



Concentrations of Selected Chemicals in Sediments from Harbors in the San Juan Islands

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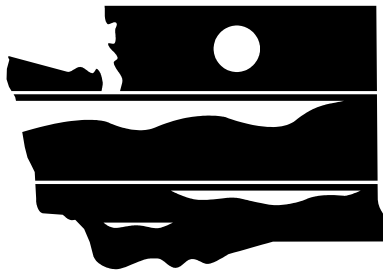
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Concentrations of Selected Chemicals in Sediments from Harbors in the San Juan Islands

by
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Abstract

The Washington State Department of Ecology (Ecology) conducted a screening level survey of sediment quality in four harbors in the San Juan Islands during May 1997. The primary objective of this investigation was to assess the occurrence and extent of toxic chemicals associated with marina activities in the four harbors. A secondary objective was to determine if chemical concentrations exceed marine Sediment Quality Standards (SQS) under the Sediment Management Standards or the Puget Sound Dredge Disposal Analysis (PSDDA) interim screening level for tributyltin.

Sampling was conducted in Friday Harbor and Roche Harbor (San Juan Island), West Sound (Orcas Island), and Fisherman Bay (Lopez Island). Sediments were collected from four to eight locations within each harbor to represent boat slips, boat moorage areas, and areas slightly beyond the moorage perimeter to assess drift of the target chemicals. Sediments potentially influenced by boatyard activities were also sampled, except in Roche Harbor which does not have a boatyard. Two locations from Mud Bay were sampled to establish background levels for the target chemicals. All samples were analyzed for the following parameters: total organic carbon, chromium, copper, lead, zinc, semivolatile organics, and butyltins.

Overall metals concentrations were low. More than half the results were below mean values obtained at the Mud Bay (Lopez Island) reference site. Mean concentration of metals at all harbors were an order of magnitude below the SQS. The highest metals concentrations (lead, copper, and zinc) were found in West Sound.

Total LPAH and HPAH (low and high molecular weight PAHs) concentrations were elevated above reference sediment values at all four harbors, although none exceeded the SQS. Similarly, individual PAHs were elevated at all four harbors but also below SQS. One exceedance of SQS occurred for fluoranthene, in West Sound.

Friday Harbor sediments were the most contaminated with the target semivolatiles; 76% of the highest concentrations were found in this harbor. None of the concentrations exceeded SQS, however.

TBT concentrations were generally elevated above reference levels in all four harbors. Elevated TBT concentrations were most evident in West Sound sediments, and the two highest values were from this harbor. Concentrations were up to 67 times the PSDDA interim screening level. It is recommended that biological testing of sediments from these locations be considered, to determine the potential for adverse biological effects.

Acknowledgments

The authors of this report would like to thank the following people for their contribution to this study:

- Glenn Kensmo for allowing Ecology staff to use his house on Center Island during the sampling activity.
- Manchester Environmental Laboratory staff for sample handling, tracking, and analysis.
- Dave Garland, John Drabek, and Dale Norton for reviewing the draft report.
- Nigel Blakley for technical editing of the report.
- Joan LeTourneau for formatting and editing the final report.

Introduction

Background

Washington's San Juan Islands (San Juans) are a group of islands and islets located at the union of the Strait of Georgia and the Strait of Juan de Fuca. Their location and scenic beauty make them a popular boating destination for both American and Canadian recreational boaters as well as commercial fishers. Five boatyards, including a shipyard in Friday Harbor, currently operate under permit in the San Juans. There are also a number of defunct boatyards.

Few data exist on concentrations of toxic chemicals in harbor sediments of the San Juans. Due to the San Juans' popularity for boating and the lack of sediment chemistry data, the San Juan/Nooksack Watershed Needs Assessment identified potential water and sediment quality impacts from San Juans harbors as an issue of concern. Potential problems include impacts due to pumpouts and land-based sources of bacterial contamination, as well as toxic contaminants from vessel-related activities (e.g., vessel repair, spillage of petroleum products, and sloughing and ablation of anti-fouling paints). This report focuses on toxic contaminants in San Juans harbor sediments.

