 2R, 3, 4, 5, 8, 12, 14, 17, 19, 21, 22, 26, 29, 30, 32, 33, 34, 35, 38, 40, 41, 44, 45, 51, 52, 53, 57, 58, 59, 60, 61, 62, 64, 66, 67, 68, 69, 70 71, 72, 73, 74, 201R, 203R, 204R, 205R, 206R, 207R, 208R
Indeno(1,2,3-c,d)pyrene	Samples	1, 2R, 8, 21, 22, 29, 30, 32, 33, 34, 35, 38, 40, 41, 57, 58, 59, 60, 61, 62, 71, 72, 73, 74, 207R
Benzo(g,h,i)perylene	Samples	33, 40, 66, 67, 68, 72
Dehydroabietic acid	Sample	80

3.7. The following analytical results have been qualified "E" (estimated) because the sample result exceeded the calibrated range of the instrument, as discussed in Section 2.1.10:

Cholesterol	Samples	34, 47
ß-Sitosterol	Sample	40

Table 1. BNA Analyses - Qualified Sample Results

CAS No.	Target Parameter (values in µg/kg, dry weight)	STATION 1 Sample 1 8041P	STATION 2R Sample 2R 8041Q	STATION 3 Sample 3 8078A	STATION 4 Sample 4 8041A	STATION 4 Sample 78 8041J	STATION 4 Sample 79 8041K	STATION 4 Sample 80 8041L	STATION 5 Sample 5 8041B
108-95-2	Phenol	16 U	**6 N**	**7 N**	20 U				18 U
111-44-4	bis(2-Chloroethyl)ether	16 U	12 U	13 U	20 U				18 U
95-57-8	2-Chlorophenol	16 U	12 U	13 U	20 U				18 U
541-73-1	1,3-Dichlorobenzene	16 U	12 U	13 U	20 U				18 U
106-46-7	1,4-Dichlorobenzene	16 U	12 U	13 U	20 U				18 U
100-51-6	Benzyl alcohol	77 U	58 U	66 U	97 U				88 U
95-50-1	1,2-Dichlorobenzene	16 U	12 U	13 U	20 U				18 U
95-48-7	2-Methylphenol	16 U	12 U	13 U	20 U				18 U
108-60-1	bis(2-Chloroisopropyl)ether	16 U	12 U	13 U	20 U				18 U
106-44-5	4-Methylphenol	16 U	12 U	13 U	20 U				18 U
621-64-7	N-Nitroso-di-n-propylamine	16 U	12 U	13 U	20 U				18 U
67-72-1	Hexachloroethane	31 U	23 U	26 U	39 U				35 U
98-95-3	Nitrobenzene	16 U	12 U	13 U	20 U				18 U
78-59-1	Isophorone	16 U	12 U	13 U	20 U				18 U
88-75-5	2-Nitrophenol	77 U	58 U	66 U	97 U				88 U
105-67-9	2,4-Dimethylphenol	31 U	23 U	26 U	39 U				35 U
65-85-0	Benzoic acid	**25 E**	**21 E**	**19 E**	**44 E**				**37 E**
111-91-1	bis(2-Chloroethoxy)methane	16 U	12 U	13 U	20 U				18 U
120-83-2	2,4-Dichlorophenol	46 U	35 U	39 U	58 U				53 U
120-82-1	1,2,4-Trichlorobenzene	16 U	12 U	13 U	20 U				18 U
91-20-3	Naphthalene	**6 E**	**4 E**	**5 E**	**8 E**				**7 E**
106-47-8	4-Chloroaniline	R	R	R	R				R
87-68-3	Hexachlorobutadiene	31 U	23 U	26 U	39 U				35 U
59-50-7	4-Chloro-3-methylphenol	31 U	23 U	26 U	39 U				35 U
91-57-6	2-Methylnaphthalene	**8 E**	**8 E**	**9 E**	**7 E**				**7 E**
77-47-4	Hexachlorocyclopentadiene	R	R	R	R				R
88-06-2	2,4,6-Trichlorophenol	77 U	58 U	66 U	97 U				88 U
95-95-4	2,4,5-Trichlorophenol	77 U	58 U	66 U	97 U				88 U
91-58-7	2-Chloronaphthalene	16 U	12 U	13 U	20 U				18 U
88-74-4	2-Nitroaniline	77 U	58 U	66 U	97 U				88 U
131-11-3	Dimethylphthalate	16 U	12 U	13 U	20 U				18 U
208-96-8	Acenaphthylene	16 U	12 U	13 U	20 U				18 U
99-09-2	3-Nitroaniline	77 U	58 U	66 U	97 U				88 U

Table 1. (continued) BNA Analyses - Qualified Sample Results

CAS No.	Target Parameter (values in µg/kg, dry weight)	STATION 1 Sample 1 8041P	STATION 2R Sample 2R 8041Q	STATION 3 Sample 3 8078A	STATION 4 Sample 4 8041A	STATION 4 Sample 78 8041J	STATION 4 Sample 79 8041K	STATION 4 Sample 80 8041L	STATION 5 Sample 5 8041B
83-32-9	Acenaphthene	**4 E**	12 U	13 U	20 U				18 U
51-28-5	2,4-Dinitrophenol	155 U	115 U	131 U	195 U				175 U
100-02-7	4-Nitrophenol	77 U	58 U	66 U	97 U				88 U
132-64-9	Dibenzofuran	**6 E**	**4 E**	13 U	20 U				**4 E**
121-14-2	2,4-Dinitrotoluene	77 U	58 U	66 U	97 U				88 U
606-20-2	2,6-Dinitrotoluene	77 U	58 U	66 U	97 U				88 U
84-66-2	Diethylphthalate	16 U	12 U	13 U	20 U				18 U
7005-72-3	4-Chlorophenyl-phenylether	16 U	12 U	13 U	20 U				18 U
86-73-7	Fluorene	**9 E**	**6 E**	**4 N**	**4 E**				**5 E**
100-01-6	4-Nitroaniline	77 U	58 U	66 U	97 U				88 U
534-52-1	4,6-Dinitro-2-methylphenol	155 U	115 U	131 U	195 U				175 U
86-30-6	N-Nitrosodiphenylamine	16 U	12 U	13 U	20 U				18 U
101-55-3	4-Bromophenyl-phenylether	16 U	12 U	13 U	20 U				18 U
118-74-1	Hexachlorobenzene	16 U	12 U	13 U	20 U				18 U
87-86-5	Pentachlorophenol	77 U	58 U	66 U	97 U				88 U
85-01-8	Phenanthrene	**110**	**59**	**38**	**51**				**50**
120-12-7	Anthracene	**17 E**	**11 E**	**3 N**	**6 N**				**7 E**
84-74-2	Di-n-butylphthalate	**12 N**	12 U	13 U	20 U				18 U
206-44-0	Fluoranthene	**94**	**57**	**17**	**36**				**39**
129-00-0	Pyrene	**58**	**33**	**10 E**	**23**				**26**
85-68-7	Butylbenzylphthalate	16 U	12 U	13 U	20 U				18 U
91-94-1	3,3'-Dichlorobenzidine	R	R	R	R				R
56-55-3	Benzo(a)anthracene	**28**	**20**	**6 E**	**13 E**				**14 E**
117-81-7	bis(2-Ethylhexyl)phthalate	**11 E**	**6 E**	**7 E**	**18 E**				**34**
218-01-9	Chrysene	**42**	**27**	**9 E**	**19 E**				**20**
117-84-0	Di-n-octylphthalate	16 U	12 U	13 U	20 U				18 U
205-99-2	Benzo(b)fluoranthene								
207-08-9	Benzo(k)fluoranthene								
	Benzo(b+k)fluoranthene	**68**	**41**	**13 E**	**26**				**29**
50-32-8	Benzo(a)pyrene	**17 E**	**11 E**	**5 N**	**10 E**				**9 E**
193-39-5	Indeno(1,2,3-c,d)pyrene	**15 N**	**9 N**	13 U	20 U				18 U
53-70-3	Dibenz(a,h)anthracene	16 U	12 U	13 U	20 U				18 U
191-24-2	Benzo(g,h,i)perylene	R	R	R	R				R

Table 1. (continued) BNA Analyses - Qualified Sample Results

CAS No.	Target Parameter (values in µg/kg, dry weight)	STATION 1 Sample 1 8041P	STATION 2R Sample 2R 8041Q	STATION 3 Sample 3 8078A	STATION 4 Sample 4 8041A	STATION 4 Sample 78 8041J	STATION 4 Sample 79 8041K	STATION 4 Sample 80 8041L	STATION 5 Sample 5 8041B
25155-15-1	Cymene	77 U	58 U	66 U	97 U				88 U
86-74-8	9H-Carbazole	16 U	**4 N**	13 U	20 U				18 U
58-08-2	Caffeine	16 U	12 U	13 U	20 U				18 U
198-55-0	Perylene	**17 E**	**10 E**	**13 E**	**12 E**				**13 N**
80-97-7	ß-Coprostanol	**180 E**	**97 N**	**170**	**180**				**140 N**
57-88-5	Cholesterol	**1000 E**	**900**	**1600**	**1600**				**1500**
83-46-5	ß-Sitosterol	**1100 E**	**770**	**1100**	**2100**				**1800**
483-65-8	Retene	**31 E**	**17 E**	**12 E**	**16 E**				**20 E**
90-05-1	2-Methoxyphenol (Guaiacol)				20 U	27 U	27 U	26 U	
2460-49-3	4,5-Dichloroguaiacol				20 U	27 U	27 U	26 U	
2668-24-8	4,5,6-Trichloroguaiacol				20 U	27 U	27 U	26 U	
57057-83-7	3,4,5-Trichloroguaiacol				20 U	27 U	27 U	26 U	
2539-17-5	Tetrachloroguaiacol				20 U	27 U	27 U	26 U	
127-27-5	Pimaric acid				27 U	27 U	27 U	26 U	
471-74-9	Sandaracopimaric acid				27 U	27 U	27 U	26 U	
5835-26-7	Isopimaric acid				**38**	27 U	27 U	26 U	
1945-53-5	Palustric acid				R	R	R	R	
1740-19-8	Dehydroabietic acid				**92**	**66**	**63**	**33 E**	
514-10-3	Abietic acid				**36**	**28 N**	**21 N**	26 U	
471-77-2	Neoabietic acid				27 U	27 U	27 U	26 U	
-	12-Chlorodehydroabietic acid				27 U	27 U	27 U	26 U	
-	14-Chlorodehydroabietic acid				**32**	**22 N**	27 U	26 U	
57055-39-7	Dichlorodehydroabietic acid				27 U	27 U	27 U	26 U	
	Pristane/Phytane Ratio		3.774						
	Carbon Preference Index	1.879	2.700	2.606	1.541				1.387

Table 1. (continued) BNA Analyses - Qualified Sample Results

CAS No.	Target Parameter (values in µg/kg, dry weight)	STATION 5 Sample 51 8041F	STATION 5 Sample 52 8041G	STATION 5 Sample 53 8041H	STATION 8 Sample 8 8078B	STATION 9R Sample 9R 8078C	STATION 10R Sample 10R 8078D	STATION 11R Sample 11R 8078E	STATION 12 Sample 12 8078J
108-95-2	Phenol	**6 E**	**6 E**	18 U	**9 N**	**7 E**	**6 E**	**50**	**10 N**
111-44-4	bis(2-Chloroethyl)ether	18 U	17 U	18 U	13 U	8 U	9 U	13 U	16 U
95-57-8	2-Chlorophenol	18 U	17 U	18 U	13 U	8 U	9 U	13 U	16 U
541-73-1	1,3-Dichlorobenzene	18 U	17 U	18 U	13 U	8 U	9 U	13 U	16 U
106-46-7	1,4-Dichlorobenzene	18 U	17 U	18 U	13 U	8 U	9 U	13 U	16 U
100-51-6	Benzyl alcohol	88 U	87 U	88 U	64 U	40 U	47 U	66 U	79 U
95-50-1	1,2-Dichlorobenzene	18 U	17 U	18 U	13 U	8 U	9 U	13 U	16 U
95-48-7	2-Methylphenol	18 U	17 U	18 U	13 U	8 U	9 U	13 U	16 U
108-60-1	bis(2-Chloroisopropyl)ether	18 U	17 U	18 U	13 U	8 U	9 U	13 U	16 U
106-44-5	4-Methylphenol	18 U	17 U	18 U	13 U	8 U	9 U	13 U	16 U
621-64-7	N-Nitroso-di-n-propylamine	18 U	17 U	18 U	13 U	8 U	9 U	13 U	16 U
67-72-1	Hexachloroethane	35 U	35 U	35 U	26 U	16 U	19 U	26 U	32 U
98-95-3	Nitrobenzene	18 U	17 U	18 U	13 U	8 U	9 U	13 U	16 U
78-59-1	Isophorone	18 U	17 U	18 U	13 U	8 U	9 U	13 U	16 U
88-75-5	2-Nitrophenol	88 U	87 U	88 U	64 U	40 U	47 U	66 U	79 U
105-67-9	2,4-Dimethylphenol	35 U	35 U	35 U	26 U	16 U	19 U	26 U	32 U
65-85-0	Benzoic acid	**21 E**	173 U	175 U	**24 E**	79 U	**15 N**	**25 E**	**48 N**
111-91-1	bis(2-Chloroethoxy)methane	18 U	17 U	18 U	13 U	8 U	9 U	13 U	16 U
120-83-2	2,4-Dichlorophenol	53 U	52 U	53 U	38 U	24 U	28 U	40 U	48 U
120-82-1	1,2,4-Trichlorobenzene	18 U	17 U	18 U	13 U	8 U	9 U	13 U	16 U
91-20-3	Naphthalene	**6 E**	**4 E**	**5 E**	**16 E**	8 U	**3 E**	13 U	**10 E**
106-47-8	4-Chloroaniline	R	R	R	R	R	R	R	R
87-68-3	Hexachlorobutadiene	35 U	35 U	35 U	26 U	16 U	19 U	26 U	32 U
59-50-7	4-Chloro-3-methylphenol	35 U	35 U	35 U	26 U	16 U	19 U	26 U	32 U
91-57-6	2-Methylnaphthalene	**5 E**	**4 E**	**4 E**	**11 E**	8 U	**4 E**	**5 E**	**11 E**
77-47-4	Hexachlorocyclopentadiene	R	R	R	R	R	R	R	R
88-06-2	2,4,6-Trichlorophenol	88 U	87 U	88 U	64 U	40 U	47 U	66 U	79 U
95-95-4	2,4,5-Trichlorophenol	88 U	87 U	88 U	64 U	40 U	47 U	66 U	79 U
91-58-7	2-Chloronaphthalene	18 U	17 U	18 U	13 U	8 U	9 U	13 U	16 U
88-74-4	2-Nitroaniline	88 U	87 U	88 U	64 U	40 U	47 U	66 U	79 U
131-11-3	Dimethylphthalate	18 U	17 U	18 U	13 U	8 U	9 U	13 U	16 U
208-96-8	Acenaphthylene	18 U	17 U	18 U	**5 E**	8 U	9 U	13 U	**2 N**
99-09-2	3-Nitroaniline	88 U	87 U	88 U	64 U	40 U	47 U	66 U	79 U

Table 1. (continued) BNA Analyses - Qualified Sample Results

CAS No.	Target Parameter (values in µg/kg, dry weight)	STATION 5 Sample 51 8041F	STATION 5 Sample 52 8041G	STATION 5 Sample 53 8041H	STATION 8 Sample 8 8078B	STATION 9R Sample 9R 8078C	STATION 10R Sample 10R 8078D	STATION 11R Sample 11R 8078E	STATION 12 Sample 12 8078J
83-32-9	Acenaphthene	18 U	17 U	18 U	**5 E**	8 U	9 U	13 U	16 U
51-28-5	2,4-Dinitrophenol	175 U	173 U	175 U	128 U	79 U	94 U	132 U	159 U
100-02-7	4-Nitrophenol	88 U	87 U	88 U	64 U	40 U	47 U	66 U	79 U
132-64-9	Dibenzofuran	18 U	17 U	18 U	**8 E**	8 U	9 U	13 U	**5 N**
121-14-2	2,4-Dinitrotoluene	88 U	87 U	88 U	64 U	40 U	47 U	66 U	79 U
606-20-2	2,6-Dinitrotoluene	88 U	87 U	88 U	64 U	40 U	47 U	66 U	79 U
84-66-2	Diethylphthalate	18 U	17 U	18 U	13 U	8 U	**11 N**	13 U	16 U
7005-72-3	4-Chlorophenyl-phenylether	18 U	17 U	18 U	13 U	8 U	9 U	13 U	16 U
86-73-7	Fluorene	**4 E**	17 U	18 U	**9 E**	8 U	9 U	13 U	**8 E**
100-01-6	4-Nitroaniline	88 U	87 U	88 U	64 U	40 U	47 U	66 U	79 U
534-52-1	4,6-Dinitro-2-methylphenol	175 U	173 U	175 U	128 U	79 U	94 U	132 U	159 U
86-30-6	N-Nitrosodiphenylamine	18 U	17 U	18 U	13 U	8 U	9 U	13 U	16 U
101-55-3	4-Bromophenyl-phenylether	18 U	17 U	18 U	13 U	8 U	9 U	13 U	16 U
118-74-1	Hexachlorobenzene	18 U	17 U	18 U	13 U	8 U	9 U	13 U	16 U
87-86-5	Pentachlorophenol	88 U	87 U	88 U	64 U	40 U	47 U	66 U	79 U
85-01-8	Phenanthrene	**36**	**30**	**35**	**73**	8 U	**19**	**19**	**64**
120-12-7	Anthracene	**7 E**	**5 E**	**5 N**	**18 E**	8 U	**2 N**	13 U	**10 E**
84-74-2	Di-n-butylphthalate	18 U	17 U	18 U	13 U	8 U	**9 N**	**4 U**	16 U
206-44-0	Fluoranthene	**32**	**26**	**28**	**82**	8 U	**8 E**	**9 E**	**53**
129-00-0	Pyrene	**21**	**16 E**	**20**	**40**	8 U	**6 E**	**8 E**	**38**
85-68-7	Butylbenzylphthalate	18 U	17 U	18 U	**22 E**	8 U	9 U	13 U	16 U
91-94-1	3,3'-Dichlorobenzidine	R	R	R	R	R	R	R	R
56-55-3	Benzo(a)anthracene	**12 E**	**8 E**	**9 E**	**26**	8 U	**3 E**	**4 E**	**16 E**
117-81-7	bis(2-Ethylhexyl)phthalate	**12 E**	**10 E**	**12 E**	**33 E**	2 U	**51**	**7 E**	**27 E**
218-01-9	Chrysene	**18**	**15 E**	14 U	**57**	8 U	5 U	6 U	**31**
117-84-0	Di-n-octylphthalate	18 U	17 U	18 U	13 U	8 U	9 U	**7 E**	16 U
205-99-2	Benzo(b)fluoranthene					8 U			
207-08-9	Benzo(k)fluoranthene					8 U			
	Benzo(b+k)fluoranthene	**25**	**21**	**18 E**	**65**	16 U	**7 E**	8 U	**45**
50-32-8	Benzo(a)pyrene	**8 E**	**6 N**	**6 E**	**11 E**	8 U	9 U	13 U	**10 E**
193-39-5	Indeno(1,2,3-c,d)pyrene	18 U	17 U	18 U	**7 N**	8 U	9 U	13 U	16 U
53-70-3	Dibenz(a,h)anthracene	**7 N**	17 U	18 U	**8 N**	8 U	9 U	13 U	16 U
191-24-2	Benzo(g,h,i)perylene	R	R	R	R	R	R	R	R

Table 1. (continued) BNA Analyses - Qualified Sample Results

CAS No.	Target Parameter (values in µg/kg, dry weight)	STATION 5 Sample 51 8041F	STATION 5 Sample 52 8041G	STATION 5 Sample 53 8041H	STATION 8 Sample 8 8078B	STATION 9R Sample 9R 8078C	STATION 10R Sample 10R 8078D	STATION 11R Sample 11R 8078E	STATION 12 Sample 12 8078J
25155-15-1	Cymene	88 U	87 U	88 U	**9 E**	40 U	47 U	66 U	79 U
86-74-8	9H-Carbazole	18 U	17 U	18 U	**4 N**	8 U	9 U	13 U	**4 N**
58-08-2	Caffeine	18 U	17 U	18 U	13 U	8 U	9 U	13 U	16 U
198-55-0	Perylene	**7 N**	**9 E**	**7 N**	**6 N**	40 U	47 U	66 U	**14 E**
80-97-7	ß-Coprostanol	**83 E**	**100 N**	**79 N**	**140 E**	40 U	**43 N**	**110 N**	**200 N**
57-88-5	Cholesterol	**1200**	**1900**	**1200**	**690 E**	**570**	**860**	**3900**	**3500 E**
83-46-5	ß-Sitosterol	**1300**	**1200**	**1300**	**1400 E**	8 U	**200 E**	**830**	**1000 E**
483-65-8	Retene	**14 E**	**11 E**	**16 E**	**68**	40 U	**6 E**	**7 E**	**36 E**
90-05-1	2-Methoxyphenol (Guaiacol)				13 U				16 U
2460-49-3	4,5-Dichloroguaiacol				13 U				16 U
2668-24-8	4,5,6-Trichloroguaiacol				13 U				16 U
57057-83-7	3,4,5-Trichloroguaiacol				13 U				16 U
2539-17-5	Tetrachloroguaiacol				13 U				16 U
127-27-5	Pimaric acid				**45**				**18 E**
471-74-9	Sandaracopimaric acid				**57 N**				23 U
5835-26-7	Isopimaric acid				**140**				**100**
1945-53-5	Palustric acid				R				R
1740-19-8	Dehydroabietic acid				**420**				**150**
514-10-3	Abietic acid				**350**				**130**
471-77-2	Neoabietic acid				20 U				23 U
-	12-Chlorodehydroabietic acid				20 U				23 U
-	14-Chlorodehydroabietic acid				**36 N**				23 U
57055-39-7	Dichlorodehydroabietic acid				20 U				23 U
	Pristane/Phytane Ratio				3.065			3.202	2.695
	Carbon Preference Index	1.166	1.553	1.542	1.565		1.977	2.389	1.892

Table 1. (continued) BNA Analyses - Qualified Sample Results

CAS No.	Target Parameter (values in µg/kg, dry weight)	STATION 13R Sample 13R 8078K	STATION 14 Sample 14 8078L	STATION 15 Sample 15 8078M	STATION 17 Sample 17 8078N	STATION 18 Sample 18 8041C	STATION 19 Sample 19 8041D	STATION 20 Sample 20 8041E	STATION 21 Sample 21 8015A
108-95-2	Phenol	**19**	**6 E**	**51**	18 U	12 U	**82**	12 U	11 U
111-44-4	bis(2-Chloroethyl)ether	8 U	11 U	8 U	18 U	12 U	21 U	12 U	11 U
95-57-8	2-Chlorophenol	8 U	11 U	8 U	18 U	12 U	21 U	12 U	11 U
541-73-1	1,3-Dichlorobenzene	8 U	11 U	8 U	18 U	12 U	21 U	12 U	11 U
106-46-7	1,4-Dichlorobenzene	8 U	11 U	8 U	18 U	12 U	21 U	12 U	11 U
100-51-6	Benzyl alcohol	41 U	54 U	42 U	89 U	57 U	104 U	61 U	57 U
95-50-1	1,2-Dichlorobenzene	8 U	11 U	8 U	18 U	12 U	21 U	12 U	11 U
95-48-7	2-Methylphenol	8 U	11 U	8 U	18 U	12 U	21 U	12 U	11 U
108-60-1	bis(2-Chloroisopropyl)ether	8 U	11 U	8 U	18 U	12 U	21 U	12 U	11 U
106-44-5	4-Methylphenol	8 U	11 U	8 U	18 U	12 U	21 U	12 U	11 U
621-64-7	N-Nitroso-di-n-propylamine	8 U	11 U	8 U	18 U	12 U	21 U	12 U	11 U
67-72-1	Hexachloroethane	16 U	22 U	17 U	36 U	23 U	42 U	24 U	23 U
98-95-3	Nitrobenzene	8 U	11 U	8 U	18 U	12 U	21 U	12 U	11 U
78-59-1	Isophorone	8 U	11 U	8 U	18 U	12 U	21 U	12 U	11 U
88-75-5	2-Nitrophenol	41 U	54 U	42 U	89 U	57 U	104 U	61 U	57 U
105-67-9	2,4-Dimethylphenol	16 U	22 U	17 U	36 U	23 U	42 U	24 U	23 U
65-85-0	Benzoic acid	**10 N**	**14 N**	**23 E**	**27 N**	**33 E**	**34 E**	**36 E**	114 U
111-91-1	bis(2-Chloroethoxy)methane	8 U	11 U	8 U	18 U	12 U	21 U	12 U	11 U
120-83-2	2,4-Dichlorophenol	24 U	33 U	25 U	53 U	34 U	62 U	37 U	34 U
120-82-1	1,2,4-Trichlorobenzene	8 U	11 U	8 U	18 U	12 U	21 U	12 U	11 U
91-20-3	Naphthalene	8 U	**2 N**	8 U	18 U	12 U	21 U	**3 E**	**10 E**
106-47-8	4-Chloroaniline	R	R	R	R	R	R	R	R
87-68-3	Hexachlorobutadiene	16 U	22 U	17 U	36 U	23 U	42 U	24 U	23 U
59-50-7	4-Chloro-3-methylphenol	16 U	22 U	17 U	36 U	23 U	42 U	24 U	23 U
91-57-6	2-Methylnaphthalene	8 U	**3 E**	8 U	18 U	12 U	21 U	**3 E**	**4 E**
77-47-4	Hexachlorocyclopentadiene	R	R	R	R	R	R	R	R
88-06-2	2,4,6-Trichlorophenol	41 U	54 U	42 U	89 U	57 U	104 U	61 U	57 U
95-95-4	2,4,5-Trichlorophenol	41 U	54 U	42 U	89 U	57 U	104 U	61 U	57 U
91-58-7	2-Chloronaphthalene	8 U	11 U	8 U	18 U	12 U	21 U	12 U	11 U
88-74-4	2-Nitroaniline	41 U	54 U	42 U	89 U	57 U	104 U	61 U	57 U
131-11-3	Dimethylphthalate	8 U	11 U	8 U	18 U	12 U	21 U	12 U	11 U
208-96-8	Acenaphthylene	8 U	11 U	8 U	18 U	12 U	21 U	12 U	11 U
99-09-2	3-Nitroaniline	41 U	54 U	42 U	89 U	57 U	104 U	61 U	57 U

Table 1. (continued) BNA Analyses - Qualified Sample Results

CAS No.	Target Parameter (values in µg/kg, dry weight)	STATION 13R Sample 13R 8078K	STATION 14 Sample 14 8078L	STATION 15 Sample 15 8078M	STATION 17 Sample 17 8078N	STATION 18 Sample 18 8041C	STATION 19 Sample 19 8041D	STATION 20 Sample 20 8041E	STATION 21 Sample 21 8015A
83-32-9	Acenaphthene	8 U	11 U	8 U	18 U	12 U	21 U	12 U	**9 E**
51-28-5	2,4-Dinitrophenol	81 U	109 U	83 U	178 U	115 U	208 U	122 U	114 U
100-02-7	4-Nitrophenol	41 U	54 U	42 U	89 U	57 U	104 U	61 U	57 U
132-64-9	Dibenzofuran	8 U	11 U	8 U	18 U	12 U	21 U	12 U	**11 E**
121-14-2	2,4-Dinitrotoluene	41 U	54 U	42 U	89 U	57 U	104 U	61 U	57 U
606-20-2	2,6-Dinitrotoluene	41 U	54 U	42 U	89 U	57 U	104 U	61 U	57 U
84-66-2	Diethylphthalate	8 U	11 U	8 U	18 U	12 U	21 U	12 U	11 U
7005-72-3	4-Chlorophenyl-phenylether	8 U	11 U	8 U	18 U	12 U	21 U	12 U	11 U
86-73-7	Fluorene	8 U	11 U	8 U	18 U	12 U	21 U	12 U	**14**
100-01-6	4-Nitroaniline	41 U	54 U	42 U	89 U	57 U	104 U	61 U	57 U
534-52-1	4,6-Dinitro-2-methylphenol	81 U	109 U	83 U	178 U	115 U	208 U	122 U	114 U
86-30-6	N-Nitrosodiphenylamine	8 U	11 U	8 U	18 U	12 U	21 U	12 U	11 U
101-55-3	4-Bromophenyl-phenylether	8 U	11 U	8 U	18 U	12 U	21 U	12 U	11 U
118-74-1	Hexachlorobenzene	8 U	11 U	8 U	18 U	12 U	21 U	12 U	11 U
87-86-5	Pentachlorophenol	41 U	54 U	42 U	89 U	57 U	104 U	61 U	57 U
85-01-8	Phenanthrene	**8 E**	**18**	**4 E**	**28**	**18**	**29**	**14**	**71**
120-12-7	Anthracene	8 U	**3 N**	8 U	18 U	12 U	**5 N**	12 U	**24**
84-74-2	Di-n-butylphthalate	8 U	11 U	8 U	**5 U**	12 U	21 U	12 U	11 U
206-44-0	Fluoranthene	**6 E**	**12**	**6 E**	**14 E**	**8 N**	**35**	**9 E**	**89**
129-00-0	Pyrene	**6 E**	**11**	**3 E**	**10 E**	**4 N**	**28**	**6 E**	**49**
85-68-7	Butylbenzylphthalate	8 U	11 U	8 U	18 U	12 U	21 U	12 U	11 U
91-94-1	3,3'-Dichlorobenzidine	R	R	R	R	R	R	R	R
56-55-3	Benzo(a)anthracene	**3 E**	**6 E**	**3 E**	18 U	**3 E**	**11 E**	12 U	**24**
117-81-7	bis(2-Ethylhexyl)phthalate	3 U	**6 E**	8 U	**22 E**	**6 E**	**11 E**	**11 E**	**48 E**
218-01-9	Chrysene	3 U	**10 E**	3 U	6 U	4 U	**23**	5 U	**33**
117-84-0	Di-n-octylphthalate	8 U	11 U	8 U	18 U	12 U	21 U	12 U	11 U
205-99-2	Benzo(b)fluoranthene	**4 N**							
207-08-9	Benzo(k)fluoranthene	**4 N**							
	Benzo(b+k)fluoranthene	**8 N**	**12**	5 U	**16 E**	**6 U**	**32**	5 U	**46**
50-32-8	Benzo(a)pyrene	8 U	**5 E**	8 U	**4 E**	12 U	**10 E**	12 U	**13 E**
193-39-5	Indeno(1,2,3-c,d)pyrene	8 U	11 U	8 U	18 U	12 U	21 U	12 U	**8 N**
53-70-3	Dibenz(a,h)anthracene	8 U	11 U	8 U	18 U	12 U	21 U	12 U	**6 N**
191-24-2	Benzo(g,h,i)perylene	R	R	R	R	R	R	R	R

Table 1. (continued) BNA Analyses - Qualified Sample Results

CAS No.	Target Parameter (values in µg/kg, dry weight)	STATION 13R Sample 13R 8078K	STATION 14 Sample 14 8078L	STATION 15 Sample 15 8078M	STATION 17 Sample 17 8078N	STATION 18 Sample 18 8041C	STATION 19 Sample 19 8041D	STATION 20 Sample 20 8041E	STATION 21 Sample 21 8015A
25155-15-1	Cymene	**4 E**	54 U	42 U	89 U	57 U	104 U	**3 E**	**26 E**
86-74-8	9H-Carbazole	8 U	11 U	8 U	18 U	12 U	21 U	12 U	**5 E**
58-08-2	Caffeine	8 U	11 U	8 U	18 U	12 U	21 U	12 U	11 U
198-55-0	Perylene	41 U	**8 E**	42 U	**11 E**	57 U	**11 E**	**7 E**	**25 E**
80-97-7	ß-Coprostanol	41 U	54 U	42 U	**99 E**	**81 E**	**160 E**	**130 E**	**370 E**
57-88-5	Cholesterol	**340**	**790**	**560**	**1300 E**	**870**	**1100**	**740**	**920**
83-46-5	ß-Sitosterol	**170**	**360**	**350**	**1500 E**	**650**	**510**	**1100**	**1600**
483-65-8	Retene	**4 E**	**9 E**	42 U	**12 E**	**8 E**	**24 E**	**36**	**280**
90-05-1	2-Methoxyphenol (Guaiacol)								
2460-49-3	4,5-Dichloroguaiacol								
2668-24-8	4,5,6-Trichloroguaiacol								
57057-83-7	3,4,5-Trichloroguaiacol								
2539-17-5	Tetrachloroguaiacol								
127-27-5	Pimaric acid								
471-74-9	Sandaracopimaric acid								
5835-26-7	Isopimaric acid								
1945-53-5	Palustric acid								
1740-19-8	Dehydroabietic acid								
514-10-3	Abietic acid								
471-77-2	Neoabietic acid								
-	12-Chlorodehydroabietic acid								
-	14-Chlorodehydroabietic acid								
57055-39-7	Dichlorodehydroabietic acid								
	Pristane/Phytane Ratio		4.852		1.012	0.816			
	Carbon Preference Index	6.711	4.490		3.851	3.688	2.491	5.294	4.136

Table 1. (continued) BNA Analyses - Qualified Sample Results

CAS No.	Target Parameter (values in µg/kg, dry weight)	STATION 22 Sample 22 8015B	STATION 26 Sample 26 8078O	STATION 29 Sample 29 8015C	STATION 30 Sample 30 7976Bre	STATION 32 Sample 32 8015D	STATION 32 Sample 57 8015F	STATION 32 Sample 58 8015G	STATION 32 Sample 59 8015H
108-95-2	Phenol	**5 N**	**31**	17 U	**6 E**	**7 E**	**19 E**	**71**	**24 E**
111-44-4	bis(2-Chloroethyl)ether	9 U	10 U	17 U	10 U	8 U	9 U	8 U	8 U
95-57-8	2-Chlorophenol	9 U	10 U	17 U	10 U	8 U	9 U	8 U	8 U
541-73-1	1,3-Dichlorobenzene	9 U	10 U	17 U	10 U	8 U	9 U	8 U	8 U
106-46-7	1,4-Dichlorobenzene	9 U	10 U	17 U	10 U	8 U	9 U	8 U	8 U
100-51-6	Benzyl alcohol	44 U	52 U	87 U	47 U	41 U	43 U	42 U	42 U
95-50-1	1,2-Dichlorobenzene	9 U	10 U	17 U	10 U	8 U	9 U	8 U	8 U
95-48-7	2-Methylphenol	9 U	10 U	17 U	10 U	8 U	9 U	8 U	8 U
108-60-1	bis(2-Chloroisopropyl)ether	9 U	10 U	17 U	10 U	8 U	9 U	8 U	8 U
106-44-5	4-Methylphenol	9 U	10 U	17 U	10 U	8 U	9 U	8 U	8 U
621-64-7	N-Nitroso-di-n-propylamine	9 U	10 U	17 U	10 U	8 U	9 U	8 U	8 U
67-72-1	Hexachloroethane	18 U	21 U	35 U	19 U	16 U	17 U	17 U	17 U
98-95-3	Nitrobenzene	9 U	10 U	17 U	10 U	8 U	9 U	8 U	8 U
78-59-1	Isophorone	9 U	10 U	17 U	10 U	8 U	9 U	8 U	8 U
88-75-5	2-Nitrophenol	44 U	52 U	87 U	47 U	41 U	43 U	42 U	42 U
105-67-9	2,4-Dimethylphenol	18 U	21 U	35 U	19 U	16 U	17 U	17 U	17 U
65-85-0	Benzoic acid	88 U	**18 N**	173 U	95 U	82 U	86 U	85 U	84 U
111-91-1	bis(2-Chloroethoxy)methane	9 U	10 U	17 U	10 U	8 U	9 U	8 U	8 U
120-83-2	2,4-Dichlorophenol	26 U	31 U	52 U	28 U	25 U	26 U	25 U	25 U
120-82-1	1,2,4-Trichlorobenzene	9 U	10 U	17 U	10 U	8 U	9 U	8 U	8 U
91-20-3	Naphthalene	**3 E**	**4 E**	**9 E**	**18 E**	**3 E**	**3 E**	**3 E**	**3 E**
106-47-8	4-Chloroaniline	R	R	R	R	R	R	R	R
87-68-3	Hexachlorobutadiene	18 U	21 U	35 U	10 U	16 U	17 U	17 U	17 U
59-50-7	4-Chloro-3-methylphenol	18 U	21 U	35 U	10 U	16 U	17 U	17 U	17 U
91-57-6	2-Methylnaphthalene	9 U	**5 E**	**5 E**	**7 E**	8 U	9 U	8 U	8 U
77-47-4	Hexachlorocyclopentadiene	R	R	R	R	R	R	R	R
88-06-2	2,4,6-Trichlorophenol	44 U	52 U	87 U	47 U	41 U	43 U	42 U	42 U
95-95-4	2,4,5-Trichlorophenol	44 U	52 U	87 U	47 U	41 U	43 U	42 U	42 U
91-58-7	2-Chloronaphthalene	9 U	10 U	17 U	10 U	8 U	9 U	8 U	8 U
88-74-4	2-Nitroaniline	44 U	52 U	87 U	47 U	41 U	43 U	42 U	42 U
131-11-3	Dimethylphthalate	9 U	10 U	17 U	10 U	8 U	9 U	8 U	8 U
208-96-8	Acenaphthylene	**2 N**	10 U	17 U	**7 E**	8 U	**2 E**	8 U	8 U
99-09-2	3-Nitroaniline	44 U	52 U	87 U	47 U	41 U	43 U	42 U	42 U

Table 1. (continued) BNA Analyses - Qualified Sample Results

CAS No.	Target Parameter (values in µg/kg, dry weight)	STATION 22 Sample 22 8015B	STATION 26 Sample 26 8078O	STATION 29 Sample 29 8015C	STATION 30 Sample 30 7976Bre	STATION 32 Sample 32 8015D	STATION 32 Sample 57 8015F	STATION 32 Sample 58 8015G	STATION 32 Sample 59 8015H
83-32-9	Acenaphthene	9 U	10 U	17 U	**20**	8 U	9 U	8 U	8 U
51-28-5	2,4-Dinitrophenol	88 U	104 U	173 U	95 U	82 U	86 U	85 U	84 U
100-02-7	4-Nitrophenol	44 U	52 U	87 U	47 U	41 U	43 U	42 U	42 U
132-64-9	Dibenzofuran	9 U	10 U	17 U	**26**	8 U	9 U	8 U	8 U
121-14-2	2,4-Dinitrotoluene	44 U	52 U	87 U	47 U	41 U	43 U	42 U	42 U
606-20-2	2,6-Dinitrotoluene	44 U	52 U	87 U	47 U	41 U	43 U	42 U	42 U
84-66-2	Diethylphthalate	9 U	10 U	17 U	10 U	**3 N**	**3 N**	8 U	8 U
7005-72-3	4-Chlorophenyl-phenylether	9 U	10 U	17 U	10 U	8 U	9 U	8 U	8 U
86-73-7	Fluorene	**2 E**	**3 N**	**6 E**	**43**	**3 E**	**2 N**	**3 E**	**2 E**
100-01-6	4-Nitroaniline	44 U	52 U	87 U	47 U	41 U	43 U	42 U	42 U
534-52-1	4,6-Dinitro-2-methylphenol	88 U	104 U	173 U	95 U	82 U	86 U	85 U	84 U
86-30-6	N-Nitrosodiphenylamine	9 U	10 U	17 U	10 U	8 U	9 U	8 U	8 U
101-55-3	4-Bromophenyl-phenylether	9 U	10 U	17 U	10 U	8 U	9 U	8 U	8 U
118-74-1	Hexachlorobenzene	9 U	10 U	17 U	10 U	8 U	**4 E**	8 U	8 U
87-86-5	Pentachlorophenol	44 U	52 U	87 U	47 U	41 U	43 U	42 U	42 U
85-01-8	Phenanthrene	**16**	**25**	**52**	**230**	**26**	**21**	**27**	**25**
120-12-7	Anthracene	**7 E**	**4 N**	**12 E**	**140**	**13**	**8 E**	**9**	**8**
84-74-2	Di-n-butylphthalate	9 U	10 U	17 U	10 U	**2 U**	9 U	8 U	8 U
206-44-0	Fluoranthene	**22**	**17**	**77**	**330**	**69**	**30**	**34**	**31**
129-00-0	Pyrene	**14**	**14**	**63**	**210**	**50**	**30**	**31**	**28**
85-68-7	Butylbenzylphthalate	9 U	10 U	17 U	10 U	8 U	9 U	8 U	8 U
91-94-1	3,3'-Dichlorobenzidine	R	R	R	R	R	R	R	R
56-55-3	Benzo(a)anthracene	**11**	**7 E**	**25**	**200**	**38**	**15**	**18**	**16**
117-81-7	bis(2-Ethylhexyl)phthalate	**13**	**7 E**	**46 E**	**17**	**12**	**13**	**19**	**17**
218-01-9	Chrysene	**16**	**10 E**	**35**	**320**	**70**	**26**	**27**	**29**
117-84-0	Di-n-octylphthalate	9 U	10 U	17 U	10 U	8 U	9 U	8 U	8 U
205-99-2	Benzo(b)fluoranthene								
207-08-9	Benzo(k)fluoranthene								
	Benzo(b+k)fluoranthene	**21**	**17**	**58**	**430**	**78**	**38**	**36**	**40**
50-32-8	Benzo(a)pyrene	**10 E**	**6 E**	**23 E**	**90 E**	**25 E**	**18 E**	**10 N**	**17 E**
193-39-5	Indeno(1,2,3-c,d)pyrene	**14 N**	10 U	**18 N**	**51 E**	**23 N**	**18**	**12 N**	**16 N**
53-70-3	Dibenz(a,h)anthracene	**6 N**	10 U	**11 N**	**33**	**8 N**	**5 N**	**6 E**	**5 N**
191-24-2	Benzo(g,h,i)perylene	R	R	R	R	R	R	R	R

Table 1. (continued) BNA Analyses - Qualified Sample Results

CAS No.	Target Parameter (values in µg/kg, dry weight)	STATION 22 Sample 22 8015B	STATION 26 Sample 26 8078O	STATION 29 Sample 29 8015C	STATION 30 Sample 30 7976Bre	STATION 32 Sample 32 8015D	STATION 32 Sample 57 8015F	STATION 32 Sample 58 8015G	STATION 32 Sample 59 8015H
25155-15-1	Cymene	44 U	52 U	87 U	47 U	41 U	43 U	42 U	42 U
86-74-8	9H-Carbazole	**7 E**	10 U	17 U	**18**	**3 N**	**6 E**	8 U	8 U
58-08-2	Caffeine	9 U	10 U	17 U	10 U	8 U	9 U	8 U	8 U
198-55-0	Perylene	**4 N**	**14 E**	**22 E**	**15 E**	**6 N**	**5 E**	42 U	**5 E**
80-97-7	ß-Coprostanol	**110 E**	**160**	**240 E**	**96**	**79 E**	**39 E**	**74 E**	**81 E**
57-88-5	Cholesterol	**540**	**1600**	**1100 E**	**1000 E**	**360**	**450**	**870**	**900**
83-46-5	ß-Sitosterol	**940**	**1100**	**810**	**1100**	**220**	**210**	**610**	**510**
483-65-8	Retene	**8 E**	**12 E**	**30 E**	**23 E**	**7 E**	**6 E**	**7 E**	42 U
90-05-1	2-Methoxyphenol (Guaiacol)								
2460-49-3	4,5-Dichloroguaiacol								
2668-24-8	4,5,6-Trichloroguaiacol								
57057-83-7	3,4,5-Trichloroguaiacol								
2539-17-5	Tetrachloroguaiacol								
127-27-5	Pimaric acid								
471-74-9	Sandaracopimaric acid								
5835-26-7	Isopimaric acid								
1945-53-5	Palustric acid								
1740-19-8	Dehydroabietic acid								
514-10-3	Abietic acid								
471-77-2	Neoabietic acid								
-	12-Chlorodehydroabietic acid								
-	14-Chlorodehydroabietic acid								
57055-39-7	Dichlorodehydroabietic acid								
	Pristane/Phytane Ratio		3.427		1.819			2.579	
	Carbon Preference Index	6.068	2.773	1.492	2.770	2.614	1.813	3.565	2.494

Table 1. (continued) BNA Analyses - Qualified Sample Results

CAS No.	Target Parameter (values in µg/kg, dry weight)	STATION 33 Sample 33 8015E	STATION 34 Sample 34 7976Cre	STATION 35 Sample 35 7976Dre	STATION 35 Sample 72 7976Ore	STATION 35 Sample 73 7976Pre	STATION 35 Sample 74 7976Qre	STATION 38 Sample 38 7976Ere	STATION 38 Sample 60 7976Jre
108-95-2	Phenol	10 U	**14 E**	**10 E**	**7 N**	**9 E**	**12 E**	24 U	**9 E**
111-44-4	bis(2-Chloroethyl)ether	10 U	18 U	19 U	18 U	18 U	18 U	24 U	23 U
95-57-8	2-Chlorophenol	10 U	18 U	19 U	18 U	18 U	18 U	24 U	23 U
541-73-1	1,3-Dichlorobenzene	10 U	18 U	19 U	18 U	18 U	18 U	24 U	23 U
106-46-7	1,4-Dichlorobenzene	10 U	18 U	19 U	18 U	18 U	18 U	24 U	23 U
100-51-6	Benzyl alcohol	48 U	90 U	93 U	90 U	90 U	90 U	119 U	117 U
95-50-1	1,2-Dichlorobenzene	10 U	18 U	19 U	18 U	18 U	18 U	24 U	23 U
95-48-7	2-Methylphenol	10 U	18 U	19 U	18 U	18 U	18 U	24 U	23 U
108-60-1	bis(2-Chloroisopropyl)ether	10 U	18 U	19 U	18 U	18 U	18 U	24 U	23 U
106-44-5	4-Methylphenol	10 U	18 U	19 U	18 U	18 U	18 U	24 U	23 U
621-64-7	N-Nitroso-di-n-propylamine	10 U	18 U	19 U	18 U	18 U	18 U	24 U	23 U
67-72-1	Hexachloroethane	19 U	36 U	37 U	36 U	36 U	36 U	48 U	47 U
98-95-3	Nitrobenzene	10 U	18 U	19 U	18 U	18 U	18 U	24 U	23 U
78-59-1	Isophorone	10 U	18 U	19 U	18 U	18 U	18 U	24 U	23 U
88-75-5	2-Nitrophenol	48 U	90 U	93 U	90 U	90 U	90 U	119 U	117 U
105-67-9	2,4-Dimethylphenol	19 U	36 U	37 U	36 U	36 U	36 U	48 U	47 U
65-85-0	Benzoic acid	96 U	180 U	**57 N**	**38 E**	**40 E**	**98 E**	238 U	234 U
111-91-1	bis(2-Chloroethoxy)methane	10 U	18 U	19 U	18 U	18 U	18 U	24 U	23 U
120-83-2	2,4-Dichlorophenol	29 U	54 U	56 U	54 U	54 U	54 U	71 U	70 U
120-82-1	1,2,4-Trichlorobenzene	10 U	18 U	19 U	18 U	18 U	18 U	24 U	23 U
91-20-3	Naphthalene	**11 E**	**5 E**	**6 E**	**6 E**	18 U	18 U	**6 N**	**11 E**
106-47-8	4-Chloroaniline	R	R	R	R	R	R	R	R
87-68-3	Hexachlorobutadiene	19 U	36 U	37 U	36 U	36 U	36 U	48 U	47 U
59-50-7	4-Chloro-3-methylphenol	19 U	36 U	37 U	36 U	36 U	36 U	48 U	47 U
91-57-6	2-Methylnaphthalene	**3 E**	18 U	**7 E**	**4 E**	18 U	**6 E**	24 U	23 U
77-47-4	Hexachlorocyclopentadiene	R	R	R	R	R	R	R	R
88-06-2	2,4,6-Trichlorophenol	48 U	90 U	93 U	90 U	90 U	90 U	119 U	117 U
95-95-4	2,4,5-Trichlorophenol	48 U	90 U	93 U	90 U	90 U	90 U	119 U	117 U
91-58-7	2-Chloronaphthalene	10 U	18 U	19 U	18 U	18 U	18 U	24 U	23 U
88-74-4	2-Nitroaniline	48 U	90 U	93 U	90 U	90 U	90 U	119 U	117 U
131-11-3	Dimethylphthalate	10 U	18 U	19 U	18 U	18 U	18 U	24 U	23 U
208-96-8	Acenaphthylene	**5 E**	**5 E**	**27**	**13 E**	**12 E**	**28**	24 U	23 U
99-09-2	3-Nitroaniline	48 U	90 U	93 U	90 U	90 U	90 U	119 U	117 U

Table 1. (continued) BNA Analyses - Qualified Sample Results

CAS No.	Target Parameter (values in µg/kg, dry weight)	STATION 33 Sample 33 8015E	STATION 34 Sample 34 7976Cre	STATION 35 Sample 35 7976Dre	STATION 35 Sample 72 7976Ore	STATION 35 Sample 73 7976Pre	STATION 35 Sample 74 7976Qre	STATION 38 Sample 38 7976Ere	STATION 38 Sample 60 7976Jre
83-32-9	Acenaphthene	**15 E**	18 U	**7 E**	**18 U**	18 U	18 U	24 U	23 U
51-28-5	2,4-Dinitrophenol	96 U	180 U	186 U	181 U	181 U	179 U	238 U	234 U
100-02-7	4-Nitrophenol	48 U	90 U	93 U	90 U	90 U	90 U	119 U	117 U
132-64-9	Dibenzofuran	**14 E**	**4 E**	**8 E**	**4 E**	18 U	**6 E**	**6 E**	23 U
121-14-2	2,4-Dinitrotoluene	48 U	90 U	93 U	90 U	90 U	90 U	119 U	117 U
606-20-2	2,6-Dinitrotoluene	48 U	90 U	93 U	90 U	90 U	90 U	119 U	117 U
84-66-2	Diethylphthalate	10 U	**6 N**	19 U	18 U	18 U	**5 E**	24 U	23 U
7005-72-3	4-Chlorophenyl-phenylether	10 U	18 U	19 U	18 U	18 U	18 U	24 U	23 U
86-73-7	Fluorene	**23**	**8 E**	**19**	**9 E**	**9 E**	**17 E**	**10 E**	**10 E**
100-01-6	4-Nitroaniline	48 U	90 U	93 U	90 U	90 U	90 U	119 U	117 U
534-52-1	4,6-Dinitro-2-methylphenol	96 U	180 U	186 U	181 U	181 U	179 U	238 U	234 U
86-30-6	N-Nitrosodiphenylamine	10 U	18 U	19 U	18 U	18 U	18 U	24 U	23 U
101-55-3	4-Bromophenyl-phenylether	10 U	18 U	19 U	18 U	18 U	18 U	24 U	23 U
118-74-1	Hexachlorobenzene	10 U	18 U	19 U	18 U	18 U	18 U	24 U	23 U
87-86-5	Pentachlorophenol	48 U	90 U	93 U	90 U	90 U	90 U	119 U	117 U
85-01-8	Phenanthrene	**180**	**100**	**240**	**120**	**120**	**190**	**93**	**98**
120-12-7	Anthracene	**75**	**34**	**200**	**120**	**110**	**200**	**21 E**	**21 E**
84-74-2	Di-n-butylphthalate	10 U	**28**	**30**	**17 E**	**21**	**27**	**8 N**	**11 E**
206-44-0	Fluoranthene	**250**	**240**	**540**	**320**	**330**	**480**	**120**	**140**
129-00-0	Pyrene	**200**	**220**	**480**	**350**	**310**	**480**	**120**	**99**
85-68-7	Butylbenzylphthalate	**7 E**	**28**	**18 N**	**12 E**	**23**	**24 N**	**9 E**	**7 N**
91-94-1	3,3'-Dichlorobenzidine	R	R	R	R	R	R	R	R
56-55-3	Benzo(a)anthracene	**120**	**100**	**300**	**180**	**170**	**350**	**47**	**43**
117-81-7	bis(2-Ethylhexyl)phthalate	**51 E**	**140**	**89**	**54**	**67**	**83**	**40**	**36**
218-01-9	Chrysene	**190**	**150**	**390**	**230**	**230**	**390**	**71**	**61**
117-84-0	Di-n-octylphthalate	10 U	18 U	19 U	18 U	18 U	18 U	24 U	23 U
205-99-2	Benzo(b)fluoranthene								
207-08-9	Benzo(k)fluoranthene								
	Benzo(b+k)fluoranthene	**320**	**270**	**470**	**300**	**320**	**490**	**130**	**110**
50-32-8	Benzo(a)pyrene	**110 E**	**76 E**	**200 E**	**120 E**	**130 E**	**190 E**	**55 E**	**34 E**
193-39-5	Indeno(1,2,3-c,d)pyrene	**75 E**	**48 N**	**150 E**	**88 E**	**87 E**	**120 E**	**36 N**	**27 N**
53-70-3	Dibenz(a,h)anthracene	**40**	**21**	**72**	**46**	**41**	**60**	**8 N**	**10 N**
191-24-2	Benzo(g,h,i)perylene	15 N	R	R	**22 N**	R	R	R	R

Table 1. (continued) BNA Analyses - Qualified Sample Results

CAS No.	Target Parameter (values in µg/kg, dry weight)	STATION 33 Sample 33 8015E	STATION 34 Sample 34 7976Cre	STATION 35 Sample 35 7976Dre	STATION 35 Sample 72 7976Ore	STATION 35 Sample 73 7976Pre	STATION 35 Sample 74 7976Qre	STATION 38 Sample 38 7976Ere	STATION 38 Sample 60 7976Jre
25155-15-1	Cymene	48 U	90 U	93 U	90 U	90 U	90 U	119 U	117 U
86-74-8	9H-Carbazole	**12**	18 U	**19**	**8 N**	**8 E**	**10 E**	24 U	23 U
58-08-2	Caffeine	10 U	18 U	19 U	18 U	18 U	18 U	24 U	23 U
198-55-0	Perylene	**26**	**26 E**	**38 E**	**31 E**	**23 E**	**27 E**	**21 E**	**19 N**
80-97-7	ß-Coprostanol	**140 E**	**400**	**250**	**130 N**	**150 N**	**140 N**	**350**	**280 E**
57-88-5	Cholesterol	**910**	**3900 E**	**2300**	**1900**	**1800**	**2200 E**	**1600 E**	**1400 E**
83-46-5	ß-Sitosterol	**1000**	**1300**	**1800 N**	**1700**	**2100**	**1900**	**1700**	**1500 E**
483-65-8	Retene	**31**	**73**	**98 E**	**71 E**	**70 E**	**91**	**120**	117 U
90-05-1	2-Methoxyphenol (Guaiacol)								
2460-49-3	4,5-Dichloroguaiacol								
2668-24-8	4,5,6-Trichloroguaiacol								
57057-83-7	3,4,5-Trichloroguaiacol								
2539-17-5	Tetrachloroguaiacol								
127-27-5	Pimaric acid								
471-74-9	Sandaracopimaric acid								
5835-26-7	Isopimaric acid								
1945-53-5	Palustric acid								
1740-19-8	Dehydroabietic acid								
514-10-3	Abietic acid								
471-77-2	Neoabietic acid								
-	12-Chlorodehydroabietic acid								
-	14-Chlorodehydroabietic acid								
57055-39-7	Dichlorodehydroabietic acid								
	Pristane/Phytane Ratio		1.168	1.447	1.857	1.359	0.822	2.020	1.229
	Carbon Preference Index	1.868	1.413	2.012	2.074	2.066	2.558	1.798	1.602

Table 1. (continued) BNA Analyses - Qualified Sample Results

CAS No.	Target Parameter (values in µg/kg, dry weight)	STATION 38 Sample 61 7976Kre	STATION 38 Sample 62 7976Lre	STATION 39 Sample 39 7976Fre	STATION 40 Sample 40 7976Gre	STATION 41 Sample 41 7976Hre	STATION 43 Sample 43 7976Ire	STATION 44 Sample 44 7976R	STATION 44 Sample 63 7976Y
108-95-2	Phenol	**13 E**	**12 N**	**7 E**	**8 E**	**11 E**	8 U	**17**	**12**
111-44-4	bis(2-Chloroethyl)ether	23 U	23 U	8 U	10 U	10 U	8 U	9 U	9 U
95-57-8	2-Chlorophenol	23 U	23 U	8 U	10 U	10 U	8 U	9 U	9 U
541-73-1	1,3-Dichlorobenzene	23 U	23 U	8 U	10 U	10 U	8 U	9 U	9 U
106-46-7	1,4-Dichlorobenzene	23 U	23 U	8 U	10 U	10 U	8 U	9 U	9 U
100-51-6	Benzyl alcohol	116 U	117 U	41 U	48 U	51 U	42 U	46 U	46 U
95-50-1	1,2-Dichlorobenzene	23 U	23 U	8 U	10 U	10 U	8 U	9 U	9 U
95-48-7	2-Methylphenol	23 U	23 U	8 U	10 U	10 U	8 U	9 U	9 U
108-60-1	bis(2-Chloroisopropyl)ether	23 U	23 U	8 U	10 U	10 U	8 U	9 U	9 U
106-44-5	4-Methylphenol	23 U	23 U	8 U	10 U	10 U	8 U	9 U	9 U
621-64-7	N-Nitroso-di-n-propylamine	23 U	23 U	8 U	10 U	10 U	8 U	9 U	9 U
67-72-1	Hexachloroethane	46 U	47 U	17 U	19 U	21 U	17 U	19 U	19 U
98-95-3	Nitrobenzene	23 U	23 U	8 U	10 U	10 U	8 U	9 U	9 U
78-59-1	Isophorone	23 U	23 U	8 U	10 U	10 U	8 U	9 U	9 U
88-75-5	2-Nitrophenol	116 U	117 U	41 U	48 U	51 U	42 U	46 U	46 U
105-67-9	2,4-Dimethylphenol	46 U	47 U	17 U	19 U	21 U	17 U	19 U	19 U
65-85-0	Benzoic acid	**55 E**	**75 E**	82 U	97 U	**38 E**	**13 E**	**21 E**	**21 E**
111-91-1	bis(2-Chloroethoxy)methane	23 U	23 U	8 U	10 U	10 U	8 U	9 U	9 U
120-83-2	2,4-Dichlorophenol	70 U	70 U	25 U	29 U	31 U	25 U	28 U	28 U
120-82-1	1,2,4-Trichlorobenzene	23 U	23 U	8 U	10 U	10 U	8 U	9 U	9 U
91-20-3	Naphthalene	**10 E**	**6 E**	8 U	**51 E**	**12 E**	8 U	9 U	9 U
106-47-8	4-Chloroaniline	R	R	R	R	R	R	R	R
87-68-3	Hexachlorobutadiene	46 U	47 U	17 U	19 U	21 U	17 U	19 U	19 U
59-50-7	4-Chloro-3-methylphenol	46 U	47 U	17 U	19 U	21 U	17 U	19 U	19 U
91-57-6	2-Methylnaphthalene	**8 E**	**6 E**	8 U	**18 E**	**15 E**	8 U	9 U	9 U
77-47-4	Hexachlorocyclopentadiene	R	R	R	R	R	R	R	R
88-06-2	2,4,6-Trichlorophenol	116 U	117 U	41 U	48 U	51 U	42 U	46 U	46 U
95-95-4	2,4,5-Trichlorophenol	116 U	117 U	41 U	48 U	51 U	42 U	46 U	46 U
91-58-7	2-Chloronaphthalene	23 U	23 U	8 U	10 U	10 U	8 U	9 U	9 U
88-74-4	2-Nitroaniline	116 U	117 U	41 U	48 U	51 U	42 U	46 U	46 U
131-11-3	Dimethylphthalate	23 U	23 U	8 U	**6 E**	10 U	8 U	9 U	9 U
208-96-8	Acenaphthylene	**6 E**	**5 E**	8 U	**98**	**3 E**	8 U	9 U	9 U
99-09-2	3-Nitroaniline	116 U	117 U	41 U	48 U	51 U	42 U	46 U	46 U

Table 1. (continued) BNA Analyses - Qualified Sample Results

CAS No.	Target Parameter (values in µg/kg, dry weight)	STATION 38 Sample 61 7976Kre	STATION 38 Sample 62 7976Lre	STATION 39 Sample 39 7976Fre	STATION 40 Sample 40 7976Gre	STATION 41 Sample 41 7976Hre	STATION 43 Sample 43 7976Ire	STATION 44 Sample 44 7976R	STATION 44 Sample 63 7976Y
83-32-9	Acenaphthene	23 U	23 U	8 U	**99**	**8 E**	8 U	9 U	9 U
51-28-5	2,4-Dinitrophenol	232 U	234 U	82 U	97 U	103 U	83 U	92 U	93 U
100-02-7	4-Nitrophenol	116 U	117 U	41 U	48 U	51 U	42 U	46 U	46 U
132-64-9	Dibenzofuran	**9 E**	**9 E**	8 U	**39**	**15**	8 U	9 U	9 U
121-14-2	2,4-Dinitrotoluene	116 U	117 U	41 U	48 U	51 U	42 U	46 U	46 U
606-20-2	2,6-Dinitrotoluene	116 U	117 U	41 U	48 U	51 U	42 U	46 U	46 U
84-66-2	Diethylphthalate	23 U	23 U	8 U	10 U	10 U	8 U	9 U	9 U
7005-72-3	4-Chlorophenyl-phenylether	23 U	23 U	8 U	10 U	10 U	8 U	9 U	9 U
86-73-7	Fluorene	**11 E**	**12 E**	8 U	**190**	**16**	8 U	9 U	9 U
100-01-6	4-Nitroaniline	116 U	117 U	41 U	48 U	51 U	42 U	46 U	46 U
534-52-1	4,6-Dinitro-2-methylphenol	232 U	234 U	82 U	97 U	103 U	83 U	92 U	93 U
86-30-6	N-Nitrosodiphenylamine	23 U	23 U	8 U	10 U	10 U	8 U	9 U	9 U
101-55-3	4-Bromophenyl-phenylether	23 U	23 U	8 U	10 U	10 U	8 U	9 U	9 U
118-74-1	Hexachlorobenzene	23 U	23 U	8 U	10 U	10 U	8 U	9 U	9 U
87-86-5	Pentachlorophenol	116 U	117 U	41 U	48 U	51 U	42 U	46 U	46 U
85-01-8	Phenanthrene	**120**	**120**	**3 E**	**800**	**210**	8 U	**12**	**8 E**
120-12-7	Anthracene	**29**	**28**	8 U	**570**	**21**	8 U	**3 E**	**4 E**
84-74-2	Di-n-butylphthalate	**15 E**	**12 N**	8 U	10 U	**7 E**	8 U	9 U	9 U
206-44-0	Fluoranthene	**150**	**150**	**4 N**	**820**	**190**	8 U	**15**	**15**
129-00-0	Pyrene	**120**	**120**	**3 E**	**780**	**130**	8 U	**6 E**	**5 E**
85-68-7	Butylbenzylphthalate	**9 N**	**8 N**	8 U	**35**	**5 N**	8 U	9 U	9 U
91-94-1	3,3'-Dichlorobenzidine	R	R	R	R	R	R	R	R
56-55-3	Benzo(a)anthracene	**51**	**49**	8 U	**570**	**28**	8 U	**9 E**	**6 E**
117-81-7	bis(2-Ethylhexyl)phthalate	**45**	**41**	**11**	**230**	**290**	8 U	**6 E**	**8 E**
218-01-9	Chrysene	**75**	**70**	3 U	**680**	**62**	8 U	**14**	**9 E**
117-84-0	Di-n-octylphthalate	23 U	23 U	8 U	10 U	10 U	8 U	9 U	9 U
205-99-2	Benzo(b)fluoranthene						8 U	**11 E**	
207-08-9	Benzo(k)fluoranthene						8 U	**9 E**	
	Benzo(b+k)fluoranthene	**120**	**120**	5 U	**840**	**65**	16 U	**20 E**	**11**
50-32-8	Benzo(a)pyrene	**34 N**	**38 E**	8 U	**400 E**	**47 E**	8 U	**3 E**	9 U
193-39-5	Indeno(1,2,3-c,d)pyrene	**42 N**	**34 N**	8 U	**240 E**	**22 E**	8 U	9 U	9 U
53-70-3	Dibenz(a,h)anthracene	**25**	**20 N**	8 U	**170**	**6 E**	8 U	**4 E**	9 U
191-24-2	Benzo(g,h,i)perylene	R	R	R	**28 E**	R	R	R	R

Table 1. (continued) BNA Analyses - Qualified Sample Results

CAS No.	Target Parameter (values in µg/kg, dry weight)	STATION 38 Sample 61 7976Kre	STATION 38 Sample 62 7976Lre	STATION 39 Sample 39 7976Fre	STATION 40 Sample 40 7976Gre	STATION 41 Sample 41 7976Hre	STATION 43 Sample 43 7976Ire	STATION 44 Sample 44 7976R	STATION 44 Sample 63 7976Y
25155-15-1	Cymene	116 U	117 U	41 U	**8 E**	**7 E**	42 U	46 U	46 U
86-74-8	9H-Carbazole	**11 N**	**7 N**	8 U	**34**	**11**	8 U	9 U	9 U
58-08-2	Caffeine	23 U	23 U	8 U	10 U	10 U	8 U	9 U	9 U
198-55-0	Perylene	**24 E**	**26 E**	41 U	**74**	**15 E**	42 U	46 U	46 U
80-97-7	ß-Coprostanol	**280**	**300**	41 U	**260 E**	**760 E**	42 U	**74**	**48 E**
57-88-5	Cholesterol	**2200**	**1900**	**250**	**1000 E**	**3900 E**	**930**	**1000**	**560 E**
83-46-5	ß-Sitosterol	**1200**	**2600**	8 U	**2400 E**	**4800**	140 U	**470 E**	**340 E**
483-65-8	Retene	**110 E**	**130 E**	**6 E**	**160**	**260**	42 U	46 U	**13 E**
90-05-1	2-Methoxyphenol (Guaiacol)					**3 E**			
2460-49-3	4,5-Dichloroguaiacol					10 U			
2668-24-8	4,5,6-Trichloroguaiacol					10 U			
57057-83-7	3,4,5-Trichloroguaiacol					10 U			
2539-17-5	Tetrachloroguaiacol					10 U			
127-27-5	Pimaric acid					**20 N**			
471-74-9	Sandaracopimaric acid					**130 N**			
5835-26-7	Isopimaric acid					**170**			
1945-53-5	Palustric acid					R			
1740-19-8	Dehydroabietic acid					**250**			
514-10-3	Abietic acid					**190**			
471-77-2	Neoabietic acid					15 U			
-	12-Chlorodehydroabietic acid					15 U			
-	14-Chlorodehydroabietic acid					**25 N**			
57055-39-7	Dichlorodehydroabietic acid					15 U			
	Pristane/Phytane Ratio	4.805	3.437			6.835			
	Carbon Preference Index	1.605	1.885	2.816	1.916	2.555	1.381	3.521	3.699

Table 1. (continued) BNA Analyses - Qualified Sample Results

CAS No.	Target Parameter (values in µg/kg, dry weight)	STATION 44 Sample 64 7976W	STATION 44 Sample 65 7976X	STATION 45 Sample 45 7976S	STATION 47 Sample 47 7976T	STATION 48 Sample 48 7976U	STATION 49 Sample 49 7976V	STATION 66 Sample 66 7976Mre	STATION 67 Sample 67 8015L
108-95-2	Phenol	**11**	**10**	13 U	**10**	**R**	**R**	**65 E**	**26 E**
111-44-4	bis(2-Chloroethyl)ether	9 U	9 U	13 U	9 U	22 U	24 U	10 U	10 U
95-57-8	2-Chlorophenol	9 U	9 U	13 U	9 U	**R**	**R**	10 U	10 U
541-73-1	1,3-Dichlorobenzene	9 U	9 U	13 U	9 U	22 U	24 U	**15 E**	**15 E**
106-46-7	1,4-Dichlorobenzene	9 U	9 U	13 U	9 U	22 U	24 U	**7 E**	**7 N**
100-51-6	Benzyl alcohol	47 U	47 U	65 U	45 U	110 U	120 U	48 U	50 U
95-50-1	1,2-Dichlorobenzene	9 U	9 U	13 U	9 U	22 U	24 U	10 U	**13 E**
95-48-7	2-Methylphenol	9 U	9 U	13 U	9 U	22 U	24 U	10 U	10 U
108-60-1	bis(2-Chloroisopropyl)ether	9 U	9 U	13 U	9 U	22 U	24 U	10 U	10 U
106-44-5	4-Methylphenol	9 U	9 U	13 U	9 U	22 U	24 U	**89 N**	**170 E**
621-64-7	N-Nitroso-di-n-propylamine	9 U	9 U	13 U	9 U	22 U	24 U	10 U	10 U
67-72-1	Hexachloroethane	19 U	19 U	26 U	18 U	45 U	48 U	19 U	20 U
98-95-3	Nitrobenzene	9 U	9 U	13 U	9 U	22 U	24 U	10 U	10 U
78-59-1	Isophorone	9 U	9 U	13 U	9 U	22 U	24 U	**32 E**	**32 E**
88-75-5	2-Nitrophenol	47 U	47 U	65 U	45 U	110 U	120 U	48 U	50 U
105-67-9	2,4-Dimethylphenol	19 U	19 U	26 U	18 U	45 U	48 U	19 U	20 U
65-85-0	Benzoic acid	**22 E**	**37 E**	**47 E**	**24 E**	220 U	**63 E**	**160 E**	**76 E**
111-91-1	bis(2-Chloroethoxy)methane	9 U	9 U	13 U	9 U	22 U	24 U	10 U	10 U
120-83-2	2,4-Dichlorophenol	28 U	28 U	39 U	27 U	67 U	72 U	29 U	30 U
120-82-1	1,2,4-Trichlorobenzene	9 U	9 U	13 U	9 U	22 U	24 U	10 U	10 U
91-20-3	Naphthalene	**2 E**	**2 E**	**4 E**	9 U	22 U	**7 E**	**36 E**	**37 E**
106-47-8	4-Chloroaniline	R	R	R	R	R	R	R	R
87-68-3	Hexachlorobutadiene	19 U	19 U	26 U	18 U	45 U	48 U	19 U	20 U
59-50-7	4-Chloro-3-methylphenol	19 U	19 U	26 U	18 U	45 U	48 U	19 U	20 U
91-57-6	2-Methylnaphthalene	9 U	9 U	**3 E**	9 U	22 U	24 U	**32 E**	**33 E**
77-47-4	Hexachlorocyclopentadiene	R	R	R	R	R	R	R	R
88-06-2	2,4,6-Trichlorophenol	47 U	47 U	65 U	45 U	110 U	120 U	48 U	50 U
95-95-4	2,4,5-Trichlorophenol	47 U	47 U	65 U	45 U	110 U	120 U	48 U	50 U
91-58-7	2-Chloronaphthalene	9 U	9 U	13 U	9 U	22 U	24 U	10 U	10 U
88-74-4	2-Nitroaniline	47 U	47 U	65 U	45 U	110 U	120 U	48 U	50 U
131-11-3	Dimethylphthalate	9 U	9 U	13 U	9 U	22 U	24 U	10 U	10 U
208-96-8	Acenaphthylene	9 U	9 U	13 U	9 U	22 U	24 U	**34**	**14 E**
99-09-2	3-Nitroaniline	47 U	47 U	65 U	45 U	110 U	120 U	48 U	50 U

Table 1. (continued) BNA Analyses - Qualified Sample Results

CAS No.	Target Parameter (values in µg/kg, dry weight)	STATION 44 Sample 64 7976W	STATION 44 Sample 65 7976X	STATION 45 Sample 45 7976S	STATION 47 Sample 47 7976T	STATION 48 Sample 48 7976U	STATION 49 Sample 49 7976V	STATION 66 Sample 66 7976Mre	STATION 67 Sample 67 8015L
83-32-9	Acenaphthene	9 U	9 U	13 U	9 U	22 U	24 U	**86**	**61 E**
51-28-5	2,4-Dinitrophenol	94 U	93 U	129 U	90 U	220 U	240 U	96 U	101 U
100-02-7	4-Nitrophenol	47 U	47 U	65 U	45 U	110 U	120 U	48 U	50 U
132-64-9	Dibenzofuran	9 U	9 U	13 U	9 U	22 U	**7 E**	**2 N**	10 U
121-14-2	2,4-Dinitrotoluene	47 U	47 U	65 U	45 U	110 U	120 U	48 U	50 U
606-20-2	2,6-Dinitrotoluene	47 U	47 U	65 U	45 U	110 U	120 U	48 U	50 U
84-66-2	Diethylphthalate	9 U	9 U	13 U	9 U	22 U	24 U	10 U	10 U
7005-72-3	4-Chlorophenyl-phenylether	9 U	9 U	13 U	9 U	22 U	24 U	**110**	**65**
86-73-7	Fluorene	9 U	9 U	13 U	9 U	22 U	**11 E**	**100**	**70**
100-01-6	4-Nitroaniline	47 U	47 U	65 U	45 U	110 U	120 U	48 U	50 U
534-52-1	4,6-Dinitro-2-methylphenol	94 U	93 U	129 U	90 U	220 U	240 U	96 U	101 U
86-30-6	N-Nitrosodiphenylamine	9 U	9 U	13 U	9 U	22 U	24 U	10 U	10 U
101-55-3	4-Bromophenyl-phenylether	9 U	9 U	13 U	9 U	22 U	24 U	**380**	**210**
118-74-1	Hexachlorobenzene	9 U	9 U	13 U	9 U	22 U	24 U	10 U	10 U
87-86-5	Pentachlorophenol	47 U	47 U	65 U	45 U	110 U	120 U	**260 E**	**360 E**
85-01-8	Phenanthrene	**14**	**10**	**25**	**8 E**	**36**	**150**	**210**	**160**
120-12-7	Anthracene	**3 E**	**3 E**	**6 E**	9 U	**6 E**	**16 E**	**180**	**120**
84-74-2	Di-n-butylphthalate	9 U	**3 U**	13 U	9 U	22 U	24 U	**4 N**	**4 U**
206-44-0	Fluoranthene	**22**	**15**	**26**	**7 E**	**48**	**150**	**200**	**180**
129-00-0	Pyrene	**9 E**	**5 E**	**13 E**	**3 E**	**15**	**41**	**110**	**82**
85-68-7	Butylbenzylphthalate	9 U	9 U	13 U	9 U	22 U	24 U	10 U	10 U
91-94-1	3,3'-Dichlorobenzidine	R	R	R	R	R	R	R	R
56-55-3	Benzo(a)anthracene	**10**	**6 E**	**12 E**	**3 E**	**15 E**	**27**	**100**	**84**
117-81-7	bis(2-Ethylhexyl)phthalate	**7 E**	**7 E**	**14**	**6 E**	**19 E**	**44**	**70**	**49 E**
218-01-9	Chrysene	**14**	**9 E**	**18**	4 U	**24**	**42**	**120**	**94**
117-84-0	Di-n-octylphthalate	9 U	9 U	13 U	9 U	22 U	24 U	10 U	10 U
205-99-2	Benzo(b)fluoranthene							**97**	**90**
207-08-9	Benzo(k)fluoranthene							10 U	10 U
	Benzo(b+k)fluoranthene	**18**	**12**	**30**	**9 E**	**33**	**57**	**97**	**90**
50-32-8	Benzo(a)pyrene	**3 E**	9 U	**5 N**	9 U	22 U	24 U	**66 E**	**65 E**
193-39-5	Indeno(1,2,3-c,d)pyrene	9 U	9 U	13 U	9 U	22 U	24 U	10 U	10 U
53-70-3	Dibenz(a,h)anthracene	9 U	9 U	**12 E**	9 U	22 U	24 U	**140**	**76**
191-24-2	Benzo(g,h,i)perylene	R	R	R	R	R	R	**15 N**	**12 N**

Table 1. (continued) BNA Analyses - Qualified Sample Results

CAS No.	Target Parameter	STATION 44	STATION 44	STATION 45	STATION 47	STATION 48	STATION 49	STATION 66	STATION 67
		Sample 64	Sample 65	Sample 45	Sample 47	Sample 48	Sample 49	Sample 66	Sample 67
	(values in µg/kg, dry weight)	7976W	7976X	7976S	7976T	7976U	7976V	7976Mre	8015L
25155-15-1	Cymene	47 U	47 U	65 U	45 U	110 U	**32 E**	48 U	50 U
86-74-8	9H-Carbazole	9 U	9 U	13 U	9 U	22 U	24 U	**4 N**	**4 E**
58-08-2	Caffeine	9 U	9 U	13 U	9 U	22 U	24 U	10 U	10 U
198-55-0	Perylene	47 U	47 U	65 U	45 U	110 U	120 U	**68**	**64**
80-97-7	ß-Coprostanol	**59 N**	**49 E**	**100 E**	**75 N**	**110 E**	**180 E**	**230**	**150 E**
57-88-5	Cholesterol	**720 E**	**580 E**	**830 E**	**1300 E**	**1500**	**2700**	**840**	**790**
83-46-5	ß-Sitosterol	**580 E**	**540 E**	**1000 E**	**660 E**	**1200 E**	**1800 E**	**520**	**310**
483-65-8	Retene	47 U	47 U	**72**	**15 E**	**62 E**	**82**	**7 E**	**5 E**
90-05-1	2-Methoxyphenol (Guaiacol)								
2460-49-3	4,5-Dichloroguaiacol								
2668-24-8	4,5,6-Trichloroguaiacol								
57057-83-7	3,4,5-Trichloroguaiacol								
2539-17-5	Tetrachloroguaiacol								
127-27-5	Pimaric acid								
471-74-9	Sandaracopimaric acid								
5835-26-7	Isopimaric acid								
1945-53-5	Palustric acid								
1740-19-8	Dehydroabietic acid								
514-10-3	Abietic acid								
471-77-2	Neoabietic acid								
-	12-Chlorodehydroabietic acid								
-	14-Chlorodehydroabietic acid								
57055-39-7	Dichlorodehydroabietic acid								
	Pristane/Phytane Ratio			10.460	3.812	1.233	0.950		
	Carbon Preference Index	4.433	3.735	3.357	3.565	1.968	2.383	1.819	1.391

Table 1. (continued) BNA Analyses - Qualified Sample Results

CAS No.	Target Parameter (values in µg/kg, dry weight)	STATION 68 Sample 68 8078P	STATION 69 Sample 69 7976Nre	STATION 70 Sample 70 7976Z	STATION 71 Sample 71 8041I	STATION 201R Sample 201R 8078F	STATION 202R Sample 202R 8078G	STATION 203R Sample 203R 8041M	STATION 204R Sample 204R 8041R
108-95-2	Phenol	**34 E**	**5 E**	**R**	**57 E**	**12 E**	**12 E**	**6 N**	**11 N**
111-44-4	bis(2-Chloroethyl)ether	10 U	9 U	**R**	12 U	9 U	9 U	14 U	21 U
95-57-8	2-Chlorophenol	10 U	9 U	**R**	12 U	9 U	9 U	14 U	21 U
541-73-1	1,3-Dichlorobenzene	**10 E**	9 U	**R**	12 U	9 U	9 U	14 U	21 U
106-46-7	1,4-Dichlorobenzene	**5 N**	9 U	**R**	12 U	9 U	9 U	14 U	21 U
100-51-6	Benzyl alcohol	48 U	46 U	**R**	61 U	45 U	47 U	69 U	107 U
95-50-1	1,2-Dichlorobenzene	**9 E**	9 U	**R**	12 U	9 U	9 U	14 U	21 U
95-48-7	2-Methylphenol	10 U	9 U	18 U	12 U	9 U	9 U	14 U	21 U
108-60-1	bis(2-Chloroisopropyl)ether	10 U	9 U	**R**	12 U	9 U	9 U	14 U	21 U
106-44-5	4-Methylphenol	**380 E**	9 U	18 U	12 U	9 U	9 U	**21 N**	21 U
621-64-7	N-Nitroso-di-n-propylamine	10 U	9 U	**R**	12 U	9 U	9 U	14 U	21 U
67-72-1	Hexachloroethane	19 U	18 U	**R**	25 U	18 U	19 U	28 U	43 U
98-95-3	Nitrobenzene	10 U	9 U	**R**	12 U	9 U	9 U	14 U	21 U
78-59-1	Isophorone	**28 E**	9 U	**R**	12 U	9 U	9 U	14 U	21 U
88-75-5	2-Nitrophenol	48 U	46 U	88 U	61 U	45 U	47 U	69 U	107 U
105-67-9	2,4-Dimethylphenol	19 U	18 U	35 U	25 U	18 U	19 U	28 U	43 U
65-85-0	Benzoic acid	**28 E**	**16 E**	**R**	**36 E**	**16 E**	**16 E**	**53 E**	**36 E**
111-91-1	bis(2-Chloroethoxy)methane	10 U	9 U	**R**	12 U	9 U	9 U	14 U	21 U
120-83-2	2,4-Dichlorophenol	29 U	27 U	53 U	37 U	27 U	28 U	41 U	64 U
120-82-1	1,2,4-Trichlorobenzene	10 U	9 U	**R**	12 U	9 U	9 U	14 U	21 U
91-20-3	Naphthalene	**37 E**	**3 N**	**R**	**6 E**	**2 E**	**3 E**	**14 E**	**8 N**
106-47-8	4-Chloroaniline	R	R	R	R	R	R	R	R
87-68-3	Hexachlorobutadiene	19 U	18 U	35 U	25 U	18 U	19 U	28 U	43 U
59-50-7	4-Chloro-3-methylphenol	19 U	18 U	35 U	25 U	18 U	19 U	28 U	43 U
91-57-6	2-Methylnaphthalene	**44 E**	9 U	18 U	**5 E**	**3 E**	**4 E**	**17 E**	**12 E**
77-47-4	Hexachlorocyclopentadiene	R	R	R	R	R	R	R	R
88-06-2	2,4,6-Trichlorophenol	48 U	46 U	88 U	61 U	45 U	47 U	69 U	107 U
95-95-4	2,4,5-Trichlorophenol	48 U	46 U	88 U	61 U	45 U	47 U	69 U	107 U
91-58-7	2-Chloronaphthalene	10 U	9 U	18 U	12 U	9 U	9 U	14 U	21 U
88-74-4	2-Nitroaniline	48 U	46 U	88 U	61 U	45 U	47 U	69 U	107 U
131-11-3	Dimethylphthalate	10 U	9 U	18 U	12 U	9 U	9 U	14 U	21 U
208-96-8	Acenaphthylene	**23**	9 U	18 U	12 U	9 U	9 U	14 U	21 U
99-09-2	3-Nitroaniline	48 U	46 U	88 U	61 U	45 U	47 U	69 U	107 U

Table 1. (continued) BNA Analyses - Qualified Sample Results

CAS No.	Target Parameter (values in µg/kg, dry weight)	STATION 68 Sample 68 8078P	STATION 69 Sample 69 7976Nre	STATION 70 Sample 70 7976Z	STATION 71 Sample 71 8041I	STATION 201R Sample 201R 8078F	STATION 202R Sample 202R 8078G	STATION 203R Sample 203R 8041M	STATION 204R Sample 204R 8041R
83-32-9	Acenaphthene	**67**	9 U	18 U	**3 N**	9 U	9 U	14 U	21 U
51-28-5	2,4-Dinitrophenol	95 U	91 U	180 U	123 U	90 U	94 U	138 U	213 U
100-02-7	4-Nitrophenol	48 U	46 U	88 U	61 U	45 U	47 U	69 U	107 U
132-64-9	Dibenzofuran	**2 E**	9 U	18 U	**5 E**	9 U	9 U	**6 E**	**5 N**
121-14-2	2,4-Dinitrotoluene	48 U	46 U	88 U	61 U	45 U	47 U	69 U	107 U
606-20-2	2,6-Dinitrotoluene	48 U	46 U	88 U	61 U	45 U	47 U	69 U	107 U
84-66-2	Diethylphthalate	10 U	**18**	18 U	12 U	9 U	9 U	**2 N**	21 U
7005-72-3	4-Chlorophenyl-phenylether	**83**	9 U	18 U	12 U	9 U	9 U	14 U	21 U
86-73-7	Fluorene	**82**	9 U	**9 E**	**7 E**	**3 E**	**2 N**	**6 E**	**6 N**
100-01-6	4-Nitroaniline	48 U	46 U	88 U	61 U	45 U	47 U	69 U	107 U
534-52-1	4,6-Dinitro-2-methylphenol	95 U	91 U	180 U	123 U	90 U	94 U	138 U	213 U
86-30-6	N-Nitrosodiphenylamine	10 U	9 U	18 U	12 U	9 U	9 U	14 U	21 U
101-55-3	4-Bromophenyl-phenylether	**240**	9 U	18 U	12 U	9 U	9 U	14 U	21 U
118-74-1	Hexachlorobenzene	10 U	9 U	18 U	12 U	9 U	9 U	14 U	21 U
87-86-5	Pentachlorophenol	**340 E**	46 U	88 U	61 U	45 U	47 U	69 U	107 U
85-01-8	Phenanthrene	**160**	**19**	**85***	**58**	**21**	**22**	**44**	**99**
120-12-7	Anthracene	**130 E**	**6 E**	**27**	**11 E**	**3 N**	9 U	**3 N**	**11 E**
84-74-2	Di-n-butylphthalate	**3 U**	**12 N**	**7 E**	12 U	**3 U**	9 U	14 U	21 U
206-44-0	Fluoranthene	**150**	**28**	**190**	**70**	**16**	**16**	**23**	**57**
129-00-0	Pyrene	**97**	**18**	**59**	**41**	**9 E**	**8 E**	**12 E**	**28**
85-68-7	Butylbenzylphthalate	10 U	9 U	**15 N**	12 U	9 U	9 U	14 U	21 U
91-94-1	3,3'-Dichlorobenzidine	R	R	R	R	R	R	R	R
56-55-3	Benzo(a)anthracene	**77**	**10**	**83**	**20**	**5 E**	**4 E**	**6 E**	**14 E**
117-81-7	bis(2-Ethylhexyl)phthalate	**68 E**	**170 E**	**45**	**12 E**	4 U	**15 E**	**16 E**	**20 E**
218-01-9	Chrysene	**92**	**17**	**150**	**42**	7 U	7 U	**14**	**23**
117-84-0	Di-n-octylphthalate	10 U	9 U	18 U	12 U	9 U	9 U	14 U	21 U
205-99-2	Benzo(b)fluoranthene	**96**							
207-08-9	Benzo(k)fluoranthene	10 U							
	Benzo(b+k)fluoranthene	**96**	**25**	**96**	**38**	**13**	**11**	**15**	**43**
50-32-8	Benzo(a)pyrene	**67 E**	**8 E**	**17 E**	**10 E**	**3 N**	9 U	**3 N**	**9 N**
193-39-5	Indeno(1,2,3-c,d)pyrene	10 U	9 U	18 U	**7 N**	9 U	9 U	14 U	21 U
53-70-3	Dibenz(a,h)anthracene	**85**	**6 N**	**19**	12 U	9 U	9 U	14 U	21 U
191-24-2	Benzo(g,h,i)perylene	**21 E**	R	R	R	R	R	R	R

Table 1. (continued) BNA Analyses - Qualified Sample Results

CAS No.	Target Parameter (values in µg/kg, dry weight)	STATION 68 Sample 68 8078P	STATION 69 Sample 69 7976Nre	STATION 70 Sample 70 7976Z	STATION 71 Sample 71 8041I	STATION 201R Sample 201R 8078F	STATION 202R Sample 202R 8078G	STATION 203R Sample 203R 8041M	STATION 204R Sample 204R 8041R
25155-15-1	Cymene	48 U	4 N	R	61 U	45 U	47 U	11 E	107 U
86-74-8	9H-Carbazole	10 U	9 U	18 U	4 N	9 U	9 U	14 U	21 U
58-08-2	Caffeine	10 U	9 U	18 U	12 U	9 U	9 U	14 U	21 U
198-55-0	Perylene	83	46 U	88 U	7 E	6 N	5 N	7 E	12 E
80-97-7	ß-Coprostanol	200 E	97 E	130 N	130	63 E	55 N	130 E	400
57-88-5	Cholesterol	840 E	880 E	1500	1400	780 E	500 E	760 E	3400
83-46-5	ß-Sitosterol	390 E	790	2000 E	1100	410 E	230 E	900 E	2200
483-65-8	Retene	10 E	11 E	1000	21 E	13 E	13 E	110	25 E
90-05-1	2-Methoxyphenol (Guaiacol)								
2460-49-3	4,5-Dichloroguaiacol								
2668-24-8	4,5,6-Trichloroguaiacol								
57057-83-7	3,4,5-Trichloroguaiacol								
2539-17-5	Tetrachloroguaiacol								
127-27-5	Pimaric acid								
471-74-9	Sandaracopimaric acid								
5835-26-7	Isopimaric acid								
1945-53-5	Palustric acid								
1740-19-8	Dehydroabietic acid								
514-10-3	Abietic acid								
471-77-2	Neoabietic acid								
-	12-Chlorodehydroabietic acid								
-	14-Chlorodehydroabietic acid								
57055-39-7	Dichlorodehydroabietic acid								
	Pristane/Phytane Ratio	0.502		1.103					
	Carbon Preference Index	2.972	2.796	2.135	2.096	1.283	1.574	4.101	2.033

Table 1. (continued) BNA Analyses - Qualified Sample Results

CAS No.	Target Parameter (values in µg/kg, dry weight)	STATION 205R Sample 205R 8041S	STATION 206R Sample 206R 8041T	STATION 207R Sample 207R 8041N	STATION 208R Sample 208R 8078H	STATION 209R Sample 209R 8041O
108-95-2	Phenol	**4 N**	**6 N**	**8 N**	27 U	**42**
111-44-4	bis(2-Chloroethyl)ether	12 U	11 U	13 U	27 U	9 U
95-57-8	2-Chlorophenol	12 U	11 U	13 U	27 U	9 U
541-73-1	1,3-Dichlorobenzene	12 U	11 U	13 U	27 U	9 U
106-46-7	1,4-Dichlorobenzene	12 U	11 U	13 U	27 U	9 U
100-51-6	Benzyl alcohol	61 U	54 U	67 U	136 U	47 U
95-50-1	1,2-Dichlorobenzene	12 U	11 U	13 U	27 U	9 U
95-48-7	2-Methylphenol	12 U	11 U	13 U	27 U	9 U
108-60-1	bis(2-Chloroisopropyl)ether	12 U	11 U	13 U	27 U	9 U
106-44-5	4-Methylphenol	12 U	11 U	13 U	27 U	9 U
621-64-7	N-Nitroso-di-n-propylamine	12 U	11 U	13 U	27 U	9 U
67-72-1	Hexachloroethane	24 U	22 U	27 U	55 U	19 U
98-95-3	Nitrobenzene	12 U	11 U	13 U	27 U	9 U
78-59-1	Isophorone	12 U	11 U	13 U	27 U	9 U
88-75-5	2-Nitrophenol	61 U	54 U	67 U	136 U	47 U
105-67-9	2,4-Dimethylphenol	24 U	22 U	27 U	55 U	19 U
65-85-0	Benzoic acid	**15 E**	**12 N**	**24 N**	**43 N**	93 U
111-91-1	bis(2-Chloroethoxy)methane	12 U	11 U	13 U	27 U	9 U
120-83-2	2,4-Dichlorophenol	37 U	32 U	40 U	82 U	28 U
120-82-1	1,2,4-Trichlorobenzene	12 U	11 U	13 U	27 U	9 U
91-20-3	Naphthalene	**4 E**	**3 E**	**7 E**	27 U	9 U
106-47-8	4-Chloroaniline	R	R	R	R	R
87-68-3	Hexachlorobutadiene	24 U	22 U	27 U	55 U	19 U
59-50-7	4-Chloro-3-methylphenol	24 U	22 U	27 U	55 U	19 U
91-57-6	2-Methylnaphthalene	**6 E**	**5 E**	**10 E**	27 U	9 U
77-47-4	Hexachlorocyclopentadiene	R	R	R	R	R
88-06-2	2,4,6-Trichlorophenol	61 U	54 U	67 U	136 U	47 U
95-95-4	2,4,5-Trichlorophenol	61 U	54 U	67 U	136 U	47 U
91-58-7	2-Chloronaphthalene	12 U	11 U	13 U	27 U	9 U
88-74-4	2-Nitroaniline	61 U	54 U	67 U	136 U	47 U
131-11-3	Dimethylphthalate	12 U	11 U	13 U	27 U	9 U
208-96-8	Acenaphthylene	12 U	11 U	13 U	27 U	9 U
99-09-2	3-Nitroaniline	61 U	54 U	67 U	136 U	47 U

Table 1. (continued) BNA Analyses - Qualified Sample Results

CAS No.	Target Parameter (values in µg/kg, dry weight)	STATION 205R Sample 205R 8041S	STATION 206R Sample 206R 8041T	STATION 207R Sample 207R 8041N	STATION 208R Sample 208R 8078H	STATION 209R Sample 209R 8041O
83-32-9	Acenaphthene	12 U	11 U	**3 N**	27 U	9 U
51-28-5	2,4-Dinitrophenol	122 U	108 U	133 U	273 U	93 U
100-02-7	4-Nitrophenol	61 U	54 U	67 U	136 U	47 U
132-64-9	Dibenzofuran	12 U	**3 E**	**4 E**	27 U	9 U
121-14-2	2,4-Dinitrotoluene	61 U	54 U	67 U	136 U	47 U
606-20-2	2,6-Dinitrotoluene	61 U	54 U	67 U	136 U	47 U
84-66-2	Diethylphthalate	12 U	11 U	13 U	27 U	9 U
7005-72-3	4-Chlorophenyl-phenylether	12 U	11 U	13 U	27 U	9 U
86-73-7	Fluorene	**3 N**	**3 E**	**6 E**	27 U	9 U
100-01-6	4-Nitroaniline	61 U	54 U	67 U	136 U	47 U
534-52-1	4,6-Dinitro-2-methylphenol	122 U	108 U	133 U	273 U	93 U
86-30-6	N-Nitrosodiphenylamine	12 U	11 U	13 U	27 U	9 U
101-55-3	4-Bromophenyl-phenylether	12 U	11 U	13 U	27 U	9 U
118-74-1	Hexachlorobenzene	12 U	11 U	13 U	27 U	9 U
87-86-5	Pentachlorophenol	61 U	54 U	67 U	136 U	47 U
85-01-8	Phenanthrene	**28**	**29**	**50**	**160 N**	**6 E**
120-12-7	Anthracene	**5 E**	**6 E**	**12 E**	27 U	9 U
84-74-2	Di-n-butylphthalate	12 U	11 U	13 U	27 U	9 U
206-44-0	Fluoranthene	**23**	**41**	**52**	**39**	**6 N**
129-00-0	Pyrene	**14**	**27**	**32**	**29**	**4 E**
85-68-7	Butylbenzylphthalate	12 U	11 U	13 U	27 U	9 U
91-94-1	3,3'-Dichlorobenzidine	R	R	R	R	R
56-55-3	Benzo(a)anthracene	**8 E**	**11**	**20**	**11 E**	**3 E**
117-81-7	bis(2-Ethylhexyl)phthalate	5 U	**11 E**	**15**	**16 E**	**5 E**
218-01-9	Chrysene	**12 E**	**20**	**31**	18 U	3 U
117-84-0	Di-n-octylphthalate	12 U	11 U	13 U	27 U	9 U
205-99-2	Benzo(b)fluoranthene					
207-08-9	Benzo(k)fluoranthene					
	Benzo(b+k)fluoranthene	**18**	**25**	**43**	**33**	**5 U**
50-32-8	Benzo(a)pyrene	**4 N**	**5 E**	**13 E**	**12 E**	9 U
193-39-5	Indeno(1,2,3-c,d)pyrene	12 U	11 U	**18 N**	27 U	9 U
53-70-3	Dibenz(a,h)anthracene	12 U	11 U	**12 N**	**20 E**	9 U
191-24-2	Benzo(g,h,i)perylene	R	R	R	R	R

Table 1. (continued) BNA Analyses - Qualified Sample Results

CAS No.	Target Parameter (values in µg/kg, dry weight)	STATION 205R Sample 205R 8041S	STATION 206R Sample 206R 8041T	STATION 207R Sample 207R 8041N	STATION 208R Sample 208R 8078H	STATION 209R Sample 209R 8041O
25155-15-1	Cymene	61 U	54 U	**6 E**	136 U	**2 E**
86-74-8	9H-Carbazole	12 U	11 U	13 U	27 U	9 U
58-08-2	Caffeine	12 U	11 U	13 U	27 U	9 U
198-55-0	Perylene	**7 E**	54 U	**14 E**	**23 E**	**4 N**
80-97-7	ß-Coprostanol	**87 N**	54 U	**160**	**800**	**72 N**
57-88-5	Cholesterol	**860**	**750**	**1600**	**2900**	**990**
83-46-5	ß-Sitosterol	**670**	**450**	**1500**	**2800**	**870**
483-65-8	Retene	**15 E**	**15 E**	**23 E**	**15 E**	**33**
90-05-1	2-Methoxyphenol (Guaiacol)					
2460-49-3	4,5-Dichloroguaiacol					
2668-24-8	4,5,6-Trichloroguaiacol					
57057-83-7	3,4,5-Trichloroguaiacol					
2539-17-5	Tetrachloroguaiacol					
127-27-5	Pimaric acid					
471-74-9	Sandaracopimaric acid					
5835-26-7	Isopimaric acid					
1945-53-5	Palustric acid					
1740-19-8	Dehydroabietic acid					
514-10-3	Abietic acid					
471-77-2	Neoabietic acid					
-	12-Chlorodehydroabietic acid					
-	14-Chlorodehydroabietic acid					
57055-39-7	Dichlorodehydroabietic acid					
	Pristane/Phytane Ratio	3.759		8.212	0.586	
	Carbon Preference Index	2.192	3.433	2.319	3.429	8.208

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.

Table 2. BNA Analyses - Sample Holding Times

Station ID	Sample ID	Rep/QC	Lab ID	Date Collected	Date Extracted	Date Analyzed F1	Date Analyzed F2	Holding Times (Days)		
								Extraction	Analysis F1	Analysis F2
1	1	1	8041 P	4/10/91	4/15/91	4/23/91	4/26/91	5	13	16
2R	2R	1	8041 Q	4/07/91	4/15/91	4/29/91		**8**	22	
3	3	1	8078 A	4/11/91	4/16/91	4/29/91		5	18	
4	4	1	8041 A	4/07/91	4/11/91	4/18/91	4/17/91	4	11	10
5	5	1	8041 B	4/06/91	4/11/91	4/18/91	4/17/91	5	12	11
5	5	MS	8041 B ms	4/06/91	4/11/91	4/18/91	4/17/91	5	12	11
5	5	MSD	8041 B msd	4/06/91	4/11/91	4/18/91	4/17/91	5	12	11
5	51	1	8041 F	4/06/91	4/11/91	4/18/91	4/17/91	5	12	11
5	52	2	8041 G	4/06/91	4/11/91	4/18/91	4/17/91	5	12	11
5	53	3	8041 H	4/06/91	4/11/91	4/18/91	4/17/91	5	12	11
8	8	1	8078 B	4/12/91	4/16/91	4/23/91	4/26/91	4	11	14
9R	9R	1	8078 C	4/12/91	4/16/91	4/29/91		4	17	
10R	10R	1	8078 D	4/13/91	4/16/91	4/23/91	5/02/91	3	10	19
11R	11R	1	8078 E	4/13/91	4/16/91	4/29/91		3	16	
11R	11R	DIL	8078 Edl	4/13/91		5/02/91			19	
12	12	1	8078 J	4/13/91	4/16/91	4/23/91	4/26/91	3	10	13
12	12	DIL	8078 Jdl	4/13/91			4/30/91			17
13R	13R	1	8078 K	4/14/91	4/16/91	4/29/91		2	15	
14	14	1	8078 L	4/14/91	4/16/91	4/29/91		2	15	
15	15	1	8078 M	4/14/91	4/16/91	4/29/91		2	15	
17	17	1	8078 N	4/14/91	4/16/91	4/23/91	4/26/91	2	9	12
18	18	1	8041 C	4/05/91	4/11/91	4/16/91		6	11	
19	19	1	8041 D	4/05/91	4/11/91	4/16/91		6	11	
20	20	1	8041 E	4/05/91	4/11/91	4/16/91		6	11	
21	21	1	8015 A	4/02/91	4/08/91	4/18/91	4/16/91	6	16	14
21	21	DIL	8015 Adl	4/02/91			4/30/91			28
22	22	1	8015 B	4/02/91	4/08/91	4/12/91		6	10	
26	26	1	8078 O	4/13/91	4/16/91	4/29/91		3	16	
26	26	DIL	8078 Odl	4/13/91		5/02/91			19	
29	29	1	8015 C	4/01/91	4/08/91	4/30/91	4/16/91	7	29	15
30	30	1	7976 B re	3/25/91	4/12/91	4/19/91	4/19/91	**18**	25	25

Holding times exceeding project-specified limits are highlighted in **bold**.

Table 2. (cont'd.) **BNA Analyses - Sample Holding Times**

Station ID	Sample ID	Rep/QC	Lab ID	Date Collected	Date Extracted	Date Analyzed F1	Date Analyzed F2	Holding Times (Days) Extraction	Analysis F1	Analysis F2
32	32	1	8015 D	4/01/91	4/08/91	4/12/91		7	11	
32	32	MS	8015 D ms	4/01/91	4/08/91	4/12/91		7	11	
32	32	MSD	8015 D msd	4/01/91	4/08/91	4/12/91		7	11	
32	57	1	8015 F	4/01/91	4/08/91	4/13/91		7	12	
32	58	2	8015 G	4/01/91	4/08/91	4/13/91		7	12	
32	58	DIL	8015 Gdl	4/01/91		4/30/91			29	
32	59	3	8015 H	4/01/91	4/08/91	4/13/91		7	12	
33	33	1	8015 E	40/1/91	4/08/91	4/18/91	4/16/91	7	17	15
34	34	1	7976 C re	3/25/91	4/12/91	4/30/91	4/19/91	**18**	36	25
35	35	1	7976 D re	3/26/91	4/12/91	4/19/91	4/25/91	**17**	24	30
35	35	DIL	7976 D redl	3/26/91			4/30/91			35
35	35	MSD	7976 D msd re	3/26/91	4/12/91	4/19/91	4/25/91	**17**	24	30
35	35	MS	7976 D ms re	3/26/91	4/12/91	4/19/91	4/25/91	**17**	24	30
35	72	1	7976 O re	3/26/91	4/12/91	4/19/91	4/25/91	**17**	24	30
35	72	DIL	7976 O redl	3/26/91			4/26/91			31
35	73	2	7976 P re	3/26/91	4/12/91	4/20/91	4/25/91	**17**	25	30
35	74	3	7976 Q re	3/26/91	4/12/91	4/20/91	4/23/91	**17**	25	28
38	38	1	7976 E re	3/26/91	4/12/91	4/19/91	4/19/91	**17**	24	24
38	60	1	7976 J re	3/26/91	4/12/91	4/19/91	4/20/91	**17**	24	25
38	61	2	7976 K re	3/26/91	4/12/91	4/19/91	4/25/91	**17**	24	30
38	61	DIL	7976 K redl	3/26/91			4/30/91			35
38	61	DUP1	7976 K re dup	3/26/91	4/12/91	4/19/91	4/25/91	**17**	24	30
38	61	DUP2	7976 K re dup2	3/26/91	4/12/91	4/19/91	4/25/91	**17**	24	30
38	62	3	7976 L re	3/26/91	4/12/91	4/19/91	4/25/91	**17**	24	30
39	39	1	7976 F re	3/27/91	4/12/91	4/30/91		**16**	34	
40	40	1	7976 G re	3/27/91	4/12/91	4/25/91	4/20/91	**16**	29	24
40	40	DIL	7976 G redl	3/27/91			4/30/91			34
41	41	1	7976 H re	3/27/91	4/12/91	4/25/91	4/20/91	**16**	29	24
41	41	DIL	7976 H redl	3/27/91			4/30/91			34
43	43	1	7976 I re	3/27/91	4/12/91	4/30/91		**16**	34	
44	44	1	7976 R	3/28/91	4/01/91	4/10/91		4	13	

Holding times exceeding project-specified limits are highlighted in **bold.**

Table 2. (cont'd.) **BNA Analyses - Sample Holding Times**

Station ID	Sample ID	Rep/QC	Lab ID	Date Collected	Date Extracted	Date Analyzed F1	Date Analyzed F2	Holding Times (Days) Extraction	Analysis F1	Analysis F2
44	44	MS	7976 R ms	3/28/91	4/01/91	4/10/91		4	13	
44	44	MSD	7976 R msd	3/28/91	4/01/91	4/10/91		4	13	
44	63	1	7976 Y	3/28/91	4/01/91	4/10/91		4	13	
44	64	2	7976 W	3/28/91	4/01/91	4/10/91		4	13	
44	65	3	7976 X	3/28/91	4/01/91	4/10/91		4	13	
45	45	1	7976 S	3/28/91	4/01/91	4/10/91		4	13	
47	47	1	7976 T	3/28/91	4/01/91	4/10/91		4	13	
48	48	1	7976 U	3/29/91	4/01/91	4/12/91	4/10/91	3	14	12
49	49	1	7976 V	3/29/91	4/01/91	4/12/91	4/11/91	3	14	13
66	66	PCS	7976 M re	3/27/91	4/12/91	4/19/91	4/25/91	**16**	23	29
66	66	DIL	7976 M redl	3/27/91			4/26/91			30
67	67	PCS	8015 L	4/02/91	4/08/91	4/18/91	4/16/91	6	16	14
68	68	PCS	8078P	4/11/91	4/16/91	4/23/91	4/26/91	5	12	15
69	69	1	7976 N re	3/25/91	4/12/91	4/30/91		**18**	36	
70	70	1	7976 Z	3/28/91	4/01/91	4/12/91	4/11/91	4	15	14
71	71	1	8041 I	4/05/91	4/11/91	4/18/91	4/17/91	6	13	12
71	71	DIL	8041 Idl	4/05/91			4/30/91			25
201R	201R	1	8078 F	4/11/91	4/16/91	4/23/91	4/26/91	5	12	15
202R	202R	1	8078 G	4/11/91	4/16/91	4/23/91	4/26/91	5	12	15
203R	203R	1	8041 M	407/91	4/11/91	4/26/91		4	19	
204R	204R	1	8041 R	4/08/91	4/15/91	4/30/91		7	22	
204R	204R	DIL	8041 Rdl	4/08/91			5/02/91			24
205R	205R	1	8041 S	4/08/91	4/15/91	4/30/91		7	22	
206R	206R	1	8041 T	4/08/91	4/15/91	4/30/91		7	22	
207R	207R	1	8041 N	4/06/91	4/11/91	4/17/91		5	11	
208R	208R	1	8078 H	4/13/91	4/16/91	4/29/91		3	16	
209R	209R	1	8041 O	4/05/91	4/11/91	4/17/91		6	12	

Holding times exceeding project-specified limits are highlighted in **bold**.

Table 3. BNA Analyses - Continuing Calibration Summary

Calibration Date: / Time:	4/10/91 09:27	4/10/91 16:04	4/12/91 15:06	4/16/91 10:06	4/16/91 12:49	4/17/91 11:41	4/18/91 08:18	4/18/91 15:00	4/19/91 08:33
Compound									
%Ds >25%[a]									
4-Methylphenol	–	–	–	–	–	–	–	–	–
Nitrobenzene	–	–	–28.8	–	–	–	–	–	–
Isophorone	–	–	–	–	–	–	–	–	–
Benzoic acid	–	–	–	31.2	–	–	–	–	–
2-Methylnaphthalene	–	–	–	-	–	–	–	–	–
2-Nitroaniline	–	–	–	-	–26.8	–	–	–	–
2,4-Dinitrophenol	–	41.7	–	58.3	–	–	–	31.4	–
4-Nitrophenol	–	–	–	–	–	–	–	–	–
2,6-Dinitrotoluene	–	–	–	–	–39.4	–31.9	–31.5	–	–28.0
2,4-Dinitrotoluene	–	–	–	–	–37.4	–39.8	–41.0	–	–37.0
4-Nitroaniline	–	–	–	–	–	–37.6	–36.0	–	–31.4
4,6-Dinitro-2-methylphenol	–	–	–	–	–30.1	–35.6	–	–	–
Anthracene	–	–	–	–	–	–	–	–	–
Butylbenzylphthalate	–	–	–	–	–	–	–	–	–
3,3'-Dichlorobenzidine	–40.5	–	–	–	–	–	–50.7	–30.5	–39.0
bis(2-Ethylhexyl)phthalate	–	–	–	–	–41.1	–	–	–	–
Dibenz(a,h)anthracene	–	–	–	–	–	–	–	–	27.8
Benzo(g,h,i)perylene	–	–	–	–	–	28.0	34.5	26.3	30.7
%Ds >30%[a]									
Retene	–	–	–	–	–	–	–	–	–
ß-Coprostanol	–	–33.3	–50.0	–	–37.0	–	–48.1	–	–40.7
Cholesterol	–	–35.7	–	–	–	–	–42.9	–32.1	–35.7
ß-Sitosterol	–31.6	–31.6	–	52.6	–	–	–	–	–
RRFs<0.05									
Cholesterol	0.032	0.038	0.036	0.022	0.032	0.027	0.040	0.037	0.038
ß-Sitosterol	0.025	0.025	0.022	0.009	0.020	0.017	0.020	0.022	0.019

a: Values presented for %D are those that exceed acceptance criteria by nearest whole percent.

Table 3. (cont'd.) BNA Analyses - Continuing Calibration Summary

Calibration Date: Time:	4/19/91 15:51	4/23/91 08:02	4/25/91 12:36	4/26/91 10:01	4/29/91 10:47	4/29/91 17:30	4/30/91 11:43	5/02/91 09:09
Compound								
%Ds >25%[a]								
4-Methylphenol	–	–	–	–	–	–	–	26.7
Nitrobenzene	–	–	–27.7	–	–	–	–	–
Isophorone	–	–	–	–29.2	–	–	–	–
Benzoic acid	–	–	–31.2	–52.9	–	–	–48.2	–48.8
2-Methylnaphthalene	–	28.1	–	–	–	–	–	–
2-Nitroaniline	–	–	–	–	–	–	–	–
2,4-Dinitrophenol	–	–	–	–33.3	–	–	–	–
4-Nitrophenol	–36.2	–	–	–	26.7	–	–	–
2,6-Dinitrotoluene	–29.1	–	–33.9	–38.2	–	–	–37.8	–29.9
2,4-Dinitrotoluene	–33.2	–	–42.2	–41.6	–	–	–39.1	–34.5
4-Nitroaniline	–	–	–33.9	–	–	–	–	–
4,6-Dinitro-2-methylphenol	–	–	–	–54.6	–	–28.8	–39.9	–40.5
Anthracene	–	–	–	26.1	–	–	–	–
Butylbenzylphthalate	–	–	–	–31.8	–	–	–	–29.5
3,3'-Dichlorobenzidine	–37.6	–29.5	–	–33.8	–	–	–	–
bis(2-Ethylhexyl)phthalate	–	–	–	–26.6	–	–	–35.5	–
Dibenz(a,h)anthracene	–	–	–	–	–	–	–	–
Benzo(g,h,i)perylene	–	35.4	27.0	–	–	–	–	–
%Ds >30%[a]								
Retene	–	–	–31.6	–	–42.3	–	–	–36.1
ß-Coprostanol	–42.6	–57.4	–	–61.1	–	–	–50.0	–50.0
Cholesterol	–50.0	–32.1	–	–75.0	–	–	–32.1	–
ß-Sitosterol	–36.8	–	–	–94.7	–	–	–	–47.4
RRFs<0.05								
Cholesterol	0.042	0.037	0.030	0.049	0.032	0.034	0.037	0.033
ß-Sitosterol	0.026	0.019	0.014	0.037	0.018	0.021	0.019	0.028

a: Values presented for %D are those that exceed acceptance criteria by nearest whole percent.

Table 4. **BNA Analyses - Method Blank Summary**

Lab QC Data Set	7976[a]	7976-re[b]	7976-re	8015	8015	8041	8041	8041	8041	8078	8078
Lab Sample ID	0401MB2	0412MB2	0412MB	0408MB	0408MB2	0411MB2	0411MB	0415MB2	0415MB	0416MB2	0416MB
	F1+F2[c]	-	F1+F2	-	F1+F2	-	F1+F2	-	F1+F2	-	F1+F2
Compound											
Di-n-butylphthalate	**0.17 E**	1.0 U	1.0 U	1.0 U	1.0 U	**0.24 E**	**0.25 E**	1.0 U	1.0 U	1.0 U	**0.36 E**
Fluoranthene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	**0.30 E**
Pyrene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	**0.27 E**
bis(2-Ethylhexyl)phthalate	**0.28 E**	1.0 U	**0.21 E**	1.0 U	**0.37 E**	1.0 U	**0.26 E**	1.0 U	**0.43 E**	1.0 U	**0.27 E**
Chrysene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	**0.79 E**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Benzo(b)fluoranthene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Benzo(k)fluoranthene	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	**0.31 E**	1.0 U	1.0 U	1.0 U	1.0 U	**0.34 E**
Benzo(g,h,i)perylene	**0.31 E**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	**0.49 E**

All values in ng/µl (final extract). Highest value for each compound is underlined.

a: Sample Delivery Group 7976, first extraction.
b: Sample Delivery Group 7976, reextraction.
c: Total for F1 and F2 fractions.
U: Method Quantitation Limit.
E: Reported values (in **bold**) are estimates.

Table 5. BNA Analyses - Surrogate Recoveries (%R)

Sample ID		Acid Fraction Surrogates					Neutral Fraction Surrogates						
		S5 (2FP)	S4 (PHL)	S8 (CRE)	S6 (TBP)	S10 (ACR)	S7 (DCB)	S1 (NBZ)	S2 (FBP)	S9 (ANT)	S11 (FLO)	S3 (TPH)	S12 (DBA)
1		**11.0**	**26.2**	62.1	64.7	133	**36.3**	**38.4**	58.1	125	89.6	87.0	115
2R		**40.6**	54.5	74.1	69.1	108	**35.8**	**42.8**	64.1	109	90.9	94.9	122
3		**47.4**	54.2	68.0	68.5	106	57.9	52.2	61.7	105	73.1	74.7	91.3
4		**20.4**	**40.9**	76.9	52.9	99.5	52.8	**47.5**	76.1	98.7	91.4	78.1	143
5		**18.9**	**39.0**	68.1	53.5	95.6	54.3	**47.4**	71.2	101	89.8	85.3	138
8		**10.7**	**30.2**	65.2	63.8	102	**30.7**	**35.5**	67.1	105	71.9	84.6	130
9R		61.2	75.0	88.4	77.1	80.8	80.9	65.3	71.7	76.4	72.6	102	98.5
10R		**16.7**	**36.6**	81.8	66.7	100	56.3	51.4	71.5	99.0	78.4	82.6	109
11R		62.5	75.4	89.7	79.6	98.0	72.1	66.2	73.6	95.9	71.7	95.6	114
11R	(Dil.)	59.1	61.8	77.5	**49.6**	97.6	81.2	66.0	92.2	108	90.3	91.8	95.3
12		**12.3**	**30.1**	70.8	69.0	103	**48.9**	**44.0**	65.2	108	78.4	103	118
12	(Dil.)	**12.2**	**28.0**	70.9	80.0	121	50.0	**49.9**	79.0	123	105	118	107
13R		53.4	61.1	78.4	76.9	87.7	67.7	59.9	68.4	91.3	78.3	111	114
14		53.3	62.8	77.6	80.4	93.5	63.6	55.2	68.1	94.0	83.7	105	116
15		62.3	72.8	84.0	78.9	95.5	81.9	66.2	72.5	93.6	81.7	102	120
17		**9.8**	**21.6**	51.0	50.2	113	**34.1**	**34.4**	50.9	116	95.1	79.7	103
18		66.5	78.0	88.6	61.0	116	74.4	76.3	72.4	107	111	96.3	104
19		66.0	68.8	78.2	60.1	90.5	70.2	69.9	65.4	91.8	92.8	106	88.7
20		53.4	62.2	76.7	56.3	90.3	57.5	55.5	61.0	89.4	89.7	91.5	102
21		**13.0**	**24.9**	**49.4**	**43.7**	87.3	**28.5**	**34.1**	**48.6**	87.9	90.9	92.2	96.4
21	(Dil.)	**7.0**	**13.7**	**27.5**	**22.4**	58.6	**27.2**	**23.4**	**42.7**	80.8	75.3	82.2	66.8
22		**42.0**	60.7	71.3	55.0	83.8	63.8	58.2	76.5	88.6	83.8	88.2	131
26		57.5	72.1	86.9	87.4	105	76.2	63.0	73.1	106	82.8	91.5	114
26	(Dil.)	51.1	54.9	77.1	**44.6**	88.9	80.5	55.8	82.9	100	85.9	81.5	90.1
29		**11.6**	**19.2**	**35.4**	**40.5**	67.8	**32.0**	**32.9**	**36.9**	69.0	71.5	76.0	79.5
30		**23.4**	**38.6**	57.7	58.6	95.4	53.9	**49.2**	73.2	94.1	81.4	105	132

Surrogate recoveries <50% are in **bold**; surrogate recoveries <10% are underlined.
See explanation at end of table.

Table 5. (cont'd.) BNA Analyses - Surrogate Recoveries (%R)

Sample ID	Acid Fraction Surrogates S5 (2FP)	S4 (PHL)	S8 (CRE)	S6 (TBP)	S10 (ACR)	Neutral Fraction Surrogates S7 (DCB)	S1 (NBZ)	S2 (FBP)	S9 (ANT)	S11 (FLO)	S3 (TPH)	S12 (DBA)
32	**37.7**	**41.1**	**43.6**	51.4	79.2	53.7	51.7	57.7	90.8	79.2	106	121
33	7.7	**15.4**	**28.8**	**45.7**	74.9	**24.2**	**21.7**	**37.6**	74.3	70.9	84.1	110
34	**12.6**	**21.4**	**40.4**	52.1	92.5	**31.8**	**27.1**	54.7	101	82.5	99.4	114
35	**21.3**	**41.9**	77.8	70.1	132	**42.8**	**42.8**	74.9	131	93.8	104	149
35 (Dil.)	**21.4**	**42.6**	73.2	57.0	114	**43.1**	50.0	81.8	134	92.2	114	118
38	**15.1**	**30.2**	53.4	57.8	102	**42.4**	**38.9**	58.5	100	91.7	96.2	113
39	57.9	65.2	71.8	64.1	90.7	74.3	61.3	67.5	87.4	81.2	111	115
40	**15.0**	**27.8**	**47.1**	55.1	97.0	**23.3**	**30.7**	67.5	91.8	75.9	108	149
40 (Dil.)	9.9	**20.0**	**37.4**	**28.2**	67.4	**20.7**	**23.7**	55.8	74.9	63.6	80.5	93.8
41	**21.1**	**40.6**	55.2	62.4	105	**34.4**	**43.8**	63.9	103	86.8	80.8	142
41 (Dil.)	**21.1**	**48.2**	79.2	56.4	124	**35.7**	57.3	85.3	136	120	118	137
43	55.6	57.4	63.8	**46.7**	74.0	75.2	65.7	65.9	79.9	75.6	108	114
44	60.4	69.0	81.9	89.1	68.3	65.5	58.6	75.2	101	78.3	97.3	133
45	**46.0**	57.3	74.5	72.3	50.3	52.4	51.6	64.1	104	90.6	102	128
47	60.3	60.0	75.9	75.6	56.4	60.2	58.1	65.6	109	102	106	141
48	0.9	4.9	**21.6**	68.1	56.7	9.8	**11.9**	**32.6**	105	112	92.7	132
49	1.2	5.6	**24.9**	72.0	81.0	9.9	**13.2**	**39.1**	113	106	99.7	118
51	**20.3**	**40.0**	70.1	58.6	94.3	56.4	**48.8**	72.4	96.8	90.4	83.3	129
52	**17.4**	**26.9**	**42.5**	**34.4**	63.9	**40.9**	**37.1**	52.5	72.7	66.2	62.9	95.7
53	**14.9**	**29.5**	51.0	**41.8**	71.3	**41.7**	**36.9**	53.7	76.1	69.3	70.5	98.8
57	**44.9**	**48.4**	53.9	62.9	85.6	65.9	53.1	57.5	87.7	85.6	95.8	137
58	**42.9**	51.7	61.7	57.0	79.1	59.5	52.2	69.0	88.0	79.1	106	132
58 (Dil.)	**47.6**	55.3	58.7	**34.6**	78.0	58.8	54.5	66.0	88.1	78.0	103	102
59	**33.6**	**41.6**	**46.3**	**46.5**	83.1	53.8	**45.4**	58.7	86.8	83.1	86.8	144
60	**15.2**	**25.6**	**43.4**	51.1	90.2	**35.9**	**37.2**	**48.9**	88.0	85.0	77.8	119
61	**17.6**	**33.3**	63.8	61.5	109	**40.0**	**40.7**	62.4	110	87.3	92.9	129

Surrogate recoveries <50% are in **bold**; surrogate recoveries <10% are underlined.
See explanation at end of table.

Table 5. (cont'd.) BNA Analyses - Surrogate Recoveries (%R)

Sample ID		Acid Fraction Surrogates					Neutral Fraction Surrogates						
		S5 (2FP)	S4 (PHL)	S8 (CRE)	S6 (TBP)	S10 (ACR)	S7 (DCB)	S1 (NBZ)	S2 (FBP)	S9 (ANT)	S11 (FLO)	S3 (TPH)	S12 (DBA)
61	(Dil.)	**15.7**	**30.4**	55.6	**39.7**	101	**39.5**	**39.8**	58.6	109	86.7	93.7	91.5
62		**14.1**	**30.6**	64.7	68.2	108	**38.4**	**40.4**	64.9	108	81.9	93.1	119
63		52.1	53.7	65.5	63.2	**40.5**	59.9	57.7	61.1	94.7	99.9	88.5	138
64		60.8	63.8	76.8	80.3	65.6	63.3	60.6	64.4	98.0	98.6	94.0	131
65		58.4	64.0	78.0	67.7	**49.2**	71.2	66.4	69.4	97.2	88.6	90.4	135
66		**15.8**	**30.6**	58.8	83.0	151	**32.0**	**32.7**	55.3	146	108	105	156
66	(Dil.)	**17.5**	**31.5**	62.4	81.7	151	**31.8**	**38.9**	53.2	154	128	122	128
67		**13.0**	**25.6**	**46.0**	**43.6**	106	**32.1**	**32.8**	**41.0**	97.5	106	79.1	88.6
68		**12.1**	**27.8**	**45.6**	**35.7**	97.8	**26.3**	**28.9**	53.4	91.6	79.9	75.9	82.7
69		**47.8**	65.4	80.1	**39.7**	79.0	73.2	55.7	76.1	91.7	69.7	78.7	97.3
70		<u>0.0</u>	<u>3.6</u>	**18.0**	66.2	83.3	<u>3.0</u>	<u>4.8</u>	**28.9**	101	97.3	108	116
71		**18.6**	**36.4**	61.0	52.0	86.7	**48.1**	**42.5**	64.8	92.9	72.4	79.5	122
71	(Dil.)	**17.6**	**28.4**	**46.3**	**38.9**	73.4	**47.8**	**38.5**	**49.6**	90.9	85.1	85.5	83.1
72		**12.1**	**22.4**	**42.0**	50.1	83.3	**24.8**	**29.1**	**49.2**	86.7	62.3	79.9	95.8
72	(Dil.)	**11.3**	**21.6**	**41.9**	51.4	95.3	**24.8**	**28.4**	**49.2**	95.9	70.0	65.3	99.8
73		**11.2**	**26.4**	53.1	54.9	93.4	**25.8**	**31.7**	50.0	99.6	70.0	77.5	105
74		**16.0**	**30.9**	58.7	83.0	110	**29.6**	**35.0**	58.4	109	83.0	101	133
201R		**15.4**	**32.3**	68.2	67.2	109	**47.0**	**49.0**	64.3	108	89.4	94.8	118
202R		**14.4**	**30.6**	66.3	74.5	116	55.0	52.2	64.6	111	93.7	93.7	122
203R		55.0	73.4	83.3	56.2	91.1	59.7	60.8	69.9	88.9	78.6	81.3	99.6
204R		53.4	62.5	70.9	54.0	106	63.3	64.9	70.9	102	80.5	79.4	88.9
204R	(Dil.)	**47.4**	57.3	82.7	**49.2**	113	70.5	56.6	78.7	106	85.3	62.4	85.3
205R		**43.0**	**48.9**	59.2	51.5	70.8	52.5	**49.1**	54.5	75.0	61.1	70.5	75.8
206R		**43.3**	**46.3**	52.3	**46.9**	59.4	54.1	**49.0**	54.7	65.8	52.7	73.9	73.3
207R		52.1	71.7	88.1	50.1	90.2	68.2	59.8	76.7	98.4	83.0	88.6	142
208R		62.6	65.9	82.3	82.0	108	65.0	60.4	71.2	110	95.1	117	99.1
209R		57.5	77.8	88.0	**45.4**	95.9	87.6	76.1	88.8	112	94.3	94.0	125

Surrogate recoveries <50% are in **bold**; surrogate recoveries <10% are underlined.
See explanation at end of table.

Table 5. (cont'd.) BNA Analyses - Surrogate Recoveries (%R)

	Acid Fraction Surrogates					Neutral Fraction Surrogates						
Sample ID	S5 (2FP)	S4 (PHL)	S8 (CRE)	S6 (TBP)	S10 (ACR)	S7 (DCB)	S1 (NBZ)	S2 (FBP)	S9 (ANT)	S11 (FLO)	S3 (TPH)	S12 (DBA)
Method Blanks												
0401MB2	**4.0**	**13.2**	55.5	56.9	58.1	**42.2**	**37.8**	55.5	89.6	86.6	110	139
0408MB	**45.1**	**45.4**	**27.6**	**30.1**	73.1	74.5	59.0	62.7	81.7	73.1	91.4	169
0408MB2	**12.9**	**25.3**	**32.9**	**28.3**	50.4	66.8	54.6	72.8	84.1	79.4	86.8	143
0411MB	**24.7**	**44.0**	57.6	**49.0**	78.2	73.5	64.1	74.4	88.2	81.4	83.8	175
0411MB2	61.4	64.2	**47.0**	52.7	75.2	79.4	65.1	66.6	79.4	112	118	111
0412MB	**21.7**	**31.3**	**28.7**	**29.1**	58.4	70.2	55.9	60	84.6	79.6	92.7	162
0412MB2	**43.7**	51.6	**32.7**	**42.4**	52.9	69.1	53.9	55.5	63.9	81.6	99.2	100
0415MB	**30.5**	**47.7**	67.1	**49.9**	77.6	68.8	65.0	80.3	77.2	82.9	97.7	124
0415MB2	59.8	70.2	53.8	62.8	72.7	79.0	66.8	74.8	61.3	75.7	110	121
0416MB	**18.4**	**34.9**	56.8	63.2	84.6	60.3	60.6	73.0	77.9	83.7	98.2	115
0416MB2	**45.2**	56.6	**38.1**	**38.0**	60.6	72.8	58.0	69.3	68.5	77.6	104	120
MS/MSD												
5 MS	**22.2**	**45.0**	78.5	67.4	98.9	53.0	**44.9**	76.0	101	89.7	105	141
5 MSD	**16.9**	**37.4**	63.7	55.5	83.5	50.7	**41.6**	65.8	85.6	79.1	85.7	126
32 MS	**42.4**	54.1	67.1	58.1	68.6	57.4	51.1	67.6	79.0	68.6	95.4	128
32 MSD	**34.8**	**45.6**	57.6	52.8	89.9	53.1	**48.7**	66.0	87.8	89.9	95.9	135
35 MS	**16.4**	**38.5**	68.2	74.7	121	**38.6**	**36.3**	76.7	124	85.6	110	169
35 MSD	**14.8**	**30.4**	57.0	75.2	138	**30.8**	**30.4**	66.5	136	93.2	105	155
44 MS	**44.0**	**47.5**	57.8	**48.5**	**47.7**	**45.2**	**48.3**	55.3	76.3	78.4	84.8	103
44 MSD	52.7	56.0	66.9	72.9	63.7	54.7	55.5	60.8	88.7	81.6	100	106
61 DUP1	**16.3**	**27.6**	52.8	70.6	117	**29.7**	**34.0**	51.9	114	80.9	109	140
61 DUP2	**15.7**	**28.2**	55.8	71.9	112	**34.2**	**33.0**	57.7	117	81.8	98	168

Surrogate recoveries <50% are in **bold**; surrogate recoveries <10% are underlined.
See explanation at end of table.

Table 5. (cont'd.) **BNA Analyses - Surrogate Recoveries**

Explanation

Surrogate Compounds			QC Limits (CLP)	QC Limits (Project)
S1 (NBZ)	=	d_5-Nitrobenzene	23-120%	≥50%
S2 (FBP)	=	2-Fluorobiphenyl	30-115%	"
S3 (TPH)	=	d_{14}-Terphenyl	18-137%	"
S4 (PHL)	=	d_5-Phenol	24-113%	"
S5 (2FP)	=	2-Fluorophenol	25-121%	"
S6 (TBP)	=	2,4,6-Tribromophenol	19-122%	"
S7 (DCB)	=	d_4-1,2-Dichlorobenzene	NA	"
S8 (CRE)	=	d_4-p-2,3,5,6-Cresol	NA	"
S9 (ANT)	=	d_{10}-Anthracene	NA	"
S10 (ACR)	=	d_9-Acridine	NA	"
S11 (FLO)	=	d_{10}-Fluoranthene	NA	"
S12 (DBA)	=	d_{14}-Dibenz(a,h)anthracene	NA	"

(Dil.) = Reanalysis after dilution

Table 6. BNA Analyses - Surrogate Grouping

Acid Fraction Compounds	Scan #[a]
2-Fluorophenol (S5)	**247**
2-Chlorophenol	436
d_5-Phenol (S4)	**438**
Phenol	440
2-Methylphenol	546
d_4-p-2,3,5,6-Cresol (S8)	**574**
4-Methylphenol	575
2-Methoxyphenol (Guaiacol)	587
2-Nitrophenol	638
2,4-Dimethylphenol	667
2,4-Dichlorophenol	684
Benzoic Acid	701
4-Chloro-3-methylphenol	831
2,4,6-Trichlorophenol	893
2,4,5-Trichlorophenol	899
4,5-Dichloroguaiacol	1025
2,4-Dinitrophenol	1048
4-Nitrophenol	1077
4,5,6-Trichloroguaiacol	1116
4,6-Dinitro-2-methylphenol	1148
2,4,6-Tribromophenol (S6)	**1165**
3,4,5-Trichloroguaiacol	1226
Pentachlorophenol	1269
Tetrachloroguaiacol	1287
d_9-Acridine (S10)	**1302**
9H-Carbazole	1335
Caffeine	1346

Neutral Fraction Surrogates	
bis(2-Chloroethyl)ether	443
1,3-Dichlorobenzene	457
1,4-Dichlorobenzene	469
Cymene	492
d_4-1,2-Dichlorobenzene (S7)	**499**
1,2-Dichlorobenzene	501
Benzyl alcohol	511
bis(2-Chloroisopropyl)ether	542
Hexachloroethane	554
N-Nitroso-di-n-propylamine	568
d_5-Nitrobenzene (S1)	**576**
Nitrobenzene	580
Isophorone	627
bis(2-Chloroethoxy)methane	683
1,2,4-Trichlorobenzene	693
Naphthalene	700
4-Chloroaniline	728

Neutral Fraction Compounds (cont'd.)	Scan #[a]
Hexachlorobutadiene	743
2-Methylnaphthalene	828
Hexachlorocyclopentadiene	874
2-Fluorobiphenyl (S2)	**908**
2-Chloronaphthalene	914
2-Nitroaniline	951
Acenaphthylene	988
Dimethylphthalate	1002
2,6-Dinitrotoluene	1010
Acenaphthene	1023
3-Nitroaniline	1029
Dibenzofuran	1054
2,4-Dinitrotoluene	1077
Fluorene	1116
4-Chlorophenyl-phenylether	1129
Diethylphthalate	1135
4-Nitroaniline	1140
N-Nitrosodiphenylamine	1155
4-Bromophenyl-phenylether	1215
Hexachlorobenzene	1230
Phenanthrene	1286
d_{10}-Anthracene (S9)	**1291**
Anthracene	1294
Di-n-butylphthalate	1437
d_{10}-Fluoranthene (S11)	**1500**
Fluoranthene	1503
Pyrene	1541
d_{14}-Terphenyl (S3)	**1594**
Retene	1616
Butylbenzylphthalate	1708
Benzo(a)anthracene	1767
Chrysene	1774
3,3'-Dichlorobenzidine	1783
bis(2-Ethylhexyl)phthalate	1832
Di-n-octylphthalate	1941
Benzo(b)fluoranthene	1956
Benzo(k)fluoranthene	1960
Benzo(a)pyrene	2006
Perylene	2020
ß-Coprostanol	2129
Cholesterol	2151
Indeno(1,2,3-c,d)pyrene	2176
d_{14}-Dibenzo(a,h)anthracene (S9)	**2180**
Dibenz(a,h)anthracene	2184
Benzo(g,h,i)perylene	2210
ß-Sitosterol	2260

a: Mass spectrometer scan number from initial calibration 25 ng/µl standard.
Surrogates in **bold**; target compounds are grouped and evaluated with specific surrogates

Table 7. BNA Analyses - Matrix Spike/Matrix Spike Duplicate Summary

COMPOUND	STATION 5 MS % REC	STATION 5 MSD % REC	STATION 5 % RPD	STATION 32 MS % REC	STATION 32 MSD % REC	STATION 32 % RPD	STATION 35 MS % REC	STATION 35 MSD % REC	STATION 35 % RPD	STATION 44 MS % REC	STATION 44 MSD % REC	STATION 44 % RPD	Mean %R (n=8)	CV (%)
Phenol	51.0	41.0	21.3	67.8	54.6	20.4	43.8	34.5	22.9	50.6	64.3	-20.7	51.0	22.2
bis(2-Chloroethyl)ether	51.0	45.1	11.9	59.4	57.0	4.2	36.5	31.2	15.9	50.3	60.1	-17.3	**48.8**	21.8
2-Chlorophenol	54.9	43.5	22.7	57.0	50.1	12.7	41.4	33.1	22.5	48.1	59.6	-21.0	**48.5**	18.3
1,3-Dichlorobenzene	49.6	42.9	14.3	46.8	44.2	5.7	29.6	24.9	17.3	37.0	43.5	-15.9	**39.8**	21.7
1,4-Dichlorobenzene	52.6	45.1	15.0	49.7	47.9	3.5	33.7	26.2	25.1	40.1	47.4	-16.5	**42.9**	20.9
Benzyl alcohol	63.6	52.4	18.9	62.4	54.0	14.2	53.5	41.1	26.4	52.5	64.0	-19.4	55.4	13.9
1,2-Dichlorobenzene	55.8	50.2	10.3	56.0	55.0	1.8	39.3	29.0	30.2	45.1	54.4	-18.3	**48.1**	20.3
2-Methylphenol	66.8	55.2	18.7	64.8	57.0	12.8	58.4	46.2	23.4	52.9	67.5	-23.8	58.6	12.6
bis(2-Chloroisopropyl)ether	49.4	43.1	13.3	58.5	48.5	18.6	34.1	28.8	17.1	46.0	54.4	-16.5	**45.3**	21.8
4-Methylphenol	82.4	65.4	22.6	74.1	63.3	15.6	71.1	58.7	19.2	59.8	70.9	-16.6	68.2	11.7
N-Nitroso-di-n-propylamine	64.1	51.5	21.3	61.4	48.7	23.0	43.4	35.3	20.8	47.3	58.3	-20.6	51.2	18.9
Hexachloroethane	43.2	36.0	17.9	41.0	40.1	2.0	24.3	20.9	15.1	16.2	17.9	-9.7	**30.0**	37.5
Nitrobenzene	54.0	46.3	15.0	41.9	41.3	1.4	42.5	35.3	18.8	51.6	61.8	-17.6	**46.8**	18.2
Isophorone	61.5	52.2	16.1	52.1	46.4	11.6	43.3	32.0	30.0	45.5	56.1	-20.5	**48.7**	18.5
2-Nitrophenol	56.3	46.5	18.7	53.1	50.6	4.7	43.2	34.2	23.3	44.7	54.0	-18.5	**47.8**	15.1
2,4-Dimethylphenol	73.9	57.5	24.7	55.1	53.1	3.6	62.1	54.4	13.3	50.3	59.2	-15.9	58.2	12.6
Benzoic acid	42.8	30.1	28.0	17.1	24.1	-34.3	29.0	34.2	-11.8	21.2	32.2	-30.3	**28.8**	28.0
bis(2-Chloroethoxy)methane	61.5	50.6	19.1	58.5	52.1	11.5	42.7	34.2	22.3	46.8	58.3	-21.5	50.6	18.1
2,4-Dichlorophenol	71.4	59.1	18.6	56.5	52.1	8.1	70.0	63.4	10.0	51.6	61.4	-16.9	60.7	12.2
1,2,4-Trichlorobenzene	45.8	40.8	11.1	53.6	50.6	5.6	34.4	27.5	22.2	38.6	45.7	-16.5	**42.1**	20.4
Naphthalene	60.2	53.6	10.9	61.7	57.8	6.3	50.0	38.5	25.5	53.3	62.7	-15.7	54.7	14.5
4-Chloroaniline	1.7	1.6	9.7	3.2	1.1	100	1.1	1.7	-45.5	0.8	2.2	-95.7	**1.7**	45.5
Hexachlorobutadiene	57.9	46.3	21.9	59.4	52.1	13.1	39.7	29.2	30.5	46.0	57.4	-21.8	**48.5**	21.5
4-Chloro-3-methylphenol	90.6	70.7	24.4	65.8	55.5	16.9	72.1	74.8	-3.5	59.4	74.0	-21.5	70.4	15.3
2-Methylnaphthalene	47.7	38.9	19.3	46.5	40.9	12.7	46.2	36.4	23.1	52.9	47.4	11.3	**44.6**	12.2
Hexachlorocyclopentadiene	5.2	5.2	-0.4	36.6	30.6	17.8	0.0	0.0	-	21.1	29.5	-32.6	**16.0**	94.3
2,4,6-Trichlorophenol	90.8	74.8	19.0	70.2	72.0	-2.7	94.7	93.7	1.1	56.4	67.5	-17.5	77.5	18.1
2,4,5-Trichlorophenol	92.7	75.9	19.5	66.3	68.6	-3.6	95.8	96.7	-0.9	56.8	73.5	-25.3	78.3	19.2
2-Chloronaphthalene	77.6	59.7	25.6	67.7	70.1	-3.5	65.3	63.2	3.3	57.7	66.6	-14.0	66.0	9.4
2-Nitroaniline	82.1	66.3	20.9	64.3	65.2	-1.5	75.4	78.9	-4.5	56.8	72.2	-23.6	70.2	12.1
Dimethylphthalate	94.5	79.8	16.5	75.0	75.9	-1.3	82.5	83.3	-0.9	67.6	82.3	-19.1	80.1	9.7
Acenaphthylene	85.6	73.0	15.6	67.7	68.2	-0.7	72.5	72.4	0.3	56.8	67.0	-16.1	70.4	11.4
3-Nitroaniline	11.9	9.6	21.7	30.6	19.6	44.0	9.0	11.2	-21.5	15.8	27.6	-54.0	**16.9**	49.3
Acenaphthene	79.2	66.8	16.6	67.2	71.1	-5.6	77.7	74.8	3.9	62.0	74.0	-17.3	71.6	8.3
2,4-Dinitrophenol	57.7	44.2	26.0	32.8	40.1	-20.0	62.9	75.7	-18.3	42.4	70.1	-48.7	53.2	29.2

Table 7. (cont'd.) BNA Analyses - Matrix Spike/Matrix Spike Duplicate Summary

COMPOUND	STATION 5			STATION 32			STATION 35			STATION 44			Mean %R	CV (%)
	MS % REC	MSD % REC	% RPD	MS % REC	MSD % REC	% RPD	MS % REC	MSD % REC	% RPD	MS % REC	MSD % REC	% RPD	(n=8)	
4-Nitrophenol	86.0	70.7	19.2	73.1	68.6	6.2	75.4	80.4	-6.3	61.1	89.7	-37.5	75.6	12.4
Dibenzofuran	87.3	75.6	13.9	72.1	71.1	1.4	82.7	82.6	0.3	65.9	78.8	-17.4	77.0	9.3
2,4-Dinitrotoluene	84.9	69.3	19.9	64.8	66.7	-3.0	82.7	88.1	-6.3	60.3	78.3	-25.7	74.4	14.0
2,6-Dinitrotoluene	87.6	72.7	18.2	67.2	63.8	5.2	82.9	86.4	-4.1	58.5	77.5	-27.5	74.6	14.5
Diethylphthalate	93.6	76.6	19.6	75.7	76.6	-1.3	82.9	83.2	-0.3	75.9	87.9	-14.3	81.5	8.1
4-Chlorophenyl-phenylether	89.7	75.5	16.9	72.6	65.7	9.9	83.7	82.5	1.6	68.1	84.0	-20.6	77.7	11.0
Fluorene	85.0	73.3	14.2	72.0	70.7	1.7	83.1	79.8	4.0	68.1	84.4	-21.1	77.1	8.8
4-Nitroaniline	30.0	24.6	19.2	46.8	42.9	8.5	22.5	23.9	-5.6	41.8	56.6	-29.8	**36.1**	35.0
4,6-Dinitro-2-methylphenol	90.6	72.5	21.8	75.5	76.3	-1.1	119	144	-19.0	62.0	87.5	-33.7	90.9	30.1
N-Nitrosodiphenylamine	92.4	77.1	17.8	72.6	76.2	-4.9	112	128	-12.9	62.0	74.0	-17.3	86.8	25.9
4-Bromophenyl-phenylether	102.7	82.1	22.0	78.0	76.9	1.3	118	134	-12.1	68.9	84.9	-20.3	93.2	24.5
Hexachlorobenzene	83.5	70.2	16.9	60.9	61.3	-0.8	67.9	67.7	0.3	28.5	29.7	-3.9	58.7	33.3
Pentachlorophenol	57.2	47.2	18.8	51.9	43.7	17.0	35.2	30.5	14.4	27.2	35.1	-24.9	**41.0**	26.0
Phenanthrene	97.9	78.2	19.5	77.2	84.2	-7.6	88.7	106	-11.7	70.3	81.0	-12.9	85.5	13.8
Anthracene	102.7	84.4	19.0	74.8	82.5	-9.0	102	122	-12.9	71.5	82.2	-13.3	90.2	18.9
Di-n-butylphthalate	78.9	70.0	11.7	68.2	78.9	-14.4	92.4	97.2	-4.7	67.6	64.8	4.6	77.3	15.6
Fluoranthene	87.0	74.4	13.8	45.1	69.4	-26.7	68.5	72.9	-2.3	70.9	72.4	-1.7	70.1	16.6
Pyrene	77.6	61.8	20.5	52.4	56.2	-5.0	44.9	52.0	-4.7	28.1	29.6	-4.7	50.3	32.5
Butylbenzylphthalate	101.6	81.6	21.4	81.8	84.2	-2.9	90.2	88.2	2.3	71.1	90.5	-23.7	86.2	10.3
3,3'-Dichlorobenzidine	2.2	2.7	-21.4	14.5	10.5	31.6	15.4	16.5	-6.5	2.9	3.2	-8.6	**8.5**	**74.9**
Benzo(a)anthracene	92.5	75.0	19.7	64.5	69.8	-6.3	64.8	63.0	1.5	68.1	83.6	-19.1	72.6	14.4
bis(2-Ethylhexyl)phthalate	94.3	73.0	23.0	82.2	82.7	-0.6	90.3	85.0	5.0	69.3	90.5	-25.3	83.4	10.4
Chrysene	97.2	78.8	19.5	59.9	66.4	-6.8	70.0	70.7	-0.4	63.9	76.7	-16.5	72.9	15.9
Di-n-octylphthalate	95.0	76.4	21.3	73.1	75.5	-3.3	81.8	81.3	0.8	66.8	93.1	-32.6	80.4	12.0
Benzo(b)fluoranthene	77.5	64.4	17.2	48.1	57.3	-12.9	70.2	81.9	-9.1	49.2	68.5	-30.1	64.6	19.2
Benzo(k)fluoranthene	86.8	77.4	10.7	63.7	75.4	-13.2	57.3	51.8	5.3	60.9	69.8	-12.6	67.9	17.1
Benzo(a)pyrene	60.0	49.6	18.1	39.0	52.1	-22.8	32.0	49.7	-21.1	13.7	11.4	16.1	**38.4**	47.1
Indeno(1,2,3-c,d)pyrene	67.5	61.1	9.6	50.1	63.7	-20.0	53.7	61.3	-8.4	24.2	18.0	29.7	**49.9**	37.5
Dibenz(a,h)anthracene	105.0	95.3	9.4	90.0	92.9	-3.1	106	99.8	5.6	68.1	73.1	-6.6	91.3	15.4
Benzo(g,h,i)perylene	10.5	10.2	2.0	9.3	15.9	-42.5	5.5	10.0	-40.9	7.5	2.1	112	**8.9**	45.2
9H-Carbazole	83.3	72.5	13.5	66.9	70.3	-4.9	85.5	96.6	-11.5	53.3	58.3	-8.6	73.3	19.7
Cholesterol	208.2	145.9	35.1	235.3	243.4	-3.4	172	284	-49	22.6	80.0	-111	173	50.7

Table 8. **BNA Analyses - Station 61 Duplicate Analysis Summary**

Compound	Station 61	Station 61 Duplicate 1	Station 61 Duplicate 2	Mean	CV (%)
	(values in ug/kg, dry weight)				
Phenol	**13 E**	**11 E**	**11 E**	11.7	9.9
bis(2-Chloroethyl)ether	23 U	23 U	23 U		
2-Chlorophenol	23 U	23 U	23 U		
1,3-Dichlorobenzene	23 U	23 U	23 U		
1,4-Dichlorobenzene	23 U	23 U	23 U		
Benzyl alcohol	116 U	116 U	116 U		
1,2-Dichlorobenzene	23 U	23 U	23 U		
2-Methylphenol	23 U	23 U	23 U		
bis(2-Chloroisopropyl)ether	23 U	23 U	23 U		
4-Methylphenol	23 U	23 U	23 U		
N-Nitroso-di-n-propylamine	23 U	23 U	23 U		
Hexachloroethane	46 U	46 U	46 U		
Nitrobenzene	23 U	23 U	23 U		
Isophorone	23 U	23 U	23 U		
2-Nitrophenol	116 U	116 U	116 U		
2,4-Dimethylphenol	46 U	46 U	46 U		
Benzoic acid	**55 E**	**53 E**	**47 E**	51.7	8.1
bis(2-Chloroethoxy)methane	23 U	23 U	23 U		
2,4-Dichlorophenol	70 U	70 U	70 U		
1,2,4-Trichlorobenzene	23 U	23 U	23 U		
Naphthalene	**10 E**	**7 E**	**14 E**	10.3	34.0
4-Chloroaniline	R	R	R		
Hexachlorobutadiene	46 U	46 U	46 U		
4-Chloro-3-methylphenol	46 U	46 U	46 U		
2-Methylnaphthalene	**8 E**	**6 E**	**10 E**	8.0	25.0
Hexachlorocyclopentadiene	R	R	R		
2,4,6-Trichlorophenol	116 U	116 U	116 U		
2,4,5-Trichlorophenol	116 U	116 U	116 U		
2-Chloronaphthalene	23 U	23 U	23 U		
2-Nitroaniline	116 U	116 U	116 U		
Dimethylphthalate	23 U	23 U	23 U		
Acenaphthylene	**6 E**	**6 E**	**4 E**	5.3	21.7
3-Nitroaniline	116 U	116 U	116 U		
Acenaphthene	23 U	23 U	23 U		
2,4-Dinitrophenol	232 U	232 U	232 U		
4-Nitrophenol	116 U	116 U	116 U		
Dibenzofuran	**9 E**	**10 E**	**9 E**	9.3	6.2

See Table 1 for explanation of data qualifiers.
CV = Coefficient of Variation

Table 8. (cont'd.) BNA Analyses - Station 61 Duplicate Analysis Summary

(values in ug/kg, dry weight)

Compound	Station 61	Station 61 Duplicate 1	Station 61 Duplicate 2	Mean	CV (%)
2,4-Dinitrotoluene	116 U	116 U	116 U		
2,6-Dinitrotoluene	116 U	116 U	116 U		
Diethylphthalate	23 U	23 U	23 U		
4-Chlorophenyl-phenylether	23 U	23 U	23 U		
Fluorene	11 E	12 E	11 E	11.3	5.1
4-Nitroaniline	116 U	116 U	116 U		
4,6-Dinitro-2-methylphenol	232 U	232 U	232 U		
N-Nitrosodiphenylamine	23 U	23 U	23 U		
4-Bromophenyl-phenylether	23 U	23 U	23 U		
Hexachlorobenzene	23 U	23 U	23 U		
Pentachlorophenol	116 U	116 U	116 U		
Phenanthrene	120	130	130	127	4.6
Anthracene	29	34	28	30.3	10.6
Di-n-butylphthalate	15 E	14 E	12 E	13.7	11.2
Fluoranthene	150	140	140	143	4.0
Pyrene	120	160	120	133	17.3
Butylbenzylphthalate	9 N	10 N	12 N	10.3	14.8
3,3'-Dichlorobenzidine	R	R	R		
Benzo(a)anthracene	51	49	50	50	2.0
bis(2-Ethylhexyl)phthalate	45	36	36	39	13.3
Chrysene	75	78	78	77	2.2
Di-n-octylphthalate	23 U	23 U	23 U		
Benzo(b)fluoranthene					
Benzo(k)fluoranthene					
Benzo(b+k)fluoranthene	120	130	110	120	8.3
Benzo(a)pyrene	34 N	66	34	44.7	41.4
Indeno(1,2,3-c,d)pyrene	42 N	62	46	50	21.2
Dibenz(a,h)anthracene	25	24	25 N	24.7	2.3
Benzo(g,h,i)perylene	R	R	R		
Cymene	116 U	116 U	116 U		
9H-Carbazole	11 N	12 N	7 N	10	26.5
Caffeine	23 U	23 U	23 U		
Perylene	24 E	29 E	23 E	25.3	12.7
ß-Coprostanol	280	590 E	340 E	403	40.8
Cholesterol	2200	2200	2600 K	2330	9.9
ß-Sitosterol	3100 K	3300 K	3800 K	3400	10.6
Retene	110 E	180 E	110 E	133	30.3

ß-Sitosterol results are above the limit of the calibration curve (K). Station 61 was diluted and reanalyzed; the diluted result is reported in Table 1. The undiluted results are reported here for comparison only.

See Table 1 for explanation of data qualifiers.

CV = Coefficient of Variation

Table 9. BNA Analyses - Average Quantitation Limits

CAS No.	Compound	Number of Non-detects	Quantitation Limit Average (µg/kg, dry weight)	Quantitation Limit Lowest (µg/kg, dry weight)
108-95-2	Phenol	14	16 U	8 U
111-44-4	bis(2-Chloroethyl)ether	65	14 U	8 U
95-57-8	2-Chlorophenol	63	13 U	8 U
541-73-1	1,3-Dichlorobenzene	62	14 U	8 U
106-46-7	1,4-Dichlorobenzene	62	14 U	8 U
100-51-6	Benzyl alcohol	65	68 U	40 U
95-50-1	1,2-Dichlorobenzene	63	14 U	8 U
95-48-7	2-Methylphenol	66	14 U	8 U
108-60-1	bis(2-Chloroisopropyl)ether	65	14 U	8 U
106-44-5	4-Methylphenol	62	14 U	8 U
621-64-7	N-Nitroso-di-n-propylamine	65	14 U	8 U
67-72-1	Hexachloroethane	65	27 U	16 U
98-95-3	Nitrobenzene	65	14 U	8 U
78-59-1	Isophorone	62	14 U	8 U
88-75-5	2-Nitrophenol	66	68 U	40 U
105-67-9	2,4-Dimethylphenol	66	27 U	16 U
65-85-0	Benzoic acid	19	130 U	79 U
111-91-1	bis(2-Chloroethoxy)methane	65	14 U	8 U
120-83-2	2,4-Dichlorophenol	66	41 U	24 U
120-82-1	1,2,4-Trichlorobenzene	65	14 U	8 U
91-20-3	Naphthalene	17	13 U	8 U
106-47-8	4-Chloroaniline	-	-	-
87-68-3	Hexachlorobutadiene	66	27 U	10 U
59-50-7	4-Chloro-3-methylphenol	66	27 U	10 U
91-57-6	2-Methylnaphthalene	28	13 U	8 U
77-47-4	Hexachlorocyclopentadiene	-	-	-
88-06-2	2,4,6-Trichlorophenol	66	68 U	40 U
95-95-4	2,4,5-Trichlorophenol	66	68 U	40 U
91-58-7	2-Chloronaphthalene	65	14 U	8 U
88-74-4	2-Nitroaniline	66	68 U	40 U
131-11-3	Dimethylphthalate	65	14 U	8 U
208-96-8	Acenaphthylene	48	13 U	8 U
99-09-2	3-Nitroaniline	66	68 U	40 U
83-32-9	Acenaphthene	53	14 U	8 U
51-28-5	2,4-Dinitrophenol	66	136 U	79 U
100-02-7	4-Nitrophenol	65	69 U	40 U
132-64-9	Dibenzofuran	41	13 U	8 U
121-14-2	2,4-Dinitrotoluene	66	68 U	40 U
606-20-2	2,6-Dinitrotoluene	66	68 U	40 U
84-66-2	Diethylphthalate	59	14 U	8 U
7005-72-3	4-Chlorophenyl-phenylether	63	14 U	8 U
86-73-7	Fluorene	24	12 U	8 U
100-01-6	4-Nitroaniline	66	68 U	40 U
534-52-1	4,6-Dinitro-2-methylphenol	66	136 U	79 U
86-30-6	N-Nitrosodiphenylamine	66	14 U	8 U

Table 9. (cont'd.) BNA Analyses - Average Quantitation Limits

CAS No.	Compound	Number of Non-detects	Quantitation Limit Average (µg/kg, dry weight)	Quantitation Limit Lowest (µg/kg, dry weight)
101-55-3	4-Bromophenyl-phenylether	63	14 U	8 U
118-74-1	Hexachlorobenzene	65	14 U	8 U
87-86-5	Pentachlorophenol	63	69 U	40 U
85-01-8	Phenanthrene	2	8 U	8 U
120-12-7	Anthracene	13	11 U	8 U
84-74-2	Di-n-butylphthalate	51	12 U	2 U
206-44-0	Fluoranthene	2	8 U	8 U
129-00-0	Pyrene	2	8 U	8 U
85-68-7	Butylbenzylphthalate	52	13 U	8 U
91-94-1	3,3'-Dichlorobenzidine	-	-	-
56-55-3	Benzo(a)anthracene	5	11 U	8 U
117-81-7	bis(2-Ethylhexyl)phthalate	6	5 U	2 U
218-01-9	Chrysene	16	7 U	3 U
117-84-0	Di-n-octylphthalate	65	14 U	8 U
205-99-2	Benzo(b)fluoranthene	2	8 U	8 U
207-08-9	Benzo(k)fluoranthene	5	9 U	8 U
	Benzo(b+k)fluoranthene	8	8 U	5 U
50-32-8	Benzo(a)pyrene	16	11 U	8 U
193-39-5	Indeno(1,2,3-c,d)pyrene	41	13 U	8 U
53-70-3	Dibenz(a,h)anthracene	35	13 U	8 U
191-24-2	Benzo(g,h,i)perylene	-	-	12
25155-15-1	Cymene	54	69 U	40 U
86-74-8	9H-Carbazole	46	14 U	8 U
58-08-2	Caffeine	66	14 U	8 U
198-55-0	Perylene	20	57 U	40 U
80-97-7	β-Coprostanol	7	45 U	40 U
57-88-5	Cholesterol	0	-	250
83-46-5	β-Sitosterol	3	52 U	8 U
483-65-8	Retene	8	53 U	40 U
90-05-1	2-Methoxyphenol (Guaiacol)	6	22 U	13 U
2460-49-3	4,5-Dichloroguaiacol	7	20 U	10 U
2668-24-8	4,5,6-Trichloroguaiacol	7	20 U	10 U
57057-83-7	3,4,5-Trichloroguaiacol	7	20 U	10 U
2539-17-5	Tetrachloroguaiacol	7	20 U	10 U
127-27-5	Pimaric acid	4	27 U	26 U
471-74-9	Sandaracopimaric acid	5	26 U	23 U
5835-26-7	Isopimaric acid	3	27 U	26 U
1945-53-5	Palustric acid	-	-	-
1740-19-8	Dehydroabietic acid	0	-	33
514-10-3	Abietic acid	1	26 U	26 U
471-77-2	Neoabietic acid	7	24 U	15 U
-	12-Chlorodehydroabietic acid	3	25 U	23 U
-	14-Chlorodehydroabietic acid	7	24 U	15 U
57055-39-7	Dichlorodehydroabietic acid	7	24 U	15 U

Table 10. BNA Analyses - Tentatively Identified Compounds Summary

Sample ID	F1 FRACTION			F2 FRACTION		
	Number of TICs	Concentration Average (µg/kg, dry weight)	Concentration Maximum (µg/kg, dry weight)	Number of TICs	Concentration Average (µg/kg, dry weight)	Concentration Maximum (µg/kg, dry weight)
1	20	130	280	20	200	470
2R	20	160	490	-	-	-
3	20	220	690	-	-	-
4	20	200	360	20	400	1300
5	20	190	370	20	340	1100
8	20	180	280	20	210	460
9R	20	80	290	-	-	-
10R	20	80	190	20	100	230
11R	20	240	700	-	-	-
12	20	120	240	20	220	530
13R	20	100	220	-	-	-
14	20	150	390	-	-	-
15	20	150	370	-	-	-
17	20	200	430	20	360	760
18	20	200	400	-	-	-
19	20	350	990	-	-	-
20	20	230	440	-	-	-
21	20	170	480	20	340	730
22	20	180	350	-	-	-
26	20	190	490	-	-	-
29	20	220	390	20	210	450
30	20	60	150	19	230	560
32	20	80	180	-	-	-
33	20	250	960	20	120	330
34	20	200	360	20	410	1400
35	20	260	470	20	290	730
38	20	250	430	20	410	920
39	20	100	230	-	-	-
40	20	70	250	20	360	800
41	20	310	760	20	660	1800
43	19	90	230	-	-	-
44	20	370	750	-	-	-
45	20	590	1100	-	-	-
47	20	430	820	-	-	-
48	20	190	520	20	900	1700
49	20	210	500	19	1620	3600
51	20	180	360	19	290	840
52	20	160	310	20	230	690
53	20	140	320	19	260	880
57	20	110	200	-	-	-

Table 10. (cont'd.) BNA Analyses - Tentatively Identified Compounds Summary

Sample ID	F1 FRACTION Number of TICs	F1 Concentration Average (µg/kg, dry weight)	F1 Concentration Maximum (µg/kg, dry weight)	F2 FRACTION Number of TICs	F2 Concentration Average (µg/kg, dry weight)	F2 Concentration Maximum (µg/kg, dry weight)
58	20	120	240	-	-	-
59	20	100	160	-	-	-
60	20	300	540	20	390	970
61	20	280	480	20	570	1400
62	20	280	510	20	260	620
63	20	390	930	-	-	-
64	20	370	790	-	-	-
65	20	330	780	-	-	-
66	20	130	400	20	130	590
67	20	100	170	20	170	370
68	20	110	390	20	160	430
69	20	180	480	-	-	-
70	20	200	400	20	880	1700
71	20	120	210	20	210	430
72	20	330	650	20	280	800
73	20	200	350	20	210	510
74	20	250	450	20	270	650
201R	20	90	160	20	100	230
202R	19	90	190	19	120	320
203R	20	310	550	-	-	-
204R	20	520	1400	-	-	-
205R	20	200	550	-	-	-
206R	20	170	510	-	-	-
207R	20	240	380	-	-	-
208R	19	950	2600	-	-	-
209R	20	230	480	-	-	-
Method Blanks						
0401MB2	20	34	88	20	55	110
0408MB	14	55	140	-	-	-
0408MB2	20	51	210	20	45	170
0411MB	20	49	98	20	45	150
0411MB2	17	49	150	-	-	-
0412MB	20	36	120	20	73	490
0412MB2	17	38	110	-	-	-
0415MB	16	28	51	20	56	180
0415MB2	19	64	190	-	-	-
0416MB	20	46	150	20	60	170
0416MB2	15	44	140	-	-	-

Table 11. BNA Analyses - Monitoring Variability Samples

STATION 5

Target Parameter (µg/kg, dry wt.)	5 (Primary Sample)	51 (Duplicate Split)	Mean (5 and 51)	RPD (5 and 51)	52 (Replicate)	53 (Replicate)	Station Mean (n=3)	Station CV (n=3)
Phenol	18 U	**6 E**	12 U	50.0	**6 E**	18 U	12 U	50.0
bis(2-Chloroethyl)ether	18 U	18 U	18 U		17 U	18 U	18 U	
2-Chlorophenol	18 U	18 U	18 U		17 U	18 U	18 U	
1,3-Dichlorobenzene	18 U	18 U	18 U		17 U	18 U	18 U	
1,4-Dichlorobenzene	18 U	18 U	18 U		17 U	18 U	18 U	
Benzyl alcohol	88 U	88 U	88 U		87 U	88 U	88 U	
1,2-Dichlorobenzene	18 U	18 U	18 U		17 U	18 U	18 U	
2-Methylphenol	18 U	18 U	18 U		17 U	18 U	18 U	
bis(2-Chloroisopropyl)ether	18 U	18 U	18 U		17 U	18 U	18 U	
4-Methylphenol	18 U	18 U	18 U		17 U	18 U	18 U	
N-Nitroso-di-n-propylamine	18 U	18 U	18 U		17 U	18 U	18 U	
Hexachloroethane	35 U	35 U	35 U		35 U	35 U	35 U	
Nitrobenzene	18 U	18 U	18 U		17 U	18 U	18 U	
Isophorone	18 U	18 U	18 U		17 U	18 U	18 U	
2-Nitrophenol	88 U	88 U	88 U		87 U	88 U	88 U	
2,4-Dimethylphenol	35 U	35 U	35 U		35 U	35 U	35 U	
Benzoic acid	**37 E**	**21 E**	**29 E**	27.6	173 U	175 U	126 U	
bis(2-Chloroethoxy)methane	18 U	18 U	18 U		17 U	18 U	18 U	
2,4-Dichlorophenol	53 U	53 U	53 U		52 U	53 U	53 U	
1,2,4-Trichlorobenzene	18 U	18 U	18 U		17 U	18 U	18 U	
Naphthalene	**7 E**	**6 E**	**7 E**	7.1	**4 E**	**5 E**	**5 E**	30.6
4-Chloroaniline	R	R			R	R		
Hexachlorobutadiene	35 U	35 U	35 U		35 U	35 U	35 U	
4-Chloro-3-methylphenol	35 U	35 U	35 U		35 U	35 U	35 U	
2-Methylnaphthalene	**7 E**	**5 E**	**6 E**	16.7	**4 E**	**4 E**	**5 E**	23.1
Hexachlorocyclopentadiene	R	R			R	R		
2,4,6-Trichlorophenol	88 U	88 U	88 U		87 U	88 U	88 U	
2,4,5-Trichlorophenol	88 U	88 U	88 U		87 U	88 U	88 U	
2-Chloronaphthalene	18 U	18 U	18 U		17 U	18 U	18 U	
2-Nitroaniline	88 U	88 U	88 U		87 U	88 U	88 U	
Dimethylphthalate	18 U	18 U	18 U		17 U	18 U	18 U	
Acenaphthylene	18 U	18 U	18 U		17 U	18 U	18 U	
3-Nitroaniline	88 U	88 U	88 U		87 U	88 U	88 U	
Acenaphthene	18 U	18 U	18 U		17 U	18 U	18 U	
2,4-Dinitrophenol	175 U	175 U	175 U		173 U	175 U	174 U	
4-Nitrophenol	88 U	88 U	88 U		87 U	88 U	88 U	
Dibenzofuran	**4 E**	18 U	11 U	-63.6	17 U	18 U	15 U	
2,4-Dinitrotoluene	88 U	88 U	88 U		87 U	88 U	88 U	
2,6-Dinitrotoluene	88 U	88 U	88 U		87 U	88 U	88 U	
Diethylphthalate	18 U	18 U	18 U		17 U	18 U	18 U	
4-Chlorophenyl-phenylether	18 U	18 U	18 U		17 U	18 U	18 U	
Fluorene	**5 E**	**4 E**	**5 E**	10.0	17 U	18 U	13 U	

Table 11. (continued) BNA Analyses - Monitoring Variability Samples

STATION 5

Target Parameter (µg/kg, dry wt)	5 (Primary Sample)	51 (Duplicate Split)	Mean (5 and 51)	RPD (5 and 51)	52 (Replicate)	53 (Replicate)	Station Mean (n=3)	Station CV (n=3)
4-Nitroaniline	88 U	88 U	88 U		87 U	88 U	88 U	
4,6-Dinitro-2-methylphenol	175 U	175 U	175 U		173 U	175 U	174 U	
N-Nitrosodiphenylamine	18 U	18 U	18 U		17 U	18 U	18 U	
4-Bromophenyl-phenylether	18 U	18 U	18 U		17 U	18 U	18 U	
Hexachlorobenzene	18 U	18 U	18 U		17 U	18 U	18 U	
Pentachlorophenol	88 U	88 U	88 U		87 U	88 U	88 U	
Phenanthrene	50	36	43	16.3	30	35	36	18.2
Anthracene	7 E	7 E	7 E	0.0	5 E	5 N	6 E	19.2
Di-n-butylphthalate	18 U	18 U	18 U		17 U	18 U	18 U	
Fluoranthene	39	32	36	9.7	26	28	30	17.6
Pyrene	26	21	24	10.4	16 E	20	20	20.0
Butylbenzylphthalate	18 U	18 U	18 U		17 U	18 U	18 U	
3,3'-Dichlorobenzidine	R	R			R	R		
Benzo(a)anthracene	14 E	12 E	13 E	7.7	8 E	9 E	10 E	26.5
bis(2-Ethylhexyl)phthalate	34	12 E	23 E	47.8	10 E	12 E	15 E	46.7
Chrysene	20	18	19	5.3	15 E	14 U	16 E	16.5
Di-n-octylphthalate	18 U	18 U	18 U		17 U	18 U	18 U	
Benzo(b)fluoranthene								
Benzo(k)fluoranthene								
Benzo(b+k)fluoranthene	29	25	27	7.4	21	18 E	22	20.8
Benzo(a)pyrene	9 E	8 E	9 E	5.6	6 N	6 E	7 E	24.7
Indeno(1,2,3-c,d)pyrene	18 U	18 U	18 U		17 U	18 U	18 U	
Dibenz(a,h)anthracene	18 U	7 N	13 U	42.3	17 U	18 U	16 U	
Benzo(g,h,i)perylene	R	R			R	R		
Cymene	88 U	88 U	88 U		87 U	88 U	88 U	
9H-Carbazole	18 U	18 U	18 U		17 U	18 U	18 U	
Caffeine	18 U	18 U	18 U		17 U	18 U	18 U	
Perylene	13 N	7 N	10 N	30.0	9 E	7 N	9 N	17.0
ß-Coprostanol	140 N	83 E	112 N	25.4	100 N	79 N	97 N	17.2
Cholesterol	1500	1200	1350	11.1	1900	1200	1480	24.9
ß-Sitosterol	1800	1300	1550	16.1	1200	1300	1350	13.4
Retene	20 E	14 E	17 E	17.6	11 E	16 E	15 E	21.4
Pristane/Phytane Ratio								
Carbon Preference Index	1.387	1.166	1.277	8.7	1.553	1.542	1.457	10.7

Table 11. (continued) BNA Analyses - Monitoring Variability Samples

STATION 32

Target Parameter (µg/kg, dry wt.)	32 (Primary Sample)	57 (Duplicate Split)	Mean (32 and 57)	RPD (32 and 57)	58 (Replicate)	59 (Replicate)	Station Mean (n=3)	Station CV (n=3)
Phenol	**7 E**	**19 E**	**13 E**	-46.2	**71**	**24 E**	**36 E**	85.6
bis(2-Chloroethyl)ether	8 U	9 U	9 U		8 U	8 U	8 U	
2-Chlorophenol	8 U	9 U	9 U		8 U	8 U	8 U	
1,3-Dichlorobenzene	8 U	9 U	9 U		8 U	8 U	8 U	
1,4-Dichlorobenzene	8 U	9 U	9 U		8 U	8 U	8 U	
Benzyl alcohol	41 U	43 U	42 U		42 U	42 U	42 U	
1,2-Dichlorobenzene	8 U	9 U	9 U		8 U	8 U	8 U	
2-Methylphenol	8 U	9 U	9 U		8 U	8 U	8 U	
bis(2-Chloroisopropyl)ether	8 U	9 U	9 U		8 U	8 U	8 U	
4-Methylphenol	8 U	9 U	9 U		8 U	8 U	8 U	
N-Nitroso-di-n-propylamine	8 U	9 U	9 U		8 U	8 U	8 U	
Hexachloroethane	16 U	17 U	17 U		17 U	17 U	17 U	
Nitrobenzene	8 U	9 U	9 U		8 U	8 U	8 U	
Isophorone	8 U	9 U	9 U		8 U	8 U	8 U	
2-Nitrophenol	41 U	43 U	42 U		42 U	42 U	42 U	
2,4-Dimethylphenol	16 U	17 U	17 U		17 U	17 U	17 U	
Benzoic acid	82 U	86 U	84 U		85 U	84 U	84 U	
bis(2-Chloroethoxy)methane	8 U	9 U	9 U		8 U	8 U	8 U	
2,4-Dichlorophenol	25 U	26 U	26 U		25 U	25 U	25 U	
1,2,4-Trichlorobenzene	8 U	9 U	9 U		8 U	8 U	8 U	
Naphthalene	**3 E**	**3 E**	**3 E**	0.0	**3 E**	**3 E**	**3 E**	0.0
4-Chloroaniline	R	R			R	R		
Hexachlorobutadiene	16 U	17 U	17 U		17 U	17 U	17 U	
4-Chloro-3-methylphenol	16 U	17 U	17 U		17 U	17 U	17 U	
2-Methylnaphthalene	8 U	9 U	9 U		8 U	8 U	8 U	
Hexachlorocyclopentadiene	R	R			R	R		
2,4,6-Trichlorophenol	41 U	43 U	42 U		42 U	42 U	42 U	
2,4,5-Trichlorophenol	41 U	43 U	42 U		42 U	42 U	42 U	
2-Chloronaphthalene	8 U	9 U	9 U		8 U	8 U	8 U	
2-Nitroaniline	41 U	43 U	42 U		42 U	42 U	42 U	
Dimethylphthalate	8 U	9 U	9 U		8 U	8 U	8 U	
Acenaphthylene	8 U	**2 E**	5 U	60.0	8 U	8 U	7 U	
3-Nitroaniline	41 U	43 U	42 U		42 U	42 U	42 U	
Acenaphthene	8 U	9 U	9 U		8 U	8 U	8 U	
2,4-Dinitrophenol	82 U	86 U	84 U		85 U	84 U	84 U	
4-Nitrophenol	41 U	43 U	42 U		42 U	42 U	42 U	
Dibenzofuran	8 U	9 U	9 U		8 U	8 U	8 U	
2,4-Dinitrotoluene	41 U	43 U	42 U		42 U	42 U	42 U	
2,6-Dinitrotoluene	41 U	43 U	42 U		42 U	42 U	42 U	
Diethylphthalate	**3 N**	**3 N**	**3 N**	0.0	8 U	8 U	6 U	
4-Chlorophenyl-phenylether	8 U	9 U	9 U		8 U	8 U	8 U	
Fluorene	**3 E**	**2 N**	**3 E**	16.7	**3 E**	**2 E**	**3 E**	19.2

Table 11. (continued) BNA Analyses - Monitoring Variability Samples

STATION 32

Target Parameter (µg/kg, dry wt.)	32 (Primary Sample)	57 (Duplicate Split)	Mean (32 and 57)	RPD (32 and 57)	58 (Replicate)	59 (Replicate)	Station Mean (n=3)	Station CV (n=3)
4-Nitroaniline	41 U	43 U	42 U		42 U	42 U	42 U	
4,6-Dinitro-2-methylphenol	82 U	86 U	84 U		85 U	84 U	84 U	
N-Nitrosodiphenylamine	8 U	9 U	9 U		8 U	8 U	8 U	
4-Bromophenyl-phenylether	8 U	9 U	9 U		8 U	8 U	8 U	
Hexachlorobenzene	8 U	4 E	6 U	33.3	8 U	8 U	7 U	
Pentachlorophenol	41 U	43 U	42 U		42 U	42 U	42 U	
Phenanthrene	26	21	24	10.4	27	25	25	6.1
Anthracene	13	8 E	11 E	22.7	9	8	9	17.0
Di-n-butylphthalate	2 U	9 U	6 U		8 U	8 U	7 U	
Fluoranthene	69	30	50	39.0	34	31	38	26.9
Pyrene	50	30	40	25.0	31	28	33	18.9
Butylbenzylphthalate	8 U	9 U	9 U		8 U	8 U	8 U	
3,3'-Dichlorobenzidine	R	R			R	R		
Benzo(a)anthracene	38	15	27	42.6	18	16	20	29.3
bis(2-Ethylhexyl)phthalate	12	13	13	-3.8	19	17	16	19.1
Chrysene	70	26	48	45.8	27	29	35	33.1
Di-n-octylphthalate	8 U	9 U	9 U		8 U	8 U	8 U	
Benzo(b)fluoranthene								
Benzo(k)fluoranthene								
Benzo(b+k)fluoranthene	78	38	58	34.5	36	40	45	26.0
Benzo(a)pyrene	25 E	18 E	22 E	15.9	10 N	17 E	16 E	37.7
Indeno(1,2,3-c,d)pyrene	23 N	18	21 N	11.9	12 N	16 N	16 N	28.2
Dibenz(a,h)anthracene	8 N	5 N	7 N	21.4	6 E	5 N	6 N	16.7
Benzo(g,h,i)perylene	R	R			R	R		
Cymene	41 U	43 U	42 U		42 U	42 U	42 U	
9H-Carbazole	3 N	6 E	5 N	-30.0	8 U	8 U	7 U	
Caffeine	8 U	9 U	9 U		8 U	8 U	8 U	
Perylene	6 N	5 E	6 N	8.3	42 U	5 E	18 N	117.1
ß-Coprostanol	79 E	39 E	59 E	33.9	74 E	81 E	71 E	15.8
Cholesterol	360	450	405	-11.1	870	900	725	38.3
ß-Sitosterol	220	210	215	2.3	610	510	445	46.1
Retene	7 E	6 E	7 E	7.1	7 E	42 U	19 E	106.4
Pristane/Phytane Ratio								
Carbon Preference Index	2.614	1.813	2.214	18.1	3.565	2.494	2.758	25.9

Table 11. (continued) BNA Analyses - Monitoring Variability Samples

STATION 35

Target Parameter (µg/kg, dry wt.)	35 (Primary Sample)	72 (Duplicate Split)	Mean (35 and 72)	RPD (35 and 72)	73 (Replicate)	74 (Replicate)	Station Mean (n=3)	Station CV (n=3)
Phenol	**10 E**	**7 N**	**9 N**	16.7	**9 E**	**12 E**	**10 E**	17.3
bis(2-Chloroethyl)ether	19 U	18 U	19 U		18 U	18 U	18 U	
2-Chlorophenol	19 U	18 U	19 U		18 U	18 U	18 U	
1,3-Dichlorobenzene	19 U	18 U	19 U		18 U	18 U	18 U	
1,4-Dichlorobenzene	19 U	18 U	19 U		18 U	18 U	18 U	
Benzyl alcohol	93 U	90 U	92 U		90 U	90 U	91 U	
1,2-Dichlorobenzene	19 U	18 U	19 U		18 U	18 U	18 U	
2-Methylphenol	19 U	18 U	19 U		18 U	18 U	18 U	
bis(2-Chloroisopropyl)ether	19 U	18 U	19 U		18 U	18 U	18 U	
4-Methylphenol	19 U	18 U	19 U		18 U	18 U	18 U	
N-Nitroso-di-n-propylamine	19 U	18 U	19 U		18 U	18 U	18 U	
Hexachloroethane	37 U	36 U	37 U		36 U	36 U	36 U	
Nitrobenzene	19 U	18 U	19 U		18 U	18 U	18 U	
Isophorone	19 U	18 U	19 U		18 U	18 U	18 U	
2-Nitrophenol	93 U	90 U	92 U		90 U	90 U	91 U	
2,4-Dimethylphenol	37 U	36 U	37 U		36 U	36 U	36 U	
Benzoic acid	**57 N**	**38 E**	**48 N**	19.8	**40 E**	**98 E**	**62 E**	50.7
bis(2-Chloroethoxy)methane	19 U	18 U	19 U		18 U	18 U	18 U	
2,4-Dichlorophenol	56 U	54 U	55 U		54 U	54 U	54 U	
1,2,4-Trichlorobenzene	19 U	18 U	19 U		18 U	18 U	18 U	
Naphthalene	**6 E**	**6 E**	**6 E**	0.0	18 U	18 U	14 U	
4-Chloroaniline	R	R			R	R		
Hexachlorobutadiene	37 U	36 U	37 U		36 U	36 U	36 U	
4-Chloro-3-methylphenol	37 U	36 U	37 U		36 U	36 U	36 U	
2-Methylnaphthalene	**7 E**	**4 E**	**6 E**	25.0	18 U	**6 E**	**10 E**	69.3
Hexachlorocyclopentadiene	R	R			R	R		
2,4,6-Trichlorophenol	93 U	90 U	92 U		90 U	90 U	91 U	
2,4,5-Trichlorophenol	93 U	90 U	92 U		90 U	90 U	91 U	
2-Chloronaphthalene	19 U	18 U	19 U		18 U	18 U	18 U	
2-Nitroaniline	93 U	90 U	92 U		90 U	90 U	91 U	
Dimethylphthalate	19 U	18 U	19 U		18 U	18 U	18 U	
Acenaphthylene	**27**	**13 E**	**20 E**	35.0	**12 E**	**28**	**20 E**	40.0
3-Nitroaniline	93 U	90 U	92 U		90 U	90 U	91 U	
Acenaphthene	**7 E**	18 U	13 U	-42.3	18 U	18 U	16 U	
2,4-Dinitrophenol	186 U	181 U	184 U		181 U	179 U	181 U	
4-Nitrophenol	93 U	90 U	92 U		90 U	90 U	91 U	
Dibenzofuran	**8 E**	**4 E**	**6 E**	33.3	18 U	**6 E**	**10 E**	69.3
2,4-Dinitrotoluene	93 U	90 U	92 U		90 U	90 U	91 U	
2,6-Dinitrotoluene	93 U	90 U	92 U		90 U	90 U	91 U	
Diethylphthalate	19 U	18 U	19 U		18 U	**5 E**	14 U	
4-Chlorophenyl-phenylether	19 U	18 U	19 U		18 U	18 U	18 U	
Fluorene	**19**	**9 E**	**14 E**	35.7	**9 E**	**17 E**	**13 E**	31.1

Table 11. (continued) BNA Analyses - Monitoring Variability Samples

STATION 35

Target Parameter (µg/kg, dry wt.)	35 (Primary Sample)	72 (Duplicate Split)	Mean (35 and 72)	RPD (35 and 72)	73 (Replicate)	74 (Replicate)	Station Mean (n=3)	Station CV (n=3)
4-Nitroaniline	93 U	90 U	92 U		90 U	90 U	91 U	
4,6-Dinitro-2-methylphenol	186 U	181 U	184 U		181 U	179 U	181 U	
N-Nitrosodiphenylamine	19 U	18 U	19 U		18 U	18 U	18 U	
4-Bromophenyl-phenylether	19 U	18 U	19 U		18 U	18 U	18 U	
Hexachlorobenzene	19 U	18 U	19 U		18 U	18 U	18 U	
Pentachlorophenol	93 U	90 U	92 U		90 U	90 U	91 U	
Phenanthrene	240	120	180	33.3	120	190	163	23.2
Anthracene	200	120	160	25.0	110	200	157	28.7
Di-n-butylphthalate	30	17 E	24 E	27.1	21	27	24	12.5
Fluoranthene	540	320	430	25.6	330	480	413	18.5
Pyrene	480	350	415	15.7	310	480	402	21.3
Butylbenzylphthalate	18 N	12 E	15 N	20.0	23	24 N	21 N	23.5
3,3'-Dichlorobenzidine	R	R			R	R		
Benzo(a)anthracene	300	180	240	25.0	170	350	253	35.9
bis(2-Ethylhexyl)phthalate	89	54	72	24.3	67	83	74	11.1
Chrysene	390	230	310	25.8	230	390	310	25.8
Di-n-octylphthalate	19 U	18 U	19 U		18 U	18 U	18 U	
Benzo(b)fluoranthene								
Benzo(k)fluoranthene								
Benzo(b+k)fluoranthene	470	300	385	22.1	320	490	398	21.6
Benzo(a)pyrene	200 E	120 E	160 E	25.0	130 E	190 E	160 E	18.8
Indeno(1,2,3-c,d)pyrene	150 E	88 E	119 E	26.1	87 E	120 E	109 E	17.2
Dibenz(a,h)anthracene	72	46	59	22.0	41	60	53	20.2
Benzo(g,h,i)perylene	R	22 N			R	R		
Cymene	93 U	90 U	92 U		90 U	90 U	91 U	
9H-Carbazole	19	8 N	14 N	39.3	8 E	10 E	11 E	27.8
Caffeine	19 U	18 U	19 U		18 U	18 U	18 U	
Perylene	38 E	31 E	35 E	10.0	23 E	27 E	28 E	21.8
ß-Coprostanol	250	130 N	190 N	31.6	150 N	140 N	160 N	16.5
Cholesterol	2300	1900	2100	9.5	1800	2200 E	2030	10.3
ß-Sitosterol	1800 N	1700	1750 N	2.9	2100	1900	1920 E	9.1
Retene	98 E	71 E	85 E	15.9	70 E	91	82 E	13.2
Pristane/Phytane Ratio	1.447	1.857	1.652	-12.4	1.359	0.822	1.278	32.9
Carbon Preference Index	2.012	2.074	2.043	-1.5	2.066	2.558	2.222	13.1

Table 11. (continued) BNA Analyses - Monitoring Variability Samples

STATION 38

Target Parameter (µg/kg, dry wt.)	38 (Primary Sample)	60 (Duplicate Split)	Mean (38 and 60)	RPD (38 and 60)	61 (Replicate)	62 (Replicate)	Station Mean (n=3)	Station CV (n=3)
Phenol	24 U	**9 E**	17 U	44.1	**13 E**	**12 N**	**14 N**	18.9
bis(2-Chloroethyl)ether	24 U	23 U	24 U		23 U	23 U	23 U	
2-Chlorophenol	24 U	23 U	24 U		23 U	23 U	23 U	
1,3-Dichlorobenzene	24 U	23 U	24 U		23 U	23 U	23 U	
1,4-Dichlorobenzene	24 U	23 U	24 U		23 U	23 U	23 U	
Benzyl alcohol	119 U	117 U	118 U		116 U	117 U	117 U	
1,2-Dichlorobenzene	24 U	23 U	24 U		23 U	23 U	23 U	
2-Methylphenol	24 U	23 U	24 U		23 U	23 U	23 U	
bis(2-Chloroisopropyl)ether	24 U	23 U	24 U		23 U	23 U	23 U	
4-Methylphenol	24 U	23 U	24 U		23 U	23 U	23 U	
N-Nitroso-di-n-propylamine	24 U	23 U	24 U		23 U	23 U	23 U	
Hexachloroethane	48 U	47 U	48 U		46 U	47 U	47 U	
Nitrobenzene	24 U	23 U	24 U		23 U	23 U	23 U	
Isophorone	24 U	23 U	24 U		23 U	23 U	23 U	
2-Nitrophenol	119 U	117 U	118 U		116 U	117 U	117 U	
2,4-Dimethylphenol	48 U	47 U	48 U		46 U	47 U	47 U	
Benzoic acid	238 U	234 U	236 U		**55 E**	**75 E**	122 U	
bis(2-Chloroethoxy)methane	24 U	23 U	24 U		23 U	23 U	23 U	
2,4-Dichlorophenol	71 U	70 U	71 U		70 U	70 U	70 U	
1,2,4-Trichlorobenzene	24 U	23 U	24 U		23 U	23 U	23 U	
Naphthalene	**6 N**	**11 E**	**9 N**	-27.8	**10 E**	**6 E**	**8 E**	26.0
4-Chloroaniline	R	R			R	R		
Hexachlorobutadiene	48 U	47 U	48 U		46 U	47 U	47 U	
4-Chloro-3-methylphenol	48 U	47 U	48 U		46 U	47 U	47 U	
2-Methylnaphthalene	24 U	23 U	24.0 U		**8 E**	**6 E**	13 U	
Hexachlorocyclopentadiene	R	R			R	R		
2,4,6-Trichlorophenol	119 U	117 U	118 U		116 U	117 U	117 U	
2,4,5-Trichlorophenol	119 U	117 U	118 U		116 U	117 U	117 U	
2-Chloronaphthalene	24 U	23 U	24 U		23 U	23 U	23 U	
2-Nitroaniline	119 U	117 U	118 U		116 U	117 U	117 U	
Dimethylphthalate	24 U	23 U	24 U		23 U	23 U	23 U	
Acenaphthylene	24 U	23 U	24 U		**6 E**	**5 E**	12 U	
3-Nitroaniline	119 U	117 U	118 U		116 U	117 U	117 U	
Acenaphthene	24 U	23 U	24 U		23 U	23 U	23 U	
2,4-Dinitrophenol	238 U	234 U	236 U		232 U	234 U	234 U	
4-Nitrophenol	119 U	117 U	118 U		116 U	117 U	117 U	
Dibenzofuran	**6 E**	23 U	15 U	-56.7	**9 E**	**9 E**	**11 E**	31.5
2,4-Dinitrotoluene	119 U	117 U	118 U		116 U	117 U	117 U	
2,6-Dinitrotoluene	119 U	117 U	118 U		116 U	117 U	117 U	
Diethylphthalate	24 U	23 U	24 U		23 U	23 U	23 U	
4-Chlorophenyl-phenylether	24 U	23 U	24 U		23 U	23 U	23 U	
Fluorene	**10 E**	**10 E**	**10 E**	0.0	**11 E**	**12 E**	**11 E**	9.1

Table 11. (continued) BNA Analyses - Monitoring Variability Samples

STATION 38

Target Parameter (µg/kg, dry wt)	38 (Primary Sample)	60 (Duplicate Split)	Mean (38 and 60)	RPD (38 and 60)	61 (Replicate)	62 (Replicate)	Station Mean (n=3)	Station CV (n=3)
4-Nitroaniline	119 U	117 U	118 U		116 U	117 U	117 U	
4,6-Dinitro-2-methylphenol	238 U	234 U	236 U		232 U	234 U	234 U	
N-Nitrosodiphenylamine	24 U	23 U	24 U		23 U	23 U	23 U	
4-Bromophenyl-phenylether	24 U	23 U	24 U		23 U	23 U	23 U	
Hexachlorobenzene	24 U	23 U	24 U		23 U	23 U	23 U	
Pentachlorophenol	119 U	117 U	118 U		116 U	117 U	117 U	
Phenanthrene	**93**	**98**	**96**	-2.6	**120**	**120**	**112**	12.4
Anthracene	**21 E**	**21 E**	**21 E**	0.0	**29**	**28**	**26**	16.8
Di-n-butylphthalate	**8 N**	**11 E**	**10 N**	-15.0	**15 E**	**12 N**	**12 N**	21.0
Fluoranthene	**120**	**140**	**130**	-7.7	**150**	**150**	**143**	8.1
Pyrene	**120**	**99**	**110**	9.5	**120**	**120**	**117**	4.9
Butylbenzylphthalate	**9 E**	**7 N**	**8 N**	12.5	**9 N**	**8 N**	**8 N**	7.2
3,3'-Dichlorobenzidine	R	R			R	R		
Benzo(a)anthracene	**47**	**43**	**45**	4.4	**51**	**49**	**48**	6.4
bis(2-Ethylhexyl)phthalate	**40**	**36**	**38**	5.3	**45**	**41**	**41**	8.6
Chrysene	**71**	**61**	**66**	7.6	**75**	**70**	**70**	6.4
Di-n-octylphthalate	24 U	23 U	24 U		23 U	23 U	23 U	
Benzo(b)fluoranthene								
Benzo(k)fluoranthene								
Benzo(b+k)fluoranthene	**130**	**110**	**120**	8.3	**120**	**120**	**120**	0.0
Benzo(a)pyrene	**55 E**	**34 E**	**45 E**	23.3	**34 N**	**38 E**	**39 E**	14.3
Indeno(1,2,3-c,d)pyrene	**36 N**	**27 N**	**32 N**	14.1	**42 N**	**34 N**	**36 N**	14.7
Dibenz(a,h)anthracene	**8 N**	**10 N**	**9 N**	-11.1	**25**	**20 N**	**18 N**	45.5
Benzo(g,h,i)perylene	R	R			R	R		
Cymene	119 U	117 U	118 U		116 U	117 U	117 U	
9H-Carbazole	24 U	23 U	24 U		**11 N**	**7 N**	14 U	
Caffeine	24 U	23 U	24 U		23 U	23 U	23 U	
Perylene	**21 E**	**19 N**	**20 N**	5.0	**24 E**	**26 E**	**23 E**	13.3
ß-Coprostanol	**350**	**280 E**	**315 E**	11.1	**280**	**300**	**298**	5.9
Cholesterol	**1600 E**	**1400 E**	**1500 E**	6.7	**2200**	**1900**	**1870 E**	18.8
ß-Sitosterol	**1700**	**1500 E**	**1600 E**	6.3	**1200**	**2600**	**1800**	40.1
Retene	**120**	117 U	**119 E**	1.3	**110 E**	**130 E**	**120 E**	8.3
Pristane/Phytane Ratio	2.020	1.229	1.625	24.3	4.805	3.437	3.289	48.5
Carbon Preference Index	1.798	1.602	1.700	5.8	1.605	1.885	1.730	8.2

Table 11. (continued) BNA Analyses - Monitoring Variability Samples

STATION 44

Target Parameter (µg/kg, dry wt)	44 (Primary Sample)	63 (Duplicate Split)	Mean (44 and 63)	RPD (44 and 63)	64 (Replicate)	65 (Replicate)	Station Mean (n=3)	Station CV (n=3)
Phenol	**17**	**12**	**15**	16.7	**11**	**10**	**12**	22.0
bis(2-Chloroethyl)ether	9 U	9 U	9 U		9 U	9 U	9 U	
2-Chlorophenol	9 U	9 U	9 U		9 U	9 U	9 U	
1,3-Dichlorobenzene	9 U	9 U	9 U		9 U	9 U	9 U	
1,4-Dichlorobenzene	9 U	9 U	9 U		9 U	9 U	9 U	
Benzyl alcohol	46 U	46 U	46 U		47 U	47 U	47 U	
1,2-Dichlorobenzene	9 U	9 U	9 U		9 U	9 U	9 U	
2-Methylphenol	9 U	9 U	9 U		9 U	9 U	9 U	
bis(2-Chloroisopropyl)ether	9 U	9 U	9 U		9 U	9 U	9 U	
4-Methylphenol	9 U	9 U	9 U		9 U	9 U	9 U	
N-Nitroso-di-n-propylamine	9 U	9 U	9 U		9 U	9 U	9 U	
Hexachloroethane	19 U	19 U	19 U		19 U	19 U	19 U	
Nitrobenzene	9 U	9 U	9 U		9 U	9 U	9 U	
Isophorone	9 U	9 U	9 U		9 U	9 U	9 U	
2-Nitrophenol	46 U	46 U	46 U		47 U	47 U	47 U	
2,4-Dimethylphenol	19 U	19 U	19 U		19 U	19 U	19 U	
Benzoic acid	**21 E**	**21 E**	**21 E**	0.0	**22 E**	**37 E**	**27 E**	33.2
bis(2-Chloroethoxy)methane	9 U	9 U	9 U		9 U	9 U	9 U	
2,4-Dichlorophenol	28 U	28 U	28 U		28 U	28 U	28 U	
1,2,4-Trichlorobenzene	9 U	9 U	9 U		9 U	9 U	9 U	
Naphthalene	9 U	9 U	9 U		**2 E**	**2 E**	4 U	
4-Chloroaniline	R	R			R	R		
Hexachlorobutadiene	19 U	19 U	19 U		19 U	19 U	19 U	
4-Chloro-3-methylphenol	19 U	19 U	19 U		19 U	19 U	19 U	
2-Methylnaphthalene	9 U	9 U	9 0 U		9 U	9 U	9 U	
Hexachlorocyclopentadiene	R	R			R	R		
2,4,6-Trichlorophenol	46 U	46 U	46 U		47 U	47 U	47 U	
2,4,5-Trichlorophenol	46 U	46 U	46 U		47 U	47 U	47 U	
2-Chloronaphthalene	9 U	9 U	9 U		9 U	9 U	9 U	
2-Nitroaniline	46 U	46 U	46 U		47 U	47 U	47 U	
Dimethylphthalate	9 U	9 U	9 U		9 U	9 U	9 U	
Acenaphthylene	9 U	9 U	9 U		9 U	9 U	9 U	
3-Nitroaniline	46 U	46 U	46 U		47 U	47 U	47 U	
Acenaphthene	9 U	9 U	9 U		9 U	9 U	9 U	
2,4-Dinitrophenol	92 U	93 U	93 U		94 U	93 U	93 U	
4-Nitrophenol	46 U	46 U	46 U		47 U	47 U	47 U	
Dibenzofuran	9 U	9 U	9 U		9 U	9 U	9 U	
2,4-Dinitrotoluene	46 U	46 U	46 U		47 U	47 U	47 U	
2,6-Dinitrotoluene	46 U	46 U	46 U		47 U	47 U	47 U	
Diethylphthalate	9 U	9 U	9 U		9 U	9 U	9 U	
4-Chlorophenyl-phenylether	9 U	9 U	9 U		9 U	9 U	9 U	
Fluorene	9 U	9 U	9 U		9 U	9 U	9 U	

Table 11. (continued) BNA Analyses - Monitoring Variability Samples

STATION 44

Target Parameter (µg/kg, dry wt)	44 (Primary Sample)	63 (Duplicate Split)	Mean (44 and 63)	RPD (44 and 63)	64 (Replicate)	65 (Replicate)	Station Mean (n=3)	Station CV (n=3)
4-Nitroaniline	46 U	46 U	46 U		47 U	47 U	47 U	
4,6-Dinitro-2-methylphenol	92 U	93 U	93 U		94 U	93 U	93 U	
N-Nitrosodiphenylamine	9 U	9 U	9 U		9 U	9 U	9 U	
4-Bromophenyl-phenylether	9 U	9 U	9 U		9 U	9 U	9 U	
Hexachlorobenzene	9 U	9 U	9 U		9 U	9 U	9 U	
Pentachlorophenol	46 U	46 U	46 U		47 U	47 U	47 U	
Phenanthrene	**12**	**8 E**	**10 E**	20.0	**14**	**10**	**11**	21.0
Anthracene	**3 E**	**4 E**	**4 E**	-12.5	**3 E**	**3 E**	**3 E**	19.2
Di-n-butylphthalate	9 U	9 U	9 U		9 U	**3 U**	7 U	
Fluoranthene	**15**	**15**	**15**	0.0	**22**	**15**	**17**	23.8
Pyrene	**6 E**	**5 E**	**6 E**	8.3	**9 E**	**5 E**	**7 E**	29.7
Butylbenzylphthalate	9 U	9 U	9 U		9 U	9 U	9 U	
3,3'-Dichlorobenzidine	R	R			R	R		
Benzo(a)anthracene	**9 E**	**6 E**	**8 E**	18.8	**10**	**6 E**	**8 E**	25.0
bis(2-Ethylhexyl)phthalate	**6 E**	**8 E**	**7 E**	-14.3	**7 E**	**7 E**	**7 E**	0.0
Chrysene	**14**	**9 E**	**12 E**	20.8	**14**	**9 E**	**12 E**	21.0
Di-n-octylphthalate	9 U	9 U	9 U		9 U	9 U	9 U	
Benzo(b)fluoranthene								
Benzo(k)fluoranthene								
Benzo(b+k)fluoranthene	**20 E**	**11**	**16 E**	28.1	**18**	**12**	**15**	20.4
Benzo(a)pyrene	**3 E**	9 U	6 U	-50.0	**3 E**	9 U	6 U	
Indeno(1,2,3-c,d)pyrene	9 U	9 U	9 U		9 U	9 U	9 U	
Dibenz(a,h)anthracene	**4 E**	9 U	7 U	-35.7	9 U	9 U	8 U	
Benzo(g,h,i)perylene	R	R			R	R		
Cymene	46 U	46 U	46 U		47 U	47 U	47 U	
9H-Carbazole	9 U	9 U	9 U		9 U	9 U	9 U	
Caffeine	9 U	9 U	9 U		9 U	9 U	9 U	
Perylene	46 U	46 U	46 U		47 U	47 U	47 U	
ß-Coprostanol	**74**	**48 E**	**61 E**	21.3	**59 N**	**49 E**	**56 E**	11.5
Cholesterol	**1000**	**560 E**	**780 E**	28.2	**720 E**	**580 E**	**693 E**	14.8
ß-Sitosterol	**470 E**	**340 E**	**405 E**	16.0	**580 E**	**540 E**	**508 E**	18.1
Retene	46 U	**13 E**	30 U	55.0	47 U	47 U	41 U	
Pristane/Phytane Ratio								
Carbon Preference Index	3.521	3.699	3.610	-2.5	4.433	3.735	3.926	11.3

Table 12 . BNA Analyses - Project Comparsion Sample (PCS) Summary

1991 Project Comparison Sample Results

(all values in µg/kg, dry weight)

Summary Statistics 1989 - 1991

Target Parameter	Sample 66	Sample 67	Sample 68	1991 Mean	1991 CV (%)	1989 Mean	1989 CV (%)	1990 Mean	1990 CV (%)	Three Year Mean	Three Year CV (%)
Phenol	**65 E**	**26 E**	**34 E**	**42 E**	49.0	**111**	16.2	**64 E**	3.1	**72 E**	46.8
bis(2-Chloroethyl)ether	10 U	10 U	10 U	10 U		14 U		NA			
2-Chlorophenol	10 U	10 U	10 U	10 U		14 U		36 U			
1,3-Dichlorobenzene	**15 E**	**15 E**	**10 E**	**13 E**	22.2	**12 E**	9.6	**51 E**	50.6	**26 E**	89.4
1,4-Dichlorobenzene	**7 E**	**7 N**	**5 N**	**6 N**	19.2	**5 N**	0.0	**25 E**	67.0	**12**	105.7
Benzyl alcohol	48 U	50 U	48 U	49 U		73 U		71 U			
1,2-Dichlorobenzene	10 U	**13 E**	**9 E**	**11 E**	18.9	**9 N**	6.4	**29 E**	42.4	**16 E**	72.1
2-Methylphenol	10 U	10 U	10 U	10 U		14 U		27 U			
bis(2-Chloroisopropyl)ether	10 U	10 U	10 U	10 U		14 U		NA			
4-Methylphenol	**89 N**	**170 E**	**380 E**	**213 E**	70.5	**287**	8.8	**220 E**	23.6	**240 E**	36.6
N-Nitroso-di-n-propylamine	10 U	10 U	10 U	10 U		14 U		NA			
Hexachloroethane	19 U	20 U	19 U	19 U		29 U		58 U			
Nitrobenzene	10 U	10 U	10 U	10 U		14 U		NA			
Isophorone	**32 E**	**32 E**	**28 E**	**31 E**	7.4	**61**	10.0	**48 E**	61.1	**47 E**	42.5
2-Nitrophenol	48 U	50 U	48 U	49 U		72 U		179 U			
2,4-Dimethylphenol	19 U	20 U	19 U	19 U		29 U		26 U			
Benzoic acid	**160 E**	**76 E**	**28 E**	**88 E**	75.9	150 U		117 U			
bis(2-Chloroethoxy)methane	10 U	10 U	10 U	10 U		14 U		NA			
2,4-Dichlorophenol	29 U	30 U	29 U	29 U		43 U		107 U			
1,2,4-Trichlorobenzene	10 U	10 U	10 U	10 U		14 U		27 U			
Naphthalene	**36 E**	**37 E**	**37 E**	**37 E**	1.6	**53**	11.1	**59 E**	38.2	**49 E**	31.3
4-Chloroaniline	R	R	R					NA			
Hexachlorobutadiene	19 U	20 U	19 U	19 U		29 U		55 U			
4-Chloro-3-methylphenol	19 U	20 U	19 U	19 U		29 U		72 U			
2-Methylnaphthalene	**32 E**	**33 E**	**44 E**	**36 E**	18.5	**51**	30.4	NA			
Hexachlorocyclopentadiene	R	R	R			72 U		179 U			

Table 12. (continued) BNA Analyses - Project Comparsion Sample (PCS) Summary

1991 Project Comparison Sample Results

(all values in µg/kg, dry weight)

Summary Statistics
1989 - 1991

Target Parameter	Sample 66	Sample 67	Sample 68	1991 Mean	1991 CV (%)	1989 Mean	1989 CV (%)	1990 Mean	1990 CV (%)	Three Year Mean	Three Year CV (%)
2,4,6-Trichlorophenol	48 U	50 U	48 U	49 U		72 U		179 U			
2,4,5-Trichlorophenol	48 U	50 U	48 U	49 U		72 U		179 U			
2-Chloronaphthalene	10 U	10 U	10 U	10 U		14 U		36 U			
2-Nitroaniline	48 U	50 U	48 U	49 U		72 U		NA			
Dimethylphthalate	10 U	10 U	10 U	10 U		14 U		36 U			
Acenaphthylene	**34**	**14 E**	**23**	**24**	41.7	**50**	13.9	**39 E**	21.9	**38**	35.9
3-Nitroaniline	48 U	50 U	48 U	49 U		72 U		NA			
Acenaphthene	**86**	**61 E**	**67**	**71**	18.4	**86**	14.4	**97 E**	33.5	**85**	25.4
2,4-Dinitrophenol	96 U	101 U	95 U	97 U		150 U		360 U			
4-Nitrophenol	48 U	50 U	48 U	49 U		72 U		179 U			
Dibenzofuran	**2 N**	10 U	**2 E**	**5**	92.4	14 U		**28 E**	29.7	**16 E**	69.3
2,4-Dinitrotoluene	48 U	50 U	48 U	49 U		72 U		NA			
2,6-Dinitrotoluene	48 U	50 U	48 U	49 U		72 U		NA			
Diethylphthalate	10 U	10 U	10 U	10 U		14 U		22 U			
4-Chlorophenyl-phenylether	**110**	**65**	**83**	**86**	26.3	**89**	8.5	NA			
Fluorene	**100**	**70**	**82**	**84**	18.0	**89**	10.8	**99 E**	28.7	**91**	19.9
4-Nitroaniline	48 U	50 U	48 U	49 U		72 U		NA			
4,6-Dinitro-2-methylphenol	96 U	101 U	95 U	97 U		150 U		NA			
N-Nitrosodiphenylamine	10 U	10 U	10 U	10 U		14 U		27 U			
4-Bromophenyl-phenylether	**380**	**210**	**240**	**277**	32.8	**200**	5.0	NA			
Hexachlorobenzene	10 U	10 U	10 U	10 U		14 U		43 U			
Pentachlorophenol	**260 E**	**360 E**	**340 E**	**320 E**	16.5	**240**	21.7	**207 E**	17.0	**256 E**	25.4
Phenanthrene	**210**	**160**	**160**	**177**	16.3	**140**	0.0	**393 E**	71.3	**237**	77.7
Anthracene	**180**	**120**	**130 E**	**143**	22.5	**130**	20.4	**189 E**	48.7	**154**	37.1
Di-n-butylphthalate	**4 N**	4 U	3 U	4 U		14 U		**36 E**	109.9	**18**	135.0
Fluoranthene	**200**	**180**	**150**	**177**	14.2	**133**	11.5	**398 E**	72.6	**236**	80.6

Table 12 . (continued) BNA Analyses - Project Comparsion Sample (PCS) Summary

1991 Project Comparison Sample Results

(all values in µg/kg, dry weight)

Summary Statistics
1989 - 1991

Target Parameter	Sample 66	Sample 67	Sample 68	1991 Mean	1991 CV (%)	1989 Mean	1989 CV (%)	1990 Mean	1990 CV (%)	Three Year Mean	Three Year CV (%)
Pyrene	**110**	82	**97**	**96**	14.6	**99**	18.5	**356 E**	71.9	**184**	98.9
Butylbenzylphthalate	10 U	10 U	10 U	10 U		14 U		36 U			
3,3'-Dichlorobenzidine	R	R	R					NA			
Benzo(a)anthracene	**100**	**84**	**77**	**87**	13.6	**93**	15.6	**201 E**	64.5	**127**	67.6
bis(2-Ethylhexyl)phthalate	**70**	**49 E**	**68 E**	**62 E**	18.7	**94**	24.3	296 U			
Chrysene	**120**	**94**	**92**	**102**	15.3	**120**	8.3	**287 E**	67.9	**170**	77.7
Di-n-octylphthalate	10 U	10 U	10 U	10 U		14 U		36 U			
Benzo(b)fluoranthene	**97**	**90**	**96**	**94**	4.0						
Benzo(k)fluoranthene	10 U	10 U	10 U	10 U							
Benzo(b+k)fluoranthene	**97**	**90**	**96**	**94**	4.0	**107**	10.8	**533 E**	84.9	**245**	127.8
Benzo(a)pyrene	**66 E**	**65 E**	**67 E**	**66 E**	1.5	**120**	8.3	**217 E**	57.4	**134 E**	68.0
Indeno(1,2,3-c,d)pyrene	10 U	10 U	10 U	10 U	.	14 U		**120 E**	66.3	**48**	139.9
Dibenz(a,h)anthracene	**140**	**76**	**85**	**100**	34.6	**108**	18.0	**163 E**	57.0	**124**	47.3
Benzo(g,h,i)perylene	**15 N**	**12 N**	**21 E**	**16 N**	28.6	**58 E**	16.0	**49 E**	60.1	**41 E**	60.1
Cymene	48 U	50 U	48 U	49 U		14 U		NA			
9H-Carbazole	**4 N**	**4 E**	10 U	6 U		14 U		**57 E**	45.9	**26 E**	103.8
Caffeine	10 U	10 U	10 U	10 U		14 U		NA			
Perylene	**68**	**64**	**83**	**72**	13.9	**150**	6.7	NA			
ß-Coprostanol	**230**	**150 E**	**200 E**	**193 E**	20.9	**240**	36.1	360 U			
Cholesterol	**840**	**790**	**840 E**	**823**	3.5	**1330**	56.7	NA			
ß-Sitosterol	**520**	**310**	**390 E**	**407**	26.0	**883**	99.8	NA			
Retene	**7 E**	**5 E**	**10 E**	**7 E**	36.0	14 U		NA			
Carbon Preference Index	1.819	1.391	2.972	2.061	39.7	1.440	20.0	NA			

Table 12. (continued) BNA Analyses - Project Comparsion Sample (PCS) Summary

	1989 Project Comparison Sample Results (all values in µg/kg, dry weight)					1990 Project Comparison Sample Results (all values in µg/kg, dry weight)				
Target Parameter	Sample 66	Sample 67	Sample 68	1989 Mean	1989 CV (%)	Sample 66	Sample 67	Sample 68	1990 Mean	1990 CV (%)
Phenol	**94**	**110**	**130**	**111**	16.2	**64 E**	**66 E**	**62 E**	**64 E**	3.1
bis(2-Chloroethyl)ether	14 U	15 U	14 U	14 U		NA	NA	NA	NA	
2-Chlorophenol	14 U	15 U	14 U	14 U		14 U	14 U	81 U	36 U	
1,3-Dichlorobenzene	**11 E**	**13 E**	**13 E**	**12 E**	9.6	**39 E**	**34 E**	81 U	**51 E**	50.6
1,4-Dichlorobenzene	**5 N**	**5 N**	**5 N**	**5 N**	0.0	**15 E**	**15 E**	44 U	**25 E**	67.0
Benzyl alcohol	73 U	72 U	73 U	73 U		70 U	67 U	75 U	71 U	
1,2-Dichlorobenzene	**8 N**	**9 N**	**9 N**	**9 N**	6.4	**20 E**	**24 E**	43 U	**29 E**	42.4
2-Methylphenol	14 U	15 U	14 U	14 U		14 U	14 U	52 U	27 U	
bis(2-Chloroisopropyl)ether	14 U	15 U	14 U	14 U		NA	NA	NA	NA	
4-Methylphenol	**260**	**290**	**310**	**287**	8.8	**190 E**	**190 E**	**280**	**220 E**	23.6
N-Nitroso-di-n-propylamine	14 U	15 U	14 U	14 U		NA	NA	NA	NA	
Hexachloroethane	29 U	29 U	29 U	29 U		28 U	27 U	120 U	58 U	
Nitrobenzene	14 U	15 U	14 U	14 U		NA	NA	NA	NA	
Isophorone	**54**	**64**	**65**	**61**	10.0	**25 E**	**38 E**	81 U	**48 E**	61.1
2-Nitrophenol	72 U	73 U	72 U	72 U		70 U	67 U	400 U	179 U	
2,4-Dimethylphenol	29 U	29 U	29 U	29 U		14 U	14 U	51 U	26 U	
Benzoic acid	150 U	150 U	150 U	150 U		140 U	130 U	82 U	117 U	
bis(2-Chloroethoxy)methane	14 U	15 U	14 U	14 U		NA	NA	NA	NA	
2,4-Dichlorophenol	43 U	44 U	43 U	43 U		42 U	40 U	240 U	107 U	
1,2,4-Trichlorobenzene	14 U	15 U	14 U	14 U		14 U	14 U	53 U	27 U	
Naphthalene	**46**	**55**	**57**	**53**	11.1	**58 E**	**82 E**	**37 N**	**59 E**	38.2
4-Chloroaniline	R	R	R			NA	NA	NA	NA	
Hexachlorobutadiene	29 U	29 U	29 U	29 U		28 U	27 U	110 U	55 U	
4-Chloro-3-methylphenol	29 U	29 U	29 U	29 U		28 U	27 U	160 U	72 U	
2-Methylnaphthalene	**40**	**45**	**69**	**51**	30.4	NA	NA	NA	NA	
Hexachlorocyclopentadiene	72 U	73 U	72 U	72 U		70 U	67 U	400 U	179 U	

Table 12. (continued) BNA Analyses - Project Comparsion Sample (PCS) Summary

	1989 Project Comparison Sample Results (all values in µg/kg, dry weight)					1990 Project Comparison Sample Results (all values in µg/kg, dry weight)				
Target Parameter	Sample 66	Sample 67	Sample 68	1989 Mean	1989 CV (%)	Sample 66	Sample 67	Sample 68	1990 Mean	1990 CV (%)
2,4,6-Trichlorophenol	72 U	73 U	72 U	72 U		70 U	67 U	400 U	179 U	
2,4,5-Trichlorophenol	72 U	73 U	72 U	72 U		70 U	67 U	400 U	179 U	
2-Chloronaphthalene	14 U	15 U	14 U	14 U		14 U	14 U	81 U	36 U	
2-Nitroaniline	72 U	73 U	72 U	72 U		NA	NA	NA	NA	
Dimethylphthalate	14 U	15 U	14 U	14 U		14 U	14 U	81 U	36 U	
Acenaphthylene	**46**	**46**	**58**	**50**	13.9	**38 E**	**48 E**	**31 N**	**39 E**	21.9
3-Nitroaniline	72 U	73 U	72 U	72 U		NA	NA	NA	NA	
Acenaphthene	**78**	**79**	**100**	**86**	14.4	**95 E**	**130 E**	**65 E**	**97 E**	33.5
2,4-Dinitrophenol	150 U	150 U	150 U	150 U		140 U	130 U	810 U	360 U	
4-Nitrophenol	72 U	73 U	72 U	72 U		70 U	67 U	400 U	179 U	
Dibenzofuran	14 U	15 U	14 U	14 U		**21 E**	**37 E**	25 U	**28 E**	29.7
2,4-Dinitrotoluene	72 U	73 U	72 U	72 U		NA	NA	NA	NA	
2,6-Dinitrotoluene	72 U	73 U	72 U	72 U		NA	NA	NA	NA	
Diethylphthalate	14 U	15 U	14 U	14 U		14 U	14 U	37 U	22 U	
4-Chlorophenyl-phenylether	**86**	**84**	**98**	**89**	8.5	NA	NA	NA	NA	
Fluorene	**85**	**82**	**100**	**89**	10.8	**94 E**	**130 E**	**74 E**	**99 E**	28.7
4-Nitroaniline	72 U	73 U	72 U	72 U		NA	NA	NA	NA	
4,6-Dinitro-2-methylphenol	150 U	150 U	150 U	150 U		NA	NA	NA	NA	
N-Nitrosodiphenylamine	14 U	15 U	14 U	14 U		14 U	14 U	54 U	27 U	
4-Bromophenyl-phenylether	**190**	**200**	**210**	**200**	5.0	NA	NA	NA	NA	
Hexachlorobenzene	14 U	15 U	14 U	14 U		14 U	14 U	100 U	43 U	
Pentachlorophenol	**270**	**270**	**180**	**240**	21.7	**170 E**	**240 E**	**210 N**	**207 E**	17.0
Phenanthrene	**140**	**140**	**140**	**140**	0.0	**400 E**	**670 E**	**110 E**	**393 E**	71.3
Anthracene	**120**	**110**	**160**	**130**	20.4	**190 E**	**280 E**	**96 E**	**189 E**	48.7
Di-n-butylphthalate	14 U	15 U	14 U	14 U		**8 E**	**18 E**	81 U	**36 E**	109.9
Fluoranthene	**130**	**120**	**150**	**133**	11.5	**430 E**	**670 E**	**95 E**	**398 E**	72.6

Table 12. (continued) BNA Analyses - Project Comparsion Sample (PCS) Summary

Target Parameter	1989 Project Comparison Sample Results (all values in µg/kg, dry weight)					1990 Project Comparison Sample Results (all values in µg/kg, dry weight)				
	Sample 66	Sample 67	Sample 68	1989 Mean	1989 CV (%)	Sample 66	Sample 67	Sample 68	1990 Mean	1990 CV (%)
Pyrene	93	85	120	99	18.5	410 E	580 E	77 E	356 E	71.9
Butylbenzylphthalate	14 U	15 U	14 U	14 U		14 U	14 U	81 U	36 U	
3,3'-Dichlorobenzidine	R	R	R			NA	NA	NA	NA	
Benzo(a)anthracene	86	84	110	93	15.6	220 E	320 E	63 E	201 E	64.5
bis(2-Ethylhexyl)phthalate	82	79	120	94	24.3	380 U	420 U	88 E	296 U	
Chrysene	110	120	130	120	8.3	310 E	470 E	82 E	287 E	67.9
Di-n-octylphthalate	14 U	15 U	14 U	14 U		14 U	14 U	81 U	36 U	
Benzo(b)fluoranthene										
Benzo(k)fluoranthene										
Benzo(b+k)fluoranthene	100	100	120	107	10.8	580 E	960 E	59 E	533 E	84.9
Benzo(a)pyrene	120	110	130	120	8.3	220 E	340 E	91 E	217 E	57.4
Indeno(1,2,3-c,d)pyrene	14 U	15 U	14 U	14 U		120 E	200 E	41 U	120 E	66.3
Dibenz(a,h)anthracene	95	98	130	108	18.0	190 E	240 E	60 N	163 E	57.0
Benzo(g,h,i)perylene	55 E	50 E	68 E	58 E	16.0	23 E	43 E	81 U	49 E	60.1
Cymene	14 U	15 U	14 U	14 U		NA	NA	NA	NA	
9H-Carbazole	14 U	15 U	14 U	14 U		29 E	60 E	81 U	57 E	45.9
Caffeine	14 U	15 U	14 U	14 U		NA	NA	NA	NA	
Perylene	140	150	160	150	6.7	NA	NA	NA	NA	
ß-Coprostanol	190	190	340 N	240	36.1	140 U	130 U	810 U	360 U	
Cholesterol	880	910	2200 E	1330	56.7	NA	NA	NA	NA	
ß-Sitosterol	400	350	1900 E	883	99.8	NA	NA	NA	NA	
Retene	14 U	15 U	14 U	14 U		NA	NA	NA	NA	
Carbon Preference Index	1.68	1.12	1.52	1.440	20.0	NA	NA	NA	NA	

NA = not analyzed or available

Table 13A. Guaiacol Analyses - Sample Holding Times

Station ID	Sample ID	Rep/QC	Lab ID	Date Collected	Date Extracted	Date Analyzed	Holding Time (Days)	
							Extraction	Analysis
4	4	1	8041 A	4/07/91	4/11/91	4/18/91	4	11
4	78	1	7976 O re	4/07/91	4/20/91	5/01/91	**13**	24
4	79	2	7976 P re	4/07/91	4/20/91	5/01/91	**13**	24
4	80	3	7976 Q re	4/07/91	4/20/91	5/01/91	**13**	24
8	8	1	8078 B	4/12/91	4/16/91	4/23/91	4	11
12	12	1	8078 J	4/13/91	4/16/91	4/23/91	3	10
41	41	1	7976 H	3/27/91	4/03/91	4/09/91	7	13

Table 13B. Resin Acid Analyses - Sample Holding Times

Station ID	Sample ID	Rep/QC	Lab ID	Date Collected	Date Extracted	Date Analyzed	Holding Time (Days)	
							Extraction	Analysis
4	4	1	8041 A	4/07/91	4/20/91	5/01/91	**13**	24
4	78	1	7976 O re	4/07/91	4/20/91	5/02/91	**13**	25
4	79	2	7976 P re	4/07/91	4/20/91	5/02/91	**13**	25
4	80	3	7976 Q re	4/07/91	4/20/91	5/02/91	**13**	25
8	8	1	8078 B	4/12/91	4/20/91	5/01/91	**8**	19
12	12	1	8078 J	4/13/91	4/20/91	5/01/91	7	18
41	41	1	7976 H	3/27/91	4/20/91	5/01/91	**24**	35

Holding times exceeding project-specified limits are highlighted in **bold**.