A review of the literature indicates that toxic contaminants of concern in harbor areas include chromium, copper, lead, zinc, tributyltin (TBT), and polycyclic aromatic hydrocarbons (PAH) (e.g., Young *et al.*, 1979; Crecelius *et al.*, 1989; Tay *et al.*, 1992). Copper and TBT are major components of anti-fouling paints applied to vessel bottoms. Although TBT has been banned for most pleasure boat applications in the U.S. since 1988, its widespread historic use has made it a chemical of concern in harbor sediments, especially those with vessel repair and maintenance facilities (Krone *et al.*, 1989a). Chromium, lead, and zinc also have the potential to contaminate harbors due to their use in boat paints, corrosion of fittings and from batteries (lead), and from electrolysis of sacrificial anodes (zinc). Incompletely combusted and uncombusted petroleum products may be a source of PAHs in marine environments (PTI Environmental Services, 1991). Creosote-treated pilings may also be a source of PAH contamination.

Objectives

The primary objective of this survey was to assess the occurrence and extent of toxic chemicals in sediments from four San Juans harbors. A secondary objective was to determine if chemical concentrations exceed marine Sediment Quality Standards (SQS) under the Sediment Management Standards (Ecology, 1991) or the Puget Sound Dredge Disposal Analysis (PSDDA) interim screening level for TBT (Michelsen *et al.*, 1996).

Methods

Site Selection and Sampling Strategy

Four harbor areas were selected for sampling: Friday Harbor and Roche Harbor (San Juan Island), West Sound (Orcas Island), and Fisherman Bay (Lopez Island) (Figures 1-6). These sites were selected after reviewing NPDES permit applications for boatyards in the San Juans, and consultation with John Drabek, Bob Newman, and Greg Cloud of Ecology's Water Quality Program. Mud Bay (Lopez Island) was sampled for reference sediments.

The major criterion for site selection was a large marina or boat moorage area with substantial vessel traffic. Friday Harbor, Roche Harbor, and West Sound probably represent the busiest marina and moorage areas within the San Juans, receiving boat traffic from both Canada and the U.S. All four sites, except Roche Harbor, have boatyards covered under the NPDES boatyard general permit. Aside from boatyards, upland activities were not considered in the selection of sites.

EPA's *Assessment of Potential Toxic Problems in Non-Urban Areas of Puget Sound* (EPA, 1988) prioritizes areas for study based on known or potential contaminant sources, chemical data, and biological data. Except for West Sound, all four sites in the San Juans were ranked as a low priority. West Sound received a "medium" rank due to the Victim Island military installation, a suspected storage site for hazardous wastes.

Appendix A shows sampling locations and descriptions for each sample. Sediments were collected from four to eight locations within each harbor to represent boat slips, boat moorage areas, and areas slightly beyond the moorage perimeter to assess drift of the target chemicals. Sediments potentially influenced by boatyard activities were also sampled except in Roche Harbor which does not have boatyard. Two samples from Mud Bay were collected to represent background levels of the target chemicals. All samples were analyzed for the following parameters:

- Total organic carbon (TOC)
- Chromium, copper, lead, and zinc
- Semivolatile organics (SVOs)
- Butyltins

Sampling Procedures

Sampling procedures were consistent with Puget Sound Estuary Program (PSEP) protocols (EPA, 1996a) and recommendations by Ecology's Sediment Management Unit (Ecology, 1995-Draft). Bottom sediments were collected from Ecology's 20-foot skiff equipped with a 0.1 m² stainless steel van Veen grab. Station positions were recorded using a differentially corrected Magellan® global positioning system receiver. Visual sightings from nearby landmarks were also recorded. All sampling was conducted during May 1997.

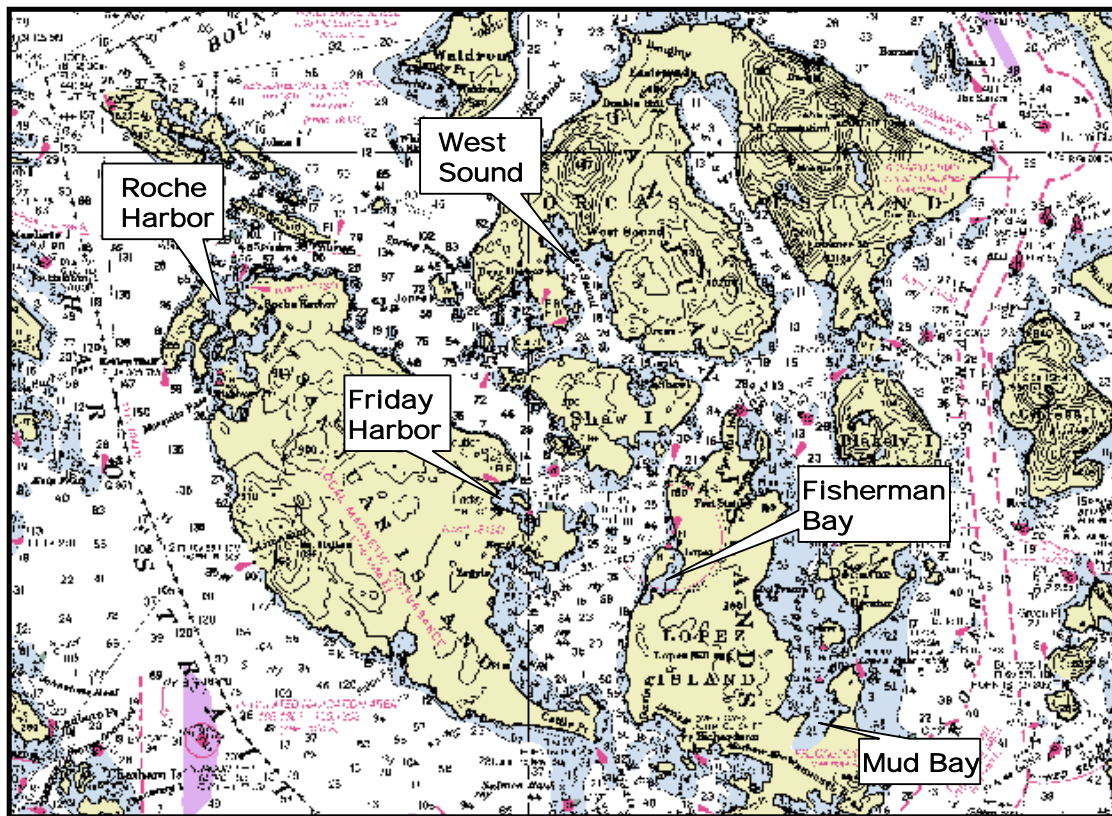
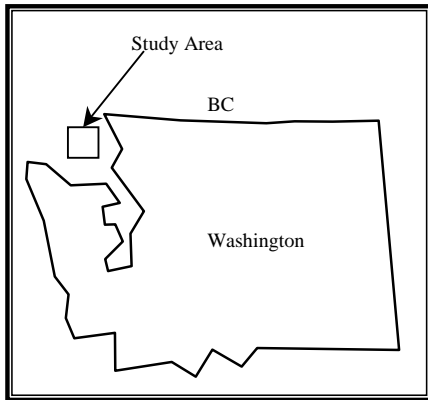