Table 14. Guaiacol/Resin Acid Analyses - Monitoring Variability Samples

STATION 4

Target Parameter (µg/kg, dry wt.)	4 (Primary Sample)	78 (Duplicate Split)	Mean (4 and 78)	RPD (4 and 78)	79 (Replicate)	80 (Replicate)	Station Mean (n=3)	Station CV (n=3)
2-Methoxyphenol (Guaiacol)	20 U	27 U	24 U		27 U	26 U	26 U	
4,5-Dichloroguaiacol	20 U	27 U	24 U		27 U	26 U	26 U	
4,5,6-Trichloroguaiacol	20 U	27 U	24 U		27 U	26 U	26 U	
3,4,5-Trichloroguaiacol	20 U	27 U	24 U		27 U	26 U	26 U	
Tetrachloroguaiacol	20 U	27 U	24 U		27 U	26 U	26 U	
Pimaric acid	27 U	27 U	27 U		27 U	26 U	27 U	
Sandaracopimaric acid	27 U	27 U	27 U		27 U	26 U	27 U	
Isopimaric acid	**38**	27 U	33 U		27 U	26 U	29 U	
Palustric acid	R	R			R	R		
Dehydroabietic acid	**92**	**66**	**79**	16.4	**63**	**33 E**	**58**	40.7
Abietic acid	**36**	**28 N**	**32 N**	13.1	**21 N**	26 U	**26 N**	21 6
Neoabietic acid	27 U	27 U	27 U		27 U	26 U	27 U	
12-Chlorodehydroabietic acid	27 U	27 U	27 U		27 U	26 U	27 U	
14-Chlorodehydroabietic acid	**32**	**22 N**	**27 E**	18 0	27 U	26 U	27 U	
Dichlorodehydroabietic acid	27 U	27 U	27 U		27 U	26 U	27 U	

September 13, 1991

Data Validation Report
Pesticide/PCB Analyses

Site:	Puget Sound
Project :	1991 PSAMP MSMT
Sample Numbers:	1, 2R, 3-5, 8, 9R, 10R, 11R, 12, 13R, 14, 15, 17-22, 26, 29, 30, 32-35, 38-41, 43-45, 47-49, 51-53, 57-74, 201R-209R
Samples Collected by:	Ambient Monitoring Section Washington State Department of Ecology

The samples included in this report were analyzed by Analytical Resources, Inc., of Seattle, Washington, under subcontract to BCI of Vashon, Washington. Funding for this contract is provided by the Ambient Monitoring Section of the Washington State Department of Ecology.

This report is submitted to:	Ambient Monitoring Section Washington State Department of Ecology

Data Evaluated by:	Thomas D. Bowden TDB
Approved by:	Raleigh C. Farlow RCF

BCI
Environmental & Medical Research
and Systems Development

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Site:	Puget Sound
Project:	1991 PSAMP MSMT
Laboratory:	Analytical Resources, Inc. (ARI)
Sample Numbers:	Samples 1, 2R, 3-5, 8, 9R, 10R, 11R, 12, 13R, 14, 15, 17-22, 26, 29, 30, 32-35, 38-41, 43-45, 47-49, 51-53, 57-74, 201R-209R
Matrix:	Sediment
Reviewer:	T. D. Bowden
Date:	September 13, 1991

1.0 Introduction

This report summarizes the validation of laboratory data for 66 marine sediment samples submitted to Analytical Resources, Inc. of Seattle, Washington for Pesticide/PCB analyses. The samples were collected from 48 different stations throughout Puget Sound by the Washington State Department of Ecology (Ecology) Ambient Monitoring Section, as part of the 1991 Marine Sediment Monitoring Task (MSMT) of the Puget Sound Ambient Monitoring Program (PSAMP). The samples were analyzed employing a protocol modified after USEPA CLP SOW 2/88, in order to decrease Method Quantitation Levels. These modifications included larger sample sizes (approximately 150 gm, wet weight). An additional surrogate compound, Dibromooctylfluorobiphenyl, and the USEPA CLP-specified surrogate compound Dibutylchlorendate were added to all samples analyzed. Dual gas chromatographic separation and analyses were conducted on all sample extracts employing fused silica wide-bore capillary columns; a DB5 column, 30 m x 0.53 mm i.d., 1.5 µm film thickness, and a confirmatory DB608 column, 30 m x 0.53 mm i.d., 0.83 µm film thickness.

This report has been prepared in accordance with USEPA guidance *Laboratory Data Validation: Functional Guidelines for Evaluating Organics Analyses* (USEPA, 1988). Data validation criteria applied these analyses are found in the USEPA *Functional Guidelines*, and in Ecology's *Puget Sound Ambient Monitoring Program: Marine Sediment Quality Implementation Plan* (Striplin, 1988).

Samples were collected using a 0.1 m^2 stainless steel Double van Veen sampler. Sediment for pesticide/PCB analyses was removed from the upper two centimeters in the sampler. The sediment constituting the sample is a homogenized composite of at least five Double van Veen casts. Sufficient material was collected to fill two 16 ounce glass jars for each sample. Samples were held on ice until delivery to the laboratory. Chain-of-Custody documents show that proper chain-of-custody was maintained from the time of sample collection until delivery to and acceptance by the laboratory. The laboratory reported that all samples were received intact.

Forty-eight of the samples are primary samples from 48 different locations or stations in Puget Sound. Fifteen of the remaining samples are field-generated quality control samples collected at five selected stations to allow determination of monitoring variability. At each selected station, the field-generated QC samples include one split of the primary sample taken from the same Double van Veen grab composite (blind laboratory duplicate), and two station replicates taken from two separate Double van Veen casts at the same station (blind field replicates). All field-generated QC samples were assigned surrogate station numbers, as summarized below, and were submitted blind to the laboratory:

Field Station and Primary Sample:	5	32	35	38	44
Duplicate Split:	51	57	72	60	63
Station Replicates:	52, 53	58, 59	73, 74	61, 62	64, 65

Samples 66, 67, and 68 are Project Comparison Samples (PCSs), consisting of fortified Sequim Bay sediment. This fortified sample material was also analyzed during the 1989 and 1990 PSAMP.

The laboratory performed Matrix Spike/Matrix Spike Duplicate analyses on Samples 5, 32, 35, 61, and 44.

Laboratory deliverables were complete and documentation was sufficient to allow evaluation and validation of the associated results.

Analytical results with associated data qualifiers are presented in Table 1. Results are expressed in µg/kg, dry weight.

2.0 Discussion

2.1. Sample Holding Times/Preservation

Technical requirements for maximum sample and extract holding times have been established only for water matrices for Pesticide/PCB analyses (extraction of samples held at 4°C within 7 days of collection; instrumental analysis of extract within 40 days of collection). All samples submitted for pesticide/PCB analyses were extracted within 7 days. All samples were analyzed within 40 days with the exception of Sample 73 (42 days), and reanalyses of Samples 66 (63 days), 67 (62 days), and 68 (53 days). All of these samples show some evidence of extract concentration as a result of solvent evaporative loss. Sample 73, a station replicate for Station 35, shows high surrogate recoveries. Positive results for Sample 73 do not compare well to results for other replicates from the same station (see Sections 2.5 and 2.9). As a consequence, positive results associated with this sample have been qualified "E" (estimated) due to exceedance of holding time limits. PCS samples 66, 67, and 68 were reanalyzed at a 10x dilution because of high concentrations of Endosulfan I. High surrogate recoveries and poor comparisons to initial analyses of these samples indicate extract concentration had occurred as a result of extended holding times for extracts. Therefore, Endosulfan I results for these analyses have not been reported (see Section 2.8).

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. Sample holding times are summarized in Table 2.

2.2. Instrument Performance

<u>DDT Retention Time:</u> Retention time for 4,4'-DDT is greater than 12 minutes on all 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 (Pesticide/PCB Standard Summary) for both columns, as required. Retention Times (RT) for all pesticide standards reported on Form IX are within the established retention time windows. All raw data were checked for transcription accuracy to Form IX. No significant transcription errors were found.

DDT/Endrin Degradation Check: Degradation of DDT and Endrin, as reported on Form VIII (Pesticide Analysis Standards Summary) did not exceed 20% for any analysis of Evaluation Standard Mix B, with one exception. Analysis of Evaluation Mix B on 4/19/91 at 23:14 hours showed DDT degradation of 31.2% on the DB5 column (quantitation column) and 33.0% on the DB608 column (confirmation column). This analysis was the last analysis of Evaluation Mix B during the instrumentation run. No positive results for DDT, DDE, or DDD were reported for any samples analyzed during this instrumentation run, and therefore, no data required qualification. All raw data were examined to verify the reported percent degradation of DDT and Endrin. All reported percent degradations were confirmed by recalculation.

DBC Retention Time Check: The percent difference (%D) in retention time for Dibutylchlorendate between Evaluation Mix A and all subsequent standards and samples is ≤1.5% (wide-bore capillary column requirement) in all 72-hour instrumentation runs. %Ds were confirmed by recalculation from raw data for approximately 20% of all analyses. No significant calculation errors were found.

2.3. Calibration

Initial Calibration: Instrumental linearity was checked for each 72-hour instrumentation run at three concentrations for Aldrin, Endrin, DDT, and Dibutylchlorendate. The percent relative standard deviation (%RSD) for calibration factors (determined at each concentration for each compound) were ≤10% for all runs. Calibration factors and %RSDs were confirmed by recalculation from raw data for all instrumentation runs. No significant errors were found.

Analytical Sequence: All 72-hour instrumentation runs followed the appropriate analytical sequence for standards and field samples.

Continuing Calibration: The percent difference (%D) between calibration factors (initial calibration versus continuing calibration) is ≤15% for all continuing calibration standards used in quantitation, and ≤20% for all standards used in confirmation, with the exception of DDT for the Individual Mix A standard analyzed on 4/18/91 at 06:09 hours. %D for DDT in this standard was >20% on both columns. Positive results for DDT associated with this standard have been qualified "E" (estimated), and include Samples 21, 29, and 57. %D was confirmed by recalculation for approximately 20% of the standards analyzed.

2.4. Method Blank Analysis

Method blank analysis was performed at the required frequency (at least one per extraction batch). A total of ten method blanks were analyzed. No TCL pesticides or PCBs were detected in any method blank. Raw data for all method blanks were examined. Observed peaks in method blank chromatograms could not be associated with any TCL pesticides or PCBs.

2.5. Surrogate Recovery

The USEPA CLP-specified surrogate compound, Dibutylchlorendate (DBC) and an additional surrogate compound, Dibromooctylfluorobiphenyl (DBOFB), were added to all samples including method blanks. One microgram (1 µg) of DBC and 0.5 µg of DBOFB were added to each sample. Equivalent average dry weight concentrations are 12.2 and 6.1 µg/kg, dry weight, respectively, using an average dry weight for all field samples of 82.3 gm.

Surrogate recoveries (%R) for all field samples are within the acceptance limits specified for this project (%R≥50%). Transcription to Form II (Pesticide Surrogate Recovery) was checked for all data. Surrogate results were verified for approximately 20% of all samples by examination of chromatograms and quantitation reports, and recalculation of recoveries. Surrogate recoveries are presented in Table 3.

Some samples showed excessively high surrogate recoveries relative to other field samples. High surrogate recoveries for reanalyses of Samples 66, 67 and 68 suggest that solvent loss between the time of the first analysis and second analysis had resulted in concentration of the extract. However, these results were not reported, and therefore no results required qualification (see Section 2.8). High surrogate recoveries for Sample 73 also indicated extract concentration, particularly when compared to other replicates associated with the same station (see Section 2.9). Positive results associated with this sample have been qualified "E" (estimated) for exceeding project holding times.

2.6. Matrix Spike/Matrix Spike Duplicate Analysis

MS/MSD analysis was performed on Samples 5, 32, 35, 44, and 61. All MS/MSD samples were spiked with the following TCL pesticides:

Compound	Amount Spiked (µg)	Approx. Concentration (µg/kg, dry weight)
γ-BHC (Lindane)	0.2	2.6
Heptachlor	0.2	2.6
Aldrin	0.2	2.6
Dieldrin	0.5	6.5
Endrin	0.5	6.5
4,4'-DDT	0.5	6.5

All MS/MSD analyses met project-specified acceptance criteria (≥50% recovery, ±100% RPD), with the exception of the matrix spike result for Aldrin in Sample 61. The average recovery for Aldrin in the MS and MSD analyses of Sample 61 was 52% and the RPD 75%; the results are considered acceptable. Aldrin was not detected in any field samples.

MS/MSD results are presented in Table 4. Transcription of laboratory data to Form II (Pesticide Matrix Spike/Matrix Spike Duplicate Recovery) was confirmed for all compounds. Recoveries and RPDs were confirmed by recalculation. Several minor rounding inconsistencies were found in dry weight conversions. These inconsistencies did not significantly affect results. Corrected results are found in Table 4. Quantitation was confirmed for all MS/MSD compounds.

2.7. 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 and verified as correct. Sample chromatograms with PCBs were compared to standard chromatograms. Examination of chromatograms for samples with reported PCBs indicates the possibility of interference with pesticide peaks, particularly DDT and DDE. DDT and Aroclor 1254 were reported for Samples 21, 22, 29, and 57, and DDE and Aroclor 1254 were reported for Sample 67. The peaks chosen for quantitation of DDT and DDE in these samples may be interfering PCB peaks, and consequently, the DDT and DDE results have been qualified as "N" (presumptive evidence of compound presence, reported concentration is an estimate). GC/MS confirmation was not accomplished nor required for any of the reported target compounds

2.8. 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. Aroclor 1260 in Sample 59 was reported incorrectly, and has been corrected as reported in Table 1. Endosulfan I exceeded the calibrated range of the instrument for Samples 66, 67, and 68. Surrogate recoveries for dilutions and reanalyses of these samples indicate that the extract became concentrated as a result of solvent evaporative loss during the intervening time since the first analyses. A comparison with TCL results from the first analyses support this conclusion (see Section 2.9). As a result, reported results for Endosulfan I associated with the reanalyses may be biased high. Endosulfan I results from the first analysis of these samples have been reported, and have been qualified as "E" (estimated) for exceedance of the calibrated range of the instrument. Average quantitation limits for all analyses of field samples are given in Table 5.

2.9. Other Performance Data

Field-Generated QC Samples: Two types of field-generated QC samples were collected from five separate stations. Station duplicate splits were generated by taking two separate aliquots from a composite of at least five Double van Veen grab samples. One aliquot was assigned to the primary station number, and the second aliquot was assigned a surrogate station number. Two additional, separate station replicates were generated by collecting one sample from each of two separate Double van Veen casts while on station. Station replicates were assigned separate surrogate station numbers.

Analytical results and summary statistics for all replicates are presented in Table 6. The CV and mean results for the four samples were calculated using the mean of the duplicate splits as the first of three replicates (n=3).

Project Comparison Samples (PCS): Homogenized archived sediment from Sequim Bay was submitted for analysis as Samples 66, 67, and 68. This material was acquired from the Office of Coastal Waters, USEPA Region X, and consists of a composited marine sediment that had been prepared as a fortified sample by NOAA, National Marine Fisheries Laboratory, under contract to EPA Region X. Analytical results and summary statistics for these samples for 1989 and 1991 are presented in Table 7. No pesticide/PCB results are available for this material for the 1990 program.

2.10. Overall Case Assessment

A high level of effort was exhibited by the laboratory for this project. All deliverables required by the project were present and the data package was complete. The quantitation levels achieved are significantly lower than CLP requirements. The general quality of the data is considered very good. The data is considered to be usable for the intended purposes of the project.

3.0 Summary of Qualified Data

3.1. The following analytical results have been qualified "E" (estimated), because the sample holding time exceeded acceptance limits, as discussed in Section 2.1:

Aroclor 1254	Sample 73
Aroclor 1260	Sample 73

3.2. The following analytical results have been qualified "E" (estimated), because continuing calibration acceptance criteria were not met, as discussed in Section 2.3:

4,4'-DDT	Samples 21, 29, 57

3.3. The following analytical results have been qualified "N" (presumptive evidence of compound presence), because of potential interference with PCBs, as discussed in Section 2.7:

4,4'-DDT	Samples 21, 22, 29, 57
4,4'-DDE	Sample 67

3.4. The following analytical results have been qualified "E" (estimated), because the calibrated range of the instrument was exceeded, as discussed in Section 2.8:

Endosulfan I	Samples 66, 67, 68

Table 1. Pesticide/PCB Analyses - Qualified Sample Results

CAS Number	Target Parameter (µg/kg, dry weight)	Station 1 Sample 1 8041 P	Station 2R Sample 2R 8041 Q	Station 3 Sample 3 8078 A	Station 4 Sample 4 8041 A	Station 5 Sample 5 8041 B	Station 5 Sample 51 8041 F	Station 5 Sample 52 8041 G	Station 5 Sample 53 8041 H	Station 8 Sample 8 8078 B	Station 9R Sample 9R 8078 C
319-84-6	alpha-BHC	1.0 U	1.0 U	0.6 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.6 U	0.6 U
319-85-7	beta-BHC	1.0 U	1.0 U	0.6 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.6 U	0.6 U
319-86-8	delta-BHC	1.5 U	1.5 U	0.8 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	0.8 U	0.8 U
58-89-9	gamma-BHC (Lindane)	1.0 U	1.0 U	0.6 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.6 U	0.6 U
76-44-8	Heptachlor	1.0 U	1.0 U	0.6 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.6 U	0.6 U
309-00-2	Aldrin	1.0 U	1.0 U	0.6 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.6 U	0.6 U
1024-57-3	Heptachlor epoxide	1.0 U	1.0 U	0.6 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.6 U	0.6 U
959-98-8	Endosulfan I	1.0 U	1.0 U	0.6 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.6 U	0.6 U
60-57-1	Dieldrin	2.0 U	2.0 U	1.2 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	1.2 U	1.2 U
72-55-9	4,4'-DDE	2.0 U	2.0 U	1.2 U	2.0 U	2.0 U	2.0 U	**3.7**	2.0 U	1.2 U	1.2 U
72-20-8	Endrin	2.0 U	2.0 U	1.2 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	1.2 U	1.2 U
33212-65-9	Endosulfan II	2.0 U	2.0 U	1.2 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	1.2 U	1.2 U
72-54-8	4,4'-DDD	2.0 U	2.0 U	1.2 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	1.2 U	1.2 U
1031-07-8	Endosulfan sulfate	4.0 U	4.0 U	2.4 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	2.4 U	2.4 U
50-29-3	4,4'-DDT	2.0 U	2.0 U	1.2 U	2.0 U	2.0 U	2.0 U	**0.8 E**	2.0 U	2.5 U	1.2 U
72-43-5	Methoxychlor	4.0 U	4.0 U	2.4 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	2.4 U	2.4 U
53494-70-5	Endrin ketone	3.0 U	3.0 U	1.6 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	1.6 U	1.6 U
5103-74-2	gamma-Chlordane	1.5 U	1.5 U	0.8 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	0.8 U	0.8 U
5103-71-9	alpha-Chlordane	1.5 U	1.5 U	0.8 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	0.8 U	0.8 U
8001-35-2	Toxaphene	150 U	150 U	80 U	150 U	150 U	150 U	150 U	150 U	80 U	80 U
-	Aroclor 1016/1242	15 U	15 U	10 U	15 U	15 U	15 U	15 U	15 U	10 U	10 U
12672-29-6	Aroclor 1248	15 U	15 U	10 U	15 U	15 U	15 U	15 U	15 U	10 U	10 U
11097-69-1	Aroclor 1254	15 U	15 U	10 U	15 U	15 U	15 U	15 U	15 U	**5.4 E**	10 U
11096-82-5	Aroclor 1260	15 U	15 U	10 U	15 U	15 U	15 U	15 U	15 U	10 U	10 U
	Aroclor 1221	15 U	15 U	10 U	15 U	15 U	15 U	15 U	15 U	10 U	10 U
	Aroclor 1232	15 U	15 U	10 U	15 U	15 U	15 U	15 U	15 U	10 U	10 U

Table 1. (continued) Pesticide/PCB Analyses - Qualified Sample Results

CAS Number	Target Parameter (µg/kg, dry weight)	Station 10R Sample 10R 8078 D	Station 11R Sample 11R 8078 E	Station 12 Sample 12 8078 J	Station 13R Sample 13R 8078 K	Station 14 Sample 14 8078 L	Station 15 Sample 15 8078 M	Station 17 Sample 17 8078 N	Station 18 Sample 18 8041 C	Station 19 Sample 19 8041 D	Station 20 Sample 20 8041 E
319-84-6	alpha-BHC	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	1.0 U	1.0 U	1.0 U
319-85-7	beta-BHC	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	1.0 U	1.0 U	1.0 U
319-86-8	delta-BHC	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	1.5 U	1.5 U	1.5 U
58-89-9	gamma-BHC (Lindane)	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	1.0 U	1.0 U	1.0 U
76-44-8	Heptachlor	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	1.0 U	1.0 U	1.0 U
309-00-2	Aldrin	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	1.0 U	1.0 U	1.0 U
1024-57-3	Heptachlor epoxide	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	1.0 U	1.0 U	1.0 U
959-98-8	Endosulfan I	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	1.0 U	1.0 U	1.0 U
60-57-1	Dieldrin	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	2.0 U	2.0 U	2.0 U
72-55-9	4,4'-DDE	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	2.0 U	2.0 U	2.0 U
72-20-8	Endrin	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	2.0 U	2.0 U	2.0 U
33212-65-9	Endosulfan II	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	2.0 U	2.0 U	2.0 U
72-54-8	4,4'-DDD	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	2.0 U	2.0 U	2.0 U
1031-07-8	Endosulfan sulfate	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	4.0 U	4.0 U	4.0 U
50-29-3	4,4'-DDT	1.2 U	1.2 U	2.0 U	1.2 U	1.2 U	1.2 U	1.2 U	2.0 U	2.0 U	2.0 U
72-43-5	Methoxychlor	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	4.0 U	4.0 U	4.0 U
53494-70-5	Endrin ketone	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	1.6 U	3.0 U	3.0 U	3.0 U
5103-74-2	gamma-Chlordane	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	1.5 U	1.5 U	1.5 U
5103-71-9	alpha-Chlordane	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U	1.5 U	1.5 U	1.5 U
8001-35-2	Toxaphene	80 U	80 U	80 U	80 U	80 U	80 U	80 U	150 U	150 U	150 U
-	Aroclor 1016/1242	10 U	10 U	10 U	10 U	10 U	10 U	10 U	15 U	15 U	15 U
12672-29-6	Aroclor 1248	10 U	10 U	10 U	10 U	10 U	10 U	10 U	15 U	15 U	15 U
11097-69-1	Aroclor 1254	10 U	10 U	10 U	10 U	10 U	10 U	10 U	15 U	**5.7 E**	15 U
11096-82-5	Aroclor 1260	10 U	10 U	10 U	10 U	10 U	10 U	10 U	15 U	15 U	15 U
	Aroclor 1221	10 U	10 U	10 U	10 U	10 U	10 U	10 U	15 U	15 U	15 U
	Aroclor 1232	10 U	10 U	10 U	10 U	10 U	10 U	10 U	15 U	15 U	15 U

Table 1. (continued) Pesticide/PCB Analyses - Qualified Sample Results

CAS Number	Target Parameter (µg/kg, dry weight)	Station 21 Sample 21 8015 A	Station 22 Sample 22 8015 B	Station 26 Sample 26 8078 O	Station 29 Sample 29 8015 C	Station 30 Sample 30 7976 B	Station 32 Sample 32 8015 D	Station 32 Sample 57 8015 F	Station 32 Sample 58 8015 G	Station 32 Sample 59 8015 H	Station 33 Sample 33 8015 E
319-84-6	alpha-BHC	0.4 U	0.4 U	0.6 U	0.8 U	0.5 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
319-85-7	beta-BHC	0.4 U	0.4 U	0.6 U	0.8 U	0.5 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
319-86-8	delta-BHC	0.6 U	0.6 U	0.8 U	1.2 U	0.8 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
58-89-9	gamma-BHC (Lindane)	0.4 U	0.4 U	0.6 U	0.8 U	0.5 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
76-44-8	Heptachlor	0.4 U	0.4 U	0.6 U	0.8 U	0.5 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
309-00-2	Aldrin	0.4 U	0.4 U	0.6 U	0.8 U	0.5 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
1024-57-3	Heptachlor epoxide	0.4 U	0.4 U	0.6 U	0.8 U	0.5 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
959-98-8	Endosulfan I	0.4 U	0.4 U	0.6 U	0.8 U	0.5 U	0.4 U	0.4 U	0.4 U	0.4 U	0.75 U
60-57-1	Dieldrin	0.8 U	0.8 U	1.2 U	1.6 U	1.0 U	0.8 U	0.8 U	0.8 U	0.8 U	0.4 U
72-55-9	4,4'-DDE	0.8 U	0.8 U	1.2 U	1.6 U	1.0 U	0.8 U	0.8 U	0.8 U	0.8 U	1.8 U
72-20-8	Endrin	0.8 U	0.8 U	1.2 U	1.6 U	1.0 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
33212-65-9	Endosulfan II	0.8 U	0.8 U	1.2 U	1.6 U	1.0 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
72-54-8	4,4'-DDD	0.8 U	0.8 U	1.2 U	1.6 U	1.0 U	0.8 U	0.8 U	0.8 U	0.8 U	0.8 U
1031-07-8	Endosulfan sulfate	1.6 U	1.6 U	2.4 U	3.2 U	2.0 U	1.6 U	1.6 U	1.6 U	0.8 U	1.3 U
50-29-3	4,4'-DDT	**0.7 N**	**0.3 N**	1.2 U	**1.0 N**	1.0 U	0.8 U	**0.4 N**	0.8 U	1.6 U	1.6 U
72-43-5	Methoxychlor	1.6 U	1.6 U	2.4 U	3.2 U	2.5 U	1.6 U	1.6 U	1.6 U	0.8 U	2.0 U
53494-70-5	Endrin ketone	1.2 U	1.2 U	1.6 U	2.4 U	1.5 U	1.2 U	1.2 U	1.2 U	1.6 U	2.0 U
5103-74-2	gamma-Chlordane	0.6 U	0.6 U	0.8 U	1.2 U	0.8 U	0.6 U	0.6 U	0.6 U	1.2 U	1.5 U
5103-71-9	alpha-Chlordane	0.6 U	0.6 U	0.8 U	1.2 U	0.8 U	0.6 U	0.6 U	0.6 U	0.6 U	1.5 U
8001-35-2	Toxaphene	60 U	60 U	80 U	120 U	75 U	60 U	60 U	60 U	0.6 U	0.6 U
-	Aroclor 1016/1242	6.0 U	6.0 U	10 U	12 U	8.0 U	6.0 U	6.0 U	6.0 U	60 U	60 U
12672-29-6	Aroclor 1248	6.0 U	6.0 U	10 U	12 U	8.0 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U
11097-69-1	Aroclor 1254	**4.2 E**	**3.6 E**	10 U	**7.2 E**	**5.8 E**	**6.8**	**4.3 E**	6.0 U	6.0 U	6.0 U
11096-82-5	Aroclor 1260	6.0 U	6.0 U	10 U	12 U	8.0 U	**5.1 E**	6.0 U	**5.8 E**	**5.3 E**	**35**
	Aroclor 1221	6.0 U	6.0 U	10 U	12 U	8.0 U	6.0 U	6.0 U	**5.9 E**	**4.5 E**	**29**
	Aroclor 1232	6.0 U	6.0 U	10 U	12 U	8.0 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U

Table 1. (continued) Pesticide/PCB Analyses - Qualified Sample Results

CAS Number	Target Parameter (µg/kg, dry weight)	Station 34 Sample 34 7976 C	Station 35 Sample 35 7976 D	Station 35 Station 72 7976 O	Station 35 Sample 73 7976 P	Station 35 Sample 74 7976 Q	Station 38 Sample 38 7976 E	Station 38 Sample 60 7976 J	Station 38 Sample 61 7976 K	Station 38 Sample 62 7976 L	Station 39 Sample 39 7976 F
319-84-6	alpha-BHC	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.5 U
319-85-7	beta-BHC	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.5 U
319-86-8	delta-BHC	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	0.8 U
58-89-9	gamma-BHC (Lindane)	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.5 U
76-44-8	Heptachlor	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.5 U
309-00-2	Aldrin	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.5 U
1024-57-3	Heptachlor epoxide	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.5 U
959-98-8	Endosulfan I	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	0.5 U
60-57-1	Dieldrin	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	1.0 U
72-55-9	4,4'-DDE	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	1.0 U
72-20-8	Endrin	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	1.0 U
33212-65-9	Endosulfan II	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	1.0 U
72-54-8	4,4'-DDD	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	1.0 U
1031-07-8	Endosulfan sulfate	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	2.0 U
50-29-3	4,4'-DDT	2.0 U	2.0 U	2.0 U	5.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	1.0 U
72-43-5	Methoxychlor	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	2.0 U
53494-70-5	Endrin ketone	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	1.5 U
5103-74-2	gamma-Chlordane	1.5 U	1.5 U	1.5 U	2.0 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	0.8 U
5103-71-9	alpha-Chlordane	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	0.8 U
8001-35-2	Toxaphene	150 U	150 U	150 U	150 U	150 U	150 U	150 U	150 U	150 U	75 U
-	Aroclor 1016/1242	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	7.5 U
12672-29-6	Aroclor 1248	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	7.5 U
11097-69-1	Aroclor 1254	**21**	**15 E**	**16**	**47 E**	**14 E**	**16**	15 U	**10 E**	**17**	7.5 U
11096-82-5	Aroclor 1260	**30**	15 U	15 U	**21 E**	30 U	15 U	15 U	15 U	15 U	7.5 U
	Aroclor 1221	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	7.5 U
	Aroclor 1232	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	15 U	7.5 U

Table 1. (continued) Pesticide/PCB Analyses - Qualified Sample Results

CAS Number	Target Parameter (µg/kg, dry weight)	Station 40 Sample 40 7976 G	Station 41 Sample 41 7976 H	Station 43 Sample 43 7976 I	Station 44 Sample 44 7976 R	Station 44 Sample 63 7976 Y	Station 44 Sample 64 7976 W	Station 44 Sample 65 7976 X	Station 45 Sample 45 7976 S	Station 47 Sample 47 7976 T	Station 48 Sample 48 7976 U
319-84-6	alpha-BHC	0.5 U	0.5 U	0.5 U	0.5 U	0.4 U	0.4 U	0.4 U	0.5 U	0.4 U	1.0 U
319-85-7	beta-BHC	0.5 U	0.5 U	0.5 U	0.5 U	0.4 U	0.4 U	0.4 U	0.5 U	0.4 U	1.0 U
319-86-8	delta-BHC	0.8 U	0.8 U	0.8 U	0.8 U	0.6 U	0.6 U	0.6 U	0.8 U	0.6 U	1.5 U
58-89-9	gamma-BHC (Lindane)	0.5 U	0.5 U	0.5 U	0.5 U	0.4 U	0.4 U	0.4 U	0.5 U	0.4 U	1.0 U
76-44-8	Heptachlor	0.5 U	0.5 U	0.5 U	0.5 U	0.4 U	0.4 U	0.4 U	0.5 U	0.4 U	1.0 U
309-00-2	Aldrin	0.5 U	0.5 U	0.5 U	0.5 U	0.4 U	0.4 U	0.4 U	0.5 U	0.4 U	1.0 U
1024-57-3	Heptachlor epoxide	0.5 U	0.5 U	0.5 U	0.5 U	0.4 U	0.4 U	0.4 U	0.5 U	0.4 U	1.0 U
959-98-8	Endosulfan I	0.5 U	0.5 U	0.5 U	0.5 U	0.4 U	0.4 U	0.4 U	0.5 U	0.4 U	1.0 U
60-57-1	Dieldrin	1.0 U	1.0 U	1.0 U	1.0 U	0.8 U	0.8 U	0.8 U	1.0 U	0.8 U	2.0 U
72-55-9	4,4'-DDE	1.0 U	1.0 U	1.0 U	1.0 U	0.8 U	0.8 U	0.8 U	1.0 U	0.8 U	2.0 U
72-20-8	Endrin	1.0 U	1.0 U	1.0 U	1.0 U	0.8 U	0.8 U	0.8 U	1.0 U	0.8 U	2.0 U
33212-65-9	Endosulfan II	1.0 U	1.0 U	1.0 U	1.0 U	0.8 U	0.8 U	0.8 U	1.0 U	0.8 U	2.0 U
72-54-8	4,4'-DDD	1.0 U	1.0 U	1.0 U	1.0 U	0.8 U	0.8 U	0.8 U	1.0 U	0.8 U	2.0 U
1031-07-8	Endosulfan sulfate	2.0 U	2.0 U	2.0 U	2.0 U	1.6 U	1.6 U	1.6 U	2.0 U	1.6 U	4.0 U
50-29-3	4,4'-DDT	1.0 U	1.0 U	1.0 U	1.0 U	0.8 U	0.8 U	0.8 U	1.0 U	0.8 U	2.0 U
72-43-5	Methoxychlor	2.0 U	2.0 U	2.0 U	2.0 U	1.6 U	1.6 U	1.6 U	2.0 U	1.6 U	4.0 U
53494-70-5	Endrin ketone	1.5 U	1.5 U	1.5 U	1.5 U	1.2 U	1.2 U	1.2 U	1.5 U	1.2 U	3.0 U
5103-74-2	gamma-Chlordane	1.3 U	0.8 U	0.8 U	0.8 U	0.6 U	0.6 U	0.6 U	0.8 U	0.6 U	1.5 U
5103-71-9	alpha-Chlordane	0.8 U	0.8 U	0.8 U	0.8 U	0.6 U	0.6 U	0.6 U	0.8 U	0.6 U	1.5 U
8001-35-2	Toxaphene	100 U	75 U	75 U	75 U	60 U	60 U	60 U	75 U	60 U	150 U
-	Aroclor 1016/1242	7.5 U	7.5 U	7.5 U	7.5 U	6.0 U	6.0 U	6.0 U	7.5 U	6.0 U	15 U
12672-29-6	Aroclor 1248	7.5 U	7.5 U	7.5 U	7.5 U	6.0 U	6.0 U	6.0 U	7.5 U	6.0 U	15 U
11097-69-1	Aroclor 1254	33	7.5 U	7.5 U	7.5 U	6.0 U	6.0 U	6.0 U	7.5 U	6.0 U	15 U
11096-82-5	Aroclor 1260	7.5 U	7.5 U	7.5 U	7.5 U	6.0 U	6.0 U	6.0 U	7.5 U	6.0 U	15 U
	Aroclor 1221	7.5 U	7.5 U	7.5 U	7.5 U	6.0 U	6.0 U	6.0 U	7.5 U	6.0 U	15 U
	Aroclor 1232	7.5 U	7.5 U	7.5 U	7.5 U	6.0 U	6.0 U	6.0 U	7.5 U	6.0 U	15 U

Table 1. (continued) Pesticide/PCB Analyses - Qualified Sample Results

CAS Number	Target Parameter (µg/kg, dry weight)	Station 49 Sample 49 7976 V	Station 66 Sample 66 7976 M	Station 67 Sample 67 8015 L	Station 68 Sample 68 8078 P	Station 69 Sample 69 7976 N	Station 70 Sample 70 7976 Z	Station 71 Sample 71 8041 I	Station 201R Sample 201R 8078 F	Station 202R Sample 202R 8078 G
319-84-6	alpha-BHC	1.0 U	0.8 U	0.4 U	1.5 U	0.5 U	1.0 U	1.0 U	0.6 U	0.6 U
319-85-7	beta-BHC	1.0 U	0.5 U	0.4 U	0.6 U	0.5 U	1.0 U	1.0 U	0.6 U	0.6 U
319-86-8	delta-BHC	1.5 U	0.8 U	0.6 U	0.8 U	0.8 U	1.5 U	1.5 U	0.8 U	0.8 U
58-89-9	gamma-BHC (Lindane)	1.0 U	0.5 U	0.4 U	0.6 U	0.5 U	1.0 U	1.0 U	0.6 U	0.6 U
76-44-8	Heptachlor	1.0 U	0.5 U	0.4 U	1.5 U	0.5 U	1.0 U	1.0 U	0.6 U	0.6 U
309-00-2	Aldrin	1.0 U	0.5 U	0.4 U	0.6 U	0.5 U	1.0 U	1.0 U	0.6 U	0.6 U
1024-57-3	Heptachlor epoxide	1.0 U	0.5 U	0.4 U	0.6 U	0.5 U	1.0 U	1.0 U	0.6 U	0.6 U
959-98-8	Endosulfan I	1.0 U	**20 E**	**27 E**	**30 E**	0.5 U	1.0 U	1.0 U	0.6 U	0.6 U
60-57-1	Dieldrin	2.0 U	1.0 U	0.8 U	1.2 U	1.0 U	2.0 U	2.0 U	1.2 U	1.2 U
72-55-9	4,4'-DDE	2.0 U	2.0 U	**22 N**	3.5 U	1.0 U	2.0 U	2.0 U	1.2 U	1.2 U
72-20-8	Endrin	2.0 U	1.0 U	0.8 U	2.5 U	1.0 U	2.0 U	2.0 U	1.2 U	1.2 U
33212-65-9	Endosulfan II	2.0 U	**14**	**16**	**20**	1.0 U	2.0 U	2.0 U	1.2 U	1.2 U
72-54-8	4,4'-DDD	2.0 U	1.0 U	0.8 U	1.2 U	1.0 U	2.0 U	2.0 U	**0.6 E**	1.2 U
1031-07-8	Endosulfan sulfate	4.0 U	2.0 U	1.6 U	2.4 U	2.0 U	4.0 U	4.0 U	2.4 U	2.4 U
50-29-3	4,4'-DDT	2.0 U	1.0 U	1.5 U	1.2 U	1.0 U	2.0 U	**1.0 E**	**0.8 E**	1.2 U
72-43-5	Methoxychlor	4.0 U	2.0 U	1.6 U	2.4 U	2.0 U	4.0 U	4.0 U	2.4 U	2.4 U
53494-70-5	Endrin ketone	3.0 U	1.5 U	1.2 U	1.6 U	1.5 U	3.0 U	3.0 U	1.6 U	1.6 U
5103-74-2	gamma-Chlordane	1.5 U	1.0 U	0.6 U	2.0 U	0.8 U	1.5 U	1.5 U	0.8 U	0.8 U
5103-71-9	alpha-Chlordane	1.5 U	0.8 U	0.6 U	0.8 U	0.8 U	1.5 U	1.5 U	0.8 U	0.8 U
8001-35-2	Toxaphene	150 U	75 U	60 U	80 U	75 U	150 U	150 U	80 U	80 U
-	Aroclor 1016/1242	20 U	7.5 U	6.0 U	10 U	7.5 U	15 U	15 U	10 U	10 U
12672-29-6	Aroclor 1248	20 U	7.5 U	6.0 U	10 U	7.5 U	15 U	15 U	10 U	10 U
11097-69-1	Aroclor 1254	**22**	**70**	**93**	**77**	**4.0 E**	15 U	15 U	10 U	10 U
11096-82-5	Aroclor 1260	20 U	7.5 U	6.0 U	10 U	7.5 U	15 U	15 U	10 U	10 U
	Aroclor 1221	20 U	7.5 U	6.0 U	10 U	7.5 U	15 U	15 U	10 U	10 U
	Aroclor 1232	20 U	7.5 U	6.0 U	10 U	7.5 U	15 U	15 U	10 U	10 U

Table 1. (continued) Pesticide/PCB Analyses - Qualified Sample Results

CAS Number	Target Parameter (µg/kg, dry weight)	Station 203R Sample 203R 8041 M	Station 204R Sample 204R 8041 R	Station 205R Sample 205R 8041 S	Station 206R Sample 206R 8041 T	Station 207R Sample 207R 8041 N	Station 208R Sample 208R 8078 H	Station 209R Sample 209R 8041 O
319-84-6	alpha-BHC	1.0 U	1.0 U	1.0 U	0.5 U	1.0 U	1.2 U	0.5 U
319-85-7	beta-BHC	1.0 U	1.0 U	1.0 U	0.5 U	1.0 U	1.2 U	0.5 U
319-86-8	delta-BHC	1.5 U	1.5 U	1.5 U	0.8 U	1.5 U	1.6 U	0.8 U
58-89-9	gamma-BHC (Lindane)	1.0 U	1.0 U	1.0 U	0.5 U	1.0 U	1.2 U	0.5 U
76-44-8	Heptachlor	1.0 U	1.0 U	1.0 U	0.5 U	1.0 U	1.2 U	0.5 U
309-00-2	Aldrin	1.0 U	1.0 U	1.0 U	0.5 U	1.0 U	1.2 U	0.5 U
1024-57-3	Heptachlor epoxide	1.0 U	1.0 U	1.0 U	0.5 U	1.0 U	1.2 U	0.5 U
959-98-8	Endosulfan I	1.0 U	1.0 U	1.0 U	0.5 U	1.0 U	1.2 U	0.5 U
60-57-1	Dieldrin	2.0 U	2.0 U	2.0 U	1.0 U	2.0 U	2.4 U	1.0 U
72-55-9	4,4'-DDE	2.0 U	2.0 U	2.0 U	1.0 U	2.0 U	2.4 U	1.0 U
72-20-8	Endrin	2.0 U	2.0 U	2.0 U	1.0 U	2.0 U	2.4 U	1.0 U
33212-65-9	Endosulfan II	2.0 U	2.0 U	2.0 U	1.0 U	2.0 U	2.4 U	1.0 U
72-54-8	4,4'-DDD	2.0 U	2.0 U	2.0 U	1.0 U	2.0 U	3.0 U	1.0 U
1031-07-8	Endosulfan sulfate	4.0 U	4.0 U	4.0 U	2.0 U	4.0 U	4.8 U	2.0 U
50-29-3	4,4'-DDT	2.0 U	2.0 U	2.0 U	1.0 U	**0.4 E**	2.4 U	**0.3 E**
72-43-5	Methoxychlor	4.0 U	4.0 U	4.0 U	2.0 U	4.0 U	4.8 U	2.0 U
53494-70-5	Endrin ketone	3.0 U	3.0 U	3.0 U	1.5 U	3.0 U	3.2 U	1.5 U
5103-74-2	gamma-Chlordane	1.5 U	1.5 U	1.5 U	0.8 U	1.5 U	1.6 U	0.8 U
5103-71-9	alpha-Chlordane	1.5 U	1.5 U	1.5 U	0.8 U	1.5 U	1.6 U	0.8 U
8001-35-2	Toxaphene	150 U	150 U	150 U	75 U	150 U	160 U	75 U
-	Aroclor 1016/1242	15 U	15 U	15 U	7.5 U	15 U	20 U	7.5 U
12672-29-6	Aroclor 1248	15 U	15 U	15 U	7.5 U	15 U	20 U	7.5 U
11097-69-1	Aroclor 1254	15 U	15 U	15 U	7.5 U	15 U	20 U	7.5 U
11096-82-5	Aroclor 1260	15 U	15 U	15 U	7.5 U	15 U	20 U	7.5 U
	Aroclor 1221	15 U	15 U	15 U	7.5 U	15 U	20 U	7.5 U
	Aroclor 1232	15 U	15 U	15 U	7.5 U	15 U	20 U	7.5 U

Data Qualifiers:

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 2. Pesticide/PCB Analyses - Sample Holding Times

Station ID	Sample ID	Rep/QC	Lab ID	Date Sampled	Date Extracted	Date Analyzed	Holding Times (Days) Extraction	Holding Times (Days) Analysis
1	1	1	8041 P	4/11/91	04/15/91	05/08/91	4	27
2R	2R	1	8041 Q	4/8/91	04/15/91	05/08/91	7	30
3	3	1	8078 A	4/12/91	04/16/91	05/08/91	4	26
4	4	1	8041 A	4/8/91	04/11/91	04/19/91	3	11
5	5	1	8041 B	4/7/91	04/11/91	04/19/91	4	12
5	5	MS	8041 B ms	4/7/91	04/11/91	04/19/91	4	12
5	5	MSD	8041 B msd	4/7/91	04/11/91	04/19/91	4	12
5	51	1	8041 F	4/7/91	04/11/91	04/19/91	4	12
5	52	2	8041 G	4/7/91	04/11/91	04/19/91	4	12
5	53	3	8041 H	4/7/91	04/11/91	04/19/91	4	12
8	8	1	8078 B	4/13/91	04/16/91	05/08/91	3	25
9R	9R	1	8078 C	4/13/91	04/16/91	05/08/91	3	25
10R	10R	1	8078 D	4/14/91	04/16/91	05/08/91	2	24
11R	11R	1	8078 E	4/14/91	04/16/91	05/08/91	2	24
12	12	1	8078 J	4/14/91	04/16/91	05/08/91	2	24
13R	13R	1	8078 K	4/15/91	04/16/91	05/08/91	1	23
14	14	1	8078 L	4/15/91	04/16/91	05/08/91	1	23
15	15	1	8078 M	4/15/91	04/16/91	05/08/91	1	23
17	17	1	8078 N	4/15/91	04/16/91	05/08/91	1	23
18	18	1	8041 C	4/6/91	04/11/91	04/19/91	5	13
19	19	1	8041 D	4/6/91	04/11/91	04/19/91	5	13
20	20	1	8041 E	4/6/91	04/11/91	04/19/91	5	13
21	21	1	8015 A	4/3/91	04/08/91	04/20/91	5	17
22	22	1	8015 B	4/3/91	04/08/91	04/19/91	5	16
22	22	1	8015 B2	4/3/91	04/08/91	05/08/91	5	35
26	26	1	8078 O	4/14/91	04/16/91	05/08/91	2	24
29	29	1	8015 C	4/2/91	04/08/91	04/20/91	6	18
30	30	1	7976 B	3/26/91	03/29/91	04/13/91	3	18
32	32	1	8015 D	4/2/91	04/08/91	04/20/91	6	18
32	32	MS	8015 D ms	4/2/91	04/08/91	04/20/91	6	18
32	32	MSD	8015 D msd	4/2/91	04/08/91	04/20/91	6	18
32	57	1	8015 F	4/2/91	04/08/91	04/19/91	6	17
32	58	2	8015 G	4/2/91	04/08/91	04/19/91	6	17
33	33	3	8015 E	4/2/91	04/08/91	04/20/91	6	18
33	59	1	8015 H	4/2/91	04/08/91	04/20/91	6	18
34	34	1	7976 C	3/26/91	03/29/91	04/13/91	3	18
35	35	1	7976 D	3/27/91	03/29/91	04/18/91	2	22
35	35	MS	7976 D ms	3/27/91	03/29/91	04/18/91	2	22
35	35	MSD	7976 D msd	3/27/91	03/29/91	04/18/91	2	22
35	72	1	7976 O	3/27/91	03/29/91	04/20/91	2	24

Holding Times exceeding project-specified acceptance limits are highlighted in bold

Table 2. (continued) Pesticide/PCB Analyses - Sample Holding Times

Station ID	Sample ID	Rep/QC	Lab ID	Date Sampled	Date Extracted	Date Analyzed	Holding Times (Days) Extraction	Analysis
35	73	2	7976 P	3/27/91	03/29/91	05/08/91	2	**42**
35	74	3	7976 Q	3/27/91	03/29/91	04/14/91	2	18
38	38	1	7976 E	3/27/91	03/29/91	04/13/91	2	17
38	60	1	7976 J	3/27/91	03/29/91	04/13/91	2	17
38	61	2	7976 K	3/27/91	03/29/91	04/13/91	2	17
38	61	MS	7976 K ms	3/27/91	03/29/91	04/13/91	2	17
38	61	MSD	7976 K msd	3/27/91	03/29/91	04/13/91	2	17
38	62	3	7976 L	3/27/91	03/29/91	04/13/91	2	17
39	39	1	7976 F	3/28/91	03/29/91	04/13/91	1	16
40	40	1	7976 G	3/28/91	03/29/91	04/14/91	1	17
41	41	1	7976 H	3/28/91	03/29/91	04/13/91	1	16
43	43	1	7976 I	3/28/91	03/29/91	04/13/91	1	16
44	44	1	7976 R	3/29/91	04/01/91	04/14/91	3	16
44	44	MS	7976 R ms	3/29/91	04/01/91	04/14/91	3	16
44	44	MSD	7976 R msd	3/29/91	04/01/91	04/14/91	3	16
44	64	2	7976 W	3/29/91	04/01/91	04/18/91	3	20
44	65	3	7976 X	3/29/91	04/01/91	04/18/91	3	20
44	63	1	7976 Y	3/29/91	04/01/91	04/18/91	3	20
45	45	1	7976 S	3/29/91	04/01/91	04/19/91	3	21
47	47	1	7976 T	3/29/91	04/01/91	04/18/91	3	20
48	48	1	7976 U	3/30/91	04/01/91	04/18/91	2	19
49	49	1	7976 V	3/30/91	04/01/91	05/08/91	2	39
66	66	PCS	7976 M	3/28/91	03/29/91	04/19/91	1	22
66	66	PCS	7976 M dil	3/28/91	03/29/91	05/30/91	1	**63**
67	67	PCS	8015 L	4/3/91	04/08/91	05/08/91	5	35
67	67	PCS	8015 L dil	4/3/91	04/08/91	06/04/91	5	**62**
68	68	PCS	8078 P	4/12/91	04/16/91	05/08/91	4	26
68	68	PCS	8078 P dil	4/12/91	04/16/91	06/04/91	4	**53**
69	69	1	7976 N	3/26/91	03/29/91	04/13/91	3	18
70	70	1	7976 Z	3/29/91	04/01/91	04/18/91	3	20
71	71	1	8041 I	4/6/91	04/11/91	04/19/91	5	13
201R	201R	1	8078 F	4/12/91	04/16/91	05/08/91	4	26
202R	202R	1	8078 G	4/12/91	04/16/91	05/08/91	4	26
203R	203R	1	8041 M	4/8/91	04/11/91	04/19/91	3	11
204R	204R	1	8041 R	4/9/91	04/15/91	05/08/91	6	29
205R	205R	1	8041 S	4/9/91	04/15/91	05/08/91	6	29
206R	206R	1	8041 T	4/9/91	04/15/91	05/08/91	6	29
207R	207R	1	8041 N	4/7/91	04/11/91	04/19/91	4	12
208R	208R	1	8078 H	4/14/91	04/16/91	05/08/91	2	24
209R	209R	1	8041 O	4/6/91	04/11/91	04/19/91	5	13

Holding Times exceeding project-specified acceptance limits are highlighted in bold

Table 3. Pesticide/PCB Analyses - Surrogate Recovery

Station ID	Sample ID	DBC %R	DBOFB %R
1	1	76	86
2R	2R	74	87
3	3	84	97
4	4	93	104
5	5	85	95
5	51	93	92
5	52	83	87
5	53	77	86
8	8	75	86
9R	9R	91	93
10R	10R	88	92
11R	11R	110	122
12	12	86	101
13R	13R	90	94
14	14	86	98
15	15	83	93
17	17	50	68
18	18	99	110
19	19	90	95
20	20	88	95
21	21	90	98
22	22	99	106
26	26	82	92
29	29	88	94
30	30	127	116
32	32	94	98
32	57	89	99
32	58	105	116
32	59	83	94
33	33	92	96
34	34	95	90
35	35	88	94
35	72	89	94
35	73	140	140
35	74	111	86

Station ID	Sample ID	DBC %R	DBOFB %R
38	38	90	87
38	60	99	88
38	61	97	89
38	62	97	89
39	39	97	91
40	40	106	85
41	41	95	91
43	43	107	97
44	44	84	85
44	63	83	93
44	64	96	103
44	65	74	85
45	45	98	106
47	47	85	92
48	48	74	83
49	49	108	114
66	66	77	83
66	66 DL	132	88
67	67	100	104
67	67 DL	196	134
68	68	83	91
68	68 DL	122	89
69	69	98	94
70	70	83	97
71	71	73	81
201R	201R	81	89
202R	202R	78	90
203R	203R	77	83
204R	204R	80	89
205R	205R	74	84
206R	206R	73	81
207R	207R	85	95
208R	208R	80	98
209R	209R	92	104

DCB = Dibutylchlorendate
DBOFB = Dibromooctylfluorobiphenyl

%R = %Recovery
DL = Dilution

Table 4. Pesticide/PCB Analyses - Matrix Spike/Matrix Spike Duplicate Recoveries

Compound	Sample Concentration (µg/kg)	MS Analysis: Spike Added (µg/kg)	MS Analysis: MS Concentration (µg/kg)	MS Analysis: MS % Recovery	MSD Analysis: Spike Added (µg/kg)	MSD Analysis: MSD Concentration (µg/kg)	MSD Analysis: MSD % Recovery	% RPD
Sample 5								
Lindane	1.0 U	3.5	3.1	89	3.5	2.8	80	10.2
Heptachlor	1.0 U	3.5	3.0	86	3.5	2.7	77	10.5
Aldrin	1.0 U	3.5	2.6	74	3.5	2.4	69	8.0
Dieldrin	2.0 U	8.7	6.8	78	8.8	6.6	75	4.1
Endrin	2.0 U	8.7	9.6	110	8.8	8.9	101	8.7
4,4'-DDT	2.0 U	8.7	8.2	94	8.8	7.9	90	4.9
Sample 32								
Lindane	0.4 U	1.7	1.3	76	1.7	1.4	82	-7.4
Heptachlor	0.4 U	1.7	1.4	82	1.7	1.5	88	-6.9
Aldrin	0.4 U	1.7	1.2	71	1.7	1.2	71	0.0
Dieldrin	0.8 U	4.1	3.1	76	4.1	3.1	76	0.0
Endrin	0.8 U	4.1	4.0	98	4.1	4.3	105	-7.2
4,4'-DDT	0.8 U	4.1	3.8	93	4.1	3.8	93	0.0
Sample 35								
Lindane	1.0 U	3.7	3.1	84	3.7	3.2	86	-3.2
Heptachlor	1.0 U	3.7	2.9	78	3.7	2.9	78	0.0
Aldrin	1.0 U	3.7	2.8	76	3.7	2.8	76	0.0
Dieldrin	2.0 U	9.3	7.0	75	9.3	7.1	76	-1.4
Endrin	2.0 U	9.3	9.4	101	9.3	9.5	102	-1.1
4,4'-DDT	2.0 U	9.3	9.9	106	9.3	9.5	102	4.1
Sample 44								
Lindane	0.5 U	1.8	1.4	78	1.8	1.3	72	7.4
Heptachlor	0.5 U	1.8	1.5	83	1.8	1.4	78	6.9
Aldrin	0.5 U	1.8	1.2	67	1.8	1.2	67	0.0
Dieldrin	1.0 U	4.6	3.0	65	4.6	3.0	65	0.0
Endrin	1.0 U	4.6	4.2	91	4.6	4.1	89	2.4
4,4'-DDT	1.0 U	4.6	3.4	74	4.6	3.2	70	6.1
Sample 61								
Lindane	1.0 U	4.7	3.5	74	4.6	4.3	93	-22.6
Heptachlor	1.0 U	4.7	3.6	77	4.6	3.9	85	-10.1
Aldrin	1.0 U	4.7	1.5	**32**	4.6	3.3	72	-76.8
Dieldrin	2.0 U	12	8.0	67	12	10	83	-22.2
Endrin	2.0 U	12	11	92	12	13	108	-16.7
4,4'-DDT	2.0 U	12	12	100	12	10	83	18.2

All concentrations in µg/kg, dry weight

Table 5. Pesticide/PCB Analyses - Average Quantitation Limits

Target Parameter	Method Blank Quantitation Limit (µg/l)	Number of Non-detects	Method Quantitation Limit Average (µg/kg, dry weight)	Method Quantitation Limit Minimum (µg/kg, dry weight)
alpha-BHC	0.005	66	0.7	0.4
beta-BHC	0.005	66	0.7	0.4
delta-BHC	0.0075	66	1.1	0.6
gamma-BHC (Lindane)	0.005	66	0.7	0.4
Heptachlor	0.005	66	0.7	0.4
Aldrin	0.005	66	0.7	0.4
Heptachlor epoxide	0.005	66	0.7	0.4
Endosulfan I	0.005	63	0.7	0.4
Dieldrin	0.01	66	1.5	0.8
4,4'-DDE	0.01	64	1.5	0.8
Endrin	0.01	66	1.5	0.8
Endosulfan II	0.01	63	1.5	0.8
4,4'-DDD	0.01	65	1.5	0.8
Endosulfan sulfate	0.02	66	2.9	1.6
4,4'-DDT	0.01	57	1.6	0.8
Methoxychlor	0.02	66	2.9	1.6
Endrin ketone	0.015	66	2.1	1.2
gamma-Chlordane	0.0075	66	1.1	0.6
alpha-Chlordane	0.0075	66	1.1	0.6
Toxaphene	0.75	66	106	60
Aroclor 1016/1242	0.075	66	11	6
Aroclor 1248	0.075	66	11	6
Aroclor 1254	0.075	41	12	6
Aroclor 1260	0.075	61	13	6
Aroclor 1221	0.075	66	11	6
Aroclor 1232	0.075	66	11	6

Method Blank Quantitation Limits based on evaluation of method blanks.
Some compounds have been reported at lower levels as estimates.

Table 6. Pesticide/PCB Analyses - Monitoring Variability Samples

STATION 5

Target Parameter (µg/kg, dry wt.)	5 (Primary Sample)	51 (Duplicate Split)	Mean (5 and 51)	RPD (5 and 51)	52 (Replicate)	53 (Replicate)	Station Mean (n=3)	Station CV (n=3)
alpha-BHC	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	
beta-BHC	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	
delta-BHC	1.5 U	1.5 U	1.5 U		1.5 U	1.5 U	1.5 U	
gamma-BHC (Lindane)	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	
Heptachlor	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	
Aldrin	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	
Heptachlor epoxide	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	
Endosulfan I	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	
Dieldrin	2.0 U	2.0 U	2.0 U		2.0 U	2.0 U	2.0 U	
4,4'-DDE	2.0 U	2.0 U	2.0 U		**3.7**	2.0 U	2.6 U	
Endrin	2.0 U	2.0 U	2.0 U		2.0 U	2.0 U	2.0 U	
Endosulfan II	2.0 U	2.0 U	2.0 U		2.0 U	2.0 U	2.0 U	
4,4'-DDD	2.0 U	2.0 U	2.0 U		2.0 U	2.0 U	2.0 U	
Endosulfan sulfate	4.0 U	4.0 U	4.0 U		4.0 U	4.0 U	4.0 U	
4,4'-DDT	2.0 U	2.0 U	2.0 U		**0.8 E**	2.0 U	1.6 U	
Methoxychlor	4.0 U	4.0 U	4.0 U		4.0 U	4.0 U	4.0 U	
Endrin ketone	3.0 U	3.0 U	3.0 U		3.0 U	3.0 U	3.0 U	
gamma-Chlordane	1.5 U	1.5 U	1.5 U		1.5 U	1.5 U	1.5 U	
alpha-Chlordane	1.5 U	1.5 U	1.5 U		1.5 U	1.5 U	1.5 U	
Toxaphene	150 U	150 U	150 U		150 U	150 U	150 U	
Aroclor 1016/1242	15 U	15 U	15 U		15 U	15 U	15 U	
Aroclor 1248	15 U	15 U	15 U		15 U	15 U	15 U	
Aroclor 1254	15 U	15 U	15 U		15 U	15 U	15 U	
Aroclor 1260	15 U	15 U	15 U		15 U	15 U	15 U	
Aroclor 1221	15 U	15 U	15 U		15 U	15 U	15 U	
Aroclor 1232	15 U	15 U	15 U		15 U	15 U	15 U	

Table 6. (continued) Pesticide/PCB Analyses - Monitoring Variability Samples

STATION 32

Target Parameter (µg/kg, dry wt.)	**32** (Primary Sample)	**57** (Duplicate Split)	**Mean** (32 and 57)	**RPD** (32 and 57)	**58** (Replicate)	**59** (Replicate)	**Station Mean** (n=3)	**Station CV** (n=3)
alpha-BHC	0.4 U	0.4 U	0.4 U		0.4 U	0.4 U	0.4 U	
beta-BHC	0.4 U	0.4 U	0.4 U		0.4 U	0.4 U	0.4 U	
delta-BHC	0.6 U	0.6 U	0.6 U		0.6 U	0.6 U	0.6 U	
gamma-BHC (Lindane)	0.4 U	0.4 U	0.4 U		0.4 U	0.4 U	0.4 U	
Heptachlor	0.4 U	0.4 U	0.4 U		0.4 U	0.4 U	0.4 U	
Aldrin	0.4 U	0.4 U	0.4 U		0.4 U	0.4 U	0.4 U	
Heptachlor epoxide	0.4 U	0.4 U	0.4 U		0.4 U	0.4 U	0.4 U	
Endosulfan I	0.4 U	0.4 U	0.4 U		0.4 U	0.4 U	0.4 U	
Dieldrin	0.8 U	0.8 U	0.8 U		0.8 U	0.8 U	0.8 U	
4,4'-DDE	0.8 U	0.8 U	0.8 U		0.8 U	0.8 U	0.8 U	
Endrin	0.8 U	0.8 U	0.8 U		0.8 U	0.8 U	0.8 U	
Endosulfan II	0.8 U	0.8 U	0.8 U		0.8 U	0.8 U	0.8 U	
4,4'-DDD	0.8 U	0.8 U	0.8 U		0.8 U	0.8 U	0.8 U	
Endosulfan sulfate	1.6 U	1.6 U	1.6 U		1.6 U	1.6 U	1.6 U	
4,4'-DDT	0.8 U	**0.4 N**	0.6 U	66.7	0.8 U	0.8 U	0.7 U	
Methoxychlor	1.6 U	1.6 U	1.6 U		1.6 U	1.6 U	1.6 U	
Endrin ketone	1.2 U	1.2 U	1.2 U		1.2 U	1.2 U	1.2 U	
gamma-Chlordane	0.6 U	0.6 U	0.6 U		0.6 U	0.6 U	0.6 U	
alpha-Chlordane	0.6 U	0.6 U	0.6 U		0.6 U	0.6 U	0.6 U	
Toxaphene	60 U	60 U	60 U		60 U	60 U	60 U	
Aroclor 1016/1242	6.0 U	6.0 U	6.0 U		6.0 U	6.0 U	6.0 U	
Aroclor 1248	6.0 U	6.0 U	6.0 U		6.0 U	6.0 U	6.0 U	
Aroclor 1254	**6.8**	**4.3 E**	**5.6 E**	45.0	**5.8 E**	**5.3 E**	**5.6 E**	4.5
Aroclor 1260	**5.1 E**	6.0 U	5.6 U	-16.2	**5.9 E**	**4.5 E**	**5.3 E**	13.4
Aroclor 1221	6.0 U	6.0 U	6.0 U		6.0 U	6.0 U	6.0 U	
Aroclor 1232	6.0 U	6.0 U	6.0 U		6.0 U	6.0 U	6.0 U	

Table 6. (continued) Pesticide/PCB Analyses - Monitoring Variability Samples

STATION 35

Target Parameter (µg/kg, dry wt.)	35 (Primary Sample)	72 (Duplicate Split)	Mean (35 and 72)	RPD (35 and 72)	73 (Replicate)	74 (Replicate)	Station Mean (n=3)	Station CV (n=3)
alpha-BHC	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	
beta-BHC	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	
delta-BHC	1.5 U	1.5 U	1.5 U		1.5 U	1.5 U	1.5 U	
gamma-BHC (Lindane)	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	
Heptachlor	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	
Aldrin	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	
Heptachlor epoxide	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	
Endosulfan I	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	
Dieldrin	2.0 U	2.0 U	2.0 U		2.0 U	2.0 U	2.0 U	
4,4'-DDE	2.0 U	2.0 U	2.0 U		2.0 U	2.0 U	2.0 U	
Endrin	2.0 U	2.0 U	2.0 U		2.0 U	2.0 U	2.0 U	
Endosulfan II	2.0 U	2.0 U	2.0 U		2.0 U	2.0 U	2.0 U	
4,4'-DDD	2.0 U	2.0 U	2.0 U		2.0 U	2.0 U	2.0 U	
Endosulfan sulfate	4.0 U	4.0 U	4.0 U		4.0 U	4.0 U	4.0 U	
4,4'-DDT	2.0 U	2.0 U	2.0 U		5.0 U	2.0 U	3.0 U	
Methoxychlor	4.0 U	4.0 U	4.0 U		4.0 U	4.0 U	4.0 U	
Endrin ketone	3.0 U	3.0 U	3.0 U		3.0 U	3.0 U	3.0 U	
gamma-Chlordane	1.5 U	1.5 U	1.5 U		2.0 U	1.5 U	1.7 U	
alpha-Chlordane	1.5 U	1.5 U	1.5 U		1.5 U	1.5 U	1.5 U	
Toxaphene	150 U	150 U	150 U		150 U	150 U	150 U	
Aroclor 1016/1242	15 U	15 U	15 U		15 U	15 U	15 U	
Aroclor 1248	15 U	15 U	15 U		15 U	15 U	15 U	
Aroclor 1254	**15 E**	**16**	**16 E**	-6.5	**47 E**	**14 E**	**26 E**	72.0
Aroclor 1260	15 U	15 U	15 U		**21 E**	30 U	22 U	
Aroclor 1221	15 U	15 U	15 U		15 U	15 U	15 U	
Aroclor 1232	15 U	15 U	15 U		15 U	15 U	15 U	

Table 6. (continued) Pesticide/PCB Analyses - Monitoring Variability Samples

STATION 38

Target Parameter (µg/kg, dry wt.)	38 (Primary Sample)	60 (Duplicate Split)	Mean (38 and 60)	RPD (38 and 60)	61 (Replicate)	62 (Replicate)	Station Mean (n=3)	Station CV (n=3)
alpha-BHC	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	
beta-BHC	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	
delta-BHC	1.5 U	1.5 U	1.5 U		1.5 U	1.5 U	1.5 U	
gamma-BHC (Lindane)	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	
Heptachlor	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	
Aldrin	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	
Heptachlor epoxide	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	
Endosulfan I	1.0 U	1.0 U	1.0 U		1.0 U	1.0 U	1.0 U	
Dieldrin	2.0 U	2.0 U	2.0 U		2.0 U	2.0 U	2.0 U	
4,4'-DDE	2.0 U	2.0 U	2.0 U		2.0 U	2.0 U	2.0 U	
Endrin	2.0 U	2.0 U	2.0 U		2.0 U	2.0 U	2.0 U	
Endosulfan II	2.0 U	2.0 U	2.0 U		2.0 U	2.0 U	2.0 U	
4,4'-DDD	2.0 U	2.0 U	2.0 U		2.0 U	2.0 U	2.0 U	
Endosulfan sulfate	4.0 U	4.0 U	4.0 U		4.0 U	4.0 U	4.0 U	
4,4'-DDT	2.0 U	2.0 U	2.0 U		2.0 U	2.0 U	2.0 U	
Methoxychlor	4.0 U	4.0 U	4.0 U		4.0 U	4.0 U	4.0 U	
Endrin ketone	3.0 U	3.0 U	3.0 U		3.0 U	3.0 U	3.0 U	
gamma-Chlordane	1.5 U	1.5 U	1.5 U		1.5 U	1.5 U	1.5 U	
alpha-Chlordane	1.5 U	1.5 U	1.5 U		1.5 U	1.5 U	1.5 U	
Toxaphene	150 U	150 U	150 U		150 U	150 U	150 U	
Aroclor 1016/1242	15 U	15 U	15 U		15 U	15 U	15 U	
Aroclor 1248	15 U	15 U	15 U		15 U	15 U	15 U	
Aroclor 1254	**16**	15 U	16 U	6.5	**10 E**	**17**	**14 E**	26.5
Aroclor 1260	15 U	15 U	15 U		15 U	15 U	15 U	
Aroclor 1221	15 U	15 U	15 U		15 U	15 U	15 U	
Aroclor 1232	15 U	15 U	15 U		15 U	15 U	15 U	

Table 6. (continued) Pesticide/PCB Analyses - Monitoring Variability Samples

STATION 44

Target Parameter (µg/kg, dry wt.)	44 (Primary Sample)	63 (Duplicate Split)	Mean (38 and 60)	RPD (38 and 60)	64 (Replicate)	65 (Replicate)	Station Mean (n=3)	Station CV (n=3)
alpha-BHC	0.5 U	0.4 U	0.5 U		0.4 U	0.4 U	0.4 U	
beta-BHC	0.5 U	0.4 U	0.5 U		0.4 U	0.4 U	0.4 U	
delta-BHC	0.8 U	0.6 U	0.7 U		0.6 U	0.6 U	0.6 U	
gamma-BHC (Lindane)	0.5 U	0.4 U	0.5 U		0.4 U	0.4 U	0.4 U	
Heptachlor	0.5 U	0.4 U	0.5 U		0.4 U	0.4 U	0.4 U	
Aldrin	0.5 U	0.4 U	0.5 U		0.4 U	0.4 U	0.4 U	
Heptachlor epoxide	0.5 U	0.4 U	0.5 U		0.4 U	0.4 U	0.4 U	
Endosulfan I	0.5 U	0.4 U	0.5 U		0.4 U	0.4 U	0.4 U	
Dieldrin	1.0 U	0.8 U	0.9 U		0.8 U	0.8 U	0.8 U	
4,4'-DDE	1.0 U	0.8 U	0.9 U		0.8 U	0.8 U	0.8 U	
Endrin	1.0 U	0.8 U	0.9 U		0.8 U	0.8 U	0.8 U	
Endosulfan II	1.0 U	0.8 U	0.9 U		0.8 U	0.8 U	0.8 U	
4,4'-DDD	1.0 U	0.8 U	0.9 U		0.8 U	0.8 U	0.8 U	
Endosulfan sulfate	2.0 U	1.6 U	1.8 U		1.6 U	1.6 U	1.7 U	
4,4'-DDT	1.0 U	0.8 U	0.9 U		0.8 U	0.8 U	0.8 U	
Methoxychlor	2.0 U	1.6 U	1.8 U		1.6 U	1.6 U	1.7 U	
Endrin ketone	1.5 U	1.2 U	1.4 U		1.2 U	1.2 U	1.3 U	
gamma-Chlordane	0.8 U	0.6 U	0.7 U		0.6 U	0.6 U	0.6 U	
alpha-Chlordane	0.8 U	0.6 U	0.7 U		0.6 U	0.6 U	0.6 U	
Toxaphene	75 U	60 U	68 U		60 U	60 U	63 U	
Aroclor 1016/1242	7.5 U	6.0 U	6.8 U		6.0 U	6.0 U	6.3 U	
Aroclor 1248	7.5 U	6.0 U	6.8 U		6.0 U	6.0 U	6.3 U	
Aroclor 1254	7.5 U	6.0 U	6.8 U		6.0 U	6.0 U	6.3 U	
Aroclor 1260	7.5 U	6.0 U	6.8 U		6.0 U	6.0 U	6.3 U	
Aroclor 1221	7.5 U	6.0 U	6.8 U		6.0 U	6.0 U	6.3 U	
Aroclor 1232	7.5 U	6.0 U	6.8 U		6.0 U	6.0 U	6.3 U	

Table 7. Pesticide/PCB Analyses - Project Comparsion Sample (PCS) Summary

1991 PCS Results

(all values in µg/kg, dry weight)

Summary Statistics 1989, 1991

Target Parameter	Sample 66	Sample 67	Sample 68	Mean	CV	1989 Mean	1989 CV	Two Year Mean	Two Year CV
alpha-BHC	0.8 U	0.4 U	1.5 U	0.9 U		**1.1**	5.2	0.8 U	
beta-BHC	0.5 U	0.4 U	0.6 U	0.5 U		0.9 U		0.6 U	
delta-BHC	0.8 U	0.6 U	0.8 U	0.7 U		0.9 U		0.7 U	
gamma-BHC (Lindane)	0.5 U	0.4 U	0.6 U	0.5 U		**1.5**	10.2	0.8 U	
Heptachlor	0.5 U	0.4 U	1.5 U	0.8 U		0.9 U		0.7 U	
Aldrin	0.5 U	0.4 U	0.6 U	0.5 U		0.9 U		0.6 U	
Heptachlor epoxide	0.5 U	0.4 U	0.6 U	0.5 U		0.9 U		0.6 U	
Endosulfan I	**20 E**	**27 E**	**30 E**	**26**	19.7	**27**	11.3	**27**	14.4
Dieldrin	1.0 U	0.8 U	1.2 U	1.0 U		1.4 U		1.0 U	
4,4'-DDE	2.0 U	**22 N**	3.5 U	9.2 U		1.4 U		4.5 U	
Endrin	1.0 U	0.8 U	2.5 U	1.4 U		1.4 U		1.2 U	
Endosulfan II	**14**	**16**	**20**	**17**	18.0	**21**	11.0	**19**	17.2
4,4'-DDD	1.0 U	0.8 U	1.2 U	1.0 U		2.7 U		1.6 U	
Endosulfan sulfate	2.0 U	1.6 U	2.4 U	2.0 U		2.7 U		2.0 U	
4,4'-DDT	1.0 U	1.5 U	1.2 U	1.2 U		1.8 U		1.3 U	
Methoxychlor	2.0 U	1.6 U	2.4 U	2.0 U		3.6 U		2.4 U	
Endrin ketone	1.5 U	1.2 U	1.6 U	1.4 U		1.4 U		1.2 U	
gamma-Chlordane	1.0 U	0.6 U	2.0 U	1.2 U		1.3 U		1.1 U	
alpha-Chlordane	0.8 U	0.6 U	0.8 U	0.7 U		0.9 U		0.7 U	
Toxaphene	75 U	60 U	80 U	72 U		130 U		86 U	
Aroclor 1016/1242	7.5 U	6.0 U	10 U	7.8 U		18 U		11 U	
Aroclor 1248	7.5 U	6.0 U	10 U	7.8 U		18 U		11 U	
Aroclor 1254	**70**	**93**	**77**	**80**	14.7	**117**	13.1	**98**	24.0
Aroclor 1260	7.5 U	6.0 U	10 U	7.8 U		18 U		11 U	
Aroclor 1221	7.5 U	6.0 U	10 U	7.8 U		—		—	
Aroclor 1232	7.5 U	6.0 U	10 U	7.8 U		—		—	

September 13, 1991

Data Validation Report
Inorganics Analyses

Site:	Puget Sound
Project:	1991 PSAMP MSMT
Sample Numbers:	1, 2R, 3-5, 8, 9R, 10R, 11R, 12, 13R, 14, 15, 17-22, 26, 29, 30, 32-35, 38-41, 43-45, 47-49, 51-53, 57-74, 201R-209R
Samples Collected by:	Ambient Monitoring Section Washington State Department of Ecology

The samples included in this report were analyzed by Analytical Resources, Inc., of Seattle, Washington, under subcontract to BCI of Vashon, Washington. Funding for this contract is provided by the Ambient Monitoring Section of the Washington State Department of Ecology.

This report is submitted to:	Ambient Monitoring Section Washington State Department of Ecology
Data Evaluated by:	Thomas D. Bowden TDB
Approved by:	Raleigh C. Farlow RF

BCI
Environmental & Medical Research
and Systems Development

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Site:	Puget Sound
Project:	1991 PSAMP MSMT
Laboratory:	Analytical Resources, Inc. (ARI)
Sample Numbers:	Samples 1, 2R, 3-5, 8, 9R, 10R, 11R, 12, 13R, 14, 15, 17-22, 26, 29, 30, 32-35, 38-41, 43-45, 47-49, 51-53, 57-74, 201R-209R
Matrix:	Sediment
Reviewer:	T. D. Bowden
Date:	September 13, 1991

1.0 Introduction

This report summarizes the validation of laboratory data for 66 marine sediment samples submitted to Analytical Resources, Inc. of Seattle, Washington for total metals analyses. The samples were collected from 48 different stations throughout Puget Sound by the Washington State Department of Ecology (Ecology) Ambient Monitoring Section, as part of the 1991 Marine Sediment Monitoring Task (MSMT) of the Puget Sound Ambient Monitoring Program (PSAMP). The samples were analyzed according to USEPA CLP SOW 390. A modification to the CLP SOW was employed by analyzing for antimony arsenic, cadmium, lead, selenium, silver, and thallium by Graphite Furnace Atomic Absorption (GFAA), with quantitation by Method of Standard Additions (MSA). Method quantitation limits have been lowered for this program by digesting a larger sample mass (an average of 1.27 gm for ICP and GFAA, and 0.44 gm for mercury) and reducing final digestate volumes to 100 ml. This report has been prepared in accordance with Ecology's *Puget Sound Ambient Monitoring Program: Marine Sediment Quality Implementation Plan* (Striplin, 1988), and USEPA guidance *Laboratory Data Validation: Functional Guidelines for Evaluating Inorganics Analyses* (USEPA, 1988).

Samples were collected using a 0.1 m^2 stainless steel Double van Veen sampler. Sediment for total metals analyses was removed from the upper two centimeters in the sampler. The sediment constituting the sample is a homogenized composite of at least five Double van Veen casts. Samples were held on ice until delivery to the laboratory. Chain-of-Custody documents indicate that proper chain-of-custody was maintained from the time of sample collection until delivery to and acceptance by the laboratory. The laboratory reported that all samples were received intact. Samples were held at 4° C. at the laboratory until digestion.

Forty-eight of the samples are primary samples from 48 different locations or stations in Puget Sound. Fifteen of the remaining samples are field-generated quality control samples collected at five selected stations to allow determination of monitoring variability. At each of the selected stations, field-generated QC samples included one split of the primary sample taken from the same Double van Veen grab composite (blind laboratory duplicate), and two station replicates taken from two separate Double van Veen casts at the same station (blind field replicates). All field-generated QC samples were assigned surrogate station numbers, as summarized below, and were submitted blind to the laboratory:

Field Station and Primary Sample:	5	32	35	38	44
Duplicate Split:	51	57	72	60	63
Station Replicates:	52, 53	58, 59	73, 74	61, 62	64, 65

The laboratory used the following field samples for laboratory QC:

Matrix Spike Analysis	Duplicate Analyses	ICP Serial Dilution
Sample 5	Sample 5	Sample 19
Sample 13R	Sample 13R	Sample 33
Sample 32	Sample 32	Sample 38
Sample 35	Sample 35	Sample 208R
Sample 44	Sample 44	
Sample 61	Sample 61	

Samples 66, 67, and 68 are Project Comparison Samples (PCSs), consisting of Sequim Bay sediment. The PCS is organic compound fortified and contains native metals. This material was also analyzed during the 1989 and 1990 PSAMP.

Laboratory deliverables were complete and documentation was sufficient to allow evaluation and validation of the associated results.

Analytical results with associated data qualifiers are presented in Table 1. Results are expressed in mg/kg, dry weight.

2.0 Discussion

2.1. Sample Holding Times/Preservation

Technical requirements for maximum sample holding time have been established only for water matrices for total metals analysis (28 days for mercury, 6 months for other metals, from time of collection to time of analysis). Samples were held on ice during transport, and maintained in the laboratory at 4° C. until digestion and analysis. All ICP and GFAA analyses were completed within 41 days of sample collection.

Approximately 40% of the mercury analyses exceeded the recommended holding time of 28 days (up to a maximum of 37 days). However, evaluation of mercury results for Sample 32 indicates that this exception had not affected data quality. The mercury analysis for Sample 32 (0.043 mg/kg) was performed on Day 37 whereas the analysis for the laboratory duplicate of the sample (0.047 mg/kg) was performed on Day 29. The relative percent difference for these two analyses is 8.9%, well within project-specific acceptance criteria (see Table 5). The results suggests minimal loss of mercury, if any, during the intervening 8 days. Therefore, no analytical results have been qualified for exceedance of target holding times.

Sample holding times are summarized in Table 2 and were determined by comparing sampling dates on the Chain-of-Custody documents with dates of analyses reported in the data package. ICP and GFAA holding times in Table 2 reflect the last date of an analysis by the specified method for the associated sample.

2.2. Calibration

2.2.1. Initial Calibration

Initial instrumental calibrations were performed using the required number of data points, two points for ICP analyses and five points for mercury analyses. One of the data points for each method is a blank, as required. Correlation coefficients for all mercury initial calibrations are ≥0.995. Correlation coefficients were confirmed by recalculation.

Initial calibration criteria are not strictly applicable to the GFAA analyses since all graphite furnace analytes were quantitated by MSA.

2.2.2. Initial Calibration Verification

Initial calibration verification checks (ICVs) were performed immediately after initial instrumental calibrations during ICP and mercury analytical runs, as required. All ICV recoveries are within acceptance criteria (90-110% for ICP; 80-120% for mercury). All ICV results were checked for transcription errors from the raw data to Form II (Initial and Continuing Calibration Verification).

ICVs also were analyzed at the beginning of GFAA analytical runs. Since all quantitation was by MSA, CLP-specified acceptance criteria for calibration checks are not strictly applicable. Examination of results for GFAA ICVs shows that recoveries are within the range of 80 to 120% for all analytical runs.

All ICV recoveries were verified by recalculation. No significant transcription or calculation errors were detected in any ICP, mercury, or GFAA data.

2.2.3. Continuing Calibration Verification

US EPA CLP SOW 390 requires that a continuing calibration verification (CCV) standard be analyzed for all analytes at a frequency of ≥10% of the analytical samples or every two hours, whichever is more frequent. CCVs also are required at the beginning of the analytical 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 recommended frequency of analysis.

All CCV recoveries are within acceptance limits (90-110% for ICP; 80-120% for mercury), with the exception of the fourth CCV on 5/06/91. Although the preceding analytical samples were reanalyzed on a subsequent ICP run, the final ICS samples for the run followed this CCV. However, this exception and the exceptions noted above for ICP CCV frequency do not require qualification of related results since all other CCV recoveries were acceptable and all interference check sample recoveries met acceptance criteria.

Continuing calibration criteria are not strictly applicable to the GFAA analyses since all graphite furnace analytes were quantitated by MSA. However, review of GFAA calibration check samples shows that recoveries were consistently within the range of 80 to 120%.

All CCV results were checked for transcription errors from raw data to Form II (Initial and Continuing Calibration Verification). All recoveries were verified by recalculation. No significant transcription or calculation errors were detected in any ICP, mercury, or GFAA data. Minor transcription or calculation errors have been corrected on the reporting form.

2.3. Blanks

2.3.1. Initial Calibration Blanks

Initial calibration blanks (ICBs) were analyzed immediately after ICVs during all ICP and mercury analytical runs, as required. All ICP and mercury ICB results are less than the instrument detection limits (IDL), with the exceptions of ICP ICBs noted in Table 3A

The CLP *Functional Guidelines* require that any sample results greater than the IDL but less than 5 times the amount in any associated blank should be qualified as "U" (quantitation limit). ICP initial calibration blanks with analytes above the IDL were evaluated relative to associated sample results. No positive sample results associated with these blanks are less than 5 times the blank results, and therefore, no results required qualification. All ICB results were checked for transcription errors from raw data to Form III (Blanks). No significant errors were detected.

2.3.2. Continuing Calibration Blanks

Continuing calibration blanks (CCBs) are required after every CCV and at the same frequency as the CCV during the analytical run. ICP CCBs were analyzed after every CCV, as required. The same exceptions noted for ICP CCV frequency apply to ICP CCBs as well. ICP CCBs with results above the IDL are summarized in Table 3A. All mercury CCBs are less than the IDL. A blank was analyzed before every MSA analysis during GFAA analytical runs. All GFAA blanks are less than the IDL.

All continuing calibration blanks with analytes above the IDL were evaluated relative to associated sample results. No positive sample results were less than 5 times the blank results, and therefore, no results required qualification. All CCB results were checked for transcription errors from raw data to Form III. A few errors were detected and have been corrected on Form III and included in Table 3.

2.3.3. Preparation Blanks

Preparation blanks were analyzed for all target analytes at the required frequency (one per digestion batch). Analytical results for preparation blanks are presented in Table 3B. Analyte concentrations greater than the IDL are highlighted in bold. Preparation blanks with analytes >IDL were evaluated relative to associated sample results within the digestion batch. With the exception of some silver results, no positive sample results were less than 5 times the blank results. Silver results associated with preparation blank 8078MB1 (Ag = 0.037 mg/kg) that are ≤5 times the blank concentration (0.19 mg/kg) and therefore require qualification ("U", quantitation limit) are summarized below:

Sample ID	Result (mg/kg, dry weight)
9R	0.12
10R	0.14
12	0.17
13R	0.028
15	0.027
26	0.17
68	0.11
201R	0.11
202R	0.15

All preparation blank results were checked for quantitation errors and transcription errors from quantitation reports to Form III (Blanks). No significant errors were detected.

2.4. Interference Check Sample

ICP interference check solutions were analyzed at the beginning and end of each ICP analytical run, as required. Recoveries for all analytes in all check samples are within acceptance limits (80-120%). All results were checked for transcription errors from raw data to Form IV (ICP Interference Check Sample) and all recoveries were verified by recalculation. No significant errors were detected.

2.5. Laboratory Control Sample

Solid laboratory control samples (LCS) were analyzed at the required frequency (at least one sample per digestion batch). Three different LCS samples were analyzed, two of which are National Institute of Standards and Technology (NIST, formerly NBS) Standard Reference Materials (SRMs):

Lab ID	Source ID	Sample Delivery Group			
LCSS1	NIST 1646	7976	8015	8041	8078
LCSS2	NIST 2704	7976	8015	8041	8078
LCSS3	ERA Lot 207	7976	8015	8041	8078
LCSS4	NIST 1646	7976	-	-	-

The LCS identified as NIST 1646 is NIST SRM Estuarine Sediment; the LCS identified as NIST 2704 is NIST SRM Buffalo River Sediment; the LCS identified as ERA Lot 207 is commercially-prepared reference material. NIST certified values, uncertainty ranges for NIST 1646, 95% confidence intervals for NIST 2704, and "true values" for ERA Lot 207 are listed in Tables 4A, 4B, and 4D. Results for all LCS analyses and % recoveries (%R) are also listed in these tables.

Recoveries for most analytes are consistently low for the NIST Standard Reference Materials, relative to the certified values. The NIST SRM certified values are for metal concentrations expressed as total metal. The digestion procedure applied for the PSAMP is a partial acid digestion employing HNO_3/H_2O_2, as recommended in USEPA guidances. This procedure solubilizes leachable metal including that which is bioavailable and thus has the greatest potential for yielding toxic effects. Because the NIST certified values represent a total digestion of the sample material, including silicate-bound metals, LCS results for these samples may be different. Project results for NIST samples are compared statistically to each other, and to 1989 PSAMP analyses (NIST 2704 only) by Analytical Resources, Inc., as summarized in Tables 4B and 4C.

Results for five analyses of NIST 1646 (Estuarine Sediment) for the 1991 program are summarized in Table 4A. The coefficients of variation (CVs) for each analyte for the five analyses are generally below 10%. Two CVs exceeded 20% (Ag = 43.4%; Tl = 38.6%). NIST certified values are not available for either of these two analytes.

Results for four analyses of NIST 2704 (Buffalo River Sediment) for the 1991 program are summarized in Table 4B. The CVs for each analyte for the four analyses are generally below 10%. CVs for three analytes exceeded 20% (K = 26.2%; Ag = 21.0%; Tl = 20.8%). No certified value is available for silver. Results for four analyses of NIST 2704 performed during the 1989 program are presented in Table 4C. Overall performance for

1989, based on CVs, is comparable to the current year. Means and CVs for combined 1989 and 1991 results also are presented in Table 4C. CVs for two analytes exceeded 20% (Sb = 21.8%; Tl = 20.9%). No results for beryllium, silver, or selenium were available for 1989. NIST 2704 was not analyzed in the 1990 program.

Recoveries for four analyses of the ERA Lot 207 LCS have been used to evaluate laboratory accuracy and digestion efficiency. USEPA CLP acceptance criteria for recoveries (80-120%, with the exception of silver and antimony) have been applied to analyses of this sample material, although these limits are strictly applicable only to aqueous samples. Although an LCS was analyzed for every digestion batch, ERA Lot 207 (LCSS3) was not analyzed for every digestion batch. Therefore, results for this LCS have been evaluated for each analyte using the mean recovery and then applying acceptance criteria to all 66 analytical samples. Results and recoveries for LCSS3 are presented in Table 4D. Mean recoveries for all applicable analytes are within acceptance limits (80-120%R). Therefore, no associated results required qualification for exceptions to LCS recovery.

All LCS results were checked for transcription errors from raw data to Form VII (Laboratory Control Sample) and all recoveries were verified by recalculation. Quantitation was verified by recalculation for all analytes and all samples. No significant errors were detected.

2.6. Duplicate Sample Analysis

Six of the 66 analytical samples were analyzed in duplicate as laboratory split samples. Results and RPDs for duplicate analyses are presented in Table 5. Results of all duplicate analyses are within CLP acceptance limits (±35% RPD for results >5X IDL; ±IDL for results ≤ 5X IDL) for all analytes, with the exception of calcium for Sample 32 (RPD = 90.8%) and arsenic for Sample 44 (RPD = 43.8%). In both cases, field duplicate and replicate results (see Section 2.11.1) are closer to the laboratory duplicate value than the primary value, and indicate that the primary value is probably biased high:

Station 32 - Calcium

Sample ID	Sample Designation	Results (mg/kg, dry wt.)
32	Primary	7990
32D	Lab split of primary	3000
57	Field split of primary	2760
58	Field replicate	3380
59	Field replicate	5300

Station 44 - Arsenic

Sample ID	Sample Designation	Results (mg/kg, dry wt.)
44	Primary	7.8
44D	Lab split of primary	5.0
63	Field split of primary	6.4
64	Field replicate	5.3
65	Field replicate	5.6

As a consequence, the primary result for calcium in Sample 32 and arsenic in Sample 44 have been qualified "E" (estimated). Duplicate performance for arsenic and calcium is acceptable for all other duplicate samples, and therefore no other associated sample results were qualified. Duplicate performance met acceptance criteria for all other duplicate samples and analytes.

All results were checked for transcription errors from raw data to Form VI (Duplicates) and all recoveries were verified by recalculation. Quantitation was verified by recalculation for all analytes and all samples. No significant errors were detected.

2.7. Matrix Spike Sample Analysis

Matrix spike (MS) analysis was performed on six of the 66 analytical samples. Sample results, recoveries, and spike levels for matrix spike analyses are presented in Table 6. MS analyses were not performed for each extraction batch, because the MS samples were station-designated rather than batch-designated. Evaluation of analytical performance by extraction batch is not appropriate since all extraction batches did not have MS analyses. To test an alternative method of evaluation, the CV between all MS recoveries (n=6) was calculated for each analyte. The CV is significantly below the target limit of 50% for all but two analytes. The arithmetic mean recoveries for all analytes evaluated in six MS analyses have been used to determine analytical performance for the entire 1991 program (all 66 analytical samples).

According to the CLP *Functional Guidelines*, spike recovery limits are applied only when sample concentrations do not exceed four times the spike concentration. With the exception of most lead and arsenic MS analyses, all individual MS analyses met this requirement. Individual sample recoveries outside of CLP acceptance limits (75-125% recovery) are indicated in bold in Table 6. An evaluation of **mean** recoveries for MS analyses (excluding arsenic and lead) indicates that antimony and silver are the only analytes with mean recoveries outside acceptance limits. Accordingly, all antimony and silver results greater than the IDL have been qualified "E" (estimated).

All selenium results for all analytical samples, including matrix spike samples, are below the IDL. The spike level for selenium also is below the IDL, and therefore, selenium analyses cannot be evaluated for accuracy. As a result, all selenium results, which were reported as nondetects, have been qualified as unusable with the "R" descriptor.

Quantitation was verified for all matrix spike analyses by recalculation from raw data. Transcription to the laboratory reporting form (Form V) was confirmed for all results. Recoveries were verified by recalculation.

2.8. Graphite Furnace QC Analysis

All analytical samples were analyzed for antimony, arsenic, cadmium, lead, selenium, silver, and thallium by graphite furnace atomic absorption. As a modification to CLP protocol, all furnace analytes were quantitated by Method of Standard Additions (MSA), which provides greater precision at low concentrations. A blank was analyzed before each MSA analysis.

According to the CLP SOW, the correlation coefficient for MSA determinations must be ≥ 0.995 to meet acceptance criteria. Since the Contract Quantitation Limit (the IDL) 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. However, this modification affects very few results, as only 6% of all correlation coefficients for MSA determinations on field samples fall below 0.995, and only 3% fall below 0.994. The correlation coefficients for four determinations falling below 0.990 are:

Sample ID	Analyte	r	Result (mg/kg, dry wt.)
3	Cadmium	0.987	0.15
8	Thallium	0.986	0.16 U
45	Thallium	0.982	0.16 U
72	Silver	0.989	1.2

The cadmium result for Sample 3 and the silver result for Sample 72 have been qualified "E" (estimated). The thallium results for Samples 8 and 45 have not been qualified since they are below the IDL.

2.9. ICP Serial Dilution

ICP serial dilution analysis was performed for each sample delivery group. In all, four samples were analyzed at a 1/5 dilution. By the CLP criteria, acceptance limits are applied only to analytes with an original sample concentration that is 50 times the IDL. For those analytes with results >50X IDL, the percent difference (%D) between the diluted sample and the undiluted sample is within CLP acceptance limits (≤10%) in all serial dilution samples, with the exceptions listed below:

Sample ID	Sample Delivery Group	Analyte	%D
19	8041	Cu	15.2
"	"	Zn	23.1
33	8015	Cu	17.9
"	"	Zn	36.6
38	7976	K	10.6
"	"	V	13.7
"	"	Zn	140
208R	8078	Zn	19.4

In accordance with the CLP acceptance criteria, positive results for these analytes, with the exception of potassium, have been qualified "E" (estimated) by sample delivery group. The %D for potassium does not significantly exceed acceptance criteria, and associated results do not require qualification.

All ICP serial dilutions results were verified by comparing raw data to results reported on Form IX (ICP Serial Dilutions). All serial dilution results for Sample 38 were found to be incorrect on Form IX. Corrected results and recalculated %Ds have been annotated on the reporting form, and are reflected in the above table. All other data were found to be correctly transcribed. %Ds were verified by recalculation.

2.10. Sample Result Verification

ICP sample quantitation and transcription to the reporting form (Form I) was verified for all samples and all analytes, including QC samples. Mercury and GFAA sample quantitation and transcription to Form I were verified for approximately 20% of the samples and all analytes. No significant errors were detected. Minor transcription errors have been corrected on the reporting forms. Corrections also have been included in various tables associated with this report.

Results for all ICP analytes are within the linear range of the instrument. Results for mercury are within the calibrated range of the instrument. Results for GFAA MSA determinations are less than the highest spike addition with the exception of arsenic results for Sample 44 (15.9 μg/L in the final sample digestate vs. the highest spike addition of 15.0 μg/L) and lead results for Sample 47 (15.8 μg/L in the final sample digestate vs. the highest spike addition of 15.0 μg/L). These results have been qualified "E" (estimated). No GFAA analytes were quantitated by ICP. No significant anomalies were noted in the raw data. All raw data are legible and complete. Average sample quantitation limits are given in Table 7.

2.11. Other Performance Data

2.11.1. Field-Generated QC Samples

Two types of field-generated QC samples were collected from five separate stations. Station duplicate splits were generated by taking two separate aliquots from a composite of at least two van Veen grab samples. One aliquot was assigned to the primary station number, and the second aliquot was assigned a surrogate sample number. Two additional, separate station replicates were generated by collecting one sample from each of two separate van Veen grabs while on station. Station replicates were assigned separate surrogate sample numbers.

Results and summary statistics for all field duplicates and replicates are presented in Table 8. In order to determine the coefficient of variation (CV) for the station, the mean value and RPD were first calculated for the station duplicate splits. The mean of all three station replicates was then calculated using the mean of the duplicate splits for the first replicate (n=3). Finally, the CV for the three replicates was calculated.

2.11.2. Project Comparison Samples (PCS)

Homogenized archived sediment from Sequim Bay was submitted for analysis as Samples 66, 67, and 68. This material was acquired from the Office of Coastal Waters, USEPA Region X, and consists of a composited marine sediment that had been prepared by the NOAA National Marine Fisheries Laboratory, under contract to EPA Region X. Analytical results and summary statistics for these samples are presented in Table 9. This material was also analyzed for the 1989 and 1990 program.

2.12. 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)

2.13. Overall Case Assessment

A high level of effort was exhibited by the laboratory for this project. All deliverables required by the project are present and the data package is complete. The overall quality of data is considered very good. The data is considered to be usable for the intended purposes of the project.

3.0 Summary of Qualified Data

3.1. The following analytical results have been qualified "U" (quantitation limit) because the results were less than five times the amount detected in the associated preparation blank, as discussed in Section 2.3.3:

Silver	Samples	9R, 10R, 12, 13R, 15, 26, 68, 201R, 202R

3.2. The following analytical results have been qualified "E" (estimated) because laboratory duplicate sample analyses did not meet acceptance criteria, as discussed in Section 2.6:

Arsenic	Sample	44
Calcium	Sample	32

3.3. The following analytical results have been qualified "E" (estimated) because the mean recoveries for the matrix spike analyses did not meet acceptance criteria, as discussed in Section 2.7:

Antimony	Samples	9R, 33, 34, 40, 44, 60, 64, 65, 72, 74,
Silver	Samples	1-8, 11R, 14, 17-22, 29-41, 44-67, 69-74, 203R-209R

3.4. The following analytical results have been qualified "R" (unusable) because the matrix spike analyses did not meet acceptance criteria, as discussed in Section 2.7:

Selenium	All samples

3.5. The following analytical results have been qualified "E" (estimated) because the correlation coefficients for MSA determinations were <0.990, as discussed in Section 2.8:

Cadmium	Sample	3
Silver	Sample	72

3.6. The following analytical results have been qualified "E" (estimated) because the results of ICP serial dilution did not meet acceptance criteria, as discussed in Section 2.9:

Copper	Samples	1, 2R, 4, 5, 18-22, 29, 32, 33, 51-59, 67, 71, 203R-207R, 209R
Vanadium	Samples	30, 34-49, 60-66, 69, 70, 72-74,
Zinc	All samples	

3.7. The following analytical results have been qualified "E" (estimated) because the concentration of the analyte in the final sample digestate exceeded the concentration of the highest standard addition, as discussed in Section 2.10:

Arsenic	Sample	44
Lead	Sample	47

Table 1. Inorganics Analyses - Qualified Sample Results

CAS No.	Target Parameter	STATION 1 Sample 1 8041P	STATION 2R Sample 2R 8041Q	STATION 3 Sample 3 8078A	STATION 4 Sample 4 8041A	STATION 5 Sample 5 8041B	STATION 5 Sample 51 8041F	STATION 5 Sample 52 8041G	STATION 5 Sample 53 8041H	STATION 8 Sample 8 8078B	STATION 9R Sample 9R 8078C
7429-90-5	Aluminum	17800	14400	16300	23100	19300	19800	21300	19400	15900	7960
7440-36-0	Antimony	0.21 U	0.14 U	0.20 U	0.25 U	0.23 U	0.23 U	0.23 U	0.23 U	0.16 U	0.086 E
7740-38-2	Arsenic	8.8	5.2	5.0	11.9	7.5	10.1	10.3	8.3	7.5	2.6
7740-39-3	Barium	46.0	39.8	46.2	60.5	50.4	50.0	54.0	48.8	35.4	11.9
7740-41-7	Beryllium	0.34	0.32	0.30	0.51	0.40	0.39	0.37	0.37	0.32	0.10
7740-70-2	Cadmium	0.28	0.18	0.15 E	0.23	0.21	0.18	0.19	0.17	0.56	0.017 U
7740-43-9	Calcium	6080	6110	12900	6390	6640	6550	7150	6390	4460	3470
7740-47-3	Chromium	39.4	29.3	28.9	60.7	46.1	45.1	47.4	44.2	30.4	31.7
7740-48-4	Cobalt	8.5	8.3	8.6	14.0	10.2	10.0	10.3	10.3	7.5	6.0
7740-50-8	Copper	27.7 E	17.7 E	21.7	42.0 E	33.9 E	31.9 E	32.5 E	31.9 E	28.9	7.7
7439-89-6	Iron	28800	23400	26600	37100	31800	32200	33300	31800	25900	13600
7439-92-1	Lead	13.8	9.5	10.8	17.8	14.8	17.3	14.0	16.1	20.8	2.4
7439-95-4	Magnesium	11600	9380	9700	16200	12500	13200	13500	13100	9560	9070
7439-96-5	Manganese	278	247	346	440	329	336	354	342	229	246
7439-97-6	Mercury	0.11	0.061	0.065	0.16	0.13	0.15	0.14	0.13	0.26	0.028 U
7440-02-0	Nickel	36.3	32.2	26.3	71.3	43.3	43.2	45.5	44.4	25.1	45.2
7440-09-7	Potassium	3360	2480	3130	4080	3660	3780	3950	3720	2490	871
7782-49-2	Selenium	R	R	R	R	R	R	R	R	R	R
7740-22-4	Silver	0.17 E	0.086 E	0.42 E	0.25 E	0.19 E	0.19 E	0.16 E	0.23 E	0.28 E	0.12 U
7740-23-5	Sodium	19400	10800	15300	26000	21800	23600	23400	23300	14100	3240
7740-28-0	Thallium	0.21	0.16	0.20 U	0.25 U	0.23 U	0.23	0.23 U	0.23 U	0.16 U	0.086 U
7740-62-2	Vanadium	51.7	43.1	48.4	67.2	57.0	57.0	61.3	56.6	47.8	29.4
7740-66-6	Zinc	82.5 E	63.0 E	69.8 E	93.2 E	84.3 E	86.2 E	88.4 E	86.0 E	91.2 E	27.4 E

Table 1. (continued) Inorganics Analyses - Qualified Sample Results

CAS No.	Target Parameter	STATION 10R Sample 10R 8078D	STATION 11R Sample 11R 8078E	STATION 12 Sample 12 8078J	STATION 13R Sample 13R 8078K	STATION 14 Sample 14 8078L	STATION 15 Sample 15 8078M	STATION 17 Sample 17 8078N	STATION 18 Sample 18 8041C	STATION 19 Sample 19 8041D	STATION 20 Sample 20 8041E
7429-90-5	Aluminum	13100	10800	17200	6300	11300	6790	32600	14500	20600	23000
7440-36-0	Antimony	0.12 U	0.17 U	0.21 U	0.088 U	0.15 U	0.12 U	0.22 U	0.15 U	0.29 U	0.17 U
7740-38-2	Arsenic	3.5	5.6	6.1	3.4	5.7	1.8	7.7	10.8	10.2	11.9
7740-39-3	Barium	24.4	22.4	43.1	12.5	26.4	10.4	19.2	33.0	49.5	63.3
7740-41-7	Beryllium	0.19	0.17 U	0.38	0.15	0.24	0.11	0.46	0.25	0.41	0.42
7740-70-2	Cadmium	0.11	0.086	0.18	0.052	0.10	0.023 U	0.29	0.16	0.15	0.12
7740-43-9	Calcium	4240	3900	5920	3810	4280	3150	14100	4740	6060	5600
7740-47-3	Chromium	28.6	24.2	37.3	15.3	25.5	16.3	54.4	55.2	64.8	126
7740-48-4	Cobalt	7.5	5.4	8.6	4.0	8.5	4.5	23.1	10.5	17.8	21.2
7740-50-8	Copper	14.7	13.5	26.9	5.7	15.0	5.6	113	30.3 E	41.9 E	50.4 E
7439-89-6	Iron	21000	17700	28300	13300	20100	10700	50700	24100	33700	41700
7439-92-1	Lead	6.1	8.7	14.0	3.7	7.3	3.4	7.4	8.0	20.6	12.6
7439-95-4	Magnesium	8660	7530	11100	4420	7770	4090	18600	11000	15100	21000
7439-96-5	Manganese	216	197	278	152	290	191	599	309	704	650
7439-97-6	Mercury	0.043	0.052 U	0.096	0.029 U	0.043	0.028 U	0.070 U	0.069	0.14	0.13
7440-02-0	Nickel	31.9	22.6	33.6	17.0	29.7	15.4	53.0	52.6	65.1	139
7440-09-7	Potassium	1710	2380	3150	1310	1860	882	3090	2210	4160	2560
7782-49-2	Selenium	R	R	R	R	R	R	R	R	R	R
7740-22-4	Silver	0.14 U	0.23 E	0.17 U	0.028 U	0.24 E	0.027 U	0.32 E	0.12 E	0.32 E	0.18 E
7740-23-5	Sodium	7620	13700	18900	3050	9070	3510	23700	10300	26300	10700
7740-28-0	Thallium	0.12 U	0.17 U	0.21 U	0.088	0.15 U	0.12 U	0.22 U	0.24	0.29 U	0.17 U
7740-62-2	Vanadium	38.5	31.4	51.7	20.6	36.9	21.2	132	46.7	65.3	67.8
7740-66-6	Zinc	50.5 E	44.1 E	77.3 E	27.3 E	46.5 E	23.7 E	83.6 E	57.3 E	95.2 E	87.9 E

Table 1. (continued) Inorganics Analyses - Qualified Sample Results

CAS No.	Target Parameter	STATION 21 Sample 21 8015A	STATION 22 Sample 22 8015B	STATION 26 Sample 26 8078O	STATION 29 Sample 29 8015C	STATION 30 Sample 30 7976Bre	STATION 32 Sample 32 8015D	STATION 32 Sample 57 8015F	STATION 32 Sample 58 8015G	STATION 32 Sample 59 8015H	STATION 33 Sample 33 8015E
7429-90-5	Aluminum	20900	7820	11600	18700	7440	6330	5980	6140	6100	10500
7440-36-0	Antimony	0.13 U	0.12 U	0.14 U	0.20 U	0.13 U	0.096 U	0.11 U	0.11 U	0.12 U	0.24 E
7740-38-2	Arsenic	15.7	4.3	4.9	8.1	3.2	5.0	5.6	4.1	5.2	6.3
7740-39-3	Barium	55.1	18.6	30.7	51.9	17.5	13.6	13.0	14.1	13.8	43.0
7740-41-7	Beryllium	0.44	0.16	0.28	0.45	0.13	0.20	0.18	0.18	0.16	0.22
7740-70-2	Cadmium	0.19	0.083	0.19	0.43	0.45	0.065	0.059	0.044	0.065	0.17
7740-43-9	Calcium	6810	3410	14900	6800	3200	7990 E	2760	3380	5300	4690
7740-47-3	Chromium	51.5	21.2	28.3	41.9	18.4	14.1	13.5	15.1	14.1	27.5
7740-48-4	Cobalt	13.5	5.4	8.7	11.1	3.6	4.6	4.5	4.5	4.5	6.6
7740-50-8	Copper	57.3 E	12.0 E	17.5	36.9 E	19.5	7.9 E	7.7 E	8.4 E	7.9 E	42.6 E
7439-89-6	Iron	29700	11300	21700	29000	9760	10100	9930	9870	9770	15600
7439-92-1	Lead	13.0	9.2	12.7	26.2	9.8	11.3	10.7	11.0	12.3	36.6
7439-95-4	Magnesium	11600	4530	8440	11100	3970	3590	3600	3540	3480	5980
7439-96-5	Manganese	389	206	356	469	145	184	169	181	170	265
7439-97-6	Mercury	0.48	0.037	0.065	0.13	0.12	0.043	0.043	0.047	0.044	0.13
7440-02-0	Nickel	51.3	19.3	32.7	35.7	14.8	13.6	13.4	13.9	13.2	28.8
7440-09-7	Potassium	2450	1140	2260	3690	1200	1140	1080	1110	1130	1440
7782-49-2	Selenium	R	R	R	R	R	R	R	R	R	R
7740-22-4	Silver	0.21 E	0.059 E	0.17 U	0.51 E	0.16 E	0.096 E	0.11 E	0.10 E	0.093 E	0.43 E
7740-23-5	Sodium	9350	4160	9520	20200	6450	3950	3730	4070	4000	7500
7740-28-0	Thallium	0.18	0.18	0.14 U	0.22	0.31	0.096 U	0.11 U	0.13	0.12 U	0.14 U
7740-62-2	Vanadium	62.1	23.0	38.4	56.5	21.2 E	20.9	20.3	21.3	20.4	33.3
7740-66-6	Zinc	85.0 E	29.1 E	53.3 E	89.3 E	31.6 E	22.7 E	22.1 E	25.8 E	22.7 E	60.5 E

Table 1. (continued) Inorganics Analyses - Qualified Sample Results

CAS No.	Target Parameter	STATION 34 Sample 34 7976C	STATION 35 Sample 35 7976D	STATION 35 Sample 72 7976O	STATION 35 Sample 73 7976P	STATION 35 Sample 74 7976Q	STATION 38 Sample 38 7976E	STATION 38 Sample 60 7976J	STATION 38 Sample 61 7976K	STATION 38 Sample 62 7976L	STATION 39 Sample 39 7976F
7429-90-5	Aluminum	19900	19600	20600	19400	18900	24900	24000	23100	23700	5430
7440-36-0	Antimony	0.65 E	0.24 U	0.31 E	0.21 U	0.27 E	0.35 U	0.54 E	0.33 U	0.32 U	0.090 U
7740-38-2	Arsenic	13.2	11.4	10.8	12.6	11.6	14.6	11.7	13.0	13.8	2.1
7740-39-3	Barium	51.6	46.0	47.0	46.0	42.0	63.2	60.9	59.0	60.6	10.2
7740-41-7	Beryllium	0.38	0.36	0.28	0.28	0.30 U	0.55	0.37	0.38	0.45	0.12
7740-70-2	Cadmium	0.79	0.92	0.76	0.81	0.81	0.28	0.36	0.33	0.35	0.056
7740-43-9	Calcium	6800	10100	9930	9000	9650	7310	7170	9100	7250	2240
7740-47-3	Chromium	59.6	50.7	51.1	49.4	48.9	50.7	48.9	46.5	47.9	12.9
7740-48-4	Cobalt	8.7	9.5	9.4	8.9	9.1	14.0	13.8	13.6	13.7	2.7
7740-50-8	Copper	131	78.4	75.7	74.4	71.8	54.5	57.1	54.8	53.5	3.9
7439-89-6	Iron	28300	26900	27300	26300	26100	34000	33800	32600	33300	7560
7439-92-1	Lead	90.5	66.3	77.9	77.7	73.2	46.2	36.1	43.5	48.9	5.6
7439-95-4	Magnesium	10700	10800	10900	10600	10600	13600	13600	13300	13400	2870
7439-96-5	Manganese	302	293	294	284	299	836	833	819	825	129
7439-97-6	Mercury	0.74	0.59	0.54	0.51	0.53	0.24	0.21	0.23	0.25	0.032 U
7440-02-0	Nickel	43.7	44.0	45.3	43.7	43.4	43.0	44.7	40.7	40.6	10.3
7440-09-7	Potassium	3460	3520	3470	3300	3350	4660	4510	4380	4450	971
7782-49-2	Selenium	R	R	R	R	R	R	R	R	R	R
7740-22-4	Silver	0.93 E	0.72 E	1.2 E	1.1 E	0.98 E	0.56 E	0.63 E	0.60 E	0.58 E	0.027 E
7740-23-5	Sodium	21500	22600	22600	22200	22400	32500	33500	31600	32100	3440
7740-28-0	Thallium	0.23 U	0.24 U	0.28	0.21 U	0.24 U	0.35 U	0.32 U	0.33 U	0.32 U	0.090
7740-62-2	Vanadium	58.9 E	58.5 E	60.1 E	56.6 E	56.2 E	71.8 E	69.5 E	66.8 E	68.7 E	15.9 E
7740-66-6	Zinc	144 E	140 E	144 E	135 E	133 E	109 E	138 E	104 E	104 E	17.5 E

Table 1. (continued) Inorganics Analyses - Qualified Sample Results

CAS No.	Target Parameter	STATION 40 Sample 40 7976G	STATION 41 Sample 41 7976H	STATION 43 Sample 43 7976I	STATION 44 Sample 44 7976R	STATION 44 Sample 63 7976Y	STATION 44 Sample 64 7976W	STATION 44 Sample 65 7976X	STATION 45 Sample 45 7976S	STATION 47 Sample 47 7976T	STATION 48 Sample 48 7976U
7429-90-5	Aluminum	10600	14600	5370	7960	7910	8280	8240	11700	7360	19500
7440-36-0	Antimony	0.28 E	0.15 U	0.11 U	0.12 E	0.12 U	0.23 E	0.13 E	0.16 U	0.098 U	0.25 U
7740-38-2	Arsenic	8.1	6.1	2.1	7.8 E	6.4	5.3	5.6	6.3	5.1	11.1
7740-39-3	Barium	26.5	35.6	10.2	14.0	14.3	14.6	14.8	20.3	11.2	32.2
7740-41-7	Beryllium	0.16	0.27	0.11 U	0.18	0.19	0.18	0.15	0.21	0.21	0.36
7740-70-2	Cadmium	0.17	0.070	0.021 U	0.099	0.097	0.097	0.10	0.29	0.20	0.57
7740-43-9	Calcium	5180	6170	2770	3380	3270	3510	3900	4840	18300	7320
7740-47-3	Chromium	16.4	17.1	12.2	15.9	16.2	16.1	16.4	18.1	20.6	35.5
7740-48-4	Cobalt	5.2	6.4	2.7	6.6	6.6	6.3	6.8	7.0	5.8	10.0
7740-50-8	Copper	46.8	31.3	4.7	14.7	15.0	16.8	14.7	30.9	10.0	47.8
7439-89-6	Iron	14000	18500	7190	11600	11500	11500	11800	14300	17700	24800
7439-92-1	Lead	34.3	9.4	3.6	12.5	12.0	16.6	11.9	17.0	7.7 E	25.8
7439-95-4	Magnesium	4300	5340	2890	4340	4340	4460	4380	5690	5660	10500
7439-96-5	Manganese	209	171	195	439	440	456	410	375	338	701
7439-97-6	Mercury	0.11	0.049	0.030 U	0.047	0.039 U	0.039 U	0.036 U	0.072	0.035 U	0.13
7440-02-0	Nickel	11.8	14.1	10.9	16.4	16.9	16.9	17.2	16.7	21.5	35.3
7440-09-7	Potassium	1240	1480	795	1260	1190	1280	1240	1840	2120	3460
7782-49-2	Selenium	R	R	R	R	R	R	R	R	R	R
7740-22-4	Silver	0.29 E	0.13 E	0.021 U	0.072 E	0.082 E	0.10 E	0.089 E	0.24 E	0.059 E	0.34 E
7740-23-5	Sodium	8520	9750	3880	6420	6420	7250	6510	13600	5520	27200
7740-28-0	Thallium	0.13 U	0.15 U	0.13	0.10	0.14	0.16	0.099 U	0.16 U	0.12	0.25 U
7740-62-2	Vanadium	39.5 E	48.5 E	16.8 E	25.2 E	25.2 E	25.9 E	26.0 E	32.6 E	25.5 E	52.2 E
7740-66-6	Zinc	48.3 E	37.4 E	15.2 E	34.1 E	34.2 E	35.9 E	35.8 E	50.4 E	34.9 E	97.5 E

Table 1. (continued) Inorganics Analyses - Qualified Sample Results

CAS No.	Target Parameter	STATION 49 Sample 49 7976V	STATION 66 Sample 66 7976M	STATION 67 Sample 67 8015L	STATION 68 Sample 68 8078P	STATION 69 Sample 69 7976N	STATION 70 Sample 70 7976Z	STATION 71 Sample 71 8041I	STATION 201R Sample 201R 8078F	STATION 202R Sample 202R 8078G
7429-90-5	Aluminum	23400	12900	11700	10700	8760	19200	13500	9440	11800
7440-36-0	Antimony	0.26 U	0.15 U	0.15 U	0.13 U	0.10 U	0.21 U	0.18 U	0.11 U	0.13 U
7740-38-2	Arsenic	12.4	5.2	5.1	4.8	3.9	5.5	8.7	3.9	4.3
7740-39-3	Barium	27.4	27.9	21.9	21.3	20.7	27.7	33.8	78.8	40.4
7740-41-7	Beryllium	0.39	0.19	0.22	0.24	0.13 U	0.31	0.23	0.19	0.27
7740-70-2	Cadmium	1.3	0.46	0.49	0.60	0.41	0.56	0.26	0.059	0.17
7740-43-9	Calcium	5940	5050	5080	5260	5000	8920	5150	4060	6970
7740-47-3	Chromium	38.1	31.1	27.0	29.4	23.1	45.6	31.4	23.2	22.9
7740-48-4	Cobalt	8.9	6.0	5.4	5.5	5.6	14.4	7.0	7.9	7.4
7740-50-8	Copper	58.9	16.0	15.4 E	15.6	11.6	46.4	20.9 E	13.0	11.8
7439-89-6	Iron	27500	19600	17300	16900	12400	28900	21100	17700	22700
7439-92-1	Lead	27.5	7.0	7.5	11.3	6.2	16.9	8.9	6.2	6.1
7439-95-4	Magnesium	11100	7870	7600	7170	5500	10600	8800	7820	7460
7439-96-5	Manganese	300	207	171	162	192	1070	255	270	274
7439-97-6	Mercury	0.18	0.044 U	0.045	0.042	0.037	0.066 U	0.074	0.034	0.042
7440-02-0	Nickel	29.3	29.7	27.6	27.7	24.5	40.7	32.0	28.6	20.6
7440-09-7	Potassium	3630	1860	1880	1820	1220	2490	2190	1460	2010
7782-49-2	Selenium	R	R	R	R	R	R	R	R	R
7740-22-4	Silver	1.3 E	0.10 E	0.12 E	0.11 U	0.13 E	0.21 E	0.11 E	0.11 U	0.15 U
7740-23-5	Sodium	29900	8930	8930	8970	5870	17700	13100	6050	7120
7740-28-0	Thallium	0.26 U	0.33	0.41	0.18	0.25	0.21 U	0.18 U	0.11 U	0.13 U
7740-62-2	Vanadium	51.9 E	41.3 E	35.0	33.2	28.2 E	70.9 E	38.2	32.1	38.0
7740-66-6	Zinc	87.0 E	47.9 E	46.2 E	44.6 E	33.5 E	78.6 E	56.8 E	43.8 E	53.7 E

Table 1. (continued) Inorganics Analyses - Qualified Sample Results

CAS No.	Target Parameter	STATION 203R Sample 203R 8041M	STATION 204R Sample 204R 8041R	STATION 205R Sample 205R 8041S	STATION 206R Sample 206R 8041T	STATION 207R Sample 207R 8041N	STATION 208R Sample 208R 8078H	STATION 209R Sample 209R 8041O
7429-90-5	Aluminum	28700	21000	15300	12200	16800	19900	12100
7440-36-0	Antimony	0.19 U	0.30 U	0.16 U	0.14 U	0.18 U	0.36 U	0.13 U
7740-38-2	Arsenic	15.2	15.8	5.9	5.5	6.4	9.8	7.4
7740-39-3	Barium	73.6	61.9	40.9	30.9	45.6	42.9	28.2
7740-41-7	Beryllium	0.55	0.33 U	0.29	0.25	0.31	0.34 U	0.11 U
7740-70-2	Cadmium	0.21	1.2	0.33	0.46	0.16	2.2	0.085
7740-43-9	Calcium	6660	6500	6450	5350	7390	5450	5060
7740-47-3	Chromium	95.2	48.0	29.7	23.7	37.0	46.2	36.0
7740-48-4	Cobalt	24.9	8.3	7.4	6.6	9.0	8.9	8.6
7740-50-8	Copper	58.6 E	36.5 E	18.7 E	14.2 E	25.2 E	39.9	24.5 E
7439-89-6	Iron	48200	30400	24100	19600	26000	29800	19000
7439-92-1	Lead	15.0	16.4	9.7	7.1	10.3	11.2	5.2
7439-95-4	Magnesium	24600	13500	9000	7340	10800	13900	8900
7439-96-5	Manganese	735	256	243	227	320	225	241
7439-97-6	Mercury	0.14	0.12	0.055	0.047	0.070	0.11 U	0.14
7440-02-0	Nickel	163	36.9	24.6	21.2	40.0	37.1	43.3
7440-09-7	Potassium	3130	4750	2750	2040	2810	4680	1350
7782-49-2	Selenium	R	R	R	R	R	R	R
7740-22-4	Silver	0.21 E	0.30 E	0.13 E	0.071 E	0.13 E	0.30 E	0.089 E
7740-23-5	Sodium	14500	30600	12500	8980	14800	39000	6290
7740-28-0	Thallium	0.19 U	0.30	0.16 U	0.21	0.18 U	0.36 U	0.13 U
7740-62-2	Vanadium	77.4	59.8	44.2	35.7	50.8	58.4	36.1
7740-66-6	Zinc	108 E	99.4 E	63.9 E	54.1 E	67.3 E	86.3 E	48.7 E

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.

E: The associated value is an estimated quantity.

Table 2. Inorganics Analyses - Sample Holding Times

Station	Sample	Rep/QC	Lab ID	Date	Date Analyzed			Holding Times (Days)		
				Collected	ICP	GFAA	Mercury	ICP	GFAA	Mercury
1	1	1	8041 P	4/10/91	5/6/91	5/15/91	5/8/91	26	35	28
2R	2R	1	8041 Q	4/7/91	5/6/91	5/13/91	5/8/91	29	36	**31**
3	3	1	8078 A	4/11/91	5/6/91	5/17/91	5/8/91	25	36	27
4	4	1	8041 A	4/7/91	5/1/91	5/16/91	5/8/91	24	39	**31**
5	5	1	8041 B	4/6/91	5/1/91	5/16/91	5/8/91	25	40	**32**
5	5	DUP	8041 B Dup	4/6/91	5/6/91	5/16/91	5/8/91	30	40	**32**
5	5	MS	8041 B Spk	4/6/91	5/6/91	5/16/91	5/8/91	30	40	**32**
5	51	1	8041 F	4/6/91	5/6/91	5/16/91	5/8/91	30	40	**32**
5	52	2	8041 G	4/6/91	5/6/91	5/16/91	5/8/91	30	40	**32**
5	53	3	8041 H	4/6/91	5/6/91	5/16/91	5/8/91	30	40	**32**
8	8	1	8078 B	4/12/91	5/6/91	5/17/91	5/8/91	24	35	26
9R	9R	1	8078 C	4/12/91	5/6/91	5/17/91	5/8/91	24	35	26
10R	10R	1	8078 D	4/13/91	5/6/91	5/17/91	5/8/91	23	34	25
11R	11R	1	8078 E	4/13/91	5/6/91	5/17/91	5/8/91	23	34	25
12	12	1	8078 J	4/13/91	5/8/91	5/17/91	5/8/91	25	34	25
13R	13R	1	8078 K	4/14/91	5/8/91	5/17/91	5/8/91	24	33	24
13	13	DUP	8078 K Dup	4/14/91	5/8/91	5/17/91	5/8/91	24	33	24
13	13	MS	8078 K Spk	4/14/91	5/8/91	5/17/91	5/8/91	24	33	24
14	14	1	8078 L	4/14/91	5/8/91	5/17/91	5/8/91	24	33	24
15	15	1	8078 M	4/14/91	5/8/91	5/17/91	5/8/91	24	33	24
17	17	1	8078 N	4/14/91	5/8/91	5/17/91	5/8/91	24	33	24
18	18	1	8041 C	4/5/91	5/1/91	5/13/91	5/8/91	26	38	**33**
19	19	1	8041 D	4/5/91	5/1/91	5/16/91	5/8/91	26	41	**33**
20	20	1	8041 E	4/5/91	5/1/91	5/16/91	5/8/91	26	41	**33**
21	21	1	8015 A	4/2/91	5/1/91	5/6/91	5/8/91	29	34	**36**
22	22	1	8015 B	4/2/91	5/1/91	5/6/91	5/8/91	29	34	**36**
26	26	1	8078 O	4/13/91	5/8/91	5/17/91	5/8/91	25	34	25
29	29	1	8015 C	4/1/91	5/1/91	5/6/91	5/8/91	30	35	**37**
30	30	1	7976 B	3/25/91	4/15/91	4/24/91	4/17/91	21	30	23

Holding times exceeding project-specified limits are highlighted in **bold**.

Table 2. (continued) Inorganics Analyses - Sample Holding Times

Station	Sample	Rep/QC	Lab ID	Date	Date Analyzed			Holding Times (Days)		
				Collected	ICP	GFAA	Mercury	ICP	GFAA	Mercury
32	32	1	8015 D	4/1/91	5/1/91	5/6/91	5/8/91	30	35	**37**
32	32	DUP	8015 D Dup	4/1/91	5/1/91	5/6/91	4/30/91	30	35	**29**
32	32	MS	8015 D Spk	4/1/91	5/1/91	5/8/91	4/30/91	30	37	**29**
32	57	1	8015 F	4/1/91	5/1/91	5/8/91	5/8/91	30	37	**37**
32	58	2	8015 G	4/1/91	5/1/91	5/6/91	5/8/91	30	35	**37**
32	59	3	8015 H	4/1/91	5/1/91	5/8/91	5/8/91	30	37	**37**
33	33	1	8015 E	4/1/91	5/1/91	5/6/91	5/8/91	30	35	**37**
34	34	1	7976 C	3/25/91	4/15/91	4/30/91	4/17/91	21	36	23
35	35	1	7976 D	3/26/91	4/15/91	4/30/91	4/17/91	20	35	22
35	35	DUP	7976 DDUP	3/26/91	4/15/91	4/30/91	4/17/91	20	35	22
35	35	MS	7976 DSPK	3/26/91	4/15/91	4/30/91	4/17/91	20	35	22
35	72	1	7976 O	3/26/91	4/15/91	4/30/91	4/17/91	20	35	22
35	73	2	7976 P	3/26/91	4/15/91	4/30/91	4/17/91	20	35	22
35	74	3	7976 Q	3/26/91	4/15/91	4/30/91	4/17/91	20	35	22
38	38	1	7976 E	3/26/91	4/15/91	4/24/91	4/17/91	20	29	22
38	60	1	7976 J	3/26/91	4/15/91	4/30/91	4/17/91	20	35	22
38	61	2	7976 K	3/26/91	4/15/91	4/24/91	4/17/91	20	29	22
38	61	DUP	7976 KDUP	3/26/91	4/15/91	4/24/91	4/17/91	20	29	22
38	61	MS	7976 KSPK	3/26/91	4/15/91	4/24/91	4/17/91	20	29	22
38	62	3	7976 L	3/26/91	4/15/91	5/1/91	4/17/91	20	36	22
39	39	1	7976 F	3/27/91	4/15/91	4/24/91	4/17/91	19	28	21
40	40	1	7976 G	3/27/91	4/15/91	4/30/91	4/17/91	19	34	21
41	41	1	7976 H	3/27/91	4/15/91	4/24/91	4/17/91	19	28	21
43	43	1	7976 I	3/27/91	4/15/91	4/24/91	4/17/91	19	28	21
44	44	1	7976 R	3/28/91	4/24/91	4/24/91	4/30/91	27	27	**33**
44	44	DUP	7976 RDUP	3/28/91	4/24/91	4/24/91	4/30/91	27	27	**33**
44	44	MS	7976 RSPK	3/28/91	5/1/91	5/2/91	4/17/91	34	35	20
44	63	1	7976 Y	3/28/91	4/24/91	4/24/91	4/23/91	27	27	26
44	64	2	7976 W	3/28/91	4/24/91	4/24/91	4/23/91	27	27	26
44	65	3	7976 X	3/28/91	4/24/91	4/25/91	4/23/91	27	28	26

Holding times exceeding project-specified limits are highlighted in **bold**.

Table 2. (continued) Inorganics Analyses - Sample Holding Times

Station	Sample	Rep/QC	Lab ID	Date	Date Analyzed			Holding Times (Days)		
				Collected	ICP	GFAA	Mercury	ICP	GFAA	Mercury
45	45	1	7976 S	3/28/91	4/24/91	4/24/91	4/23/91	27	27	26
47	47	1	7976 T	3/28/91	4/24/91	4/24/91	4/23/91	27	27	26
48	48	1	7976 U	3/29/91	4/24/91	4/24/91	4/23/91	26	26	25
49	49	1	7976 V	3/29/91	4/24/91	4/24/91	4/23/91	26	26	25
66	66	PCS	7976M	3/27/91	4/15/91	4/24/91	4/17/91	19	28	21
67	67	PCS	8015 L	4/2/91	5/6/91	5/8/91	4/30/91	34	36	28
68	68	PCS	8078P	4/11/91	5/8/91	5/17/91	5/8/91	27	36	27
69	69	1	7976 N	3/25/91	4/15/91	4/24/91	4/17/91	21	30	23
70	70	1	7976 Z	3/28/91	4/24/91	4/24/91	4/23/91	27	27	26
71	71	1	8041 I	4/5/91	5/6/91	5/13/91	5/8/91	31	38	**33**
201R	201R	1	8078 F	4/11/91	5/6/91	5/17/91	5/8/91	25	36	27
202R	202R	1	8078 G	4/11/91	5/6/91	5/17/91	5/8/91	25	36	27
203R	203R	1	8041 M	4/7/91	5/6/91	5/16/91	5/8/91	29	39	**31**
204R	204R	1	8041 R	4/8/91	5/6/91	5/13/91	5/8/91	28	35	**30**
205R	205R	1	8041 S	4/8/91	5/6/91	5/13/91	5/8/91	28	35	**30**
206R	206R	1	8041 T	4/8/91	5/6/91	5/13/91	5/8/91	28	35	**30**
207R	207R	1	8041 N	4/6/91	5/6/91	5/13/91	5/8/91	30	35	**30**
208R	208R	1	8078 H	4/13/91	5/6/91	5/17/91	5/8/91	23	34	25
209R	209R	1	8041 O	4/5/91	5/6/91	5/13/91	5/8/91	31	38	**33**

Holding times exceeding project-specified limits are highlighted in **bold**.

Table 3A. Inorganics Analyses - ICP Calibration Blank Summary

(All values in μg/l)

Analyte	IDL	4/15/91				4/24/94				5/01/91					
	(μg/l)	CCB1	CCB2	CCB3	CCB4	ICB	CCB1	CCB2	CCB3	ICB	CCB1	CCB2	CCB3	CCB4	CCB5
Aluminum	20.0	25.2	–	–	–	–	–	–	–	–	–	–	–	–	24.0
Barium	1.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Beryllium	1.0	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Calcium	10.0	21.5	–	–	–	–	–	–	–	–	44.9	–	-	13.4	234
Copper	2.0	–	–	–	–	–2.2	–2.2	–2.2	–2.2	–	4.5	–	-	2.4	7.0
Iron	5.0	23.6	7.5	8.1	18.7		5.7	9.2	6.7	–	5.7	–	5.7	31.3	-
Magnesium	10.0	19.4	–	–	–	–	–	–	–	–	12.0	–	11.0	20.4	70.0
Potassium	300	–	–	363	323	–	–	–	–	–	–	–	–	–	–
Sodium	10.0	–	13.5	39.2	65.7	–	–	–	12.5	–10.9	–13.4	–14.3	21.9	74.3	27.0
Zinc	4.0	–	–	–	–	–	–	–	–	–	–	–	–	–	10.0

Analyte	IDL	5/06/91					5/08/91				
	(μg/l)	CCB1	CCB2	CCB3	CCB4	CCB5	CCB1	CCB2	CCB3	CCB4	CCB5
Calcium	10.0	10.0	–	21.0	27.0	31.0	–	–	–	–	–
Iron	5.0	40.0	22.0	31.0	38.0	–	15.2	26.7	15.8	10.4	8.5
Magnesium	10.0	22.0	–	–	–	–	–	–	–	–	–
Potassium	300	–	–	–	–	–354	–	–	–	–	–
Sodium	10.0	–	–	–	–	–	–	–	–12.6	–10.5	–

Values listed only tor analytes and blanks greater than the instrument detection limit.

Table 3B. Inorganics Analyses - Preparation Blank Summary

(All values in mg/kg, dry weight)*

	Instrument Detection Limit (µg/l)	7976 MB PBS1	7976 MB2 PBS2	8015 MB PBS	8041 MB PBS	8041 MB2 PBS2	8078 MB1 PBS1	8078 MB2 PBS2
Aluminum	20.0	**3.9**	**3.4**	**4.6**	**4.1**	**6.9**	**7.1**	**6.3**
Antimony	1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Arsenic	1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Barium	1.0	0.10 U	0.10 U	**0.17**	0.10 U	0.10 U	**0.25**	**0.12**
Beryllium	1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Cadmium	0.20	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U
Calcium	10.0	**5.4**	**2.6**	**12.6**	**4.7**	**5.2**	**1.0**	**1.2**
Chromium	5.0	0.50 U	0.50 U	0.50 U	0.50 U	**0.61**	0.50 U	0.50 U
Cobalt	3.0	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U
Copper	2.0	0.20 U	0.20 U	**0.37**	**0.37**	**0.33**	0.20 U	0.20 U
Iron	5.0	**1.5**	**0.69**	**0.98**	**0.52**	**6.6**	**20.4**	**0.51**
Lead	1.0	0.10 U	0.10 U	**0.17**	**0.10**	**0.30**	**0.22**	0.10 U
Magnesium	10.0	1.0 U	1.0 U	1.0 U	**2.7**	**2.2**	1.0 U	**1.3**
Manganese	1.0	0.10 U	0.10 U	0.10 U	0.10 U	**0.13**	0.10 U	0.10 U
Mercury	0.10	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
Nickel	10.0	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Potassium	300	30.0 U	30.0 U	30.0 U	30.0 U	30.0 U	30.0 U	30.0 U
Selenium	1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Silver	0.20	0.020 U	0.020 U	0.020 U	0.020 U	0.020 U	**0.037**	0.020 U
Sodium	10.0	**10.0**	**8.1**	**1.7**	**13.7**	**71.9**	**21.9**	**15.3**
Thallium	1.0	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Vanadium	2.0	**0.66**	0.20 U	0.20 U	0.20 U	**−0.55**	0.20 U	0.20 U
Zinc	4.0	**0.52**	**0.76**	0.40 U	**0.96**	**1.7**	0.40 U	**0.48**

* Based on a 1.0 gram sample weight for ICP and GFAA, a 0.4 gram sample weight for Mercury, a 100 ml final volume, and 100 % total solids.
Analytes detected above the instrument detection limit are highlighted in bold. Although reported here, all selenium results have been qualified "R" (unusable).

Table 4A. Inorganics Analyses - Laboratory Control Sample Summary

NIST SRM 1646 **Estuarine Sediment** (LCSS1)

(All results in mg/kg, dry weight)

Analyte	True Value	Uncertainty Range (Certified Values)		7976 REF1 Result	%R	8015 REF1 Result	%R	8041 REF1 Result	%R	8078 REF1 Result	%R	7976 REF4 Result	%R	MEAN	CV (Values)
Aluminum	62500	64500	60500	18000	28.8	16300	26.1	14800	23.7	13400	21.4	12500	20.0	15000	14.7
Antimony	0.4 (a)			0.16	40.0	0.090 U	22.5	0.079 U	19.8	0.087 U	21.8	0.10 U	25.0	0.10 U	
Arsenic	11.6	12.9	10.3	7.1	61.2	8.5	73.3	8.5	73.3	8.0	69.0	8.7	75.0	8.2	7.9
Barium	NVA			40.4	-	37.5	-	34.2	-	32.8	-	31.5		35.3	10.3
Beryllium	1.5 (a)			0.76	50.7	0.77	51.3	0.71	47.3	0.66	44.0	0.63	42.0	0.71	8.6
Cadmium	0.36	0.43	0.29	0.36	100	0.36	100	0.32	88.9	0.30	83.3	0.43	119	0.35	14.2
Calcium	8300	8600	8000	3970	47.8	3860	46.5	3740	45.1	3700	44.6	3650	44.0	3780	3.4
Chromium	76	79	73	39.8	52.4	37.5	49.3	35.2	46.3	32.2	42.4	32.1	42.2	35.4	9.5
Cobalt	10.5	11.8	9.2	7.8	74.3	7.8	74.3	7.5	71.4	7.4	70.5	7.2	68.6	7.5	3.5
Copper	18	21	15	15.8	87.8	16.3	90.6	15.0	83.3	14.8	82.2	14.4	80.0	15.3	5.1
Iron	33500	34500	32500	27400	81.8	26100	77.9	25200	75.2	23700	70.7	24300	72.5	25300	5.8
Lead	28.2	30	26.4	24.9	88.3	24.5	86.9	21.2	75.2	24.5	86.9	23.0	81.6	23.6	6.5
Magnesium	10900	11700	10100	8320	76.3	7930	72.8	7760	71.2	7730	70.9	7700	70.6	7890	3.3
Manganese	375	395	355	236	62.9	229	61.1	222	59.2	218	58.1	215	57.3	224	3.8
Mercury	0.063	0.075	0.051	0.068	108	0.068	108	0.076	121	0.076	121	0.067	106	0.071	6.5
Nickel	32	35	29	23.8	74.4	22.3	69.7	21.8	68.1	20.5	64.1	19.9	62.2	21.7	7.1
Potassium	14000 (a)			4070	29.1	4040	28.9	3660	26.1	3450	24.6	3310	23.6	3710	9.2
Selenium	0.6 (a)			0.46 U	76.7	0.45 U	75.0	0.40 U	66.7	0.44 U	73.3	0.50 U	83.3	0.45 U	
Silver	NVA			0.26	-	0.11		0.14	-	NA	-	0.12	-	0.16	43.4
Sodium	20000 (a)			11100	55.5	10800	54.0	10600	53.0	10500	52.5	10700	53.5	10700	2.2
Thallium	0.5 (a)			0.21	42.0	0.45 U	90.0	0.19	38.0	0.087	17.4	0.12	24.0	0.15	38.6
Vanadium	94	95	93	47.1	50.1	44.7	47.6	41.8	44.5	40.3	42.9	38.2	40.6	42.4	8.3
Zinc	138	144	132	107	77.5	104	75.4	101	73.2	105	76.1	102	73.9	104	2.3

NCV = No Value Available
NA = Not Analyzed
(a) = Uncertified Value

Table 4B. Inorganics Analyses - Laboratory Control Sample Summary

NIST SRM 2704 **Buffalo River Sediment** (LCSS2)
1991 Results

(All results in mg/kg, dry weight)

Analyte	True Value	95% Confidence Interval		7976 REF2		8015 REF2		8041 REF2		8078 REF2		MEAN	CV
				Result	%R	Result	%R	Result	%R	Result	%R		(Values)
Aluminum	61100	59500	62700	13900	22.7	12700	20.8	11800	19.3	11200	18.3	12400	9.5
Antimony	3.79	3.64	3.94	0.52	13.7	0.69	18.2	0.56	14.8	0.45	11.9	0.56	18.0
Arsenic	23.4	22.6	24.2	18.0	76.9	20.4	87.2	16.6	70.9	20.6	88.0	18.9	10.2
Barium	414	402	426	97.9	23.6	89.5	21.6	83.8	20.2	85.8	20.7	89.3	7.0
Beryllium	NCV			0.68	-	0.65	-	0.53		0.55	-	0.60	12.3
Cadmium	3.45	3.23	3.67	2.7	78.3	3.9	113	3.6	104	3.5	101	3.4	15.1
Calcium	26000	25700	26300	23600	90.8	22800	87.7	22800	87.7	22800	87.7	23000	1.7
Chromium	135	130	140	84.4	62.5	80.7	59.8	77.7	57.6	76.7	56.8	79.9	4.3
Cobalt	14	13.4	14.6	11.5	82.1	11.4	81.4	11.0	78.6	11.3	80.7	11.3	1.9
Copper	98.6	93.6	103.6	96.9	98.3	94.6	95.9	90.8	92.1	91.1	92.4	93.4	3.1
Iron	41100	40100	42100	33100	80.5	31400	76.4	30100	73.2	29000	70.6	30900	5.7
Lead	161	144	178	149	92.5	161	100	149	92.5	177	110	159	8.3
Magnesium	12000	11800	12200	9240	77.0	8710	72.6	8980	74.8	8770	73.1	8930	2.7
Manganese	555	536	574	496	89.4	481	86.7	473	85.2	469	84.5	480	2.5
Mercury	1.44	1.37	1.51	1.2	83.3	1.3	90.3	1.4	97.2	1.4	97.2	1.3	7.4
Nickel	44.1	41.1	47.1	37.9	85.9	35.8	81.2	35.7	81.0	35.1	79.6	36.1	3.4
Potassium	20000	19600	20400	1910	9.6	1810	9.1	1270	6.4	1100	5.5	1520	26.2
Selenium	NCV			0.46 U	-	0.46 U		0.42 U		0.41 U		0.44 U	
Silver	NCV			0.26		0.28	-	0.17		0.28	-	0.25	21.0
Sodium	5470	5330	5610	140	2.6	143	2.6	155	2.8	114	2.1	138	12.5
Thallium	1.2	1.0	1.4	0.85	70.8	0.57	47.5	0.59	49.2	0.58	48.3	0.65	20.8
Vanadium	95	91	99	24.2	25.5	22.4	23.6	19.9	20.9	19.5	20.5	21.5	10.3
Zinc	438	426	450	394	90.0	373	85.2	385	87.9	382	87.2	384	2.3

NCV = No Certifed Value

Table 4C. Inorganics Analyses - Laboratory Control Sample Summary

NIST SRM 2704 **Buffalo River Sediment**
1989 Results

(All results in mg/kg, dry weight)

Analyte	True Value	2756 REF Result	2756 REF %R	2772 REF Result	2772 REF %R	2772 REF2 Result	2772 REF2 %R	2772 REF3 Result	2772 REF3 %R	Mean	CV (Values)	1989/1991 Mean (n=9)	1989/1991 CV (n=9)
Aluminum	61100	13600	22.3	14200	23.2	12500	20.5	13700	22.4	13500	5.3	12900	7.9
Antimony	3.79	0.61	16.1	0.29	7.7	0.6	15.8	0.47	12.4	0.49	30.5	0.53	21.8
Arsenic	23.4	17	72.6	17.4	74.4	9.6	41.0	18.7	79.9	15.7	26.2	17.5	18.6
Barium	414	90.6	21.9	96.1	23.2	90.9	22.0	91.7	22.1	92.3	2.8	90.6	4.9
Beryllium	NCV												
Cadmium	3.45	3.5	101.4	3.5	101.4	3.6	104	3.5	101	3.5	1.4	3.5	9.1
Calcium	26000	23800	91.5	23900	91.9	23500	90.4	23200	89.2	23600	1.3	23300	1.9
Chromium	135	85	63.0	87	64.4	83.1	61.6	83.4	61.8	84.6	2.1	82	4.2
Cobalt	14	11.8	84.3	11.5	82.1	11.9	85.0	11.2	80.0	11.6	2.7	11.4	2.5
Copper	98.6	90.1	91.4	95	96.3	93.5	94.8	92.9	94.2	92.9	2.2	93.1	2.4
Iron	41100	34300	83.5	34000	82.7	33200	80.8	33700	82.0	33800	1.4	32200	5.9
Lead	161	154	95.7	159	98.8	159	98.8	149	93.0	155	3.1	157	5.6
Magnesium	12000	9280	77.3	9930	82.8	9620	80.2	9550	79.6	9600	2.8	9220	4.5
Manganese	555	502	90.5	508	91.5	505	91.0	497	89.5	503	0.9	490	3.0
Mercury	1.44	1.46	101.4	1.47	102.1	1.3	90.3	1.5	104.2	1.4	6.4	1.4	7.2
Nickel	44.1	38	86.2	39	88.4	37	83.9	38	86.2	38	2.1	37	3.6
Potassium	20000	1970	9.9	1900	9.5	1510	7.6	1820	9.1	1800	11.3	1650	18.8
Selenium	NCV				-		-		-				
Silver	NCV		-										
Sodium	5470	130	2.4	134	2.4	129	2.4	132	2.4	131	1.7	135	8.3
Thallium	1.2	0.44	36.7	0.55	45.8	0.45	37.5	0.53	44.2	0.49	11.3	0.58	20.9
Vanadium	95	23.2	24.4	21.4	22.5	20.7	21.8	21.6	22.7	21.7	4.9	21.6	7.0
Zinc	438	418	95.4	430	98.2	415	94.7	402	91.8	416	2.8	398	4.9

NCV = No Certifed Value

Table 4D. Inorganics Analyses - Laboratory Control Sample Summary

ERA Lot 207 LCSS3

(All results in mg/kg, dry weight)

Analyte	True Value	7976 REF3 Result	%R	8015 REF3 Result	%R	8041 REF3 Result	%R	8078 REF3 Result	%R	Mean Value	Mean Recovery	CV (%R)	Number Out
Aluminum	9580	11000	115	9520	99.4	9200	96.0	7620	**79.5**	9340	97.4	14.9	1
Antimony (a)	47	63.9	136	76.0	162	70.0	149	81.5	173	70.0	155	10.4	4
Arsenic	194	187	96.4	184	94.8	130	**67.0**	126	64.9	157	80.8	21.2	1
Barium	226	235	104	231	102	227	100	214	94.7	227	100	4.0	0
Beryllium	54	53.0	98.1	50.9	94.3	53.2	98.5	49.0	90.7	50.0	95.4	3.8	0
Cadmium	120	88.0	**73.3**	115	95.8	105	87.5	95.0	**79.2**	101	84.0	11.7	2
Calcium	7520	6860	91.2	6660	88.6	6830	90.8	6380	84.8	6680	88.9	3.3	0
Chromium	67	66.4	99.1	63.0	94.0	65.9	98.4	59.4	88.7	63.7	95.1	5.0	0
Cobalt	96	91.3	95.1	88.9	92.6	93.2	97.1	86.0	89.6	89.9	93.6	3.5	0
Copper	149	143	96.0	139	93.3	141	94.6	131	87.9	139	93.0	3.8	0
Iron	15700	15100	96.2	14100	89.8	13800	87.9	12100	**77.1**	13800	87.8	9.0	1
Lead	117	119	102	142	**121**	149	**127**	130	111	135	115	9.8	2
Magnesium	3410	3970	116	3790	111	3770	111	3540	104	3770	111	4.7	0
Manganese	677	664	98.1	639	94.4	659	97.3	615	90.8	644	95.2	3.5	0
Mercury (b)	6.4	NA	-	NA	-	NA	-	NA	-		-	-	-
Nickel	225	212	94.2	200	88.9	207	92.0	194	86.2	203	90.3	3.9	0
Potassium	3480	3820	110	3810	110	3670	106	3490	100	3700	106	4.2	0
Selenium	107	82.4	**77.0**	97.0	90.7	90.0	84.1	103	96.3	93.1	87.0	9.6	1
Silver (a)	52	46.3	89.0	40.0	76.9	50.0	96.2	61.0	117	49.3	94.9	17.9	1
Sodium	643	739	115	671	104	765	119	630	98.0	701	109	8.8	0
Thallium	9.2	8.6	93.5	11.9	129	7.9	85.9	8.6	93.5	9.3	101	19.4	0
Vanadium	86	75.4	87.7	72.3	84.1	71.6	83.3	65.8	**76.5**	71.3	82.9	5.6	1
Zinc	257	230	89.5	216	84.0	231	89.9	217	84.4	224	87.0	3.7	0

NA = Not Analyzed.

Recoveries not meeting project-specified acceptance limits (80-120%R) are highlighted in bold.

(a) = Acceptance criteria do not apply to antimony and silver.

(b) = Solid LCS not required for mercury.

Table 5. Inorganics Analyses - Duplicate Summary

Analyte	STATION 5 8041B	STATION 5D 8041BDUP	Relative Percent Difference	STATION 13R 8078K	STATION 13RD 8078KDUP	Relative Percent Difference
Aluminum	19300	21100	-8.9	6300	7130	-12.4
Antimony	0.23 U	0.27 U	NC	0.11 U	0.13	-16.7
Arsenic	7.5	8.8	-16.0	3.4	3.2	6.1
Barium	50.4	53.2	-5.4	12.5	13.5	-7.7
Beryllium	0.40	0.37	7.8	0.15	0.14	6.9
Cadmium	0.21	0.16	27.0	0.052	0.049	5.9
Calcium	6640	6430	3.2	3810	4720	-21.3
Chromium	46.1	47.1	-2.1	15.3	16.8	-9.3
Cobalt	10.2	10.3	-1.0	4.0	4.2	-4.9
Copper	33.9	32.6	3.9	5.7	5.6	1.8
Iron	31800	33200	-4.3	13300	14100	-5.8
Lead	14.8	14.4	2.7	3.7	3.8	-2.7
Magnesium	12500	13400	-6.9	4420	4730	-6.8
Manganese	329	342	-3.9	152	160	-5.1
Mercury	0.13	0.12	8.0	0.029 U	0.061	±0.046 (a)
Nickel	43.3	44.4	-2.5	17.0	17.5	-2.9
Potassium	3660	3900	-6.3	1310	1380	-5.2
Selenium (b)	1.2 U	1.4 U	NC	0.44 U	0.54 U	NC
Silver	0.19	0.11	±0.10 (a)	0.028	0.060	±0.10 (a)
Sodium	21800	22500	-3.2	3050	3040	0.3
Thallium	0.23 U	0.27 U	-16.0	0.088	0.11 U	-22.2
Vanadium	57.0	60.8	-6.5	20.6	23.3	-12.3
Zinc	84.3	88.2	-4.5	27.3	26.5	3.0

Relative Percent Differences in bold exceed project-specified acceptance criteria: ±35% RPD, if results are >5X IDL (instrument detection limit); ±IDL if results are ≤5X IDL.

NC = Not Calculated

(a) : Value given is ±IDL (instrument detection limit) and is the control limit for the analyses.

(b) : Although reported here, all selenium results have been qualified "R" (unusable).

Table 5. (continued) Inorganics Analyses - Duplicate Summary

Analyte	STATION 32 8015D	STATION 32D 8015DDUP	Relative Percent Difference	STATION 35 7976D	STATION 35D 7976DDUP	Relative Percent Difference
Aluminum	6330	6200	2.1	19600	20000	-2.0
Antimony	0.11 U	0.098 U	11.5	0.24 U	0.24 U	NC
Arsenic	5.0	5.1	-2.0	11.4	11.6	-1.7
Barium	13.6	13.3	2.2	46.0	44.6	3.1
Beryllium	0.20	0.18	10.5	0.36	0.35	2.8
Cadmium	0.065	0.069	-6.0	0.92	0.77	17.8
Calcium	7990	3000	**90.8**	10100	10400	-2.9
Chromium	14.1	15.5	-9.5	50.7	51.1	-0.8
Cobalt	4.6	4.6	0	9.5	9.6	-1.0
Copper	7.9	7.9	0	78.4	76.3	2.7
Iron	10100	10000	1.0	26900	27200	-1.1
Lead	11.3	14.2	-22.7	66.3	71.6	-7.7
Magnesium	3590	3550	1.1	10800	10900	-0.9
Manganese	184	167	9.7	293	295	-0.7
Mercury	0.043	0.047	-8.9	0.59	0.55	7.0
Nickel	13.6	12.9	5.3	44.0	43.7	0.7
Potassium	1140	1140	0	3520	3470	1.4
Selenium (b)	0.48 U	0.52 U	NC	1.2 U	1.2 U	NC
Silver	0.096	0.10	-4.1	0.72	0.85	-16.6
Sodium	3950	3890	1.5	22600	22700	-0.4
Thallium	0.096 U	0.10 U	NC	0.24 U	0.24 U	NC
Vanadium	20.9	21.5	-2.8	58.5	59.6	-1.9
Zinc	22.7	23.2	-2.2	140	138	1.4

Relative Percent Differences in bold exceed project-specified acceptance criteria: ±35% RPD, if results are >5X IDL (instrument detection limit); ±IDL if results are ≤5X IDL.

NC = Not Calculated

(a) : Value given is ±IDL (instrument detection limit) and is the control limit for the analyses.

(b) : Although reported here, all selenium results have been qualified "R" (unusable).

Table 5. (continued) Inorganics Analyses - Duplicate Summary

Analyte	STATION 44 7976R	STATION 44D 7976RDUP	Relative Percent Difference	STATION 61 7976K	STATION 61D 7976KDUP	Relative Percent Difference
Aluminum	7960	8160	-2.5	23100	24000	-3.8
Antimony	0.15	0.23	±0.18 (a)	0.33 U	0.32 U	NC
Arsenic	7.8	5.0	**43.8**	13.0	13.2	-1.5
Barium	14.0	13.5	3.6	59.0	63.3	-7.0
Beryllium	0.18	0.19	-5.4	0.38	0.38	0
Cadmium	0.099	0.10	-1.0	0.33	0.38	-14.1
Calcium	3380	3280	3.0	9100	6970	26.5
Chromium	15.9	15.8	0.6	46.5	48.6	-4.4
Cobalt	6.6	7.2	-8.7	13.6	13.5	0.7
Copper	14.7	16.9	-13.9	54.8	54.2	1.1
Iron	11600	12600	-8.3	32600	33100	-1.5
Lead	12.5	12.7	-1.6	43.5	47.2	-8.2
Magnesium	4340	4500	-3.6	13300	13300	0
Manganese	439	456	-3.8	819	821	-0.2
Mercury	0.047	0.063	-29.1	0.23	0.21	9.1
Nickel	16.4	16.3	0.6	40.7	42.1	-3.4
Potassium	1260	1430	-12.6	4380	4480	-2.3
Selenium (b)	0.52 U	0.51 U	NC	1.7 U	1.6 U	NC
Silver	0.072	0.072	0.0	0.60	0.57	5.1
Sodium	6420	6920	-7.5	31600	31600	0
Thallium	0.10	0.16	±0.19 (a)	0.33 U	0.32 U	NC
Vanadium	25.2	28.0	-10.5	66.8	68.5	-2.5
Zinc	34.1	37.4	-9.2	104	104	0

Relative Percent Differences in bold exceed project-specified acceptance criteria: ±35% RPD, if results are >5X IDL (instrument detection limit); ±IDL if results are ≤5X IDL.

NC = Not Calculated

(a) : Value given is ±IDL (instrument detection limit) and is the control limit for the analyses.

(b) : Although reported here, all selenium results have been qualified "R" (unusable).

Table 6. Inorganics Analyses - Matrix Spike Summary

Target Parameter	STATION 5 8041B	STATION 5S 8041BSPK	Spike Added	Percent Recovery	STATION 13R 8078K	STATION 13RS 8078KSPK	Spike Added	Percent Recovery
Aluminum	19300	44600	23990	105.5	6300	16900	11030	96.1
Antimony	0.23 U	0.40	1.200	**33.3**	0.11 U	0.26	0.552	**47.1**
Arsenic	7.5 (a)	10.1	1.986	130.9	3.4	4.0	0.727	82.5
Barium	50.4	168	120.0	98.0	12.5	68.0	55.17	100.6
Beryllium	0.40	23.1	23.99	94.6	0.15	10.1	11.03	90.2
Cadmium	0.21	0.45	0.248	96.8	0.052	0.14	0.091	96.7
Calcium	6640	30500	23990	99.5	3810	15000	11030	101.5
Chromium	46.1	145	95.96	103.1	15.3	59.0	44.13	99.0
Cobalt	10.2	33.1	23.99	95.5	4.0	14.1	11.03	91.6
Copper	33.9	149	120.0	95.9	5.7	57.5	55.17	93.9
Iron	31800	53600	23990	90.9	13300	22300	11030	81.6
Lead	14.8 (a)	20.4	2.483	225.5	3.7	4.9	0.909	**132.0**
Magnesium	12500	37200	23990	103.0	4420	14900	11030	95.0
Manganese	329	901	599.8	95.4	152	400	275.8	89.9
Mercury	0.13	1.3	1.255	93.2	0.029 U	0.59	0.587	100.5
Nickel	43.3	157	120.0	94.8	17.0	66.4	55.17	89.5
Potassium	3660	11300	7197	106.2	1310	4570	3310	98.5
Selenium (b)	1.2 U	1.2 U	0.497	NC	0.44 U	0.45 U	0.182	NC
Silver	0.19	0.50	0.248	125.0	0.028	0.14	0.091	123.1
Sodium	21800	46900	23990	104.6	3050	13800	11030	97.5
Thallium	0.23 U	1.4	1.241	112.8	0.088	0.49	0.454	88.5
Vanadium	57.0	173	120.0	96.7	20.6	72.4	55.17	93.9
Zinc	84.3	313	239.9	95.3	27.3	126	110.3	89.5

Recoveries not meeting project acceptance criteria are highlighted in bold.
NC = Not Calculated; spike level less than detection limit.
(a) : Sample concentration greater than four times spike added concentration (acceptance criteria not applicable).
(b) : Although reported here, selenium results have been qualified "R" (unusable).

Table 6. (continued) Inorganics Analyses - Matrix Spike Summary

Target Parameter	STATION 32 8015D	STATION 32S 8015DSPK	Spike Added	Percent Recovery	STATION 35 7976D	STATION 35S 7976DSPK	Spike Added	Percent Recovery
Aluminum	6330	16000	9669	100.0	19600	43000	24030	97.4
Antimony	0.11 U	0.29	0.483	**60.0**	0.24 U	0.46	1.202	**38.3**
Arsenic	5.0 (a)	6.2	0.876	137.0	11.4	13.6	1.899	115.9
Barium	13.6	61.6	48.35	99.3	46.0	165	120.2	99.0
Beryllium	0.20	9.4	9.669	95.1	0.36	23.3	24.03	95.5
Cadmium	0.065	0.17	0.109	**96.3**	0.92	1.2	0.237	118.1
Calcium	7990	12600	9669	**47.7**	10100	33100	24030	95.7
Chromium	14.1	54.9	38.68	105.5	50.7	149	96.13	102.3
Cobalt	4.6	13.8	9.669	95.1	9.5	31.3	24.03	90.7
Copper	7.9	56.0	48.35	99.5	78.4	196	120.2	97.8
Iron	10100	18700	9669	88.9	26900	47800	24030	87.0
Lead	11.3 (a)	12.7	1.095	127.9	66.3 (a)	83.5	2.373	724.8
Magnesium	3590	13200	9669	99.4	10800	34400	24030	98.2
Manganese	184	402	241.7	90.2	293	859	600.8	94.2
Mercury	0.043	0.61	0.624	90.9	0.59	1.6	1.383	**73.0**
Nickel	13.6	60.2	48.35	96.4	44.0	161	120.2	97.3
Potassium	1140	4160	2901	104.1	3520	10500	7210	96.8
Selenium (b)	0.48 U	0.55 U	0.219	NC	1.2 U	1.2 U	0.475	NC
Silver	0.096	0.22	0.109	**113.8**	0.72	1.3	0.237	**244.7**
Sodium	3950	14100	9669	105.0	22600	48300	24030	106.9
Thallium	0.096 U	0.61	0.547	111.5	0.24 U	1.4	1.187	117.9
Vanadium	20.9	68.4	48.35	98.2	58.5	170	122.6	90.9
Zinc	22.7	113	96.69	93.4	140	352	240.3	88.2

Recoveries not meeting project acceptance criteria are highlighted in bold.
NC = Not Calculated; spike level less than detection limit.
(a) : Sample concentration greater than four times spike added concentration (acceptance criteria not applicable).
(b) : Although reported here, selenium results have been qualified "R" (unusable).

Table 6. (continued) Inorganics Analyses - Matrix Spike Summary

Target Parameter	STATION 44 7976R	STATION 44S 7976RSPK	Spike Added	Percent Recovery	STATION 61 7976K	STATION 61S 7976KSPK	Spike Added	Percent Recovery
Aluminum	7960	19400	11420	100.2	23100	55800	32180	101.6
Antimony	0.15	0.61	0.571	80.6	0.33 U	0.55	1.609	**34.2**
Arsenic	7.8 (a)	5.3	0.793	0	13.0 (a)	17.0	2.833	141.2
Barium	14.0	71.7	57.1	101.1	59.0	221	160.9	100.7
Beryllium	0.18	11.3	11.42	97.4	0.38	31.0	32.18	95.2
Cadmium	0.099	0.17	0.099	**71.7**	0.33	0.67	0.354	96.0
Calcium	3380	14500	11420	97.4	9100	38000	32180	89.8
Chromium	15.9	63.9	45.68	105.1	46.5	183	128.7	106.1
Cobalt	6.6	17.7	11.42	97.2	13.6	43.3	32.18	92.3
Copper	14.7	72.2	57.1	100.7	54.8	213	160.9	98.3
Iron	11600	21700	11420	88.4	32600	62500	32180	92.9
Lead	12.5 (a)	13.0	0.992	50.4	43.5 (a)	50.6	3.542	200.5
Magnesium	4340	15400	11420	96.8	13300	45300	32180	99.4
Manganese	439	699	285.5	91.1	819	1590	804.5	95.8
Mercury	0.047	0.61	0.745	75.6	0.23	1.5	1.780	**71.3**
Nickel	16.4	70.6	57.1	94.9	40.7	198	160.9	97.8
Potassium	1260	4940	3426	107.4	4380	13600	9655	95.5
Selenium (b)	0.52 U	0.50 U	0.198	NC	1.7 U	1.8 U	0.708	NC
Silver	0.072	0.22	0.099	**149.5**	0.60	1.1	0.354	**141.2**
Sodium	6420	18500	11420	105.8	31600	66300	32180	107.8
Thallium	0.10	0.62	0.496	104.8	0.33 U	2.1	1.771	118.6
Vanadium	25.2	79.7	57.1	95.4	66.8	223	160.9	97.1
Zinc	34.1	140	114.2	92.7	104	398	321.8	91.4

Recoveries not meeting project acceptance criteria are highlighted in bold.
NC = Not Calculated; spike level less than detection limit.
(a) : Sample concentration greater than four times spike added concentration (acceptance criteria not applicable).
(b) : Although reported here, selenium results have been qualified "R" (unusable).

Table 6. (continued) Inorganics Analyses - Matrix Spike Summary

Target Parameter	Mean Percent Recovery	Recovery CV (%)	Minimum Percent Recovery	Minimum Percent Recovery	Number Out
Aluminum	100.1	3.3	96.1	105.5	0
Antimony	**48.9**	37.7	**33.3**	80.6	5
Arsenic	101.3	53.3	0	141.2	0
Barium	99.8	1.2	98.0	101.1	0
Beryllium	94.7	2.5	90.2	97.4	0
Cadmium	95.9	15.3	71.7	118.1	2
Calcium	88.6	23.1	**47.7**	101.5	1
Chromium	103.5	2.6	99.0	106.1	0
Cobalt	93.7	2.7	90.7	97.2	0
Copper	97.7	2.5	93.9	100.7	0
Iron	88.3	4.4	81.6	92.9	0
Lead	243.5	100	50.4	724.8	1
Magnesium	98.6	2.8	95.0	103.0	0
Manganese	92.8	2.9	89.9	95.8	0
Mercury	84.1	14.6	**71.3**	100.5	2
Nickel	95.1	3.2	89.5	97.8	0
Potassium	101.4	5	95.5	107.4	0
Selenium (b)					
Silver	**149.6**	32.3	113.8	**244.7**	4
Sodium	104.6	3.5	97.5	107.8	0
Thallium	109.0	10.3	88.5	118.6	0
Vanadium	95.4	2.8	90.9	98.2	0
Zinc	91.8	2.8	88.2	95.3	0

Table 7. Inorganics Analyses - Average Quantitation Limits

Analyte	Method	Instrument Detection Limit (µg/l)	Number of Non-Detects	Quantitation Limit Average (mg/kg, dry weight)	Quantitation Limit Minimum (mg/kg, dry weight)
Aluminum	P	20 0	0	3.2	
Antimony	F	1 0	**56**	**0.18**	**0.088**
Arsenic	F	1 0	0	0 16	
Barium	P	1 0	0	0.16	
Beryllium	P	1 0	**7**	**0.21**	**0.11**
Cadmium	F	0.20	**3**	**0.020**	**0.017**
Calcium	P	10.0	0	1.6	
Chromium	P	5 0	0	0 80	
Cobalt	P	3.0	0	0.48	
Copper	P	2 0	0	0 32	
Iron	P	5.0	0	0 80	
Lead	F	1.0	0	0.16	
Magnesium	P	10.0	0	1.6	
Manganese	P	1.0	0	0 16	
Mercury	CV	0 10	**14**	**0.046**	0.028
Nickel	P	10.0	0	1 6	
Potassium	P	300	0	48 1	
Selenium (a)	F	1.0	**66**	**0.88**	**0.12**
Silver	F	0 20	**10**	**0.10**	**0.021**
Sodium	P	10.0	0	1.6	
Thallium	F	1 0	**43**	**0.19**	**0.086**
Vanadium	P	2.0	0	0.32	
Zinc	P	4 0	0	0 64	

(a) : Although reported here, selenium results have been qualified "R" (unusable)

P = ICP AES
F = Graphite Furnace Atomic Absorption
CV = Cold Vapor Atomic Absorption

Analytes with reported non-detects are in bold.

For analytes with no reported non-detects, the average quantitation limit has been determined using the instrument detection limit, the average sample weight, and the average percent total solids

Method	Averge Sample Wt. (gm; n=66))	Average %TS
ICP AES	1 253	49.78
GFAA	1.291	49 78
CV	0.435	49 78

Table 8. Inorganics Analyses - Monitoring Variability Samples

STATION 5

Target Parameter	5 (Primary Sample)	51 (Duplicate Split)	Mean (5 and 51)	RPD (5 and 51)	52 (Replicate)	53 (Replicate)	Station Mean (n=3)*	Station CV (n=3)*
Aluminum	19300	19800	19600	-2.6	21300	19400	20100	5.2
Antimony	0.23 U	0.23 U	0.23 U	-	0.23 U	0.23 U	0.23 U	-
Arsenic	7.5	10.1	8.8	-29.5	10.3	8.3	9.1	11.4
Barium	50.4	50.0	50.2	0.8	54.0	48.8	51	5.3
Beryllium	0.40	0.39	0.40	2.5	0.37	0.37	0.38	4.6
Cadmium	0.21	0.18	0.20	15.4	0.19	0.17	0.19	8
Calcium	6640	6550	6600	1.4	7150	6390	6710	5.8
Chromium	46.1	45.1	45.6	2.2	47.4	44.2	45.7	3.5
Cobalt	10.2	10.0	10.1	2.0	10.3	10.3	10.2	1.1
Copper	33.9 E	31.9 E	32.9 E	6.1	32.5 E	31.9 E	32.4 E	1.6
Iron	31800	32200	32000	-1.3	33300	31800	32400	2.5
Lead	14.8	17.3	16.1	-15.6	14.0	16.1	15.4	7.9
Magnesium	12500	13200	12900	-5.4	13500	13100	13200	2.3
Manganese	329	336	333	-2.1	354	342	343	3.1
Mercury	0.13	0.15	0.14	-14.3	0.14	0.13	0.14	4.1
Nickel	43.3	43.2	43.3	0.2	45.5	44.4	44.4	2.5
Potassium	3660	3780	3720	-3.2	3950	3720	3800	3.5
Selenium	R	R	-	-	R	R	-	-
Silver	0.19 E	0.19 E	0.20 E	0	0.16 E	0.23 E	0.20 E	17.6
Sodium	21800	23600	22700	-7.9	23400	23300	23100	1.6
Thallium	0.23 U	0.23	0.20 U	-	0.23 U	0.23 U	0.22 U	-
Vanadium	57.0	57.0	57.0	0	61.3	56.6	58.3	4.5
Zinc	84.3 E	86.2 E	85.3 E	-2.2	88.4 E	86.0 E	86.6 E	1.9

* Station mean and station CV calculated using the primary sample and duplicate split mean, and the values for the two station replicates.

Table 8. (continued) Inorganics Analyses - Monitoring Variability Samples

STATION 32

Target Parameter	32 (Primary Sample)	57 (Duplicate Split)	Mean (32 and 57)	RPD (32 and 57)	58 (Replicate)	59 (Replicate)	Station Mean (n=3)*	Station CV (n=3)*
Aluminum	6330	5980	6160	5.7	6140	6100	6130	0.5
Antimony	0.096 U	0.11 U	0.10 U	-	0.11 U	0.12 U	0.11 U	-
Arsenic	5.0	5.6	5.3	-11.3	4.1	5.2	4.9	13.6
Barium	13.6	13.0	13.3	4.5	14.1	13.8	13.7	2.9
Beryllium	0.20	0.18	0.19	10.5	0.18	0.16	0.18	8.5
Cadmium	0.065	0.059	0.062	9.7	0.044	0.065	0.057	19.9
Calcium	7990	2760	5380	97.3	3380	5300	4690	24.1
Chromium	14.1	13.5	13.8	4.3	15.1	14.1	14.3	4.8
Cobalt	4.6	4.5	4.6	2.2	4.5	4.5	4.5	1.3
Copper	7.9 E	7.7 E	7.8 E	2.6	8.4 E	7.9 E	8.0 E	4.0
Iron	10100	9930	10000	1.7	9870	9770	9880	1.2
Lead	11.3	10.7	11.0	5.5	11.0	12.3	11.4	6.6
Magnesium	3590	3600	3600	-0.3	3540	3480	3540	1.7
Manganese	184	169	177	8.5	181	170	176	3.2
Mercury	0.043	0.043	0.043	0	0.047	0.044	0.045	4.6
Nickel	13.6	13.4	13.5	1.5	13.9	13.2	13.5	2.6
Potassium	1140	1080	1110	5.4	1110	1130	1120	1.0
Selenium	R	R	-	-	R	R	-	-
Silver	0.096 E	0.11 E	0.10 E	-13.6	0.10 E	0.093 E	0.098 E	4.1
Sodium	3950	3730	3840	5.7	4070	4000	3970	3
Thallium	0.096 U	0.11 U	0.10 U	-	0.13	0.12 U	0.12 U	-
Vanadium	20.9	20.3	20.6	2.9	21.3	20.4	20.8	2.3
Zinc	22.7 E	22.1 E	22.4 E	2.7	25.8 E	22.7 E	23.6 E	8.0

* Station mean and station CV calculated using the primary sample and duplicate split mean, and the values for the two station replicates.

Table 8. (continued) Inorganics Analyses - Monitoring Variability Samples

STATION 35

Target Parameter	35 (Primary Sample)	72 (Duplicate Split)	Mean (35 and 72)	RPD (35 and 72)	73 (Replicate)	74 (Replicate)	Station Mean (n=3)*	Station CV (n=3)*
Aluminum	19600	20600	20100	-5.0	19400	18900	19500	3.1
Antimony	0.24 U	0.31 E	0.28 E	-25.5	0.21 U	0.27 E	0.25 U	-
Arsenic	11.4	10.8	11.1	5.4	12.6	11.6	11.8	6.5
Barium	46.0	47.0	46.5	-2.2	46.0	42.0	44.8	5.5
Beryllium	0.36	0.28	0.32	25	0.28	0.30 U	0.30	6.7
Cadmium	0.92	0.76	0.84	19	0.81	0.81	0.82	2.1
Calcium	10100	9930	10000	1.7	9000	9650	9550	5.3
Chromium	50.7	51.1	50.9	-0.8	49.4	48.9	49.7	2.1
Cobalt	9.5	9.4	9.5	1.1	8.9	9.1	9.2	3.3
Copper	78.4	75.7	77.1	3.5	74.4	71.8	74.4	3.6
Iron	26900	27300	27100	-1.5	26300	26100	26500	2.0
Lead	66.3	77.9	72.1	-16.1	77.7	73.2	74.3	4.0
Magnesium	10800	10900	10900	-0.9	10600	10600	10700	1.6
Manganese	293	294	294	-0.3	284	299	292	2.6
Mercury	0.59	0.54	0.57	8.8	0.51	0.53	0.54	5.7
Nickel	44.0	45.3	44.7	-2.9	43.7	43.4	43.9	1.6
Potassium	3520	3470	3500	1.4	3300	3350	3380	3.1
Selenium	R	R	-	-	R	R	-	-
Silver	0.72 E	1.2 E	0.96 E	-50.0	1.1 E	0.98 E	1.0 E	7.6
Sodium	22600	22600	22600	0	22200	22400	22400	0.9
Thallium	0.24 U	0.28	0.30	-15.4	0.21 U	0.24 U	0.25 U	-
Vanadium	58.5 E	60.1 E	59.3 E	-2.7	56.6 E	56.2 E	57.4 E	2.9
Zinc	140 E	144 E	142 E	-2.8	135 E	133 E	137 E	3.4

* Station mean and station CV calculated using the primary sample and duplicate split mean, and the values for the two station replicates.

Table 8. (continued) Inorganics Analyses - Monitoring Variability Samples

STATION 38

Target Parameter	38 (Primary Sample)	60 (Duplicate Split)	Mean (38 and 60)	RPD (38 and 60)	61 (Replicate)	62 (Replicate)	Station Mean (n=3)*	Station CV (n=3)*
Aluminum	24900	24000	24500	3.7	23100	23700	23800	3.0
Antimony	0.35 U	0.54 E	0.45 E	-42.7	0.33 U	0.32 U	0.37 U	-
Arsenic	14.6	11.7	13.2	22.1	13.0	13.8	13.3	3.1
Barium	63.2	60.9	62.1	3.7	59.0	60.6	60.6	2.6
Beryllium	0.55	0.37	0.46	39.1	0.38	0.45	0.43	10.1
Cadmium	0.28	0.36	0.32	-25.0	0.33	0.35	0.33	4.6
Calcium	7310	7170	7240	1.9	9100	7250	7860	13.6
Chromium	50.7	48.9	49.8	3.6	46.5	47.9	48.1	3.4
Cobalt	14.0	13.8	13.9	1.4	13.6	13.7	13.7	1.1
Copper	54.5	57.1	55.8	-4.7	54.8	53.5	54.7	2.1
Iron	34000	33800	33900	0.6	32600	33300	33300	2.0
Lead	46.2	36.1	41.2	24.5	43.5	48.9	44.5	8.9
Magnesium	13600	13600	13600	0	13300	13400	13400	1.1
Manganese	836	833	835	0.4	819	825	826	1.0
Mercury	0.24	0.21	0.23	13.3	0.23	0.25	0.24	4.8
Nickel	43.0	44.7	43.9	-3.9	40.7	40.6	41.7	4.5
Potassium	4660	4510	4590	3.3	4380	4450	4470	2.4
Selenium	R	R	-		R	R	-	-
Silver	0.56 E	0.63 E	0.60 E	-11.8	0.60 E	0.58 E	0.59 E	2.0
Sodium	32500	33500	33000	-3.0	31600	32100	32200	2.2
Thallium	0.35 U	0.32 U	0.30 U	-	0.33 U	0.32 U	0.32 U	-
Vanadium	71.8 E	69.5 E	70.7 E	3.3	66.8 E	68.7 E	68.7 E	2.8
Zinc	109 E	138 E	124 E	-23.5	104 E	104 E	111 E	10.4

* Station mean and station CV calculated using the primary sample and duplicate split mean, and the values for the two station replicates.

Table 8. (continued) Inorganics Analyses - Monitoring Variability Samples

STATION 44

Target Parameter	44 (Primary Sample)	63 (Duplicate Split)	Mean (44 and 63)	RPD (44 and 63)	64 (Replicate)	65 (Replicate)	Station Mean (n=3)*	Station CV (n=3)*
Aluminum	7960	7910	7940	0.6	8280	8240	8150	2.3
Antimony	0.12 E	0.12 U	0.12 E	0	0.23 E	0.13 E	0.16 E	-
Arsenic	7.8 E	6.4	7.1 E	19.7	5.3	5.6	6.0	16.1
Barium	14.0	14.3	14.2	-2.1	14.6	14.8	14.5	2.1
Beryllium	0.18	0.19	0.19	-5.4	0.18	0.15	0.17	12.2
Cadmium	0.099	0.097	0.098	2.0	0.097	0.10	0.098	1.6
Calcium	3380	3270	3330	3.3	3510	3900	3580	8.1
Chromium	15.9	16.2	16.1	-1.9	16.1	16.4	16.2	1.1
Cobalt	6.6	6.6	6.6	0	6.3	6.8	6.6	3.8
Copper	14.7	15.0	14.9	-2.0	16.8	14.7	15.5	7.5
Iron	11600	11500	11600	0.9	11500	11800	11600	1.3
Lead	12.5	12.0	12.3	4.1	16.6	11.9	13.6	19.2
Magnesium	4340	4340	4340	0	4460	4380	4390	1.4
Manganese	439	440	440	-0.2	456	410	435	5.4
Mercury	0.047	0.039 U	0.043	18.6	0.039 U	0.036 U	0.039	9.0
Nickel	16.4	16.9	16.7	-3.0	16.9	17.2	16.9	1.5
Potassium	1260	1190	1230	5.7	1280	1240	1250	2.1
Selenium	R	R		-	R	R	-	-
Silver	0.072 E	0.082 E	0.077 E	-13.0	0.10 E	0.089 E	0.089 E	12.9
Sodium	6420	6420	6420	0	7250	6510	6730	6.8
Thallium	0.10	0.14	0.12 U	-	0.16	0.099 U	0.13 U	-
Vanadium	25.2 E	25.2 E	25.2 E	0	25.9 E	26.0 E	25.7 E	1.7
Zinc	34.1 E	34.2 E	34.2 E	-0.3	35.9 E	35.8 E	35.3 E	2.7

* Station mean and station CV calculated using the primary sample and duplicate split mean, and the values for the two station replicates.

Table 9. Inorganics Analyses - Project Comparsion Sample Summary

1991 Project Comparison Sample Results

(all values in mg/kg, dry weight)

Summary Statistics
1989 - 1991

Target Parameter	Sample 66	Sample 67	Sample 68	1991 Mean	1991 CV (%)	1989 Mean	1989 CV (%)	1990 Mean	1990 CV (%)	Three Year Mean
Aluminum	12900	11700	10700	11800	9.3	10400	4.0	11200	6.4	11100
Antimony	0.15 U	0.15 U	0.13 U	0.14 U	-	-	-	-	-	-
Arsenic	5.2	5.1	4.8	5.0	4.2	3.6	6.4	5.0	32.9	4.6
Barium	27.9	21.9	21.3	23.7	15.4	21.3	5.9	24.3	15.1	23.1
Beryllium	0.19	0.22	0.24	0.22	11.4	0.26 U	9.7	0.30 U	-	-
Cadmium	0.46	0.49	0.60	0.52	14.2	0.61 E	21.8	0.60	4.4	0.58
Calcium	5050	5080	5260	5130	2.2	4190	3.0	4700 E	6.7	4670
Chromium	31.1	27.0	29.4	29.2	7.1	24.3	5.6	26.5	8.2	26.7
Cobalt	6.0	5.4	5.5	5.6	5.7	4.9	4.2	5.3	5.0	5.3
Copper	16.0	15.4 E	15.6	15.7	1.9	14.1	7.1	14.5	5.2	14.8
Iron	19600	17300	16900	17900	8.1	16000	4.5	17400	4.4	17100
Lead	7.0	7.5	11.3	8.6	27.3	5.5 E	9.1	4.5 E	34.5	6.2
Magnesium	7870	7600	7170	7550	4.7	6930	2.5	7430	5.1	7300
Manganese	207	171	162	180	13.2	157	1.6	177	4.0	171
Mercury	0.044 U	0.045	0.042	0.044	3.5	0.054 U	-	0.067 U	-	-
Nickel	29.7	27.6	27.7	28.3	4.2	24.7	1.9	28.0	9.4	27.0
Potassium	1860	1880	1820	1850	1.7	1650	6.8	1760	2.9	1760
Selenium	R	R	R	-	-	1.3 U	-		-	
Silver	0.10 E	0.12 E	0.11 U	0.11 E	9.1	0.070 U	10.7	0.12	26.8	0.10
Sodium	8930	8930	8970	8940	0.3	7630	3.1	8320	4.0	8300
Thallium	0.33	0.41	0.18	0.31	37.7	0.29	7.2	0.40	0	0.33
Vanadium	41.3 E	35.0	33.2	36.5	11.7	32.1	5.0	33.0	3.6	33.9
Zinc	47.9 E	46.2 E	44.6 E	46.2 E	3.6	41.0	5.8	44.7 E	2.4	44.0

Table 9. (continued) Inorganics Analyses - Project Comparsion Sample Summary

	1989 Project Comparison Sample Results (all values in mg/kg, dry weight)					1990 Project Comparison Sample Results (all values in mg/kg, dry weight)				
Target Parameter	**Sample 66**	**Sample 67**	**Sample 68**	**1989 Mean**	**1989 CV (%)**	**Sample 66**	**Sample 67**	**Sample 68**	**1990 Mean**	**1990 CV (%)**
Aluminum	10300	10900	10100	10400	4	11400	11800	10400	11200	6.4
Antimony	R	R	R	-	-	R	R	R	-	-
Arsenic	3.5	3.9	3.5	3.6	6.4	4.4 E	3.8 E	6.9 E	5.0	32.9
Barium	20.9	22.7	20.3	21.3	5.9	27.3	25.3	20.2	24.3	15.1
Beryllium	0.26 U	0.24 U	0.29 U	0.26 U	9.7	0.30	0.30	0.30 U	0.30 U	-
Cadmium	0.46 E	0.69 E	0.69 E	0.61 E	21.8	0.63	0.58	0.59	0.60	4.4
Calcium	4040	4250	4270	4190	3	5050 E	4630 E	4430 E	4700 E	6.7
Chromium	23.7	25.9	23.4	24.3	5.6	27.7	27.8	24.0	26.5	8.2
Cobalt	4.7	5.1	4.8	4.9	4.2	5.6	5.1	5.2	5.3	5.0
Copper	13.3	15.2	13.7	14.1	7.1	15.3	14.5	13.8	14.5	5.2
Iron	15500	16800	15600	16000	4.5	17900	17700	16500	17400	4.4
Lead	5.0 E	5.5 E	6.0 E	5.5 E	9.1	5.6 E	5.1 E	2.7 E	4.5 E	34.5
Magnesium	6920	7110	6760	6930	2.5	7820	7410	7060	7430	5.1
Manganese	157	160	155	157	1.6	182	180	169	177	4.0
Mercury	0.059 U	0.050 U	0.052 U	0.054 U	-	0.070 U	0.070 U	0.060 U	0.067 U	-
Nickel	24.5	25.2	24.3	24.7	1.9	31.0	27.0	26.0	28.0	9.4
Potassium	1610	1780	1570	1650	6.8	1810	1770	1710	1760	2.9
Selenium	1.3 U	1.2 U	1.4 U	1.3 U	-	R	R	R	-	
Silver	0.074	0.067	0.082	0.070 U	10.7	0.14	0.13	0.080	0.12	26.8
Sodium	7550	7900	7450	7630	3.1	8570	7940	8450	8320	4.0
Thallium	0.27	0.28	0.31	0.29	7.2	0.40	0.40	0.40	0.40	0
Vanadium	31.2	34	31.2	32.1	5	33.8	33.5	31.6	33.0	3.6
Zinc	39.3	43.7	39.9	41.0	5.8	45.9 E	44.4 E	43.8 E	44.7 E	2.4

Data Validation Report
for
Amphipod Sediment Bioassays

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DATA VALIDATION OF AMPHIPOD BIOASSAYS FOR 1991 MARINE SEDIMENT MONITORING TASK OF THE PUGET SOUND AMBIENT MONITORING PROGRAM

SUMMARY OF DATA QUALITY

Overall the amphipod sediment bioassays followed the recommended Puget Sound Estuary Program protocols (PSEP 1990) and the Sediment Quality Implementation Plan (Striplin 1988) Only one sample requires qualification of the results. Sample 64 had a holding time of 15 days prior to testing, but it is very unlikely that this deviation would affect the test result

TEST AND CONTROL SEDIMENTS

Test sediments were delivered in three batches to the testing laboratory, INVERT*AID, under Chain-of-Custody procedures by Department of Ecology personnel. Proper documentation is on file at the laboratory Sediments were properly stored under refrigeration (4°C) in the dark Sediment holding times were all within the 14 day limit with only one exception. Sample No. 64 was collected on 3-28-91 and tested beginning on 4-12-91 The resulting holding time of 15 days is only a small deviation, from the recommended holding time and should not be considered significant. The collection date for control sediments was not given, but was indicated by the laboratory to be at the same time as the animal collections which were 4-5 days prior to testing The control sediments were from the animal collection site.

Reported interstitial salinities of test and control sediments ranged from 25-33 ppt and as a result, adjustment of interstitial salinities prior to testing was not required. Four minor inconsistencies were observed between the laboratory's raw data and the reported (Table 1) interstitial salinities. Samples 11R and 53 were both reported as having 30 ppt interstitial salinity, but the raw data indicated that the measured values were 33 and 31 ppt, respectively. Samples 64 and C2 were each reported as 30 ppt, but interstitial salinities were not recorded in the raw data No measurement was taken on sample 9R, and no explanation was provided. With the possible exception of sample 9R, these inconsistencies should have no adverse effect on the test response since all values are above the minimum recommended salinity. The data for sample 9R can probably be accepted without qualification as well since survival was high, 19.4 $\pm$ 89, and emergence was absent

TEST ORGANISMS

Amphipods were collected off West Beach near Whidbey Island, WA The holding times prior to testing were satisfactory (4-5 days). Only limited information was supplied by the laboratory regarding collection and handling methodologies, but there is no reason to believe either that inappropriate methods were used or unsatisfactory conditions existed.

BIOASSAY METHODS

The laboratory's test report indicated that the bioassays were conducted according to PSEP protocols (PSEP 1990) and the Department of Ecology's MSAMP Implementation Plan (Striplin 1988) Beyond that, the information supplied in the narrative report was sketchy. The raw data sheets indicated, however, that the test design was appropriate and that the necessary water quality and biological observations were made. Additional information requested from the laboratory confirmed that other conditions including vessel size, amounts of sediment and water, initial number of test organisms employed, use of aeration and test container covers, and constant lighting were all employed as required by the PSEP protocols.

WATER QUALITY AND OTHER TEST CONDITIONS

Water quality measurements were recorded daily during the 10-day test. The pH meter used was sensitive to 0.1 pH units. Salinity was measured to the nearest 1 ppt using a refractometer. Temperature and dissolved oxygen were measured to the nearest 0.5°C and 0.5 ppm, respectively. The number of significant digits reported was not consistent, probably largely due to omission of the first decimal place on whole numbers.

The reported temperatures during the 10-day test ranged from 14 to 15°C and are within the limits suggested by the PSEP guidelines (PSEP 1990), but not the Sediment Quality Implementation Plan (Striplin 1988). The latter specifies 15 $\pm$ 0.5°C, but is probably excessively restrictive. Reported salinities ranged from 28 to 29 ppt and are within the acceptable limits of both guidelines. All measurements of dissolved oxygen exceeded 5.0 ppm, the recommended lower limit (Striplin 1988). The lowest reported value was 6 ppm. All pHs were within the required range of 7.0 to 9.0; the reported values were from 7.5 to 8.3.

Total soluble sulfide was measured at the beginning and end of the tests in the overlying water using a test kit employing a colorimetric procedure. Sulfide was reported to be < .1 ppm in all samples except one. Sulfide was reported as 0.1 ppm For 203R, a level which should not adversely affect the test animals.

Ammonia nitrogen, presumably both ionized and unionized, was measured at the beginning and end of the test using a test kit employing the Nessler procedure. All measurements indicated that the ammonia concentration was < .1 ppm. The EPAs water quality criteria for saltwater aquatic life continuously exposed to total ammonia at 15°C, pH 8.0, and 30 ppt salinity is 1.6 ppm. The reported ammonia concentrations should not, therefore, influence the test results.

CONTROLS

Appropriate negative controls, consisting of West Beach collection site sediments, were included with each of the three test series. The mean numbers of surviving amphipods per beaker in each of the three tests were 19.8 $\pm$ .44, 18.6 $\pm$ .89, and 19.8 $\pm$ .44, respectively. All of these represent >90% survival, and no individual beakers had <80% survival. The lowest control survival was 18 out of 20 amphipods (90%) in one beaker.

Three positive control series were conducted, one with each test series. These tests were run using a proper design consisting of at least 20 animals (30 were used) per test concentration. Four test concentrations ranging from 0.625 to 2.5 mg/L were employed. Analyses used the EPA Probit Analysis Program, Ver. 1.4 and are properly documented. The results were initially erroneously reported in units of µg/L, but subsequently corrected to mg/L. Evidence is given that the results are consistent, both within this program and with the laboratory's previous database. Reported LC50s (rounded off) were 1.15, 1.13, and 1.04 mg/L. These values are also consistent with the observations of others. The sensitivity of the test organisms may, therefore, be considered as normal.

TEST RESULTS

The daily emergence for each beaker and the 10-day survival in each beaker are given in the raw data. The mean and standard deviation for emergence for each treatment and for the number of survivors for each treatment are shown in the raw data and reported in Table 1 of the laboratory's report. Several minor discrepancies were observed between the raw data and the reported values. The reported survival for sample 12 is 17.8 ± 2.8, but should be 17.8 ± 2.48 according to the raw data. The reported and raw data values for emergence were as follows:

Sample No.	Reported value	Raw data value
2R	4 ± 1.64	4 ± 1.67
26	.22 ±	.22 ± .67
38	1.16 ± 2.14	(blank)
40	.52 ± 1.14	(blank)
69	.19 ± .44	.19 ± .74
74	.08 ± .56	(blank)

The expression of numerical values in the report was generally faulty in the use of significant digits. For example, in the expression of the positive control results, five significant digits are employed, and this far exceeds the possible precision of the result. In the reporting of survival and emergence (Table 1) an inconsistent number of significant digits was employed. An example can be observed in the above table.

Variation in the survival test data generally appeared to be low between replicate beakers. Most would have coefficients of variation not greatly exceeding 5.0 or 6.0. The most severe variations were observed in samples 1, 2R, 21, and 207R; the coefficients of variation were 24.1, 25.9, 27.3, and 39.5, respectively. Variation in this study is not great enough to adversely affect comparisons between control or reference sediments and test sediments.

LITERATURE CITED

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Reviewed by Rick D. Caldwell 8/29/91

Name Date

APPENDIX D

1991 Sediment Chemistry and Amphipod Bioassay Data

Table A1. Grain Size Determinations in Puget Sound Sediments

Station ID	Sample ID	Rep	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)
1	1	1	4/10/91	0.06	0.02	0.10	0.27	0.89
2R	2R	1	4/7/91	0.06	0.10	0.31	0.65	7.9
3	3	1	4/11/91	7.8	1.0	1.1	1.8	7.0
4	4	1	4/7/91	0.05	0.05	0.21	0.30	0.87
5	5	1	4/6/91	0.13	0.05	0.25	0.47	1.2
5	51	1	4/6/91	0.37	0.09	0.37	0.50	1.1
5	52	2	4/6/91	0.03	0.16	0.15	0.43	1.2
5	53	3	4/6/91	0.02	0.01	0.20	0.47	1.1
8	8	1	4/12/91	0.40	0.48	1.9	3.0	12.2
9R	9R	1	4/12/91	3.4	16.4	39.1	34.0	6.1
10R	10R	1	4/13/91	0.06	0.09	0.37	1.5	47.9
11R	11R	1	4/13/91	0.26	3.5	5.7	14.6	42.7
12	12	1	4/13/91	0.13	0.04	0.25	0.53	2.1
13R	13R	1	4/14/91	0.02	1.9	21.1	39.9	18.4
14	14	1	4/14/91	0.05	1.3	11.7	20.7	17.7
15	15	1	4/14/91	0.07	0.46	5.1	27.0	51.5
17	17	1	4/14/91	0.10	0.23	0.68	1.1	2.2
18	18	1	4/5/91	0.03	0.09	0.94	25.4	28.7
19	19	1	4/5/91	0.04	0.04	0.47	1.5	8.6
20	20	1	4/5/91	0.21	0.02	0.05	0.07	0.36
21	21	1	4/2/91	0.06	0.13	0.30	0.51	3.2
22	22	1	4/2/91	0.13	0.26	2.2	10.9	63.4
26	26	1	4/13/91	52.8	3.0	2.5	5.2	15.5
29	29	1	4/1/91	0.10	0.17	1.3	2.6	4.2
30	30	1	3/25/91	0.06	0.10	1.3	7.1	53.4
32	32	1	4/1/91	0.08	0.34	2.8	22.5	64.7
32	57	1	4/1/91	0.20	0.65	1.6	5.6	36.8
32	58	2	4/1/91	0.22	0.25	2.9	22.7	64.2
32	59	3	4/1/91	0.12	0.25	3.0	22.6	64.8
33	33	1	4/1/91	0.39	0.27	2.9	23.1	64.2
34	34	1	3/25/91	0.06	0.19	0.40	0.71	1.9
35	35	1	3/26/91	0.12	0.33	1.5	1.6	6.4
35	72	1	3/26/91	0.08	0.21	0.74	1.2	6.0
35	73	2	3/26/91	0.07	0.19	0.75	1.4	6.5
35	74	3	3/26/91	0.07	0.18	1.1	1.7	8.0
38	38	1	3/26/91	0.17	0.04	0.21	0.69	2.0
38	60	1	3/26/91	0.05	0.07	0.13	0.42	1.4
38	61	2	3/26/91	0.12	0.06	0.46	2.0	2.5
38	62	3	3/26/91	0.02	0.00	0.25	1.1	2.0
39	39	1	3/27/91	0.20	1.5	12.0	34.4	48.3
40	40	1	3/27/91	0.15	1.3	9.6	17.0	30.1
41	41	1	3/27/91	0.10	0.04	0.14	0.46	6.9
43	43	1	3/27/91	0.02	0.05	2.2	19.0	67.8

Table A1. (continued) Grain Size Determinations in Puget Sound Sediments

Station ID	Sample ID	Rep	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)
44	44	1	3/28/91	0.25	1.7	7.3	12.5	46.6
44	63	1	3/28/91	0.39	1.9	7.2	12.4	46.6
44	64	2	3/28/91	0.23	1.4	6.4	12.1	46.0
44	65	3	3/28/91	0.44	2.1	6.8	11.7	46.8
45	45	1	3/28/91	0.03	0.04	0.15	0.42	10.4
47	47	1	3/28/91	26.4	4.9	6.4	17.4	33.6
48	48	1	3/29/91	0.08	0.11	0.54	0.93	2.9
49	49	1	3/29/91	0.11	0.55	3.1	3.0	5.2
69	69	1	3/25/91	0.05	0.22	2.6	9.9	50.5
70	70	1	3/28/91	0.35	0.41	1.6	1.9	12.2
71	71	1	4/5/91	0.04	0.05	0.27	1.1	33.3
201R	201R	1	4/11/91	0.02	0.57	0.86	12.0	57.1
202R	202R	1	4/11/91	0.43	0.12	0.30	0.48	38.7
203R	203R	1	4/7/91	0.06	0.01	0.06	0.16	0.51
204R	204R	1	4/8/91	0.19	0.31	0.53	0.89	2.1
205R	205R	1	4/8/91	0.56	0.49	0.60	1.6	13.1
206R	206R	1	4/8/91	0.06	0.18	0.58	1.3	30.0
207R	207R	1	4/6/91	0.23	0.09	0.23	0.52	12.0
208R	208R	1	4/13/91	0.84	0.37	1.3	2.0	3.2
209R	209R	1	4/5/91	0.04	0.08	0.19	0.29	22.8

Table A1. (continued) Grain Size Determinations in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Percent Very Fine Sand (3-4 phi)	Percent Sand ((-1)-4 phi)	Percent Silt (4-8 phi)	Percent Clay (>8 phi)	Percent Fines (>4 phi)
1	1	1	4/10/91	2.9	4.2	69.8	26.0	95.8
2R	2R	1	4/7/91	33.3	42.3	40.9	16.8	57.7
3	3	1	4/11/91	17.6	28.5	42.5	21.3	63.8
4	4	1	4/7/91	0.92	2.4	51.8	45.8	97.6
5	5	1	4/6/91	2.3	4.3	60.9	34.7	95.6
5	51	1	4/6/91	2.2	4.3	60.3	35.0	95.3
5	52	2	4/6/91	2.5	4.4	60.7	34.9	95.6
5	53	3	4/6/91	2.4	4.2	59.9	35.9	95.8
8	8	1	4/12/91	18.3	35.9	46.3	17.4	63.7
9R	9R	1	4/12/91	0.04	95.6	0.10	0.82	0.9
10R	10R	1	4/13/91	17.4	67.1	23.0	9.8	32.8
11R	11R	1	4/13/91	4.1	70.6	17.9	11.2	29.1
12	12	1	4/13/91	5.5	8.4	64.6	26.8	91.4
13R	13R	1	4/14/91	8.8	90.2	6.6	3.2	9.8
14	14	1	4/14/91	10.8	62.1	24.1	13.7	37.8
15	15	1	4/14/91	10.1	94.1	3.3	2.5	5.8
17	17	1	4/14/91	2.1	6.3	61.8	31.9	93.7
18	18	1	4/5/91	3.0	58.2	21.0	20.8	41.8
19	19	1	4/5/91	7.4	18.0	32.6	49.4	82.0
20	20	1	4/5/91	3.1	3.6	60.6	35.6	96.2
21	21	1	4/2/91	15.6	19.7	62.6	17.7	80.3
22	22	1	4/2/91	10.2	87.0	6.2	6.7	12.9
26	26	1	4/13/91	4.2	30.3	9.4	7.5	16.9
29	29	1	4/1/91	7.8	16.1	51.3	32.6	83.9
30	30	1	3/25/91	14.5	76.5	17.2	6.3	23.5
32	32	1	4/1/91	2.6	93.0	3.3	3.6	6.9
32	57	1	4/1/91	23.7	68.3	24.4	7.1	31.5
32	58	2	4/1/91	2.7	92.7	3.4	3.7	7.1
32	59	3	4/1/91	2.6	93.3	3.0	3.6	6.6
33	33	1	4/1/91	2.5	93.0	3.2	3.5	6.7
34	34	1	3/25/91	4.0	7.2	59.2	33.5	92.7
35	35	1	3/26/91	9.4	19.2	47.7	33.0	80.7
35	72	1	3/26/91	9.5	17.6	49.0	33.3	82.3
35	73	2	3/26/91	10.0	18.9	47.9	33.2	81.1
35	74	3	3/26/91	12.1	23.1	48.1	28.7	76.8
38	38	1	3/26/91	2.0	4.9	45.7	49.3	95.0
38	60	1	3/26/91	1.8	3.8	44.1	52.1	96.2
38	61	2	3/26/91	2.0	7.0	42.5	50.3	92.8
38	62	3	3/26/91	2.1	5.4	44.2	50.4	94.6
39	39	1	3/27/91	1.3	97.4	0.74	1.7	2.4
40	40	1	3/27/91	8.6	66.7	24.3	8.9	33.2
41	41	1	3/27/91	22.3	29.9	59.6	10.4	70.0
43	43	1	3/27/91	5.1	94.1	2.8	3.1	5.9

Table A1. (continued) Grain Size Determinations in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Percent Very Fine Sand (3-4 phi)	Percent Sand ((-1)-4 phi)	Percent Silt (4-8 phi)	Percent Clay (>8 phi)	Percent Fines (>4 phi)
44	44	1	3/28/91	15.0	83.1	8.6	8.0	16.6
44	63	1	3/28/91	15.2	83.2	8.6	7.8	16.4
44	64	2	3/28/91	15.6	81.4	9.7	8.6	18.3
44	65	3	3/28/91	15.7	83.1	8.5	7.9	16.4
45	45	1	3/28/91	29.2	40.3	40.7	19.1	59.8
47	47	1	3/28/91	1.9	64.2	4.9	4.5	9.4
48	48	1	3/29/91	5.7	10.1	54.9	34.9	89.8
49	49	1	3/29/91	4.2	15.9	50.1	33.9	84.0
69	69	1	3/25/91	15.4	78.6	15.4	6.0	21.4
70	70	1	3/28/91	16.3	32.4	43.4	23.8	67.2
71	71	1	4/5/91	9.5	44.3	37.8	18.0	55.8
201R	201R	1	4/11/91	7.6	78.1	13.5	8.4	21.9
202R	202R	1	4/11/91	35.7	75.3	16.6	7.8	24.4
203R	203R	1	4/7/91	0.52	1.3	54.2	44.5	98.7
204R	204R	1	4/8/91	1.9	5.7	59.4	34.7	94.1
205R	205R	1	4/8/91	21.6	37.3	43.3	18.8	62.1
206R	206R	1	4/8/91	32.4	64.4	23.2	12.4	35.6
207R	207R	1	4/6/91	13.6	26.4	47.9	25.5	73.4
208R	208R	1	4/13/91	2.2	9.1	50.7	39.4	90.1
209R	209R	1	4/5/91	42.6	66.0	26.7	7.3	34.0

Table A2. Conventional Variables in Puget Sound Metals - Total Organic Carbon and Sulfides

Station ID	Sample ID	Replicate	Sampling Date	Total Sulfides (mg-S/kg)	Total Organic Carbon (Percent)
1	1	1	4/10/91	1.1 U	1.7
2R	2R	1	4/7/91	1.0	0.8
3	3	1	4/11/91	1.1 U	1.3
4	4	1	4/7/91	2.7 U	2.0
5	5	1	4/6/91	2.4 U	2.1
5	51	1	4/6/91	1.8 U	1.8
5	52	2	4/6/91	1.8 U	1.7
5	53	3	4/6/91	1.6 U	1.8
8	8	1	4/12/91	0.9 U	2.9
9R	9R	1	4/12/91	0.4 U	0.1
10R	10R	1	4/13/91	0.6 U	0.6
11R	11R	1	4/13/91	0.8 U	1.2
12	12	1	4/13/91	1.1 U	1.5
13R	13R	1	4/14/91	0.6 U	0.2
14	14	1	4/14/91	0.8 U	0.7
15	15	1	4/14/91	0.5 U	0.2
17	17	1	4/14/91	1.3 U	1.9
18	18	1	4/5/91	1.4 U	0.6
19	19	1	4/5/91	105	1.8
20	20	1	4/5/91	1.2 U	1.0
21	21	1	4/2/91	0.9	1.3
22	22	1	4/2/91	11	0.2
26	26	1	4/13/91	0.7 U	0.8
29	29	1	4/1/91	8.0	1.4
30	30	1	3/25/91	1.5 U	0.7
32	32	1	4/1/91	0.7 U	0.1
32	57	1	4/1/91	0.8 U	0.2
32	58	2	4/1/91	1.0 U	0.1
32	59	3	4/1/91	1.0 U	0.1
33	33	1	4/1/91	1.1 U	0.9
34	34	1	3/25/91	2.9 U	2.3
35	35	1	3/26/91	392	2.5
35	72	1	3/26/91	186	2.4
35	73	2	3/26/91	270	2.5
35	74	3	3/26/91	21.2	2.4
38	38	1	3/26/91	33.7	2.0
38	60	1	3/26/91	32.3	2.2
38	61	2	3/26/91	8.3	2.2
38	62	3	3/26/91	42.0	2.1
39	39	1	3/27/91	0.6 U	0.1
40	40	1	3/27/91	0.8 U	0.9
41	41	1	3/27/91	0.9 U	1.0
43	43	1	3/27/91	0.6 U	0.1

Table A2. (cont'd) Conventional Variables in Puget Sound Metals - Total Organic Carbon and Sulfides

Station ID	Sample ID	Replicate	Sampling Date	Total Sulfides (mg-S/kg)	Total Organic Carbon (Percent)
44	44	1	3/28/91	1.2	0.6
44	63	1	3/28/91	1.0 U	0.5
44	64	2	3/28/91	0.6 U	0.5
44	65	3	3/28/91	0.7 U	0.5
45	45	1	3/28/91	1.0	1.1
47	47	1	3/28/91	0.6 U	0.3
48	48	1	3/29/91	2.5	2.3
49	49	1	3/29/91	107	3.3
66	66	1	3/27/91		0.8
67	67	1	4/2/91		0.8
68	68	1	4/11/91		0.8
69	69	1	3/25/91	0.7 U	0.6
70	70	1	3/28/91	1.7 U	3.2
71	71	1	4/5/91	0.7 U	1.2
201R	201R	1	4/11/91	0.6 U	0.6
202R	202R	1	4/11/91	0.6 U	0.5
203R	203R	1	4/7/91	1.0 U	1.7
204R	204R	1	4/8/91	24.0	2.4
205R	205R	1	4/8/91	1.2 U	1.1
206R	206R	1	4/8/91	13.0	0.8
207R	207R	1	4/6/91	0.9 U	1.5
208R	208R	1	4/13/91	744	2.8
209R	209R	1	4/5/91	0.6 U	0.5

Table B1. Concentrations (μg/kg dry weight) of Volatile Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Chloromethane	Bromomethane	Vinyl chloride	Chloroethane	Methylene chloride	Acetone	Carbon disulfide	1,1-Dichloro-ethene
3	3	1	4/11/91	1.0 U	1.0 U	1.0 U	1.0 U	**6.5**	**9.3 E**	**0.84**	0.41 U
8	8	1	4/12/91	0.92 U	0.92 U	0.92 U	0.92 U	**1.2 E**	**8.6 E**	**1.7**	0.37 U
11R	11R	1	4/13/91	1.0 U	1.0 U	1.0 U	1.0 U	**0.86**	**20 E**	**1.6**	0.39 U
12	12	1	4/13/91	1.1 U	1.1 U	1.1 U	1.1 U	**1.2 E**	**9.2 E**	**2.4**	0.44 U
17	17	1	4/14/91	1.1 U	1.1 U	1.1 U	1.1 U	**1.5 E**	**8.0 E**	**2.0**	0.46 U
26	26	1	4/13/91	0.62 U	0.62 U	0.62 U	0.62 U	**0.51 E**	**6.0 E**	**0.81**	0.25 U
29	29	1	4/1/91	1.4 U	1.4 U	1.4 U	1.4 U	**1.5 E**	**16 E**	**3.0**	0.56 U
29	75	1	4/1/91	1.1 U	1.1 U	1.1 U	1.1 U	**2.8**	**7.4 E**	**1.4**	0.45 U
29	76	2	4/1/91	1.1 U	1.1 U	1.1 U	1.1 U	**1.9**	**5.9 E**	**2.0**	0.42 U
29	77	3	4/1/91	1.1 U	1.1 U	1.1 U	1.1 U	**1.6**	**11 E**	**3.0**	0.43 U
34	34	1	3/25/91	1.4 U	1.4 U	1.4 U	1.4 U	**2.1**	**21 E**	**5.3**	0.56 U
35	35	1	3/26/91	1.2 U	1.2 U	1.2 U	1.2 U	**2.4**	**18 E**	**3.6**	0.47 U
38	38	1	3/26/91	1.2 U	1.2 U	1.2 U	1.2 U	**1.7 E**	**20 E**	**2.0**	0.50 U
38	60	1	3/26/91	1.3 U	1.3 U	1.3 U	1.3 U	**2.0 E**	**17 E**	**2.4**	0.53 U
38	61	2	3/26/91	1.4 U	1.4 U	1.4 U	1.4 U	**3.6 E**	**10 E**	**0.8**	0.56 U
38	62	3	3/26/91	1.5 U	1.5 U	1.5 U	1.5 U	**2.2 E**	**9.0 E**	**2.1**	0.59 U
45	45	1	3/28/91	0.70 U	0.70 U	0.70 U	0.70 U	**1.6**	**7.0 E**	**3.5**	0.28 U
48	48	1	3/29/91	1.3 U	1.3 U	1.3 U	1.3 U	**4.1**	**11 E**	**3.1**	0.52 U
66	66	1	3/27/91	0.59 U	0.59 U	0.59 U	0.59 U	**7.7 E**	**1100 E**	**30 E**	0.24 U
68	68	1	4/11/91	0.55 U	0.55 U	0.55 U	0.55 U	**27**	**4600 E**	**8.7**	0.22 U
201R	201R	1	4/11/91	0.57 U	0.57 U	0.57 U	0.57 U	**0.47**	**5.5 E**	**0.50**	0.23 U
202R	202R	1	4/11/91	0.63 U	0.63 U	0.63 U	0.63 U	**1.1**	**4.4 E**	**0.36**	0.25 U
204R	204R	1	4/8/91	1.2 U	1.2 U	1.2 U	1.2 U	**3.2 E**	**33 E**	**5.3**	0.46 U

Table B1. (cont'd) Concentrations (μg/kg dry weight) of Volatile Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	1,1-Dichloro-ethane	trans-1,2-Dichloroethene	cis-1,2-Dichloroethene	Chloroform	1,2-Dichloro-ethane	2-Butanone	1,1,1-Trichloro-ethane
3	3	1	4/11/91	0.41 U	0.41 U	0.41 U	0.12 U	0.41 U	**3.7 E**	0.41 U
8	8	1	4/12/91	0.37 U	0.37 U	0.37 U	0.10 U	0.37 U	**1.8 E**	0.37 U
11R	11R	1	4/13/91	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	**6.7 E**	0.39 U
12	12	1	4/13/91	0.44 U	0.44 U	0.44 U	0.06 U	0.44 U	**3.0 E**	0.44 U
17	17	1	4/14/91	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U	**2.2 E**	0.46 U
26	26	1	4/13/91	0.25 U	0.25 U	0.25 U	0.07 U	0.25 U	**2.7 E**	0.25 U
29	29	1	4/1/91	0.56 U	0.56 U	0.56 U	0.13 U	0.56 U	**5.5 E**	0.56 U
29	75	1	4/1/91	0.45 U	0.45 U	0.45 U	0.06 U	0.45 U	**4.1 E**	0.45 U
29	76	2	4/1/91	0.42 U	0.42 U	0.42 U	0.09 U	0.42 U	**3.6 E**	0.42 U
29	77	3	4/1/91	0.43 U	0.43 U	0.43 U	0.10 U	0.43 U	**4.7 E**	0.43 U
34	34	1	3/25/91	0.56 U	0.56 U	0.56 U	0.56 U	0.56 U	**12 E**	0.56 U
35	35	1	3/26/91	0.47 U	0.47 U	0.47 U	0.47 U	0.47 U	**9.7 E**	0.47 U
38	38	1	3/26/91	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	**6.9 E**	0.50 U
38	60	1	3/26/91	0.53 U	0.53 U	0.53 U	0.53 U	0.53 U	**5.5 E**	0.53 U
38	61	2	3/26/91	0.56 U	0.56 U	0.56 U	0.56 U	0.56 U	**3.8 E**	0.56 U
38	62	3	3/26/91	0.59 U	0.59 U	0.59 U	0.59 U	0.59 U	**3.5 E**	0.59 U
45	45	1	3/28/91	0.28 U	0.28 U	0.28 U	0.04 U	0.28 U	**3.3 E**	0.28 U
48	48	1	3/29/91	0.52 U	0.52 U	0.52 U	0.52 U	0.52 U	**3.8 E**	0.52 U
66	66	1	3/27/91	0.24 U	0.24 U	0.24 U	**0.46**	0.24 U	**290 E**	0.24 U
68	68	1	4/11/91	0.22 U	0.22 U	0.22 U	**0.88**	0.22 U	**120 E**	0.22 U
201R	201R	1	4/11/91	0.23 U	0.23 U	0.23 U	0.03 U	0.23 U	**1.8 E**	0.23 U
202R	202R	1	4/11/91	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	**1.5 E**	0.25 U
204R	204R	1	4/8/91	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U	**2.8 E**	0.46 U

Table B1. (cont'd) Concentrations (µg/kg dry weight) of Volatile Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Carbon tetrachloride	Vinyl acetate	Bromodichloro-methane	1,2-Dichloro-propane	trans-1,3-Dichloropropene	Trichloroethene	Dibromochloro-methane
3	3	1	4/11/91	0.41 U	0.41 U	1.0 U	0.41 U	1.0 U	0.41 U	0.41 U
8	8	1	4/12/91	0.37 U	0.37 U	0.92 U	0.37 U	0.92 U	0.37 U	0.37 U
11R	11R	1	4/13/91	0.39 U	0.39 U	1.0 U	0.39 U	1.0 U	0.39 U	0.39 U
12	12	1	4/13/91	0.44 U	0.44 U	1.1 U	0.44 U	1.1 U	0.44 U	0.44 U
17	17	1	4/14/91	0.46 U	0.46 U	1.1 U	0.46 U	1.1 U	0.46 U	0.46 U
26	26	1	4/13/91	0.25 U	0.25 U	0.62 U	0.25 U	0.62 U	0.25 U	0.25 U
29	29	1	4/1/91	0.56 U	0.56 U	1.4 U	0.56 U	1.4 U	0.56 U	0.56 U
29	75	1	4/1/91	0.45 U	0.45 U	1.1 U	0.45 U	1.1 U	0.45 U	0.45 U
29	76	2	4/1/91	0.42 U	0.42 U	1.1 U	0.42 U	1.1 U	0.42 U	0.42 U
29	77	3	4/1/91	0.43 U	0.43 U	1.1 U	0.43 U	1.1 U	0.43 U	0.43 U
34	34	1	3/25/91	0.56 U	0.56 U	1.4 U	0.56 U	1.4 U	0.56 U	0.56 U
35	35	1	3/26/91	0.47 U	0.47 U	1.2 U	0.47 U	1.2 U	0.47 U	0.47 U
38	38	1	3/26/91	0.50 U	0.50 U	1.2 U	0.50 U	1.2 U	0.50 U	0.50 U
38	60	1	3/26/91	0.53 U	0.53 U	1.3 U	0.53 U	1.3 U	0.53 U	0.53 U
38	61	2	3/26/91	0.56 U	0.56 U	1.4 U	0.56 U	1.4 U	0.56 U	0.56 U
38	62	3	3/26/91	0.59 U	0.59 U	1.5 U	0.59 U	1.5 U	0.59 U	0.59 U
45	45	1	3/28/91	0.28 U	0.28 U	0.70 U	0.28 U	0.70 U	0.28 U	0.28 U
48	48	1	3/29/91	0.52 U	0.52 U	1.3 U	0.52 U	1.3 U	0.52 U	0.52 U
66	66	1	3/27/91	0.24 U	0.24 U	0.59 U	0.24 U	0.59 U	0.24 U	0.24 U
68	68	1	4/11/91	0.22 U	0.22 U	0.55 U	0.22 U	0.55 U	0.22 U	0.22 U
201R	201R	1	4/11/91	0.23 U	0.23 U	0.57 U	0.23 U	0.57 U	0.23 U	0.23 U
202R	202R	1	4/11/91	0.25 U	0.25 U	0.63 U	0.25 U	0.63 U	0.25 U	0.25 U
204R	204R	1	4/8/91	0.46 U	0.46 U	1.2 U	0.46 U	1.2 U	0.46 U	0.46 U

Table B1. (cont'd) Concentrations (µg/kg dry weight) of Volatile Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	1,1,2-Trichloro-ethane	Benzene	cis-1,3-Dichloropropene	2-Chloroethyl-vinylether	Bromoform	4-Methyl-2-pentanone	2-Hexanone
3	3	1	4/11/91	1.0 U	**0.15 E**	1.0 U	1.0 U	0.41 U	1.0 U	1.0 U
8	8	1	4/12/91	0.92 U	**0.11 E**	0.92 U	0.92 U	0.37 U	0.92 U	0.92 U
11R	11R	1	4/13/91	1.0 U	**0.07 N**	1.0 U	1.0 U	**0.07 N**	1.0 U	1.0 U
12	12	1	4/13/91	1.1 U	**0.10 N**	1.1 U	1.1 U	**0.08 N**	1.1 U	1.1 U
17	17	1	4/14/91	1.1 U	**0.06 N**	1.1 U	1.1 U	0.46 U	1.1 U	1.1 U
26	26	1	4/13/91	0.62 U	**0.05 E**	0.62 U	0.62 U	**0.03 N**	0.62 U	0.62 U
29	29	1	4/1/91	1.4 U	**0.17 E**	1.4 U	1.4 U	0.56 U	0.56 U	1.4 U
29	75	1	4/1/91	1.1 U	**0.15 N**	1.1 U	1.1 U	0.45 U	1.1 U	1.1 U
29	76	2	4/1/91	1.1 U	**0.11 N**	1.1 U	1.1 U	0.42 U	1.1 U	1.1 U
29	77	3	4/1/91	1.1 U	**0.17 E**	1.1 U	1.1 U	0.43 U	1.1 U	1.1 U
34	34	1	3/25/91	1.4 U	0.31 U	1.4 U	1.4 U	0.56 U	**6.3 E**	1.4 U
35	35	1	3/26/91	1.2 U	0.47 U	1.2 U	1.2 U	0.47 U	**2.0 E**	1.2 U
38	38	1	3/26/91	1.2 U	1.2 U	1.2 U	1.2 U	0.50 U	1.2 U	1.2 U
38	60	1	3/26/91	1.3 U	1.3 U	1.3 U	1.3 U	0.53 U	1.3 U	1.3 U
38	61	2	3/26/91	1.4 U	1.4 U	1.4 U	1.4 U	0.56 U	1.4 U	1.4 U
38	62	3	3/26/91	1.5 U	1.5 U	1.5 U	1.5 U	0.59 U	1.5 U	1.5 U
45	45	1	3/28/91	0.70 U	**0.06 N**	0.70 U	0.70 U	0.28 U	0.70 U	0.70 U
48	48	1	3/29/91	1.3 U	**0.10 N**	1.3 U	1.3 U	0.52 U	1.3 U	1.3 U
66	66	1	3/27/91	0.59 U	**0.58 E**	0.59 U	0.59 U	0.24 U	**0.71**	**6.4**
68	68	1	4/11/91	0.55 U	**0.50 E**	0.55 U	0.55 U	0.22 U	**0.92 E**	**3.5 E**
201R	201R	1	4/11/91	0.57 U	**0.04 N**	0.57 U	0.57 U	0.23 U	0.57 U	0.57 U
202R	202R	1	4/11/91	0.63 U	**0.05 N**	0.63 U	0.63 U	0.25 U	0.63 U	0.63 U
204R	204R	1	4/8/91	1.2 U	**0.13 N**	1.2 U	1.2 U	0.46 U	1.2 U	1.2 U