Figure 1. San Juan Islands Study Area Locations

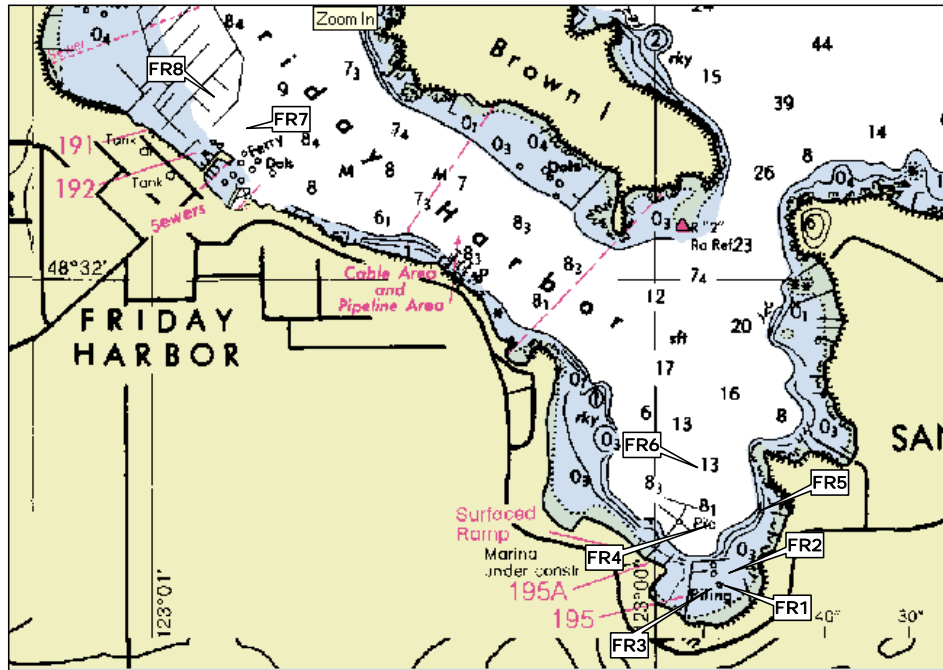


Figure 2. Friday Harbor Sampling Locations.

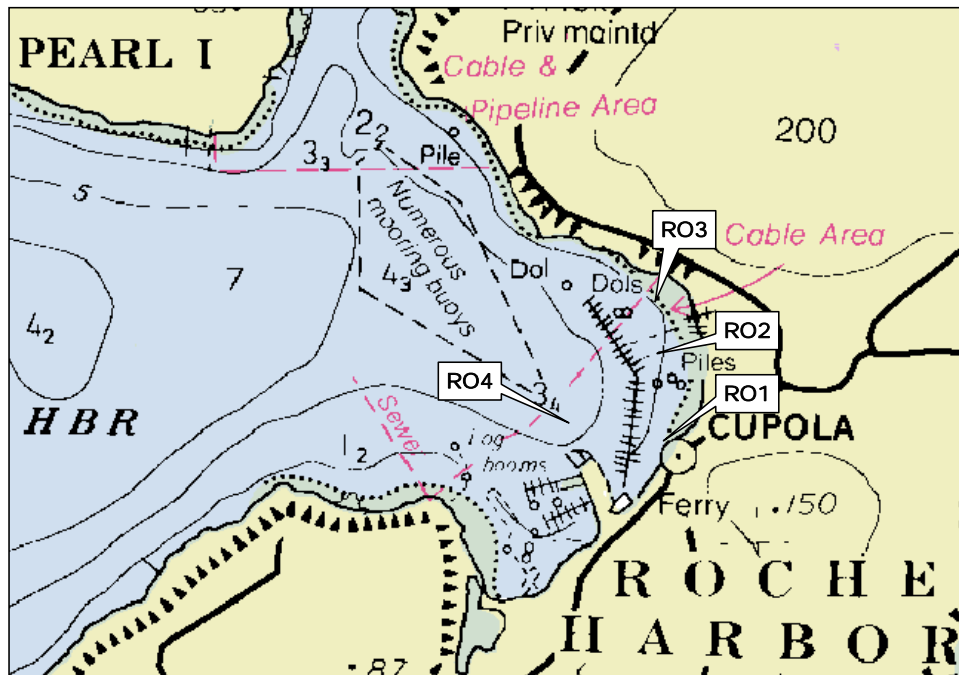


Figure 3. Roche Harbor Sampling Locations.