Table B1. (cont'd) Concentrations (µg/kg dry weight) of Volatile Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Tetrachloroethene	1,1,2,2-Tetra-chloroethane	Toluene	Chlorobenzene	Ethylbenzene	Styrene	Total Xylenes
3	3	1	4/11/91	**0.10 N**	1.0 U	0.62 U	0.41 U	**0.11 N**	1.0 U	**0.48 E**
8	8	1	4/12/91	0.37 U	0.92 U	0.36 U	0.37 U	**0.07 N**	0.92 U	**0.28 N**
11R	11R	1	4/13/91	0.4 U	1.0 U	1.3 U	0.39 U	0.39 U	1.0 U	**0.26 E**
12	12	1	4/13/91	**0.08 N**	1.1 U	0.26 U	0.44 U	0.44 U	**0.05 N**	**0.26 N**
17	17	1	4/14/91	0.46 U	1.1 U	0.14 U	0.46 U	0.46 U	1.1 U	0.09 U
26	26	1	4/13/91	**0.04 E**	0.62 U	0.66 U	0.25 U	**0.03 N**	**0.04 E**	0.14 U
29	29	1	4/1/91	**0.09 E**	1.4 U	0.35 U	0.56 U	0.56 U	**0.13 N**	**0.39 E**
29	75	1	4/1/91	**0.05 N**	1.1 U	0.45 U	0.45 U	0.45 U	**0.09 N**	**0.35 E**
29	76	2	4/1/91	**0.07 N**	1.1 U	0.45 U	0.42 U	0.42 U	**0.11 N**	**0.34 E**
29	77	3	4/1/91	**0.07 N**	1.1 U	0.51 U	0.43 U	**0.08 N**	**0.11 N**	**0.43 E**
34	34	1	3/25/91	**0.11 E**	1.4 U	0.32 U	0.56 U	0.56 U	**0.14 N**	**0.57 E**
35	35	1	3/26/91	0.47 U	1.2 U	0.25 U	0.47 U	0.47 U	**0.23 N**	**0.38 E**
38	38	1	3/26/91	**0.08 E**	1.2 U	0.28 U	0.50 U	0.50 U	1.2 U	**0.33 E**
38	60	1	3/26/91	**0.09 E**	1.3 U	0.20 U	0.53 U	0.53 U	1.3 U	0.28 U
38	61	2	3/26/91	0.56 U	1.4 U	0.25 U	0.56 U	0.56 U	1.4 U	0.27 U
38	62	3	3/26/91	**0.08 E**	1.5 U	0.24 U	0.59 U	0.59 U	1.5 U	0.28 U
45	45	1	3/28/91	**0.04 N**	0.70 U	0.13 U	0.28 U	0.28 U	0.70 U	0.12 U
48	48	1	3/29/91	0.52 U	1.3 U	0.25 U	0.52 U	0.52 U	1.3 U	0.13 U
66	66	1	3/27/91	0.24 U	0.59 U	**3.8**	0.24 U	**1.1**	**0.33 N**	**6.8**
68	68	1	4/11/91	**0.03 N**	0.55 U	**3.8**	**0.04 N**	**1.3**	**0.24 E**	**7.1**
201R	201R	1	4/11/91	0.23 U	0.57 U	0.87 U	0.23 U	0.23 U	0.57 U	**0.14**
202R	202R	1	4/11/91	0.25 U	0.63 U	0.31 U	0.25 U	0.25 U	0.63 U	0.13 U
204R	204R	1	4/8/91	0.46 U	1.2 U	1.0 U	0.46 U	0.46 U	0.46 U	0.17 U

Table B1. (cont'd) Concentrations (µg/kg dry weight) of Volatile Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	1,3-Dichloro-benzene	1,4-Dichloro-benzene	1,2-Dichloro-benzene	Trichloro-fluoromethane	1,1,2-Trichloro-1,2,2-trifluoroethane
3	3	1	4/11/91	0.41 U	**0.11 E**	0.41 U	0.41 U	0.41 U
8	8	1	4/12/91	0.37 U	0.37 U	0.37 U	0.17 U	**0.22 N**
11R	11R	1	4/13/91	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U
12	12	1	4/13/91	0.44 U	0.07 U	0.44 U	0.19 U	0.44 U
17	17	1	4/14/91	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U
26	26	1	4/13/91	0.25 U	0.05 U	0.25 U	0.25 U	0.25 U
29	29	1	4/1/91	0.56 U	0.11 U	0.56 U	**0.66 N**	0.56 U
29	75	1	4/1/91	0.45 U	0.08 U	0.45 U	0.45 U	0.45 U
29	76	2	4/1/91	0.42 U	0.08 U	0.42 U	0.42 U	0.42 U
29	77	3	4/1/91	0.43 U	0.08 U	0.43 U	0.43 U	0.43 U
34	34	1	3/25/91	0.56 U	**0.18 N**	0.56 U	**0.85 N**	0.56 U
35	35	1	3/26/91	0.47 U	**0.19**	0.47 U	0.30 U	0.47 U
38	38	1	3/26/91	0.50 U	**0.14 E**	0.50 U	0.37 U	0.50 U
38	60	1	3/26/91	0.53 U	**0.14 E**	0.53 U	0.29 U	0.53 U
38	61	2	3/26/91	0.56 U	0.10 U	0.56 U	0.38 U	0.56 U
38	62	3	3/26/91	0.59 U	0.12 U	0.59 U	0.42 U	0.59 U
45	45	1	3/28/91	0.28 U	0.06 U	0.28 U	0.28 U	0.28 U
48	48	1	3/29/91	0.52 U	0.07 U	0.52 U	0.32 U	0.52 U
66	66	1	3/27/91	**10**	**5.3**	**9.8**	**21 E**	3.8 U
68	68	1	4/11/91	**8.5**	**4.7**	**8.4**	**11**	0.22 U
201R	201R	1	4/11/91	0.23 U	0.03 U	0.23 U	0.23 U	0.23 U
202R	202R	1	4/11/91	0.25 U	0.03 U	0.25 U	0.11 U	0.25 U
204R	204R	1	4/8/91	0.46 U	0.46 U	0.46 U	0.22 U	0.46 U

Table B2. Concentrations (µg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Phenol	bis(2-Chloro-ethyl)ether	2-Chlorophenol	1,3-Dichloro-benzene	1,4-Dichloro-benzene	Benzyl alcohol
1	1	1	4/10/91	16 U	16 U	16 U	16 U	16 U	77 U
2R	2R	1	4/7/91	**6 N**	12 U	12 U	12 U	12 U	58 U
3	3	1	4/11/91	**7 N**	13 U	13 U	13 U	13 U	66 U
4	4	1	4/7/91	20 U	20 U	20 U	20 U	20 U	97 U
4	78	1	4/7/91						
4	79	2	4/7/91						
4	80	3	4/7/91						
5	5	1	4/6/91	18 U	18 U	18 U	18 U	18 U	88 U
5	51	1	4/6/91	**6 E**	18 U	18 U	18 U	18 U	88 U
5	52	2	4/6/91	**6 E**	17 U	17 U	17 U	17 U	87 U
5	53	3	4/6/91	18 U	18 U	18 U	18 U	18 U	88 U
8	8	1	4/12/91	**9 N**	13 U	13 U	13 U	13 U	64 U
9R	9R	1	4/12/91	**7 E**	8 U	8 U	8 U	8 U	40 U
10R	10R	1	4/13/91	**6 E**	9 U	9 U	9 U	9 U	47 U
11R	11R	1	4/13/91	**50**	13 U	13 U	13 U	13 U	66 U
12	12	1	4/13/91	**10 N**	16 U	16 U	16 U	16 U	79 U
13R	13R	1	4/14/91	**19**	8 U	8 U	8 U	8 U	41 U
14	14	1	4/14/91	**6 E**	11 U	11 U	11 U	11 U	54 U
15	15	1	4/14/91	**51**	8 U	8 U	8 U	8 U	42 U
17	17	1	4/14/91	18 U	18 U	18 U	18 U	18 U	89 U
18	18	1	4/5/91	12 U	12 U	12 U	12 U	12 U	57 U
19	19	1	4/5/91	**82**	21 U	21 U	21 U	21 U	100 U
20	20	1	4/5/91	12 U	12 U	12 U	12 U	12 U	61 U
21	21	1	4/2/91	11 U	11 U	11 U	11 U	11 U	57 U
22	22	1	4/2/91	**5 N**	9 U	9 U	9 U	9 U	44 U
26	26	1	4/13/91	**31**	10 U	10 U	10 U	10 U	52 U
29	29	1	4/1/91	17 U	17 U	17 U	17 U	17 U	87 U
30	30	1	3/25/91	**6 E**	10 U	10 U	10 U	10 U	47 U
32	32	1	4/1/91	**7 E**	8 U	8 U	8 U	8 U	41 U
32	57	1	4/1/91	**19 E**	9 U	9 U	9 U	9 U	43 U
32	58	2	4/1/91	**71**	8 U	8 U	8 U	8 U	42 U
32	59	3	4/1/91	**24 E**	8 U	8 U	8 U	8 U	42 U
33	33	1	4/1/91	10 U	10 U	10 U	10 U	10 U	48 U
34	34	1	3/25/91	**14 E**	18 U	18 U	18 U	18 U	90 U
35	35	1	3/26/91	**10 E**	19 U	19 U	19 U	19 U	93 U
35	72	1	3/26/91	**7 N**	18 U	18 U	18 U	18 U	90 U
35	73	2	3/26/91	**9 E**	18 U	18 U	18 U	18 U	90 U
35	74	3	3/26/91	**12 E**	18 U	18 U	18 U	18 U	90 U
38	38	1	3/26/91	24 U	24 U	24 U	24 U	24 U	120 U
38	60	1	3/26/91	**9 E**	23 U	23 U	23 U	23 U	120 U
38	61	2	3/26/91	**13 E**	23 U	23 U	23 U	23 U	120 U
38	62	3	3/26/91	**12 N**	23 U	23 U	23 U	23 U	120 U
39	39	1	3/27/91	**7 E**	8 U	8 U	8 U	8 U	41 U
40	40	1	3/27/91	**8 E**	10 U	10 U	10 U	10 U	48 U
41	41	1	3/27/91	**11 E**	10 U	10 U	10 U	10 U	51 U
43	43	1	3/27/91	8 U	8 U	8 U	8 U	8 U	42 U

Table B2. (cont'd) Concentrations (µg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Phenol	bis(2-Chloro-ethyl)ether	2-Chlorophenol	1,3-Dichloro-benzene	1,4-Dichloro-benzene	Benzyl alcohol
44	44	1	3/28/91	**17**	9 U	9 U	9 U	9 U	46 U
44	63	1	3/28/91	**12**	9 U	9 U	9 U	9 U	46 U
44	64	2	3/28/91	**11**	9 U	9 U	9 U	9 U	47 U
44	65	3	3/28/91	**10**	9 U	9 U	9 U	9 U	47 U
45	45	1	3/28/91	13 U	13 U	13 U	13 U	13 U	65 U
47	47	1	3/28/91	**10**	9 U	9 U	9 U	9 U	45 U
48	48	1	3/29/91	R	22 U	R	22 U	22 U	110 U
49	49	1	3/29/91	R	24 U	R	24 U	24 U	120 U
66	66	1	3/27/91	**65 E**	10 U	10 U	**15 E**	**7 E**	48 U
67	67	1	4/2/91	**26 E**	10 U	10 U	**15 E**	**7 N**	50 U
68	68	1	4/11/91	**34 E**	10 U	10 U	**10 E**	**5 N**	48 U
69	69	1	3/25/91	**5 E**	9 U	9 U	9 U	9 U	46 U
70	70	1	3/28/91	R	R	R	R	R	R
71	71	1	4/5/91	**57 E**	12 U	12 U	12 U	12 U	61 U
201R	201R	1	4/11/91	**12 E**	9 U	9 U	9 U	9 U	45 U
202R	202R	1	4/11/91	**12 E**	9 U	9 U	9 U	9 U	47 U
203R	203R	1	4/7/91	**6 N**	14 U	14 U	14 U	14 U	69 U
204R	204R	1	4/8/91	**11 N**	21 U	21 U	21 U	21 U	110 U
205R	205R	1	4/8/91	**4 N**	12 U	12 U	12 U	12 U	61 U
206R	206R	1	4/8/91	**6 N**	11 U	11 U	11 U	11 U	54 U
207R	207R	1	4/6/91	**8 N**	13 U	13 U	13 U	13 U	67 U
208R	208R	1	4/13/91	27 U	27 U	27 U	27 U	27 U	140 U
209R	209R	1	4/5/91	**42**	9 U	9 U	9 U	9 U	47 U

Table B2. (cont'd) Concentrations (µg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	1,2-Dichloro-benzene	2-Methylphenol	bis(2-Chloro-isopropyl)ether	4-Methylphenol	N-Nitroso-di-n-propylamine
1	1	1	4/10/91	16 U	16 U	16 U	16 U	16 U
2R	2R	1	4/7/91	12 U	12 U	12 U	12 U	12 U
3	3	1	4/11/91	13 U	13 U	13 U	13 U	13 U
4	4	1	4/7/91	20 U	20 U	20 U	20 U	20 U
4	78	1	4/7/91					
4	79	2	4/7/91					
4	80	3	4/7/91					
5	5	1	4/6/91	18 U	18 U	18 U	18 U	18 U
5	51	1	4/6/91	18 U	18 U	18 U	18 U	18 U
5	52	2	4/6/91	17 U	17 U	17 U	17 U	17 U
5	53	3	4/6/91	18 U	18 U	18 U	18 U	18 U
8	8	1	4/12/91	13 U	13 U	13 U	13 U	13 U
9R	9R	1	4/12/91	8 U	8 U	8 U	8 U	8 U
10R	10R	1	4/13/91	9 U	9 U	9 U	9 U	9 U
11R	11R	1	4/13/91	13 U	13 U	13 U	13 U	13 U
12	12	1	4/13/91	16 U	16 U	16 U	16 U	16 U
13R	13R	1	4/14/91	8 U	8 U	8 U	8 U	8 U
14	14	1	4/14/91	11 U	11 U	11 U	11 U	11 U
15	15	1	4/14/91	8 U	8 U	8 U	8 U	8 U
17	17	1	4/14/91	18 U	18 U	18 U	18 U	18 U
18	18	1	4/5/91	12 U	12 U	12 U	12 U	12 U
19	19	1	4/5/91	21 U	21 U	21 U	21 U	21 U
20	20	1	4/5/91	12 U	12 U	12 U	12 U	12 U
21	21	1	4/2/91	11 U	11 U	11 U	11 U	11 U
22	22	1	4/2/91	9 U	9 U	9 U	9 U	9 U
26	26	1	4/13/91	10 U	10 U	10 U	10 U	10 U
29	29	1	4/1/91	17 U	17 U	17 U	17 U	17 U
30	30	1	3/25/91	10 U	10 U	10 U	10 U	10 U
32	32	1	4/1/91	8 U	8 U	8 U	8 U	8 U
32	57	1	4/1/91	9 U	9 U	9 U	9 U	9 U
32	58	2	4/1/91	8 U	8 U	8 U	8 U	8 U
32	59	3	4/1/91	8 U	8 U	8 U	8 U	8 U
33	33	1	4/1/91	10 U	10 U	10 U	10 U	10 U
34	34	1	3/25/91	18 U	18 U	18 U	18 U	18 U
35	35	1	3/26/91	19 U	19 U	19 U	19 U	19 U
35	72	1	3/26/91	18 U	18 U	18 U	18 U	18 U
35	73	2	3/26/91	18 U	18 U	18 U	18 U	18 U
35	74	3	3/26/91	18 U	18 U	18 U	18 U	18 U
38	38	1	3/26/91	24 U	24 U	24 U	24 U	24 U
38	60	1	3/26/91	23 U	23 U	23 U	23 U	23 U
38	61	2	3/26/91	23 U	23 U	23 U	23 U	23 U
38	62	3	3/26/91	23 U	23 U	23 U	23 U	23 U
39	39	1	3/27/91	8 U	8 U	8 U	8 U	8 U
40	40	1	3/27/91	10 U	10 U	10 U	10 U	10 U
41	41	1	3/27/91	10 U	10 U	10 U	10 U	10 U
43	43	1	3/27/91	8 U	8 U	8 U	8 U	8 U

Table B2. (cont'd) Concentrations (μg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	1,2-Dichloro-benzene	2-Methylphenol	bis(2-Chloro-isopropyl)ether	4-Methylphenol	N-Nitroso-di-n-propylamine
44	44	1	3/28/91	9 U	9 U	9 U	9 U	9 U
44	63	1	3/28/91	9 U	9 U	9 U	9 U	9 U
44	64	2	3/28/91	9 U	9 U	9 U	9 U	9 U
44	65	3	3/28/91	9 U	9 U	9 U	9 U	9 U
45	45	1	3/28/91	13 U	13 U	13 U	13 U	13 U
47	47	1	3/28/91	9 U	9 U	9 U	9 U	9 U
48	48	1	3/29/91	22 U	22 U	22 U	22 U	22 U
49	49	1	3/29/91	24 U	24 U	24 U	24 U	24 U
66	66	1	3/27/91	10 U	10 U	10 U	**89 N**	10 U
67	67	1	4/2/91	**13 E**	10 U	10 U	**170 E**	10 U
68	68	1	4/11/91	**9 E**	10 U	10 U	**380 E**	10 U
69	69	1	3/25/91	9 U	9 U	9 U	9 U	9 U
70	70	1	3/28/91	R	18 U	R	18 U	R
71	71	1	4/5/91	12 U	12 U	12 U	12 U	12 U
201R	201R	1	4/11/91	9 U	9 U	9 U	9 U	9 U
202R	202R	1	4/11/91	9 U	9 U	9 U	9 U	9 U
203R	203R	1	4/7/91	14 U	14 U	14 U	**21 N**	14 U
204R	204R	1	4/8/91	21 U	21 U	21 U	21 U	21 U
205R	205R	1	4/8/91	12 U	12 U	12 U	12 U	12 U
206R	206R	1	4/8/91	11 U	11 U	11 U	11 U	11 U
207R	207R	1	4/6/91	13 U	13 U	13 U	13 U	13 U
208R	208R	1	4/13/91	27 U	27 U	27 U	27 U	27 U
209R	209R	1	4/5/91	9 U	9 U	9 U	9 U	9 U

Table B2. (cont'd) Concentrations (µg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Hexachloro-ethane	Nitrobenzene	Isophorone	2-Nitrophenol	2,4-Dimethyl-phenol	Benzoic acid
1	1	1	4/10/91	31 U	16 U	16 U	77 U	31 U	**25 E**
2R	2R	1	4/7/91	23 U	12 U	12 U	58 U	23 U	**21 E**
3	3	1	4/11/91	26 U	13 U	13 U	66 U	26 U	**19 E**
4	4	1	4/7/91	39 U	20 U	20 U	97 U	39 U	**44 E**
4	78	1	4/7/91						
4	79	2	4/7/91						
4	80	3	4/7/91						
5	5	1	4/6/91	35 U	18 U	18 U	88 U	35 U	**37 E**
5	51	1	4/6/91	35 U	18 U	18 U	88 U	35 U	**21 E**
5	52	2	4/6/91	35 U	17 U	17 U	87 U	35 U	170 U
5	53	3	4/6/91	35 U	18 U	18 U	88 U	35 U	180 U
8	8	1	4/12/91	26 U	13 U	13 U	64 U	26 U	**24 E**
9R	9R	1	4/12/91	16 U	8 U	8 U	40 U	16 U	79 U
10R	10R	1	4/13/91	19 U	9 U	9 U	47 U	19 U	**15 N**
11R	11R	1	4/13/91	26 U	13 U	13 U	66 U	26 U	**25 E**
12	12	1	4/13/91	32 U	16 U	16 U	79 U	32 U	**48 N**
13R	13R	1	4/14/91	16 U	8 U	8 U	41 U	16 U	**10 N**
14	14	1	4/14/91	22 U	11 U	11 U	54 U	22 U	**14 N**
15	15	1	4/14/91	17 U	8 U	8 U	42 U	17 U	**23 E**
17	17	1	4/14/91	36 U	18 U	18 U	89 U	36 U	**27 N**
18	18	1	4/5/91	23 U	12 U	12 U	57 U	23 U	**33 E**
19	19	1	4/5/91	42 U	21 U	21 U	100 U	42 U	**34 E**
20	20	1	4/5/91	24 U	12 U	12 U	61 U	24 U	**36 E**
21	21	1	4/2/91	23 U	11 U	11 U	57 U	23 U	110 U
22	22	1	4/2/91	18 U	9 U	9 U	44 U	18 U	88 U
26	26	1	4/13/91	21 U	10 U	10 U	52 U	21 U	**18 N**
29	29	1	4/1/91	35 U	17 U	17 U	87 U	35 U	170 U
30	30	1	3/25/91	19 U	10 U	10 U	47 U	19 U	95 U
32	32	1	4/1/91	16 U	8 U	8 U	41 U	16 U	82 U
32	57	1	4/1/91	17 U	9 U	9 U	43 U	17 U	86 U
32	58	2	4/1/91	17 U	8 U	8 U	42 U	17 U	85 U
32	59	3	4/1/91	17 U	8 U	8 U	42 U	17 U	84 U
33	33	1	4/1/91	19 U	10 U	10 U	48 U	19 U	96 U
34	34	1	3/25/91	36 U	18 U	18 U	90 U	36 U	180 U
35	35	1	3/26/91	37 U	19 U	19 U	93 U	37 U	**57 N**
35	72	1	3/26/91	36 U	18 U	18 U	90 U	36 U	**38 E**
35	73	2	3/26/91	36 U	18 U	18 U	90 U	36 U	**40 E**
35	74	3	3/26/91	36 U	18 U	18 U	90 U	36 U	**98 E**
38	38	1	3/26/91	48 U	24 U	24 U	120 U	48 U	240 U
38	60	1	3/26/91	47 U	23 U	23 U	120 U	47 U	230 U
38	61	2	3/26/91	46 U	23 U	23 U	120 U	46 U	**55 E**
38	62	3	3/26/91	47 U	23 U	23 U	120 U	47 U	**75 E**
39	39	1	3/27/91	17 U	8 U	8 U	41 U	17 U	82 U
40	40	1	3/27/91	19 U	10 U	10 U	48 U	19 U	97 U
41	41	1	3/27/91	21 U	10 U	10 U	51 U	21 U	**38 E**
43	43	1	3/27/91	17 U	8 U	8 U	42 U	17 U	**13 E**

Table B2. (cont'd) Concentrations (µg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Hexachloro-ethane	Nitrobenzene	Isophorone	2-Nitrophenol	2,4-Dimethyl-phenol	Benzoic acid
44	44	1	3/28/91	19 U	9 U	9 U	46 U	19 U	21 E
44	63	1	3/28/91	19 U	9 U	9 U	46 U	19 U	21 E
44	64	2	3/28/91	19 U	9 U	9 U	47 U	19 U	22 E
44	65	3	3/28/91	19 U	9 U	9 U	47 U	19 U	37 E
45	45	1	3/28/91	26 U	13 U	13 U	65 U	26 U	47 E
47	47	1	3/28/91	18 U	9 U	9 U	45 U	18 U	24 E
48	48	1	3/29/91	45 U	22 U	22 U	110 U	45 U	220 U
49	49	1	3/29/91	48 U	24 U	24 U	120 U	48 U	63 E
66	66	1	3/27/91	19 U	10 U	32 E	48 U	19 U	160 E
67	67	1	4/2/91	20 U	10 U	32 E	50 U	20 U	76 E
68	68	1	4/11/91	19 U	10 U	28 E	48 U	19 U	28 E
69	69	1	3/25/91	18 U	9 U	9 U	46 U	18 U	16 E
70	70	1	3/28/91	R	R	R	88 U	35 U	R
71	71	1	4/5/91	25 U	12 U	12 U	61 U	25 U	36 E
201R	201R	1	4/11/91	18 U	9 U	9 U	45 U	18 U	16 E
202R	202R	1	4/11/91	19 U	9 U	9 U	47 U	19 U	16 E
203R	203R	1	4/7/91	28 U	14 U	14 U	69 U	28 U	53 E
204R	204R	1	4/8/91	43 U	21 U	21 U	110 U	43 U	36 E
205R	205R	1	4/8/91	24 U	12 U	12 U	61 U	24 U	15 E
206R	206R	1	4/8/91	22 U	11 U	11 U	54 U	22 U	12 N
207R	207R	1	4/6/91	27 U	13 U	13 U	67 U	27 U	24 N
208R	208R	1	4/13/91	55 U	27 U	27 U	140 U	55 U	43 N
209R	209R	1	4/5/91	19 U	9 U	9 U	47 U	19 U	93 U

Table B2. (cont'd) Concentrations (µg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	bis(2-Chloro-ethoxy)methane	2,4-Dichloro-phenol	1,2,4-Trichloro-benzene	Naphthalene	4-Chloroaniline
1	1	1	4/10/91	16 U	46 U	16 U	**6 E**	R
2R	2R	1	4/7/91	12 U	35 U	12 U	**4 E**	R
3	3	1	4/11/91	13 U	39 U	13 U	**5 E**	R
4	4	1	4/7/91	20 U	58 U	20 U	**8 E**	R
4	78	1	4/7/91					
4	79	2	4/7/91					
4	80	3	4/7/91					
5	5	1	4/6/91	18 U	53 U	18 U	**7 E**	R
5	51	1	4/6/91	18 U	53 U	18 U	**6 E**	R
5	52	2	4/6/91	17 U	52 U	17 U	**4 E**	R
5	53	3	4/6/91	18 U	53 U	18 U	**5 E**	R
8	8	1	4/12/91	13 U	38 U	13 U	**16 E**	R
9R	9R	1	4/12/91	8 U	24 U	8 U	8 U	R
10R	10R	1	4/13/91	9 U	28 U	9 U	**3 E**	R
11R	11R	1	4/13/91	13 U	40 U	13 U	13 U	R
12	12	1	4/13/91	16 U	48 U	16 U	**10 E**	R
13R	13R	1	4/14/91	8 U	24 U	8 U	8 U	R
14	14	1	4/14/91	11 U	33 U	11 U	**2 N**	R
15	15	1	4/14/91	8 U	25 U	8 U	8 U	R
17	17	1	4/14/91	18 U	53 U	18 U	18 U	R
18	18	1	4/5/91	12 U	34 U	12 U	12 U	R
19	19	1	4/5/91	21 U	62 U	21 U	21 U	R
20	20	1	4/5/91	12 U	37 U	12 U	**3 E**	R
21	21	1	4/2/91	11 U	34 U	11 U	**10 E**	R
22	22	1	4/2/91	9 U	26 U	9 U	**3 E**	R
26	26	1	4/13/91	10 U	31 U	10 U	**4 E**	R
29	29	1	4/1/91	17 U	52 U	17 U	**9 E**	R
30	30	1	3/25/91	10 U	28 U	10 U	**18 E**	R
32	32	1	4/1/91	8 U	25 U	8 U	**3 E**	R
32	57	1	4/1/91	9 U	26 U	9 U	**3 E**	R
32	58	2	4/1/91	8 U	25 U	8 U	**3 E**	R
32	59	3	4/1/91	8 U	25 U	8 U	**3 E**	R
33	33	1	4/1/91	10 U	29 U	10 U	**11 E**	R
34	34	1	3/25/91	18 U	54 U	18 U	**5 E**	R
35	35	1	3/26/91	19 U	56 U	19 U	**6 E**	R
35	72	1	3/26/91	18 U	54 U	18 U	**6 E**	R
35	73	2	3/26/91	18 U	54 U	18 U	18 U	R
35	74	3	3/26/91	18 U	54 U	18 U	18 U	R
38	38	1	3/26/91	24 U	71 U	24 U	**6 N**	R
38	60	1	3/26/91	23 U	70 U	23 U	**11 E**	R
38	61	2	3/26/91	23 U	70 U	23 U	**10 E**	R
38	62	3	3/26/91	23 U	70 U	23 U	**6 E**	R
39	39	1	3/27/91	8 U	25 U	8 U	8 U	R
40	40	1	3/27/91	10 U	29 U	10 U	**51 E**	R
41	41	1	3/27/91	10 U	31 U	10 U	**12 E**	R
43	43	1	3/27/91	8 U	25 U	8 U	8 U	R

Table B2. (cont'd) Concentrations (µg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	bis(2-Chloro-ethoxy)methane	2,4-Dichloro-phenol	1,2,4-Trichloro-benzene	Naphthalene	4-Chloroaniline
44	44	1	3/28/91	9 U	28 U	9 U	9 U	R
44	63	1	3/28/91	9 U	28 U	9 U	9 U	R
44	64	2	3/28/91	9 U	28 U	9 U	**2 E**	R
44	65	3	3/28/91	9 U	28 U	9 U	**2 E**	R
45	45	1	3/28/91	13 U	39 U	13 U	**4 E**	R
47	47	1	3/28/91	9 U	27 U	9 U	9 U	R
48	48	1	3/29/91	22 U	67 U	22 U	22 U	R
49	49	1	3/29/91	24 U	72 U	24 U	**7 E**	R
66	66	1	3/27/91	10 U	29 U	10 U	**36 E**	R
67	67	1	4/2/91	10 U	30 U	10 U	**37 E**	R
68	68	1	4/11/91	10 U	29 U	10 U	**37 E**	R
69	69	1	3/25/91	9 U	27 U	9 U	**3 N**	R
70	70	1	3/28/91	R	53 U	R	R	R
71	71	1	4/5/91	12 U	37 U	12 U	**6 E**	R
201R	201R	1	4/11/91	9 U	27 U	9 U	**2 E**	R
202R	202R	1	4/11/91	9 U	28 U	9 U	**3 E**	R
203R	203R	1	4/7/91	14 U	41 U	14 U	**14 E**	R
204R	204R	1	4/8/91	21 U	64 U	21 U	**8 N**	R
205R	205R	1	4/8/91	12 U	37 U	12 U	**4 E**	R
206R	206R	1	4/8/91	11 U	32 U	11 U	**3 E**	R
207R	207R	1	4/6/91	13 U	40 U	13 U	**7 E**	R
208R	208R	1	4/13/91	27 U	82 U	27 U	27 U	R
209R	209R	1	4/5/91	9 U	28 U	9 U	9 U	R

Table B2. (cont'd) Concentrations (µg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Hexachloro-butadiene	4-Chloro-3-methylphenol	2-Methyl-naphthalene	Hexachloro-cyclopentadiene	2,4,6-Trichloro-phenol
1	1	1	4/10/91	31 U	31 U	8 E	R	77 U
2R	2R	1	4/7/91	23 U	23 U	8 E	R	58 U
3	3	1	4/11/91	26 U	26 U	9 E	R	66 U
4	4	1	4/7/91	39 U	39 U	7 E	R	97 U
4	78	1	4/7/91					
4	79	2	4/7/91					
4	80	3	4/7/91					
5	5	1	4/6/91	35 U	35 U	7 E	R	88 U
5	51	1	4/6/91	35 U	35 U	5 E	R	88 U
5	52	2	4/6/91	35 U	35 U	4 E	R	87 U
5	53	3	4/6/91	35 U	35 U	4 E	R	88 U
8	8	1	4/12/91	26 U	26 U	11 E	R	64 U
9R	9R	1	4/12/91	16 U	16 U	8 U	R	40 U
10R	10R	1	4/13/91	19 U	19 U	4 E	R	47 U
11R	11R	1	4/13/91	26 U	26 U	5 E	R	66 U
12	12	1	4/13/91	32 U	32 U	11 E	R	79 U
13R	13R	1	4/14/91	16 U	16 U	8 U	R	41 U
14	14	1	4/14/91	22 U	22 U	3 E	R	54 U
15	15	1	4/14/91	17 U	17 U	8 U	R	42 U
17	17	1	4/14/91	36 U	36 U	18 U	R	89 U
18	18	1	4/5/91	23 U	23 U	12 U	R	57 U
19	19	1	4/5/91	42 U	42 U	21 U	R	100 U
20	20	1	4/5/91	24 U	24 U	3 E	R	61 U
21	21	1	4/2/91	23 U	23 U	4 E	R	57 U
22	22	1	4/2/91	18 U	18 U	9 U	R	44 U
26	26	1	4/13/91	21 U	21 U	5 E	R	52 U
29	29	1	4/1/91	35 U	35 U	5 E	R	87 U
30	30	1	3/25/91	10 U	10 U	7 E	R	47 U
32	32	1	4/1/91	16 U	16 U	8 U	R	41 U
32	57	1	4/1/91	17 U	17 U	9 U	R	43 U
32	58	2	4/1/91	17 U	17 U	8 U	R	42 U
32	59	3	4/1/91	17 U	17 U	8 U	R	42 U
33	33	1	4/1/91	19 U	19 U	3 E	R	48 U
34	34	1	3/25/91	36 U	36 U	18 U	R	90 U
35	35	1	3/26/91	37 U	37 U	7 E	R	93 U
35	72	1	3/26/91	36 U	36 U	4 E	R	90 U
35	73	2	3/26/91	36 U	36 U	18 U	R	90 U
35	74	3	3/26/91	36 U	36 U	6 E	R	90 U
38	38	1	3/26/91	48 U	48 U	24 U	R	120 U
38	60	1	3/26/91	47 U	47 U	23 U	R	120 U
38	61	2	3/26/91	46 U	46 U	8 E	R	120 U
38	62	3	3/26/91	47 U	47 U	6 E	R	120 U
39	39	1	3/27/91	17 U	17 U	8 U	R	41 U
40	40	1	3/27/91	19 U	19 U	18 E	R	48 U
41	41	1	3/27/91	21 U	21 U	15 E	R	51 U
43	43	1	3/27/91	17 U	17 U	8 U	R	42 U

Table B2. (cont'd) Concentrations (µg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Hexachloro-butadiene	4-Chloro-3-methylphenol	2-Methyl-naphthalene	Hexachloro-cyclopentadiene	2,4,6-Trichloro-phenol
44	44	1	3/28/91	19 U	19 U	9 U	R	46 U
44	63	1	3/28/91	19 U	19 U	9 U	R	46 U
44	64	2	3/28/91	19 U	19 U	9 U	R	47 U
44	65	3	3/28/91	19 U	19 U	9 U	R	47 U
45	45	1	3/28/91	26 U	26 U	**3 E**	R	65 U
47	47	1	3/28/91	18 U	18 U	9 U	R	45 U
48	48	1	3/29/91	45 U	45 U	22 U	R	110 U
49	49	1	3/29/91	48 U	48 U	24 U	R	120 U
66	66	1	3/27/91	19 U	19 U	**32 E**	R	48 U
67	67	1	4/2/91	20 U	20 U	**33 E**	R	50 U
68	68	1	4/11/91	19 U	19 U	**44 E**	R	48 U
69	69	1	3/25/91	18 U	18 U	9 U	R	46 U
70	70	1	3/28/91	35 U	35 U	18 U	R	88 U
71	71	1	4/5/91	25 U	25 U	**5 E**	R	61 U
201R	201R	1	4/11/91	18 U	18 U	**3 E**	R	45 U
202R	202R	1	4/11/91	19 U	19 U	**4 E**	R	47 U
203R	203R	1	4/7/91	28 U	28 U	**17 E**	R	69 U
204R	204R	1	4/8/91	43 U	43 U	**12 E**	R	110 U
205R	205R	1	4/8/91	24 U	24 U	**6 E**	R	61 U
206R	206R	1	4/8/91	22 U	22 U	**5 E**	R	54 U
207R	207R	1	4/6/91	27 U	27 U	**10 E**	R	67 U
208R	208R	1	4/13/91	55 U	55 U	27 U	R	140 U
209R	209R	1	4/5/91	19 U	19 U	9 U	R	47 U

Table B2. (cont'd) Concentrations (μg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	2,4,5-Trichloro-phenol	2-Chloro-naphthalene	2-Nitroaniline	Dimethyl-phthalate	Acenaphthylene	3-Nitroaniline
1	1	1	4/10/91	77 U	16 U	77 U	16 U	16 U	77 U
2R	2R	1	4/7/91	58 U	12 U	58 U	12 U	12 U	58 U
3	3	1	4/11/91	66 U	13 U	66 U	13 U	13 U	66 U
4	4	1	4/7/91	97 U	20 U	97 U	20 U	20 U	97 U
4	78	1	4/7/91						
4	79	2	4/7/91						
4	80	3	4/7/91						
5	5	1	4/6/91	88 U	18 U	88 U	18 U	18 U	88 U
5	51	1	4/6/91	88 U	18 U	88 U	18 U	18 U	88 U
5	52	2	4/6/91	87 U	17 U	87 U	17 U	17 U	87 U
5	53	3	4/6/91	88 U	18 U	88 U	18 U	18 U	88 U
8	8	1	4/12/91	64 U	13 U	64 U	13 U	**5 E**	64 U
9R	9R	1	4/12/91	40 U	8 U	40 U	8 U	8 U	40 U
10R	10R	1	4/13/91	47 U	9 U	47 U	9 U	9 U	47 U
11R	11R	1	4/13/91	66 U	13 U	66 U	13 U	13 U	66 U
12	12	1	4/13/91	79 U	16 U	79 U	16 U	**2 N**	79 U
13R	13R	1	4/14/91	41 U	8 U	41 U	8 U	8 U	41 U
14	14	1	4/14/91	54 U	11 U	54 U	11 U	11 U	54 U
15	15	1	4/14/91	42 U	8 U	42 U	8 U	8 U	42 U
17	17	1	4/14/91	89 U	18 U	89 U	18 U	18 U	89 U
18	18	1	4/5/91	57 U	12 U	57 U	12 U	12 U	57 U
19	19	1	4/5/91	100 U	21 U	100 U	21 U	21 U	100 U
20	20	1	4/5/91	61 U	12 U	61 U	12 U	12 U	61 U
21	21	1	4/2/91	57 U	11 U	57 U	11 U	11 U	57 U
22	22	1	4/2/91	44 U	9 U	44 U	9 U	**2 N**	44 U
26	26	1	4/13/91	52 U	10 U	52 U	10 U	10 U	52 U
29	29	1	4/1/91	87 U	17 U	87 U	17 U	17 U	87 U
30	30	1	3/25/91	47 U	10 U	47 U	10 U	**7 E**	47 U
32	32	1	4/1/91	41 U	8 U	41 U	8 U	8 U	41 U
32	57	1	4/1/91	43 U	9 U	43 U	9 U	**2 E**	43 U
32	58	2	4/1/91	42 U	8 U	42 U	8 U	8 U	42 U
32	59	3	4/1/91	42 U	8 U	42 U	8 U	8 U	42 U
33	33	1	4/1/91	48 U	10 U	48 U	10 U	**5 E**	48 U
34	34	1	3/25/91	90 U	18 U	90 U	18 U	**5 E**	90 U
35	35	1	3/26/91	93 U	19 U	93 U	19 U	**27**	93 U
35	72	1	3/26/91	90 U	18 U	90 U	18 U	**13 E**	90 U
35	73	2	3/26/91	90 U	18 U	90 U	18 U	**12 E**	90 U
35	74	3	3/26/91	90 U	18 U	90 U	18 U	**28**	90 U
38	38	1	3/26/91	120 U	24 U	120 U	24 U	24 U	120 U
38	60	1	3/26/91	120 U	23 U	120 U	23 U	23 U	120 U
38	61	2	3/26/91	120 U	23 U	120 U	23 U	**6 E**	120 U
38	62	3	3/26/91	120 U	23 U	120 U	23 U	**5 E**	120 U
39	39	1	3/27/91	41 U	8 U	41 U	8 U	8 U	41 U
40	40	1	3/27/91	48 U	10 U	48 U	**6 E**	**98**	48 U
41	41	1	3/27/91	51 U	10 U	51 U	10 U	**3 E**	51 U
43	43	1	3/27/91	42 U	8 U	42 U	8 U	8 U	42 U

Table B2. (cont'd) Concentrations (µg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	2,4,5-Trichloro-phenol	2-Chloro-naphthalene	2-Nitroaniline	Dimethyl-phthalate	Acenaphthylene	3-Nitroaniline
44	44	1	3/28/91	46 U	9 U	46 U	9 U	9 U	46 U
44	63	1	3/28/91	46 U	9 U	46 U	9 U	9 U	46 U
44	64	2	3/28/91	47 U	9 U	47 U	9 U	9 U	47 U
44	65	3	3/28/91	47 U	9 U	47 U	9 U	9 U	47 U
45	45	1	3/28/91	65 U	13 U	65 U	13 U	13 U	65 U
47	47	1	3/28/91	45 U	9 U	45 U	9 U	9 U	45 U
48	48	1	3/29/91	110 U	22 U	110 U	22 U	22 U	110 U
49	49	1	3/29/91	120 U	24 U	120 U	24 U	24 U	120 U
66	66	1	3/27/91	48 U	10 U	48 U	10 U	34	48 U
67	67	1	4/2/91	50 U	10 U	50 U	10 U	14 E	50 U
68	68	1	4/11/91	48 U	10 U	48 U	10 U	23	48 U
69	69	1	3/25/91	46 U	9 U	46 U	9 U	9 U	46 U
70	70	1	3/28/91	88 U	18 U	88 U	18 U	18 U	88 U
71	71	1	4/5/91	61 U	12 U	61 U	12 U	12 U	61 U
201R	201R	1	4/11/91	45 U	9 U	45 U	9 U	9 U	45 U
202R	202R	1	4/11/91	47 U	9 U	47 U	9 U	9 U	47 U
203R	203R	1	4/7/91	69 U	14 U	69 U	14 U	14 U	69 U
204R	204R	1	4/8/91	110 U	21 U	110 U	21 U	21 U	110 U
205R	205R	1	4/8/91	61 U	12 U	61 U	12 U	12 U	61 U
206R	206R	1	4/8/91	54 U	11 U	54 U	11 U	11 U	54 U
207R	207R	1	4/6/91	67 U	13 U	67 U	13 U	13 U	67 U
208R	208R	1	4/13/91	140 U	27 U	140 U	27 U	27 U	140 U
209R	209R	1	4/5/91	47 U	9 U	47 U	9 U	9 U	47 U

Table B2. (cont'd) Concentrations (µg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Acenaphthene	2,4-Dinitro-phenol	4-Nitro-phenol	Dibenzo-furan	2,4-Dinitro-toluene	2,6-Dinitro-toluene
1	1	1	4/10/91	**4 E**	160 U	77 U	**6 E**	77 U	77 U
2R	2R	1	4/7/91	12 U	120 U	58 U	**4 E**	58 U	58 U
3	3	1	4/11/91	13 U	130 U	66 U	13 U	66 U	66 U
4	4	1	4/7/91	20 U	200 U	97 U	20 U	97 U	97 U
4	78	1	4/7/91						
4	79	2	4/7/91						
4	80	3	4/7/91						
5	5	1	4/6/91	18 U	180 U	88 U	**4 E**	88 U	88 U
5	51	1	4/6/91	18 U	180 U	88 U	18 U	88 U	88 U
5	52	2	4/6/91	17 U	170 U	87 U	17 U	87 U	87 U
5	53	3	4/6/91	18 U	180 U	88 U	18 U	88 U	88 U
8	8	1	4/12/91	**5 E**	130 U	64 U	**8 E**	64 U	64 U
9R	9R	1	4/12/91	8 U	79 U	40 U	8 U	40 U	40 U
10R	10R	1	4/13/91	9 U	94 U	47 U	9 U	47 U	47 U
11R	11R	1	4/13/91	13 U	130 U	66 U	13 U	66 U	66 U
12	12	1	4/13/91	16 U	160 U	79 U	**5 N**	79 U	79 U
13R	13R	1	4/14/91	8 U	81 U	41 U	8 U	41 U	41 U
14	14	1	4/14/91	11 U	110 U	54 U	11 U	54 U	54 U
15	15	1	4/14/91	8 U	83 U	42 U	8 U	42 U	42 U
17	17	1	4/14/91	18 U	180 U	89 U	18 U	89 U	89 U
18	18	1	4/5/91	12 U	120 U	57 U	12 U	57 U	57 U
19	19	1	4/5/91	21 U	210 U	100 U	21 U	100 U	100 U
20	20	1	4/5/91	12 U	120 U	61 U	12 U	61 U	61 U
21	21	1	4/2/91	**9 E**	110 U	57 U	**11 E**	57 U	57 U
22	22	1	4/2/91	9 U	88 U	44 U	9 U	44 U	44 U
26	26	1	4/13/91	10 U	100 U	52 U	10 U	52 U	52 U
29	29	1	4/1/91	17 U	170 U	87 U	17 U	87 U	87 U
30	30	1	3/25/91	**20**	95 U	47 U	**26**	47 U	47 U
32	32	1	4/1/91	8 U	82 U	41 U	8 U	41 U	41 U
32	57	1	4/1/91	9 U	86 U	43 U	9 U	43 U	43 U
32	58	2	4/1/91	8 U	85 U	42 U	8 U	42 U	42 U
32	59	3	4/1/91	8 U	84 U	42 U	8 U	42 U	42 U
33	33	1	4/1/91	**15 E**	96 U	48 U	**14 E**	48 U	48 U
34	34	1	3/25/91	18 U	180 U	90 U	**4 E**	90 U	90 U
35	35	1	3/26/91	**7 E**	190 U	93 U	**8 E**	93 U	93 U
35	72	1	3/26/91	18 U	180 U	90 U	**4 E**	90 U	90 U
35	73	2	3/26/91	18 U	180 U	90 U	18 U	90 U	90 U
35	74	3	3/26/91	18 U	180 U	90 U	**6 E**	90 U	90 U
38	38	1	3/26/91	24 U	240 U	120 U	**6 E**	120 U	120 U
38	60	1	3/26/91	23 U	230 U	120 U	23 U	120 U	120 U
38	61	2	3/26/91	23 U	230 U	120 U	**9 E**	120 U	120 U
38	62	3	3/26/91	23 U	230 U	120 U	**9 E**	120 U	120 U
39	39	1	3/27/91	8 U	82 U	41 U	8 U	41 U	41 U
40	40	1	3/27/91	**99**	97 U	48 U	**39**	48 U	48 U
41	41	1	3/27/91	**8 E**	100 U	51 U	**15**	51 U	51 U
43	43	1	3/27/91	8 U	83 U	42 U	8 U	42 U	42 U

Table B2. (cont'd) Concentrations (µg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Acenaphthene	2,4-Dinitro-phenol	4-Nitro-phenol	Dibenzo-furan	2,4-Dinitro-toluene	2,6-Dinitro-toluene
44	44	1	3/28/91	9 U	92 U	46 U	9 U	46 U	46 U
44	63	1	3/28/91	9 U	93 U	46 U	9 U	46 U	46 U
44	64	2	3/28/91	9 U	94 U	47 U	9 U	47 U	47 U
44	65	3	3/28/91	9 U	93 U	47 U	9 U	47 U	47 U
45	45	1	3/28/91	13 U	130 U	65 U	13 U	65 U	65 U
47	47	1	3/28/91	9 U	90 U	45 U	9 U	45 U	45 U
48	48	1	3/29/91	22 U	220 U	110 U	22 U	110 U	110 U
49	49	1	3/29/91	24 U	240 U	120 U	**7 E**	120 U	120 U
66	66	1	3/27/91	**86**	96 U	48 U	**2 N**	48 U	48 U
67	67	1	4/2/91	**61 E**	100 U	50 U	10 U	50 U	50 U
68	68	1	4/11/91	**67**	95 U	48 U	**2 E**	48 U	48 U
69	69	1	3/25/91	9 U	91 U	46 U	9 U	46 U	46 U
70	70	1	3/28/91	18 U	180 U	88 U	18 U	88 U	88 U
71	71	1	4/5/91	**3 N**	120 U	61 U	**5 E**	61 U	61 U
201R	201R	1	4/11/91	9 U	90 U	45 U	9 U	45 U	45 U
202R	202R	1	4/11/91	9 U	94 U	47 U	9 U	47 U	47 U
203R	203R	1	4/7/91	14 U	140 U	69 U	**6 E**	69 U	69 U
204R	204R	1	4/8/91	21 U	210 U	110 U	**5 N**	110 U	110 U
205R	205R	1	4/8/91	12 U	120 U	61 U	12 U	61 U	61 U
206R	206R	1	4/8/91	11 U	110 U	54 U	**3 E**	54 U	54 U
207R	207R	1	4/6/91	**3 N**	130 U	67 U	**4 E**	67 U	67 U
208R	208R	1	4/13/91	27 U	270 U	140 U	27 U	140 U	140 U
209R	209R	1	4/5/91	9 U	93 U	47 U	9 U	47 U	47 U

Table B2. (cont'd) Concentrations (µg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Diethyl-phthalate	4-Chlorophenyl-phenylether	Fluorene	4-Nitroaniline	4,6-Dinitro-2-methylphenol
1	1	1	4/10/91	16 U	16 U	**9 E**	77 U	160 U
2R	2R	1	4/7/91	12 U	12 U	**6 E**	58 U	120 U
3	3	1	4/11/91	13 U	13 U	**4 N**	66 U	130 U
4	4	1	4/7/91	20 U	20 U	**4 E**	97 U	200 U
4	78	1	4/7/91					
4	79	2	4/7/91					
4	80	3	4/7/91					
5	5	1	4/6/91	18 U	18 U	**5 E**	88 U	180 U
5	51	1	4/6/91	18 U	18 U	**4 E**	88 U	180 U
5	52	2	4/6/91	17 U	17 U	17 U	87 U	170 U
5	53	3	4/6/91	18 U	18 U	18 U	88 U	180 U
8	8	1	4/12/91	13 U	13 U	**9 E**	64 U	130 U
9R	9R	1	4/12/91	8 U	8 U	8 U	40 U	79 U
10R	10R	1	4/13/91	**11 N**	9 U	9 U	47 U	94 U
11R	11R	1	4/13/91	13 U	13 U	13 U	66 U	130 U
12	12	1	4/13/91	16 U	16 U	**8 E**	79 U	160 U
13R	13R	1	4/14/91	8 U	8 U	8 U	41 U	81 U
14	14	1	4/14/91	11 U	11 U	11 U	54 U	110 U
15	15	1	4/14/91	8 U	8 U	8 U	42 U	83 U
17	17	1	4/14/91	18 U	18 U	18 U	89 U	180 U
18	18	1	4/5/91	12 U	12 U	12 U	57 U	120 U
19	19	1	4/5/91	21 U	21 U	21 U	100 U	210 U
20	20	1	4/5/91	12 U	12 U	12 U	61 U	120 U
21	21	1	4/2/91	11 U	11 U	**14**	57 U	110 U
22	22	1	4/2/91	9 U	9 U	**2 E**	44 U	88 U
26	26	1	4/13/91	10 U	10 U	**3 N**	52 U	100 U
29	29	1	4/1/91	17 U	17 U	**6 E**	87 U	170 U
30	30	1	3/25/91	10 U	10 U	**43**	47 U	95 U
32	32	1	4/1/91	**3 N**	8 U	**3 E**	41 U	82 U
32	57	1	4/1/91	**3 N**	9 U	**2 N**	43 U	86 U
32	58	2	4/1/91	8 U	8 U	**3 E**	42 U	85 U
32	59	3	4/1/91	8 U	8 U	**2 E**	42 U	84 U
33	33	1	4/1/91	10 U	10 U	**23**	48 U	96 U
34	34	1	3/25/91	**6 N**	18 U	**8 E**	90 U	180 U
35	35	1	3/26/91	19 U	19 U	**19**	93 U	186 U
35	72	1	3/26/91	18 U	18 U	**9 E**	90 U	180 U
35	73	2	3/26/91	18 U	18 U	**9 E**	90 U	180 U
35	74	3	3/26/91	**5 E**	18 U	**17 E**	90 U	180 U
38	38	1	3/26/91	24 U	24 U	**10 E**	120 U	1 U
38	60	1	3/26/91	23 U	23 U	**10 E**	120 U	240 U
38	61	2	3/26/91	23 U	23 U	**11 E**	120 U	230 U
38	62	3	3/26/91	23 U	23 U	**12 E**	120 U	230 U
39	39	1	3/27/91	8 U	8 U	8 U	41 U	82 U
40	40	1	3/27/91	10 U	10 U	**190**	48 U	97 U
41	41	1	3/27/91	10 U	10 U	**16**	51 U	100 U
43	43	1	3/27/91	8 U	8 U	8 U	42 U	83 U

Table B2. (cont'd) Concentrations (μg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Diethyl-phthalate	4-Chlorophenyl-phenylether	Fluorene	4-Nitroaniline	4,6-Dinitro-2-methylphenol
44	44	1	3/28/91	9 U	9 U	9 U	46 U	92 U
44	63	1	3/28/91	9 U	9 U	9 U	46 U	93 U
44	64	2	3/28/91	9 U	9 U	9 U	47 U	94 U
44	65	3	3/28/91	9 U	9 U	9 U	47 U	93 U
45	45	1	3/28/91	13 U	13 U	13 U	65 U	130 U
47	47	1	3/28/91	9 U	9 U	9 U	45 U	90 U
48	48	1	3/29/91	22 U	22 U	22 U	110 U	220 U
49	49	1	3/29/91	24 U	24 U	**11 E**	120 U	240 U
66	66	1	3/27/91	10 U	**110**	**100**	48 U	96 U
67	67	1	4/2/91	10 U	**65**	**70**	50 U	100 U
68	68	1	4/11/91	10 U	**83**	**82**	48 U	95 U
69	69	1	3/25/91	**18**	9 U	9 U	46 U	91 U
70	70	1	3/28/91	18 U	18 U	**9 E**	88 U	180 U
71	71	1	4/5/91	12 U	12 U	**7 E**	61 U	120 U
201R	201R	1	4/11/91	9 U	9 U	**3 E**	45 U	90 U
202R	202R	1	4/11/91	9 U	9 U	**2 N**	47 U	94 U
203R	203R	1	4/7/91	**2 N**	14 U	**6 E**	69 U	140 U
204R	204R	1	4/8/91	21 U	21 U	**6 N**	110 U	210 U
205R	205R	1	4/8/91	12 U	12 U	**3 N**	61 U	120 U
206R	206R	1	4/8/91	11 U	11 U	**3 E**	54 U	110 U
207R	207R	1	4/6/91	13 U	13 U	**6 E**	67 U	130 U
208R	208R	1	4/13/91	27 U	27 U	27 U	140 U	270 U
209R	209R	1	4/5/91	9 U	9 U	9 U	47 U	93 U

Table B2. (cont'd) Concentrations (µg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	N-Nitroso-diphenylamine	4-Bromophenyl-phenylether	Hexachloro-benzene	Pentachloro-phenol	Phenanthrene
1	1	1	4/10/91	16 U	16 U	16 U	77 U	110
2R	2R	1	4/7/91	12 U	12 U	12 U	58 U	59
3	3	1	4/11/91	13 U	13 U	13 U	66 U	38
4	4	1	4/7/91	20 U	20 U	20 U	97 U	51
4	78	1	4/7/91					
4	79	2	4/7/91					
4	80	3	4/7/91					
5	5	1	4/6/91	18 U	18 U	18 U	88 U	50
5	51	1	4/6/91	18 U	18 U	18 U	88 U	36
5	52	2	4/6/91	17 U	17 U	17 U	87 U	30
5	53	3	4/6/91	18 U	18 U	18 U	88 U	35
8	8	1	4/12/91	13 U	13 U	13 U	64 U	73
9R	9R	1	4/12/91	8 U	8 U	8 U	40 U	8 U
10R	10R	1	4/13/91	9 U	9 U	9 U	47 U	19
11R	11R	1	4/13/91	13 U	13 U	13 U	66 U	19
12	12	1	4/13/91	16 U	16 U	16 U	79 U	64
13R	13R	1	4/14/91	8 U	8 U	8 U	41 U	8 E
14	14	1	4/14/91	11 U	11 U	11 U	54 U	18
15	15	1	4/14/91	8 U	8 U	8 U	42 U	4 E
17	17	1	4/14/91	18 U	18 U	18 U	89 U	28
18	18	1	4/5/91	12 U	12 U	12 U	57 U	18
19	19	1	4/5/91	21 U	21 U	21 U	100 U	29
20	20	1	4/5/91	12 U	12 U	12 U	61 U	14
21	21	1	4/2/91	11 U	11 U	11 U	57 U	71
22	22	1	4/2/91	9 U	9 U	9 U	44 U	16
26	26	1	4/13/91	10 U	10 U	10 U	52 U	25
29	29	1	4/1/91	17 U	17 U	17 U	87 U	52
30	30	1	3/25/91	10 U	10 U	10 U	47 U	230
32	32	1	4/1/91	8 U	8 U	8 U	41 U	26
32	57	1	4/1/91	9 U	9 U	4 E	43 U	21
32	58	2	4/1/91	8 U	8 U	8 U	42 U	27
32	59	3	4/1/91	8 U	8 U	8 U	42 U	25
33	33	1	4/1/91	10 U	10 U	10 U	48 U	180
34	34	1	3/25/91	18 U	18 U	18 U	90 U	100
35	35	1	3/26/91	19 U	19 U	19 U	93 U	240
35	72	1	3/26/91	18 U	18 U	18 U	90 U	120
35	73	2	3/26/91	18 U	18 U	18 U	90 U	120
35	74	3	3/26/91	18 U	18 U	18 U	90 U	190
38	38	1	3/26/91	24 U	24 U	24 U	120 U	93
38	60	1	3/26/91	23 U	23 U	23 U	120 U	98
38	61	2	3/26/91	23 U	23 U	23 U	120 U	120
38	62	3	3/26/91	23 U	23 U	23 U	120 U	120
39	39	1	3/27/91	8 U	8 U	8 U	41 U	3 E
40	40	1	3/27/91	10 U	10 U	10 U	48 U	800
41	41	1	3/27/91	10 U	10 U	10 U	51 U	210
43	43	1	3/27/91	8 U	8 U	8 U	42 U	8 U

Table B2. (cont'd) Concentrations (µg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	N-Nitroso-diphenylamine	4-Bromophenyl-phenylether	Hexachloro-benzene	Pentachloro-phenol	Phenanthrene
44	44	1	3/28/91	9 U	9 U	9 U	46 U	12
44	63	1	3/28/91	9 U	9 U	9 U	46 U	8 E
44	64	2	3/28/91	9 U	9 U	9 U	47 U	14
44	65	3	3/28/91	9 U	9 U	9 U	47 U	10
45	45	1	3/28/91	13 U	13 U	13 U	65 U	25
47	47	1	3/28/91	9 U	9 U	9 U	45 U	8 E
48	48	1	3/29/91	22 U	22 U	22 U	110 U	36
49	49	1	3/29/91	24 U	24 U	24 U	120 U	150
66	66	1	3/27/91	10 U	380	10 U	260 E	210
67	67	1	4/2/91	10 U	210	10 U	360 E	160
68	68	1	4/11/91	10 U	240	10 U	340 E	160
69	69	1	3/25/91	9 U	9 U	9 U	46 U	19
70	70	1	3/28/91	18 U	18 U	18 U	88 U	85
71	71	1	4/5/91	12 U	12 U	12 U	61 U	58
201R	201R	1	4/11/91	9 U	9 U	9 U	45 U	21
202R	202R	1	4/11/91	9 U	9 U	9 U	47 U	22
203R	203R	1	4/7/91	14 U	14 U	14 U	69 U	44
204R	204R	1	4/8/91	21 U	21 U	21 U	110 U	99
205R	205R	1	4/8/91	12 U	12 U	12 U	61 U	28
206R	206R	1	4/8/91	11 U	11 U	11 U	54 U	29
207R	207R	1	4/6/91	13 U	13 U	13 U	67 U	50
208R	208R	1	4/13/91	27 U	27 U	27 U	140 U	160 N
209R	209R	1	4/5/91	9 U	9 U	9 U	47 U	6 E

Table B2. (cont'd) Concentrations (µg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Anthracene	Di-n-butyl-phthalate	Fluoranthene	Pyrene	Butylbenzyl-phthalate	3,3'-Dichloro-benzidine
1	1	1	4/10/91	**17 E**	**12 N**	**94**	**58**	16 U	R
2R	2R	1	4/7/91	**11 E**	12 U	**57**	**33**	12 U	R
3	3	1	4/11/91	**3 N**	13 U	**17**	**10 E**	13 U	R
4	4	1	4/7/91	**6 N**	20 U	**36**	**23**	20 U	R
4	78	1	4/7/91						
4	79	2	4/7/91						
4	80	3	4/7/91						
5	5	1	4/6/91	**7 E**	18 U	**39**	**26**	18 U	R
5	51	1	4/6/91	**7 E**	18 U	**32**	**21**	18 U	R
5	52	2	4/6/91	**5 E**	17 U	**26**	**16 E**	17 U	R
5	53	3	4/6/91	**5 N**	18 U	**28**	**20**	18 U	R
8	8	1	4/12/91	**18 E**	13 U	**82**	**40**	**22 E**	R
9R	9R	1	4/12/91	8 U	8 U	8 U	8 U	8 U	R
10R	10R	1	4/13/91	**2 N**	**9 N**	**8 E**	**6 E**	9 U	R
11R	11R	1	4/13/91	13 U	4 U	**9 E**	**8 E**	13 U	R
12	12	1	4/13/91	**10 E**	16 U	**53**	**38**	16 U	R
13R	13R	1	4/14/91	8 U	8 U	**6 E**	**6 E**	8 U	R
14	14	1	4/14/91	**3 N**	11 U	**12**	**11**	11 U	R
15	15	1	4/14/91	8 U	8 U	**6 E**	**3 E**	8 U	R
17	17	1	4/14/91	18 U	5 U	**14 E**	**10 E**	18 U	R
18	18	1	4/5/91	12 U	12 U	**8 N**	**4 N**	12 U	R
19	19	1	4/5/91	**5 N**	21 U	**35**	**28**	21 U	R
20	20	1	4/5/91	12 U	12 U	**9 E**	**6 E**	12 U	R
21	21	1	4/2/91	**24**	11 U	**89**	**49**	11 U	R
22	22	1	4/2/91	**7 E**	9 U	**22**	**14**	9 U	R
26	26	1	4/13/91	**4 N**	10 U	**17**	**14**	10 U	R
29	29	1	4/1/91	**12 E**	17 U	**77**	**63**	17 U	R
30	30	1	3/25/91	**140**	10 U	**330**	**210**	10 U	R
32	32	1	4/1/91	**13**	2 U	**69**	**50**	8 U	R
32	57	1	4/1/91	**8 E**	9 U	**30**	**30**	9 U	R
32	58	2	4/1/91	**9**	8 U	**34**	**31**	8 U	R
32	59	3	4/1/91	**8**	8 U	**31**	**28**	8 U	R
33	33	1	4/1/91	**75**	10 U	**250**	**200**	**7 E**	R
34	34	1	3/25/91	**34**	**28**	**240**	**220**	**28**	R
35	35	1	3/26/91	**200**	**30**	**540**	**480**	**18 N**	R
35	72	1	3/26/91	**120**	**17 E**	**320**	**350**	**12 E**	R
35	73	2	3/26/91	**110**	**21**	**330**	**310**	**23**	R
35	74	3	3/26/91	**200**	**27**	**480**	**480**	**24 N**	R
38	38	1	3/26/91	**21 E**	**8 N**	**120**	**120**	**9 E**	R
38	60	1	3/26/91	**21 E**	**11 E**	**140**	**99**	**7 N**	R
38	61	2	3/26/91	**29**	**15 E**	**150**	**120**	**9 N**	R
38	62	3	3/26/91	**28**	**12 N**	**150**	**120**	**8 N**	R
39	39	1	3/27/91	8 U	8 U	**4 N**	**3 E**	8 U	R
40	40	1	3/27/91	**570**	10 U	**820**	**780**	**35**	R
41	41	1	3/27/91	**21**	**7 E**	**190**	**130**	**5 N**	R
43	43	1	3/27/91	8 U	8 U	8 U	8 U	8 U	R

Table B2. (cont'd) Concentrations (µg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Anthracene	Di-n-butyl-phthalate	Fluoranthene	Pyrene	Butylbenzyl-phthalate	3,3'-Dichloro-benzidine
44	44	1	3/28/91	**3 E**	9 U	**15**	**6 E**	9 U	R
44	63	1	3/28/91	**4 E**	9 U	**15**	**5 E**	9 U	R
44	64	2	3/28/91	**3 E**	9 U	**22**	**9 E**	9 U	R
44	65	3	3/28/91	**3 E**	3 U	**15**	**5 E**	9 U	R
45	45	1	3/28/91	**6 E**	13 U	**26**	**13 E**	13 U	R
47	47	1	3/28/91	9 U	9 U	**7 E**	**3 E**	9 U	R
48	48	1	3/29/91	**6 E**	22 U	**48**	**15**	22 U	R
49	49	1	3/29/91	**16 E**	24 U	**150**	**41**	24 U	R
66	66	1	3/27/91	**180**	**4 N**	**200**	**110**	10 U	R
67	67	1	4/2/91	**120**	4 U	**180**	**82**	10 U	R
68	68	1	4/11/91	**130 E**	3 U	**150**	**97**	10 U	R
69	69	1	3/25/91	**6 E**	**12 N**	**28**	**18**	9 U	R
70	70	1	3/28/91	**27**	**7 E**	**190**	**59**	**15 N**	R
71	71	1	4/5/91	**11 E**	12 U	**70**	**41**	12 U	R
201R	201R	1	4/11/91	**3 N**	3 U	**16**	**9 E**	9 U	R
202R	202R	1	4/11/91	9 U	9 U	**16**	**8 E**	9 U	R
203R	203R	1	4/7/91	**3 N**	14 U	**23**	**12 E**	14 U	R
204R	204R	1	4/8/91	**11 E**	21 U	**57**	**28**	21 U	R
205R	205R	1	4/8/91	**5 E**	12 U	**23**	**14**	12 U	R
206R	206R	1	4/8/91	**6 E**	11 U	**41**	**27**	11 U	R
207R	207R	1	4/6/91	**12 E**	13 U	**52**	**32**	13 U	R
208R	208R	1	4/13/91	27 U	27 U	**39**	**29**	27 U	R
209R	209R	1	4/5/91	9 U	9 U	**6 N**	**4 E**	9 U	R

Table B2. (cont'd) Concentrations (μg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Benzo(a)-anthracene	bis(2-Ethylhexyl)-phthalate	Chrysene	Di-n-octyl-phthalate	Benzo(b)-fluoranthene	Benzo(k)-fluoranthene
1	1	1	4/10/91	28	11 E	42	16 U		
2R	2R	1	4/7/91	20	6 E	27	12 U		
3	3	1	4/11/91	6 E	7 E	9 E	13 U		
4	4	1	4/7/91	13 E	18 E	19 E	20 U		
4	78	1	4/7/91						
4	79	2	4/7/91						
4	80	3	4/7/91						
5	5	1	4/6/91	14 E	34	20	18 U		
5	51	1	4/6/91	12 E	12 E	18	18 U		
5	52	2	4/6/91	8 E	10 E	15 E	17 U		
5	53	3	4/6/91	9 E	12 E	14 U	18 U		
8	8	1	4/12/91	26	33 E	57	13 U		
9R	9R	1	4/12/91	8 U	2 U	8 U	8 U	8 U	8 U
10R	10R	1	4/13/91	3 E	51	5 U	9 U		
11R	11R	1	4/13/91	4 E	7 E	6 U	7 E		
12	12	1	4/13/91	16 E	27 E	31	16 U		
13R	13R	1	4/14/91	3 E	3 U	3 U	8 U	4 N	4 N
14	14	1	4/14/91	6 E	6 E	10 E	11 U		
15	15	1	4/14/91	3 E	8 U	3 U	8 U		
17	17	1	4/14/91	18 U	22 E	6 U	18 U		
18	18	1	4/5/91	3 E	6 E	4 U	12 U		
19	19	1	4/5/91	11 E	11 E	23	21 U		
20	20	1	4/5/91	12 U	11 E	5 U	12 U		
21	21	1	4/2/91	24	48 E	33	11 U		
22	22	1	4/2/91	11	13	16	9 U		
26	26	1	4/13/91	7 E	7 E	10 E	10 U		
29	29	1	4/1/91	25	46 E	35	17 U		
30	30	1	3/25/91	200	17	320	10 U		
32	32	1	4/1/91	38	12	70	8 U		
32	57	1	4/1/91	15	13	26	9 U		
32	58	2	4/1/91	18	19	27	8 U		
32	59	3	4/1/91	16	17	29	8 U		
33	33	1	4/1/91	120	51 E	190	10 U		
34	34	1	3/25/91	100	140	150	18 U		
35	35	1	3/26/91	300	89	390	19 U		
35	72	1	3/26/91	180	54	230	18 U		
35	73	2	3/26/91	170	67	230	18 U		
35	74	3	3/26/91	350	83	390	18 U		
38	38	1	3/26/91	47	40	71	24 U		
38	60	1	3/26/91	43	36	61	23 U		
38	61	2	3/26/91	51	45	75	23 U		
38	62	3	3/26/91	49	41	70	23 U		
39	39	1	3/27/91	8 U	11	3 U	8 U		
40	40	1	3/27/91	570	230	680	10 U		
41	41	1	3/27/91	28	290	62	10 U		
43	43	1	3/27/91	8 U	8 U	8 U	8 U	8 U	8 U

Table B2. (cont'd) Concentrations (µg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Benzo(a)-anthracene	bis(2-Ethylhexyl)-phthalate	Chrysene	Di-n-octyl-phthalate	Benzo(b)-fluoranthene	Benzo(k)-fluoranthene
44	44	1	3/28/91	9 E	6 E	14	9 U	11 E	9 E
44	63	1	3/28/91	6 E	8 E	9 E	9 U		
44	64	2	3/28/91	10	7 E	14	9 U		
44	65	3	3/28/91	6 E	7 E	9 E	9 U		
45	45	1	3/28/91	12 E	14	18	13 U		
47	47	1	3/28/91	3 E	6 E	4 U	9 U		
48	48	1	3/29/91	15 E	19 E	24	22 U		
49	49	1	3/29/91	27	44	42	24 U		
66	66	1	3/27/91	100	70	120	10 U	97	10 U
67	67	1	4/2/91	84	49 E	94	10 U	90	10 U
68	68	1	4/11/91	77	68 E	92	10 U	96	10 U
69	69	1	3/25/91	10	170 E	17	9 U		
70	70	1	3/28/91	83	45	150	18 U		
71	71	1	4/5/91	20	12 E	42	12 U		
201R	201R	1	4/11/91	5 E	4 U	7 U	9 U		
202R	202R	1	4/11/91	4 E	15 E	7 U	9 U		
203R	203R	1	4/7/91	6 E	16 E	14	14 U		
204R	204R	1	4/8/91	14 E	20 E	23	21 U		
205R	205R	1	4/8/91	8 E	5 U	12 E	12 U		
206R	206R	1	4/8/91	11	11 E	20	11 U		
207R	207R	1	4/6/91	20	15	31	13 U		
208R	208R	1	4/13/91	11 E	16 E	18 U	27 U		
209R	209R	1	4/5/91	3 E	5 E	3 U	9 U		

Table B2. (cont'd) Concentrations (µg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Benzo(b+k)-fluoranthene	Benzo(a)-pyrene	Indeno(1,2,3-c,d)-pyrene	Dibenz(a,h)-anthracene	Benzo(g,h,i)-perylene	Cymene
1	1	1	4/10/91	**68**	**17 E**	**15 N**	16 U	R	77 U
2R	2R	1	4/7/91	**41**	**11 E**	**9 N**	12 U	R	58 U
3	3	1	4/11/91	**13 E**	**5 N**	13 U	13 U	R	66 U
4	4	1	4/7/91	**26**	**10 E**	20 U	20 U	R	97 U
4	78	1	4/7/91						
4	79	2	4/7/91						
4	80	3	4/7/91						
5	5	1	4/6/91	**29**	**9 E**	18 U	18 U	R	88 U
5	51	1	4/6/91	**25**	**8 E**	18 U	**7 N**	R	88 U
5	52	2	4/6/91	**21**	**6 N**	17 U	17 U	R	87 U
5	53	3	4/6/91	**18 E**	**6 E**	18 U	18 U	R	88 U
8	8	1	4/12/91	**65**	**11 E**	**7 N**	**8 N**	R	**9 E**
9R	9R	1	4/12/91	16 U	8 U	8 U	8 U	R	40 U
10R	10R	1	4/13/91	**7 E**	9 U	9 U	9 U	R	47 U
11R	11R	1	4/13/91	8 U	13 U	13 U	13 U	R	66 U
12	12	1	4/13/91	**45**	**10 E**	16 U	16 U	R	79 U
13R	13R	1	4/14/91	**8 N**	8 U	8 U	8 U	R	**4 E**
14	14	1	4/14/91	**12**	**5 E**	11 U	11 U	R	54 U
15	15	1	4/14/91	5 U	8 U	8 U	8 U	R	42 U
17	17	1	4/14/91	**16 E**	**4 E**	18 U	18 U	R	89 U
18	18	1	4/5/91	6 U	12 U	12 U	12 U	R	57 U
19	19	1	4/5/91	**32**	**10 E**	21 U	21 U	R	100 U
20	20	1	4/5/91	5 U	12 U	12 U	12 U	R	**3 E**
21	21	1	4/2/91	**46**	**13 E**	**8 N**	**6 N**	R	**26 E**
22	22	1	4/2/91	**21**	**10 E**	**14 N**	**6 N**	R	44 U
26	26	1	4/13/91	**17**	**6 E**	10 U	10 U	R	52 U
29	29	1	4/1/91	**58**	**23 E**	**18 N**	**11 N**	R	87 U
30	30	1	3/25/91	**430**	**90 E**	**51 E**	**33**	R	47 U
32	32	1	4/1/91	**78**	**25 E**	**23 N**	**8 N**	R	41 U
32	57	1	4/1/91	**38**	**18 E**	**18**	**5 N**	R	43 U
32	58	2	4/1/91	**36**	**10 N**	**12 N**	**6 E**	R	42 U
32	59	3	4/1/91	**40**	**17 E**	**16 N**	**5 N**	R	42 U
33	33	1	4/1/91	**320**	**110 E**	**75 E**	**40**	**15 N**	48 U
34	34	1	3/25/91	**270**	**76 E**	**48 N**	**21**	R	90 U
35	35	1	3/26/91	**470**	**200 E**	**150 E**	**72**	R	93 U
35	72	1	3/26/91	**300**	**120 E**	**88 E**	**46**	**22 N**	90 U
35	73	2	3/26/91	**320**	**130 E**	**87 E**	**41**	R	90 U
35	74	3	3/26/91	**490**	**190 E**	**120 E**	**60**	R	90 U
38	38	1	3/26/91	**130**	**55 E**	**36 N**	**8 N**	R	120 U
38	60	1	3/26/91	**110**	**34 E**	**27 N**	**10 N**	R	120 U
38	61	2	3/26/91	**120**	**34 N**	**42 N**	**25**	R	120 U
38	62	3	3/26/91	**120**	**38 E**	**34 N**	**20 N**	R	120 U
39	39	1	3/27/91	5 U	8 U	8 U	8 U	R	41 U
40	40	1	3/27/91	**840**	**400 E**	**240 E**	**170**	**28 E**	**8 E**
41	41	1	3/27/91	**65**	**47 E**	**22 E**	**6 E**	R	**7 E**
43	43	1	3/27/91	16 U	8 U	8 U	8 U	R	42 U

Table B2. (cont'd) Concentrations (µg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Benzo(b+k)-fluoranthene	Benzo(a)-pyrene	Indeno(1,2,3-c,d)-pyrene	Dibenz(a,h)-anthracene	Benzo(g,h,i)-perylene	Cymene
44	44	1	3/28/91	**20 E**	**3 E**	9 U	**4 E**	R	46 U
44	63	1	3/28/91	**11**	9 U	9 U	9 U	R	46 U
44	64	2	3/28/91	**18**	**3 E**	9 U	9 U	R	47 U
44	65	3	3/28/91	**12**	9 U	9 U	9 U	R	47 U
45	45	1	3/28/91	**30**	**5 N**	13 U	**12 E**	R	65 U
47	47	1	3/28/91	**9 E**	9 U	9 U	9 U	R	45 U
48	48	1	3/29/91	**33**	22 U	22 U	22 U	R	110 U
49	49	1	3/29/91	**57**	24 U	24 U	24 U	R	**32 E**
66	66	1	3/27/91	**97**	**66 E**	10 U	**140**	**15 N**	48 U
67	67	1	4/2/91	**90**	**65 E**	10 U	**76**	**12 N**	50 U
68	68	1	4/11/91	**96**	**67 E**	10 U	**85**	**21 E**	48 U
69	69	1	3/25/91	**25**	**8 E**	9 U	**6 N**	R	**4 N**
70	70	1	3/28/91	**96**	**17 E**	18 U	**19**	R	R
71	71	1	4/5/91	**38**	**10 E**	**7 N**	12 U	R	61 U
201R	201R	1	4/11/91	**13**	**3 N**	9 U	9 U	R	45 U
202R	202R	1	4/11/91	**11**	9 U	9 U	9 U	R	47 U
203R	203R	1	4/7/91	**15**	**3 N**	14 U	14 U	R	**11 E**
204R	204R	1	4/8/91	**43**	**9 N**	21 U	21 U	R	110 U
205R	205R	1	4/8/91	**18**	**4 N**	12 U	12 U	R	61 U
206R	206R	1	4/8/91	**25**	**5 E**	11 U	11 U	R	54 U
207R	207R	1	4/6/91	**43**	**13 E**	**18 N**	**12 N**	R	**6 E**
208R	208R	1	4/13/91	**33**	**12 E**	27 U	**20 E**	R	140 U
209R	209R	1	4/5/91	5 U	9 U	9 U	9 U	R	**2 E**

Table B2. (cont'd) Concentrations (µg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	9H-Carbazole	Caffeine	Perylene	ß-Coprostanol	Cholesterol	ß-Sitosterol	Retene
1	1	1	4/10/91	16 U	16 U	17 E	180 E	1000 E	1100 E	31 E
2R	2R	1	4/7/91	4 N	12 U	10 E	97 N	900	770	17 E
3	3	1	4/11/91	13 U	13 U	13 E	170	1600	1100	12 E
4	4	1	4/7/91	20 U	20 U	12 E	180	1600	2100	16 E
4	78	1	4/7/91							
4	79	2	4/7/91							
4	80	3	4/7/91							
5	5	1	4/6/91	18 U	18 U	13 N	140 N	1500	1800	20 E
5	51	1	4/6/91	18 U	18 U	7 N	83 E	1200	1300	14 E
5	52	2	4/6/91	17 U	17 U	9 E	100 N	1900	1200	11 E
5	53	3	4/6/91	18 U	18 U	7 N	79 N	1200	1300	16 E
8	8	1	4/12/91	4 N	13 U	6 N	140 E	690 E	1400 E	68
9R	9R	1	4/12/91	8 U	8 U	40 U	40 U	570	8 U	40 U
10R	10R	1	4/13/91	9 U	9 U	47 U	43 N	860	200 E	6 E
11R	11R	1	4/13/91	13 U	13 U	66 U	110 N	3900	830	7 E
12	12	1	4/13/91	4 N	16 U	14 E	200 N	3500 E	1000 E	36 E
13R	13R	1	4/14/91	8 U	8 U	41 U	41 U	340	170	4 E
14	14	1	4/14/91	11 U	11 U	8 E	54 U	790	360	9 E
15	15	1	4/14/91	8 U	8 U	42 U	42 U	560	350	42 U
17	17	1	4/14/91	18 U	18 U	11 E	99 E	1300 E	1500 E	12 E
18	18	1	4/5/91	12 U	12 U	57 U	81 E	870	650	8 E
19	19	1	4/5/91	21 U	21 U	11 E	160 E	1100	510	24 E
20	20	1	4/5/91	12 U	12 U	7 E	130 E	740	1100	36
21	21	1	4/2/91	5 E	11 U	25 E	370 E	920	1600	280
22	22	1	4/2/91	7 E	9 U	4 N	110 E	540	940	8 E
26	26	1	4/13/91	10 U	10 U	14 E	160	1600	1100	12 E
29	29	1	4/1/91	17 U	17 U	22 E	240 E	1100 E	810	30 E
30	30	1	3/25/91	18	10 U	15 E	96	1000 E	1100	23 E
32	32	1	4/1/91	3 N	8 U	6 N	79 E	360	220	7 E
32	57	1	4/1/91	6 E	9 U	5 E	39 E	450	210	6 E
32	58	2	4/1/91	8 U	8 U	42 U	74 E	870	610	7 E
32	59	3	4/1/91	8 U	8 U	5 E	81 E	900	510	42 U
33	33	1	4/1/91	12	10 U	26	140 E	910	1000	31
34	34	1	3/25/91	18 U	18 U	26 E	400	3900 E	1300	73
35	35	1	3/26/91	19	19 U	38 E	250	2300	1800 N	98 E
35	72	1	3/26/91	8 N	18 U	31 E	130 N	1900	1700	71 E
35	73	2	3/26/91	8 E	18 U	23 E	150 N	1800	2100	70 E
35	74	3	3/26/91	10 E	18 U	27 E	140 N	2200 E	1900	91
38	38	1	3/26/91	24 U	24 U	21 E	350	1600 E	1700	120
38	60	1	3/26/91	23 U	23 U	19 N	280 E	1400 E	1500 E	120 U
38	61	2	3/26/91	11 N	23 U	24 E	280	2200	3100 E	110 E
38	62	3	3/26/91	7 N	23 U	26 E	300	1900	2600	130 E
39	39	1	3/27/91	8 U	8 U	41 U	41 U	250	8 U	6 E
40	40	1	3/27/91	34	10 U	74	260 E	1000 E	2400 E	160
41	41	1	3/27/91	11	10 U	15 E	760 E	3900 E	4800	260
43	43	1	3/27/91	8 U	8 U	42 U	42 U	930	140 U	42 U

Table B2. (cont'd) Concentrations (μg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	9H-Carbazole	Caffeine	Perylene	ß-Coprostanol	Cholesterol	ß-Sitosterol	Retene
44	44	1	3/28/91	9 U	9 U	46 U	74	1000	470 E	46 U
44	63	1	3/28/91	9 U	9 U	46 U	48 E	560 E	340 E	13 E
44	64	2	3/28/91	9 U	9 U	47 U	59 N	720 E	580 E	47 U
44	65	3	3/28/91	9 U	9 U	47 U	49 E	580 E	540 E	47 U
45	45	1	3/28/91	13 U	13 U	65 U	100 E	830 E	1000 E	72
47	47	1	3/28/91	9 U	9 U	45 U	75 N	1300 E	660 E	15 E
48	48	1	3/29/91	22 U	22 U	110 U	110 E	1500	1200 E	62 E
49	49	1	3/29/91	24 U	24 U	120 U	180 E	2700	1800 E	82
66	66	1	3/27/91	4 N	10 U	68	230	840	520	7 E
67	67	1	4/2/91	4 E	10 U	64	150 E	790	310	5 E
68	68	1	4/11/91	10 U	10 U	83	200 E	840 E	390 E	10 E
69	69	1	3/25/91	9 U	9 U	46 U	97 E	880 E	790	11 E
70	70	1	3/28/91	18 U	18 U	88 U	130 N	1500	2000 E	1000
71	71	1	4/5/91	4 N	12 U	7 E	130	1400	1100	21 E
201R	201R	1	4/11/91	9 U	9 U	6 N	63 E	780 E	410 E	13 E
202R	202R	1	4/11/91	9 U	9 U	5 N	55 N	500 E	230 E	13 E
203R	203R	1	4/7/91	14 U	14 U	7 E	130 E	760 E	900 E	110
204R	204R	1	4/8/91	21 U	21 U	12 E	400	3400	2200	25 E
205R	205R	1	4/8/91	12 U	12 U	7 E	87 N	860	670	15 E
206R	206R	1	4/8/91	11 U	11 U	54 U	54 U	750	450	15 E
207R	207R	1	4/6/91	13 U	13 U	14 E	160	1600	1500	23 E
208R	208R	1	4/13/91	27 U	27 U	23 E	800	2900	2800	15 E
209R	209R	1	4/5/91	9 U	9 U	4 N	72 N	990	870	33

Table B2. (cont'd) Concentrations (μg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	2-Methoxyphenol (Guaiacol)	4,5-Dichloro-guaiacol	4,5,6-Trichloro-guaiacol	3,4,5-Trichloro-guaiacol	Tetrachloro-guaiacol
1	1	1	4/10/91					
2R	2R	1	4/7/91					
3	3	1	4/11/91					
4	4	1	4/7/91	20 U	20 U	20 U	20 U	20 U
4	78	1	4/7/91	27 U	27 U	27 U	27 U	27 U
4	79	2	4/7/91	27 U	27 U	27 U	27 U	27 U
4	80	3	4/7/91	26 U	26 U	26 U	26 U	26 U
5	5	1	4/6/91					
5	51	1	4/6/91					
5	52	2	4/6/91					
5	53	3	4/6/91					
8	8	1	4/12/91	13 U	13 U	13 U	13 U	13 U
9R	9R	1	4/12/91					
10R	10R	1	4/13/91					
11R	11R	1	4/13/91					
12	12	1	4/13/91	16 U	16 U	16 U	16 U	16 U
13R	13R	1	4/14/91					
14	14	1	4/14/91					
15	15	1	4/14/91					
17	17	1	4/14/91					
18	18	1	4/5/91					
19	19	1	4/5/91					
20	20	1	4/5/91					
21	21	1	4/2/91					
22	22	1	4/2/91					
26	26	1	4/13/91					
29	29	1	4/1/91					
30	30	1	3/25/91					
32	32	1	4/1/91					
32	57	1	4/1/91					
32	58	2	4/1/91					
32	59	3	4/1/91					
33	33	1	4/1/91					
34	34	1	3/25/91					
35	35	1	3/26/91					
35	72	1	3/26/91					
35	73	2	3/26/91					
35	74	3	3/26/91					
38	38	1	3/26/91					
38	60	1	3/26/91					
38	61	2	3/26/91					
38	62	3	3/26/91					
39	39	1	3/27/91					
40	40	1	3/27/91					
41	41	1	3/27/91	**3 E**	10 U	10 U	10 U	10 U
43	43	1	3/27/91					

Table B2. (cont'd) Concentrations (µg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	2-Methoxyphenol (Guaiacol)	4,5-Dichloro-guaiacol	4,5,6-Trichloro-guaiacol	3,4,5-Trichloro-guaiacol	Tetrachloro-guaiacol
44	44	1	3/28/91					
44	63	1	3/28/91					
44	64	2	3/28/91					
44	65	3	3/28/91					
45	45	1	3/28/91					
47	47	1	3/28/91					
48	48	1	3/29/91					
49	49	1	3/29/91					
66	66	1	3/27/91					
67	67	1	4/2/91					
68	68	1	4/11/91					
69	69	1	3/25/91					
70	70	1	3/28/91					
71	71	1	4/5/91					
201R	201R	1	4/11/91					
202R	202R	1	4/11/91					
203R	203R	1	4/7/91					
204R	204R	1	4/8/91					
205R	205R	1	4/8/91					
206R	206R	1	4/8/91					
207R	207R	1	4/6/91					
208R	208R	1	4/13/91					
209R	209R	1	4/5/91					

Table B2. (cont'd) Concentrations (µg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Pimaric acid	Sandara-copimaric acid	Isopimaric acid	Palustric acid	Dehydroabietic acid	Abietic acid
1	1	1	4/10/91						
2R	2R	1	4/7/91						
3	3	1	4/11/91						
4	4	1	4/7/91	27 U	27 U	38	R	92	36
4	78	1	4/7/91	27 U	27 U	27 U	R	66	28 N
4	79	2	4/7/91	27 U	27 U	27 U	R	63	21 N
4	80	3	4/7/91	26 U	26 U	26 U	R	33 E	26 U
5	5	1	4/6/91						
5	51	1	4/6/91						
5	52	2	4/6/91						
5	53	3	4/6/91						
8	8	1	4/12/91	45	57 N	140	R	420	350
9R	9R	1	4/12/91						
10R	10R	1	4/13/91						
11R	11R	1	4/13/91						
12	12	1	4/13/91	18 E	23 U	100	R	150	130
13R	13R	1	4/14/91						
14	14	1	4/14/91						
15	15	1	4/14/91						
17	17	1	4/14/91						
18	18	1	4/5/91						
19	19	1	4/5/91						
20	20	1	4/5/91						
21	21	1	4/2/91						
22	22	1	4/2/91						
26	26	1	4/13/91						
29	29	1	4/1/91						
30	30	1	3/25/91						
32	32	1	4/1/91						
32	57	1	4/1/91						
32	58	2	4/1/91						
32	59	3	4/1/91						
33	33	1	4/1/91						
34	34	1	3/25/91						
35	35	1	3/26/91						
35	72	1	3/26/91						
35	73	2	3/26/91						
35	74	3	3/26/91						
38	38	1	3/26/91						
38	60	1	3/26/91						
38	61	2	3/26/91						
38	62	3	3/26/91						
39	39	1	3/27/91						
40	40	1	3/27/91						
41	41	1	3/27/91	20 N	130 N	170	R	250	190
43	43	1	3/27/91						

Table B2. (cont'd) Concentrations (µg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Pimaric acid	Sandara-copimaric acid	Isopimaric acid	Palustric acid	Dehydroabietic acid	Abietic acid
44	44	1	3/28/91						
44	63	1	3/28/91						
44	64	2	3/28/91						
44	65	3	3/28/91						
45	45	1	3/28/91						
47	47	1	3/28/91						
48	48	1	3/29/91						
49	49	1	3/29/91						
66	66	1	3/27/91						
67	67	1	4/2/91						
68	68	1	4/11/91						
69	69	1	3/25/91						
70	70	1	3/28/91						
71	71	1	4/5/91						
201R	201R	1	4/11/91						
202R	202R	1	4/11/91						
203R	203R	1	4/7/91						
204R	204R	1	4/8/91						
205R	205R	1	4/8/91						
206R	206R	1	4/8/91						
207R	207R	1	4/6/91						
208R	208R	1	4/13/91						
209R	209R	1	4/5/91						

Table B2. (cont'd) Concentrations (µg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Neoabietic acid	12-Chlorodehydro-abietic acid	14-Chlorodehydro-abietic acid	Dichlorodehydro-abietic acid
1	1	1	4/10/91				
2R	2R	1	4/7/91				
3	3	1	4/11/91				
4	4	1	4/7/91	27 U	27 U	**32**	27 U
4	78	1	4/7/91	27 U	27 U	**22 N**	27 U
4	79	2	4/7/91	27 U	27 U	27 U	27 U
4	80	3	4/7/91	26 U	26 U	26 U	26 U
5	5	1	4/6/91				
5	51	1	4/6/91				
5	52	2	4/6/91				
5	53	3	4/6/91				
8	8	1	4/12/91	20 U	20 U	**36 N**	20 U
9R	9R	1	4/12/91				
10R	10R	1	4/13/91				
11R	11R	1	4/13/91				
12	12	1	4/13/91	23 U	23 U	23 U	23 U
13R	13R	1	4/14/91				
14	14	1	4/14/91				
15	15	1	4/14/91				
17	17	1	4/14/91				
18	18	1	4/5/91				
19	19	1	4/5/91				
20	20	1	4/5/91				
21	21	1	4/2/91				
22	22	1	4/2/91				
26	26	1	4/13/91				
29	29	1	4/1/91				
30	30	1	3/25/91				
32	32	1	4/1/91				
32	57	1	4/1/91				
32	58	2	4/1/91				
32	59	3	4/1/91				
33	33	1	4/1/91				
34	34	1	3/25/91				
35	35	1	3/26/91				
35	72	1	3/26/91				
35	73	2	3/26/91				
35	74	3	3/26/91				
38	38	1	3/26/91				
38	60	1	3/26/91				
38	61	2	3/26/91				
38	62	3	3/26/91				
39	39	1	3/27/91				
40	40	1	3/27/91				
41	41	1	3/27/91	15 U	15 U	**25 N**	15 U
43	43	1	3/27/91				

Table B2. (cont'd) Concentrations (µg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Neoabietic acid	12-Chlorodehydro-abietic acid	14-Chlorodehydro-abietic acid	Dichlorodehydro-abietic acid
44	44	1	3/28/91				
44	63	1	3/28/91				
44	64	2	3/28/91				
44	65	3	3/28/91				
45	45	1	3/28/91				
47	47	1	3/28/91				
48	48	1	3/29/91				
49	49	1	3/29/91				
66	66	1	3/27/91				
67	67	1	4/2/91				
68	68	1	4/11/91				
69	69	1	3/25/91				
70	70	1	3/28/91				
71	71	1	4/5/91				
201R	201R	1	4/11/91				
202R	202R	1	4/11/91				
203R	203R	1	4/7/91				
204R	204R	1	4/8/91				
205R	205R	1	4/8/91				
206R	206R	1	4/8/91				
207R	207R	1	4/6/91				
208R	208R	1	4/13/91				
209R	209R	1	4/5/91				

Table B2. (cont'd) Concentrations (µg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Pristane/Phytane Ratio	Carbon Preference Index
1	1	1	4/10/91		1.9
2R	2R	1	4/7/91	3.8	2.7
3	3	1	4/11/91		2.6
4	4	1	4/7/91		1.5
4	78	1	4/7/91		
4	79	2	4/7/91		
4	80	3	4/7/91		
5	5	1	4/6/91		1.4
5	51	1	4/6/91		1.2
5	52	2	4/6/91		1.6
5	53	3	4/6/91		1.5
8	8	1	4/12/91	3.1	1.6
9R	9R	1	4/12/91		
10R	10R	1	4/13/91		2.0
11R	11R	1	4/13/91	3.2	2.4
12	12	1	4/13/91	2.7	1.9
13R	13R	1	4/14/91		6.7
14	14	1	4/14/91	4.9	4.5
15	15	1	4/14/91		
17	17	1	4/14/91	1.0	3.9
18	18	1	4/5/91	0.82	3.7
19	19	1	4/5/91		2.5
20	20	1	4/5/91		5.3
21	21	1	4/2/91		4.1
22	22	1	4/2/91		6.1
26	26	1	4/13/91	3.4	2.8
29	29	1	4/1/91		1.5
30	30	1	3/25/91	1.8	2.8
32	32	1	4/1/91		2.6
32	57	1	4/1/91		1.8
32	58	2	4/1/91	2.6	3.6
32	59	3	4/1/91		2.5
33	33	1	4/1/91		1.9
34	34	1	3/25/91	1.2	1.4
35	35	1	3/26/91	1.4	2.0
35	72	1	3/26/91	1.9	2.1
35	73	2	3/26/91	1.4	2.1
35	74	3	3/26/91	0.82	2.6
38	38	1	3/26/91	2.0	1.8
38	60	1	3/26/91	1.2	1.6
38	61	2	3/26/91	4.8	1.6
38	62	3	3/26/91	3.4	1.9
39	39	1	3/27/91		2.8
40	40	1	3/27/91		1.9
41	41	1	3/27/91	6.8	2.6
43	43	1	3/27/91		1.4

Table B2. (cont'd) Concentrations (µg/kg dry wt) of Extractable Organic Compounds in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Pristane/Phytane Ratio	Carbon Preference Index
44	44	1	3/28/91		3.5
44	63	1	3/28/91		3.7
44	64	2	3/28/91		4.4
44	65	3	3/28/91		3.7
45	45	1	3/28/91	10.5	3.4
47	47	1	3/28/91	3.8	3.6
48	48	1	3/29/91	1.2	2.0
49	49	1	3/29/91	1.0	2.4
66	66	1	3/27/91		1.8
67	67	1	4/2/91		1.4
68	68	1	4/11/91	0.50	3.0
69	69	1	3/25/91		2.8
70	70	1	3/28/91	1.1	2.1
71	71	1	4/5/91		2.1
201R	201R	1	4/11/91		1.3
202R	202R	1	4/11/91		1.6
203R	203R	1	4/7/91		4.1
204R	204R	1	4/8/91		2.0
205R	205R	1	4/8/91	3.8	2.2
206R	206R	1	4/8/91		3.4
207R	207R	1	4/6/91	8.2	2.3
208R	208R	1	4/13/91	0.59	3.4
209R	209R	1	4/5/91		8.2

Table B3. Concentrations (μg/kg, dry weight) of Pesticides and PCBs in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	alpha-BHC	beta-BHC	delta-BHC	gamma-BHC (Lindane)	Heptachlor	Aldrin
1	1	1	4/10/91	1.0 U	1.0 U	1.5 U	1.0 U	1.0 U	1.0 U
2R	2R	1	4/7/91	1.0 U	1.0 U	1.5 U	1.0 U	1.0 U	1.0 U
3	3	1	4/11/91	0.6 U	0.6 U	0.8 U	0.6 U	0.6 U	0.6 U
4	4	1	4/7/91	1.0 U	1.0 U	1.5 U	1.0 U	1.0 U	1.0 U
5	5	1	4/6/91	1.0 U	1.0 U	1.5 U	1.0 U	1.0 U	1.0 U
5	51	1	4/6/91	1.0 U	1.0 U	1.5 U	1.0 U	1.0 U	1.0 U
5	52	2	4/6/91	1.0 U	1.0 U	1.5 U	1.0 U	1.0 U	1.0 U
5	53	3	4/6/91	1.0 U	1.0 U	1.5 U	1.0 U	1.0 U	1.0 U
8	8	1	4/12/91	0.6 U	0.6 U	0.8 U	0.6 U	0.6 U	0.6 U
9R	9R	1	4/12/91	0.6 U	0.6 U	0.8 U	0.6 U	0.6 U	0.6 U
10R	10R	1	4/13/91	0.6 U	0.6 U	0.8 U	0.6 U	0.6 U	0.6 U
11R	11R	1	4/13/91	0.6 U	0.6 U	0.8 U	0.6 U	0.6 U	0.6 U
12	12	1	4/13/91	0.6 U	0.6 U	0.8 U	0.6 U	0.6 U	0.6 U
13R	13R	1	4/14/91	0.6 U	0.6 U	0.8 U	0.6 U	0.6 U	0.6 U
14	14	1	4/14/91	0.6 U	0.6 U	0.8 U	0.6 U	0.6 U	0.6 U
15	15	1	4/14/91	0.6 U	0.6 U	0.8 U	0.6 U	0.6 U	0.6 U
17	17	1	4/14/91	0.6 U	0.6 U	0.8 U	0.6 U	0.6 U	0.6 U
18	18	1	4/5/91	1.0 U	1.0 U	1.5 U	1.0 U	1.0 U	1.0 U
19	19	1	4/5/91	1.0 U	1.0 U	1.5 U	1.0 U	1.0 U	1.0 U
20	20	1	4/5/91	1.0 U	1.0 U	1.5 U	1.0 U	1.0 U	1.0 U
21	21	1	4/2/91	0.4 U	0.4 U	0.6 U	0.4 U	0.4 U	0.4 U
22	22	1	4/2/91	0.4 U	0.4 U	0.6 U	0.4 U	0.4 U	0.4 U
26	26	1	4/13/91	0.6 U	0.6 U	0.8 U	0.6 U	0.6 U	0.6 U
29	29	1	4/1/91	0.8 U	0.8 U	1.2 U	0.8 U	0.8 U	0.8 U
30	30	1	3/25/91	0.5 U	0.5 U	0.8 U	0.5 U	0.5 U	0.5 U
32	32	1	4/1/91	0.4 U	0.4 U	0.6 U	0.4 U	0.4 U	0.4 U
32	57	1	4/1/91	0.4 U	0.4 U	0.6 U	0.4 U	0.4 U	0.4 U
32	58	2	4/1/91	0.4 U	0.4 U	0.6 U	0.4 U	0.4 U	0.4 U
32	59	3	4/1/91	0.4 U	0.4 U	0.6 U	0.4 U	0.4 U	0.4 U
33	33	1	4/1/91	0.4 U	0.4 U	0.6 U	0.4 U	0.4 U	0.4 U
34	34	1	3/25/91	1.0 U	1.0 U	1.5 U	1.0 U	1.0 U	1.0 U
35	35	1	3/26/91	1.0 U	1.0 U	1.5 U	1.0 U	1.0 U	1.0 U
35	72	1	3/26/91	1.0 U	1.0 U	1.5 U	1.0 U	1.0 U	1.0 U
35	73	2	3/26/91	1.0 U	1.0 U	1.5 U	1.0 U	1.0 U	1.0 U
35	74	3	3/26/91	1.0 U	1.0 U	1.5 U	1.0 U	1.0 U	1.0 U
38	38	1	3/26/91	1.0 U	1.0 U	1.5 U	1.0 U	1.0 U	1.0 U
38	60	1	3/26/91	1.0 U	1.0 U	1.5 U	1.0 U	1.0 U	1.0 U
38	61	2	3/26/91	1.0 U	1.0 U	1.5 U	1.0 U	1.0 U	1.0 U
38	62	3	3/26/91	1.0 U	1.0 U	1.5 U	1.0 U	1.0 U	1.0 U
39	39	1	3/27/91	0.5 U	0.5 U	0.8 U	0.5 U	0.5 U	0.5 U
40	40	1	3/27/91	0.5 U	0.5 U	0.8 U	0.5 U	0.5 U	0.5 U
41	41	1	3/27/91	0.5 U	0.5 U	0.8 U	0.5 U	0.5 U	0.5 U
43	43	1	3/27/91	0.5 U	0.5 U	0.8 U	0.5 U	0.5 U	0.5 U

Table B3. (cont'd) Concentrations (µg/kg, dry wt) of Pesticides and PCBs in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	alpha-BHC	beta-BHC	delta-BHC	gamma-BHC (Lindane)	Heptachlor	Aldrin
44	44	1	3/28/91	0.5 U	0.5 U	0.8 U	0.5 U	0.5 U	0.5 U
44	63	1	3/28/91	0.4 U	0.4 U	0.6 U	0.4 U	0.4 U	0.4 U
44	64	2	3/28/91	0.4 U	0.4 U	0.6 U	0.4 U	0.4 U	0.4 U
44	65	3	3/28/91	0.4 U	0.4 U	0.6 U	0.4 U	0.4 U	0.4 U
45	45	1	3/28/91	0.5 U	0.5 U	0.8 U	0.5 U	0.5 U	0.5 U
47	47	1	3/28/91	0.4 U	0.4 U	0.6 U	0.4 U	0.4 U	0.4 U
48	48	1	3/29/91	1.0 U	1.0 U	1.5 U	1.0 U	1.0 U	1.0 U
49	49	1	3/29/91	1.0 U	1.0 U	1.5 U	1.0 U	1.0 U	1.0 U
66	66	1	3/27/91	0.8 U	0.5 U	0.8 U	0.5 U	0.5 U	0.5 U
67	67	1	4/2/91	0.4 U	0.4 U	0.6 U	0.4 U	0.4 U	0.4 U
68	68	1	4/11/91	1.5 U	0.6 U	0.8 U	0.6 U	1.5 U	0.6 U
69	69	1	3/25/91	0.5 U	0.5 U	0.8 U	0.5 U	0.5 U	0.5 U
70	70	1	3/28/91	1.0 U	1.0 U	1.5 U	1.0 U	1.0 U	1.0 U
71	71	1	4/5/91	1.0 U	1.0 U	1.5 U	1.0 U	1.0 U	1.0 U
201R	201R	1	4/11/91	0.6 U	0.6 U	0.8 U	0.6 U	0.6 U	0.6 U
202R	202R	1	4/11/91	0.6 U	0.6 U	0.8 U	0.6 U	0.6 U	0.6 U
203R	203R	1	4/7/91	1.0 U	1.0 U	1.5 U	1.0 U	1.0 U	1.0 U
204R	204R	1	4/8/91	1.0 U	1.0 U	1.5 U	1.0 U	1.0 U	1.0 U
205R	205R	1	4/8/91	1.0 U	1.0 U	1.5 U	1.0 U	1.0 U	1.0 U
206R	206R	1	4/8/91	0.5 U	0.5 U	0.8 U	0.5 U	0.5 U	0.5 U
207R	207R	1	4/6/91	1.0 U	1.0 U	1.5 U	1.0 U	1.0 U	1.0 U
208R	208R	1	4/13/91	1.2 U	1.2 U	1.6 U	1.2 U	1.2 U	1.2 U
209R	209R	1	4/5/91	0.5 U	0.5 U	0.8 U	0.5 U	0.5 U	0.5 U

Table B3. (cont'd) Concentrations (µg/kg, dry wt) of Pesticides and PCBs in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Heptachlor epoxide	Endosulfan I	Dieldrin	4,4'-DDE	Endrin	Endosulfan II
1	1	1	4/10/91	1.0 U	1.0 U	2.0 U	2.0 U	2.0 U	2.0 U
2R	2R	1	4/7/91	1.0 U	1.0 U	2.0 U	2.0 U	2.0 U	2.0 U
3	3	1	4/11/91	0.6 U	0.6 U	1.2 U	1.2 U	1.2 U	1.2 U
4	4	1	4/7/91	1.0 U	1.0 U	2.0 U	2.0 U	2.0 U	2.0 U
5	5	1	4/6/91	1.0 U	1.0 U	2.0 U	2.0 U	2.0 U	2.0 U
5	51	1	4/6/91	1.0 U	1.0 U	2.0 U	2.0 U	2.0 U	2.0 U
5	52	2	4/6/91	1.0 U	1.0 U	2.0 U	**3.7**	2.0 U	2.0 U
5	53	3	4/6/91	1.0 U	1.0 U	2.0 U	2.0 U	2.0 U	2.0 U
8	8	1	4/12/91	0.6 U	0.6 U	1.2 U	1.2 U	1.2 U	1.2 U
9R	9R	1	4/12/91	0.6 U	0.6 U	1.2 U	1.2 U	1.2 U	1.2 U
10R	10R	1	4/13/91	0.6 U	0.6 U	1.2 U	1.2 U	1.2 U	1.2 U
11R	11R	1	4/13/91	0.6 U	0.6 U	1.2 U	1.2 U	1.2 U	1.2 U
12	12	1	4/13/91	0.6 U	0.6 U	1.2 U	1.2 U	1.2 U	1.2 U
13R	13R	1	4/14/91	0.6 U	0.6 U	1.2 U	1.2 U	1.2 U	1.2 U
14	14	1	4/14/91	0.6 U	0.6 U	1.2 U	1.2 U	1.2 U	1.2 U
15	15	1	4/14/91	0.6 U	0.6 U	1.2 U	1.2 U	1.2 U	1.2 U
17	17	1	4/14/91	0.6 U	0.6 U	1.2 U	1.2 U	1.2 U	1.2 U
18	18	1	4/5/91	1.0 U	1.0 U	2.0 U	2.0 U	2.0 U	2.0 U
19	19	1	4/5/91	1.0 U	1.0 U	2.0 U	2.0 U	2.0 U	2.0 U
20	20	1	4/5/91	1.0 U	1.0 U	2.0 U	2.0 U	2.0 U	2.0 U
21	21	1	4/2/91	0.4 U	0.4 U	0.8 U	0.8 U	0.8 U	0.8 U
22	22	1	4/2/91	0.4 U	0.4 U	0.8 U	0.8 U	0.8 U	0.8 U
26	26	1	4/13/91	0.6 U	0.6 U	1.2 U	1.2 U	1.2 U	1.2 U
29	29	1	4/1/91	0.8 U	0.8 U	1.6 U	1.6 U	1.6 U	1.6 U
30	30	1	3/25/91	0.5 U	0.5 U	1.0 U	1.0 U	1.0 U	1.0 U
32	32	1	4/1/91	0.4 U	0.4 U	0.8 U	0.8 U	0.8 U	0.8 U
32	57	1	4/1/91	0.4 U	0.4 U	0.8 U	0.8 U	0.8 U	0.8 U
32	58	2	4/1/91	0.4 U	0.4 U	0.8 U	0.8 U	0.8 U	0.8 U
32	59	3	4/1/91	0.4 U	0.4 U	0.8 U	0.8 U	0.8 U	0.8 U
33	33	1	4/1/91	0.8 U	0.4 U	1.8 U	0.8 U	0.8 U	0.8 U
34	34	1	3/25/91	1.0 U	1.0 U	2.0 U	2.0 U	2.0 U	2.0 U
35	35	1	3/26/91	1.0 U	1.0 U	2.0 U	2.0 U	2.0 U	2.0 U
35	72	1	3/26/91	1.0 U	1.0 U	2.0 U	2.0 U	2.0 U	2.0 U
35	73	2	3/26/91	1.0 U	1.0 U	2.0 U	2.0 U	2.0 U	2.0 U
35	74	3	3/26/91	1.0 U	1.0 U	2.0 U	2.0 U	2.0 U	2.0 U
38	38	1	3/26/91	1.0 U	1.0 U	2.0 U	2.0 U	2.0 U	2.0 U
38	60	1	3/26/91	1.0 U	1.0 U	2.0 U	2.0 U	2.0 U	2.0 U
38	61	2	3/26/91	1.0 U	1.0 U	2.0 U	2.0 U	2.0 U	2.0 U
38	62	3	3/26/91	1.0 U	1.0 U	2.0 U	2.0 U	2.0 U	2.0 U
39	39	1	3/27/91	0.5 U	0.5 U	1.0 U	1.0 U	1.0 U	1.0 U
40	40	1	3/27/91	0.5 U	0.5 U	1.0 U	1.0 U	1.0 U	1.0 U
41	41	1	3/27/91	0.5 U	0.5 U	1.0 U	1.0 U	1.0 U	1.0 U
43	43	1	3/27/91	0.5 U	0.5 U	1.0 U	1.0 U	1.0 U	1.0 U

Table B3. (cont'd) Concentrations (µg/kg, dry wt) of Pesticides and PCBs in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Heptachlor epoxide	Endosulfan I	Dieldrin	4,4'-DDE	Endrin	Endosulfan II
44	44	1	3/28/91	0.5 U	0.5 U	1.0 U	1.0 U	1.0 U	1.0 U
44	63	1	3/28/91	0.4 U	0.4 U	0.8 U	0.8 U	0.8 U	0.8 U
44	64	2	3/28/91	0.4 U	0.4 U	0.8 U	0.8 U	0.8 U	0.8 U
44	65	3	3/28/91	0.4 U	0.4 U	0.8 U	0.8 U	0.8 U	0.8 U
45	45	1	3/28/91	0.5 U	0.5 U	1.0 U	1.0 U	1.0 U	1.0 U
47	47	1	3/28/91	0.4 U	0.4 U	0.8 U	0.8 U	0.8 U	0.8 U
48	48	1	3/29/91	1.0 U	1.0 U	2.0 U	2.0 U	2.0 U	2.0 U
49	49	1	3/29/91	1.0 U	1.0 U	2.0 U	2.0 U	2.0 U	2.0 U
66	66	1	3/27/91	0.5 U	**20 E**	1.0 U	2.0 U	1.0 U	**14**
67	67	1	4/2/91	0.4 U	**27 E**	0.8 U	**22 N**	0.8 U	**16**
68	68	1	4/11/91	0.6 U	**30 E**	1.2 U	3.5 U	2.5 U	**20**
69	69	1	3/25/91	0.5 U	0.5 U	1.0 U	1.0 U	1.0 U	1.0 U
70	70	1	3/28/91	1.0 U	1.0 U	2.0 U	2.0 U	2.0 U	2.0 U
71	71	1	4/5/91	1.0 U	1.0 U	2.0 U	2.0 U	2.0 U	2.0 U
201R	201R	1	4/11/91	0.6 U	0.6 U	1.2 U	1.2 U	1.2 U	1.2 U
202R	202R	1	4/11/91	0.6 U	0.6 U	1.2 U	1.2 U	1.2 U	1.2 U
203R	203R	1	4/7/91	1.0 U	1.0 U	2.0 U	2.0 U	2.0 U	2.0 U
204R	204R	1	4/8/91	1.0 U	1.0 U	2.0 U	2.0 U	2.0 U	2.0 U
205R	205R	1	4/8/91	1.0 U	1.0 U	2.0 U	2.0 U	2.0 U	2.0 U
206R	206R	1	4/8/91	0.5 U	0.5 U	1.0 U	1.0 U	1.0 U	1.0 U
207R	207R	1	4/6/91	1.0 U	1.0 U	2.0 U	2.0 U	2.0 U	2.0 U
208R	208R	1	4/13/91	1.2 U	1.2 U	2.4 U	2.4 U	2.4 U	2.4 U
209R	209R	1	4/5/91	0.5 U	0.5 U	1.0 U	1.0 U	1.0 U	1.0 U