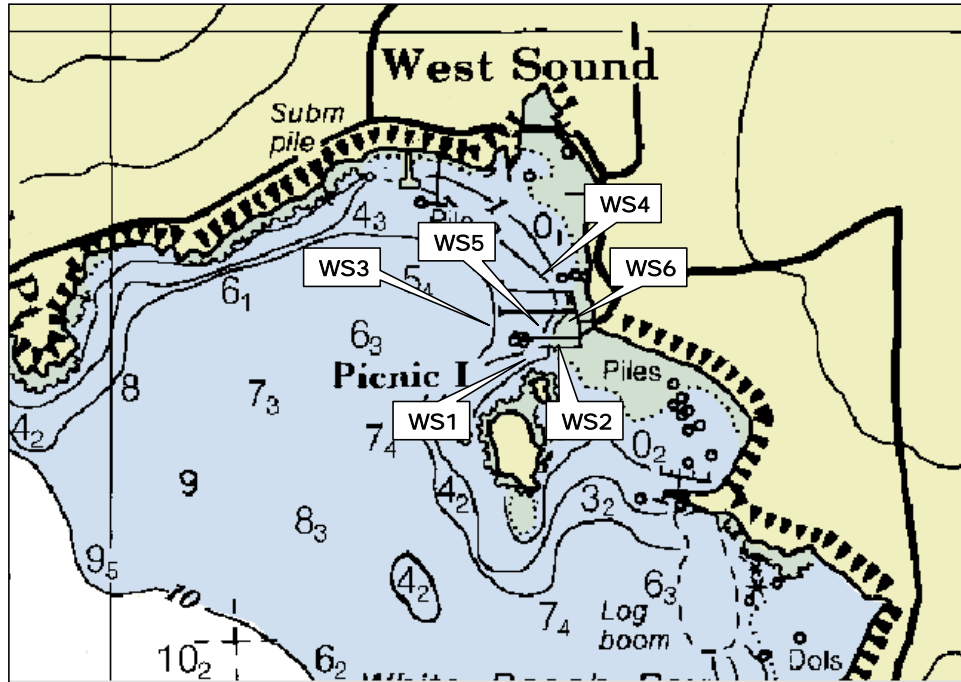


Figure 4. West Sound Sampling Locations.

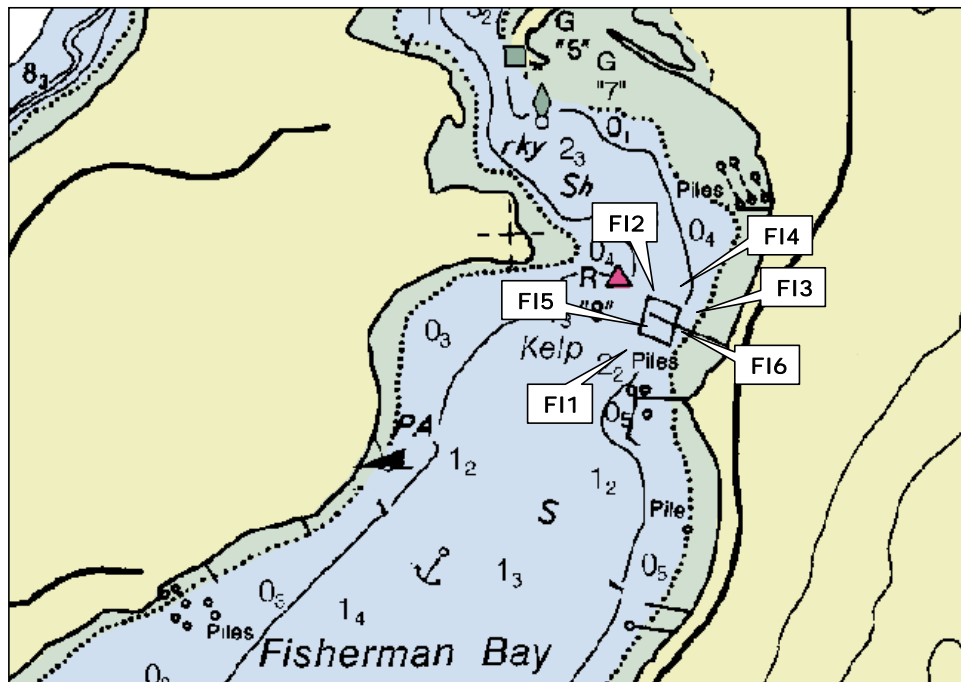


Figure 5. Fisherman Bay Sampling Locations.

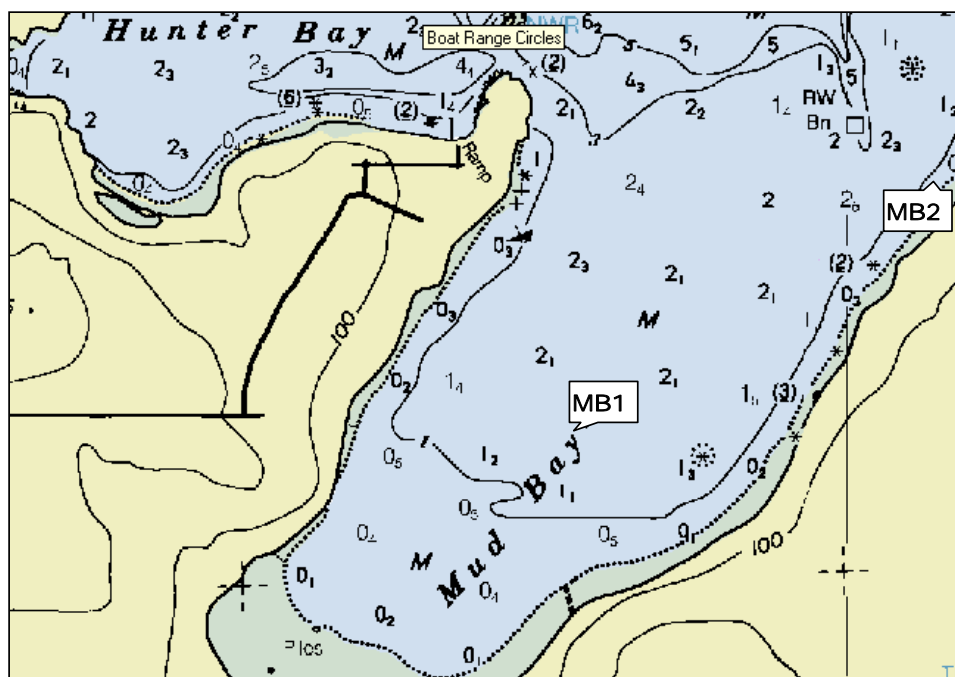


Figure 6. Mud Bay (Reference Area) Sampling Locations.

A grab sample was collected at each station. Sample grabs were considered adequate if the van Veen was filled with sediment, and both the grab and access doors were closed tightly. Upon retrieving a successful grab, the overlying water was siphoned off and the top 10 cm of sediment not touching the walls of the grab was scooped out through the top doors and placed in a stainless steel beaker. The grab was thoroughly brushed and rinsed with on-site water between samples.

All stainless steel tools (grab, beakers, and spoons) were decontaminated prior to sampling using the following procedure: wash in hot water and Liquinox® detergent, rinse in tap water, rinse in 10% nitric acid, rinse with deionized water, rinse with pesticide analysis grade acetone, air dry, and wrap in aluminum foil.