Table B3. (cont'd) Concentrations (µg/kg, dry wt) of Pesticides and PCBs in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	4,4'-DDD	Endosulfan sulfate	4,4'-DDT	Methoxychlor	Endrin ketone
1	1	1	4/10/91	2.0 U	4.0 U	2.0 U	4.0 U	3.0 U
2R	2R	1	4/7/91	2.0 U	4.0 U	2.0 U	4.0 U	3.0 U
3	3	1	4/11/91	1.2 U	2.4 U	1.2 U	2.4 U	1.6 U
4	4	1	4/7/91	2.0 U	4.0 U	2.0 U	4.0 U	3.0 U
5	5	1	4/6/91	2.0 U	4.0 U	2.0 U	4.0 U	3.0 U
5	51	1	4/6/91	2.0 U	4.0 U	2.0 U	4.0 U	3.0 U
5	52	2	4/6/91	2.0 U	4.0 U	**0.8 E**	4.0 U	3.0 U
5	53	3	4/6/91	2.0 U	4.0 U	2.0 U	4.0 U	3.0 U
8	8	1	4/12/91	1.2 U	2.4 U	2.5 U	2.4 U	1.6 U
9R	9R	1	4/12/91	1.2 U	2.4 U	1.2 U	2.4 U	1.6 U
10R	10R	1	4/13/91	1.2 U	2.4 U	1.2 U	2.4 U	1.6 U
11R	11R	1	4/13/91	1.2 U	2.4 U	1.2 U	2.4 U	1.6 U
12	12	1	4/13/91	1.2 U	2.4 U	2.0 U	2.4 U	1.6 U
13R	13R	1	4/14/91	1.2 U	2.4 U	1.2 U	2.4 U	1.6 U
14	14	1	4/14/91	1.2 U	2.4 U	1.2 U	2.4 U	1.6 U
15	15	1	4/14/91	1.2 U	2.4 U	1.2 U	2.4 U	1.6 U
17	17	1	4/14/91	1.2 U	2.4 U	1.2 U	2.4 U	1.6 U
18	18	1	4/5/91	2.0 U	4.0 U	2.0 U	4.0 U	3.0 U
19	19	1	4/5/91	2.0 U	4.0 U	2.0 U	4.0 U	3.0 U
20	20	1	4/5/91	2.0 U	4.0 U	2.0 U	4.0 U	3.0 U
21	21	1	4/2/91	0.8 U	1.6 U	**0.7 N**	1.6 U	1.2 U
22	22	1	4/2/91	0.8 U	1.6 U	**0.3 N**	1.6 U	1.2 U
26	26	1	4/13/91	1.2 U	2.4 U	1.2 U	2.4 U	1.6 U
29	29	1	4/1/91	1.6 U	3.2 U	**1.0 N**	3.2 U	2.4 U
30	30	1	3/25/91	1.0 U	2.0 U	1.0 U	2.5 U	1.5 U
32	32	1	4/1/91	0.8 U	1.6 U	0.8 U	1.6 U	1.2 U
32	57	1	4/1/91	0.8 U	1.6 U	**0.4 N**	1.6 U	1.2 U
32	58	2	4/1/91	0.8 U	1.6 U	0.8 U	1.6 U	1.2 U
32	59	3	4/1/91	0.8 U	1.6 U	0.8 U	1.6 U	1.2 U
33	33	1	4/1/91	1.3 U	1.6 U	2.0 U	2.0 U	1.5 U
34	34	1	3/25/91	2.0 U	4.0 U	2.0 U	4.0 U	3.0 U
35	35	1	3/26/91	2.0 U	4.0 U	2.0 U	4.0 U	3.0 U
35	72	1	3/26/91	2.0 U	4.0 U	2.0 U	4.0 U	3.0 U
35	73	2	3/26/91	2.0 U	4.0 U	5.0 U	4.0 U	3.0 U
35	74	3	3/26/91	2.0 U	4.0 U	2.0 U	4.0 U	3.0 U
38	38	1	3/26/91	2.0 U	4.0 U	2.0 U	4.0 U	3.0 U
38	60	1	3/26/91	2.0 U	4.0 U	2.0 U	4.0 U	3.0 U
38	61	2	3/26/91	2.0 U	4.0 U	2.0 U	4.0 U	3.0 U
38	62	3	3/26/91	2.0 U	4.0 U	2.0 U	4.0 U	3.0 U
39	39	1	3/27/91	1.0 U	2.0 U	1.0 U	2.0 U	1.5 U
40	40	1	3/27/91	1.0 U	2.0 U	1.0 U	2.0 U	1.5 U
41	41	1	3/27/91	1.0 U	2.0 U	1.0 U	2.0 U	1.5 U
43	43	1	3/27/91	1.0 U	2.0 U	1.0 U	2.0 U	1.5 U

Table B3. (cont'd) Concentrations (µg/kg, dry wt) of Pesticides and PCBs in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	4,4'-DDD	Endosulfan sulfate	4,4'-DDT	Methoxychlor	Endrin ketone
44	44	1	3/28/91	1.0 U	2.0 U	1.0 U	2.0 U	1.5 U
44	63	1	3/28/91	0.8 U	1.6 U	0.8 U	1.6 U	1.2 U
44	64	2	3/28/91	0.8 U	1.6 U	0.8 U	1.6 U	1.2 U
44	65	3	3/28/91	0.8 U	1.6 U	0.8 U	1.6 U	1.2 U
45	45	1	3/28/91	1.0 U	2.0 U	1.0 U	2.0 U	1.5 U
47	47	1	3/28/91	0.8 U	1.6 U	0.8 U	1.6 U	1.2 U
48	48	1	3/29/91	2.0 U	4.0 U	2.0 U	4.0 U	3.0 U
49	49	1	3/29/91	2.0 U	4.0 U	2.0 U	4.0 U	3.0 U
66	66	1	3/27/91	1.0 U	2.0 U	1.0 U	2.0 U	1.5 U
67	67	1	4/2/91	0.8 U	1.6 U	1.5 U	1.6 U	1.2 U
68	68	1	4/11/91	1.2 U	2.4 U	1.2 U	2.4 U	1.6 U
69	69	1	3/25/91	1.0 U	2.0 U	1.0 U	2.0 U	1.5 U
70	70	1	3/28/91	2.0 U	4.0 U	2.0 U	4.0 U	3.0 U
71	71	1	4/5/91	2.0 U	4.0 U	**1.0 E**	4.0 U	3.0 U
201R	201R	1	4/11/91	**0.6 E**	2.4 U	**0.8 E**	2.4 U	1.6 U
202R	202R	1	4/11/91	1.2 U	2.4 U	1.2 U	2.4 U	1.6 U
203R	203R	1	4/7/91	2.0 U	4.0 U	2.0 U	4.0 U	3.0 U
204R	204R	1	4/8/91	2.0 U	4.0 U	2.0 U	4.0 U	3.0 U
205R	205R	1	4/8/91	2.0 U	4.0 U	2.0 U	4.0 U	3.0 U
206R	206R	1	4/8/91	1.0 U	2.0 U	1.0 U	2.0 U	1.5 U
207R	207R	1	4/6/91	2.0 U	4.0 U	**0.4 E**	4.0 U	3.0 U
208R	208R	1	4/13/91	3.0 U	4.8 U	2.4 U	4.8 U	3.2 U
209R	209R	1	4/5/91	1.0 U	2.0 U	**0.3 E**	2.0 U	1.5 U

Table B3. (cont'd) Concentrations (µg/kg, dry wt) of Pesticides and PCBs in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	gamma-Chlordane	alpha-Chlordane	Toxaphene	Aroclor 1016/1242	Aroclor 1248	Aroclor 1254
1	1	1	4/10/91	1.5 U	1.5 U	150 U	15 U	15 U	15 U
2R	2R	1	4/7/91	1.5 U	1.5 U	150 U	15 U	15 U	15 U
3	3	1	4/11/91	0.8 U	0.8 U	80 U	10 U	10 U	10 U
4	4	1	4/7/91	1.5 U	1.5 U	150 U	15 U	15 U	15 U
5	5	1	4/6/91	1.5 U	1.5 U	150 U	15 U	15 U	15 U
5	51	1	4/6/91	1.5 U	1.5 U	150 U	15 U	15 U	15 U
5	52	2	4/6/91	1.5 U	1.5 U	150 U	15 U	15 U	15 U
5	53	3	4/6/91	1.5 U	1.5 U	150 U	15 U	15 U	15 U
8	8	1	4/12/91	0.8 U	0.8 U	80 U	10 U	10 U	**5.4 E**
9R	9R	1	4/12/91	0.8 U	0.8 U	80 U	10 U	10 U	10 U
10R	10R	1	4/13/91	0.8 U	0.8 U	80 U	10 U	10 U	10 U
11R	11R	1	4/13/91	0.8 U	0.8 U	80 U	10 U	10 U	10 U
12	12	1	4/13/91	0.8 U	0.8 U	80 U	10 U	10 U	10 U
13R	13R	1	4/14/91	0.8 U	0.8 U	80 U	10 U	10 U	10 U
14	14	1	4/14/91	0.8 U	0.8 U	80 U	10 U	10 U	10 U
15	15	1	4/14/91	0.8 U	0.8 U	80 U	10 U	10 U	10 U
17	17	1	4/14/91	0.8 U	0.8 U	80 U	10 U	10 U	10 U
18	18	1	4/5/91	1.5 U	1.5 U	150 U	15 U	15 U	15 U
19	19	1	4/5/91	1.5 U	1.5 U	150 U	15 U	15 U	**5.7 E**
20	20	1	4/5/91	1.5 U	1.5 U	150 U	15 U	15 U	15 U
21	21	1	4/2/91	0.6 U	0.6 U	60 U	6.0 U	6.0 U	**4.2 E**
22	22	1	4/2/91	0.6 U	0.6 U	60 U	6.0 U	6.0 U	**3.6 E**
26	26	1	4/13/91	0.8 U	0.8 U	80 U	10 U	10 U	10 U
29	29	1	4/1/91	1.2 U	1.2 U	120 U	12 U	12 U	**7.2 E**
30	30	1	3/25/91	0.8 U	0.8 U	75 U	8.0 U	8.0 U	**5.8 E**
32	32	1	4/1/91	0.6 U	0.6 U	60 U	6.0 U	6.0 U	**6.8**
32	57	1	4/1/91	0.6 U	0.6 U	60 U	6.0 U	6.0 U	**4.3 E**
32	58	2	4/1/91	0.6 U	0.6 U	60 U	6.0 U	6.0 U	**5.8 E**
32	59	3	4/1/91	0.6 U	0.6 U	60 U	6.0 U	6.0 U	**5.3 E**
33	33	1	4/1/91	1.5 U	0.6 U	60 U	6.0 U	6.0 U	**35**
34	34	1	3/25/91	1.5 U	1.5 U	150 U	15 U	15 U	**21**
35	35	1	3/26/91	1.5 U	1.5 U	150 U	15 U	15 U	**15 E**
35	72	1	3/26/91	1.5 U	1.5 U	150 U	15 U	15 U	**16**
35	73	2	3/26/91	2.0 U	1.5 U	150 U	15 U	15 U	**47 E**
35	74	3	3/26/91	1.5 U	1.5 U	150 U	15 U	15 U	**14 E**
38	38	1	3/26/91	1.5 U	1.5 U	150 U	15 U	15 U	**16**
38	60	1	3/26/91	1.5 U	1.5 U	150 U	15 U	15 U	15 U
38	61	2	3/26/91	1.5 U	1.5 U	150 U	15 U	15 U	**10 E**
38	62	3	3/26/91	1.5 U	1.5 U	150 U	15 U	15 U	**17**
39	39	1	3/27/91	0.8 U	0.8 U	75 U	7.5 U	7.5 U	7.5 U
40	40	1	3/27/91	1.3 U	0.8 U	100 U	7.5 U	7.5 U	**33**
41	41	1	3/27/91	0.8 U	0.8 U	75 U	7.5 U	7.5 U	7.5 U
43	43	1	3/27/91	0.8 U	0.8 U	75 U	7.5 U	7.5 U	7.5 U

Table B3. (cont'd) Concentrations (µg/kg, dry wt) of Pesticides and PCBs in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	gamma-Chlordane	alpha-Chlordane	Toxaphene	Aroclor 1016/1242	Aroclor 1248	Aroclor 1254
44	44	1	3/28/91	0.8 U	0.8 U	75 U	7.5 U	7.5 U	7.5 U
44	63	1	3/28/91	0.6 U	0.6 U	60 U	6.0 U	6.0 U	6.0 U
44	64	2	3/28/91	0.6 U	0.6 U	60 U	6.0 U	6.0 U	6.0 U
44	65	3	3/28/91	0.6 U	0.6 U	60 U	6.0 U	6.0 U	6.0 U
45	45	1	3/28/91	0.8 U	0.8 U	75 U	7.5 U	7.5 U	7.5 U
47	47	1	3/28/91	0.6 U	0.6 U	60 U	6.0 U	6.0 U	6.0 U
48	48	1	3/29/91	1.5 U	1.5 U	150 U	15 U	15 U	15 U
49	49	1	3/29/91	1.5 U	1.5 U	150 U	20 U	20 U	**22**
66	66	1	3/27/91	1.0 U	0.8 U	75 U	7.5 U	7.5 U	**70**
67	67	1	4/2/91	0.6 U	0.6 U	60 U	6.0 U	6.0 U	**93**
68	68	1	4/11/91	2.0 U	0.8 U	80 U	10 U	10 U	**77**
69	69	1	3/25/91	0.8 U	0.8 U	75 U	7.5 U	7.5 U	**4.0 E**
70	70	1	3/28/91	1.5 U	1.5 U	150 U	15 U	15 U	15 U
71	71	1	4/5/91	1.5 U	1.5 U	150 U	15 U	15 U	15 U
201R	201R	1	4/11/91	0.8 U	0.8 U	80 U	10 U	10 U	10 U
202R	202R	1	4/11/91	0.8 U	0.8 U	80 U	10 U	10 U	10 U
203R	203R	1	4/7/91	1.5 U	1.5 U	150 U	15 U	15 U	15 U
204R	204R	1	4/8/91	1.5 U	1.5 U	150 U	15 U	15 U	15 U
205R	205R	1	4/8/91	1.5 U	1.5 U	150 U	15 U	15 U	15 U
206R	206R	1	4/8/91	0.8 U	0.8 U	75 U	7.5 U	7.5 U	7.5 U
207R	207R	1	4/6/91	1.5 U	1.5 U	150 U	15 U	15 U	15 U
208R	208R	1	4/13/91	1.6 U	1.6 U	160 U	20 U	20 U	20 U
209R	209R	1	4/5/91	0.8 U	0.8 U	75 U	7.5 U	7.5 U	7.5 U

Table B3. (cont'd) Concentrations (µg/kg, dry wt) of Pesticides and PCBs in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Aroclor 1260	Aroclor 1221	Aroclor 1232
1	1	1	4/10/91	15 U	15 U	15 U
2R	2R	1	4/7/91	15 U	15 U	15 U
3	3	1	4/11/91	10 U	10 U	10 U
4	4	1	4/7/91	15 U	15 U	15 U
5	5	1	4/6/91	15 U	15 U	15 U
5	51	1	4/6/91	15 U	15 U	15 U
5	52	2	4/6/91	15 U	15 U	15 U
5	53	3	4/6/91	15 U	15 U	15 U
8	8	1	4/12/91	10 U	10 U	10 U
9R	9R	1	4/12/91	10 U	10 U	10 U
10R	10R	1	4/13/91	10 U	10 U	10 U
11R	11R	1	4/13/91	10 U	10 U	10 U
12	12	1	4/13/91	10 U	10 U	10 U
13R	13R	1	4/14/91	10 U	10 U	10 U
14	14	1	4/14/91	10 U	10 U	10 U
15	15	1	4/14/91	10 U	10 U	10 U
17	17	1	4/14/91	10 U	10 U	10 U
18	18	1	4/5/91	15 U	15 U	15 U
19	19	1	4/5/91	15 U	15 U	15 U
20	20	1	4/5/91	15 U	15 U	15 U
21	21	1	4/2/91	6.0 U	6.0 U	6.0 U
22	22	1	4/2/91	6.0 U	6.0 U	6.0 U
26	26	1	4/13/91	10 U	10 U	10 U
29	29	1	4/1/91	12 U	12 U	12 U
30	30	1	3/25/91	8.0 U	8.0 U	8.0 U
32	32	1	4/1/91	**5.1 E**	6.0 U	6.0 U
32	57	1	4/1/91	6.0 U	6.0 U	6.0 U
32	58	2	4/1/91	**5.9 E**	6.0 U	6.0 U
32	59	3	4/1/91	**4.5 E**	6.0 U	6.0 U
33	33	1	4/1/91	**29**	6.0 U	6.0 U
34	34	1	3/25/91	**30**	15 U	15 U
35	35	1	3/26/91	15 U	15 U	15 U
35	72	1	3/26/91	15 U	15 U	15 U
35	73	2	3/26/91	**21 E**	15 U	15 U
35	74	3	3/26/91	30 U	15 U	15 U
38	38	1	3/26/91	15 U	15 U	15 U
38	60	1	3/26/91	15 U	15 U	15 U
38	61	2	3/26/91	15 U	15 U	15 U
38	62	3	3/26/91	15 U	15 U	15 U
39	39	1	3/27/91	7.5 U	7.5 U	7.5 U
40	40	1	3/27/91	7.5 U	7.5 U	7.5 U
41	41	1	3/27/91	7.5 U	7.5 U	7.5 U
43	43	1	3/27/91	7.5 U	7.5 U	7.5 U

Table B3. (cont'd) Concentrations (μg/kg, dry wt) of Pesticides and PCBs in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Aroclor 1260	Aroclor 1221	Aroclor 1232
44	44	1	3/28/91	7.5 U	7.5 U	7.5 U
44	63	1	3/28/91	6.0 U	6.0 U	6.0 U
44	64	2	3/28/91	6.0 U	6.0 U	6.0 U
44	65	3	3/28/91	6.0 U	6.0 U	6.0 U
45	45	1	3/28/91	7.5 U	7.5 U	7.5 U
47	47	1	3/28/91	6.0 U	6.0 U	6.0 U
48	48	1	3/29/91	15 U	15 U	15 U
49	49	1	3/29/91	20 U	20 U	20 U
66	66	1	3/27/91	7.5 U	7.5 U	7.5 U
67	67	1	4/2/91	6.0 U	6.0 U	6.0 U
68	68	1	4/11/91	10 U	10 U	10 U
69	69	1	3/25/91	7.5 U	7.5 U	7.5 U
70	70	1	3/28/91	15 U	15 U	15 U
71	71	1	4/5/91	15 U	15 U	15 U
201R	201R	1	4/11/91	10 U	10 U	10 U
202R	202R	1	4/11/91	10 U	10 U	10 U
203R	203R	1	4/7/91	15 U	15 U	15 U
204R	204R	1	4/8/91	15 U	15 U	15 U
205R	205R	1	4/8/91	15 U	15 U	15 U
206R	206R	1	4/8/91	7.5 U	7.5 U	7.5 U
207R	207R	1	4/6/91	15 U	15 U	15 U
208R	208R	1	4/13/91	20 U	20 U	20 U
209R	209R	1	4/5/91	7.5 U	7.5 U	7.5 U

Table B4. Concentrations (mg/kg, dry weight) of Metals in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium
1	1	1	4/10/91	17800	0.21 U	8.8	46.0	0.34	0.28
2R	2R	1	4/7/91	14400	0.14 U	5.2	39.8	0.32	0.18
3	3	1	4/11/91	16300	0.20 U	5.0	46.2	0.30	0.15 E
4	4	1	4/7/91	23100	0.25 U	11.9	60.5	0.51	0.23
5	5	1	4/6/91	19300	0.23 U	7.5	50.4	0.40	0.21
5	51	1	4/6/91	19800	0.23 U	10.1	50.0	0.39	0.18
5	52	2	4/6/91	21300	0.23 U	10.3	54.0	0.37	0.19
5	53	3	4/6/91	19400	0.23 U	8.3	48.8	0.37	0.17
8	8	1	4/12/91	15900	0.16 U	7.5	35.4	0.32	0.56
9R	9R	1	4/12/91	7960	0.086 E	2.6	11.9	0.10	0.017 U
10R	10R	1	4/13/91	13100	0.12 U	3.5	24.4	0.19	0.11
11R	11R	1	4/13/91	10800	0.17 U	5.6	22.4	0.17 U	0.086
12	12	1	4/13/91	17200	0.21 U	6.1	43.1	0.38	0.18
13R	13R	1	4/14/91	6300	0.088 U	3.4	12.5	0.15	0.052
14	14	1	4/14/91	11300	0.15 U	5.7	26.4	0.24	0.10
15	15	1	4/14/91	6790	0.12 U	1.8	10.4	0.11	0.023 U
17	17	1	4/14/91	32600	0.22 U	7.7	19.2	0.46	0.29
18	18	1	4/5/91	14500	0.15 U	10.8	33.0	0.25	0.16
19	19	1	4/5/91	20600	0.29 U	10.2	49.5	0.41	0.15
20	20	1	4/5/91	23000	0.17 U	11.9	63.3	0.42	0.12
21	21	1	4/2/91	20900	0.13 U	15.7	55.1	0.44	0.19
22	22	1	4/2/91	7820	0.12 U	4.3	18.6	0.16	0.083
26	26	1	4/13/91	11600	0.14 U	4.9	30.7	0.28	0.19
29	29	1	4/1/91	18700	0.20 U	8.1	51.9	0.45	0.43
30	30	1	3/25/91	7440	0.13 U	3.2	17.5	0.13	0.45
32	32	1	4/1/91	6330	0.096 U	5.0	13.6	0.20	0.065
32	57	1	4/1/91	5980	0.11 U	5.6	13.0	0.18	0.059
32	58	2	4/1/91	6140	0.11 U	4.1	14.1	0.18	0.044
32	59	3	4/1/91	6100	0.12 U	5.2	13.8	0.16	0.065
33	33	1	4/1/91	10500	0.24 E	6.3	43.0	0.22	0.17
34	34	1	3/25/91	19900	0.65 E	13.2	51.6	0.38	0.79
35	35	1	3/26/91	19600	0.24 U	11.4	46.0	0.36	0.92
35	72	1	3/26/91	20600	0.31 E	10.8	47.0	0.28	0.76
35	73	2	3/26/91	19400	0.21 U	12.6	46.0	0.28	0.81
35	74	3	3/26/91	18900	0.27 E	11.6	42.0	0.30 U	0.81
38	38	1	3/26/91	24900	0.35 U	14.6	63.2	0.55	0.28
38	60	1	3/26/91	24000	0.54 E	11.7	60.9	0.37	0.36
38	61	2	3/26/91	23100	0.33 U	13.0	59.0	0.38	0.33
38	62	3	3/26/91	23700	0.32 U	13.8	60.6	0.45	0.35
39	39	1	3/27/91	5430	0.090 U	2.1	10.2	0.12	0.056
40	40	1	3/27/91	10600	0.28 E	8.1	26.5	0.16	0.17
41	41	1	3/27/91	14600	0.15 U	6.1	35.6	0.27	0.070
43	43	1	3/27/91	5370	0.11 U	2.1	10.2	0.11 U	0.021 U

Table B4. (cont'd) Concentrations (mg/kg, dry weight) of Metals in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium
44	44	1	3/28/91	7960	0.12 E	7.8 E	14.0	0.18	0.099
44	63	1	3/28/91	7910	0.12 U	6.4	14.3	0.19	0.097
44	64	2	3/28/91	8280	• 0.23 E	5.3	14.6	0.18	0.097
44	65	3	3/28/91	8240	0.13 E	5.6	14.8	0.15	0.10
45	45	1	3/28/91	11700	0.16 U	6.3	20.3	0.21	0.29
47	47	1	3/28/91	7360	0.098 U	5.1	11.2	0.21	0.20
48	48	1	3/29/91	19500	0.25 U	11.1	32.2	0.36	0.57
49	49	1	3/29/91	23400	0.26 U	12.4	27.4	0.39	1.3
66	66	1	3/27/91	12900	0.15 U	5.2	27.9	0.19	0.46
67	67	1	4/2/91	11700	0.15 U	5.1	21.9	0.22	0.49
68	68	1	4/11/91	10700	0.13 U	4.8	21.3	0.24	0.60
69	69	1	3/25/91	8760	0.10 U	3.9	20.7	0.13 U	0.41
70	70	1	3/28/91	19200	0.21 U	5.5	27.7	0.31	0.56
71	71	1	4/5/91	13500	0.18 U	8.7	33.8	0.23	0.26
201R	201R	1	4/11/91	9440	0.11 U	3.9	78.8	0.19	0.059
202R	202R	1	4/11/91	11800	0.13 U	4.3	40.4	0.27	0.17
203R	203R	1	4/7/91	28700	0.19 U	15.2	73.6	0.55	0.21
204R	204R	1	4/8/91	21000	0.30 U	15.8	61.9	0.33 U	1.2
205R	205R	1	4/8/91	15300	0.16 U	5.9	40.9	0.29	0.33
206R	206R	1	4/8/91	12200	0.14 U	5.5	30.9	0.25	0.46
207R	207R	1	4/6/91	16800	0.18 U	6.4	45.6	0.31	0.16
208R	208R	1	4/13/91	19900	0.36 U	9.8	42.9	0.34 U	2.2
209R	209R	1	4/5/91	12100	0.13 U	7.4	28.2	0.11 U	0.085

Table B4. (cont'd) Concentrations (mg/kg, dry weight) of Metals in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Calcium	Chromium	Cobalt	Copper	Iron	Lead
1	1	1	4/10/91	6080	39.4	8.5	27.7 E	28800	13.8
2R	2R	1	4/7/91	6110	29.3	8.3	17.7 E	23400	9.5
3	3	1	4/11/91	12900	28.9	8.6	21.7	26600	10.8
4	4	1	4/7/91	6390	60.7	14.0	42.0 E	37100	17.8
5	5	1	4/6/91	6640	46.1	10.2	33.9 E	31800	14.8
5	51	1	4/6/91	6550	45.1	10.0	31.9 E	32200	17.3
5	52	2	4/6/91	7150	47.4	10.3	32.5 E	33300	14.0
5	53	3	4/6/91	6390	44.2	10.3	31.9 E	31800	16.1
8	8	1	4/12/91	4460	30.4	7.5	28.9	25900	20.8
9R	9R	1	4/12/91	3470	31.7	6.0	7.7	13600	2.4
10R	10R	1	4/13/91	4240	28.6	7.5	14.7	21000	6.1
11R	11R	1	4/13/91	3900	24.2	5.4	13.5	17700	8.7
12	12	1	4/13/91	5920	37.3	8.6	26.9	28300	14.0
13R	13R	1	4/14/91	3810	15.3	4.0	5.7	13300	3.7
14	14	1	4/14/91	4280	25.5	8.5	15.0	20100	7.3
15	15	1	4/14/91	3150	16.3	4.5	5.6	10700	3.4
17	17	1	4/14/91	14100	54.4	23.1	113	50700	7.4
18	18	1	4/5/91	4740	55.2	10.5	30.3 E	24100	8.0
19	19	1	4/5/91	6060	64.8	17.8	41.9 E	33700	20.6
20	20	1	4/5/91	5600	126	21.2	50.4 E	41700	12.6
21	21	1	4/2/91	6810	51.5	13.5	57.3 E	29700	13.0
22	22	1	4/2/91	3410	21.2	5.4	12.0 E	11300	9.2
26	26	1	4/13/91	14900	28.3	8.7	17.5	21700	12.7
29	29	1	4/1/91	6800	41.9	11.1	36.9 E	29000	26.2
30	30	1	3/25/91	3200	18.4	3.6	19.5	9760	9.8
32	32	1	4/1/91	7990 E	14.1	4.6	7.9 E	10100	11.3
32	57	1	4/1/91	2760	13.5	4.5	7.7 E	9930	10.7
32	58	2	4/1/91	3380	15.1	4.5	8.4 E	9870	11.0
32	59	3	4/1/91	5300	14.1	4.5	7.9 E	9770	12.3
33	33	1	4/1/91	4690	27.5	6.6	42.6 E	15600	36.6
34	34	1	3/25/91	6800	59.6	8.7	131	28300	90.5
35	35	1	3/26/91	10100	50.7	9.5	78.4	26900	66.3
35	72	1	3/26/91	9930	51.1	9.4	75.7	27300	77.9
35	73	2	3/26/91	9000	49.4	8.9	74.4	26300	77.7
35	74	3	3/26/91	9650	48.9	9.1	71.8	26100	73.2
38	38	1	3/26/91	7310	50.7	14.0	54.5	34000	46.2
38	60	1	3/26/91	7170	48.9	13.8	57.1	33800	36.1
38	61	2	3/26/91	9100	46.5	13.6	54.8	32600	43.5
38	62	3	3/26/91	7250	47.9	13.7	53.5	33300	48.9
39	39	1	3/27/91	2240	12.9	2.7	3.9	7560	5.6
40	40	1	3/27/91	5180	16.4	5.2	46.8	14000	34.3
41	41	1	3/27/91	6170	17.1	6.4	31.3	18500	9.4
43	43	1	3/27/91	2770	12.2	2.7	4.7	7190	3.6

Table B4. (cont'd) Concentrations (mg/kg, dry weight) of Metals in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Calcium	Chromium	Cobalt	Copper	Iron	Lead
44	44	1	3/28/91	3380	15.9	6.6	14.7	11600	12.5
44	63	1	3/28/91	3270	16.2	6.6	15.0	11500	12.0
44	64	2	3/28/91	3510	16.1	6.3	16.8	11500	16.6
44	65	3	3/28/91	3900	16.4	6.8	14.7	11800	11.9
45	45	1	3/28/91	4840	18.1	7.0	30.9	14300	17.0
47	47	1	3/28/91	18300	20.6	5.8	10.0	17700	7.7 E
48	48	1	3/29/91	7320	35.5	10.0	47.8	24800	25.8
49	49	1	3/29/91	5940	38.1	8.9	58.9	27500	27.5
66	66	1	3/27/91	5050	31.1	6.0	16.0	19600	7.0
67	67	1	4/2/91	5080	27.0	5.4	15.4 E	17300	7.5
68	68	1	4/11/91	5260	29.4	5.5	15.6	16900	11.3
69	69	1	3/25/91	5000	23.1	5.6	11.6	12400	6.2
70	70	1	3/28/91	8920	45.6	14.4	46.4	28900	16.9
71	71	1	4/5/91	5150	31.4	7.0	20.9 E	21100	8.9
201R	201R	1	4/11/91	4060	23.2	7.9	13.0	17700	6.2
202R	202R	1	4/11/91	6970	22.9	7.4	11.8	22700	6.1
203R	203R	1	4/7/91	6660	95.2	24.9	58.6 E	48200	15.0
204R	204R	1	4/8/91	6500	48.0	8.3	36.5 E	30400	16.4
205R	205R	1	4/8/91	6450	29.7	7.4	18.7 E	24100	9.7
206R	206R	1	4/8/91	5350	23.7	6.6	14.2 E	19600	7.1
207R	207R	1	4/6/91	7390	37.0	9.0	25.2 E	26000	10.3
208R	208R	1	4/13/91	5450	46.2	8.9	39.9	29800	11.2
209R	209R	1	4/5/91	5060	36.0	8.6	24.5 E	19000	5.2

Table B4. (cont'd) Concentrations (mg/kg, dry weight) of Metals in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Magnesium	Manganese	Mercury	Nickel	Potassium
1	1	1	4/10/91	11600	278	0.11	36.3	3360
2R	2R	1	4/7/91	9380	247	0.061	32.2	2480
3	3	1	4/11/91	9700	346	0.065	26.3	3130
4	4	1	4/7/91	16200	440	0.16	71.3	4080
5	5	1	4/6/91	12500	329	0.13	43.3	3660
5	51	1	4/6/91	13200	336	0.15	43.2	3780
5	52	2	4/6/91	13500	354	0.14	45.5	3950
5	53	3	4/6/91	13100	342	0.13	44.4	3720
8	8	1	4/12/91	9560	229	0.26	25.1	2490
9R	9R	1	4/12/91	9070	246	0.028 U	45.2	871
10R	10R	1	4/13/91	8660	216	0.043	31.9	1710
11R	11R	1	4/13/91	7530	197	0.052 U	22.6	2380
12	12	1	4/13/91	11100	278	0.096	33.6	3150
13R	13R	1	4/14/91	4420	152	0.029 U	17.0	1310
14	14	1	4/14/91	7770	290	0.043	29.7	1860
15	15	1	4/14/91	4090	191	0.028 U	15.4	882
17	17	1	4/14/91	18600	599	0.070 U	53.0	3090
18	18	1	4/5/91	11000	309	0.069	52.6	2210
19	19	1	4/5/91	15100	704	0.14	65.1	4160
20	20	1	4/5/91	21000	650	0.13	139	2560
21	21	1	4/2/91	11600	389	0.48	51.3	2450
22	22	1	4/2/91	4530	206	0.037	19.3	1140
26	26	1	4/13/91	8440	356	0.065	32.7	2260
29	29	1	4/1/91	11100	469	0.13	35.7	3690
30	30	1	3/25/91	3970	145	0.12	14.8	1200
32	32	1	4/1/91	3590	184	0.043	13.6	1140
32	57	1	4/1/91	3600	169	0.043	13.4	1080
32	58	2	4/1/91	3540	181	0.047	13.9	1110
32	59	3	4/1/91	3480	170	0.044	13.2	1130
33	33	1	4/1/91	5980	265	0.13	28.8	1440
34	34	1	3/25/91	10700	302	0.74	43.7	3460
35	35	1	3/26/91	10800	293	0.59	44.0	3520
35	72	1	3/26/91	10900	294	0.54	45.3	3470
35	73	2	3/26/91	10600	284	0.51	43.7	3300
35	74	3	3/26/91	10600	299	0.53	43.4	3350
38	38	1	3/26/91	13600	836	0.24	43.0	4660
38	60	1	3/26/91	13600	833	0.21	44.7	4510
38	61	2	3/26/91	13300	819	0.23	40.7	4380
38	62	3	3/26/91	13400	825	0.25	40.6	4450
39	39	1	3/27/91	2870	129	0.032 U	10.3	971
40	40	1	3/27/91	4300	209	0.11	11.8	1240
41	41	1	3/27/91	5340	171	0.049	14.1	1480
43	43	1	3/27/91	2890	195	0.030 U	10.9	795

Table B4. (cont'd) Concentrations (mg/kg, dry weight) of Metals in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Magnesium	Manganese	Mercury	Nickel	Potassium
44	44	1	3/28/91	4340	439	0.047	16.4	1260
44	63	1	3/28/91	4340	440	0.039 U	16.9	1190
44	64	2	3/28/91	4460	456	0.039 U	16.9	1280
44	65	3	3/28/91	4380	410	0.036 U	17.2	1240
45	45	1	3/28/91	5690	375	0.072	16.7	1840
47	47	1	3/28/91	5660	338	0.035 U	21.5	2120
48	48	1	3/29/91	10500	701	0.13	35.3	3460
49	49	1	3/29/91	11100	300	0.18	29.3	3630
66	66	1	3/27/91	7870	207	0.044 U	29.7	1860
67	67	1	4/2/91	7600	171	0.045	27.6	1880
68	68	1	4/11/91	7170	162	0.042	27.7	1820
69	69	1	3/25/91	5500	192	0.037	24.5	1220
70	70	1	3/28/91	10600	1070	0.066 U	40.7	2490
71	71	1	4/5/91	8800	255	0.074	32.0	2190
201R	201R	1	4/11/91	7820	270	0.034	28.6	1460
202R	202R	1	4/11/91	7460	274	0.042	20.6	2010
203R	203R	1	4/7/91	24600	735	0.14	163	3130
204R	204R	1	4/8/91	13500	256	0.12	36.9	4750
205R	205R	1	4/8/91	9000	243	0.055	24.6	2750
206R	206R	1	4/8/91	7340	227	0.047	21.2	2040
207R	207R	1	4/6/91	10800	320	0.070	40.0	2810
208R	208R	1	4/13/91	13900	225	0.11 U	37.1	4680
209R	209R	1	4/5/91	8900	241	0.14	43.3	1350

Table B4. (cont'd) Concentrations (mg/kg, dry weight) of Metals in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
1	1	1	4/10/91	R	0.17 E	19400	0.21	51.7	82.5 E
2R	2R	1	4/7/91	R	0.086 E	10800	0.16	43.1	63.0 E
3	3	1	4/11/91	R	0.42 E	15300	0.20 U	48.4	69.8 E
4	4	1	4/7/91	R	0.25 E	26000	0.25 U	67.2	93.2 E
5	5	1	4/6/91	R	0.19 E	21800	0.23 U	57.0	84.3 E
5	51	1	4/6/91	R	0.19 E	23600	0.23	57.0	86.2 E
5	52	2	4/6/91	R	0.16 E	23400	0.23 U	61.3	88.4 E
5	53	3	4/6/91	R	0.23 E	23300	0.23 U	56.6	86.0 E
8	8	1	4/12/91	R	0.28 E	14100	0.16 U	47.8	91.2 E
9R	9R	1	4/12/91	R	0.12 U	3240	0.086 U	29.4	27.4 E
10R	10R	1	4/13/91	R	0.14 U	7620	0.12 U	38.5	50.5 E
11R	11R	1	4/13/91	R	0.23 E	13700	0.17 U	31.4	44.1 E
12	12	1	4/13/91	R	0.17 U	18900	0.21 U	51.7	77.3 E
13R	13R	1	4/14/91	R	0.028 U	3050	0.088	20.6	27.3 E
14	14	1	4/14/91	R	0.24 E	9070	0.15 U	36.9	46.5 E
15	15	1	4/14/91	R	0.027 U	3510	0.12 U	21.2	23.7 E
17	17	1	4/14/91	R	0.32 E	23700	0.22 U	132	83.6 E
18	18	1	4/5/91	R	0.12 E	10300	0.24	46.7	57.3 E
19	19	1	4/5/91	R	0.32 E	26300	0.29 U	65.3	95.2 E
20	20	1	4/5/91	R	0.18 E	10700	0.17 U	67.8	87.9 E
21	21	1	4/2/91	R	0.21 E	9350	0.18	62.1	85.0 E
22	22	1	4/2/91	R	0.059 E	4160	0.18	23.0	29.1 E
26	26	1	4/13/91	R	0.17 U	9520	0.14 U	38.4	53.3 E
29	29	1	4/1/91	R	0.51 E	20200	0.22	56.5	89.3 E
30	30	1	3/25/91	R	0.16 E	6450	0.31	21.2 E	31.6 E
32	32	1	4/1/91	R	0.096 E	3950	0.096 U	20.9	22.7 E
32	57	1	4/1/91	R	0.11 E	3730	0.11 U	20.3	22.1 E
32	58	2	4/1/91	R	0.10 E	4070	0.13	21.3	25.8 E
32	59	3	4/1/91	R	0.093 E	4000	0.12 U	20.4	22.7 E
33	33	1	4/1/91	R	0.43 E	7500	0.14 U	33.3	60.5 E
34	34	1	3/25/91	R	0.93 E	21500	0.23 U	58.9 E	144 E
35	35	1	3/26/91	R	0.72 E	22600	0.24 U	58.5 E	140 E
35	72	1	3/26/91	R	1.2 E	22600	0.28	60.1 E	144 E
35	73	2	3/26/91	R	1.1 E	22200	0.21 U	56.6 E	135 E
35	74	3	3/26/91	R	0.98 E	22400	0.24 U	56.2 E	133 E
38	38	1	3/26/91	R	0.56 E	32500	0.35 U	71.8 E	109 E
38	60	1	3/26/91	R	0.63 E	33500	0.32 U	69.5 E	138 E
38	61	2	3/26/91	R	0.60 E	31600	0.33 U	66.8 E	104 E
38	62	3	3/26/91	R	0.58 E	32100	0.32 U	68.7 E	104 E
39	39	1	3/27/91	R	0.027 E	3440	0.090	15.9 E	17.5 E
40	40	1	3/27/91	R	0.29 E	8520	0.13 U	39.5 E	48.3 E
41	41	1	3/27/91	R	0.13 E	9750	0.15 U	48.5 E	37.4 E
43	43	1	3/27/91	R	0.021 U	3880	0.13	16.8 E	15.2 E

Table B4. (cont'd) Concentrations (mg/kg, dry weight) of Metals in Puget Sound Sediments

Station ID	Sample ID	Rep	Sampling Date	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
44	44	1	3/28/91	R	0.072 E	6420	0.10	25.2 E	34.1 E
44	63	1	3/28/91	R	0.082 E	6420	0.14	25.2 E	34.2 E
44	64	2	3/28/91	R	0.10 E	7250	0.16	25.9 E	35.9 E
44	65	3	3/28/91	R	0.089 E	6510	0.099 U	26.0 E	35.8 E
45	45	1	3/28/91	R	0.24 E	13600	0.16 U	32.6 E	50.4 E
47	47	1	3/28/91	R	0.059 E	5520	0.12	25.5 E	34.9 E
48	48	1	3/29/91	R	0.34 E	27200	0.25 U	52.2 E	97.5 E
49	49	1	3/29/91	R	1.3 E	29900	0.26 U	51.9 E	87.0 E
66	66	1	3/27/91	R	0.10 E	8930	0.33	41.3 E	47.9 E
67	67	1	4/2/91	R	0.12 E	8930	0.41	35.0	46.2 E
68	68	1	4/11/91	R	0.11 U	8970	0.18	33.2	44.6 E
69	69	1	3/25/91	R	0.13 E	5870	0.25	28.2 E	33.5 E
70	70	1	3/28/91	R	0.21 E	17700	0.21 U	70.9 E	78.6 E
71	71	1	4/5/91	R	0.11 E	13100	0.18 U	38.2	56.8 E
201R	201R	1	4/11/91	R	0.11 U	6050	0.11 U	32.1	43.8 E
202R	202R	1	4/11/91	R	0.15 U	7120	0.13 U	38.0	53.7 E
203R	203R	1	4/7/91	R	0.21 E	14500	0.19 U	77.4	108 E
204R	204R	1	4/8/91	R	0.30 E	30600	0.30	59.8	99.4 E
205R	205R	1	4/8/91	R	0.13 E	12500	0.16 U	44.2	63.9 E
206R	206R	1	4/8/91	R	0.071 E	8980	0.21	35.7	54.1 E
207R	207R	1	4/6/91	R	0.13 E	14800	0.18 U	50.8	67.3 E
208R	208R	1	4/13/91	R	0.30 E	39000	0.36 U	58.4	86.3 E
209R	209R	1	4/5/91	R	0.089 E	6290	0.13 U	36.1	48.7 E

Table C1. 1991 Amphipod Bioassay Data by Station for Puget Sound Sediments

Station	Sample I.D.	Reference Toxicant Concentration	Replicate	Number of Organisms Tested	Number of Survivors	Number Emerged	Percent Mortality	Percent Emergence	Data Qualifier	Analysis Start Date
1	1		1	20	11	2	45	1.0		4/12/91
			2	20	20	0	0	0.0		4/12/91
			3	20	13	0	35	0.0		4/12/91
			4	20	20	0	0	0.0		4/12/91
			5	20	20	0	0	0.0		4/12/91
2R	2R		1	20	6	0	70	0.0		4/12/91
			2	20	16	0	20	0.0		4/12/91
			3	20	20	16	0	8.0		4/12/91
			4	20	18	3	10	1.5		4/12/91
			5	20	15	1	25	0.5		4/12/91
3	3		1	20	20	0	0	0.0		4/23/91
			2	20	20	0	0	0.0		4/23/91
			3	20	17	0	15	0.0		4/23/91
			4	20	18	0	10	0.0		4/23/91
			5	20	17	0	15	0.0		4/23/91
4	4		1	20	18	0	10	0.0		4/12/91
			2	20	19	0	5	0.0		4/12/91
			3	20	20	0	0	0.0		4/12/91
			4	20	19	0	5	0.0		4/12/91
			5	20	18	0	10	0.0		4/12/91
5	5		1	20	19	1	5	0.5		4/12/91
			2	20	20	0	0	0.0		4/12/91
			3	20	16	4	20	2.0		4/12/91
			4	20	20	0	0	0.0		4/12/91
			5	20	20	0	0	0.0		4/12/91
5	51		1	20	20	0	0	0.0		4/12/91
			2	20	20	0	0	0.0		4/12/91
			3	20	19	0	5	0.0		4/12/91
			4	20	19	0	5	0.0		4/12/91
			5	20	20	0	0	0.0		4/12/91
5	52		1	20	19	0	5	0.0		4/12/91
			2	20	18	0	10	0.0		4/12/91
			3	20	20	0	0	0.0		4/12/91
			4	20	20	8	0	4.0		4/12/91
			5	20	20	0	0	0.0		4/12/91
5	53		1	20	20	3	0	1.5		4/12/91
			2	20	15	0	25	0.0		4/12/91
			3	20	20	0	0	0.0		4/12/91
			4	20	20	5	0	2.5		4/12/91
			5	20	20	0	0	0.0		4/12/91
8	8		1	20	19	0	5	0.0		4/23/91
			2	20	18	0	10	0.0		4/23/91
			3	20	18	0	10	0.0		4/23/91

Table C1. (cont'd) 1991 Amphipod Bioassay Data by Station for Puget Sound Sediments

Station	Sample I.D.	Reference Toxicant Concentration	Replicate	Number of Organisms Tested	Number of Survivors	Number Emerged	Percent Mortality	Percent Emergence	Data Qualifier	Analysis Start Date
8	8		4	20	18	0	10	0.0		4/23/91
			5	20	17	0	15	0.0		4/23/91
9R	9R		1	20	19	0	5	0.0		4/23/91
			2	20	20	0	0	0.0		4/23/91
			3	20	20	0	0	0.0		4/23/91
			4	20	20	0	0	0.0		4/23/91
			5	20	18	0	10	0.0		4/23/91
10R	10R		1	20	19	0	5	0.0		4/23/91
			2	20	18	0	10	0.0		4/23/91
			3	20	20	0	0	0.0		4/23/91
			4	20	18	0	10	0.0		4/23/91
			5	20	19	0	5	0.0		4/23/91
11R	11R		1	20	20	13	0	6.5		4/23/91
			2	20	18	10	10	5.0		4/23/91
			3	20	20	4	0	2.0		4/23/91
			4	20	19	10	5	5.0		4/23/91
			5	20	19	5	5	2.5		4/23/91
12	12		1	20	14	2	30	1.0		4/23/91
			2	20	20	1	0	0.5		4/23/91
			3	20	18	1	10	0.5		4/23/91
			4	20	20	3	0	1.5		4/23/91
			5	20	17	1	15	0.5		4/23/91
13R	13R		1	20	18	11	10	5.5		4/23/91
			2	20	19	9	5	4.5		4/23/91
			3	20	17	7	15	3.5		4/23/91
			4	20	18	7	10	3.5		4/23/91
			5	20	19	9	5	4.5		4/23/91
14	14		1	20	19	0	5	0.0		4/23/91
			2	20	17	0	15	0.0		4/23/91
			3	20	20	0	0	0.0		4/23/91
			4	20	20	0	0	0.0		4/23/91
			5	20	18	0	10	0.0		4/23/91
15	15		1	20	20	0	0	0.0		4/23/91
			2	20	19	0	5	0.0		4/23/91
			3	20	17	0	15	0.0		4/23/91
			4	20	19	0	5	0.0		4/23/91
			5	20	20	0	0	0.0		4/23/91
17	17		1	20	19	13	5	6.5		4/23/91
			2	20	17	7	15	3.5		4/23/91
			3	20	19	0	5	0.0		4/23/91
			4	20	18	0	10	0.0		4/23/91
			5	20	19	0	5	0.0		4/23/91
18	18		1	20	15	0	25	0.0		4/12/91
			2	20	16	0	20	0.0		4/12/91

Table C1. (cont'd) 1991 Amphipod Bioassay Data by Station for Puget Sound Sediments

Station	Sample I.D.	Reference Toxicant Concentration	Replicate	Number of Organisms Tested	Number of Survivors	Number Emerged	Percent Mortality	Percent Emergence	Data Qualifier	Analysis Start Date
18	18		3	20	17	35	15	17.5		4/12/91
			4	20	11	0	45	0.0		4/12/91
			5	20	11	0	45	0.0		4/12/91
19	19		1	20	16	16	20	8 0		4/12/91
			2	20	17	6	15	3 0		4/12/91
			3	20	17	0	15	0 0		4/12/91
			4	20	20	0	0	0.0		4/12/91
			5	20	20	0	0	0.0		4/12/91
20	20		1	20	20	0	0	0 0		4/12/91
			2	20	18	0	10	0.0		4/12/91
			3	20	16	0	20	0 0		4/12/91
			4	20	20	3	0	1 5		4/12/91
			5	20	20	0	0	0.0		4/12/91
21	21		1	20	18	4	10	2 0		4/12/91
			2	20	19	6	5	3.0		4/12/91
			3	20	18	8	10	4 0		4/12/91
			4	20	13	3	35	1 5		4/12/91
			5	20	9	2	55	1.0		4/12/91
22	22		1	20	20	0	0	0 0		4/12/91
			2	20	18	0	10	0.0		4/12/91
			3	20	20	0	0	0.0		4/12/91
			4	20	19	0	5	0 0		4/12/91
			5	20	18	0	10	0.0		4/12/91
26	26		1	20	18	0	10	0.0		4/23/91
			2	20	19	4	5	2 0		4/23/91
			3	20	18	2	10	1 0		4/23/91
			4	20	19	4	5	2.0		4/23/91
			5	20	18	1	10	0.5		4/23/91
29	29		1	20	19	2	5	1.0		4/12/91
			2	20	18	0	10	0.0		4/12/91
			3	20	17	1	15	0.5		4/12/91
			4	20	20	0	0	0.0		4/12/91
			5	20	18	0	10	0.0		4/12/91
30	30		1	20	16	4	20	2.0		4/2/91
			2	20	19	0	5	0.0		4/2/91
			3	20	19	3	5	1.5		4/2/91
			4	20	19	11	5	5.5		4/2/91
			5	20	19	0	5	0.0		4/2/91
32	32		1	20	15	1	25	0.5		4/12/91
			2	20	16	0	20	0.0		4/12/91
			3	20	18	0	10	0.0		4/12/91
			4	20	20	0	0	0.0		4/12/91
			5	20	19	2	5	1.0		4/12/91
32	57		1	20	20	0	0	0.0		4/12/91

Table C1. (cont'd) 1991 Amphipod Bioassay Data by Station for Puget Sound Sediments

Station	Sample I.D.	Reference Toxicant Concentration	Replicate	Number of Organisms Tested	Number of Survivors	Number Emerged	Percent Mortality	Percent Emergence	Data Qualifier	Analysis Start Date
32	57		2	20	20	0	0	0.0		4/12/91
			3	20	20	0	0	0.0		4/12/91
			4	20	20	0	0	0.0		4/12/91
			5	20	20	0	0	0.0		4/12/91
32	58		1	20	19	0	5	0.0		4/12/91
			2	20	19	0	5	0.0		4/12/91
			3	20	15	0	25	0.0		4/12/91
			4	20	19	0	5	0.0		4/12/91
			5	20	19	0	5	0.0		4/12/91
32	59		1	20	18	2	10	1.0		4/12/91
			2	20	18	0	10	0.0		4/12/91
			3	20	16	0	20	0.0		4/12/91
			4	20	20	0	0	0.0		4/12/91
			5	20	18	0	10	0.0		4/12/91
33	33		1	20	19	0	5	0.0		4/12/91
			2	20	19	0	5	0.0		4/12/91
			3	20	19	0	5	0.0		4/12/91
			4	20	17	0	15	0.0		4/12/91
			5	20	19	0	5	0.0		4/12/91
34	34		1	20	17	5	15	2.5		4/2/91
			2	20	18	3	10	1.5		4/2/91
			3	20	16	0	20	0.0		4/2/91
			4	20	16	0	20	0.0		4/2/91
			5	20	18	1	10	0.5		4/2/91
35	35		1	20	20	0	0	0.0		4/2/91
			2	20	20	0	0	0.0		4/2/91
			3	20	19	0	5	0.0		4/2/91
			4	20	19	0	5	0.0		4/2/91
			5	20	17	0	15	0.0		4/2/91
35	72		1	20	20	9	0	4.5		4/2/91
			2	20	20	0	0	0.0		4/2/91
			3	20	19	0	5	0.0		4/2/91
			4	20	18	1	10	0.5		4/2/91
			5	20	20	0	0	0.0		4/2/91
35	73		1	20	20	0	0	0.0		4/2/91
			2	20	16	0	20	0.0		4/2/91
			3	20	18	0	10	0.0		4/2/91
			4	20	20	0	0	0.0		4/2/91
			5	20	18	0	10	0.0		4/2/91
35	74		1	20	20	4	0	2.0		4/2/91
			2	20	18	0	10	0.0		4/2/91
			3	20	18	0	10	0.0		4/2/91
			4	20	20	0	0	0.0		4/2/91
			5	20	20	0	0	0.0		4/2/91

Table C1. (cont'd) 1991 Amphipod Bioassay Data by Station for Puget Sound Sediments

Station	Sample I.D.	Reference Toxicant Concentration	Replicate	Number of Organisms Tested	Number of Survivors	Number Emerged	Percent Mortality	Percent Emergence	Data Qualifier	Analysis Start Date
38	38		1	20	19	7	5	3.5		4/2/91
			2	20	18	14	10	7.0		4/2/91
			3	20	17	16	15	8.0		4/2/91
			4	20	18	11	10	5.5		4/2/91
			5	20	18	10	10	5.0		4/2/91
38	60		1	20	20	4	0	2.0		4/2/91
			2	20	20	4	0	2.0		4/2/91
			3	20	20	1	0	0.5		4/2/91
			4	20	19	0	5	0.0		4/2/91
			5	20	19	0	5	0.0		4/2/91
38	61		1	20	20	0	0	0.0		4/2/91
			2	20	20	0	0	0.0		4/2/91
			3	20	19	0	5	0.0		4/2/91
			4	20	20	1	0	0.5		4/2/91
			5	20	20	0	0	0.0		4/2/91
38	62		1	20	20	10	0	5.0		4/2/91
			2	20	20	0	0	0.0		4/2/91
			3	20	19	0	5	0.0		4/2/91
			4	20	20	0	0	0.0		4/2/91
			5	20	20	0	0	0.0		4/2/91
39	39		1	20	18	1	10	0.5		4/2/91
			2	20	19	0	5	0.0		4/2/91
			3	20	20	0	0	0.0		4/2/91
			4	20	18	0	10	0.0		4/2/91
			5	20	18	4	10	2.0		4/2/91
40	40		1	20	20	5	0	2.5		4/2/91
			2	20	18	18	10	9.0		4/2/91
			3	20	19	3	5	1.5		4/2/91
			4	20	20	0	0	0.0		4/2/91
			5	20	19	0	5	0.0		4/2/91
41	41		1	20	18	2	10	1.0		4/2/91
			2	20	17	0	15	0.0		4/2/91
			3	20	18	6	10	3.0		4/2/91
			4	20	20	0	0	0.0		4/2/91
			5	20	19	0	5	0.0		4/2/91
43	43		1	20	20	6	0	3.0		4/2/91
			2	20	16	0	20	0.0		4/2/91
			3	20	20	10	0	5.0		4/2/91
			4	20	19	3	5	1.5		4/2/91
			5	20	20	0	0	0.0		4/2/91
44	44		1	20	18	0	10	0.0		4/2/91
			2	20	20	0	0	0.0		4/2/91
			3	20	20	0	0	0.0		4/2/91
			4	20	18	1	10	0.5		4/2/91

Table C1. (cont'd) 1991 Amphipod Bioassay Data by Station for Puget Sound Sediments

Station	Sample I.D.	Reference Toxicant Concentration	Replicate	Number of Organisms Tested	Number of Survivors	Number Emerged	Percent Mortality	Percent Emergence	Data Qualifier	Analysis Start Date
44	44		5	20	20	1	0	0.5		4/2/91
44	63		1	20	20	0	0	0.0		4/2/91
			2	20	20	0	0	0.0		4/2/91
			3	20	20	0	0	0.0		4/2/91
			4	20	20	0	0	0.0		4/2/91
			5	20	19	0	5	0.0		4/2/91
44	64		1	20	19	1	5	0.5	E	4/12/91
			2	20	20	3	0	1.5	E	4/12/91
			3	20	19	0	5	0.0	E	4/12/91
			4	20	20	0	0	0.0	E	4/12/91
			5	20	19	2	5	1.0	E	4/12/91
44	65		1	20	20	0	0	0.0		4/2/91
			2	20	20	0	0	0.0		4/2/91
			3	20	20	0	0	0.0		4/2/91
			4	20	20	0	0	0.0		4/2/91
			5	20	19	0	5	0.0		4/2/91
45	45		1	20	20	0	0	0.0		4/2/91
			2	20	20	7	0	3.5		4/2/91
			3	20	18	8	10	4.0		4/2/91
			4	20	20	0	0	0.0		4/2/91
			5	20	19	0	5	0.0		4/2/91
47	47		1	20	19	0	5	0.0		4/2/91
			2	20	20	0	0	0.0		4/2/91
			3	20	20	0	0	0.0		4/2/91
			4	20	20	0	0	0.0		4/2/91
			5	20	18	0	10	0.0		4/2/91
48	48		1	20	19	0	5	0.0		4/2/91
			2	20	20	0	0	0.0		4/2/91
			3	20	19	0	5	0.0		4/2/91
			4	20	19	0	5	0.0		4/2/91
			5	20	19	0	5	0.0		4/2/91
49	49		1	20	19	0	5	0.0		4/2/91
			2	20	20	0	0	0.0		4/2/91
			3	20	20	0	0	0.0		4/2/91
			4	20	20	0	0	0.0		4/2/91
			5	20	20	0	0	0.0		4/2/91
69	69		1	20	20	0	0	0.0		4/2/91
			2	20	20	0	0	0.0		4/2/91
			3	20	20	9	0	4.5		4/2/91
			4	20	19	1	5	0.5		4/2/91
			5	20	20	0	0	0.0		4/2/91
70	70		1	20	20	0	0	0.0		4/2/91
			2	20	20	3	0	1.5		4/2/91
			3	20	17	4	15	2.0		4/2/91

Table C1. (cont'd) 1991 Amphipod Bioassay Data by Station for Puget Sound Sediments

Station	Sample I.D.	Reference Toxicant Concentration	Replicate	Number of Organisms Tested	Number of Survivors	Number Emerged	Percent Mortality	Percent Emergence	Data Qualifier	Analysis Start Date
70	70		4	20	18	0	10	0.0		4/2/91
			5	20	20	3	0	1.5		4/2/91
71	71		1	20	20	0	0	0.0		4/12/91
			2	20	15	0	25	0.0		4/12/91
			3	20	19	0	5	0.0		4/12/91
			4	20	18	0	10	0.0		4/12/91
			5	20	20	0	0	0.0		4/12/91
201R	201R		1	20	19	17	5	8.5		4/23/91
			2	20	19	4	5	2.0		4/23/91
			3	20	19	1	5	0.5		4/23/91
			4	20	20	0	0	0.0		4/23/91
			5	20	19	0	5	0.0		4/23/91
202R	202R		1	20	17	1	15	0.5		4/23/91
			2	20	20	0	0	0.0		4/23/91
			3	20	15	1	25	0.5		4/23/91
			4	20	18	0	10	0.0		4/23/91
			5	20	19	0	5	0.0		4/23/91
203R	203R		1	20	18	0	10	0.0		4/12/91
			2	20	18	0	10	0.0		4/12/91
			3	20	18	0	10	0.0		4/12/91
			4	20	20	0	0	0.0		4/12/91
			5	20	15	0	25	0.0		4/12/91
204R	204R		1	20	20	0	0	0.0		4/12/91
			2	20	18	0	10	0.0		4/12/91
			3	20	20	0	0	0.0		4/12/91
			4	20	19	0	5	0.0		4/12/91
			5	20	19	0	5	0.0		4/12/91
205R	205R		1	20	17	0	15	0.0		4/12/91
			2	20	19	2	5	1.0		4/12/91
			3	20	20	0	0	0.0		4/12/91
			4	20	19	0	5	0.0		4/12/91
			5	0	-	-	-	-		4/12/91
206R	206R		1	20	15	0	25	0.0		4/12/91
			2	20	20	0	0	0.0		4/12/91
			3	20	17	8	15	4.0		4/12/91
			4	20	20	0	0	0.0		4/12/91
			5	20	20	8	0	4.0		4/12/91
207R	207R		1	20	6	7	70	3.5		4/12/91
			2	20	15	0	25	0.0		4/12/91
			3	20	17	2	15	1.0		4/12/91
			4	20	19	0	5	0.0		4/12/91
			5	20	10	0	50	0.0		4/12/91
208R	208R		1	20	20	10	0	5.0		4/23/91
			2	20	18	5	10	2.5		4/23/91

Table C1. (cont'd) 1991 Amphipod Bioassay Data by Station for Puget Sound Sediments

Station	Sample I.D.	Reference Toxicant Concentration	Replicate	Number of Organisms Tested	Number of Survivors	Number Emerged	Percent Mortality	Percent Emergence	Data Qualifier	Analysis Start Date
208R	208R		3	20	20	6	0	3 0		4/23/91
			4	20	16	5	20	2.5		4/23/91
			5	20	19	4	5	2.0		4/23/91
209R	209R		1	20	20	0	0	0.0		4/12/91
			2	20	20	0	0	0 0		4/12/91
			3	20	20	0	0	0.0		4/12/91
			4	20	20	0	0	0.0		4/12/91
			5	20	20	0	0	0.0		4/12/91
WBC1			1	20	20	1	0	0.5		4/2/91
			2	20	20	0	0	0 0		4/2/91
			3	20	20	0	0	0.0		4/2/91
			4	20	20	0	0	0 0		4/2/91
			5	20	19	0	5	0.0		4/2/91
WBC2			1	20	20	0	0	0.0		4/12/91
			2	20	18	0	10	0.0		4/12/91
			3	20	18	0	10	0 0		4/12/91
			4	20	19	0	5	0.0		4/12/91
			5	20	18	0	10	0.0		4/12/91
WBC3			1	20	20	8	0	4 0		4/23/91
			2	20	20	1	0	0 5		4/23/91
			3	20	19	0	5	0.0		4/23/91
			4	20	20	0	0	0.0		4/23/91
			5	20	20	0	0	0.0		4/23/91
	PC1(CdCl2)	0 625 mg/L		30	24		20			4/2/91
	LC50 = 1 15 mg/L	1 25 mg/L		30	16		47			4/2/91
		1.87 mg/L		30	8		73			4/2/91
		2.50 mg/L		30	0		100			4/2/91
	PC2(CdCl2)	0 625 mg/L		30	24		20			4/12/91
	LC50 = 1 13 mg/L	1.25 mg/L		30	17		43			4/12/91
		1 87 mg/L		30	6		80			4/12/91
		2.50 mg/L		30	0		100			4/12/91
	PC3(CdCl2)	0.625 mg/L		30	22		27			4/23/91
	LC50 = 1.04 mg/L	1.25 mg/L		30	14		53			4/23/91
		1 87 mg/L		30	8		73			4/23/91
		2.50 mg/L		30	0		100			4/23/91

E = Estimate

APPENDIX E

1991 Benthic Infauna Data

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 1

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
43	Nemertea		1	3	1	2	7
500102	Polynoidae		1				1
5001021701	Hesperone complanata			1			1
5001022301	Tenonia kitsapensis	1					1
5001060101	Pholoe minuta	4	8	9	20	14	55
5001210102	Gyptis brevipalpa			1			1
5001250106	Nephtys rickettsi			1			1
5001250111	Nephtys ferruginea				1		1
5001250119	Nephtys caecoides	1					1
50012801	Glycinde spp.					1	1
5001280101	Glycinde picta		2	2	2	3	9
5001280103	Glycinde armigera	1				1	2
5001310109	Lumbrineris luti		1				1
5001310118	Lumbrineris cruzensis	1	6	4	2	1	14
5001400102	Leitoscoloplos pugettensis				2	2	4
5001410801	Levinsenia gracilis		1		2		3
5001430521	Prionospio lighti	24	58	3	9	5	99
5001431701	Paraprionospio pinnata	2	3		2		7
5001500302	Tharyx multifilis			1		1	2
5001540199	Brada sachalina	2			3	1	6
5001540202	Flabelligera affinis					1	1
5001570101	Scalibregma inflatum	1					1
5001600201	Heteromastus filiformis				1		1
5001600203	Heteromastus filobranchus					1	1
5001600403	Mediomastus capensis				1		1
5001690101	Terebellides stroemi	1				3	4
51032001	Alvania spp.		1				1
51034601	Bittium spp.		1				1
510801019999	Odostomia (Odostomia) spp.		2		1		3
5110040205	Cylichna attonsa				1		1
5502020101	Acila castrensis	2	4	1	5	2	14
5502020201	Nucula tenuis		2			1	3
5515020201	Axinopsida serricata		2	1			3
5515100102	Mysella tumida	1	7	3	27	9	47
5515310112	Macoma carlottensis	2	3	5	1	1	12
5515310114	Macoma nasuta					1	1
6111070303	Euphilomedes producta	1	1	1			3
6154040202	Eudorella pacifica	10	7	19	10	9	55
6169220201	Pontoporeia femorata	1			2	1	4
6169260303	Protomedeia grandimana	165	91	175	121	171	723
6169370816	Monoculodes zernovi			2			2
6169420301	Heterophoxus oculatus	13	14	25	16	26	94
617922010701	Crangon franciscorum angustimana	1					1
6189060404	Pinnixa schmitti	10	20	27	99	53	209
812903019999	Amphiodia urtica/periercta	26	65	84	210	163	548
8129030999	Amphioplus strongyloplax	2	2	8	4	9	25
	TOTAL ABUNDANCE	272	303	376	543	482	1976
	NUMBER OF TAXA	22	24	21	24	25	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 2R

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
3743010303	Pachycerianthus fimbriatus	1				1	2
43	Nemertea		4	4	2	4	14
8201	Enteropneusta	1		1	4		6
7200020104	Golfingia pugettensis					1	1
7400010101	Priapulus caudatus	1					1
5001022301	Tenonia kitsapensis			1		1	2
5001060101	Pholoe minuta	1			1	1	3
5001060305	Sthenalais tertiaglabra					1	1
5001131402	Phyllodoce (Aponaitides) hartmanae			1	1		2
5001210102	Gyptis brevipalpa					1	1
5001220301	Pilargis berkeleyae	2	1				3
5001230501	Syllis alternata					1	1
5001230703	Exogone lourei		1				1
5001240404	Nereis procera			1	4		5
5001250102	Nephtys ciliata				1		1
5001250104	Nephtys cornuta			1			1
5001250111	Nephtys ferruginea	1					1
5001250124	Nephty glabra					1	1
5001270101	Glycera capitata	1	2	1	2	3	9
5001280103	Glycinde armigera				2		2
5001290202	Diopatra ornata				1		1
5001310101	Lumbrineris bicirrata		1		1		2
5001310109	Lumbrineris luti	9	4	4	7	1	25
5001310118	Lumbrineris cruzensis	5	4		2	3	14
500133010402	Drilonereis falcata minor			1		1	2
5001400102	Leitoscoloplos pugettensis		1				1
5001410706	Allia ramosa	26	15	22	7	20	90
5001410801	Levinsenia gracilis	79	38	47	13	30	207
5001411302	Acesta lopezi	3	4	1	10	4	22
5001430201	Laonice cirrata	4		1	4	8	17
5001430402	Polydora socialis	1					1
5001430429	Polydora brachycephala	1					1
5001430431	Polydora cardalia				1		1
5001430521	Prionospio lighti		1				1
5001431004	Spiophanes berkeleyorum	1	1	1		2	5
5001431701	Paraprionospio pinnata	1	2		2	4	9
5001440105	Magelona longicornis	2	2	3	1	5	13
5001500302	Tharyx multifilis	1	3		1	3	8
5001500309	Tharyx secundus	2	2	3	1	2	10
5001500401	Chaetozone setosa					1	1
5001520106	Cossura pygodactylata	2		1	1	2	6
5001540102	Brada villosa				1	1	2
5001590101	Sternaspis scutata	11	15	11	14	4	55
5001600203	Heteromastus filobranchus				1		1
5001600302	Notomastus tenuis	1			1	1	3
5001600402	Mediomastus californiensis	4	2	1	1	1	9
5001600501	Decamastus gracilis		1				1
5001600601	Barantolla americana			1			1
5001630901	Praxillella gracilis			1	1	1	3
5001630902	Praxillella praetermissa		1	3	1	3	8
5001631	Euclymeninae	62	7	13	18	29	129
5001631103	Euclymene zonalis	1		1		1	3
5001640202	Galathowenia nr. G. oculata	10	5	8	8	6	37
5001660304	Pectinaria californiensis	1					1
5001670101	Amage anops	1					1
5001670208	Ampharete acutifrons					1	1
5001670214	Ampharete finmarchica					4	4
5001681101	Artacama coniferi	1					1
500168130201	Lanassa venusta venusta					1	1
5001681702	Proclea graffii				1		1

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 2R (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5001690101	Terebellides stroemi	1	1				2
5001690103	Terebellides californica		1	1	2	1	5
5004	Oligochaeta	1					1
51032001	Alvania spp.	2			2	1	5
51034601	Bittium spp.	8	9	17	14	12	60
5103509999	Nitidiscala tincta					1	1
5105030202	Mitrella tuberosa					1	1
5105030247	Mitrella gausapata		2	1	1	2	6
510801019999	Odostomia (Odostomia) spp.	1	4		2	3	10
51080102	Turbonilla spp.					4	4
5108011134	Turbonilla aurantia		1			2	3
5110040205	Cylichna attonsa			3	2		5
5502020101	Acila castrensis		1	1	1	1	4
5502040202	Nuculana minuta	4	6	4	1	4	19
5502040504	Yoldia scissurata	2	3	2	1		8
550701	Mytilidae	1	1				2
5507010301	Megacrenella columbiana	1					1
5507010402	Musculus discors				4	2	6
5515010101	Parvilucina tenuisculpta		1	3		1	5
5515010201	Lucinoma acutilineata			1			1
5515020102	Adontorhina cyclica			1		1	2
5515020201	Axinopsida serricata	2	11	87	9	17	126
5515020301	Thyasira flexuosa		1		1		2
5515100102	Mysella tumida			1	3		4
5515290201	Solen sicarius					1	1
5515310102	Macoma elimata	4		3	2		9
5515310112	Macoma carlottensis		4	6	1		11
5515470301	Compsomyax subdiaphana	1	3	4	3	1	12
5515470501	Psephidia lordi	5	4	5	5	6	25
5520020102	Pandora filosa		4	1	3	5	13
5520050202	Lyonsia californica			1	4		5
5520080203	Thracia trapezoides			1			1
5600010101	Dentalium rectius	13	17	14	7	13	64
6111070303	Euphilomedes producta	6	2	5	2	4	19
6154040202	Eudorella pacifica	5	2	1	5	3	16
6154050101	Diastylis alaskensis	1					1
6157020204	Leptognathia brevimana	1		1			2
6169020125	Ampelisca brevisimulata	1					1
6169020135	Ampelisca careyi	1	1	1	1	1	5
61692602	Photis spp.	1					1
61692603	Protomedeia spp.		1				1
6169260303	Protomedeia grandimana					2	2
6169371502	Westwoodilla caecula	1				1	2
6169420301	Heterophoxus oculatus		3		1	7	11
61830402	Callianassa spp.		1				1
61890604	Pinnixa spp.	1					1
8120	Ophiuroidea	1					1
812903019999	Amphiodia urtica/periercta	8	3	2	4	6	23
	TOTAL ABUNDANCE	310	204	300	197	257	1268
	NUMBER OF TAXA	56	49	51	58	64	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 3

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
43	Nemertea			1			1
5001020810	Harmothoe lunulata		1				1
5001060101	Pholoe minuta	8	4	89	20	7	128
5001130102	Phyllodoce (Anaitides) groenlandica			1			1
5001210202	Microphthalmus aberrans		1				1
5001230201	Pionosyllis gigantea			1			1
5001230805	Sphaerosyllis pirifera			1			1
5001250102	Nephtys ciliata			1			1
500125010401	Nephtys cornuta franciscana	8		4	4	6	22
5001250106	Nephtys rickettsi		1	2		1	4
5001250111	Nephtys ferruginea	1	3			1	5
5001270101	Glycera capitata			1		1	2
5001280101	Glycinde picta				1		1
5001310101	Lumbrineris bicirrata				1		1
5001400102	Leitoscoloplos pugettensis			2			2
5001430506	Prionospio steenstrupi	22	8	30	32	25	117
5001430521	Prionospio lighti	12	6	86	16	3	123
5001430599	Prionospio multibranchiata			2	2		4
5001431004	Spiophanes berkeleyorum	27	6	5	14	18	70
5001520101	Cossura longocirrata	7	7	22	15	12	63
5001600203	Heteromastus filobranchus				1		1
5001630502	Nicomache personata				1	1	2
500168089999	Polycirrus spp. complex		1	1	1	1	4
5004	Oligochaeta	3	1	25	15		44
5103760201	Natica clausa	2	5	7	3	3	20
5105030202	Mitrella tuberosa				1	1	2
5105030247	Mitrella gausapata			2			2
510801019999	Odostomia (Odostomia) spp.			1			1
5402	Chaetodermatida	1					1
5502040504	Yoldia scissurata	18	8	1	2	17	46
5515020201	Axinopsida serricata			1			1
5515310101	Macoma calcarea	7	10	50	14	4	85
6134020104	Balanus crenatus	7			2		9
6154040115	Leucon subnasica	1				1	2
6169211008	Melita desdichada			3			3
6169260312	Protomedeia prudens		1			2	3
6169260401	Gammaropsis thompsoni	3					3
61693708	Monoculodes spp.				2	2	4
6169420301	Heterophoxus oculatus	1	3	1	2	2	9
61694303	Parapleustes spp.	1					1
61830602	Pagurus spp.				1		1
6183060203	Pagurus aleuticus	1					1
6189060404	Pinnixa schmitti	7	9	33	12	4	65
8127010607	Ophiura lutkeni	1	3	3	1		8
	TOTAL ABUNDANCE	138	78	376	163	112	867
	NUMBER OF TAXA	20	18	27	23	20	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 4

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
3743010303	Pachycerianthus fimbriatus	2	1	2	2	2	9
43	Nemertea	1					1
5001060101	Pholoe minuta	1					1
5001130102	Phyllodoce (Anaitides) groenlandica		1				1
5001240501	Platynereis bicanaliculata		1				1
5001250111	Nephtys ferruginea			1	1	1	3
5001270101	Glycera capitata	3	4	2	1	4	14
5001280103	Glycinde armigera	1			1		2
5001280203	Goniada brunnea	1	2	1	2	1	7
50013101	Lumbrineris spp.	8	2				10
5001310109	Lumbrineris luti	5	2	1	2	2	12
5001310118	Lumbrineris cruzensis		3	4	5	12	24
5001400102	Leitoscoloplos pugettensis		1				1
5001410801	Levinsenia gracilis	7	14	2	6	11	40
5001411302	Acesta lopezi	1	3			1	5
5001430201	Laonice cirrata	2	1	1	1	3	8
5001430521	Prionospio lighti	2				2	4
5001431701	Paraprionospio pinnata	2				3	5
5001500101	Cirratulus cirratus	1					1
5001500302	Tharyx multifilis	1					1
50015201	Cossura spp.	3					3
5001520104	Cossura soyeri				1	1	2
5001580403	Travisia pupa	1				1	2
5001590101	Sternaspis scutata	3	3	3	3	2	14
5001600201	Heteromastus filiformis					1	1
5001600203	Heteromastus filobranchus			1			1
50016004	Mediomastus spp.		1				1
5001670304	Amphicteis scaphobranchiata					1	1
5001690101	Terebellides stroemi		1				1
51032001	Alvania spp.	2			1	1	4
5105030202	Mitrella tuberosa				2		2
510801019999	Odostomia (Odostomia) spp.				1	3	4
5110040205	Cylichna attonsa		1				1
5110040499	Cylichnella culcitella		1				1
5502020101	Acila castrensis	23	25	19	32	21	120
5502020201	Nucula tenuis	32	13	20	8	16	89
5502040202	Nuculana minuta	2	1	4		6	13
5502040504	Yoldia scissurata		1		1		2
5515010101	Parvilucina tenuisculpta	1				1	2
5515020201	Axinopsida serricata	6			1	13	20
5515100102	Mysella tumida	21	10	30	20	21	102
5515310102	Macoma elimata			1			1
5515310112	Macoma carlottensis	1	1	1	1	3	7
5515470301	Compsomyax subdiaphana				1	2	3
5515470501	Psephidia lordi	3	3	3		2	11
6111070301	Euphilomedes carcharodonta					1	1
6111070303	Euphilomedes producta	17	17	11	15	18	78
6154040202	Eudorella pacifica			3	7	6	16
61691202	Calliopius spp.				1		1
61692603	Protomedeia spp.		1				1
61693708	Monoculodes spp.		1				1
6169370816	Monoculodes zernovi					1	1
6169420301	Heterophoxus oculatus	24	19	22	23	13	101
8120	Ophiuroidea	2					2
812903019999	Amphiodia urtica/periercta	36	65	106	110	41	358
8129030999	Amphioplus strongyloplax		3		4	2	9
	TOTAL ABUNDANCE	215	202	238	253	219	1127
	NUMBER OF TAXA	31	30	21	27	34	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 5

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
3743010303	Pachycerianthus fimbriatus	2		1		1	4
43	Nemertea	3	1	1			5
47	Nematoda			3			3
5001020606	Gattyana treadwelli	1	2		1		4
5001022301	Tenonia kitsapensis		1				1
5001060101	Pholoe minuta	1			1	1	3
5001230101	Autolytus cornutus	1					1
500125	Nephtyidae	1					1
5001250111	Nephtys ferruginea			1	1	1	3
5001270101	Glycera capitata	3	5	7	7	10	32
5001280103	Glycinde armigera	3	1	1	2		7
50013101	Lumbrineris spp.	2	4	6	4	7	23
5001310109	Lumbrineris luti	1			4	1	6
5001310118	Lumbrineris cruzensis	12	7	7	12	8	46
5001410801	Levinsenia gracilis	43	10	39	19	31	142
5001411306	Acmira catherinae		2		1		3
5001430201	Laonice cirrata	2		1	4	3	10
5001430521	Prionospio lighti	7	6	6	9	2	30
5001431004	Spiophanes berkeleyorum	2			1		3
5001431701	Paraprionospio pinnata	1	1	1	4		7
5001500302	Tharyx multifilis			1			1
5001520101	Cossura longocirrata	7		22	3	8	40
5001540199	Brada sachalina					1	1
5001590101	Sternaspis scutata	3		3			6
5001600203	Heteromastus filobranchus			1	1		2
5001600401	Mediomastus ambiseta		2	5	2	1	10
5001600402	Mediomastus californiensis		1		3	2	6
500163090301	Praxillella affinis pacifica	1	1		1		3
5001640201	Myriochele heeri		2	4		1	7
5001670101	Amage anops			1		1	2
5001690101	Terebellides stroemi	1	1	2		1	5
5004	Oligochaeta		1	6	2	11	20
51032001	Alvania spp.		2				2
51034601	Bittium spp.	13	2	4	1	4	24
5105030247	Mitrella gausapata	1					1
510801019999	Odostomia (Odostomia) spp.	4	4	4	5	5	22
5110040205	Cylichna attonsa	4	1	2	1		8
5110070101	Gastropteron pacificum					1	1
5402	Chaetodermatida	1					1
5502020101	Acila castrensis	28	17	23	18	28	114
5502020201	Nucula tenuis	17	26	14	11	18	86
55020402	Nuculana spp.		3	1	1		5
5502040202	Nuculana minuta	2				1	3
5502040504	Yoldia scissurata	1					1
5515010101	Parvilucina tenuisculpta	2		2	1	2	7
5515020201	Axinopsida serricata	51	35	53	29	36	204
5515020301	Thyasira flexuosa		1				1
5515100102	Mysella tumida	3	7	5	4	4	23
5515310102	Macoma elimata					2	2
5515310112	Macoma carlottensis	4	3	1	1	1	10
5515470501	Psephidia lordi	31	12	25	13	27	108
55200201	Pandora spp.					1	1
5520020102	Pandora filosa	1	1				2
5520050202	Lyonsia californica		1			1	2
56	Scaphopoda	1		3			4
6111070303	Euphilomedes producta	11	13	11	11	12	58
6153010105	Pacifacanthomysis nephrophthalma	1					1
6154040202	Eudorella pacifica	7	5	3	2	1	18
6169260201	Photis brevipes	1					1
6169371502	Westwoodilla caecula		1				1

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 5 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
6169420204	Harpiniopsis fulgens		1		2		3
6169420301	Heterophoxus oculatus	14	6	5	6	6	37
61890604	Pinnixa spp.				3		3
6189060404	Pinnixa schmitti					3	3
7200020104	Golfingia pugettensis		1			2	3
8120	Ophiuroidea			2	1		3
812903019999	Amphiodia urtica/periercta	48	48	16	45	44	201
8129030202	Amphipholis squamata			1			1
8129030999	Amphioplus strongyloplax	2		4	1	1	8
8178010299	Leptosynapta transgressor			3			3
	TOTAL ABUNDANCE	345	238	301	238	291	1413
	NUMBER OF TAXA	44	39	42	40	40	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 8

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5001020810	Harmothoe lunulata				1		1
5001060101	Pholoe minuta					2	2
5001130202	Eteone spetsbergensis				2		2
5001130205	Eteone longa	1					1
5001131101	Eulalia (Eumida) sanguinea		1				1
5001210102	Gyptis brevipalpa	1			2		3
5001230501	Syllis alternata		1			1	2
5001230703	Exogone lourei	3	2	2	6	7	20
5001250103	Nephtys caeca	1					1
500125010401	Nephtys cornuta franciscana			1			1
5001250111	Nephtys ferruginea	4	2	3	2	5	16
5001270101	Glycera capitata		2				2
50012801	Glycinde spp.		6	3	1	3	13
5001280101	Glycinde picta	4	5	4	4	2	19
5001280103	Glycinde armigera			1			1
50013101	Lumbrineris spp.	8	6	5		4	23
5001310109	Lumbrineris luti	15	14	13	8	5	55
5001310118	Lumbrineris cruzensis		4		1		5
5001310129	Lumbrineris lagunae	1	2	1			4
5001330302	Notocirrus californiensis	1					1
5001360505	Schistomeringos caeca	2	2	1		1	6
5001400102	Leitoscoloplos pugettensis		1	2		1	4
5001410801	Levinsenia gracilis	5	1	1	1		8
5001411306	Acmira catherinae	2	1			1	4
5001430201	Laonice cirrata	1	1	1			3
50014304	Polydora spp.				3		3
5001430401	Polydora giardi			1			1
5001430402	Polydora socialis			2	5	2	9
5001430429	Polydora brachycephala	2	1	4	3	2	12
5001430506	Prionospio steenstrupi	1	2	1	1	1	6
5001430507	Prionospio pygmaea	1					1
5001430521	Prionospio lighti	2	7	5		3	17
5001430812	Polydora (Boccardia) pugettensis	26	49	52	45	25	197
5001431001	Spiophanes bombyx			1			1
5001431701	Paraprionospio pinnata	23	16	4	4	18	65
5001440105	Magelona longicornis	6	3	1	3	7	20
5001500302	Tharyx multifilis	12	11	18	22	35	98
5001500401	Chaetozone setosa	1					1
5001520101	Cossura longocirrata		1				1
5001540302	Pherusa plumosa		1				1
5001580202	Armandia brevis			1			1
5001580607	Ophelina acuminata	4	13	3	2	1	23
5001590101	Sternaspis scutata	2	1				3
500160	Capitellidae			1			1
5001600203	Heteromastus filobranchus	2	3	1	3	2	11
5001600302	Notomastus tenuis			1	1		2
5001600401	Mediomastus ambiseta	2					2
5001600402	Mediomastus californiensis	3	1	1		2	7
5001600601	Barantolla americana	6	1	3	9	8	27
500163	Maldanidae	10	2	4	3	8	27
5001630901	Praxillella gracilis	32	41	24	12	23	132
500163090301	Praxillella affinis pacifica	2	3	3		6	14
5001631103	Euclymene zonalis		4	3	1	3	11
5001640201	Myriochele heeri					1	1
500167	Ampharetidae	1					1
5001670208	Ampharete acutifrons		1			2	3
5001670804	Asabellides lineata		1				1
500168	Terebellidae				1	1	2
5001680101	Amphitrite cirrata		1	1			2
5001680701	Pista cristata	12	2	6	1	5	26

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 8 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5001680810	Polycirrus californicus			2		1	3
500168089999	Polycirrus spp. complex					1	1
5001681101	Artacama coniferi	1					1
5001690101	Terebellides stroemi	14	23	12	6	23	78
5001700204	Euchone incolor	2	2			1	5
5001701401	Laonome kroyeri					1	1
5004	Oligochaeta	2			2		4
51032001	Alvania spp.	21	11	1		5	38
51050302	Mitrella spp.		3				3
5105030202	Mitrella tuberosa	2			1		3
5105030247	Mitrella gausapata	2				1	3
5108011134	Turbonilla aurantia	1	1				2
5110040205	Cylichna attonsa				1	1	2
5502020101	Acila castrensis	7	8	2	1	8	26
5502020201	Nucula tenuis	11	6	1		5	23
5502040202	Nuculana minuta					1	1
5502040504	Yoldia scissurata			2	1	1	4
5515020201	Axinopsida serricata	2	1			1	4
5515020301	Thyasira flexuosa		1				1
5515100102	Mysella tumida	7	2	6		4	19
5515170101	Cyclocardia ventricosa	1		2	2	2	7
55152201	Clinocardium spp.	1					1
5515310102	Macoma elimata	2	2	5	2	12	23
5515310112	Macoma carlottensis		1		1		2
5515470301	Compsomyax subdiaphana	2	2	2	1		7
5515470501	Psephidia lordi	3	2	5		8	18
5517010201	Mya arenaria					1	1
5520020102	Pandora filosa					1	1
5520050202	Lyonsia californica				1		1
6111070303	Euphilomedes producta	7	4	4	2	3	20
6154040202	Eudorella pacifica	1	7		2	3	13
6154050101	Diastylis alaskensis	1					1
6157020204	Leptognathia brevimana	2	1		1	3	7
6161050101	Limnoria lignorum	1					1
6169020113	Ampelisca hancocki			1		3	4
6169020135	Ampelisca careyi		2		2		4
6169020208	Byblis millsi					1	1
6169060204	Aoroides spinosus				1		1
6169211008	Melita desdichada					1	1
61692603	Protomedeia spp.	1	1		1		3
6169342904	Orchomene pinquis					1	1
6169345701	Prachynella lodo	1			1		2
6169370816	Monoculodes zernovi		2		1	4	7
6169371502	Westwoodilla caecula				1	1	2
6169400303	Pardalisca tenuipes	1					1
6169420301	Heterophoxus oculatus	10	9	2	6	13	40
616942099999	Foxiphalus similis/cognatus				1		1
61830402	Callianassa spp.		1				1
61890604	Pinnixa spp.	6	1	4		3	14
8127010607	Ophiura lutkeni	1				1	2
812903	Amphiuridae	4				1	5
812903019999	Amphiodia urtica/periercta	3					3
	TOTAL ABUNDANCE	319	309	230	185	303	1346
	NUMBER OF TAXA	65	62	52	50	64	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 9R

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
3740	Anthozoa		1	1			2
43	Nemertea	3	7	6	8	6	30
47	Nematoda					1	1
5001070101	Pisione remota	1	1				2
5001130205	Eteone longa		1			3	4
500113090101	Hesionura coineaui difficilis	23	46	31	54	18	172
5001211101	Heteropodarke heteromorpha	20	15	12	45	18	110
5001230805	Sphaerosyllis pirifera			1	1		2
5001232201	Ehlersia heterochaeta	2			1		3
500124	Nereidae				1	1	2
50012501	Nephtys spp.					4	4
5001250102	Nephtys ciliata			10	3		13
5001250113	Nephtys californiensis	6	5		2		13
5001270108	Glycera oxycephala			1		1	2
5001270201	Hemipodus borealis	16	16	22	12	20	86
5001280103	Glycinde armigera			1			1
5001360201	Protodorvillea gracilis	2	1			1	4
5001430402	Polydora socialis		1				1
5001431001	Spiophanes bombyx	203	416	298	285	429	1631
5001432201	Aonides oxycephala	1					1
500150	Cirratulidae	1					1
5001500101	Cirratulus cirratus	3	4	5	2	3	17
5001580301	Ophelia limacina		1	1			2
500163	Maldanidae	1	2		3	6	12
5001630802	Axiothella rubrocincta	3	2	5			10
5001640102	Owenia fusiformis	14	38	15	19	30	116
500168089999	Polycirrus spp. complex	48					48
5002040101	Saccocirrus eroticus	1					1
50020501	Polygordius spp.		40	22	24	33	119
5004	Oligochaeta	4	3	2	1	19	29
51050301	Amphissa spp.		1				1
5105100102	Olivella baetica		6		1	1	8
53	Polyplacophora				1		1
5507010201	Crenella decussata			1			1
5507010301	Megacrenella columbiana			1	2		3
5515190102	Tridonta alaskensis	13	13	6	13	4	49
5515220101	Clinocardium ciliatum		1	2			3
5515220102	Clinocardium nuttali					1	1
5515250104	Spisula falcata	1	2		2		5
5515310102	Macoma elimata					1	1
5515310202	Tellina nuculoides	31	41	33	50	23	178
55170102	Mya spp.		1	1			2
6169020112	Ampelisca cristata		5	2	2		9
6169070101	Argissa hamatipes		1				1
61691502	Corophium spp.	2		2			4
6169150203	Corophium crassicorne					2	2
6169260201	Photis brevipes		2				2
6169371402	Synchelidium shoemakeri	2	17	4	17	6	46
6179220102	Crangon alaskensis	1					1
61830602	Pagurus spp.	1					1
77	Phoronida		2				2
812903019999	Amphiodia urtica/periercta	2					2
8155010101	Dendraster excentricus	86	115	65	161	85	512
8178010203	Leptosynapta clarki		1				1
8401	Ascidiacea	2	9	2	6	8	27
	TOTAL ABUNDANCE	493	817	552	716	724	3302
	NUMBER OF TAXA	28	33	27	25	25	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 10R

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
39	Platyhelminthes	1					1
43	Nemertea	2		3		1	6
47	Nematoda	2					2
5001021805	Lepidasthenia longicirrata			1			1
5001060101	Pholoe minuta	1		1			2
5001060301	Sthenelais berkeleyi			1			1
5001130102	Phyllodoce (Anaitides) groenlandica			1			1
5001130403	Notophyllum tectum			1			1
5001131101	Eulalia (Eumida) sanguinea	5	1	4		3	13
50011314	Phyllodoce spp.	1	2		2		5
5001210401	Ophiodromus pugettensis					1	1
5001220301	Pilargis berkeleyae			1			1
5001230201	Pionosyllis gigantea	1		1		1	3
5001230501	Syllis alternata			2	2		4
5001230702	Exogone gemmifera	4					4
5001230703	Exogone lourei		7	3	1	1	12
5001232201	Ehlersia heterochaeta	1	2	8	3		14
5001240501	Platynereis bicanaliculata	1		2	1	3	7
5001250102	Nephtys ciliata			1			1
5001250111	Nephtys ferruginea		1			1	2
5001260202	Sphaerodoropsis sphaerulifer			1	1		2
5001270101	Glycera capitata	1	1	3	1	1	7
5001270104	Glycera americana			2		1	3
50012801	Glycinde spp.	2		1	3	1	7
5001280101	Glycinde picta	2	6		2	1	11
5001280103	Glycinde armigera					1	1
50013101	Lumbrineris spp.	6	6	6	6	9	33
5001310101	Lumbrineris bicirrata			1	1	1	3
5001310109	Lumbrineris luti	1	1		1		3
5001310128	Lumbrineris limicola	1		1			2
5001310132	Lumbrineris californiensis	3	3	4	4	8	22
500133010402	Drilonereis falcata minor			2	2		4
5001400102	Leitoscoloplos pugettensis		2	3		1	6
5001410801	Levinsenia gracilis		2	8	7	1	18
5001411306	Acmira catherinae	1		2			3
5001420102	Apistobranchus ornatus		3	4		1	8
5001430201	Laonice cirrata			1	1	1	3
5001430402	Polydora socialis	9	5	14	12	11	51
5001430408	Polydora quadrilobata		1	2		1	4
5001430429	Polydora brachycephala	1		2	1		4
5001430431	Polydora cardalia	17	3	8	14	4	46
5001430506	Prionospio steenstrupi	33	52	52	22	30	189
5001430521	Prionospio lighti	3		5	6	4	18
5001430599	Prionospio multibranchiata	5		3		10	18
5001430703	Spio cirrifera		1				1
5001430812	Polydora (Boccardia) pugettensis	2	2	1	7	1	13
5001431001	Spiophanes bombyx		1		1	2	4
5001431004	Spiophanes berkeleyorum	11	10	13		14	48
5001431701	Paraprionospio pinnata	1	6	15		3	25
5001440105	Magelona longicornis	3	7	16	3	2	31
5001490202	Phyllochaetopterus prolifica	170	172	296	99	187	924
5001490302	Spiochaetopterus costarum	3	2	8	1	2	16
500150	Cirratulidae	4					4
5001500302	Tharyx multifilis	2	1	4	2	3	12
5001500309	Tharyx secundus				1		1
5001500401	Chaetozone setosa		1	1	1	2	5
5001500407	Chaetozone spinosa	2	1	5	1	4	13
5001520101	Cossura longocirrata	5	1	9	4	4	23
5001520199	Cossura modica			1			1
5001580202	Armandia brevis	4	4	4	1	1	14

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 10R (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5001580607	Ophelina acuminata	2	9		7	2	20
5001590101	Sternaspis scutata	7	1	9	9	6	32
500160	Capitellidae			6	4	4	14
5001600101	Capitella capitata	1	3	13	2	4	23
5001600203	Heteromastus filobranchus	1					1
5001600302	Notomastus tenuis		4	3	2		9
5001600303	Notomastus lineatus				1		1
5001600402	Mediomastus californiensis	7	25	23	13	14	82
5001600601	Barantolla americana	3	2	18	8	2	33
500163	Maldanidae	4	3	9	3	6	25
5001630302	Maldane glebifex	1					1
5001630901	Praxillella gracilis	1	3	8	7	2	21
500163090301	Praxillella affinis pacifica	1		2			3
500163099999	Praxillella sp. A			1	1		2
5001631001	Rhodine bitorquata	3	3	16	18	6	46
5001631103	Euclymene zonalis	4	10	11	3	1	29
5001640102	Owenia fusiformis		1	4		1	6
5001640201	Myriochele heeri	1	3	1	5	1	11
5001670101	Amage anops	1					1
5001670208	Ampharete acutifrons		1	2			3
5001670215	Ampharete labrops			1			1
5001670503	Melinna elisabethae			1			1
5001670701	Anobothrus gracilis					1	1
5001670804	Asabellides lineata		3		1		4
5001680701	Pista cristata		1				1
5001680810	Polycirrus californicus			1			1
500168089999	Polycirrus spp. complex				1		1
500168130201	Lanassa venusta venusta					2	2
5001682502	Streblosoma bairdi			1			1
5001690101	Terebellides stroemi	1	1	3	2	1	8
5001700106	Chone magna		1			2	3
5001700204	Euchone incolor					2	2
5001700600	Potamilla occelata			1			1
5001700602	Potamilla myriops		1	3		1	5
5001730602	Spirorbis spirillum					2	2
5004	Oligochaeta	1	3	1		1	6
51	Gastropoda					1	1
5102100499	Solariella vancouverensis			1			1
51032001	Alvania spp.	3	3	1	2	2	11
51035306	Balcis spp.	1					1
51036402	Crepidula spp.	1				1	2
5105030199	Amphissa versicolor					1	1
510602	Turridae		1				1
5402	Chaetodermatida					1	1
55	Bivalvia		1				1
5502020101	Acila castrensis	2	1			1	4
5502020201	Nucula tenuis			1			1
5515010101	Parvilucina tenuisculpta	3	1	5	1		10
5515020102	Adontorhina cyclica		1		2	2	5
5515020201	Axinopsida serricata	24	59	109	8	40	240
5515020301	Thyasira flexuosa		1	2			3
5515100102	Mysella tumida	6	3	8		4	21
5515170101	Cyclocardia ventricosa	2	1	1	1		5
5515220101	Clinocardium cilitum					2	2
55153101	Macoma spp.	1			2	1	4
5515310102	Macoma elimata	2	2	1			5
5515310111	Macoma yoldiformis			1			1
5515310112	Macoma carlottensis	3	1	1			5
611103	Cylindroleberididae				1		1

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 10R (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
6111070303	Euphilomedes producta		1	1			2
6154040202	Eudorella pacifica			3	3		6
6154040202	Diastylopsis tenuis		1				1
6157020101	Leptochelia savignyi			1		1	2
6157020202	Leptognathia gracilis		1		1		2
6157020204	Leptognathia brevimana	3	1		2	5	11
6160011601	Haliophasma geminata	1		3			4
6169020113	Ampelisca hancocki				2	4	6
6169020114	Ampelisca pugettica	13	3	6	6	4	32
6169020134	Ampelisca lobata	1		1			2
6169020135	Ampelisca careyi			1	1		2
6169020208	Byblis millsi				1		1
61690602	Aoroides spp.				3	2	5
61691502	Corophium spp.	3					3
6169211008	Melita desdichada	1	2				3
61692602	Photis spp.					1	1
61692603	Protomedeia spp.	6	2	5	1		14
6169343101	Pachynus barnardi					1	1
6169371502	Westwoodilla caecula		1	1			2
6169420301	Heterophoxus oculatus	17	7	27	10	1	62
6169420926	Rhepoxynius variatus	2				2	4
616942099999	Foxiphalus similis/cognatus	14	2	2	10	3	31
6169421503	Rhepoxynius bicuspidata	2	2	4	1	3	12
6169430501	Pleusymptes subglaber				1	1	2
6169440111	Dulichia rhabdoplastis				5	1	6
6179160201	Spirontocaris prionata			1			1
6179160408	Eualus pusiolus	2		1	4	5	12
6179220115	Mesocrangon munitella			2			2
61830602	Pagurus spp.		1				1
6183060208	Pagurus caurinus	1					1
61870101	Oregonia spp.	1					1
6187010501	Pugettia producta			1			1
61890604	Pinnixa spp.	2	2	2		6	12
7200020104	Golfingia pugettensis	2		5	1	3	11
	TOTAL ABUNDANCE	469	486	864	370	483	2672
	NUMBER OF TAXA	80	76	101	74	86	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 11R

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
43	Nemertea	12	17	23	20	17	89
47	Nematoda					4	4
5001020603	Gattyana cirrosa	1				1	2
5001020803	Harmothoe extenuata		2			4	6
5001040101	Pholoides aspera	5	13	11	12	14	55
5001130102	Phyllodoce (Anaitides) groenlandica		1				1
5001130103	Anaitides medipapillata	1		1		1	3
5001130104	Phyllodoce (Anaitides) mucosa	3	2				5
5001130201	Eteone californica					1	1
5001130299	Eteone spilotus	2					2
5001130308	Eulalia bilineata		3	2			5
50011311	Eumida				1		1
5001131101	Eulalia (Eumida) sanguinea	10	21	15	6	22	74
50011314	Phyllodoce spp.	2	7				9
5001210201	Microphthalmus sczelkowii			1			1
5001210801	Micropodarke dubia		4		2		6
5001230308	Syllis elongata				2	1	3
5001230603	Eusyllis japonica					1	1
5001230702	Exogone gemmifera	9	34	1	6	38	88
5001230703	Exogone lourei	7	19	8	14	9	57
5001230805	Sphaerosyllis pirifera		1				1
5001232201	Ehlersia heterochaeta	11	2	14	10	4	41
500124	Nereidae		1				1
5001240404	Nereis procera	2	2	1	3		8
5001240501	Platynereis bicanaliculata		1				1
50012501	Nephtys spp.			2			2
50012701	Glycera spp.					1	1
5001270101	Glycera capitata	2	1	2		2	7
5001270104	Glycera americana		2	9	1		12
5001280101	Glycinde picta	4	9	2	3	3	21
5001290103	Onuphis iridescens	2					2
5001290202	Diopatra ornata	2	2				4
50013101	Lumbrineris spp.	1	8		3	2	14
5001310101	Lumbrineris bicirrata		1	1	3	1	6
5001310118	Lumbrineris cruzensis	14	41	28	7	18	108
5001310132	Lumbrineris californiensis	58	80	69	89	89	385
500133010402	Drilonereis falcata minor	1					1
5001330302	Notocirrus californiensis		1				1
5001360101	Dorvillea pseudorubrovittata					1	1
5001400102	Laonice pugettensis	2	1	1	4	1	9
5001410706	Allia ramosa				1		1
5001410801	Levinsenia gracilis		1				1
5001411302	Acesta lopezi				1		1
50014302	Laonice spp.					2	2
5001430204	Leitoscoloplos pugettensis			1	1	1	3
5001430402	Polydora socialis	23	59	8	16	40	146
5001430419	Polydora armata	9	22	1	1	16	49
5001430429	Polydora brachycephala		2		1	1	4
5001430506	Prionospio steenstrupi	74	141	25	22	28	290
5001430521	Prionospio lighti	2	10		1	3	16
5001430599	Prionospio multibranchiata	7	26	1	9	9	52
50014308	Polydora (Boccardia) spp.	7	182	67	1		257
5001431004	Spiophanes berkeleyorum	7	21	1	2	2	33
5001431701	Paraprionospio pinnata	1	4	1		1	7
5001440105	Magelona longicornis	54	47	60	38	3	202
5001490202	Phyllochaetopterus prolifica	82	92	16	41	242	473
5001490302	Spiochaetopterus costarum	6	1	3	1	4	15
5001490401	Mesochaetopterus taylori	2	1	11	6	4	24
5001500302	Tharyx multifilis		2	1	8	8	19
5001500303	Tharyx parvus	1	3		2		6

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 11R (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5001500308	Tharyx tesselata	3	5	5	4	5	22
5001500309	Tharyx secundus		2	2			4
5001540102	Brada villosa	1					1
5001540302	Pherusa plumosa			2	2	7	11
5001580202	Armandia brevis	5	8	3	11	5	32
5001600101	Capitella capitata	1					1
50016002	Heteromastus spp.		1				1
5001600201	Heteromastus filiformis			4	5		9
5001600302	Notomastus tenuis	8	9	20	9	2	48
5001600303	Notomastus lineatus	2	3	5	4	12	26
5001600402	Mediomastus californiensis	45	68	10	23	48	194
5001600501	Decamastus gracilis	13	2	5			20
5001600601	Barantolla americana			6	6		12
500163	Maldanidae					4	4
5001630302	Maldane glebifex					1	1
5001630901	Praxillella gracilis		1				1
5001631	Euclymeninae					3	3
5001631001	Rhodine bitorquata	6	2	2	4		14
5001631103	Euclymene zonalis		9		1	5	15
5001640102	Owenia fusiformis			1			1
5001650201	Sabellaria cementarium			2			2
5001670214	Ampharete finmarchia		1	2	1		4
5001670306	Amphicteis mucronata					1	1
5001670503	Melinna elisabethae			1	1		2
5001670701	Anobothrus gracilis	5	21	20	9	1	56
5001670804	Asabellides lineata	19	20	7	51	64	161
5001680701	Pista cristata		1	1			2
5001680710	Pista brevibranchiata		2				2
50016808	Polycirrus spp.	1					1
50016808	Polycirrus spp.		3	3	3		9
500168089999	Polycirrus spp. complex					1	1
500168130201	Lanassa venusta venusta	3	12		7	14	36
5001681802	Scionella japonica	1					1
5001681803	Scionella estevanica	5		5	8	4	22
50016901	Terebellides spp.	1	6	1		1	9
5001690101	Terebellides stroemi	3	3	3		2	11
5001690103	Terebellides californica	1		4			5
5001690201	Artacamella hancocki	2	1				3
5001700104	Chone duneri	1	1		1		3
5001700105	Chone ecaudata		2		1	3	6
5001700602	Potamilla myriops	1					1
5001700802	Sabella media			1			1
5001730101	Pseudochitinopoma occidentalis	1	1		2	1	5
5001730602	Spirorbis spirillum	3		38	17	60	118
5004	Oligochaeta		1			3	4
5102100308	Margarites pupillus		1				1
51032001	Alvania spp.	59	64	91	48	118	380
51050301	Amphissa spp.	1		1	1	1	4
5105030247	Mitrella gausapata		4	27			31
5105080101	Nassarius mendicus		1				1
5106021107	Kurtziella plumbea	3	3	4	3	1	14
5502020101	Acila castrensis		1		1	1	3
5502020201	Nucula tenuis		1				1
55070106	Modiolus spp.				2		2
55090501	Chlamys spp.	2		1		3	6
5509090103	Pododesmus cepio	1					1
5515010101	Parvilucina tenuisculpta		1	2			3
5515020201	Axinopsida serricata			2		2	4
5515100102	Mysella tumida		2	8	5	6	21

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 11R (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5515170101	Cyclocardia ventricosa	19	8	28	43	36	134
5515310101	Macoma calcarea	1		5		1	7
5515350101	Semele rubropicta					1	1
5515470501	Psephidia lordi			20			20
5517010201	Mya arenaria	3	3	4	2	3	15
5517060201	Hiatella arctica					1	1
5520050202	Lyonsia californica				1		1
6111060103	Rutiderma lomae	1	1	2	5	3	12
6111070301	Euphilomedes carcharodonta			1			1
6134020104	Balanus crenatus		1				1
61450101	Nebalia spp.					1	1
6154040202	Eudorella pacifica	1	3		2	5	11
6157020101	Leptochelia savignyi			1	1		2
6157020202	Leptognathia gracilis					1	1
6169020114	Ampelisca pugettica	425	827	479	643	404	2778
6169020134	Ampelisca lobata	7	10	15	7	6	45
6169020208	Byblis millsi	2		7	3	1	13
61690602	Aoroides spp.		3	2			5
61691502	Corophium spp.					1	1
6169211008	Melita desdichada		2	8	3	6	19
61692602	Photis spp.		1	2			3
6169260203	Photis spasskii					4	4
6169260401	Gammaropsis thompsoni		5				5
6169342914	Orchomene decipiens			2			2
6169343101	Pachynus barnardi		1	1			2
61693708	Monoculodes spp.	1					1
6169370816	Monoculodes zernovi			2	2		4
6169371502	Westwoodilla caecula		2	2	2	1	7
6169420301	Heterophoxus oculatus	5	7	4	1	5	22
6169420601	Metaphoxus frequens		3				3
6169420925	Paraphoxus oculatus		4	1		2	7
616942099999	Foxiphalus similis/cognatus	15	23	10	16	3	67
6169440111	Dulichia rhabdoplastis			1			1
6169500503	Tiron biocellata		1				1
6179160408	Eualus pusiolus	4				2	6
6179220115	Mesocrangon munitella			2	1		3
61830602	Pagurus spp.	1					1
6183060208	Pagurus caurinus		1			1	2
6187010101	Oregonia gracilis					3	3
618902010102	Lophopanopeus bellus diegensis	1				3	4
61890604	Pinnixa spp.	1		2	1		4
7200020103	Golfingia vulgaris		1	3	1	1	6
7200020104	Golfingia pugettensis	2		2		2	6
77	Phoronida	2	1				3
8005110201	Terebratalia transversa					1	1
8127010607	Ophiura lutkeni			1			1
8129030202	Amphipholis squamata				1	9	10
	TOTAL ABUNDANCE	1114	2061	1283	1303	1485	7246
	NUMBER OF TAXA	81	99	92	81	95	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 12

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
39	Platyhelminthes					1	1
43	Nemertea	1			1	1	3
47	Nematoda		1				1
5001020810	Malmgrenia lunulata	2					2
5001060101	Pholoe minuta	34	30	25	27	22	138
5001250106	Nephtys rickettsi	1					1
5001250111	Nephtys ferruginea		1				1
5001270101	Glycera capitata		1				1
5001280103	Glycinde armigera			1	2		3
50013101	Lumbrineris spp.		5	3		5	13
5001310101	Lumbrineris bicirrata		1		1		2
5001310109	Lumbrineris luti	3	2	1	4		10
5001310118	Lumbrineris cruzensis		1	2	3		6
5001400102	Leitoscoloplos pugettensis				1		1
50014102	Acesta/Aricidea spp.					1	1
5001410706	Aricidea ramosa				4		4
5001410706	Allia ramosa				4		
5001410801	Levinsenia gracilis	5	10	5	21	2	43
5001411306	Acmira catherinae	5	5	5			15
5001430201	Laonice cirrata	1	1	3	1	2	8
5001430402	Polydora socialis				1		1
5001430431	Polydora cardalia	1		1			2
50014305	Prionospio spp.				1		1
5001430506	Prionospio steenstrupi				1		1
5001430521	Prionospio lighti	6	11	5	5		27
5001431701	Paraprionospio pinnata		2	1		1	4
500150	Cirratulidae		1	1			2
5001500309	Tharyx secundus	1	1		1		3
5001520101	Cossura longocirrata	3	3				6
5001520106	Cossura pygodactylata				3		3
5001520198	Cossura sp. I				1		1
5001520199	Cossura modica	1	1				2
5001540302	Pherusa plumosa		2				2
5001580401	Travisia brevis	1					1
5001580403	Travisia pupa	1	2				3
5001580607	Ophelina acuminata		1	1			2
5001590101	Sternaspis scutata	4	1	3	3	2	13
5001600203	Heteromastus filobranchus			1			1
50016004	Mediomastus spp.					1	1
5001600402	Mediomastus californiensis	1	4	4	6		15
5001600601	Barantolla americana	1					1
500163	Maldanidae		4	2			6
5001630302	Maldane glebifex				1		1
5001630901	Praxillella gracilis			1		1	2
5001630902	Praxillella praetermissa				4		4
500163090301	Praxillella affinis pacifica	5	3	4		3	15
5001631	Euclymeninae				1	3	4
5001631103	Euclymene zonalis	2	4	1			7
5001640201	Myriochele heeri	1	1				2
5001640202	Galathowenia nr. G. oculata				1	2	3
5001660304	Pectinaria californiensis	2		2	1	4	9
5001670101	Amage anops			1			1
500168130201	Lanassa venusta venusta				1		1
5001690101	Terebellides stroemi	2	1	1		1	5
5004	Oligochaeta	1	3	5	3		12
51032001	Alvania spp.	1	2		2	4	9
51034601	Bittium spp.			2	3	1	6
5105030202	Mitrella tuberosa		1			1	2
510801019999	Odostomia (Odostomia) spp.				1	1	2
5108011134	Turbonilla aurantia			1			1

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 12 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5110040205	Cylichna attonsa	2	4	3			9
55	Bivalvia		2		2		4
5502020101	Acila castrensis		3	4	3	4	14
5502020201	Nucula tenuis	1	6	5	7	7	26
5502040202	Nuculana minuta	1					1
5502040504	Yoldia scissurata		1			1	2
5502040507	Yoldia thraciaeformis					1	1
5515010101	Parvilucina tenuisculpta	2	1		1	1	5
5515010201	Lucinoma acutilineata		1	1		1	3
5515020201	Axinopsida serricata	1	20	5	23	13	62
5515100102	Mysella tumida	52	54	50	36	47	239
55153101	Macoma spp.	2			1		3
5515310102	Macoma elimata					1	1
5515310106	Macoma obliqua					1	1
5515310112	Macoma carlottensis	2	7	2	1	2	14
5515470301	Compsomyax subdiaphana	7	4	6	2	5	24
5515470501	Psephidia lordi			1			1
5520050202	Lyonsia californica		1		1	1	3
56	Scaphopoda	11	3	3	1	5	23
6111070303	Euphilomedes producta	2	4	3	1	3	13
6154040202	Eudorella pacifica	18	21	10	9	17	75
6169020113	Ampelisca hancocki				1	1	2
6169020135	Ampelisca careyi	1			1	1	3
61691207	Leptamphous spp.	1					1
6169211008	Melita desdichada			1			1
6169370816	Monoculodes zernovi	1					1
6169371502	Westwoodilla caecula					1	1
6169420204	Harpiniopsis fulgens	2	2	2	2	1	9
6169420301	Heterophoxus oculatus	10	3	7	9	11	40
61890604	Pinnixa spp.		1		1		2
7400010101	Priapulus caudatus			1			1
812903019999	Amphiodia urtica/periercta	132	200	191	158	175	856
8129030999	Amphioplus strongyloplax		3	1	3	2	9
	TOTAL ABUNDANCE	334	447	378	372	361	1892
	NUMBER OF TAXA	44	51	45	51	44	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 13R

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
3740	Anthozoa			1			1
39	Platyhelminthes				1		1
43	Nemertea		4		5		9
50010204	Arctonoe spp.					1	1
5001020806	Harmothoe imbricata				1		1
5001022301	Tenonia kitsapensis		1			1	2
5001060101	Pholoe minuta	1	3	1	2	2	9
5001130102	Phyllodoce (Anaitides) groenlandica		1				1
50011302	Eteone spp.					1	1
5001130205	Eteone longa			1		2	3
5001130803	Phyllodoce (Paranaitis) polynoides			1			1
5001131101	Eulalia (Eumida) sanguinea	1	1				2
50011314	Phyllodoce spp.	1	1				2
5001210801	Micropodarke dubia		1			1	2
5001230702	Exogone gemmifera	1	4	4			9
5001230806	Sphaerosyllis brandhorsti	1					1
5001232201	Ehlersia heterochaeta			2		3	5
5001240501	Platynereis bicanaliculata	2	10	1		4	17
50012501	Nephtys spp.		2				2
5001250103	Nephtys caeca					2	2
5001250111	Nephtys ferruginea	1			1		2
5001250113	Nephtys californiensis		1			2	3
5001260202	Sphaerodoropsis sphaerulifer					1	1
5001270104	Glycera americana	1		1	1		3
5001280101	Glycinde picta	2		1	4		7
5001280103	Glycinde armigera			1	2	1	4
5001280203	Goniada brunnea					1	1
500129	Onuphidae			1	1	2	4
5001290111	Onuphis elegans	4	1	3	2	3	13
5001290202	Diopatra ornata		1				1
5001310109	Lumbrineris luti	3	5	3	4	8	23
5001310118	Lumbrineris cruzensis		1				1
5001310132	Lumbrineris californiensis	1	1			1	3
5001400102	Leitoscoloplos pugettensis	6	14	12	8	21	61
5001400301	Scoloplos armiger	6	6	2	4	4	22
5001430201	Laonice cirrata					1	1
5001430402	Polydora socialis	7	1	2		5	15
50014305	Prionospio spp.		1				1
5001430506	Prionospio steenstrupi					1	1
5001430599	Prionospio multibranchiata					1	1
50014308	Polydora (Boccardia) spp.		8	11	10	10	39
5001431001	Spiophanes bombyx		1	1		1	3
5001431004	Spiophanes berkeleyorum		1			1	2
5001431701	Paraprionospio pinnata					1	1
5001440105	Magelona longicornis					1	1
5001490302	Spiochaetopterus costarum		1			2	3
5001500101	Cirratulus cirratus		1				1
5001600302	Notomastus tenuis	6		4	5	11	26
5001600303	Notomastus lineatus		6				6
5001600402	Mediomastus californiensis	1	15	6	3	91	116
5001630902	Praxillella praetermissa		2	2			4
5001631	Euclymeninae			1	2	4	7
5001631103	Euclymene zonalis	1				2	3
500168	Terebellidae		1			1	2
5001680101	Amphitrite cirrata					1	1
5001680810	Polycirrus californicus		1	1		1	3
5001690101	Terebellides stroemi		1				1
5001700602	Potamilla myriops					1	1
5004	Oligochaeta		1				1
51032001	Alvania spp.	16	119	33	16	107	291

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 13R (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5103760201	Natica clausa		1				1
5105030202	Mitrella tuberosa			10			10
5105030247	Mitrella gausapata	7	104		2	23	136
5105080101	Nassarius mendicus		1	1			2
510801019999	Odostomia (Odostomia) spp.	2	2	2		2	8
51080102	Turbonilla spp.		2				2
5110040205	Cylichna attonsa		2				2
511006999999	Melanochlamys dimedea			1			1
5502020101	Acila castrensis		1			1	2
5502020201	Nucula tenuis	1			2		3
5502040504	Yoldia scissurata			1	1		2
5507010301	Megacrenella columbiana		1				1
5507010601	Modiolus modiolus					1	1
5515010101	Parvilucina tenuisculpta	1	6			8	15
5515020201	Axinopsida serricata	5	33	19	7	23	87
5515100102	Mysella tumida	8	16	9	9	24	66
55152201	Clinocardium spp.		2				2
5515290201	Solen sicarius			1	1		2
55153101	Macoma spp.	2					2
5515310101	Macoma calcarea		2	1	4	2	9
55153102	Tellina spp.		1				1
5515310202	Tellina nuculoides		1				1
5515310204	Tellina modesta	1	5	3	1	7	17
5515470301	Compsomyax subdiaphana	1					1
5515470501	Psephidia lordi	415	611	528	1003	1155	3712
55170102	Mya spp.				1		1
5517010201	Mya arenaria	1					1
5517060201	Hiatella arctica					1	1
55200502	Lyonsia spp.				2		2
5520050202	Lyonsia californica	1				5	6
6111070301	Euphilomedes carcharodonta	105	59	81	100	108	453
6111070303	Euphilomedes producta	3		3	2	2	10
6154050101	Diastylis alaskensis					1	1
6154070105	Campylaspis hartae			1		1	2
6157020101	Leptochelia savignyi	3	3	2		4	12
6160011601	Haliophasma geminata		1	3			4
61620202	Synidotea spp.			2		1	3
6169020135	Ampelisca careyi		1				1
6169020208	Byblis millsi			1		1	2
61690602	Aoroides spp.		2	3			5
6169201203	Pontogenia inermis					1	1
6169201307	Rhachotropis oculata					2	2
6169211008	Melita desdichada		2		1	2	5
6169260401	Gammaropsis thompsoni		1			5	6
6169261199	Cheirimedeia zotea	2	1	2	4	6	15
6169342903	Orchomene pacifica	1	1	3	2	1	8
6169371502	Westwoodilla caecula	1	1			5	7
6169420925	Paraphoxus oculatus			1			1
6169430408	Pleustes depressa		1				1
6169430501	Pleusymptes subglaber			1			1
61694803	Metopella spp.		1			2	3
6171010719	Caprella mendax	57	56			8	121
61830402	Callianassa spp.				1	3	4
61830602	Pagurus spp.			1			1
6188030105	Cancer gracilis		1				1
61890604	Pinnixa spp.	2	1	2	1	3	9
7200020104	Golfingia pugettensis		1	1			2
77	Phoronida	4	4	3			11
812903	Amphiuridae			1			1

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 13R (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
812903019999	Amphiodia urtica/periercta					2	2
81720602	Eupentacta spp.					1	1
	TOTAL OF ABUNDANCE	685	1146	783	1216	1715	5545
	NUMBER OF TAXA	42	69	54	38	72	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 14

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
3743010303	Pachycerianthus fimbriatus		2	2	2		6
3754010103	Stylatula elongata			1			1
3760060101	Metridium senile					3	3
43	Nemertea	2	4	3	3	2	14
500102	Polynoidae		1				1
5001020201	Antinoella macrolepida	4	3	1		3	11
5001020810	Harmothoe lunulata	4					4
5001021601	Polyeunoe tuta			1			1
5001021702	Hesperone adventor		1				
5001060101	Pholoe minuta	3	7	4	10	6	30
5001130102	Phyllodoce (Anaitides) groenlandica				1		1
5001130205	Eteone longa		1				1
5001130310	Eulalia levicornuta					1	1
5001131101	Eulalia (Eumida) sanguinea		1	1			2
50011314	Phyllodoce (Genetyllis) castanea				1		1
5001131402	Phyllodoce (Aponaitides) hartmanae			1	2		3
5001210102	Gyptis brevipalpa			1	1		2
5001210401	Ophiodromus pugettensis		1				1
5001230201	Pionosyllis gigantea			1			1
5001230702	Exogone gemmifera			1	1	1	3
500125010401	Nephtys cornuta franciscana				1		1
5001250105	Nephtys punctata				1		1
5001250106	Nephtys rickettsi	3	1	2	3	1	10
5001270101	Glycera capitata		4	2	2	1	9
5001270104	Glycera americana			1		1	2
5001280101	Glycinde picta			2	1		3
5001280103	Glycinde armigera	1		1			2
5001280203	Goniada brunnea		1	1			2
500129	Onuphidae				1	1	2
5001290103	Onuphis iridescens		3	1		1	5
5001290111	Onuphis elegans	1					1
5001290202	Diopatra ornata		3	4	2	3	12
50013101	Lumbrineris spp.		1		1	1	3
5001310109	Lumbrineris luti	1	2				3
5001400102	Leitoscoloplos pugettensis	8	1	4	4	3	20
5001410801	Levinsenia gracilis				1	1	2
5001411306	Acmira catherinae			1		1	2
5001430429	Polydora brachycephala	3	7	1	4	1	16
5001430506	Prionospio steenstrupi				1	2	3
5001430521	Prionospio lighti	3	2	5	7	4	21
5001430812	Polydora (Boccardia) pugettensis					1	1
5001431001	Spiophanes bombyx	1					1
5001431004	Spiophanes berkeleyorum	2	2	1	2	2	9
5001431701	Paraprionospio pinnata				1	1	2
5001490202	Phyllochaetopterus prolifica	1	1	8		4	14
5001490302	Spiochaetopterus costarum					1	1
50015003	Tharyx spp.		1	2	2	3	8
5001500302	Tharyx multifilis				1		1
5001500309	Tharyx secundus	1	2			2	5
5001500401	Chaetozone setosa				1		1
5001520101	Cossura longocirrata	1	2		4		7
5001520199	Cossura modica				3	2	5
5001540199	Brada sachalina		1		2	5	8
5001540302	Pherusa plumosa					4	4
5001590101	Sternaspis scutata	12	6	9	8	10	45
500160	Capitellidae		2		2	1	5
5001600402	Mediomastus californiensis	1	7	3	4	7	22
5001600501	Decamastus gracilis	6	6	4	6	9	31
5001600601	Barantolla americana			1	6	2	9
500163	Maldanidae	14	7	1	6	6	34

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 14 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5001630302	Maldane glebifex	7	13	14	10	17	61
5001630901	Praxillella gracilis		1				1
500163090301	Praxillella affinis pacifica	1		3	4	3	11
5001631001	Rhodine bitorquata				1		1
5001631103	Euclymene zonalis		1		1	1	3
5001640201	Myriochele heeri	5	5	4	2	9	25
5001650201	Sabellaria cementarium					1	1
5001660304	Pectinaria californiensis	1		1			2
500167	Ampharetidae		1				1
5001670208	Ampharete acutifrons			1			1
5001670503	Melinna elisabethae	1					1
500168	Terebellidae			2		1	3
5001680401	Neoamphitrite robusta			2			2
5001680710	Pista brevibranchiata	3	1		3	2	9
5001680810	Polycirrus californicus				1		1
500168089999	Polycirrus spp. complex	1			1		2
5001690101	Terebellides stroemi					1	1
5004	Oligochaeta		3	1	1	1	6
51032001	Alvania spp.			3	1	6	10
5103760201	Natica clausa	1					1
5105030247	Mitrella gausapata	1		1	1		3
5110010401	Rictaxis punctocaelatus					1	1
511006999999	Melanochlamys dimedea	1					1
5502020201	Nucula tenuis			1			1
5502040504	Yoldia scissurata	1	1	1	2	1	6
5507010301	Megacrenella columbiana	1	1				2
55070104	Musculus spp.			1		1	2
5509050502	Propeamussium alaskense			5		36	41
5515010101	Parvilucina tenuisculpta		2	1	1		4
5515010201	Lucinoma acutilineata				1		1
5515020201	Axinopsida serricata	11	8	13	14	15	61
55151001	Mysella spp.					6	6
5515100102	Mysella tumida			2		2	4
5515220301	Nemocardium centifilosum		1				1
55153101	Macoma spp.	1	1	7	2	2	13
5515310101	Macoma calcarea		1	1	2	2	6
5515310102	Macoma elimata	6	12	8	11	3	40
5515310112	Macoma carlottensis	2	3			2	7
5515470301	Compsomyax subdiaphana	4	1	1	1	1	8
5515470501	Psephidia lordi		1	1			2
5517060201	Hiatella arctica		1				1
5520050202	Lyonsia californica		1			1	2
56	Scaphopoda		1				1
6001010107	Nymphon pixellae			1		1	2
6111070303	Euphilomedes producta	3	4	1	8	4	20
6134020104	Balanus crenatus					1	1
6153011901	Pseudomma berkeleyi	2	1	3	1	3	10
6154040115	Leucon subnasica			1	1		2
6154040202	Eudorella pacifica	1				1	2
6154040306	Eudorellopsis longirostris			5	1		6
6154050101	Diastylis alaskensis				2	1	3
6154050115	Diastylis paraspinulosa	1	1	1			3
6154050401	Leptostylis villosa				1		1
6154070102	Campylaspis canaliculata		1				1
6154070103	Campylaspis rubicunda	2		2	2	1	7
6157020202	Leptognathia gracilis		1				1
6157020204	Leptognathia brevimana		1		1	1	3
6169020113	Ampelisca hancocki	2	1				3
6169020135	Ampelisca careyi				1	2	3

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 14 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
61690602	Aoroides spp.		1	3		2	6
6169070101	Argissa hamatipes					1	1
61691207	Leptamphous spp.			3			3
61692099	Eusirus spp.			2		1	3
6169270202	Ischyrocerus anguipes					1	1
6169341101	Cyphocaris challengeri				1		1
61693501	Melphidippa spp.			1	1		2
61693708	Monoculodes spp.				1		1
6169371502	Westwoodilla caecula	9	4	9	2	11	35
6169420204	Harpiniopsis fulgens			1			1
6169420301	Heterophoxus oculatus	4	6	7	9	6	32
6169440101	Dyopedos arcticus			3			3
6169440102	Dyopedos bispinis			4		5	9
61694803	Metopella spp.					1	1
6171010710	Caprella laeviuscula					1	1
6171010719	Caprella mendax			1		11	12
6179160408	Eualus pusiolus					1	1
61830402	Callianassa spp.	1	2		3		6
61890604	Pinnixa spp.		1		1	2	4
7200020104	Golfingia pugettensis			1	1	2	4
77000102	Phoronis spp.		2	3	1		6
8127010607	Ophiura lutkeni			1	2	1	4
812903019999	Amphiodia urtica/periercta		1	1	1		3
8129030202	Amphipholis squamata		1	2		1	4
	TOTAL ABUNDANCE	145	171	201	199	274	990
	NUMBER OF TAXA	48	68	77	76	84	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 15

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
43	Nemertea	5	5	8	8	7	33
50010208	Harmothoe spp.				1		1
5001040101	Pholoides aspera	1	2	1		4	8
5001060101	Pholoe minuta	1		3	1		5
500113	Phyllodocidae			2		1	3
5001130102	Phyllodoce (Anaitides) groenland	6	2			2	10
5001230312	Syllis hyalina					1	1
5001230501	Syllis alternata		3				3
5001230702	Exogone gemmifera	1		2			3
5001230703	Exogone lourei	42	54	44	30	32	202
5001232201	Ehlersia heterochaeta	2	1	3	4		10
5001240501	Platynereis bicanaliculata	1					1
5001250102	Nephtys ciliata		1				1
5001250106	Nephyts rickettsi			1			1
5001250111	Nephtys ferruginea		1			1	2
5001260202	Sphaerodoropsis sphaerulifer		1				1
5001270101	Glycera capitata	3	1	1	1	1	7
5001280103	Glycinde armigera					1	1
5001280203	Goniada brunnea	3	2	1			6
5001290101	Onuphis conchylega				1	2	3
5001290111	Onuphis elegans		2	1			3
5001290202	Diopatra ornata					1	1
50013101	Lumbrineris spp.	3	1	7	7	9	27
5001310109	Lumbrineris luti	9	9	2	12	6	38
5001310118	Lumbrineris cruzensis			1			1
5001310132	Lumbrineris californensis					2	2
5001400102	Leitoscoloplos pugettensis	5	6	4	5	1	21
5001400510	Orbinia (Phylo) felix		4		4		8
5001411302	Aricidea lopezi				2	1	3
5001411306	Acmira catherinae	3	1	2			6
5001420102	Apistobranchus ornatus	4	1	2	5		12
5001430201	Laonice cirrata				1		1
50014304	Polydora spp.					1	1
5001430402	Polydora socialis			1		1	2
5001430429	Polydora brachycephala			3			3
5001430431	Polydora cardalia		1	1			2
5001430506	Prionospio steenstrupi	21	17	12	16	14	80
5001430521	Prionospio lighti	1			1		2
5001430703	Spio cirrifera	2	4		1	1	8
5001430812	Polydora (Boccardia) pugettensis	1					1
5001431701	Paraprionospio pinnata			1	2		3
5001440105	Magelona longicornis		2	3			5
5001490202	Phyllochaetopterus prolifica	1	2	3	5	5	16
500150	Cirratulidae		1				1
5001500302	Tharyx multifilis	3	4	3	1	3	14
5001500309	Tharyx secundus			1			1
5001500401	Chaetozone setosa				1		1
5001500407	Chaetozone spinosa		1				1
50015201	Cossura spp.					1	1
5001600302	Notomastus tenuis	24	25	15	4	7	75
5001600303	Notomatus lineatus				1		1
5001600402	Mediomastus californiensis		2	1			3
5001600501	Decamastus gracilis				30	8	38
5001600601	Barantolla americana					1	1
500163	Maldanidae	2	2	1			5
5001630202	Clymenella torquata					2	2
5001630802	Axiothella rubrocincta				2		2
500163099999	Praxillella sp. A	5	5	4	4		18
5001631	Euclymeninae					1	1
5001631001	Rhodine bitorquata	3	2	3	2	1	11

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 15 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5001631103	Euclymene zonalis	1		1	1		3
5001631206	Clymenura columbiana					1	1
5001640102	Owenia fusiformis		1	1			2
5001640201	Myriochele heeri	29	8	17	11	8	73
5001640203	Myriochele nr. gracilis				4		4
5001660303	Pectinaria granulata	1	1		2	2	6
500167	Ampharetidae			3			3
5001670208	Ampharete acutifrons	1					1
5001670401	Lysippe labiata			3			3
5001670701	Anobothrus gracilis			1	1		2
500168	Terebellidae			3			3
5001681803	Pista estevanica		1				1
5001690101	Terebellides stroemi	1				1	2
51032001	Alvania spp.	29	35	24	2	46	136
51034601	Bittium spp.	2	2		1	5	10
5103760201	Natica clausa	1		1			2
51050301	Amphissa spp.	1					1
5105030202	Mitrella tuberosa				1		1
5105030247	Mitrella gausapata	9	5	3	1	6	24
5105080101	Nassarius mendicus		1				1
510801019999	Odostomia (Odostomia) spp.	3					3
51080102	Turbonilla spp.	1			1		2
5108011134	Turbonilla aurantia	2		2	2	2	8
5110040205	Cylichna attonsa	1	1	3	2		7
55	Bivalvia					1	1
5502020201	Nucula tenuis	3	1	1	1		6
5502040202	Nuculana minuta	1		1		6	8
5507010301	Megacrenella columbiana	1	2		1	1	5
55070104	Musculus spp.					1	1
5509050502	Propeamussium alaskense				1	3	4
5515010101	Parvilucina tenuisculpta	2	4	9	12	11	38
5515010201	Lucinoma acutilineata	2		1	1		4
5515020102	Adontorhina cyclica	3	1	4	2	1	11
5515020201	Axinopsida serricata	3	5	4	2	2	16
5515020301	Thyasira flexuosa		2	5	3		10
5515100102	Mysella tumida	1	2		1		4
5515220301	Nemocardium centifilosum		1	1	3		5
55153101	Macoma spp.	1				1	2
5515310101	Macoma calcarea	3	1	2	1		7
5515310102	Macoma elimata	5	10	2	3	6	26
5515310112	Macoma carlottensis				1		1
5515310204	Tellina modesta					1	1
5515470301	Compsomyax subdiaphana	3	1			1	5
5515470501	Psephidia lordi	9	8	3	2	2	24
5517060201	Hiatella arctica	1					1
5520080203	Thracia trapezoides		1		2		3
5520100108	Cardiomya californica	4	3	4	3	3	17
56	Scaphopoda	1	1	2	2		6
6111070301	Euphilomedes carcharodonta	1					1
6111070303	Euphilomedes producta	7	3	5	9	6	30
6154050101	Diastylis alaskensis			1			1
6154070102	Campylaspis canaliculata	1					1
6154070111	Campylapsis crispa	1	1			1	3
6157020101	Leptochelia savignyi	5	1	6			12
6157020202	Leptognathia gracilis		1	1	1		3
6157020204	Leptognathia brevimana	2				1	3
6160011601	Haliophasma geminata		1			2	3
6169020113	Ampelisca hancocki	1					1
6169020125	Ampelisca brevisimulata		3		1	1	5

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 15 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
6169020135	Ampelisca careyi	3	1	1	1		6
6169020208	Byblis millsi	1		1		1	3
6169201307	Rhachotropis oculata	2				1	3
6169260211	Photis lacia	1		1		1	3
6169370816	Monoculodes zernovi		1		1		2
6169371502	Westwoodilla caecula				2		2
6169420918	Eyakia robustus				1		1
6169421504	Rhepoxynius abronius	1	3	2		1	7
7200020104	Golfingia pugettensis	2	2	1			5
77	Phoronida	364	343	346	425	404	1882
8129030999	Amphioplus strongyloplax			1			1
8170	Holothuroidea		2				2
	TOTAL ABUNDANCE	669	625	604	663	648	3209
	NUMBER OF TAXA	71	69	69	66	63	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 17

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
43	Nemertea					1	1
500102	Polynoidae				1	1	2
5001060305	Sthenalais tertiaglabra				1	1	2
50011314	Phyllodoce spp.		1				1
5001210102	Gyptis brevipalpa			1			1
5001220201	Sigambra tentaculata		3	4	2	1	10
5001220301	Pilargis berkeleyae		1				1
5001250111	Nephtys ferruginea	6	3	2	5	3	19
5001270101	Glycera capitata		1	2	4	1	8
5001280203	Goniada brunnea	1		1	1	1	4
5001290103	Onuphis iridescens	1	1			1	3
5001400102	Leitoscoloplos pugettensis	6		4	2	2	14
5001410217	Aricidea quadrilobata			1			1
5001410801	Levinsenia gracilis		1		1	4	6
5001411306	Acmira catherinae				5	8	13
5001430201	Laonice cirrata					1	1
5001430506	Prionospio steenstrupi		2		1		3
5001430521	Prionospio lighti	1			5	5	11
5001431004	Spiophanes berkeleyorum	26	11	7	35	29	108
5001431701	Paraprionospio pinnata		1		2	2	5
50015003	Tharyx spp.			1			1
5001520101	Cossura longocirrata		1		1	2	4
5001520199	Cossura modica	2	3	2	11	13	31
50016002	Heteromastus spp.				3	2	5
5001600203	Heteromastus filobranchus	1					1
5001600402	Mediomastus californiensis	1				1	2
500163090301	Praxillella affinis pacifica				1		1
5001660304	Pectinaria californiensis	1			1		2
5001670208	Ampharete acutifrons		2	1		1	4
5001690101	Terebellides stroemi	2				1	3
5105030247	Mitrella gausapata				1		1
510801019999	Odostomia (Odostomia) spp.		1	2	2		5
5110040205	Cylichna attonsa	9	4	12	11	7	43
5502020201	Nucula tenuis		2	1	1		4
5502040504	Yoldia scissurata		1				1
5515020201	Axinopsida serricata	345	344	295	305	265	1554
5515310112	Macoma carlottensis	7	4	12	9	8	40
5515470301	Compsomyax subdiaphana	1					1
6169370599	Bathymedon pumilus				1		1
6169420204	Harpiniopsis fulgens	1					1
616942099999	Foxiphalus similis/cognatus	1					1
6174020101	Euphausia pacifica			3	1		4
	TOTAL ABUNDANCE	412	387	351	413	361	1924
	NUMBER OF TAXA	17	19	17	26	24	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 18

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
39	Platyhelminthes			3	1		4
43	Nemertea	3	19	3	6	4	35
5001021801	Lepidasthenia berkeleyae		1	1		1	3
5001021805	Lepidasthenia longicirrata		1				1
5001022301	Tenonia kitsapensis		3		1	1	5
5001022689	Malmgreniella spp. L		1				1
5001060101	Pholoe minuta	2		1			3
5001130201	Eteone californica				1		1
50011311	Eulalia (Eumida) spp.			1			1
50011314	Phyllodoce spp.		1				1
5001210102	Gyptis brevipalpa	1					1
5001220201	Sigambra tentaculata		2	7			9
5001230501	Syllis alternata	1	7		2		10
5001230703	Exogone lourei	1	2		1		4
5001250197	Nephtys sp. A	3	6	1			10
5001270101	Glycera capitata	2	4	3	4	5	18
5001270104	Glycera americana	1		1			2
5001280101	Glycinde picta	3	1			1	5
5001280103	Glycinde armigera					1	1
5001310101	Lumbrineris bicirrata			1		1	2
5001310109	Lumbrineris luti	56	21	3	48	5	133
5001430402	Polydora socialis				1		1
5001430419	Polydora armata		1	2			3
5001430431	Polydora cardalia			1		1	2
5001431004	Spiophanes berkeleyorum	1		1		1	3
5001431701	Paraprionospio pinnata	2	12	4	8	6	32
5001450102	Trochochaeta multisetosa	1	12	2	1	2	18
5001490302	Spiochaetopterus costarum	28	85	2	6	45	166
5001490401	Mesochaetopterus taylori		1				1
5001500302	Tharyx multifilis	3	1	3	3	1	11
5001500309	Tharyx secundus		4	4	1		9
5001500401	Chaetozone setosa		3	2	1		6
5001580607	Ophelina acuminata		1				1
5001590101	Sternaspis scutata	1	3	3		4	11
5001600203	Heteromastus filobranchus	6	7	11	4	1	29
5001630901	Praxillella gracilis	1	1		1		3
5001630902	Praxillella praetermissa	3	3		3	2	11
5001631	Euclymeninae	1	1				2
5001631103	Euclymene zonalis	2	1				3
5001660304	Pectinaria californiensis	80	93	27	55	89	344
5001670214	Amphar ete finmarchica		1			1	2
5001680101	Amphitrite cirrata		1				1
5001680810	Polycirrus californicus		1				1
500168130201	Lanassa venusta venusta	1	1				2
50016901	Terebellides spp.			1			1
5001690101	Terebellides stroemi	16	11		6	10	43
5001690103	Terebellides californica	1	8		5	6	20
51032001	Alvania spp.		1		3	1	5
5105030247	Mitrella gausapata	2	1		1		4
5105080101	Nassarius mendicus		1				1
510801019999	Odostomia (Odostomia) spp.	1				1	2
51080102	Turbonilla spp.	1		1			2
5110040205	Cylichna attonsa	11	15	3	13	9	51
51101201	Haminoea spp.	1					1
5502020101	Acila castrensis		1				1
5502020201	Nucula tenuis	2	4		7	5	18
5502040504	Yoldia scissurata		1			2	3
5515010101	Parvilucina tenuisculpta	1					1
5515020201	Axinopsida serricata	350	365	160	446	238	1559
5515100102	Mysella tumida	22	30	9	11	22	94

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 18 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5515310112	Macoma carlottensis	1	2	1	2	6	12
5515470301	Compsomyax subdiaphana		1			1	2
5520020102	Pandora filosa					1	1
6111070301	Euphilomedes carcharodonta		1			1	2
6111070303	Euphilomedes producta	1	1				2
6153010105	Pacifacanthomysis nephrophthalma			3			3
6154040202	Eudorella pacifica	2		1	2		5
6169260201	Photis brevipes					2	2
61692603	Protomedeia spp.			1			1
6169420926	Rhepoxynius variatus			1			1
61890604	Pinnixa spp.	4	2	2		2	10
77	Phoronida	7	11	4	11	11	44
8172060301	Pentamera pseudocalcigera		1			1	2
	TOTAL ABUNDANCE	626	759	274	655	491	2805
	NUMBER OF TAXA	40	52	36	31	37	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 19

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
43	Nemertea		3			2	5
5001020606	Gattyana treadwelli	1	2				3
5001060101	Pholoe minuta		1				1
5001130310	Eulalia levicornuta	1					1
5001210102	Gyptis brevipalpa		1				1
500125	Nephtyidae					1	1
500125010401	Nephtys cornuta franciscana					2	2
5001250111	Nephtys ferruginea					1	1
5001270101	Glycera capitata			1		1	2
5001280103	Glycinde armigera					1	1
5001280203	Goniada brunnea	1		1	1	1	4
5001290103	Onuphis iridescens	6	3	4	2	5	20
5001290111	Onuphis elegans				1		1
50013101	Lumbrineris spp.	1			1	2	4
5001310109	Lumbrineris luti		3	3	1		7
5001400102	Leitoscoloplos pugettensis	3	2	1		3	9
5001410801	Levinsenia gracilis		1	2			3
5001411306	Acmira catherinae			1			1
5001430506	Prionospio steenstrupi	2		1		4	7
5001430521	Prionospio lighti					1	1
5001430812	Polydora (Boccardia) pugettensis					1	1
5001431004	Spiophanes berkeleyorum	1	1	3	1	5	11
5001431701	Paraprionospio pinnata		2	1	1		4
5001490302	Spiochaetopterus costarum				1		1
50015003	Tharyx spp.					1	1
5001500407	Chaetozone spinosa		1				1
5001520199	Cossura modica	1		1		1	3
5001540199	Brada sachalina	4	1	1			6
5001580403	Travisia pupa	1					1
5001590101	Sternaspis scutata	1	2	1			4
5001600203	Heteromastus filobranchus		2	3	2	4	11
5001630104	Asychis biceps		1			1	2
5001630901	Praxillella gracilis					1	1
5001660304	Pectinaria californiensis	5	7		4	7	23
5001670208	Ampharete acutifrons		1		2		3
5001670701	Anobothrus gracilis	1					1
500168	Terebellidae	1					1
5001680710	Pista brevibranchiata				1	1	2
5001690101	Terebellides stroemi			1	1		2
510801019999	Odostomia (Odostomia) spp.				1		1
5110040205	Cylichna attonsa	1				2	3
51101201	Haminoea spp.				1		1
5402	Chaetodermatida	3	5	5	3	7	23
5502040504	Yoldia scissurata	2					2
5502040507	Yoldia thraciaeformis		1				1
5515010101	Parvilucina tenuisculpta			1			1
5515010201	Lucinoma acutilineata					1	1
5515020102	Adontorhina cyclica	1		2			3
5515310112	Macoma carlottensis			1			1
6111070301	Euphilomedes carcharodonta		1				1
6154040202	Eudorella pacifica	4	6	2	6	2	20
6154050123	Diastylis hirsuta			1			1
61631601	Eurycope sp.			1			1
6169020135	Ampelisca careyi				2	1	3
6169201309	Rhachotropis clemens	1					1
6169211008	Melita desdichada					5	5
61692603	Protomedeia spp.			1		1	2
6169341101	Cyphocaris challengeri		1				1
6169420301	Heterophoxus oculatus			1	1	1	3
6169420925	Paraphoxus oculatus		1				1

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 19 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
6179160511	Heptacarpus stimpsoni			1			1
8162040103	Brisaster latifrons	1					1
81720601	Cucumaria spp.	1			1	2	4
8179010101	Molpadia intermedia	3	2	3	3	2	13
	TOTAL ABUNDANCE	47	51	44	37	70	249
	NUMBER OF TAXA	25	25	27	22	32	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 20

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
43	Nemertea	1	3	1	6	1	12
50010226	Malmgrienella spp.				1		1
5001022699	Malmgreniella nigralba	1					1
5001040101	Pholoides aspera	1					1
5001060101	Pholoe minuta	2	1	1			4
5001230501	Syllis alternata	2		1			3
5001230704	Exogone molesta	1	3		1	1	6
5001240302	Nereis (Neanthes) virens		1			1	2
5001240405	Nereis vexillosa	1					1
5001240406	Nereis zonata	1		1		1	3
5001240501	Platynereis bicanaliculata				1		1
500125	Nephtyidae		1				1
5001250104	Nephtys cornuta	2	3		1	1	7
5001250105	Nephtys punctata		1			1	2
5001250111	Nephtys ferruginea		3		2	5	10
5001250197	Nephtys sp. 1				2		2
5001270101	Glycera capitata	2	3	3	8	5	21
50013101	Lumbrineris spp.	7	20	25	18	25	95
5001310101	Lumbrineris bicirrata				2		2
5001310109	Lumbrineris luti	39	37	46	28	29	179
5001360101	Dorvillea pseudorubrovittata		1				1
5001360505	Schistomeringos caeca	1					1
5001400102	Leitoscoloplos pugettensis	1					1
5001400301	Scoloplos armiger					1	1
5001410801	Levinsenia gracilis	2	6	3	3	2	16
5001411302	Acesta lopezi		5	1	1	4	11
5001430402	Polydora socialis	1				2	3
5001430431	Polydora cardalia			1	1		2
50014305	Prionospio spp.		1				1
5001430506	Prionospio steenstrupi		1	1	1		3
5001430521	Prionospio lighti	1					1
5001431004	Spiophanes berkeleyorum	1				1	2
5001500302	Tharyx multifilis				1		1
5001520106	Cossura pygodactylata	21	18		3		42
5001520198	Cossura sp. 1	6	17	1			24
5001600201	Heteromastus filiformis		1				1
5001600302	Notomastus tenuis				2		2
5001600402	Mediomastus californiensis	1					1
500163	Maldanidae		2			1	3
5001630302	Maldane glebifex	2	4	2	3	2	13
5001630901	Praxillella gracilis	26	22	30	28	22	128
5001630902	Praxillella praetermissa		4		4		8
5001631	Euclymeninae				1		1
5001631103	Euclymene zonalis	4					4
5001660304	Pectinaria californiensis		3	1	1		5
5001680701	Pista cristata	6	3		7	6	22
5001680710	Pista brevibranchiata	1					1
5001680810	Polycirrus californicus	1			1		2
5001690101	Terebellides stroemi	7	13	11	9	10	50
51080102	Turbonilla spp.			1			1
5108011134	Turbonilla aurantia	3		1	9	3	16
5110040205	Cylichna attonsa	1	2				3
5502020201	Nucula tenuis	5	4		9		18
55070106	Modiolus spp.	1					1
5515020201	Axinopsida serricata	9	6	13	12	8	48
5515100102	Mysella tumida	5	1	6	9		21
5515310102	Macoma elimata	2	2	2			6
5515310112	Macoma carlottensis	4	1	6	3	3	17
5515310114	Macoma nasuta			2			2
5515470301	Compsomyax subdiaphana	4	5	3	7	4	23

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 20 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5515470501	Psephidia lordi	10	12	9	6	4	41
5517010201	Mya arenaria				1		1
5520020102	Pandora filosa					1	1
6154040202	Eudorella pacifica			1	1		2
6169211008	Melita desdichada		1		1		2
6169211901	Eogammarus oclairi				2		2
61692603	Protomedeia spp.		1				1
6169420301	Heterophoxus oculatus					1	1
61890604	Pinnixa spp.		3		1		4
	TOTAL ABUNDANCE	186	215	173	197	145	916
	NUMBER OF TAXA	39	38	27	39	28	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 21

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
3754020201	Ptilosarcus gurneyi			1			1
43	Nemertea	1		10	3	2	16
5001022689	Malmgreniella spp. L	2	5	4	1	8	20
5001060101	Pholoe minuta		1	1	1		3
5001130102	Phyllodoce (Anaitides) groenlandica	2		1			3
5001130201	Eteone californica	2	1	2		2	7
5001130803	Phyllodoce (Paranaitis) polynoides					1	1
5001240501	Platynereis bicanaliculata		1				1
5001250104	Nephtys cornuta		2	1			3
5001250111	Nephtys ferruginea				1	1	2
5001250124	Nephty glabra			3			3
5001250197	Nephtys sp. A	10	7	3	3	3	26
5001260202	Sphaerodoropsis sphaerulifer			1	1	1	3
5001270101	Glycera capitata	6	2	6	9	4	27
5001280103	Glycinde armigera		1				1
5001290103	Onuphis iridescens		1		1		2
5001310109	Lumbrineris luti	37	31	25	34	28	155
5001400102	Leitoscoloplos pugettensis	7	5	10	16	3	41
5001411302	Acesta lopezi				1		1
5001430506	Prionospio steenstrupi	7	3	4	3	3	20
5001430521	Prionospio lighti		27	1	2		30
5001431701	Paraprionospio pinnata	1		1	1		3
5001490302	Spiochaetopterus costarum					2	2
5001520106	Cossura pygodactylata		1			1	2
5001580202	Armandia brevis		1				1
5001580607	Ophelina acuminata	1	2		1	1	5
5001590101	Sternaspis scutata	1					1
5001600101	Capitella capitata				1		1
5001600203	Heteromastus filobranchus	30	60	36	47	61	234
5001600601	Barantolla americana	1			2		3
5001630901	Praxillella gracilis				1		1
5001631	Euclymeninae		1		1		2
5001631103	Euclymene zonalis	7	3	8	3	2	23
5001660304	Pectinaria californiensis	2	3	1	1		7
5001670101	Amage anops		1				1
5001670214	Ampharete finmarchica				3	1	4
5001670401	Lysippe labiata	1		1	1		3
50016808	Polycirrus spp.		2				2
5001680810	Polycirrus californicus	10	12	8	15	12	57
500168130201	Lanassa venusta venusta	14	17	9	36	3	79
5001690101	Terebellides stroemi	1	3	1	1		6
5004	Oligochaeta		1				1
51032001	Alvania spp.	3	4	7	2	2	18
5105030247	Mitrella gausapata		1			5	6
5105080101	Nassarius mendicus					2	2
510801019999	Odostomia (Odostomia) spp.					1	1
51080102	Turbonilla spp.			1	2		3
5108011134	Turbonilla aurantia	2	3		1	2	8
5110040205	Cylichna attonsa	3				2	5
5502020201	Nucula tenuis	2	3	3	11	4	23
5515010101	Parvilucina tenuisculpta	2	1		2	4	9
5515010201	Lucinoma acutilineata		1	1		2	4
5515020201	Axinopsida serricata	119	172	119	196	250	856
5515100102	Mysella tumida	4	11	2	8	12	37
55152201	Clinocardium spp.					4	4
5515220301	Nemocardium centifilosum		1				1
55153101	Macoma spp.			2	1	1	4
5515310101	Macoma calcarea			1	1		2
5515310102	Macoma elimata	8	5	12	15	7	47
5515310112	Macoma carlottensis	76	64	67	101	78	386

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 21 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5515310204	Tellina modesta			1			1
5515470301	Compsomyax subdiaphana		1		1		2
5515470501	Psephidia lordi	33	11	32	22	14	112
5515470701	Protothaca staminea					1	1
55200201	Pandora spp.				1		1
6111070301	Euphilomedes carcharodonta	74	62	58	75	61	330
6111070303	Euphilomedes producta	32	35	37	32	44	180
6169020113	Ampelisca hancocki			1			1
6169371402	Synchelidium shoemakeri		1		1		2
6169371502	Westwoodilla caecula	1					1
6169421503	Rhepoxynius bicuspidata	3	5	1	1	4	14
7200020104	Golfingia pugettensis	1					1
	TOTAL ABUNDANCE	506	575	483	663	639	2866
	NUMBER OF TAXA	36	44	40	46	40	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 22

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
43	Nemertea		1	1			2
5001020603	Gattyana cirrosa		1				1
5001060101	Pholoe minuta			1	2	1	4
5001131101	Eulalia (Eumida) sanguinea		1				1
5001210202	Microphthalmus aberrans					1	1
5001230703	Exogone lourei	1	1	2	4	2	10
5001240501	Platyneris bicanaliculata		2	3	1	2	8
500125010401	Nephtys cornuta franciscana				1		1
5001250111	Nephtys ferruginea	2	2	8	3	1	16
5001250119	Nephyts caecoides	1	2	2	1		6
5001260202	Sphaerodoropsis sphaerulifer			2	2	1	5
50012701	Glycera spp.		1				1
5001270101	Glycera capitata		1				1
5001270104	Glycera americana			1			1
5001280103	Glycinde armigera	5	3		1		9
5001280202	Goniada maculata				1		1
5001280203	Goniada brunnea		1				1
50013101	Lumbrineris spp.		1	8	2		11
5001310106	Lumbrineris zonata			1			1
5001310109	Lumbrineris luti		2	6		3	11
5001400102	Leitoscoloplos pugettensis	4	9	13	14	4	44
5001411302	Acesta lopezi	1	1	1			3
5001430506	Prionospio steenstrupi	2	1	1	1	2	7
5001490302	Spiochaetopterus costarum		1				1
5001490401	Mesochaetopterus taylori		1				1
5001500302	Tharyx multifilis		1				1
5001500401	Chaetozone setosa	1	3				4
5001580607	Ophelina acuminata			1	1		2
5001600101	Capitella capitata			8	9		17
5001600201	Heteromastus filiformis			1			1
5001600302	Notomastus tenuis		1				1
5001600501	Decamastus gracilis		1		1		2
5001631	Euclymeninae		1	1	2		4
50016311	Euclymene spp.	2					2
5001640102	Owenia fusiformis		1				1
5001660303	Pectinaria granulata	1		2	11	5	19
5001660304	Pectinaria californiensis	1	2	2	2	1	8
5001670208	Ampharete acutifrons	1					1
5001670401	Lysippe labiata		1				1
5001680701	Pista cristata				1		1
500168089999	Polycirrus spp. complex	1	3	1			5
500168130201	Lanassa venusta venusta	1	2	6	1	1	11
51032001	Alvania spp.		10	1	7	4	22
51034601	Bittium spp.	24	17	100	66	38	245
5105030247	Mitrella gausapata	2		5		17	24
5105080101	Nassarius mendicus		1	1			2
510801019999	Odostomia (Odostomia) spp.	1	1	1	4		7
5108011134	Turbonilla aurantia		4			1	5
511006999999	Melanochlamys dimedea		1				1
5502020201	Nucula tenuis	1	2	2	1	5	11
5502040202	Nuculana minuta				1		1
5504010106	Solemya reidi			1	1	1	3
5507010201	Crenella decussata	1					1
5507010301	Megacrenella columbiana	2	2				4
5515010101	Parvilucina tenuisculpta	5	2	9	5	5	26
5515010201	Lucinoma acutilineata	3	3	1	1		8
5515020201	Axinopsida serricata	64	100	152	98	107	521
5515100102	Mysella tumida	1	1		1		3
55152201	Clinocardium spp.					1	1
5515220301	Nemocardium centifilosum	3	1		2		6

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 22 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
55153101	Macoma spp.			8			8
5515310101	Macoma calcarea	1					1
5515310102	Macoma elimata	1		3	8	8	20
5515310112	Macoma carlottensis	8	3	12	58	10	91
5515310114	Macoma nasuta		1		1	1	3
5515310204	Tellina modesta	1	1	2	1	2	7
5515470301	Compsomyax subdiaphana	9	3	3	1	1	17
5515470501	Psephidia lordi	32	23	16	10	9	90
5515470701	Protothaca staminea	1	1				2
5520020102	Pandora filosa	1		1		1	3
5520050202	Lyonsia californica	1					1
5520100108	Cardiomya californica	1	1		1		3
611103	Cylindroleberididae		1		1		2
6111060103	Rutiderma lomae			1			1
6111070301	Euphilomedes carcharodonta	82	82	95	127	72	458
6111070303	Euphilomedes producta	2	5	5		4	16
6154010206	Hemilamprops californica					1	1
6154040306	Eudorellopsis longirostris		1				1
6154050101	Diastylis alaskensis				1		1
6154070101	Campylaspis rufa				1		1
6154070105	Campylaspis hartae			1			1
6157020101	Leptochelia savignyi	3	6	13	15	26	63
6160011601	Haliophasma geminata		1				1
6169020113	Ampelisca hancocki	2					2
6169020135	Ampelisca careyi		2	1	1		4
6169020208	Byblis millsi					1	1
6169211008	Melita desdichada			2		6	8
6169341411	Hippomedon coecus	5	3	1	2	1	12
6169371402	Synchelidium shoemakeri	1					1
6169371502	Westwoodilla caecula				2		2
6169421504	Rhepoxynius abronius	1	3			1	5
7200020104	Golfingia pugettensis	1	3	2		1	7
7200020106	Golfingia minuta				2		2
8129030202	Amphipholis squamata					1	1
8401	Ascidiacea		1				1
	TOTAL ABUNDANCE	284	334	511	480	349	1958
	NUMBER OF TAXA	44	60	49	48	39	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 26

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
3740	Anthozoa					1	1
3743010303	Pachycerianthus fimbriatus			1		1	2
3760060101	Metridium senile			2			2
39	Platyhelminthes					1	1
43	Nemertea	8	8	12	1	6	35
47	Nematoda	7		42		68	117
500102	Polynoidae			4		1	5
5001020502	Eunoe depressa	2			1		3
5001020602	Gattyana ciliata		2				2
5001020603	Gattyana cirrosa	7	10	5	12	1	35
5001020803	Harmothoe extenuata		1	3			4
5001020810	Harmothoe lunulata	2		1	3	8	14
5001021103	Lepidonotus squamatus		1				1
5001021701	Hesperone complanata		1				1
5001021805	Lepidasthenia longicirrata			2	2	1	5
5001040101	Pholoides aspera	22	17	51	12	50	152
5001060101	Pholoe minuta	4	1	4	3	8	20
5001060305	Sthenelais tertiaglabra		1				1
5001130102	Phyllodoce (Anaitides) groenlandica					1	1
5001130308	Eulalia (Eumida) bilineata	1				1	2
5001131101	Eulalia (Eumida) sanguinea		1			1	2
50011314	Phyllodoce spp.		1		1	5	7
5001131402	Phyllodoce (Aponaitides) hartmanae	1	1				2
500123	Syllidae	1		7			8
5001230201	Pionosyllis gigantea			9	3	4	16
5001230204	Pionosyllis uraga				1		1
5001230303	Syllis spongiphila		2				2
5001230501	Syllis alternata	2	1	2			5
5001230512	Syllis variegata	1	1	6	3	7	18
5001230702	Exogone gemmifera	5	1	15	12	2	35
5001230703	Exogone lourei	43	15	64	8	59	189
5001230805	Sphaerosyllis pirifera	42	18	91	20	115	286
5001230806	Sphaerosyllis brandhorsti	11	2	21	1	13	48
5001231303	Odontosyllis phosphorea	13	7	16	6	13	55
5001232201	Ehlersia heterochaeta	1	8	11	6	28	54
50012404	Nereis spp.	1					1
5001240404	Nereis procera					5	5
5001240406	Nereis zonata	3	2	2	1		8
50012501	Nephtys spp.			1		2	3
5001250102	Nephtys ciliata				3	1	4
5001250103	Nephtys caeca	2					2
500125010401	Nephtys cornuta franciscana	1			2		3
5001250106	Nephtys rickettsi		9	4			13
5001250111	Nephtys ferruginea	1		1	1		3
5001270101	Glycera capitata	6	3	11	3	3	26
5001270104	Glycera americana	2		1			3
5001280101	Glycinde picta		1			1	2
5001280103	Glycinde armigera					2	2
5001290202	Diopatra ornata	2		1	1		4
50013101	Lumbrineris spp.	8	8	1	4	12	33
5001310101	Lumbrineris bicirrata	4		2			6
5001310108	Lumbrineris inflata					2	2
5001310109	Lumbrineris luti	4	3		1		8
5001310128	Lumbrineris limicola		1				1
5001310132	Lumbrineris californiensis	2					2
5001330103	Drilonereis longa					1	1
500133010402	Drilonereis falcata minor	1				1	2
5001330302	Notocirrus californiensis		1				1
5001360201	Protodorvillea gracilis	4	1	6	2	6	19

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 26 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5001360504	Schistomeringos rudolphi	1	2	3			6
5001400204	Naineris uncinata			5	4	10	19
5001410801	Levinsenia gracilis	9	5	7	14	1	36
5001411306	Acmira catherinae			1			1
5001420102	Apistobranchus ornatus	2	1	2			5
500143	Spionidae	33	2	90	8	83	216
5001430201	Laonice cirrata					5	5
5001430402	Polydora socialis	1					1
5001430419	Polydora armata					1	1
5001430429	Polydora brachycephala		1			1	2
5001430431	Polydora cardalia		3	3			6
5001430506	Prionospio steenstrupi	22	22	22	19	16	101
5001430521	Prionospio lighti	3		5	1		9
5001430599	Prionospio multibranchiata	4	5	3	2	3	17
5001430708	Spio butleri	3					3
5001431001	Spiophanes bombyx		2			1	3
5001431004	Spiophanes berkeleyorum	20	6	11	9	24	70
5001450102	Trochochaeta multisetosa	2	5		1	3	11
5001490101	Chaetopterus variopedatus	1	1				2
500150	Cirratulidae	12	5	24	4	4	49
5001500101	Cirratulus cirratus	29	8	53	20	76	186
5001500201	Caulleriella hamata	4		5	1	7	17
5001500202	Caulleriella alata	2	1	5		5	13
5001500302	Tharyx multifilis	1		4	1		6
5001500309	Tharyx secundus	3		3	4		10
5001500401	Chaetozone setosa	5	1	1	2	2	11
5001500489	Chaetozone acuta	2	1	1	1	3	8
5001520101	Cossura longocirrata	2	4	3	2	1	12
5001520199	Cossura modica				1		1
5001540202	Flabelligera affinis					2	2
5001540302	Pherusa plumosa	14	5	11	19	14	63
5001570101	Scalibregma inflatum					8	8
5001580202	Armandia brevis	1					1
5001590101	Sternaspis scutata		1		1		2
500160	Capitellidae	1					1
5001600101	Capitella capitata		1			1	2
50016002	Heteromastus spp.			1			1
5001600201	Heteromastus filiformis		13		3	1	17
5001600302	Notomastus tenuis	1	19	4	11	8	43
5001600402	Mediomastus californiensis	17	29	20	27	22	115
5001600601	Barantolla americana		1	2	1	2	6
500163	Maldanidae	106	25	93	37	310	571
5001630302	Maldane glebifex					26	26
50016304	Maldanella harai			1			1
5001630502	Nicomache personata	21	11	29	9	781	851
5001630701	Petaloproctus tenuis					46	46
500163070101	Petaloproctus tenuis borealis	86	22	28	11	209	356
5001630901	Praxillella gracilis	1	1				2
500163090301	Praxillella affinis pacifica	1					1
5001631001	Rhodine bitorquata					5	5
5001631103	Euclymene zonalis	1				1	2
5001640201	Myriochele heeri	1		4	2	1	8
5001650101	Idanthyrsus ornamentatus	1		1		1	3
5001650201	Sabellaria cementarium	2	1	3	3		9
5001660303	Pectinaria granulata		2				2
5001660304	Pectinaria californiensis	1	2		1	1	5
500167	Ampharetidae	4	3	10	8	22	47
5001670208	Ampharete acutifrons	2	1	3		3	9

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 26 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5001670501	Melinna cristata	1					1
5001670701	Anobothrus gracilis	2			3	2	7
5001670804	Asabellides lineata	12	6	2	7	12	39
5001672501	Schistocomus hiltoni		1	2	1	2	6
500168	Terebellidae	8	3	12	3	7	33
5001680101	Amphitrite cirrata					1	1
5001680701	Pista cristata					2	2
5001680710	Pista brevibranchiata	3	2	4	1		10
50016808	Polycirrus spp.	2	1	2	1	12	18
5001681101	Artacama coniferi	2				2	4
5001682502	Streblosoma bairdi	1	2	3	4		10
5001690101	Terebellides stroemi	5	3	6	7	2	23
5001690201	Trichobranchus glacialis				1		1
500170	Sabellidae			2			2
5001700502	Myxicola infundibulum	1					1
5001700608	Potamilla occelata	3	2			1	6
50017022	Potamethus spp.	3	3	4		2	12
5004	Oligochaeta	4	1	2	3	5	15
51	Gastropoda			1	1		2
51020502	Collisella spp.	1					1
51021003	Margarites spp.		1				1
51032001	Alvania spp.	2	6	2	1	1	12
5103509999	Nitidiscala tincta		1			7	8
51035302	Eulima spp.	1	1		2		4
51035306	Balcis spp.					5	5
5103620204	Trichotropis cancellata	4				1	5
5103640301	Crepipatella lingulata		1				1
5103760201	Natica clausa			4			4
5105030247	Mitrella gausapata		1			10	11
51050506	Mohnia spp.		2				2
51050905	Fusinus spp.		1				1
5106021107	Kurtziella plumbea	2		1			3
510801019999	Odostomia (Odostomia) spp.	6	4	6	4	1	21
51080102	Turbonilla spp.			1	1	1	3
5108011134	Turbonilla aurantia	5	5	4	2	46	62
5110040205	Cylichna attonsa	5		1	2	1	9
53	Polyplacophora		1				1
55	Bivalvia		3	4	1	2	10
5502020101	Acila castrensis	4		49	40		93
5502020201	Nucula tenuis					1	1
5502040202	Nuculana minuta	7	3	1	4	2	17
5502040289	Nuculana taphria			1		1	2
5502040504	Yoldia scissurata	13	10	19	24	12	78
55070104	Musculus spp.			1			1
5507010402	Musculus discors					1	1
5507010601	Modiolus modiolus	7	7	13	7	34	68
5509050102	Chlamys rubida			1	1		2
55090505	Propeamussium spp.	4	3	1			8
5509090103	Pododesmus cepio			1		1	2
5515010101	Parvilucina tenuisculpta	1	4	5	2	4	16
5515010201	Lucinoma acutilineata				1		1
5515020201	Axinopsida serricata	2	2			3	7
55150701	Lasaea subviridis					1	1
5515100102	Mysella tumida			2	3	2	7
5515170101	Cyclocardia ventricosa		3	6	12	2	23
5515220101	Clinocardium cilitum				1		1
5515220102	Clinocardium nuttali	1					1
5515220301	Nemocardium centifilosum		6	1	1	3	11

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 26 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
55152502	Tresus spp.		2				2
55153101	Macoma spp.		3	2	1	5	11
5515310101	Macoma calcarea	1	2			7	10
5515310102	Macoma elimata					2	2
5515310112	Macoma carlottensis	7	10	5	5	10	37
5515310115	Macoma inquinata					2	2
5517010201	Mya arenaria					2	2
5517060201	Hiatella arctica	17	14	4	3	26	64
55170604	Panopea spp.	1					1
5520050202	Lyonsia californica					1	1
6001010107	Nymphon pixellae	4	4	1		2	11
6001040201	Achelia chelata	2	2	1			5
6001060102	Phoxichilidium femoratum	1			1	4	6
6111060103	Rutiderma lomae					1	1
6111070303	Euphilomedes producta					1	1
6134020104	Balanus crenatus			1			1
6154040202	Eudorella pacifica	2	2	1	5	5	15
6154040306	Eudorellopsis longirostris	2	1	1		1	5
6157020101	Leptochelia savignyi			3			3
6157020202	Leptognathia gracilis	1		1			2
6157020204	Leptognathia brevimana	1	1			2	4
6161050101	Limnoria lignorum					1	1
6163120303	Munnogonium tillerae		1	3			4
6169020134	Ampelisca lobata			3			3
6169020301	Haploops tubicola		1		1		2
6169060203	Aoroides inermis	1					1
6169210801	Maera danae				4		4
6169211008	Melita desdichada			2	2		4
61692602	Photis spp.			1			1
6169260401	Gammaropsis thompsoni			1	2	2	5
6169270202	Ischyrocerus anguipes	2				1	3
6169342903	Orchomene pacifica					2	2
6169343101	Pachynus barnardi			1			1
6169343899	Schisturella cocula			1			1
6169371402	Synchelidium shoemakeri		1				1
6169371502	Westwoodilla caecula		4	1	2	1	8
6169420925	Paraphoxus oculatus	31	11	12	8	9	71
616942099999	Foxiphalus similis/cognatus			1	1		2
61694303	Parapleustes spp.					18	18
6169440102	Dyopedos bispinis	23	1	23	4	11	62
6169440302	Paradulichia typica	2	2		2	50	56
61694815	Metopa spp.	3			1	1	5
6171010602	Tritella pilimana	1	2	2	1	11	17
61710107	Caprella spp.	10	3				13
6171010708	Caprella irregularis					15	15
6179160408	Eualus pusiolus			1			1
61830602	Pagurus spp.		1				1
6183060223	Pagurus dalli			1	2		3
6183060301	Elassochirus tenuimanus	1					1
61870101	Oregonia spp.			1	2		3
6188030106	Cancer oregonensis			1			1
6189060301	Fabia subquadrata		1				1
61890604	Pinnixa spp.			1	1		2
72000201	Golfingia spp.					56	56
7200020103	Golfingia vularis	8	1	7	4		20
7301011401	Nellobia eusoma		1				1
730102020101	Echiurus echiurus alaskanus		1				1
8005110201	Terebratalia transversa					2	2

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 26 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
8127010607	Ophiura lutkeni				1		1
8129030202	Amphipholis squamata	4	2	4			10
81720302	Psolus spp.		1	2			3
81720601	Cucumaria spp.			1			1
8172060202	Eupentacta quinquesemita	6	5	2	5	18	36
8178010203	Leptosynapta clarki			1		1	2
8178010299	Leptosynapta transgressor	5		4	3	11	23
8401	Ascidiacea	1				4	5
8406010505	Styela gibbsii			3	1		4
84130101	Oikopleura spp.	1					1
	TOTAL ABUNDANCE	886	510	1124	543	2618	5681
	NUMBER OF TAXA	125	121	132	109	140	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 29

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
43	Nemertea	3	1			4	8
5001020201	Antinoella macrolepida	1				1	2
5001020810	Harmothoe lunulata	1		2	2	5	10
5001130102	Phyllodoce (Anaitides) groenlandica				1	1	2
5001130310	Eulalia levicornuta	1		1		2	4
5001250105	Nephtys punctata	1	1		2	4	8
5001250111	Nephtys ferruginea	1	6	6	4	17	34
5001270101	Glycera capitata		3	1	2	6	12
5001280103	Glycinde armigera					0	0
5001290103	Onuphis iridescens	1	1		2	4	8
50013101	Lumbrineris spp.				1	1	2
5001410801	Levinsenia gracilis	4	1	2		7	14
5001411306	Acmira catherinae		1			1	2
5001430201	Laonice cirrata				1	1	2
5001430506	Prionospio steenstrupi	1				1	2
5001430521	Prionospio lighti	1	1			2	4
5001431004	Spiophanes berkeleyorum	7	9	2	8	26	52
5001431701	Paraprionospio pinnata	2	1	1		4	8
5001500407	Chaetozone spinosa		1			1	2
5001520199	Cossura modica				2	2	4
5001540199	Brada sachalina		1	1	1	3	6
5001580403	Travisia pupa				1	1	2
5001580607	Ophelina acuminata			1		1	2
5001600203	Heteromastus filobranchus		1			1	2
5001600401	Mediomastus ambiseta	1				1	2
5001600402	Mediomastus californiensis	1				1	2
500163	Maldanidae	1			1	2	4
500163090301	Praxillella affinis pacifica	1	1			2	4
5001660304	Pectinaria californiensis	5	5	6	9	25	50
5001670208	Ampharete acutifrons	23	17	11	31	82	164
5001680710	Pista brevibranchiata				2	2	4
51034601	Bittium spp.	9	8	11	11	39	78
510801019999	Odostomia (Odostomia) spp.		1	3		4	8
511006999999	Melanochlamys dimedea		2			2	4
5131070101	Corambe pacifica	1				1	2
5402	Chaetodermatida				1	1	2
5502020101	Acila castrensis	2	1	2	2	7	14
5502020201	Nucula tenuis		2	2		4	8
5502040504	Yoldia scissurata	1	4	2		7	14
5515010101	Parvilucina tenuisculpta		1	1		2	4
5515010201	Lucinoma acutilineata				1	1	2
5515020201	Axinopsida serricata	13	13	12	10	48	96
5515310112	Macoma carlottensis	196	237	176	188	797	1594
5520020103	Pandora bilirata	3	1		1	5	10
6111070303	Euphilomedes producta	16	7	9	11	43	86
6153011901	Pseudomma berkeleyi		1		1	2	4
6154040115	Leucon subnasica					0	0
6154040202	Eudorella pacifica	3	6	1	1	11	22
6154050101	Diastylis alaskensis	4	2	7	3	16	32
6169020113	Ampelisca hancocki			1		1	2
6169020135	Ampelisca careyi		2		3	5	10
6169201309	Rhachotropis clemens				1	1	2
61692099	Eusirus sp.				1	1	2
6169211008	Melita desdichada					0	0
6169260312	Protomedeia prudens	3	8	2		13	26
6169340303	Anonyx lilljeborgi			2		2	4
6169341101	Cyphocaris challengeri				1	1	2
6169342904	Orchomene pinquis	6				6	12

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 29 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
6169370599	Bathymedon pumilus		1			1	2
6169420204	Harpiniopsis fulgens	1	3		1	5	10
6169420301	Heterophoxus oculatus	2	3	1		6	12
6169420925	Paraphoxus oculatus	1	1	2	1	5	10
6189060404	Pinnixa schmitti	2				2	4
8162040103	Brisaster latifrons			2	1	3	6
8170	Holothuroidea			1		1	2
81720601	Cucumaria spp.	1				1	2
8179010101	Molpadia intermedia	2	3	2		7	14
	TOTAL ABUNDANCE	339	373	284	325	1321	2642
	NUMBER OF TAXA	37	38	31	35	68	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 30

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
39	Platyhelminthes	1					1
43	Nemertea	1		1			2
47	Nematoda			4		1	5
5001020810	Harmothoe lunulata				1		1
5001021801	Lepidasthenia berkeleyae	1		2			3
5001040101	Pholoides aspera	1					1
5001060101	Pholoe minuta	7	2	4	2	1	16
5001080101	Paleonotus bellis		1			1	2
5001130202	Eteone spetsbergensis	1	2	3		1	7
5001130205	Eteone longa			1			1
5001130403	Notophyllum tectum		1	1			2
5001131101	Eulalia (Eumida) sanguinea	2	1		4		7
5001210102	Gyptis brevipalpa	4					4
5001210401	Ophiodromus pugettensis		2				2
5001230308	Syllis elongata	3					3
5001230501	Syllis alternata		3	5	2	1	11
5001230702	Exogone gemmifera		1				1
5001230703	Exogone lourei		4	2	6	8	20
5001230704	Exogone molesta					1	1
5001230706	Exogone verugera	2					2
5001230806	Sphaerosyllis brandhorsti					1	1
5001240501	Platynereis bicanaliculata	1	20	6	6	13	46
500125010401	Nephtys cornuta franciscana		2	2		5	9
5001250109	Nephtys longosetosa	1					1
5001250111	Nephtys ferruginea	8	1	6	2	3	20
5001260202	Sphaerodoropsis sphaerulifer					1	1
5001270101	Glycera capitata					1	1
5001270104	Glycera americana		1	1			2
50012801	Glycinde spp.		1				1
5001280101	Glycinde picta	2	7	5	3	2	19
5001280103	Glycinde armigera	1					1
500129	Onuphidae	3			1		4
5001290111	Onuphis elegans		1	2	2		5
5001290202	Diopatra ornata		2			1	3
50013101	Lumbrineris spp.	4	2			2	8
5001310109	Lumbrineris luti	12	10	20	15	11	68
5001310118	Lumbrineris cruzensis		2			1	3
500133010402	Drilonereis falcata minor	1					1
5001330302	Notocirrus californiensis					1	1
5001360504	Schistomeringos rudolphi		1				1
5001360505	Schistomeringos caeca			1			1
5001400102	Leitoscoloplos pugettensis		1	1	1	2	5
50014304	Polydora spp.	3					3
5001430402	Polydora socialis		1	3			4
5001430408	Polydora quadrilobata		2	1	2	5	10
5001430431	Polydora cardalia	2				2	4
5001430506	Prionospio steenstrupi	5	3	3	2	5	18
5001430521	Prionospio lighti					1	1
5001431004	Spiophanes berkeleyorum	4	1	1	2	2	10
5001431701	Paraprionospio pinnata	4	1	1	3	2	11
5001440105	Magelona longicornis		1	2			3
5001490202	Phyllochaetopterus prolifica		4		9		13
5001490302	Spiochaetopterus costarum	4	1		1		6
5001490401	Mesochaetopterus taylori	1					1
5001500302	Tharyx multifilis	3		2			5
5001500303	Tharyx parvus	25					25
5001500309	Tharyx secundus	4	2		1	4	11
5001580202	Armandia brevis	1	1		1	1	4
500160	Capitellidae					2	2

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 30 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5001600101	Capitella capitata			2			2
5001600302	Notomastus tenuis	10	15	10	4		39
50016004	Mediomastus spp.	15					15
5001600401	Mediomastus ambiseta	30					30
5001600402	Mediomastus californiensis			30	18	22	70
5001600601	Barantolla americana	4		2		2	8
500163	Maldanidae			1			1
50016309	Praxillella spp.	5					5
500163090301	Praxillella affinis pacifica	3					3
5001631103	Euclymene zonalis			1			1
5001660304	Pectinaria californiensis	1	1	3	1		6
500167	Ampharetidae			1			1
5001670101	Amage anops			1	1		2
5001670208	Ampharete acutifrons				1	3	4
5001670503	Melinna elisabethae	1					1
5001670804	Asabellides lineata					1	1
500168	Terebellidae		3	9	7	1	20
5001680101	Amphitrite cirrata		1	1			2
5001680701	Pista cristata	5	5	1	3	5	19
500168089999	Polycirrus spp. complex	131	32	35	20	40	258
5001681001	Thelepus crispus	3					3
5001681101	Artacama coniferi	3					3
500168130201	Lanassa venusta venusta				2	3	5
5001690101	Terebellides stroemi	5				3	8
5001700204	Euchone incolor	9	4	2	2	1	18
51032001	Alvania spp.		34	2	12	13	61
5105030247	Mitrella gausapata		1		2		3
5106021107	Kurtziella plumbea					1	1
510801019999	Odostomia (Odostomia) spp.		1	1			2
5110040205	Cylichna attonsa			1			1
5502020101	Acila castrensis	16	13	12	14	15	70
5502020201	Nucula tenuis			1		1	2
55070106	Modiolus spp.					1	1
5515010101	Parvilucina tenuisculpta	1	1	3	1	2	8
5515020201	Axinopsida serricata	1	2	4	3		10
5515100102	Mysella tumida	2	3	3	2		10
5515290201	Solen sicarius				2		2
5515310111	Macoma yoldiformis				1		1
5515310112	Macoma carlottensis			1		3	4
5515310114	Macoma nasuta	2	1	3		2	8
5515310204	Tellina modesta	2		1	4	1	8
5515470301	Compsomyax subdiaphana				1		1
5515470501	Psephidia lordi	1	3	2	6	4	16
5520050202	Lyonsia californica	1				1	2
6111070301	Euphilomedes carcharodonta	76	57	86	99	53	371
6111070303	Euphilomedes producta	3			3		6
6154040202	Eudorella pacifica		1			1	2
6154050101	Diastylis alaskensis			1		1	2
6157020101	Leptochelia savignyi	4	6	3	5	5	23
6169020113	Ampelisca hancocki		1			1	2
6169020208	Byblis millsi	1	3	4	3	1	12
61690602	Aoroides spp.		2		4		6
6169070101	Argissa hamatipes				1		1
6169211008	Melita desdichada		9		1	2	12
6169260307	Protomedeia articulata	2	1	1	1		5
6169260401	Gammaropsis thompsoni		4			1	5
6169342914	Orchomeme decipiens		1				1
6169371402	Synchelidium shoemakeri		2	1	2		5

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 30 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
6169371502	Westwoodilla caecula	2	5		2	3	12
6169420301	Heterophoxus oculatus	1	1				2
6169420601	Metaphoxus frequens					1	1
6179220102	Crangon alaskensis			1	2		3
6188030105	Cancer gracilis		3	1			4
6189060404	Pinnixa schmitti	14	9	8	2	2	35
812903019999	Amphiodia urtica/periercta	4	1	2	2		9
	TOTAL ABUNDANCE	470	311	321	300	278	1680
	NUMBER OF TAXA	61	64	61	54	61	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 32

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
3759010102	Edwardsia sipunculoides	4		1		1	6
37590401	Halcampa spp.					1	1
3759040101	Halcampa decemtentaculata	2					2
39	Platyhelminthes		3				3
43	Nemertea	5	6		2	7	20
5001020603	Gattyana cirrosa		1				1
5001020810	Harmothoe lunulata				1		1
5001021805	Lepidasthenia longicirrata	1	1		2		4
5001022301	Tenonia kitsapensis	1					1
5001040101	Pholoides aspera	43	95	21	45	79	283
5001060101	Pholoe minuta	2	1	3		2	8
5001060305	Sthenalais tertiaglabra		1				1
5001130102	Phyllodoce (Anaitides) groenlandica		1	1	2		4
50011302	Eteone spp.				1	1	2
5001130205	Eteone longa				1		1
50011303	Eulalia (Eulalia) spp.	3					3
5001130306	Eulalia quadrioculata					1	1
5001130308	Eulalia (Eumida) bilineata		4	4	3	4	15
5001131101	Eulalia (Eumida) sanguinea	12	14	13	13	18	70
5001210102	Gyptis brevipalpa	1	1			1	3
50012302	Pionosyllis spp.		2	1	1	2	6
50012303	Syllis spp.					1	1
5001230308	Syllis elongata	3	2				5
50012307	Exogone spp.	6	1				7
5001230702	Exogone gemmifera	8					8
5001230706	Exogone verugera		18	16	6	18	58
5001231303	Odontosyllis phosphorea	3	2		1	2	8
5001240501	Platynereis bicanaliculata		9	1	3	3	16
50012501	Nephtys spp.	2	2		2	1	7
5001250111	Nephtys ferruginea	4	2	2	3	6	17
5001270101	Glycera capitata		1		3	1	5
5001270104	Glycera americana			2		1	3
5001280101	Glycinde picta			4	3		7
5001280103	Glycinde armigera	4			2	3	9
5001280202	Goniada maculata	1		1			2
500129	Onuphidae		5	1	5	12	23
50012901	Onuphis spp.	6					6
5001290111	Onuphis elegans	6		2	2	1	11
5001290202	Diopatra ornata	2	4		2	6	14
50013101	Lumbrineris spp.	11	2		22	6	41
5001310104	Lumbrineris latreilli	1					1
5001310109	Lumbrineris luti	1					1
5001310132	Lumbrineris californiensis	28	13	8	30	28	107
500133010402	Drilonereis falcata minor		2		1		3
5001360101	Dorvillea pseudorubrovittata	19	23	5	6	14	67
5001411306	Acmira catherinae			2	3	4	9
5001420102	Apistobranchus ornatus	1					1
50014302	Laonice spp.		1		1		2
50014304	Polydora spp.		2		1	2	5
5001430401	Polydora giardi				1		1
5001430506	Prionospio steenstrupi	15	24	14	7	15	75
5001430521	Prionospio lighti				1	1	2
5001430599	Prionospio multibranchiata		1				1
5001430703	Spio cirrifera				1	1	2
5001431001	Spiophanes bombyx				1		1
5001431701	Paraprionospio pinnata	4	2		1	1	8
5001440105	Magelona longicornis	3	1	6	5	6	21
500149	Chaetopteridae			1			1
5001490202	Phyllochaetopterus prolifica			2	13	7	22

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 32 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5001490302	Spiochaetopterus costarum	24	25	7	8	10	74
5001490401	Mesochaetopterus taylori			5	5	3	13
500150	Cirratulidae	2					2
5001500101	Cirratulus cirratus	7	3	1	6	10	27
5001500202	Caulleriella alata	3					3
50015003	Tharyx spp.	1	1	3	7	2	14
5001500302	Tharyx multifilis			1			1
5001500401	Chaetozone setosa		3		5	4	12
5001540102	Brada villosa	1					1
5001540202	Flabelligera affinis		1				1
5001540302	Pherusa plumosa					1	1
5001580607	Ophelina acuminata	1					1
5001600302	Notomastus tenuis	12	3	12	10	4	41
5001600303	Notomastus lineatus			1			1
50016004	Mediomastus spp.			1			1
5001600402	Mediomastus californiensis	4				3	7
5001600501	Decamastus gracilis			1	2	4	7
5001630502	Nicomache personata				3		3
5001630903	Praxillella affinis				2	6	8
500163099999	Praxillella sp. A.	4		4			8
5001631001	Rhodine bitorquata					1	1
5001631206	Clymenura columbiana		2	2			4
5001632	Nicomachinae				2		2
5001640102	Owenia fusiformis			1			1
5001650101	Idanthyrsus ornamentatus	1	1			1	3
5001650201	Sabellaria cementarium			1			1
5001660303	Pectinaria granulata	16	17	2	10	19	64
5001660304	Pectinaria californiensis	3			7	3	13
5001670101	Amage anops	1	2			1	4
50016702	Ampharete spp.	1	2	1	3	1	8
5001670208	Ampharete acutifrons				2		2
5001670214	Ampharete finmarchica		2				2
5001670701	Anobothrus gracilis	3		5		3	11
5001672502	Schistocomus hiltoni					1	1
5001680601	Nicolea zostericola		1				1
5001680701	Pista cristata	3		4	2	3	12
5001680703	Pista elongata		1				1
50016808	Polycirrus spp.	1	1				2
500168089999	Polycirrus spp. complex			3			3
5001681004	Thelepus setosus	1	1		1	1	4
500170	Sabellidae	1		1	1		3
5001700602	Potamilla myriops			1			1
5001700701	Potamilla intermedia		1				1
5001700802	Sabella media	1	1		2	3	7
50017022	Potamethus spp.				1		1
51032001	Alvania spp.	13	1		1	2	17
51034601	Bittium spp.	4	2	2	2	3	13
51035302	Eulima spp	1					1
51035306	Balcis spp.			2		2	4
5103760201	Natica clausa		1				1
5105030247	Mitrella gausapata	1					1
5105100102	Olivella baetica	2	1	1			4
5106021107	Kurtziella plumbea					1	1
510801019999	Odostomia (Odostomia) spp.	6		2	6	8	22
51080102	Turbonilla spp.				1		1
5108011134	Turbonilla aurantia	2	1		2	3	8
5110010401	Rictaxis punctocaelatus	2					2
5110040205	Cylichna attonsa	1		1			2

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 32 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
511006999999	Melanochlamys dimedea			2			2
5402	Chaetodermatida			1			1
55	Pelecypoda		1				1
55	Bivalvia		1				1
5502020201	Nucula tenuis			1			1
5502040202	Nuculana minuta	1	1				2
5507010301	Megacrenella columbiana	7	5	9	12	8	41
5507010402	Musculus discors		1				1
55070106	Modiolus spp.	2					2
5507010601	Modiolus modiolus		3		1	3	7
5515010101	Parvilucina tenuisculpta	8	5	5	5	3	26
5515020102	Adontorhina cyclica				1		1
5515020201	Axinopsida serricata	3		3	1		7
5515100102	Mysella tumida	4	2	2	5	2	15
55152201	Clinocardium spp.	2					2
5515220101	Clinocardium cilitum				1		1
5515220301	Nemocardium centifilosum	3	4		1	2	10
5515310102	Macoma elimata	4	3	4	7	12	30
5515310111	Macoma yoldiformis	2		1	2	3	8
5515310112	Macoma carlottensis	37	17	10	10	11	85
5515310204	Tellina modesta	2		2			4
55154704	Liocyma spp.				1		1
5515470501	Psephidia lordi	3		1			4
55170103	Platyodon sp.	1		1	1	4	7
5517060201	Hiatella arctica		2	3	3	2	10
5520050202	Lyonsia californica	2		4	2	1	9
5520080203	Thracia trapezoides	1					1
6111070301	Euphilomedes carcharodonta	107	78	93	82	92	452
6111070303	Euphilomedes producta		1		1		2
6154040202	Eudorella pacifica					2	2
6154040306	Eudorellopsis longirostris	1	1		1		3
6154050101	Diastylis alaskensis	1					1
6154070105	Campylaspis hartae		1				1
6157020101	Leptochelia savignyi	4		2	1		7
6157020202	Leptognathia gracilis					1	1
6160011601	Haliophasma geminata		1				1
6169020134	Ampelisca lobata	1	6			2	9
6169020208	Byblis millsi	5	5	1	2	4	17
61690602	Aoroides spp.	1	2				3
61691502	Corophium spp.				1	3	4
6169150203	Corophium crassicorne	3		3			6
6169341411	Hippomedon coecus	1	3	4	4		12
61693708	Monoculodes spp.				1	1	2
6169371402	Synchelidium shoemakeri	1	1	2	1		5
6169371502	Westwoodilla caecula	11	3	7	3		24
6169400302	Pardalisca cuspidata				1		1
6169420301	Heterophoxus oculatus	5	8	3	2	3	21
6169420601	Metaphoxus frequens	1					1
6169421504	Rhepoxynius abronius		3	1		1	5
6171010602	Tritella pilimana					2	2
6179160204	Spirontocaris snyderi				1		1
61830402	Callianassa spp.				1		1
6189060404	Pinnixa schmitti	3	2	8	2	2	17
7200020104	Golfingia pugettensis	6	2	6	4	3	21
77	Phoronida	1					1
8005110201	Terebratalia transversa	5	4	1	2	2	14
811301	Solasteridae		1				1
8127010607	Ophiura lutkeni	1					1

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 32 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
812903019999	Amphiodia urtica/periercta				2	4	6
8129030202	Amphipholis squamata	2	5				7
8136	Echinoidea	1		1			2
81490302	Strongylocentrous spp.		1				1
81720601	Cucumaria spp.	2	4		1		7
8172060109	Cucumaria lubrica				1		1
8172060111	Cucumaria piperata	11	10	7	2	3	33
8172060202	Eupentacta quinquesemita	4	6	1	6	6	23
8178010203	Leptosynapta clarki				1		1
8178010299	Leptosynapta transgressor				6		6
	TOTAL ABUNDANCE	585	514	365	470	542	2476
	NUMBER OF TAXA	99	89	77	99	88	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 33

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
3759010102	Edwardsia sipunculoides		3		1		4
43	Nemertea	2	2		1	2	7
5001020810	Harmothoe lunulata	1	1		1		3
5001022301	Tenonia kitsapensis			1		1	2
5001040101	Pholoides aspera	2	14	7	9	5	37
5001060101	Pholoe minuta	2	1				3
5001130102	Phyllodoce (Anaitides) groenlandica		1				1
5001130112	Phyllodoce (Anaitides) longipes			1	1		2
5001130114	Phyllodoce (Anaitides) williamsi					1	1
5001130202	Eteone spetsbergensis	1	1		1		3
5001130308	Eulalia (Eumida) bilineata	1	3	4	4	3	15
5001130803	Phyllodoce (Paranaitis) polynoides		1				1
5001131101	Eulalia (Eumida) sanguinea	2	4	3	6	4	19
5001131402	Phyllodoce (Aponaitides) hartmanae			1			1
5001210102	Gyptis brevipalpa		2				2
5001210401	Ophiodromus pugettensis			1	2		3
500123	Armillaris					1	1
5001230396	Syllis sp. II		1				1
5001230501	Syllis alternata			1		1	2
5001230703	Exogone lourei	3			2	1	6
5001230806	Sphaerosyllis brandhorsti				1		1
5001232201	Ehlersia heterochaeta	1			1	1	3
5001240501	Platynereis bicanaliculata		1			1	2
500125	Nephtyidae	1			3		4
50012501	Nephtys spp.		3				3
500125010401	Nephtys cornuta franciscana	4		1	5	2	12
5001250111	Nephtys ferruginea	9	8	8	10	7	42
5001260202	Sphaerodoropsis sphaerulifer	2		1	5	1	9
50012701	Glycera spp.			1			1
5001270101	Glycera capitata	8	7	6	15	14	50
5001280101	Glycinde picta		1	1			2
5001280103	Glycinde armigera	1	2	1		2	6
5001280202	Goniada maculata	2	1	1			4
500129	Onuphidae	2			3	4	9
5001290111	Onuphis elegans		1	5	2	1	9
5001290202	Diopatra ornata	2	5	1	5	3	16
50013101	Lumbrineris spp.	14	18	10	7	15	64
5001310109	Lumbrineris luti	3			1	3	7
5001310111	Lumbrineris pallida		8				8
5001310118	Lumbrineris cruzensis				1		1
5001310128	Lumbrineris limicola		1	1		1	3
5001310132	Lumbrineris californiensis	2		24	6	17	49
5001330302	Notocirrus californiensis				1		1
5001360505	Schistomeringos caeca				1		1
5001400102	Leitoscoloplos pugettensis		6	1		2	9
5001411306	Acmira catherinae	1			1	1	3
5001420102	Apistobranchus ornatus	1	2	5	6	2	16
500143	Spionidae					2	2
5001430201	Laonice cirrata		1		1		2
50014304	Polydora spp.		1				1
5001430402	Polydora socialis	1		3	2		6
5001430419	Polydora armata				13	9	22
5001430431	Polydora cardalia			5		1	6
5001430506	Prionospio steenstrupi	57	23	36	86	29	231
5001430521	Prionospio lighti			1	6		7
5001430599	Prionospio multibranchiata				2		2
5001430806	Polydora (Boccardiella) hamata			1	2		3
5001431004	Spiophanes berkeleyorum	4		3	3	1	11
5001431701	Paraprionospio pinnata	2	1	1	2	1	7

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 33 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5001440105	Magelona longicornis	9	4	7	18	8	46
500149	Chaetopteridae		1				1
5001490302	Spiochaetopterus costarum	2	14	11	13	4	44
5001490401	Mesochaetopterus taylori		3		2	4	9
500150	Cirratulidae	1		4	1	1	7
5001500202	Caulleriella alata				3		3
50015003	Tharyx spp.		5				5
5001500302	Tharyx multifilis	2		2	2	3	9
5001500303	Tharyx parvus		4				4
5001500309	Tharyx secundus	3		6	6	3	18
5001500401	Chaetozone setosa	6	4	1	4		15
5001500407	Chaetozone spinosa				8	1	9
5001520201	Cossura longocirrata		1	1			2
500160	Capitellidae				6	1	7
5001600101	Capitella capitata	7					7
5001600302	Notomastus tenuis	12	10	18	32	30	102
5001600303	Notomastus lineatus		1				1
5001600402	Mediomastus californiensis	3	1	2	3	1	10
500163	Maldanidae			1	1		2
50016309	Praxillella spp.	2		1	5	5	13
5001630901	Praxillella gracilis				1		1
5001631	Euclymeninae		1				1
5001631001	Rhodine bitorquata				1	1	2
5001632001	Isocirrus longiceps		2		1		3
5001640201	Myriochele heeri	35			10		45
5001660303	Pectinaria granulata	5	13	17	8	12	55
5001660304	Pectinaria californiensis	6	5	5	5	8	29
500167	Ampharetidae				1	1	2
5001670101	Amage anops		1	1			2
5001670208	Ampharete acutifrons		3				3
5001670701	Anobothrus gracilis	2	4	5	1	4	16
5001680101	Amphitrite cirrata			1			1
50016807	Pista spp.		1				1
50016808	Polycirrus spp.		1				1
500168089999	Polycirrus spp. complex	1		1			2
5001681101	Artacama coniferi	1					1
500168130201	Lanassa venusta venusta	4					4
5001681803	Scionella estevanica	2		2	4	5	13
50016901	Terebellides spp.	2		1	3	4	10
5001700106	Chone magna					1	1
5001700401	Magalomma splendida		1				1
5004	Oligochaeta				1		1
51032001	Alvania spp.	20	37	2	15	8	82
51035306	Balcis spp.			1			1
51036402	Crepidula spp.		1				1
5103640301	Crepipatella lingulata			1			1
5103760402	Polinices pallida	1					1
5105030247	Mitrella gausapata	1	4	5	8		18
5105080101	Nassarius mendicus				2	1	3
5106021107	Kurtziella plumbea					1	1
510801019999	Odostomia (Odostomia) spp.	5	4	3	11	3	26
51080102	Turbonilla spp.			2			2
5108011134	Turbonilla aurantia		2		1		3
5110040205	Cylichna attonsa		1		1		2
5110070101	Gastropteron pacificum					1	1
5502020201	Nucula tenuis	27	5	17	13	5	67
5502040202	Nuculana minuta			1			1
5502040504	Yoldia scissurata		1				1

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 33 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5507010301	Megacrenella columbiana	14	2	11	5	8	40
5515010101	Parvilucina tenuisculpta	8	8	9	7	7	39
5515010201	Lucinoma acutilineata	1	1	1		1	4
5515020102	Adontorhina cyclica	1					1
5515020201	Axinopsida serricata	94	40	80	97	37	348
5515020301	Thyasira flexuosa	1			3	1	5
5515100102	Mysella tumida	1	4	2	2		9
5515220301	Nemocardium centifilosum	4	3		6	1	14
55153101	Macoma spp.	8		1	4	1	14
5515310102	Macoma elimata	4	5	7	4	16	36
5515310111	Macoma yoldiformis			1			1
5515310112	Macoma carlottensis	12	17	9	28	9	75
5515310114	Macoma nasuta	16	8	4	9	6	43
5515470301	Compsomyax subdiaphana	2	1			1	4
55170102	Mya spp.	1					1
5517060201	Hiatella arctica	3	2				5
5520050202	Lyonsia californica	3		2	3	1	9
611103	Cylindroleberididae	1	2				3
6111060103	Rutiderma lomae	1	2	2	6		11
6111070301	Euphilomedes carcharodonta	160	148	112	112	119	651
6111070303	Euphilomedes producta	36	14	16	48	21	135
6134020104	Balanus crenatus	1	1	1			3
6153011001	Inusitatomysis insolita	1					1
6153011301	Mysidella americana			1			1
6154040115	Leucon subnasica				1		1
6154040202	Eudorella pacifica		1				1
6154040306	Eudorellopsis longirostris					1	1
6154070111	Campylapsis crispa				1		1
6157020101	Leptochelia savignyi	9	11	6	8	4	38
6157020202	Leptognathia gracilis		2	1			3
6157020204	Leptognathia brevimana	1					1
6160011601	Haliophasma geminata	1		1	2	2	6
6163120202	Pleurogonium rubicundum				1		1
6169020134	Ampelisca lobata				1		1
6169020135	Ampelisca careyi	1			1		2
6169020208	Byblis millsi	1		1			2
61691502	Corophium spp.	1	1				2
6169260307	Protomedeia articulata				1		1
6169342914	Orchomeme decipiens		1				1
6169371402	Synchelidium shoemakeri	1	1	1			3
6169371502	Westwoodilla caecula	1	1	2		1	5
6169420301	Heterophoxus oculatus		4	5		1	10
61890604	Pinnixa spp.	2		1	1	4	8
72000201	Golfingia spp.	2			1		3
7200020104	Golfingia pugettensis			1	3	3	7
77	Phoronida		1				1
8120	Ophiuroidea		2				2
8127010607	Ophiura lutkeni				1	1	2
812903019999	Amphiodia urtica/periercta	2	1	2	10	2	17
8129030999	Amphioplus strongyloplax	1			3	3	7
8170	Holothuroidea		1				1
8172060113	Cucumaria pseudocurata			1			1
81720603	Pentamera spp.					1	1
8172060301	Pentamera pseudocalcigera		2	3	3	1	9
	TOTAL ABUNDANCE	686	546	539	782	508	3061
	NUMBER OF TAXA	87	90	87	100	85	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 34

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
3743010303	Pachycerianthus fimbriatus		2				2
43	Nemertea		2			2	4
5001020810	Harmothoe lunulata			1		1	2
5001021601	Polyeunoa tuta		1	1			2
5001022301	Tenonia kitsapensis		1	1			2
5001060101	Pholoe minuta	1	1	1		1	4
5001130114	Phyllodoce (Anaitides) williamsi		1				1
5001130202	Eteone spetsbergensis		1				1
5001130205	Eteone longa		1				1
5001131101	Eulalia (Eumida) sanguinea	4	2		3	1	10
50011314	Phyllodoce spp.		1				1
5001131402	Phyllodoce (Aponaitides) hartmanae					1	1
5001210102	Gyptis brevipalpa	6	1				7
5001210202	Microphthalmus aberrans	1					1
5001210401	Ophiodromus pugettensis		1				1
5001230201	Pionosyllis gigantea				1		1
5001230512	Syllis variegata				1	1	2
5001240501	Platynereis bicanaliculata	1	1				2
5001250103	Nephtys caeca		1				1
500125010401	Nephtys cornuta franciscana	1		1			2
5001250111	Nephtys ferruginea		1	1		2	4
5001280101	Glycinde picta	1	1				2
5001280103	Glycinde armigera	1					1
50013101	Lumbrineris spp.	24	26	17	18	20	105
5001310109	Lumbrineris luti	22	10	31	5	17	85
5001310118	Lumbrineris cruzensis	31	15	15	9	6	76
5001360505	Schistomeringos caeca	1	1				2
5001410801	Levinsenia gracilis	1	1	1			3
5001430201	Laonice cirrata					1	1
5001430402	Polydora socialis				1		1
5001430415	Polydora limicola		3	1		2	6
5001430429	Polydora brachycephala		1				1
5001430431	Polydora cardalia	28	4	22	20	12	86
5001430506	Prionospio steenstrupi	6	6	12	7	8	39
5001430521	Prionospio lighti	22	4	2	2		30
5001431004	Spiophanes berkeleyorum	1	4		1	2	8
5001431701	Paraprionospio pinnata	31	25	24	14	26	120
5001490202	Phyllochaetopterus prolifica	950	536	51	1119	539	3195
5001490302	Spiochaetopterus costarum	7	7	8	3	4	29
500150	Cirratulidae	16	13	13	9	10	61
5001500302	Tharyx multifilis	35	64	29	7	34	169
5001500309	Tharyx secundus	47	8	3		5	63
5001500401	Chaetozone setosa	3	1				4
5001520101	Cossura longocirrata	2	2	1	1		6
5001540202	Flabelligera affinis				1		1
5001580202	Armandia brevis	1			2	1	4
5001580607	Ophelina acuminata			1			1
5001600203	Heteromastus filobranchus		1				1
5001600402	Mediomastus californiensis		4	2			6
500163	Maldanidae				2		2
500163090301	Praxillella affinis pacifica	2	1	6		1	10
5001650201	Sabellaria cementarium					1	1
5001660304	Pectinaria californiensis	1					1
500167	Ampharetidae	1					1
5001670101	Amage anops		1				1
5001670304	Amphicteis scaphobranchiata	2	2	2			6
5001670701	Anobothrus gracilis		1				1

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 34 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5001670804	Asabellides lineata			1			1
5001680401	Neoamphitrite robusta		1	1			2
50016808	Polycirrus spp.		1		1	1	3
5001680810	Polycirrus californicus	3	1				4
5001690101	Terebellides stroemi	2	1	1			4
5001730101	Pseudochitinopoma occidentalis	34	13		5	4	56
5001730602	Spirorbis spirillum	13	2		10	25	50
51032001	Alvania spp.	13	15	1	1	9	39
5103640301	Crepipatella lingulata	1					1
5105030202	Mitrella tuberosa		1	1			2
5105080101	Nassarius mendicus					3	3
510801019999	Odostomia (Odostomia) spp.	3	4	8	1	3	19
5108011134	Turbonilla aurantia				1		1
5502020101	Acila castrensis	12	10	9	9	15	55
5507010601	Modiolus modiolus	1					1
55090501	Chlamys spp.	3	2				5
5515010101	Parvilucina tenuisculpta		1		1		2
5515020201	Axinopsida serricata	6	2	3	4	2	17
5515100102	Mysella tumida	5	4	1	9	2	21
5515470501	Psephidia lordi		2	1		3	6
6134020104	Balanus crenatus	15		4	2	20	41
6154040202	Eudorella pacifica	46	43	27	21	30	167
61690201	Ampelisca spp.		1				1
6169020135	Ampelisca careyi	1		2	1	5	9
6169060203	Aoroides inermis	1					1
61691502	Corophium spp.		5	1			6
61692603	Protomedeia spp.	2		1			3
6169260307	Protomedeia articulata		7				7
6169371502	Westwoodilla caecula		1			1	2
6169420301	Heterophoxus oculatus	46	26	33	25	39	169
616942099999	Foxiphalus similis/cognatus				1		1
61694499	Dyopedos spp.	1					1
6171010719	Caprella mendax					1	1
6179160201	Spirontocaris prionata		2				2
6179160511	Heptacarpus stimpsoni		2	1	1		4
6179220102	Crangon alaskensis				3		3
6179220115	Mesocrangon munitella				1		1
61870101	Oregonia spp.		1				1
6189060404	Pinnixa schmitti	64	20	20	33	25	162
8120	Ophiuroidea		1				1
812903019999	Amphiodia urtica/periercta	4	3	5	1	9	22
8172060202	Eupentacta quinquesemita		1		1	1	3
8401	Ascidiacea					1	1
8406020101	Pyura haustor		1				1
8842120402	Anoplarchus puperscens				1		1
	TOTAL ABUNDANCE	1526	934	368	1359	897	5084
	NUMBER OF TAXA	51	70	44	42	44	

NTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 35

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
3743010303	Pachycerianthus fimbriatus		2	1			3
3754010103	Stylatula elongata		2			1	3
39	Platyhelminthes	6			3	1	10
43	Nemertea	4		2	2	2	10
5001020810	Harmothoe lunulata		1				1
5001022301	Tenonia kitsapensis		2				2
5001060101	Pholoe minuta	6	10	6	10	16	48
5001130102	Phyllodoce (Anaitides) groenlandica		1				1
5001130201	Eteone californica	2	1	1	2	1	7
5001130205	Eteone longa				2		2
5001131101	Eulalia (Eumida) sanguinea	13		3	5		21
5001210102	Gyptis brevipalpa	1	1	2	2		6
5001210401	Ophiodromus pugettensis	2	1	1	2		6
5001230201	Pionosyllis gigantea				1		1
5001230512	Syllis variegata	3		2			5
5001230806	Sphaerosyllis brandhorsti		1				1
5001240501	Platynereis bicanaliculata				2		2
500125010401	Nephtys cornuta franciscana	3	2	1	2		8
5001250111	Nephtys ferruginea		2	1	1		4
5001270101	Glycera capitata			1		1	2
5001280101	Glycinde picta	1		1		3	5
5001280103	Glycinde armigera					1	1
50013101	Lumbrineris spp.	3	14	4	4	7	32
5001310109	Lumbrineris luti	8	13	14	5	8	48
5001310118	Lumbrineris cruzensis	7	10	5	4	1	27
5001410801	Levinsenia gracilis	3	1	1	1	3	9
5001430402	Polydora socialis			1			1
5001430415	Polydora limicola	1	1			1	3
5001430431	Polydora cardalia	7	1	1	1	4	14
5001430521	Prionospio lighti	11	52	11	20	2	96
5001431004	Spiophanes berkeleyorum		1				1
5001431701	Paraprionospio pinnata	3	8	6	6	3	26
5001490202	Phyllochaetopterus prolifica	245		140	182		567
5001490302	Spiochaetopterus costarum	3	5	1	2	7	18
5001500101	Cirratulus cirratus	3	10	4	5		22
5001500302	Tharyx multifilis	84	13	30	8	2	137
5001500308	Tharyx tesselata		7	6	4	2	19
5001520101	Cossura longocirrata	5	1	2	3		11
5001540302	Pherusa plumosa	1					1
5001580607	Ophelina acuminata	1					1
5001600402	Mediomastus californiensis		2				2
500163090301	Praxillella affinis pacifica	1	4	2	2	1	10
5001650201	Sabellaria cementarium	2					2
5001660304	Pectinaria californiensis				1	1	2
5001670306	Amphicteis mucronata	1		1			2
5001670503	Melinna elisabethae					1	1
500168	Terebellidae			1			1
5001680601	Nicolea zostericola				1		1
5001680810	Polycirrus californicus	8		17	13	4	42
5001690101	Terebellides stroemi	2	6	3	1	4	16
5001730602	Spirorbis spirillum	35	1		43		79
51032001	Alvania spp.	6		12	5		23
5103350599	Petaloconchus compactus			12			12
51034602	Cerithiopsis signa			1			1
51036402	Crepidula spp.	1					1
5105030202	Mitrella tuberosa	2		1			3
5105030247	Mitrella gausapata	1		4	3		8
5105080101	Nassarius mendicus	1					1
510801019999	Odostomia (Odostomia) spp.	12	27	7	29	22	97

NTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 35

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
51080102	Turbonilla spp.	3		3	3		9
5502020101	Acila castrensis	2	9	1		1	13
5502040504	Yoldia scissurata					1	1
5507010601	Modiolus modiolus	1					1
5515020201	Axinopsida serricata					1	1
5515100102	Mysella tumida	3	1	1	1		6
5517060201	Hiatella arctica				1		1
6111070301	Euphilomedes carcharodonta	3	2		2	2	9
6134020104	Balanus crenatus	1					1
6154040202	Eudorella pacifica	59	73	44	68	93	337
6169020135	Ampelisca careyi		1				1
61691502	Corophium spp.	5		1			6
6169371502	Westwoodilla caecula	1	1		1	1	4
6169420301	Heterophoxus oculatus	17		23	16	9	65
6179160511	Heptacarpus stimpsoni	2		1			3
6179220115	Mesocrangon munitella	1		1			2
6188030105	Cancer gracilis	1					1
6189060404	Pinnixa schmitti	78	86	105	99	109	477
7200020104	Golfingia pugettensis			2	1		3
8114030101	Dermasterias imbricata	1					1
812903019999	Amphiodia urtica/periercta	42	14	37	52	46	191
8129030202	Amphipholis squamata	1					1
8129030999	Amphioplus strongyloplax				1		1
81720601	Cucumaria spp.					1	1
8172060111	Cucumaria piperata	2		3	2		7
8172060202	Eupentacta quinquesemita		1		1		2
8401	Ascidiacea	1					1
	TOTAL ABUNDANCE	722	391	531	625	363	2632
	NUMBER OF TAXA	56	40	49	47	35	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 38

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
43	Nemertea		1		1	2	4
5001020201	Antinoella macrolepida	1	1				2
5001021702	Hesperone adventor			2			2
5001130102	Phyllodoce (Anaitides) groenlandica					1	1
5001210102	Gyptis brevipalpa	2					2
5001250111	Nephtys ferruginea	1	1	1			3
5001270101	Glycera capitata			1	1		2
5001280103	Glycinde armigera					1	1
5001290103	Onuphis iridescens					1	1
5001290111	Onuphis elegans			1			1
50013101	Lumbrineris spp.					1	1
5001410801	Levinsenia gracilis	3		5			8
5001430201	Laonice cirrata	1	1	1	1		4
5001430506	Prionospio steenstrupi	1			1		2
5001430521	Prionospio lighti	2		2			4
5001431004	Spiophanes berkeleyorum	2	1				3
5001431701	Paraprionospio pinnata	1	1	6		2	10
5001490302	Spiochaetopterus costarum		1				1
5001500302	Tharyx multifilis				1		1
5001520101	Cossura longocirrata			1			1
5001540199	Brada sachalina	1			1	3	5
5001580403	Travisia pupa	1	1				2
500163090301	Praxillella affinis pacifica			1			1
5001660304	Pectinaria californiensis	5	8	7	7	7	34
5001670208	Ampharete acutifrons		2	2		3	7
51034601	Bittium spp.		3		1		4
510801019999	Odostomia (Odostomia) spp.		2	2	2		6
5110040205	Cylichna attonsa					1	1
511006999999	Melanochlamys dimedea		1				1
5402	Chaetodermatida	7	3	2	1	2	15
55	Bivalvia		1				1
5502020201	Nucula tenuis	1			1		2
5502040504	Yoldia scissurata	1		1		1	3
5515010201	Lucinoma acutilineata			1		1	2
5515020201	Axinopsida serricata					2	2
5515220301	Nemocardium centifilosum			1			1
5515310112	Macoma carlottensis	19	57	59	59	59	253
6111070303	Euphilomedes producta	8	14	8	11	19	60
6153011901	Pseudomma berkeleyi		2	1	1		4
6154040115	Leucon subnasica		1	1			2
6154040202	Eudorella pacifica	6	24	8	4	12	54
6154040301	Eudorellopsis integra	3	10	3	2	3	21
6154050101	Diastylis alaskensis			2			2
6169020135	Ampelisca careyi	1	1	2			4
6169201309	Rhachotropis clemens		1				1
6169211008	Melita desdichada	1					1
6169260312	Protomedeia prudens	5	8	5	6	6	30
61693501	Melphidippa spp.					2	2
61693704	Arrhis spp.					2	2
61693705	Bathymedon spp.	1		3	1	1	6
6169420204	Harpiniopsis fulgens	2	1	2	1		6
6169420301	Heterophoxus oculatus	3	2	2	6	5	18
6169420925	Paraphoxus oculatus	1		5	4		10
61694499	Dyopedos spp.	1					1
6174020101	Euphausia pacifica		1				1
6183020499	Axiopsis spinulicauda			1			1
61890604	Pinnixa spp.	1					1
7301011401	Nellobia eusoma	1	1				2
812903019999	Amphiodia urtica/periercta		1			2	3

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 38 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
8179010101	Molpadia intermedia	2	1		3	3	9
83000003	Sagitta spp.	1				1	2
	TOTAL ABUNDANCE	86	153	139	116	143	637
	NUMBER OF TAXA	31	30	31	22	26	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 39

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
3754020201	Ptilosarcus gurneyi	1	1	2	1		5
3759010102	Edwardsia sipunculoides		4				4
43	Nemertea	1	1			1	3
5001060101	Pholoe minuta			2			2
5001130201	Eteone californica					1	1
5001130299	Eteone spilotus		1				1
5001130803	Phyllodoce (Paranaitis) polynoides					1	1
5001131101	Eulalia (Eumida) sanguinea	1		2	2	2	7
5001230704	Exogone molesta		1				1
5001232201	Syllis heterochaeta			1			1
5001240404	Nereis procera	1					1
5001240501	Platynereis bicanaliculata	1	1	6	1	4	13
50012501	Nephtys spp.			5	4	2	11
5001250109	Nephtys longosetosa		1	2			3
5001250111	Nephtys ferruginea	2	1		1	2	6
50012701	Glycera spp.				1		1
5001270104	Glycera americana			1	1	2	4
5001280103	Glycinde armigera	4	7	5	7	4	27
5001290103	Onuphis iridescens		2	4	1	2	9
5001290111	Onuphis elegans	3					3
5001290202	Diopatra ornata	1		3		1	5
50013101	Lumbrineris spp.		1				1
5001310132	Lumbrineris californiensis			2	2	1	5
5001400102	Leitoscoloplos pugettensis		3	1	4	5	13
5001400311	Scoloplos acmeceps	1					1
5001411302	Acesta lopezi	1	3			1	5
5001430506	Prionospio steenstrupi	5	1	11	10	29	56
5001430521	Prionospio lighti					1	1
5001440105	Magelona longicornis		1				1
5001490202	Phyllochaetopterus prolifica			1			1
5001490302	Spiochaetopterus costarum	6	3	4	4	5	22
500150	Cirratulidae	1					1
5001500302	Tharyx multifilis		1				1
5001500401	Chaetozone setosa	1		1	1	1	4
5001600302	Notomastus tenuis	5	2	6	1	4	18
5001600303	Notomastus lineatus		2		1	1	4
5001600402	Mediomastus californiensis	1	1	3		1	6
5001630802	Axiothella rubrocincta	1					1
5001631103	Euclymene zonalis					1	1
5001660303	Pectinaria granulata			1			1
5001670701	Anobothrus gracilis	1					1
500168	Terebellidae		1				1
50016808	Polycirrus spp.					1	1
5001680810	Polycirrus californicus					1	1
500168089999	Polycirrus spp. complex	1					1
5001681803	Pista estevanica				1		1
5001681803	Scionella estevanica				1		1
5001682502	Streblosoma bairdi	4		7	4		15
5001700602	Pseudopotamilla myriops			1			1
5004	Oligochaeta			1		2	3
51032001	Alvania spp.					2	2
51034601	Bittium spp.					2	2
51035302	Eulima spp.		2		1	1	4
5105030247	Mitrella gausapata	1	3	2			6
5105080101	Nassarius mendicus	1			1	1	3
5105100102	Olivella baetica	5	2	3	3	4	17
5106021107	Kurtziella plumbea					1	1
510801019999	Odostomia (Odostomia) spp.			2			2
51080102	Turbonilla spp.					1	1

STATION 39 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5108011134	Turbonilla aurantia	2	1				3
55	Bivalvia					1	1
5507010301	Megacrenella columbiana		1				1
5515010101	Parvilucina tenuisculpta	26	23	15	15	11	90
5515010201	Lucinoma acutilineata				1		1
5515020201	Axinopsida serricata	1	3	6	1	2	13
5515100102	Mysella tumida	2	3	3	2	4	14
5515220101	Clinocardium cilitum	1		1		1	3
5515290201	Solen sicarius				1		1
5515310112	Macoma carlottensis					1	1
5515310204	Tellina modesta	1	1	3	2	10	17
5515470501	Psephidia lordi		1	1			2
5520050202	Lyonsia californica					1	1
611103	Cylindroleberididae		1	2	4	3	10
6111070301	Euphilomedes carcharodonta	11	9	71	36	43	170
6154050101	Diastylis alaskensis		1		2	4	7
6157020101	Leptochelia savignyi	2		4	2	1	9
6160011601	Haliophasma geminata	1					1
6169020112	Ampelisca cristata			1			1
6169020134	Ampelisca lobata			1			1
6169020208	Byblis millsi		1		1	1	3
61690602	Aoroides spp.		1				1
6169201307	Rhachotropis oculata		1		1	1	3
6169211008	Melita desdichada	1					1
6169261199	Cheirimedeia zotea					1	1
6169341411	Hippomedon coecus	3		1		1	5
61693708	Monoculodes spp.	1				4	5
6169371402	Synchelidium shoemakeri		1			1	2
6169371502	Westwoodilla caecula	1	8	5	7	2	23
6169421504	Rhepoxynius abronius	15	13	13	14	16	71
61694803	Metopella spp.			1			1
7200020104	Golfingia pugettensis		1	3	1		5
8172060202	Eupentacta quinquesemita			1			1
	TOTAL ABUNDANCE	118	116	211	143	197	785
	NUMBER OF TAXA	38	41	43	37	52	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 40

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
3759010102	Edwardsia sipunculoides	2	1	1			4
43	Nemertea		1	2			3
5001021801	Lepidasthenia berkeleyae		1				1
5001022301	Tenonia kitsapensis			1			1
5001060101	Pholoe minuta	1	3			1	5
5001060305	Sthenalais tertiaglabra		3	1	1		5
5001130202	Eteone spetsbergensis		1		1		2
5001130205	Eteone longa			1			1
5001131101	Eulalia (Eumida) sanguinea			3		2	5
5001131402	Phyllodoce (Aponaitides) hartmanae				1		1
5001210401	Ophiodromus pugettensis					1	1
5001230704	Exogone molesta	1				1	2
5001230806	Sphaerosyllis brandhorsti					1	1
5001240406	Nereis zonata					1	1
50012501	Nephtys spp.	1	1				2
5001250111	Nephtys ferruginea	5	4	8	2	9	28
5001260202	Sphaerodoropsis sphaerulifer		3				3
5001270101	Glycera capitata	8	10	4		6	28
5001270104	Glycera americana				2	2	4
5001280103	Glycinde armigera	2	1	2	1	1	7
5001280203	Goniada brunnea	1	3	2	1	3	10
500129	Onuphidae				1		1
5001290111	Onuphis elegans		1	1			2
5001290202	Diopatra ornata	1					1
50013101	Lumbrineris spp.	13	6	9	4	19	51
5001310109	Lumbrineris luti	5	16	12	7	8	48
5001310132	Lumbrineris californiensis		14	4	5	9	32
500133010402	Drilonereis falcata minor					6	6
5001400102	Leitoscoloplos pugettensis	4	2	1	2	3	12
5001410801	Levinsenia gracilis	1		1			2
5001411306	Acmira catherinae	1				1	2
5001430201	Laonice cirrata		1				1
5001430402	Polydora socialis		1			2	3
5001430431	Polydora cardalia	3	2	1	1		7
5001430506	Prionospio steenstrupi	10	14	11	9	16	60
5001430521	Prionospio lighti			2			2
5001430599	Prionospio multibranchiata					1	1
5001430703	Spio cirrifera		1		1		2
5001430806	Polydora (Boccardiella) hamata			2			2
5001431004	Spiophanes berkeleyorum	6	8	11	7	26	58
5001431701	Paraprionospio pinnata		1				1
5001440105	Magelona longicornis		1				1
5001490302	Spiochaetopterus costarum	1	7	4	2	6	20
500150	Cirratulidae	3	2			22	27
5001500101	Cirratulus cirratus	1		1		1	3
5001500302	Tharyx multifilis	6	50	35	33	117	241
5001500309	Tharyx secundus	8	5	5		3	21
5001500401	Chaetozone setosa	3	2	4	7	11	27
5001500407	Chaetozone spinosa		3	7	5	9	24
5001520101	Cossura longocirrata	1		2	3		6
5001540302	Pherusa plumosa			2			2
5001580607	Ophelina acuminata		1	1	1		3
500160	Capitellidae	1	4	1		1	7
5001600302	Notomastus tenuis	15	17	17	10	14	73
5001600303	Notomastus lineatus				1		1
5001600402	Mediomastus californiensis	5	23	14	19	18	79
500163	Maldanidae	6	4	3	9	4	26
5001630302	Maldane glebifex	1	1			1	3
5001630901	Praxillella gracilis		1	1	1		3

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 40 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
500163090301	Praxillella affinis pacifica		8				8
500163099999	Praxillella sp. A	4	6			3	13
5001631001	Rhodine bitorquata	4	5	7	6	6	28
5001631103	Euclymene zonalis		2			2	4
5001650201	Sabellaria cementarium		1				1
5001660304	Pectinaria californiensis		1		2		3
500167	Ampharetidae	1	2		5	4	12
5001670101	Amage anops		1	2			3
5001670208	Ampharete acutifrons	3	5	9	4	8	29
5001670701	Anobothrus gracilis	2	2	2			6
5001670804	Asabellides lineata	1			2		3
500168	Terebellidae	7	11	19	11	15	63
5001680101	Amphitrite cirrata	1		1	2	2	6
5001680401	Neoamphitrite robusta			1			1
5001680701	Pista cristata	2	1	7		2	12
5001680710	Pista brevibranchiata		2	2	1	2	7
500168089999	Polycirrus spp. complex	1	1				2
500168130201	Lanassa venusta venusta			4	5	3	12
5001681803	Scionella estevanica		7	4	3	2	16
5001690101	Terebellides stroemi	1	2	3		2	8
5001700602	Potamilla myriops		1				1
51	Gastropoda			2		1	3
51032001	Alvania spp.				1		1
5105030247	Mitrella gausapata				1		1
5105100102	Olivella baetica					1	1
510801019999	Odostomia (Odostomia) spp.	2	2	3	7		14
51080102	Turbonilla spp.			1			1
5108011134	Turbonilla aurantia	5	12	2	6	1	26
5110040205	Cylichna attonsa			2			2
5502020201	Nucula tenuis		2	5	1	1	9
5502040504	Yoldia scissurata			1			1
5507010301	Megacrenella columbiana	1	2	4	6	5	18
5515010101	Parvilucina tenuisculpta	2	8	5	1		16
5515010201	Lucinoma acutilineata	1			1		2
5515020102	Adontorhina cyclica	1					1
5515020201	Axinopsida serricata	109	96	167	107	158	637
5515020301	Thyasira flexuosa		1		1		2
5515100102	Mysella tumida	9	2	13			24
5515220301	Nemocardium centifilosum	4		1	3	5	13
55153101	Macoma spp.	12	2	11		10	35
5515310102	Macoma elimata	3	10	6	1	3	23
5515310111	Macoma yoldiformis	2	4			5	11
5515310112	Macoma carlottensis	22	38	12	19	15	106
5515310114	Macoma nasuta	12	9	9	13	10	53
5515470301	Compsomyax subdiaphana	2	1	2	5	5	15
5515470501	Psephidia lordi	2			1		3
5520050202	Lyonsia californica	1			2		3
611103	Cylindroleberididae		1			1	2
6111070301	Euphilomedes carcharodonta	87	83	68	98	95	431
6111070303	Euphilomedes producta	39	22	40	41	38	180
6154040202	Eudorella pacifica					3	3
6157020101	Leptochelia savignyi	8	7	9	22	27	73
6169020208	Byblis millsi	1	1				2
6169341411	Hippomedon coecus	3		2		1	6
6169371402	Synchelidium shoemakeri				1	2	3
6169371502	Westwoodilla caecula		1				1
6169420301	Heterophoxus oculatus					1	1
6169430501	Pleusymptes subglaber	1					1

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 40 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP	REP 5	TOTAL
61830402	Callianassa spp.			4	3	1	8
61890604	Pinnixa spp.	8	8	15	2	9	42
7200020104	Golfingia pugettensis	3	4	6	3	8	24
8120	Ophiuroidea		1				1
812903019999	Amphiodia urtica/periercta	2			1	1	4
8129030999	Amphioplus strongyloplax		1		2		3
8170	Holothuroidea					1	1
	TOTAL ABUNDANCE	485	80	72	64	71	772
	NUMBER OF TAXA	66	79	71	63	71	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 41

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
39	Platyhelminthes	1					1
43	Nemertea	1	3	4		4	12
5001130102	Phyllodoce (Anaitides) groenlandica			1			1
5001130201	Eteone californica			2		5	7
5001130205	Eteone longa		1				1
5001210102	Gyptis brevipalpa			1			1
5001220301	Pilargis berkeleyae			2		1	3
5001230704	Exogone molesta		1				1
5001250103	Nephtys caeca		4				4
500125010401	Nephtys cornuta franciscana	1	4	2			7
5001250106	Nephtys rickettsi					1	1
5001250111	Nephtys ferruginea		2	1	4		7
5001260202	Sphaerodoropsis sphaerulifer			1		1	2
5001270101	Glycera capitata	20	24	16	30	13	103
5001270104	Glycera americana			2			2
5001280101	Glycinde picta			1	1		2
5001280103	Glycinde armigera	2	3		2		7
5001280203	Goniada brunnea	1			1		2
500129	Onuphidae				1		1
50013101	Lumbrineris spp.	5	5	9	2	12	33
5001310109	Lumbrineris luti	27	27	34	36	20	144
50013301	Drilonereis spp.			1			1
5001410801	Levinsenia gracilis			4			4
5001430506	Prionospio steenstrupi	4	7	7	7	5	30
5001430806	Polydora (Boccardiella) hamata		1				1
5001431004	Spiophanes berkeleyorum			1			1
5001431702	Paraprionospio pinnata		1				1
5001440105	Magelona longicornis				1		1
500150	Cirratulidae	20	13				33
5001500302	Tharyx multifilis	90	168	300	293	407	1258
5001500309	Tharyx secundus	12	38				50
5001520101	Cossura longocirrata	2	4	1	1		8
5001590101	Sternaspis scutata			1	1		2
500160	Capitellidae	1			5	2	8
50016002	Heteromastus spp.					2	2
5001600203	Heteromastus filobranchus	21	16	19	5	17	78
5001600302	Notomastus tenuis	33	24	23	36	22	138
5001600303	Notomastus lineatus					1	1
50016004	Mediomastus spp.			3			3
5001600402	Mediomastus californiensis	2			1		3
5001600601	Barantolla americana	29	6	13	17	4	69
500163	Maldanidae				1		1
50016309	Praxillella spp.			1			1
500163090301	Praxillella affinis pacifica	1					1
5001631001	Rhodine bitorquata		1				1
5001660303	Pectinaria granulata	1			1		2
5001660304	Pectinaria californiensis	1					1
500167	Ampharetidae	1	1				2
5001670101	Amage anops			5			5
5001670701	Anobothrus gracilis					1	1
500168	Terebellidae	2	1		1		4
5001680101	Amphitrite cirrata	1	3	2		1	7
50016808	Polycirrus spp.				4	1	5
500168089999	Polycirrus spp. complex		1				1
5001681101	Artacama coniferi				2		2
500168130201	Lanassa venusta venusta		10	12	8	9	39
51037604	Polinices spp.					2	2
5105030247	Mitrella gausapata	1	4		2	7	14
5105100101	Olivella biplicata					1	1

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 41 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
510801019999	Odostomia (Odostomia) spp.	9	3	8	3	7	30
51080102	Turbonilla spp.			3		2	5
5108011134	Turbonilla aurantia	1					1
5110010401	Rictaxis punctocaelatus	2	3		1	1	7
5110040205	Cylichna attonsa				2		2
511006999999	Melanochlamys dimedea	1		1		1	3
5502020201	Nucula tenuis	7	15	10	5	8	45
5502040504	Yoldia scissurata	1		1		2	4
5515010101	Parvilucina tenuisculpta	4	4	7	12	11	38
5515010201	Lucinoma acutilineata	6	6	7	4	3	26
5515020201	Axinopsida serricata	852	1171	1097	957	1166	5243
5515100102	Mysella tumida				1		1
5515220301	Nemocardium centifilosum		1		1		2
55153101	Macoma spp.	7	12	7	25	7	58
5515310102	Macoma elimata	7	26	12	13	14	72
5515310112	Macoma carlottensis	50	143	40	101	94	428
5515310114	Macoma nasuta	5	2	3	3	3	16
55153102	Tellina spp.	1					1
5515470301	Compsomyax subdiaphana	1		1	1		3
5515470501	Psephidia lordi			1	1	3	5
5520020103	Pandora bilirata				1		1
6111070301	Euphilomedes carcharodonta	10	7	11	8	12	48
6111070303	Euphilomedes producta	40	30	38	31	25	164
6169371402	Synchelidium shoemakeri			2			2
6169421503	Rhepoxynius bicuspidata	20	11	14	12	13	70
61890604	Pinnixa spp.	3	4	3	5	8	23
812903019999	Amphiodia urtica/periercta	4	5	14	12	11	46
8129030999	Amphioplus strongyloplax			1			1
	TOTAL ABUNDANCE	1311	1816	1750	1662	1930	8469
	NUMBER OF TAXA	45	43	49	46	42	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 43

NODC	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
3759010102	Edwardsia sipunculoides	1				3	4
39	Platyhelminthes		1				1
43	Nemertea	3		1		5	9
5001020502	Eunoe depressa					1	1
5001020603	Gattyana cirrosa					1	1
5001020810	Harmothoe lunulata	1					1
5001021801	Lepidasthenia berkeleyae	2					2
5001022301	Tenonia kitsapensis	2	2	1			5
5001060101	Pholoe minuta	4	6	4	2	3	19
5001060305	Sthenalais tertiaglabra	1	2		2		5
5001130102	Phyllodoce (Anaitides) groenlandica				1		1
5001130202	Eteone spetsbergensis					1	1
5001131101	Eulalia (Eumida) sanguinea	5	10	4	9	12	40
5001131402	Phyllodoce (Aponaitides) hartmanae	1			1	1	3
5001210102	Gyptis brevipalpa			1			1
5001210202	Microphthalmus aberrans	2	2				4
5001210401	Ophiodromus pugettensis		1	2			3
5001220802	Parandalia fauveli					3	3
5001230501	Syllis alternata		1				1
5001232201	Ehlersia heterochaeta		1				1
500124	Nereidae		1				1
5001240501	Platynereis bicanaliculata	1					1
5001250103	Nephtys caeca	3	2		4	3	12
5001250106	Nephtys rickettsi			1			1
5001250111	Nephtys ferruginea				1		1
5001260202	Sphaerodoropsis sphaerulifer		1				1
5001270101	Glycera capitata	5	5	8	9	10	37
50012801	Glycinde spp.		1				1
5001280101	Glycinde picta	1					1
5001280103	Glycinde armigera	7	16	4	9	14	50
5001280202	Goniada maculata				1		1
5001290103	Onuphis iridescens	2					2
5001290111	Onuphis elegans		1	1			2
50013101	Lumbrineris spp.	1			1	1	3
5001310109	Lumbrineris luti	9	2	4	1	4	20
5001310118	Lumbrineris cruzensis				2		2
5001310128	Lumbrineris limicola	1		2	2		5
5001310132	Lumbrineris californiensis	5	5	2		2	14
5001400102	Leitoscoloplos pugettensis	4	6	6	5	5	26
5001400510	Orbinia (Phylo) felix					1	1
50014302	Laonice spp.					1	1
5001430431	Polydora cardalia		1				1
5001430506	Prionospio steenstrupi	17	10	5	9	12	53
5001430521	Prionospio lighti	5	8			2	15
5001430812	Polydora (Boccardia) pugettensis				2		2
5001431702	Paraprionospio pinnata				1		1
5001440105	Magelona longicornis	1					1
5001490202	Phyllochaetopterus prolifica	2			2		4
5001490302	Spiochaetopterus costarum	102	137	65	127	92	523
5001490401	Mesochaetopterus taylori	16	18	7	23	11	75
5001500302	Tharyx multifilis	1	1			1	3
5001570101	Scalibregma inflatum	13	6	6	4	2	31
5001580202	Armandia brevis		1				1
5001580301	Ophelia limacina					1	1
5001600302	Notomastus tenuis	1	1				2
5001600303	Notomastus lineatus			1	1		2
5001600402	Mediomastus californiensis		2		1		3
500163	Maldanidae	6	2	2	1		11
5001630502	Nicomache personata					1	1

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 43 (Continued)

NODC	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
50016309	Praxillella spp.	18	6	11	8	14	57
500163090301	Praxillella affinis pacifica	2	2		4	4	12
5001631001	Rhodine bitorquata				1		1
5001632001	Isocirrus longiceps	3	2	3	3	2	13
5001660303	Pectinaria granulata		3	1			4
5001660304	Pectinaria californiensis					2	2
5001670101	Amage anops	1					1
5001670208	Ampharete acutifrons				2		2
5001670701	Anobothrus gracilis	2	4	3	2	3	14
5001680701	Pista cristata					2	2
50016808	Polycirrus spp.	1					1
5001681803	Scionella estevanica				1		1
50017022	Potamethus spp.	1					1
51032001	Alvania spp.		1		1		2
5103760404	Polinices draconis		1				1
5105030202	Mitrella tuberosa			1			1
5105030247	Mitrella gausapata	1	16	1	10		28
5105080101	Nassarius mendicus		1	3	1	1	6
5105100102	Olivella baetica				1		1
5106021107	Kurtziella plumbea					4	4
510801019999	Odostomia (Odostomia) spp.			1	1		2
5108011134	Turbonilla aurantia	1	1	1		1	4
5110040205	Cylichna attonsa	6	3	5	4	9	27
51100404	Cylichnella spp.					1	1
5110070101	Gastropteron pacificum				1		1
55	Bivalvia	1					1
5502020101	Acila castrensis			1		1	2
5502020201	Nucula tenuis		5	7	6	8	26
5502040504	Yoldia scissurata	1	2	1			4
5507010201	Crenella decussata			1			1
5507010301	Megacrenella columbiana	2	4	2	8	3	19
5515010101	Parvilucina tenuisculpta	6	3	4	2	2	17
5515010201	Lucinoma acutilineata	1				1	2
5515020201	Axinopsida serricata		1	1			2
5515020301	Thyasira flexuosa	5	4	8	5	3	25
5515100102	Mysella tumida	18	9	17	15	9	68
55153101	Macoma spp.	1	1	2	1		5
5515310101	Macoma calcarea		2	3			5
5515310111	Macoma yoldiformis	6	9	6	5	5	31
5515310112	Macoma carlottensis				1	1	2
5515310204	Tellina modesta			1			1
5515470501	Psephidia lordi	2	2		1	3	8
5520020103	Pandora bilirata		1				1
5520050202	Lyonsia californica		1				1
6111070301	Euphilomedes carcharodonta	119	129	79	115	115	557
6154040202	Eudorella pacifica					1	1
6157020101	Leptochelia savignyi	1	1	1	2		5
6160011601	Haliophasma geminata	1					1
6169020113	Ampelisca hancocki		3		1	1	5
6169020208	Byblis millsi	2	1	1	2	4	10
61691502	Corophium spp.	7	20	2	3	3	35
61692602	Photis spp.				1		1
6169260307	Protomedeia articulata		2		4		6
6169371502	Westwoodilla caecula		3		2	1	6
6169420301	Heterophoxus oculatus	7	6	6	4	5	28
6169420918	Eyakia robustus	6	15	16	6	9	52
6169420926	Rhepoxynius variatus	18	23	9	14	29	93
6169421504	Rhepoxynius abronius	3	7	3	3	1	17

1991 BENTHIC INFAUNA DATA STATION AND REPLICATE

STATION 43 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
61830602	Pagurus spp.	1					1
6183060208	Pagurus caurinus				1		1
61890604	Pinnixa spp.	23	20	20	17	22	102
7200020104	Golfingia pugettensis	5	1		1	3	10
8127010607	Ophiura lutkeni				1		1
812903019999	Amphiodia urtica/periercta	193	189	224	126	225	957
8129030999	Amphioplus strongyloplax	7	4	1	1	2	15
8172060111	Cucumaria piperata	1					1
	TOTAL ABUNDANCE	698	761	573	609	693	3334
	NUMBER OF TAXA	66	69	54	66	61	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 44

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
3740	Anthozoa	1	1				2
3759010102	Edwardsia sipunculoides	12	2	3	2	4	23
43	Nemertea	3	5	17	11	6	42
5001020603	Gattyana cirrosa			2			2
5001020810	Harmothoe lunulata				1		1
5001021805	Lepidasthenia longicirrata		1	2			3
5001022301	Tenonia kitsapensis	2	1	1	1	1	6
5001040101	Pholoides aspera	14	10	13	11	1	49
5001060101	Pholoe minuta	3				1	4
5001130102	Phyllodoce (Anaitides) groenlandica		1		1		2
5001130201	Eteone californica	1					1
5001130202	Eteone spetsbergensis				3		3
5001130308	Eulalia (Eumida) bilineata	1		1	1		3
5001130403	Notophyllum tectum				1		1
5001131101	Eulalia (Eumida) sanguinea	8	5	8	5	4	30
50011314	Phyllodoce spp.		1				1
5001131402	Phyllodoce (Aponaitides) hartmanae					1	1
5001210102	Gyptis brevipalpa		1				1
5001210401	Ophiodromus pugettensis	3		2	2		7
5001220301	Pilargis berkeleyae				1		1
5001230201	Pionosyllis gigantea	1		1	1		3
5001230501	Syllis alternata	3	3	4	5	2	17
5001230702	Exogone gemmifera	7	2	6	8	1	24
5001231303	Odontosyllis phosphorea	1	2	1	3	1	8
5001232201	Ehlersia heterochaeta	12	3	3	3	1	22
5001240201	Cheilonereis cyclurus			1			1
5001240404	Nereis procera	2	2	1		1	6
5001240501	Platynereis bicanaliculata	2	4	2	2	1	11
500125	Nephtyidae	1					1
5001250103	Nephtys caeca			1			1
500125010401	Nephtys cornuta franciscana	1				1	2
5001250106	Nephtys rickettsi					1	1
5001250111	Nephtys ferruginea	8	8	11		5	32
5001260202	Sphaerodoropsis sphaerulifer			1	1	2	4
5001270101	Glycera capitata		2		1	4	7
5001270104	Glycera americana	2	2			2	6
5001280101	Glycinde picta	3	2			1	6
5001280103	Glycinde armigera	2	2		7	1	12
5001280203	Goniada brunnea	3		1			4
500129	Onuphidae			1			1
5001290111	Onuphis elegans	3		1		1	5
5001290202	Diopatra ornata	14	8	10	10	2	44
50013101	Lumbrineris spp.	13	9	9	6	5	42
5001310101	Lumbrineris bicirrata			1			1
5001310109	Lumbrineris luti			1	1		2
5001310132	Lumbrineris californiensis	14	9	10	11		44
500133010402	Drilonereis falcata minor			1			1
5001330302	Notocirrus californiensis				1	2	3
5001360101	Dorvillea pseudorubrovittata		1				1
5001360201	Protodorvillea gracilis	3					3
5001400102	Leitoscoloplos pugettensis	7	12	4	14	10	47
5001400204	Naineris uncinata			1			1
5001410603	Cirrophorus lyra			1			1
5001410801	Levinsenia gracilis				2		2
5001411306	Acmira catherinae	6	11	5	7	2	31
5001430201	Laonice cirrata	1	2	3	1	1	8
5001430415	Polydora limicola	1			1	1	3
5001430416	Polydora (Boccardia) polybranchia			1			1
5001430431	Polydora cardalia	1					1
5001430506	Prionospio steenstrupi	22	19	15	28	14	98

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 44 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5001430521	Prionospio lighti	3	2	3	3	3	14
5001430703	Spio cirrifera			1			1
5001430812	Polydora (Boccardia) pugettensis			1			1
5001431004	Spiophanes berkeleyorum	42	20	37	9	5	113
5001431701	Paraprionospio pinnata	2	3	9	7	3	24
5001440105	Magelona longicornis	2		3	3	1	9
5001490202	Phyllochaetopterus prolifica	46	34	40	13	10	143
5001490302	Spiochaetopterus costarum	50	17	19	12	22	120
5001490401	Mesochaetopterus taylori	9	6	9	6	4	34
500150	Cirratulidae				3		3
5001500101	Cirratulus cirratus			2			2
5001500201	Caulleriella hamata			1			1
5001500202	Caulleriella alata	4	1	3			8
5001500302	Tharyx multifilis	2	1	5	6	1	15
5001500309	Tharyx secundus	2					2
5001500401	Chaetozone setosa		1			1	2
5001500407	Chaetozone spinosa					1	1
5001500409	Chaetozone acuta	1					1
5001540202	Flabelligera affinis		2	6			8
5001570101	Scalibregma inflatum		1				1
5001600302	Notomastus tenuis	2	5	2	1	1	11
5001600303	Notomastus lineatus	6	7	5	1		19
5001600402	Mediomastus californiensis	46	15	4	14	15	94
500163	Maldanidae	3	1				4
5001630901	Praxillella gracilis	2	3	1		2	8
500163090301	Praxillella affinis pacifica	3			1		4
500163099999	Praxillella sp. A	9	2	2	3	3	19
5001631001	Rhodine bitorquata	1				1	2
5001632001	Isocirrus longiceps	1		2		2	5
5001640201	Myriochele heeri				1		1
5001650201	Sabellaria cementarium			2	1	4	7
5001660303	Pectinaria granulata	9	2	3	4	4	22
5001660304	Pectinaria californiensis		3	6	5	1	15
500167	Ampharetidae		1	2			3
5001670101	Amage anops			7	2		9
5001670503	Melinna elisabethae	1				1	2
5001670701	Anobothrus gracilis	4	4	1	1	1	11
500168	Terebellidae	6	3		5	1	15
5001680101	Amphitrite cirrata			5			5
5001680201	Eupolymnia heterobranchia	1					1
5001680401	Neoamphitrite robusta			1	1		2
5001680710	Pista brevibranchiata			1			1
500168089999	Polycirrus spp. complex	4		2	1	1	8
5001681101	Artacama coniferi	1			3		4
5001682502	Streblosoma bairdi	1		2			3
5001690101	Terebellides stroemi	3	1	3	1		8
5001700106	Chone magna			1			1
5001700602	Potamilla myriops					1	1
50017022	Potamethus spp.	3		1	2		6
5001730101	Pseudochitinopoma occidentalis			1			1
5004	Oligochaeta					1	1
51032001	Alvania spp.	2	2	4	1	2	11
51035306	Balcis spp.	1					1
5103640301	Crepipatella lingulata		2	5	1		8
5105030202	Mitrella tuberosa			4			4
5105030247	Mitrella gausapata		27	8		1	36
5105080101	Nassarius mendicus	3			10		13
5105100101	Olivella biplicata		1				1
5105100102	Olivella baetica	4	5		1	4	14

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 44 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5106021107	Kurtziella plumbea	3	1	2	3		9
510801019999	Odostomia (Odostomia) spp.		1				1
5108011134	Turbonilla aurantia	7		1	1	2	11
5110040205	Cylichna attonsa	1	1		2	1	5
511006999999	Melanochlamys dimedea	1					1
51101101	Bulla spp.					1	1
55	Pelecypoda		1				1
5502020101	Acila castrensis	3	1		1		5
5502020201	Nucula tenuis	4		5	3	3	15
5507010301	Megacrenella columbiana	1		2	1	1	5
5507010601	Modiolus modiolus	1	1	1	1	1	5
5509050102	Chlamys rubida		1				1
5515010101	Parvilucina tenuisculpta	8	10	5	2	8	33
5515010201	Lucinoma acutilineata	1	4				5
5515020201	Axinopsida serricata	19	1	5	2	9	36
5515100102	Mysella tumida	18	7	3	5	6	39
55153101	Macoma spp.				2		2
5515310102	Macoma elimata		2			1	3
5515310111	Macoma yoldiformis	12	3	4	5	6	30
5515310112	Macoma carlottensis	1				1	2
5515310204	Tellina modesta				1		1
5515470301	Compsomyax subdiaphana		1		2		3
5515470501	Psephidia lordi					1	1
55170103	Platyodon spp.			1			1
5517060201	Hiatella arctica			2			2
5517060401	Panopea generosa			1	1		2
5520050202	Lyonsia californica	1		4	3		8
6001010107	Nymphon pixellae				1		1
6111070301	Euphilomedes carcharodonta	5	14	19	16	8	62
6111070303	Euphilomedes producta	1					1
6134020104	Balanus crenatus		1				1
6154040202	Eudorella pacifica	6		1	2		9
6154050101	Diastylis alaskensis				2		2
6157020101	Leptochelia savignyi			1			1
6169020113	Ampelisca hancocki			1	2	1	4
6169020134	Ampelisca lobata	2		9	7		18
6169020208	Byblis millsi	7		1	1		9
61690602	Aoroides spp.	1		1	1		3
61691502	Corophium spp.	3		9	3		15
6169150301	Erichthonius hunteri		1	4			5
6169150302	Erichthonius brasiliensis	2	2				4
6169260307	Protomedeia articulata		1	2			3
6169260401	Gammaropsis thompsoni	3	3				6
6169341101	Cyphocaris challengeri			1			1
6169342914	Orchomeme decipiens	1					1
6169370816	Monoculodes zernovi	1					1
6169371502	Westwoodilla caecula	2	1	1	1	1	6
6169420301	Heterophoxus oculatus	6	1	5	5		17
616942099999	Foxiphalus similis/cognatus			1			1
6179160204	Spirontocaris snyderi	1					1
6179160408	Eualus pusiolus			1	2		3
61830602	Pagurus spp.	1					1
6183060206	Pagurus setosus					1	1
618902010102	Lophopanopeus bellus diegensis				2		2
6189060404	Pinnixa schmitti	26	17	17	20	15	95
7200020103	Golfingia vulgaris	3					3
7200020104	Golfingia pugettensis	6		7	9	16	38
77000102	Phoronis spp.		2				2
8005110201	Terebratalia transversa	3					3

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 44 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
8120	Ophiuroidea			1			1
812903019999	Amphiodia urtica/periercta	12	3	11	7	11	44
8129030202	Amphipholis squamata	1	1	4	1		7
81720601	Cucumaria spp.		1				1
8172060202	Eupentacta quinquesemita	1			1		2
81720603	Pentamera spp.			1			1
8401	Ascidiacea			1	1		2
	TOTAL ABUNDANCE	635	386	495	394	271	2181
	NUMBER OF TAXA	109	87	113	100	81	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 45

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
3743010303	Pachycerianthus fimbriatus	1	3	2	2	1	9
37590401	Halcampa spp.			1			1
43	Nemertea	2	4	6	3	2	17
47	Nematoda		2				2
5001021601	Polyeunoe tuta	1		1		1	3
5001021801	Lepidasthenia berkeleyae	2	1	1	5		9
5001060101	Pholoe minuta	1	1		2		4
5001220201	Sigambra tentaculata	5	2	18	15	4	44
5001220301	Pilargis berkeleyae	1	4	6	2	4	17
5001230501	Syllis alternata	1					1
500124	Nereidae	4		1	1	1	7
5001240404	Nereis procera	1		1			2
5001240406	Nereis zonata					2	2
50012501	Nephtys spp.				1		1
500125010401	Nephtys cornuta franciscana		1			1	2
5001250111	Nephtys ferruginea		1				1
5001270101	Glycera capitata	3	3	2	2		10
5001280101	Glycinde picta				1		1
5001280203	Goniada brunnea		1			1	2
5001290202	Diopatra ornata		1				1
50013101	Lumbrineris spp.	1	1	1	1	1	5
5001310109	Lumbrineris luti	1	1	1			3
5001310118	Lumbrineris cruzensis	1				1	2
5001400102	Leitoscoloplos pugettensis		2			1	3
5001410801	Levinsenia gracilis	23	17	56	54	35	185
5001411306	Acmira catherinae	18	7	53	20	37	135
5001430201	Laonice cirrata	1	4	3	3	4	15
5001430402	Polydora socialis		1	1		1	3
5001430431	Polydora cardalia		3				3
5001430506	Prionospio steenstrupi	2	1			1	4
5001430521	Prionospio lighti	1	1		1		3
5001431004	Spiophanes berkeleyorum		4				4
5001431701	Paraprionospio pinnata	1	3				4
5001490302	Spiochaetopterus costarum			1			1
5001500101	Cirratulus cirratus	3		1			4
5001500309	Tharyx secundus		3			1	4
5001520101	Cossura longocirrata					1	1
5001600203	Heteromastus filobranchus	1	2	5	5		13
5001600402	Mediomastus californiensis	1	1	1		1	4
500163	Maldanidae	2	1		1	1	5
500163090301	Praxillella affinis pacifica	1	3	2	9	3	18
5001631	Euclymeninae		5	2			7
5001631001	Rhodine bitorquata			1			1
5001660304	Pectinaria californiensis		7	8	9	5	29
5001670101	Amage anops		1				1
5001680401	Neoamphitrite robusta			2		1	3
5001680710	Pista brevibranchiata		1		1		2
5001681101	Artacama coniferi	2	1	3	3	4	13
5004	Oligochaeta			1			1
51	Gastropoda	1					1
5103509999	Nitidiscala tincta		2		1	3	6
5106021107	Kurtziella plumbea					1	1
510801019999	Odostomia (Odostomia) spp.			1			1
5108011134	Turbonilla aurantia	1					1
5110040205	Cylichna attonsa	2		3		1	6
511006999999	Melanochlamys dimedea				1		1
5402	Chaetodermatida				1		1
5502040504	Yoldia scissurata	3		2	1	2	8
5507010201	Crenella decussata		1	2			3
5515010101	Parvilucina tenuisculpta	5	1	3	13	3	25
5515010201	Lucinoma acutilineata	5	4	4	6	9	28
5515020301	Thyasira flexuosa		1				1
5515100102	Mysella tumida	1		1	2		4
5515220301	Nemocardium centifilosum			1			1
5515310102	Macoma elimata					1	1

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 45 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5515310111	Macoma yoldiformis					1	1
5515470301	Compsomyax subdiaphana					3	3
5520050202	Lyonsia californica	1	1	1	1		4
6111070301	Euphilomedes carcharodonta	19	28	29	27	28	131
6111070303	Euphilomedes producta		2	2		2	6
6134020104	Balanus crenatus	1					1
6153010105	Pacifacanthomysis nephrophthalma	1					1
6154040202	Eudorella pacifica	1	1	2	1	4	9
61691202	Calliopius spp.			1			1
6169260307	Protomedeia articulata				3		3
6169420301	Heterophoxus oculatus	2	3	6	2	2	15
6169420926	Rhepoxynius variatus			1			1
61694812	Stenula spp.			1			1
61890604	Pinnixa spp.			2	2	1	5
7200020104	Golfingia pugettensis	2		13	2	2	19
8127010607	Ophiura lutkeni				1		1
812903019999	Amphiodia urtica/periercta	2	1	5	8	7	23
81720601	Cucumaria spp.	1					1
81720603	Pentamera spp.		1				1
83000003	Sagitta spp.	1					1
	TOTAL ABUNDANCE	130	140	261	213	185	929
	NUMBER OF TAXA	43	46	46	37	41	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 47

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
3740	Anthozoa			1			1
3743010303	Pachycerianthus fimbriatus		1			1	2
3759010102	Edwardsia sipunculoides	2	2	11	12	5	32
3760060101	Metridium senile		1				1
39	Platyhelminthes			1			1
43	Nemertea	18	28	13	11	15	85
47	Nematoda			3			3
5001020806	Harmothoe imbricata	1	1	1		2	5
5001021103	Lepidonotus squamatus	1				1	2
5001021801	Lepidasthenia berkeleyae			3		1	4
5001022689	Malmgreniella spp. L					1	1
5001040101	Pholoides aspera	16	23	27	27	28	121
5001060101	Pholoe minuta	1				3	4
5001060301	Sthenalais berkeleyi					1	1
5001060305	Sthenalais tertiaglabra	1	3	2	1		7
5001080101	Paleonotus bellis				1		1
5001130308	Eulalia (Eumida) bilineata	1	2	1		5	9
500113090101	Hesionura coineaui difficilis	1					1
5001131101	Eulalia (Eumida) sanguinea	6	1	1	5	4	17
5001131402	Phyllodoce (Aponaitides) hartmanae		1		1	1	3
50011315	Sige macrocirrus orientalis	1					1
5001210102	Gyptis brevipalpa	1					1
5001210401	Ophiodromus pugettensis		1		2	1	4
5001211101	Heteropodarke heteromorpha	1					1
5001220201	Sigambra tentaculata	9	3	6		4	22
5001220301	Pilargis berkeleyae	2	1	3		1	7
500123	Syllidae		1		1		2
5001230101	Autolytus cornutus					3	3
5001230501	Syllis alternata	2	1	2		2	7
5001230602	Eusyllis blomstrandi		1		1		2
5001230603	Eusyllis japonica				1		1
5001230702	Exogone gemmifera		2		1	1	4
5001232201	Ehlersia heterochaeta	2	6	6	6	3	23
5001240404	Nereis procera	5	3	6	2	3	19
5001250104	Nephtys cornuta	1		2	1		4
5001260202	Sphaerodoropsis sphaerulifer			1			1
5001270101	Glycera capitata	6	7	7	1	3	24
5001270104	Glycera americana	2		2	1	1	6
5001280103	Glycinde armigera				6		6
500129	Onuphidae			3		1	4
5001290103	Onuphis iridescens		1	2	1	2	6
5001290111	Onuphis elegans				1		1
5001290202	Diopatra ornata	19	6	6	10	5	46
50013101	Lumbrineris spp.	5	1	6		3	15
5001310101	Lumbrineris bicirrata			1			1
5001310109	Lumbrineris luti	31	23	19	19	25	117
5001310118	Lumbrineris cruzensis		4		2	1	7
5001310132	Lumbrineris californiensis	15	6		3	7	31
500133010402	Drilonereis falcata minor	1					1
5001400102	Leitoscoloplos pugettensis	7	5	8	8	15	43
5001410706	Allia ramosa	13	6	14	5		38
5001410801	Levinsenia gracilis	8	5	6	5	1	25
50014302	Laonice spp.		1				1
5001430201	Laonice cirrata	3	2	1	3	2	11
50014304	Polydora spp.		2				2
5001430402	Polydora socialis		1	1	1	1	4
5001430419	Polydora armata				1		1
5001430506	Prionospio steenstrupi	47	23	35	25	13	143
5001430521	Prionospio lighti					1	1
5001430599	Prionospio multibranchiata			2	1		3

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 47 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5001431001	Spiophanes bombyx	1					1
5001431004	Spiophanes berkeleyorum	4	4	7	2	3	20
5001431701	Paraprionospio pinnata	2	1		1		4
5001440105	Magelona longicornis	84	38	27	39	13	201
5001490302	Spiochaetopterus costarum	27	30	4	14	41	116
50015001	Cirratulus spp.	1				2	3
5001500101	Cirratulus cirratus	3	5				8
5001500302	Tharyx multifilis	5	3	6	2	2	18
5001500303	Tharyx parvus	2	2				4
5001500309	Tharyx secundus	11	12	10	6	4	43
5001500402	Chaetozone gracilis	1	1	1	1		4
5001540202	Flabelligera affinis	1					1
5001540302	Pherusa plumosa	2					2
5001580202	Armandia brevis	1					1
5001600302	Notomastus tenuis	2	1	1	1		5
5001600401	Mediomastus ambiseta	1					1
5001600402	Mediomastus californiensis	14	20	12	17	12	75
500163	Maldanidae		1	2			3
5001630302	Maldane glebifex		1				1
5001630501	Nicomache lumbricalis		1				1
5001631	Euclymeninae					1	1
5001631001	Rhodine bitorquata		2	1	2	2	7
5001631206	Clymenura columbiana			1			1
5001632	Nicomachinae					1	1
5001640202	Galathowenia nr. G. oculata			1			1
5001650201	Sabellaria cementarium	1					1
5001660303	Pectinaria granulata	8	1	1			10
5001660304	Pectinaria californiensis	5	2	3		1	11
5001670101	Amage anops	5	63	75	9	27	179
5001670208	Ampharete acutifrons		2	2			4
5001670214	Ampharete finmarchica				1	1	2
5001670804	Asabellides lineata			1			1
5001680101	Amphitrite cirrata		2	2			4
5001680710	Pista brevibranchiata	1					1
5001681803	Scionella estevanica	1			2		3
5001690101	Terebellides stroemi				1		1
5001700106	Chone magna				1		1
5001700502	Myxicola infundibulum	1				3	4
50017008	Sabella spp.					1	1
5004	Oligochaeta		2	1			3
51021003	Margarites spp.		1				1
51032001	Alvania spp.		1		2		3
5103509999	Nitidiscala tincta	1	2				3
5103640301	Crepipatella lingulata	17	8	8	15	13	61
5105030247	Mitrella gausapata	1					1
5105080101	Nassarius mendicus	4					4
5106021107	Kurtziella plumbea	9	4	1	5	4	23
51080102	Turbonilla spp.		1	1			2
5108011134	Turbonilla aurantia			3			3
5110040205	Cylichna attonsa	2			1	1	4
5127	Nudibranchia				3		3
5402	Chaetodermatida	1		3	2		6
5507010301	Megacrenella columbiana	2	1	3	1	2	9
55070106	Modiolus spp.	2			1		3
5515010101	Parvilucina tenuisculpta	58	27	23	31	16	155
5515010201	Lucinoma acutilineata	7	6	3	5	2	23
5515020102	Adontorhina cyclica			1			1
5515020201	Axinopsida serricata		1		4		5
5515020301	Thyasira flexuosa	1		2			3

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 47 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5515100102	Mysella tumida			2	1		3
5515220103	Clinocardium fucanum	1	1				2
5515220301	Nemocardium centifilosum		1			1	2
5515310102	Macoma elimata	1					1
5515310111	Macoma yoldiformis	6	4	5	9	9	33
5515310112	Macoma carlottensis	3	1	2		3	9
5515310115	Macoma inquinata	1					1
5515470301	Compsomyax subdiaphana			1	1		2
5515470501	Psephidia lordi	3	2	1			6
5517010201	Mya arenaria	5	3	9	2	3	22
5517060201	Hiatella arctica					3	3
5520020102	Pandora filosa			1			1
5520050202	Lyonsia californica	1	1	3			5
5520080203	Thracia trapezoides					2	2
5520100108	Cardiomya californica		1				1
6001010107	Nymphon pixellae				1		1
6111070301	Euphilomedes carcharodonta	1	5	5	8	2	21
6111070303	Euphilomedes producta	2	1	1			4
6134020104	Balanus crenatus			3	2		5
6154040202	Eudorella pacifica		1				1
6157020202	Leptognathia gracilis	2	2	1		1	6
6169020113	Ampelisca hancocki				1		1
6169020114	Ampelisca pugettica		1	7	2		10
6169020134	Ampelisca lobata	7	1	1	4	1	14
6169020208	Byblis millsi	2	3	6	2	2	15
61690602	Aoroides spp.				1		1
6169150301	Erichthonius hunteri	35	5		1	1	42
6169260401	Gammaropsis thompsoni	2	1		4		7
6169371502	Westwoodilla caecula		1	1		2	4
6169420301	Heterophoxus oculatus	6	5	8	6	11	36
616942099999	Foxiphalus similis/cognatus	3		1		1	5
6169440111	Dulichia rhabdoplastis		3				3
6169500503	Tiron biocellata		1				1
6171010719	Caprella mendax					1	1
6179160408	Eualus pusiolus	2	1				3
6179160511	Heptacarpus stimpsoni		1		1		2
61830602	Pagurus spp.					2	2
6183060206	Pagurus setosus		1	1			2
6183060208	Pagurus caurinus	7		5			12
6183060222	Pagurus stevensae				1		1
6188030105	Cancer gracilis		1			1	2
618902010102	Lophopanopeus bellus diegensis	1					1
61890604	Pinnixa spp.	1	1	1	1	7	11
7200020104	Golfingia pugettensis	2	8	2	5	12	29
7200020180	Phascolosoma agassizii		2				2
77	Phoronida				1	1	2
8120	Ophiuroidea					2	2
812903019999	Amphiodia urtica/periercta	62	24	85	262	126	559
8129030202	Amphipholis squamata	1		4	4	2	11
81720603	Pentamera pseudocalcigera	1	1		1		3
8401	Ascidiacea					1	1
	TOTAL ABUNDANCE	676	505	565	656	516	2918
	NUMBER OF TAXA	92	95	86	81	81	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 48

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
3754010103	Stylatula elongata	2	4	2	2	2	12
43	Nemertea	2	5		1		8
47	Nematoda	2	14	3		2	21
5001021801	Lepidasthenia berkeleyae				3		3
5001060101	Pholoe minuta	3		2	4		9
5001060305	Sthenalais tertiaglabra		1				1
5001210102	Gyptis brevipalpa				1	1	2
5001220201	Sigambra tentaculata	2	2	8	6	2	20
5001220204	Sigambra bassi		1		2		3
5001220301	Pilargis berkeleyae	1	1		5		7
500125010401	Nephtys cornuta franciscana		1		2		3
5001250111	Nephtys ferruginea	1					1
5001270101	Glycera capitata					1	1
5001270104	Glycera americana		1				1
50013101	Lumbrineris spp.			1		1	2
5001310118	Lumbrineris cruzensis	1	1				2
5001410801	Levinsenia gracilis	1					1
5001411306	Acmira catherinae	3	3	2	6	2	16
5001430201	Laonice cirrata				1		1
5001430429	Polydora brachycephala		15		1		16
5001430521	Prionospio lighti		1				1
5001431004	Spiophanes berkeleyorum		1		1	1	3
5001431701	Paraprionospio pinnata	2	3		2	2	9
50015003	Aphelochaeta spp.					1	1
500163090301	Praxillella affinis pacifica				2		2
5001680810	Polycirrus californicus			1			1
51032001	Alvania spp.			1	1		2
51050302	Mitrella spp.		2			1	3
5105030247	Mitrella gausapata	2		1			3
5105080101	Nassarius mendicus	2		1	1	1	5
510801019999	Odostomia (Odostomia) spp.			3	2	1	6
5110040205	Cylichna attonsa	3	3	3	1	1	11
511006999999	Melanochlamys dimedea				1		1
5502040504	Yoldia scissurata		1	1	4	1	7
5515010101	Parvilucina tenuisculpta	12	18	11	13	18	72
5515020201	Axinopsida serricata			1		1	2
5515100102	Mysella tumida	14	15	16	24	5	74
55153101	Macoma spp.				1		1
5515310102	Macoma elimata					1	1
5515310111	Macoma yoldiformis	1		1	1		3
5515310112	Macoma carlottensis		3	1	1		5
5515310114	Macoma nasuta	1	1	2		1	5
5515470501	Psephidia lordi	10	6		2	2	20
6154040202	Eudorella pacifica	81	68	77	78	46	350
6169020135	Ampelisca careyi	13	3	13	14	13	56
6169420301	Heterophoxus oculatus	8	4	4	4	4	24
6169420925	Paraphoxus oculatus			1			1
61890604	Pinnixa spp.	1					1
6189060410	Pinnixa eburna		1				1
812903019999	Amphiodia urtica/periercta	8	8	5	9	7	37
	TOTAL ABUNDANCE	176	187	161	196	118	838
	NUMBER OF TAXA	24	28	24	31	25	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 49

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
43	Nemertea	5	3	4	9	6	27
5001060101	Pholoe minuta			1	8	5	14
5001130205	Eteone longa		2	1	1		4
5001131402	Phyllodoce (Aponaitides) hartmanae					1	1
5001210102	Gyptis brevipalpa	6	6	1	3	10	26
5001220201	Sigambra tentaculata			1	2	7	10
5001220204	Sigambra bassi	11	5	5	14	10	45
500125010401	Nephtys cornuta franciscana	2			9	5	16
5001280101	Glycinde picta			1	1	2	4
5001310109	Lumbrineris luti	1	2		3	2	8
5001430506	Prionospio steenstrupi	1					1
5001430521	Prionospio lighti		1	1	1		3
5001431004	Spiophanes berkeleyorum	22	11	19	16	19	87
5001431701	Paraprionospio pinnata	33	31	29	39	30	162
5001490302	Spiochaetopterus costarum					1	1
5001500302	Tharyx multifilis	4	1	1	5	4	15
5001690101	Terebellides stroemi					1	1
51032001	Alvania spp.	1					1
5105030202	Mitrella tuberosa		1		1		2
5105030247	Mitrella gausapata				2	2	4
5105080101	Nassarius mendicus			4		6	10
510801019999	Odostomia (Odostomia) spp.	3	6	6	2	7	24
51080102	Turbonilla spp.		1				1
5110040205	Cylichna attonsa	1		1	3	1	6
5515010101	Parvilucina tenuisculpta	1					1
5515100102	Mysella tumida			2			2
5515310114	Macoma nasuta	1	2	1	1	5	10
5515470501	Psephidia lordi	17	6	16	4	8	51
6154040202	Eudorella pacifica	1					1
6154050101	Diastylis alaskensis	1		1			2
6169020114	Ampelisca pugettica			2			2
6169020135	Ampelisca careyi			2		4	6
6169070101	Argissa hamatipes				1	1	2
6169420301	Heterophoxus oculatus	1		1	4	1	7
6179220102	Crangon alaskensis	1		1	1		3
6189060404	Pinnixa schmitti	15	30	27	35	16	123
8120	Ophiuroidea				3		3
812903019999	Amphiodia urtica/periercta		3	1	8	4	16
	TOTAL ABUNDANCE	128	111	129	176	158	702
	NUMBER OF TAXA	20	16	24	25	25	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 69

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
3740	Anthozoa		1				1
3760060101	Metridium senile			1			1
43	Nemertea	1	3	1	5		10
500102	Polynoidae	1					1
5001020810	Harmothoe lunulata					1	1
5001022301	Tenonia kitsapensis			1	1		2
5001060101	Pholoe minuta	3	7	7	7	6	30
5001060301	Sthenalais berkeleyi	1					1
5001060305	Sthenalais tertiaglabra			1	2	2	5
5001080101	Paleonotus bellis	2	2			1	5
5001130115	Phyllodoce papillosa			1			1
5001130301	Eulalia viridis					1	1
5001130310	Eulalia levicornuta					1	1
5001131101	Eulalia (Eumida) sanguinea	8	5	9	2	2	26
50011315	Sige macrocirrus orientalis					1	1
5001210102	Gyptis brevipalpa				1		1
5001210401	Ophiodromus pugettensis	2		2			4
50012301	Autolytus spp.				1		1
5001230204	Pionosyllis uraga	1					1
5001230308	Syllis elongata	2	1	2	1		6
5001230703	Exogone lourei	2					2
5001231303	Odontosyllis phosphorea		1				1
5001232201	Ehlersia heterochaeta		1				1
500124	Nereidae		1				1
5001240404	Nereis procera	2		2	1	1	6
5001240501	Platynereis bicanaliculata	4				4	8
5001250104	Nephtys cornuta	8	1	1	1	1	12
5001250111	Nephtys ferruginea	2	2	4	2	2	12
5001260202	Sphaerodoropsis sphaerulifer	1			1		2
5001270101	Glycera capitata	6	8	9	6	4	33
5001270104	Glycera americana		1				1
5001280103	Glycinde armigera	3		1	2	1	7
5001280203	Goniada brunnea	1					1
500129	Onuphidae	9	22	10	4		45
5001290103	Onuphis iridescens	2	3	1	11		17
5001290202	Diopatra ornata	4	2	12	15	21	54
50013101	Lumbrineris spp.	2	2	5			9
5001310109	Lumbrineris luti	7	7	9	4	7	34
5001310132	Lumbrineris californiensis	1					1
5001330103	Drilonereis longa			1			1
5001400102	Leitoscoloplos pugettensis			5	3	5	13
5001400510	Orbinia (Phylo) felix			1			1
5001410706	Allia ramosa	3	1				4
5001410801	Levinsenia gracilis	4	1	2	4	1	12
5001411302	Acesta lopezi		3		2		5
5001430201	Laonice cirrata	3					3
5001430204	Laonice pugettensis	1					1
50014304	Polydora spp.	1					1
5001430429	Polydora brachycephala	1					1
5001430506	Prionospio steenstrupi	1		7	6		14
5001430521	Prionospio lighti	1			1		2
5001431004	Spiophanes berkeleyorum	7	3	1		2	13
5001431701	Paraprionospio pinnata	1	1	2	1		5
5001440105	Magelona longicornis		1		3		4
5001490202	Phyllochaetopterus prolifica			2	4	3	9
5001490302	Spiochaetopterus costarum		1				1
5001490401	Mesochaetopterus taylori		1			1	2
5001500302	Tharyx multifilis	4	3		1	3	11
5001500309	Tharyx secundus	2	1				3

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 69 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5001500407	Chaetozone spinosa	1	3	1			5
5001520106	Cossura pygodactylata	2			1		3
5001580607	Ophelina acuminata			1		1	2
5001600101	Capitella capitata	6					6
5001600203	Heteromastus filobranchus		5				5
5001600302	Notomastus tenuis	3		9	19	9	40
5001600303	Notomastus lineatus		3				3
5001600402	Mediomastus californiensis	35	31	32	58	11	167
5001600501	Decamastus gracilis				4		4
500163	Maldanidae	38	9	19	11	7	84
5001630302	Maldane glebifex	1					1
5001630502	Nicomache personata	1					1
5001630901	Praxillella gracilis		1	2	1	1	5
500163090399	Praxillella affinis affinis	3		2	3		8
5001631001	Rhodine bitorquata	1	2				3
5001631103	Euclymene zonalis	1	2			1	4
5001631206	Clymenura columbiana		4	9	1	4	18
5001640201	Myriochele heeri		6	2	4	4	16
5001640202	Galathowenia nr. G. oculata			3			3
5001660304	Pectinaria californiensis	2	4	1	2	1	10
500167	Ampharetidae	2	4		1	1	8
5001670101	Amage anops		1		1		2
5001670503	Melinna elisabethae				1		1
5001670701	Anobothrus gracilis	1					1
5001670804	Asabellides lineata		1				1
500168	Terebellidae	31	2	4	1	3	41
500168089999	Polycirrus spp. complex	72	43	50	40	25	230
5001681101	Artacama coniferi	12	5	5	5	5	32
500168130201	Lanassa venusta venusta	22	36	20	44	24	146
5001681803	Scionella estevanica			1			1
50016901	Terebellides spp.	3					3
5001690101	Terebellides stroemi	18	16	21	20	14	89
5004	Oligochaeta	1					1
51021003	Margarites spp.			1			1
51032001	Alvania spp.	5	8	1	1		15
51034601	Bittium spp.	2	8	2	2	4	18
51080102	Turbonilla spp.	1				1	2
5108011134	Turbonilla aurantia		1			1	2
5110040205	Cylichna attonsa	1					1
5502020101	Acila castrensis	2	2	1	1	1	7
5502020201	Nucula tenuis	3	1	1		1	6
5502040504	Yoldia scissurata		1		3		4
5507010301	Megacrenella columbiana	1		2		2	5
5515010101	Parvilucina tenuisculpta	1	5	7	6	7	26
5515010201	Lucinoma acutilineata	1	2	2	3	1	9
5515020201	Axinopsida serricata	18	14	16	20	21	89
5515100102	Mysella tumida	1	2		2	4	9
5515220301	Nemocardium centifilosum				1		1
5515310111	Macoma yoldiformis		2		1	1	4
5515310112	Macoma carlottensis	16	8	3	7	6	40
5515310204	Tellina modesta	1			1		2
5515470301	Compsomyax subdiaphana	1		2	1		4
5515470501	Psephidia lordi	1	2	1			4
55200502	Lyonsia spp.				4		4
5520050202	Lyonsia californica					5	5
5520100108	Cardiomya californica					1	1
611103	Cylindroleberididae			1		1	2
6111070301	Euphilomedes carcharodonta	27	56	50	38	45	216
6111070303	Euphilomedes producta	70	54	39	42	56	261

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 69 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
6154040115	Leucon subnasica		1				1
6154040202	Eudorella pacifica	2			1		3
6154050101	Diastylis alaskensis	1				1	2
6157020101	Leptochelia savignyi	58	7	5	8	3	81
6157020202	Leptognathia gracilis		2			1	3
6157020204	Leptognathia brevimana	2	7	6	4	10	29
61690201	Ampelisca spp.					1	1
6169020113	Ampelisca hancocki	1	1				2
6169020135	Ampelisca careyi				2		2
6169020208	Byblis millsi	2					2
6169211008	Melita desdichada	2					2
6169341411	Hippomedon coecus					1	1
6169342913	Orchomeme obtusa		1				1
6169345701	Prachynella lodo	1		1		1	3
6169371402	Synchelidium shoemakeri	1	1	2		1	5
6169371502	Westwoodilla caecula		2	1	1	1	5
6169420301	Heterophoxus oculatus	1					1
6169420926	Rhepoxynius variatus	1	5	10	9	8	33
6169421503	Rhepoxynius bicuspidata	1	2	1		2	6
6169421504	Rhepoxynius abronius					2	2
6169440101	Dyopedos arcticus					1	1
6179160204	Spirontocaris snyderi		1				1
61890604	Pinnixa spp.	6	2	2	5	2	17
7200020104	Golfingia pugettensis			3		1	4
77	Phoronida					1	1
8120	Ophiuroidea	2					2
812903019999	Amphiodia urtica/periercta	10	65	43	27	23	168
8172060202	Eupentacta quinquesemita					1	1
	TOTAL ABUNDANCE	603	527	485	499	401	2515
	NUMBER OF TAXA	89	75	69	69	72	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 70

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
3754010103	Stylatula elongata			1			1
43	Nemertea		1	4			5
5001210102	Gyptis brevipalpa	2	1	1	1	3	8
5001220201	Sigambra tentaculata		3	7		4	14
5001240501	Platynereis bicanaliculata		1				1
500125010401	Nephtys cornuta franciscana	18	14	14	10	6	62
5001250111	Nephtys ferruginea	1					1
5001270101	Glycera capitata				1		1
5001280101	Glycinde picta	3	7	3	6	7	26
50013101	Lumbrineris spp.	1					1
5001430429	Polydora brachycephala		1	33			34
5001430521	Prionospio lighti	2		1	2	1	6
5001431701	Paraprionospio pinnata	3		4	2	3	12
5001490302	Spiochaetopterus costarum		1				1
5001500302	Tharyx multifilis	2		1	1	1	5
5001690101	Terebellides stroemi			1			1
51032001	Alvania spp.	14	2	1	20	4	41
5105030202	Mitrella tuberosa				2		2
5105030247	Mitrella gausapata		3				3
5105080101	Nassarius mendicus		14	1	6	1	22
510801019999	Odostomia (Odostomia) spp.	1	6	1	2	4	14
550701	Mytilidae	4	2	1	1	1	9
5515010101	Parvilucina tenuisculpta			1	1	1	3
5515010201	Lucinoma acutilineata			1			1
5515310102	Macoma elimata		1			1	2
5515310111	Macoma yoldiformis					1	1
5515310114	Macoma nasuta	17	14	15	12	14	72
5515470501	Psephidia lordi	26	17	14	14	27	98
6134020104	Balanus crenatus		1				1
6154040202	Eudorella pacifica	1		1			2
6169020113	Ampelisca hancocki		1	1			2
6169211008	Melita desdichada	1					1
6169260401	Gammaropsis thompsoni				1		1
6179220102	Crangon alaskensis		1				1
61830602	Pagurus spp.		2	4			6
61890604	Pinnixa spp.				4		4
8120	Ophiuroidea				1		1
	TOTAL ABUNDANCE	96	93	111	87	79	466
	NUMBER OF TAXA	15	20	22	18	16	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 71

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
43	Nemertea	7	5	6	7	3	28
500102	Polynoidae		2				2
5001020806	Harmothoe imbricata				1		1
5001022301	Tenonia kitsapensis	1			1		2
5001060101	Pholoe minuta	4	3		8	10	25
5001210102	Gyptis brevipalpa	1	2			1	4
5001230308	Syllis elongata	2		1	2	1	6
5001240501	Platynereis bicanaliculata					1	1
5001250103	Nephtys caeca			1			1
5001250104	Nephtys cornuta	1	5	1	3	1	11
5001250111	Nephtys ferruginea		4	1	1	1	7
5001270101	Glycera capitata	1					1
5001270104	Glycera americana				1		1
5001280101	Glycinde picta	6	5	3	3	3	20
5001280103	Glycinde armigera			1			1
50013101	Lumbrineris spp.	4	3		4		11
5001310101	Lumbrineris bicirrata	1	1	1		1	4
5001310109	Lumbrineris luti	20	30	24	41	22	137
5001310132	Lumbrineris californiensis	2					2
500133010402	Drilonereis falcata minor				1		1
5001400102	Leitoscoloplos pugettensis	1					1
5001410706	Allia ramosa	1					1
5001410801	Levinsenia gracilis	1	4	1	1		7
5001411302	Acesta lopezi	1	1	3	1		6
5001430201	Laonice cirrata	3					3
5001430506	Prionospio steenstrupi	9	16	18	14	15	72
5001430521	Prionospio lighti		1	1	2	1	5
5001431701	Paraprionospio pinnata	1	2	1	1		5
5001440105	Magelona longicornis	1	1	1	5	3	11
5001500302	Tharyx multifilis	5	13	1	7	5	31
5001500309	Tharyx secundus	15	21	8	13	14	71
5001500407	Chaetozone spinosa			1	2		3
5001520106	Cossura pygodactylata	3	4	6	2		15
5001580202	Armandia brevis	1		1			2
5001580607	Ophelina acuminata	6	2	3	4	3	18
5001590101	Sternaspis scutata	12	18	21	19	10	80
5001600203	Heteromastus filobranchus				1		1
50016004	Mediomastus spp.			2		1	3
5001600401	Mediomastus ambiseta			2			2
5001600402	Mediomastus californiensis	6	10		7		23
500163	Maldanidae	2					2
5001630901	Praxillella gracilis	1	1		2	1	5
500163090399	Praxillella affinis affinis		1	4		3	8
5001631103	Euclymene zonalis	1	2	1	3		7
5001640102	Owenia fusiformis				1		1
5001640202	Galathowenia nr. G. oculata	2	1	5	3	2	13
500167	Ampharetidae		2				2
5001670208	Ampharete acutifrons	1	2				3
5001670214	Ampharete finmarchica			5			5
500168089999	Polycirrus spp. complex				1		1
500168130201	Lanassa venusta venusta	1	1		1		3
5001681803	Scionella estevanica	1					1
5001690101	Terebellides stroemi		2	3		1	6
51032001	Alvania spp.		2			4	6
5105030202	Mitrella tuberosa					2	2
5106021107	Kurtziella plumbea				1		1
510801019999	Odostomia (Odostomia) spp.	1	5		2	2	10
51080102	Turbonilla spp.	4	6	2	2	2	16
5108011134	Turbonilla aurantia		1	1			2
5502020101	Acila castrensis	5	5	4	9	4	27

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 71 (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5502020201	Nucula tenuis	2	4	4	5	7	22
5502040202	Nuculana minuta		2	1	1	1	5
5502040504	Yoldia scissurata			1		2	3
550701	Mytilidae			1		1	2
5515010101	Parvilucina tenuisculpta	1			2		3
5515020201	Axinopsida serricata	5	6	3	4	7	25
5515100102	Mysella tumida	2	5	7	12	4	30
5515170101	Cyclocardia ventricosa	1					1
55153101	Macoma spp.					2	2
5515310112	Macoma carlottensis		2		1		3
5515310204	Tellina modesta		2		2		4
5515470301	Compsomyax subdiaphana		1				1
5515470501	Psephidia lordi	3	1	6	1	6	17
5515470701	Protothaca staminea	4	4	6	10	7	31
5520050202	Lyonsia californica		1				1
6111070301	Euphilomedes carcharodonta	3	4	7	2	3	19
6111070303	Euphilomedes producta	1		2	5	4	12
6154040202	Eudorella pacifica	1	1	1		3	6
6154050101	Diastylis alaskensis					1	1
6169020113	Ampelisca hancocki		2				2
6169420301	Heterophoxus oculatus	23	10	18	25	13	89
6169420926	Rhepoxynius variatus	1	3	2	7	12	25
616942099999	Foxiphalus similis/cognatus			1	1		2
6189060404	Pinnixa schmitti	15	14	7	34	8	78
8120	Ophiuroidea	7	1	6	2	6	22
812903019999	Amphiodia urtica/periercta	9	6	15	8	7	45
	TOTAL ABUNDANCE	213	253	222	299	211	1198
	NUMBER OF TAXA	52	53	49	53	45	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 201R

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
321605	Urticaceae	1	2				3
321605	Urticina coreacea	1	2				3
3740	Anthozoa					2	2
43	Nemertea	1	2	1	2	3	9
47	Nematoda	1					1
500102	Polynoidae	2		6	1	1	10
5001020806	Harmothoe imbricata	2	1				3
5001020810	Harmothoe lunulata		7		1	1	9
5001021601	Polyeunoe tuta	1					1
5001060101	Pholoe minuta	1	1		2		4
5001130102	Phyllodoce (Anaitides) groenlandica				1		1
5001130205	Eteone longa	1				3	4
5001131402	Phyllodoce (Aponaitides) hartma	1					1
5001230308	Syllis elongata		1				1
5001230702	Exogone gemmifera	25	36	49		83	193
5001230703	Exogone lourei	5	5	6	9	27	52
5001230706	Exogone verugera				13		13
5001231303	Odontosyllis phosphorea			1			1
5001232201	Ehlersia heterochaeta	1	2		2		5
500124	Nereidae	1					1
5001240406	Nereis zonata				1		1
5001250105	Nephtys punctata		1				1
5001250111	Nephtys ferruginea				1		1
5001270101	Glycera capitata	1	3	1		2	7
5001280101	Glycinde picta			1			1
5001280103	Glycinde armigera		1			1	2
5001280203	Goniada brunnea				1		1
5001290103	Onuphis iridescens			1			1
50013101	Lumbrineris spp.	8	8	4	3	5	28
5001310101	Lumbrineris bicirrata				1		1
5001310109	Lumbrineris luti			6	5		11
5001310118	Lumbrineris cruzensis		3		1		4
5001310202	Ninoe gemmea	1		1		1	3
500133010402	Drilonereis falcata minor		2				2
5001400102	Leitoscoloplos pugettensis	3	3	8	2	1	17
5001400510	Orbinia (Phylo) felix		1				1
5001410801	Levinsenia gracilis		1	1		1	3
5001430201	Laonice cirrata	2	1	1	3	1	8
5001430506	Prionospio steenstrupi	50	30	38	32	57	207
5001430701	Spio filicornis	1			1	2	4
5001431001	Spiophanes bombyx				1		1
5001431004	Spiophanes berkeleyorum	36	25	28	25	28	142
5001431801	Streblospio benedicti		3			1	4
5001432001	Scolelepis squamata		1				1
5001440105	Magelona longicornis	1	1				2
500149	Chaetopteridae				1		1
5001490202	Phyllochaetopterus prolifica			4			4
500150	Cirratulidae		2				2
5001500302	Tharyx multifilis	11	3	12	14	4	44
5001500308	Tharyx tesselata	4	4	6	2	1	17
5001500309	Tharyx secundus	5	4	1	3		13
5001500402	Chaetozone gracilis			1			1
5001500407	Chaetozone spinosa		1		1		2
5001580401	Travisia brevis	1					1
5001580403	Travisia pupa	1				1	2
5001580607	Ophelina acuminata				1		1
5001590101	Sternaspis scutata	4	3	5	2	2	16
5001600101	Capitella capitata		1				1
5001600302	Notomastus tenuis			2		3	5
5001600303	Notomastus lineatus	2	2	1	1	1	7

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 201R (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
50016004	Mediomastus spp.				9		9
5001600402	Mediomastus californiensis	4	12	8		3	27
5001600501	Decamastus gracilis	11	7	14	2	5	39
500163	Maldanidae	9	11	31	2	7	60
5001630102	Asychis similis	4		2		2	8
5001630105	Metasychis disparadentata				3		3
5001630302	Maldane glebifex	2	2	42		3	49
5001630501	Nicomache lumbricalis	1			1	10	12
5001630502	Nicomache personata		1				1
5001630901	Praxillella gracilis				3	1	4
500163090399	Praxillella affinis affinis		1		1		2
5001631001	Rhodine bitorquata		1				1
5001631103	Euclymene zonalis	3			5		8
5001640102	Owenia fusiformis	16	4	8		2	30
5001640201	Myriochele heeri	11	3	2			16
5001640202	Galathowenia nr. G. oculata	89	106	102	49	96	442
5001650101	Idanthyrsus ornamentatus	1			1	2	4
5001650201	Sabellaria cementarium	5	2	4	3	11	25
500167	Ampharetidae	1					1
50016702	Ampharete spp.					1	1
5001670208	Ampharete acutifrons	4		2	1	10	17
5001670214	Ampharete finmarchica				2		2
5001670503	Melinna elisabethae	1			2		3
5001670701	Anobothrus gracilis		3	2			5
500168089999	Polycirrus spp. complex		1				1
500168130201	Lanassa venusta venusta			1			1
5001681803	Scionella estevanica					2	2
5001690101	Terebellides stroemi	1		1	1	1	4
500170	Sabellidae			2		3	5
50017006	Potamilla spp.				1		1
5004	Oligochaeta	1					1
5103760201	Natica clausa	1	2	1			4
5105050321	Colus halli				1		1
51080102	Turbonilla spp.	1					1
55	Bivalvia				1		1
5502020101	Acila castrensis		2				2
5502020201	Nucula tenuis	1					1
5502040202	Nuculana minuta				1	2	3
5502040501	Yoldia amygdaiea				1		1
5507010301	Megacrenella columbiana			2			2
5507010402	Musculus discors	1	1	1		2	5
5515010101	Parvilucina tenuisculpta	1	3	2			6
5515010201	Lucinoma acutilineata				1		1
5515020201	Axinopsida serricata	2		1			3
5515100102	Mysella tumida	1	1				2
5515170101	Cyclocardia ventricosa	2	2		2	4	10
5515190108	Astarte esquimalti		1				1
5515220301	Nemocardium centifilosum		1				1
55153101	Macoma spp.					1	1
5515310102	Macoma elimata	2		1	1		4
551531010702	Macoma moesta alaskana		1	1			2
5515310112	Macoma carlottensis				2		2
5515310204	Tellina modesta	1					1
5515470501	Psephidia lordi	7	5	7	5	8	32
5520020101	Pandora glacialis	1					1
5520050202	Lyonsia californica	1					1
5600010101	Dentalium recticus					1	1
6001010107	Nymphon pixellae	1					1
6111070303	Euphilomedes producta	14	17	6	4	9	50

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 201R (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
6111070401	Scleroconcha trituberculata	2		1	1		4
6154040306	Eudorellopsis longirostris	2	2	1		1	6
6154050101	Diastylis alaskensis			2			2
6154070101	Campylaspis rufa		1	1	1	1	4
6157020202	Leptognathia gracilis				1		1
6160011601	Haliophasma geminata				1		1
61690201	Ampelisca spp.	2					2
6169020111	Ampelisca agassizi				1		1
6169020135	Ampelisca careyi			1			1
6169020208	Byblis millsi	2					2
6169020301	Haploops tubicola				1	1	2
6169260201	Photis brevipes	1		2			3
6169270402	Microjassa litodes			4			4
6169371502	Westwoodilla caecula				1		1
6169420301	Heterophoxus oculatus	3		3	1	1	8
6169420928	Eobrolgus spinosus		2	1		1	4
6169421503	Rhepoxynius bicuspidata		1	1	1		3
6169440102	Dyopedos bispinis	4	1	2	1	3	11
6169500503	Tiron biocellata			1			1
61710107	Caprella spp.					2	2
6171010708	Caprella irregularis	1		11			12
6171010719	Caprella mendax	2		6			8
6183060202	Pagurus ochotensis		1				1
72000201	Golfingia spp.	452	353	397	380	647	2229
7200020104	Golfingia pugettensis			1	5		6
8120	Ophiuroidea	11	2				13
8127010610	Ophiura sarsi	25	24	25	57	30	161
812903019999	Amphiodia urtica/periercta			1		1	2
8129030202	Amphipholis squamata	13	26	29	8	17	93
8129030999	Amphioplus strongyloplax			1			1
8172060301	Pentamera pseudocalcigera					1	1
8178010203	Leptosynapta clarki					26	26
8178010299	Leptosynapta transgressor	17		26	2		45
81790201	Paracaudia chilensis				1	2	3
8401	Ascidiacea			1			1
	TOTAL ABUNDANCE	913	766	946	701	1152	4478
	NUMBER OF TAXA	78	69	71	73	63	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 202R

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
43	Nemertea		2	2	1	2	7
72000201	Golfingia spp.				2		2
7200020104	Golfingia pugettensis			1	2	3	6
7200020106	Golfingia minuta	2					2
5001021103	Lepidonotus squamatus				1		1
5001060101	Pholoe minuta					1	1
5001060305	Sthenalais tertiaglabra				1		1
5001130205	Eteone longa	1	1		5	3	10
5001210102	Gyptis brevipalpa		1				1
5001230308	Syllis elongata				1		1
5001230703	Exogone lourei	1				1	2
5001250103	Nephtys caeca	1			1	1	3
5001250111	Nephtys ferruginea	1					1
5001270101	Glycera capitata	1	1	1	2		5
5001290111	Onuphis elegans					1	1
5001290202	Diopatra ornata				1		1
50013101	Lumbrineris spp.			2	1	5	8
5001310109	Lumbrineris luti	3	3	3	1	3	13
5001310118	Lumbrineris cruzensis			3			3
5001330103	Drilonereis longa				1		1
500133010402	Drilonereis falcata minor	1	4	5	1	4	15
5001400102	Leitoscoloplos pugettensis	9	11	17	8	3	48
5001400510	Orbinia (Phylo) felix		1	3	1		5
5001420102	Apistobranchus ornatus			2	1		3
5001430402	Polydora socialis		1				1
5001430429	Polydora brachycephala			1			1
5001430431	Polydora cardalia	4		2	1	1	8
5001430506	Prionospio steenstrupi	11	23	19	17	29	99
5001430701	Spio filicornis			2			2
5001431004	Spiophanes berkeleyorum	1	5	1	1	2	10
5001431701	Paraprionospio pinnata				1	1	2
5001440105	Magelona longicornis				1		1
5001490202	Phyllochaetopterus prolifica				1		1
5001500101	Cirratulus cirratus		1				1
5001500302	Tharyx multifilis	1		4	10		15
5001500309	Tharyx secundus	1	3			2	6
5001500407	Chaetozone spinosa	1	3	4	3	1	12
5001570101	Scalibregma inflatum			3	2		5
5001590101	Sternaspis scutata	21	11	22	15	5	74
5001600203	Heteromastus filobranchus			1			1
5001600303	Notomastus lineatus	1		5	1	2	9
5001600402	Mediomastus californiensis	4	13	12	6	7	42
5001600501	Decamastus gracilis	2	2	1	1		6
500163	Maldanidae		3	8	7	5	23
5001630302	Maldane glebifex	1	1				2
5001630901	Praxillella gracilis	1					1
500163090399	Praxillella affinis affinis	1			1	1	3
5001631103	Euclymene zonalis	7	2	18	3	7	37
5001640102	Owenia fusiformis			1			1
5001640202	Galathowenia nr. G. oculata	28	37	22	33	40	160
5001670208	Ampharete acutifrons	11	24	18	15	29	97
5001670214	Ampharete finmarchica				2	4	6
5001670801	Asabellides sibirica					3	3
500168	Terebellidae				1		1
5001680710	Pista brevibranchiata				3		3
500168089999	Polycirrus spp. complex				1		1
5001681101	Artacama coniferi		1				1
5001681803	Scionella estevanica				1	1	2
5001690101	Terebellides stroemi				1		1
5001700104	Chone duneri				1		1

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 202R (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
51035306	Balcis spp.			1		2	3
5103760201	Natica clausa	1					1
5105050605	Mohnia frielei	1			1		2
510801019999	Odostomia (Odostomia) spp.			1	1	1	3
51080102	Turbonilla spp.	1			1		2
5110040205	Cylichna attonsa				1		1
5402	Chaetodermatida			1			1
5502040504	Yoldia scissurata	2	1	1	1		5
5515010101	Parvilucina tenuisculpta	1	3		5	3	12
5515010201	Lucinoma acutilineata	1	2			1	4
5515020102	Adontorhina cyclica	1	1				2
5515020201	Axinopsida serricata	2	1	5	3	3	14
5515310102	Macoma elimata		1	2	1	5	9
5515470301	Compsomyax subdiaphana		1	1	1	1	4
5515470501	Psephidia lordi	2	4	5	5	3	19
5517060201	Hiatella arctica				1		1
5520020101	Pandora glacialis	1		1	2	1	5
5520020102	Pandora filosa					3	3
6154040115	Leucon subnasica			1	1		2
6154040202	Eudorella pacifica			1	1	1	3
6157020204	Leptognathia brevimana		1	2		1	4
6160011601	Haliophasma geminata		1				1
6169020111	Ampelisca agassizi	1			1		2
6169020135	Ampelisca careyi	2	5	5	2	3	17
6169020208	Byblis millsi				1		1
6169060203	Aoroides inermis				5		5
6169340303	Anonyx lilljeborgi			1			1
6169371502	Westwoodilla caecula	1	2	1		2	6
6169420204	Harpiniopsis fulgens				2		2
6169420301	Heterophoxus oculatus		2		1	2	5
6169421503	Rhepoxynius bicuspidata	8	9	9	8	9	43
8129030999	Amphioplus strongyloplax	1					1
8172060301	Pentamera pseudocalcigera		1		5	7	13
8172060399	Pentamera trachyplaca				2		2
	TOTAL ABUNDANCE	142	189	221	212	215	979
	NUMBER OF TAXA	40	38	44	65	45	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 203R

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
3743010303	Pachycerianthus fimbriatus		1				1
39	Platyhelminthes			2		1	3
43	Nemertea	1		3	2	5	11
500102	Polynoidae	1	1	2	7	2	13
5001020806	Harmothoe imbricata		1				1
5001021601	Polyeunoe tuta				1		1
5001022301	Tenonia kitsapensis		3				3
5001040101	Pholoides aspera				1	1	2
5001060101	Pholoe minuta	2	4	1	2	5	14
5001130115	Phyllodoce papillosa					1	1
50011302	Eteone spp.					7	7
5001130203	Eteone pacifica				3		3
5001130205	Eteone longa	7	6	6	1		20
5001131101	Eulalia (Eumida) sanguinea			3	1		4
5001210102	Gyptis brevipalpa			9			9
5001210401	Ophiodromus pugettensis	11	7		7	4	29
5001210501	Kefersteinia cirrata			1			1
50012404	Nereis spp.				1		1
5001240404	Nereis procera	1		2			3
5001240406	Nereis zonata		2		1	2	5
5001250104	Nephtys cornuta	1	3	7	3	1	15
5001270101	Glycera capitata		4	7	7	7	25
5001270104	Glycera americana				1		1
5001280103	Glycinde armigera	8	10	14	11	7	50
50013101	Lumbrineris spp.	17	20	10	16	27	90
5001310101	Lumbrineris bicirrata		2				2
5001310109	Lumbrineris luti	2					2
5001360504	Schistomeringos rudolphi	1				2	3
5001410801	Levinsenia gracilis		1	2			3
5001430201	Laonice cirrata	1					1
5001430429	Polydora brachycephala		2				2
5001431004	Spiophanes berkeleyorum				1		1
5001431701	Paraprionospio pinnata	4	2	3	2	2	13
5001440105	Magelona longicornis				2		2
5001450102	Trochochaeta multisetosa	2		1	2	2	7
500150	Cirratulidae		7	2		1	10
5001500101	Cirratulus cirratus	4	2	3		1	10
5001500302	Tharyx multifilis	24	45		13	5	87
5001500309	Tharyx secundus	5	90	5	25		125
5001580607	Ophelina acuminata				1		1
5001600101	Capitella capitata		1		1	1	3
5001600203	Heteromastus filobranchus	1		2			3
50016004	Mediomastus spp.		2		3		5
5001600402	Mediomastus californiensis	1					1
500163	Maldanidae	7	5	18	2		32
5001630901	Praxillella gracilis			3	9	3	15
500163090399	Praxillella affinis affinis	19	3		9	5	36
5001640102	Owenia fusiformis	3	1	10		2	16
5001640202	Galathowenia nr. G. oculata	2					2
5001660304	Pectinaria californiensis			1	1	1	3
500167	Ampharetidae		1	1	1	1	4
5001670101	Amage anops		1		2		3
5001670208	Ampharete acutifrons					1	1
5001670304	Amphicteis scaphobranchiata		2		3	2	7
5001670306	Amphicteis mucronata	2					2
5001670503	Melinna elisabethae	18	10	19	23	12	82
5001670701	Anobothrus gracilis	1			2		3
500168	Terebellidae	1			1		2
5001680405	Neoamphitrite edwardsii			1			1
5001680701	Pista cristata			5			5

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 203R (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5001680710	Pista brevibranchiata	2	1			1	4
500168089999	Polycirrus spp. complex	1			1		2
5001681803	Scionella estevanica	4	2		9	9	24
5001690101	Terebellides stroemi	5		1	3	4	13
5004	Oligochaeta	1					1
5105080101	Nassarius mendicus		1				1
510801019999	Odostomia (Odostomia) spp.	1	4	2	4		11
51080102	Turbonilla spp.		1			1	2
5110040205	Cylichna attonsa		1				1
5502020101	Acila castrensis					2	2
5502020201	Nucula tenuis				2	1	3
5502040504	Yoldia scissurata	3	1	3	1	1	9
5515020201	Axinopsida serricata	2	1	2			5
5515100102	Mysella tumida	6	5	9	5	8	33
55153101	Macoma spp.	1					1
5515310102	Macoma elimata			1			1
5515310114	Macoma nasuta					1	1
5515470501	Psephidia lordi	2	2			2	6
6111070301	Euphilomedes carcharodonta		1	4	3	2	10
6111070303	Euphilomedes producta	4	2	1	3	4	14
6154040202	Eudorella pacifica	6	4	7	2	3	22
6169260303	Protomedeia grandimana	12	37	4	13	6	72
6169371502	Westwoodilla caecula	1					1
6169420301	Heterophoxus oculatus	20	15	20	29	14	98
616942099999	Foxiphalus similis/cognatus	1			2		3
6179220102	Crangon alaskensis		1				1
6189060404	Pinnixa schmitti	13	5	13	10	12	53
7200020104	Golfingia pugettensis	1	1	1	2		5
7400010101	Priapulus caudatus			1			1
77	Phoronida	3		1		5	9
8120	Ophiuroidea	9	2	5	5	5	26
812903019999	Amphiodia urtica/periercta	15	9	13	1	14	52
	TOTAL ABUNDANCE	260	335	231	263	206	1295
	NUMBER OF TAXA	49	49	45	52	47	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 204R

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
43	Nemertea	2	10	9	7	9	37
5001020810	Harmothoe lunulata		1		1		2
5001060101	Pholoe minuta	2	2		2	2	8
5001130205	Eteone longa	1			1	1	3
5001210102	Gyptis brevipalpa	4	1	2		1	8
5001250104	Nephtys cornuta	8	1		1		10
5001250111	Nephtys ferruginea					1	1
5001250124	Nephty glabra			1			1
5001270101	Glycera capitata	2		1	1	1	5
5001280101	Glycinde picta	1		2	2	2	7
50013101	Lumbrineris spp.	4	4	1	1	3	13
5001310109	Lumbrineris luti		2	4		3	9
5001310118	Lumbrineris cruzensis	7			3		10
5001400102	Leitoscoloplos pugettensis					1	1
5001431004	Spiophanes berkeleyorum	1	8	2	2	1	14
5001431701	Paraprionospio pinnata		1				1
5001570101	Scalibregma inflatum	39	32	30	19	58	178
5001600203	Heteromastus filobranchus	23	24	7	21	20	95
500163	Maldanidae	2	4			1	7
5001630802	Axiothella rubrocincta		1				1
500167	Ampharetidae	1					1
5001670306	Amphicteis mucronata		1			2	3
500168089999	Polycirrus spp. complex	50	14	5	8	13	90
5001690101	Terebellides stroemi	2		1		2	5
51032001	Alvania spp.			1			1
5110040205	Cylichna attonsa		14	2	2	4	22
5515010101	Parvilucina tenuisculpta	10	19	8	19	14	70
5515020201	Axinopsida serricata	3	5	6	7	4	25
5515100102	Mysella tumida	1	3	2	2	6	14
5515310112	Macoma carlottensis	23	13	17	15	16	84
5515470301	Compsomyax subdiaphana	2	2	3			7
5515470501	Psephidia lordi	12	15	5	2	13	47
6154040202	Eudorella pacifica				1		1
6169260303	Protomedeia grandimana	57	12	14	20	70	173
6169370816	Monoculodes zernovi		2			1	3
6169420301	Heterophoxus oculatus			1			1
6189060404	Pinnixa schmitti	18	14	20	18	14	84
812903019999	Amphiodia urtica/periercta	13	20	3	8	13	57
	TOTAL ABUNDANCE	288	225	147	163	276	1099
	NUMBER OF TAXA	25	26	24	23	27	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 205R

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
43	Nemertea	2	1	6	1	2	12
47	Nematoda				2	1	3
5001020806	Harmothoe imbricata			1		1	2
5001020810	Harmothoe lunulata		1				1
5001021601	Polyeunoe tuta				1		1
5001060101	Pholoe minuta	1	1	2		2	6
5001130203	Eteone pacifica	1					1
5001131101	Eulalia (Eumida) sanguinea		2	1			3
5001210102	Gyptis brevipalpa					1	1
5001230308	Syllis elongata				1	1	2
5001230703	Exogone lourei		1				1
5001240404	Nereis procera			1			1
5001240501	Platynereis bicanaliculata		1				1
5001250111	Nephtys ferruginea	3				1	4
5001270101	Glycera capitata			1		2	3
5001280203	Goniada brunnea	1	1		1		3
50013101	Lumbrineris spp.	4	5	6	7	7	29
5001310101	Lumbrineris bicirrata	2				2	4
5001310109	Lumbrineris luti	3	3			3	9
5001310118	Lumbrineris cruzensis		1	4			5
500133010402	Drilonereis falcata minor	3	4	1	2	5	15
5001400102	Leitoscoloplos pugettensis		5	1		1	7
5001410801	Levinsenia gracilis		4	1	1		6
5001411302	Acesta lopezi	3		2		1	6
5001430201	Laonice cirrata			1	4		5
5001430401	Polydora giardi		3				3
5001430402	Polydora socialis			1			1
5001430429	Polydora brachycephala				1		1
5001430431	Polydora cardalia		2	1			3
5001430506	Prionospio steenstrupi		4	1	1		6
5001430521	Prionospio lighti		1	4	1		6
5001431701	Paraprionospio pinnata	1	3	2	3	4	13
5001440105	Magelona longicornis	5	5	3	3	4	20
5001490202	Phyllochaetopterus prolifica	1	4	1		2	8
5001490302	Spiochaetopterus costarum	1		2			3
5001500101	Cirratulus cirratus					1	1
5001500302	Tharyx multifilis	2	4	2	1	2	11
5001500309	Tharyx secundus	5	9	6	1	1	22
5001500407	Chaetozone spinosa	3	2	2	1	1	9
5001520106	Cossura pygodactylata		4				4
5001570101	Scalibregma inflatum	2	9	3	9	2	25
5001580202	Armandia brevis					1	1
5001580607	Ophelina acuminata	1					1
5001590101	Sternaspis scutata	32	33	40	28	23	156
50016004	Mediomastus spp.	2				1	3
5001600402	Mediomastus californiensis		4	1			5
5001600501	Decamastus gracilis		1		1		2
500163	Maldanidae			2	5		7
5001630302	Maldane glebifex					1	1
5001630901	Praxillella gracilis	1	3	2	4	7	17
500163090399	Praxillella affinis affinis	2		3	4	3	12
5001631001	Rhodine bitorquata				1		1
5001631103	Euclymene zonalis	3	2	3		3	11
5001640202	Galathowenia nr. G. oculata		2	1		1	4
5001650201	Sabellaria cementarium				1		1
5001670101	Amage anops			1			1
5001670503	Melinna elisabethae				1		1
5001680405	Neoamphitrite edwardsii				1		1
500168089999	Polycirrus spp. complex	1	1	1	2		5
5001681101	Artacama coniferi		1				1

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 205R (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5001690101	Terebellides stroemi			1	1		2
5001690201	Trichobranchus glacialis		1				1
51032001	Alvania spp.		6		4	3	13
5105030202	Mitrella tuberosa		2	1	2		5
5105030247	Mitrella gausapata	3	1	2	1	2	9
510801019999	Odostomia (Odostomia) spp.	20	15	17	9	30	91
5108011134	Turbonilla aurantia	1		4		3	8
511006999999	Melanochlamys dimedea	1					1
55	Bivalvia					1	1
5502020101	Acila castrensis	183	165	171	204	192	915
5502020201	Nucula tenuis			2	1	2	5
5502040202	Nuculana minuta	2					2
5502040504	Yoldia scissurata	1	2		1	3	7
5515020201	Axinopsida serricata	6	3	2	1	1	13
55151001	Mysella spp.			4			4
5515100102	Mysella tumida	10	1	10	2		23
5515310102	Macoma elimata	1				4	5
5515310112	Macoma carlottensis			2	4	1	7
5515310115	Macoma inquinata				1		1
5515470301	Compsomyax subdiaphana	6	5	9	3	3	26
55154704	Liocyma spp.	1					1
5515470501	Psephidia lordi	13	1	9	14	21	58
5515470701	Protothaca staminea				1		1
5520020101	Pandora glacialis					1	1
5520020102	Pandora filosa					2	2
5520050202	Lyonsia californica	1					1
5520100108	Cardiomya californica	2					2
56000101	Dentalium spp.	1	1	1		3	6
5600010101	Dentalium recticus				1		1
6111070303	Euphilomedes producta	6	4		1	3	14
6134020104	Balanus crenatus				4	3	7
6154040202	Eudorella pacifica	8	12	16	6	10	52
6169020113	Ampelisca hancocki	1					1
6169020135	Ampelisca careyi			1			1
61690602	Aoroides spp.		1				1
61691202	Calliopius spp.				1		1
6169211008	Melita desdichada		1		1		2
6169260303	Protomedeia grandimana					3	3
6169345701	Prachynella lodo			1		1	2
6169420301	Heterophoxus oculatus	4	8	1	5	2	20
616942099999	Foxiphalus similis/cognatus					1	1
61830602	Pagurus spp.				1		1
61890604	Pinnixa spp.				1		1
7400010101	Priapulus caudatus		2				2
8120	Ophiuroidea			1			1
812903019999	Amphiodia urtica/periercta	17	33	60	22	24	156
	TOTAL ABUNDANCE	373	391	425	381	406	1976
	NUMBER OF TAXA	46	52	54	53	54	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 206R

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
43	Nemertea	11	12	5	13	15	56
47	Nematoda					2	2
5001020806	Harmothoe imbricata	1					1
5001020810	Malmgrenia lunulata			1			1
5001022301	Tenonia kitsapensis		1				1
5001060101	Pholoe minuta	3	4		3	3	13
50011302	Eteone spp.					1	1
5001130205	Eteone longa	1		2			3
5001131101	Eulalia (Eumida) sanguinea		2	1		1	4
5001131402	Phyllodoce (Aponaitides) hartmanae		1	1	1		3
5001210102	Gyptis brevipalpa	1	1	1	2	1	6
5001230308	Syllis elongata		1				1
5001230702	Exogone gemmifera		1	6			7
5001230703	Exogone lourei	2	3		3		8
5001240404	Nereis procera	1					1
50012501	Nephtys spp.				1		1
5001250103	Nephtys caeca	1			1		2
5001250104	Nephtys cornuta			2			2
5001250105	Nephtys punctata				1		1
5001250111	Nephtys ferruginea	4		2	3	2	11
5001270101	Glycera capitata		1	1		1	3
5001280101	Glycinde picta	1			1		2
5001280103	Glycinde armigera	1			1	3	5
500129	Onuphidae	3	2	1	2		8
5001290103	Onuphis iridescens			1	2		3
5001290202	Diopatra ornata		1	3			4
50013101	Lumbrineris spp.		4	3	8	12	27
5001310101	Lumbrineris bicirrata			1			1
5001310109	Lumbrineris luti	5		1	1		7
5001310118	Lumbrineris cruzensis				2		2
500133010402	Drilonereis falcata minor	2	10	6	6	5	29
5001360504	Schistomeringos rudolphi	1				2	3
5001360505	Schistomeringos caeca		1	1	4		6
5001400102	Leitoscoloplos pugettensis	10	12	7	17	17	63
500141	Paraonidae				1		1
5001410706	Allia ramosa		1		3		4
5001410801	Levinsenia gracilis	2	2	3	3	5	15
5001411302	Acesta lopezi			2		1	3
5001420102	Apistobranchus ornatus	3	1	2	5	2	13
5001430201	Laonice cirrata	3	3	7	6	3	22
5001430402	Polydora socialis				1		1
5001430431	Polydora cardalia				1	1	2
5001430506	Prionospio steenstrupi	4	1	9	6	7	27
5001430521	Prionospio lighti		2	2	8		12
5001430701	Spio filicornis		3	2	2	2	9
5001431004	Spiophanes berkeleyorum				2		2
5001431701	Paraprionospio pinnata	1	1		1		3
5001432001	Scolelepis squamata		1		1		2
5001440105	Magelona longicornis	9	10	3	2	3	27
500150	Cirratulidae					1	1
5001500302	Tharyx multifilis	1	10	7	7	5	30
5001500308	Tharyx tesselata	1			1		2
5001500309	Tharyx secundus	6	7	2	4	3	22
5001500407	Chaetozone spinosa	4		6	3	4	17
5001520106	Cossura pygodactylata	1		1		1	3
5001570101	Scalibregma inflatum		1		1	2	4
5001580607	Ophelina acuminata			1	1		2
5001590101	Sternaspis scutata	1	15	4	11	8	39
500160	Capitellidae				1		1
5001600101	Capitella capitata		5	1	2		8

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 206R (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5001600203	Heteromastus filobranchus				1		1
5001600302	Notomastus tenuis			2		2	4
5001600303	Notomastus lineatus	3	2	3		1	9
50016004	Mediomastus spp.				13		13
5001600402	Mediomastus californiensis	7	7	10		6	30
500163	Maldanidae	18	13	15	24	33	103
5001630302	Maldane glebifex		1	1	6	4	12
5001630901	Praxillella gracilis	2	10	9	18	5	44
500163090399	Praxillella affinis affinis	5	14	10	20	4	53
5001631001	Rhodine bitorquata	1	4	4	1	3	13
5001631103	Euclymene zonalis	5	37	11	18	21	92
5001631206	Clymenura columbiana		2		1	1	4
5001640201	Myriochele heeri		6		2	4	12
5001640202	Galathowenia nr. G. oculata	6	9	6	11	7	39
500167	Ampharetidae	1					1
5001670101	Amage anops			1	2		3
5001670208	Ampharete acutifrons		1				1
5001670214	Ampharete finmarchica			1	1		2
5001670503	Melinna elisabethae	3	2		2	2	9
5001670701	Anobothrus gracilis			1	1	1	3
5001670801	Asabellides sibirica					2	2
500168	Terebellidae			1			1
5001680601	Nicolea zostericola			1			1
500168089999	Polycirrus spp. complex	5	1	3	4		13
500168130201	Lanassa venusta venusta		1	2	1		4
5001681803	Scionella estevanica			4			4
5001690101	Terebellides stroemi	2	3	1	3		9
5001690201	Trichobranchus glacialis	2		1			3
500170	Sabellidae		1		1		2
5001700104	Chone duneri	1					1
5004	Oligochaeta			1	3		4
51032001	Alvania spp.	5	7	13	20	3	48
51034601	Bittium spp.	3	7	6	7	13	36
5105030202	Mitrella tuberosa	2		1	2		5
5105030247	Mitrella gausapata	1	4	4	1		10
510801019999	Odostomia (Odostomia) spp.				1		1
51080102	Turbonilla spp.		2		2		4
5108011134	Turbonilla aurantia	1				3	4
5110040205	Cylichna attonsa		3	2			5
5402	Chaetodermatida				1		1
55	Pelecypoda					1	1
5502020101	Acila castrensis	1	2	2	8	3	16
5502020201	Nucula tenuis	9	8	7	7	11	42
5502040202	Nuculana minuta	3	3	2	2	2	12
5502040501	Yoldia amygdaiea					1	1
5502040504	Yoldia scissurata				5		5
5507010301	Megacrenella columbiana			4	1		5
55070106	Modiolus spp.					1	1
5515010101	Parvilucina tenuisculpta	22	31	28	51	45	177
5515010201	Lucinoma acutilineata	1	1	2	1	2	7
5515020102	Adontorhina cyclica	3	1	1	5	4	14
5515020201	Axinopsida serricata	67	151	91	187	84	580
5515020301	Thyasira flexuosa	4	4	2	2	2	14
5515100102	Mysella tumida	2	2	1			5
55153101	Macoma spp.	2	7		4	3	16
5515310102	Macoma elimata	20	24	12	16	13	85
5515310111	Macoma yoldiformis		1			1	2
5515310112	Macoma carlottensis	2	13	7	9	8	39
5515470301	Compsomyax subdiaphana	1	3	3	5	8	20

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 206R (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5515470501	Psephidia lordi	11	50	11	45	16	133
5515470701	Protothaca staminea				2		2
5517010201	Mya arenaria				1		1
5520050202	Lyonsia californica		1		1		2
5520080203	Thracia trapezoides					1	1
56000101	Dentalium spp.	10	21	10	20	16	77
6111070301	Euphilomedes carcharodonta	2	2	2	4	1	11
6111070303	Euphilomedes producta	12	12	9	15	10	58
6154040202	Eudorella pacifica					1	1
6157020204	Leptognathia brevimana	1		2	3		6
6169020113	Ampelisca hancocki	2		1	1		4
6169020135	Ampelisca careyi	2			2		4
6169020208	Byblis millsi		3	1			4
61690602	Aoroides spp.		1		1		2
6169211008	Melita desdichada			2			2
61692603	Protomedeia spp.	1		1			2
6169342802	Opisa tridentata		1				1
6169371402	Synchelidium shoemakeri				1		1
6169371502	Westwoodilla caecula		8			2	10
6169420301	Heterophoxus oculatus	5	3	1	3	2	14
6169420926	Rhepoxynius variatus	3		3	6	2	14
6179160408	Eualus pusiolus					1	1
6179160511	Heptacarpus stimpsoni			1			1
61830402	Callianassa spp.				1		1
61890604	Pinnixa spp.	2			3	1	6
7200020104	Golfingia pugettensis	4	3	2	2		11
812903019999	Amphiodia urtica/periercta		1		1	2	4
81720601	Cucumaria spp.			1			1
8172060304	Pentamera populifera		1				1
8178010203	Leptosynapta clarki		9				9
8178010299	Leptosynapta transgressor		25				25
	TOTAL ABUNDANCE	349	649	421	727	472	2618
	NUMBER OF TAXA	72	82	87	101	74	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 207R

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
43	Nemertea	2	2	4	7	2	17
7200020104	Golfingia pugettensis				1		1
7400010101	Priapulus caudatus			1			1
5001022301	Tenonia kitsapensis				1		1
5001022688	Malmgreniella sp. B		1				1
5001060101	Pholoe minuta		1		1		2
5001060305	Sthenalais tertiaglabra				1		1
5001130201	Eteone californica			2			2
5001130299	Eteone spilotus				1		1
5001131402	Phyllodoce (Aponaitides) hartmanae				1		1
5001210102	Gyptis brevipalpa	1					1
5001210201	Microphthalmus sczelkowii					1	1
5001210801	Micropodarke dubia				1		1
5001220301	Pilargis berkeleyi			3	2		5
5001230702	Exogone gemmifera				1		1
500124	Nereidae				1		1
5001240404	Nereis procera		2	1			3
50012501	Nephtys spp.			1			1
5001250103	Nephtys caeca	1	1				2
5001250105	Nephtys punctata				2		2
5001250111	Nephtys ferruginea					1	1
5001250197	Nephtys sp. A	1	1	1	2	1	6
5001270101	Glycera capitata	4	3	2	1	3	13
50012801	Glycinde spp.	2					2
5001280103	Glycinde armigera	2		4	2		8
5001290103	Onuphis iridescens			1			1
5001290202	Diopatra ornata		1	2	5		8
5001310101	Lumbrineris bicirrata	1	1	4	3	1	10
5001310109	Lumbrineris luti	3	11	9	7	4	34
5001310118	Lumbrineris cruzensis	2	8	2	5	7	24
5001360504	Schistomeringos rudolphi		1				1
5001400102	Leitoscoloplos pugettensis	1	2		1		4
5001410706	Allia ramosa			1			1
5001410801	Levinsenia gracilis	27	50	42	120	34	273
5001411302	Acesta lopezi	5		2	10		17
50014302	Laonice spp.					2	2
5001430201	Laonice cirrata		2			2	4
5001430506	Prionospio steenstrupi	1	1		3	6	11
5001430521	Prionospio lighti	3	2		2	1	8
5001431004	Spiophanes berkeleyorum	1	2		1		4
5001431701	Paraprionospio pinnata	1	3	1	1	4	10
5001440105	Magelona longicornis		1			1	2
5001490302	Spiochaetopterus costarum		2				2
5001500302	Tharyx multifilis	1	2	4	5	5	17
5001500309	Tharyx secundus		5	2	2	2	11
5001500401	Chaetozone setosa	5	1	4	2		12
5001520106	Cossura pygodactylata	2	4	3	8	8	25
5001520198	Cossura sp. 1		2		1	1	4
5001540302	Pherusa plumosa				1		1
5001580202	Armandia brevis				1		1
5001590101	Sternaspis scutata	58	21	44	14	43	180
5001600101	Capitella capitata				1		1
5001600203	Heteromastus filobranchus			1	5	1	7
5001600402	Mediomastus californiensis	3		5	8	2	18
5001600601	Barantolla americana			1			1
5001630901	Praxillella gracilis		1				1
5001630902	Praxillella praetermissa			1	1		2
5001631	Euclymeninae		1		1	1	3

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 207R (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
5001631001	Rhodine bitorquata			1			1
5001631103	Euclymene zonalis	1	1	1		2	5
5001640202	Galathowenia nr. G. oculata	7	5	11	5	10	38
5001660304	Pectinaria californiensis	1				1	2
5001670101	Amage anops			1	1		2
5001670208	Ampharete acutifrons			1			1
5001680701	Pista cristata		1	1			2
5001681101	Artacama coniferi		2	1			3
500168130201	Lanassa venusta venusta	1	2	1		2	6
5001690101	Terebellides stroemi	3					3
5001690103	Terebellides californica	1	1	3	2		7
5004	Oligochaeta		2		1		3
51	Gastropoda	1					1
51032001	Alvania spp.				15		15
5103760201	Natica clausa					1	1
5105030202	Mitrella tuberosa	4					4
5105030247	Mitrella gausapata			2	4	6	12
510801019999	Odostomia (Odostomia) spp.	2	3	3	3	4	15
5108011134	Turbonilla aurantia		2				2
5110040205	Cylichna attonsa		1		1		2
5402	Chaetodermatida		2				2
5502020201	Nucula tenuis	2	1	2	4	5	14
5502040202	Nuculana minuta	3	4	5		6	18
5502040501	Yoldia amygdaiea			3	1	2	6
5502040504	Yoldia scissurata	4	1	4	1	4	14
5502040507	Yoldia thraciaeformis	1		4		1	6
5515010101	Parvilucina tenuisculpta	11	17	14	25	15	82
5515010201	Lucinoma acutilineata				2	1	3
5515020102	Adontorhina cyclica		3			1	4
5515020201	Axinopsida serricata	141	229	195	179	265	1009
5515020301	Thyasira flexuosa			1			1
5515100102	Mysella tumida		3				3
55153101	Macoma spp.	2		1			3
5515310102	Macoma elimata	3	3	4			10
5515310112	Macoma carlottensis	8	9	11	6	12	46
5515470301	Compsomyax subdiaphana	5	11	4	7	7	34
5517060201	Hiatella arctica				1		1
5520020102	Pandora filosa			2			2
56000101	Dentalium spp.		5				5
5600010101	Dentalium recticus	5		11	4	3	23
6111070301	Euphilomedes carcharodonta					1	1
6111070303	Euphilomedes producta	5	2	7	2	2	18
6154040202	Eudorella pacifica	1	3	1	3	5	13
6157020101	Leptochelia savignyi				4		4
6157020204	Leptognathia brevimana			2			2
6169020113	Ampelisca hancocki	1			1		2
6169020125	Ampelisca brevisimulata	1		1			2
6169020135	Ampelisca careyi	1				1	2
6169060206	Aoroides intermedius				3		3
6169150302	Erichthonius brasiliensis				1		1
6169210802	Maera loveni					1	1

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 207R (Continued)

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
6169211008	Melita desdichada				2		2
61692603	Protomedeia spp.				1		1
6169260401	Gammaropsis thompsoni				6		6
6169420204	Harpiniopsis fulgens	4	3	2	4	6	19
6169420301	Heterophoxus oculatus	4		3	6	3	16
6169421503	Rhepoxynius bicuspidata					1	1
61890604	Pinnixa spp.	1			1		2
8127010607	Ophiura lutkeni				1		1
812903019999	Amphiodia urtica/periercta	1	2	1	1	3	8
	TOTAL ABUNDANCE	352	453	452	531	504	2292
	NUMBER OF TAXA	51	55	59	71	51	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 208R

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
38	Ctenophora		1				1
5001220204	Sigambra bassi		4	8			12
5001250104	Nephtys cornuta	101	119	145	134	124	623
61792201	Crangon spp.					1	1
61830401	Upogebia spp.		1		1		2
	TOTAL ABUNDANCE	101	125	153	135	125	639
	NUMBER OF TAXA	1	4	2	2	2	

1991 BENTHIC INFAUNA DATA BY STATION AND REPLICATE

STATION 209R

NODC CODE	TAXON	REP 1	REP 2	REP 3	REP 4	REP 5	TOTAL
3759010102	Edwardsia sipunculoides					2	2
43	Nemertea	8	6	7	6	1	28
5001021601	Polyeunoe tuta	1					1
5001021805	Lepidasthenia longicirrata	2					2
5001022301	Tenonia kitsapensis	1					1
5001022688	Malmgreniella spp. B	1		1			2
5001022689	Malmgreniella spp. L		1				1
5001060101	Pholoe minuta	1	1				2
5001130299	Eteone fauchaldi	1	1				2
5001131101	Eulalia (Eumida) sanguinea	5	2	3	5	7	22
50011314	Phyllodoce spp.	1				1	2
5001131402	Phyllodoce (Aponaitides) hartmanae		2				2
5001210102	Gyptis brevipalpa			1		1	2
5001240404	Nereis procera	1					1
5001280101	Glycinde picta	3	2	1	2	6	14
5001280103	Glycinde armigera	3	3	2	2	3	13
5001280203	Goniada brunnea	1					1
500129	Onuphidae				1		1
5001290202	Diopatra ornata	1			1		2
5001310109	Lumbrineris luti	23	28	23	25	23	122
5001400102	Leitoscoloplos pugettensis	13	19	21	16	14	83
5001400102	Laonice pugettensis				1		1
5001400202	Naineris quadricuspida			1	1	3	5
5001400510	Orbinia (Phylo) felix		1	1			2
50014102	Acesta/Aricidea spp.					1	1
5001411302	Acesta lopezi	1	5	5		8	19
5001430419	Polydora armata	4					4
5001430506	Prionospio steenstrupi	2	2	4	1	1	10
5001430521	Prionospio lighti					1	1
5001431004	Spiophanes berkeleyorum	6	2	1		4	13
5001431701	Paraprionospio pinnata	1		1		4	6
5001490302	Spiochaetopterus costarum	19	97	51	20	46	233
50015001	Cirratulus spp.	2					2
5001500302	Tharyx multifilis			1	2	1	4
5001500303	Tharyx parvus	2					2
5001500309	Tharyx secundus	1					1
5001520106	Cossura pygodactylata	1				1	2
5001580401	Travisia brevis		1				1
5001590101	Sternaspis scutata		4	1	1	4	10
5001600203	Heteromastus filobranchus					1	1
5001600402	Mediomastus californiensis	2	1				3
5001630901	Praxillella gracilis			1			1
5001631	Euclymeninae	2	1			3	6
5001631103	Euclymene zonalis	1	1	5	2	1	10
5001640202	Galathowenia nr. G. oculata	1	2				3
5001660303	Pectinaria granulata		1				1
5001660304	Pectinaria californiensis	4	17	10	18	8	57
5001670208	Ampharete acutifrons	1	3			2	6
5001670214	Ampharete finmarchica	1					1
5001670503	Melinna elisabethae	1					1
500168	Terebellidae	1	1				2
5001680101	Amphitrite cirrata	2					2
5001680701	Pista cristata	5	2	2	2	1	12
5001680710	Pista brevibranchiata	1				2	3
5001680810	Polycirrus californicus	1	2	5	2	2	12
500168130201	Lanassa venusta venusta	2			1		3
5001681803	Scionella estevanica	1					1
5001690101	Terebellides stroemi				1		1
5001690103	Terebellides californica	1		1		1	3
5001700106	Chone magna		1				1