The beaker contents were homogenized, and subsamples for metals and organics analysis were dispensed into separate 8-oz priority pollutant-clean jars capped with Teflon lid liners. Samples for organic carbon analysis were placed in 4-oz jars.

Chemical Analysis and Data Quality

Samples were analyzed at the Ecology/EPA Manchester Environmental Laboratory using the methods in Table 1.

Table 1. Methods for Chemical Analysis

Analysis	Approximate Detection Limit	Method	Reference
TOC	0.1 %	PSEP Method	EPA, 1986a
Chromium	0.5 mg/kg, dw	ICAP - EPA Method 200.7	EPA, 1986b
Copper	0.4 mg/kg, dw	ICAP - EPA Method 200.7	EPA, 1986b
Lead	2 mg/kg, dw	ICAP - EPA Method 200.7	EPA, 1986b
Zinc	2 mg/kg, dw	ICAP - EPA Method 200.7	EPA, 1986b
SVOs (low-level)	20-100 µg/kg, dw	GC/MS - EPA Method 8270	EPA, 1986b
Butyltins	3-60 µg/kg, dw	GC/MS - NOAA Method	Krone <i>et al.</i> , 1989b

Precision of the data was assessed through analysis of field replicates, laboratory duplicates, and matrix spike duplicates (Appendix B). For metals, duplicate analysis of matrix spikes and laboratory samples showed a high degree of precision. The relative percent differences (RPDs, difference relative to the mean) of these results were generally less than 10%, although there was poor agreement in the recovery of one set of copper spikes (RPD of 71%). One sediment sample split in the field (field split) also showed poor agreement for copper but good precision for other metals, suggesting copper was unevenly distributed in this sample.

Bias of the metals data was assessed through analysis of matrix spikes and laboratory blanks. High recoveries were obtained for all matrix spikes and spike duplicates except for one copper sample with a mean recovery of 16%. Therefore, some copper results are qualified (J) and should be viewed as potentially biased low. No metals were detected in laboratory blanks, indicating laboratory contamination was not a source of bias.

Precision of the semivolatile organics analysis was poor in terms of RPDs, but this was influenced by the low native analyte concentrations found in the samples. Precision of duplicate matrix spikes was very high (mean RPD of 6%), yet laboratory replicates showed an average RPD of 61% and field replicates had a 56% RPD. These results suggest that 1) good precision estimates were difficult with the low native analyte concentrations, and 2) most of the variability stemmed from poor analytical precision.

Matrix spike analyses for semivolatile organics had an average recovery of 75% suggesting the results were biased slightly low. Results were qualified (J) for analytes with recoveries below 50% for one or both spikes (Table B-3 in Appendix B). Hexachlorocyclopentadiene results were rejected due to the lack of recovery from either matrix spike. Several target analytes were detected in blanks below concentrations considered to influence the results. However, many tentatively identified compounds were detected in blanks at substantial concentrations, and these data should be viewed with caution.

All butyltin data should be considered estimates. All measures of precision showed poor results. Analysis of National Research Council of Canada PACS-2 standard reference material indicated poor accuracy (Appendix B). Results are qualified (J).

Results and Discussion

Total Organic Carbon

TOC concentrations were generally similar for the four harbors sampled and comparable to values from the Mud Bay reference site (Table 2). The three lowest values were all from Fisherman Bay (Stations F11, F12, and F16) and this is reflected in the lower mean and median concentrations for this harbor. The two highest concentrations were from West Sound (WS2) and Friday Harbor (FR8) stations. Complete results for each station are shown in Appendix C.

Table 2. Summary of Total Organic Carbon Concentrations (%) in Four San Juans Harbors

	Mean	Median	Min.	Max.
Reference (Mud Bay)	1.5	1.5	1.4	1.5
Fisherman Bay	0.6	0.5	0.3	1.2
Roche Harbor	1.1	1.0	0.7	1.6
West Sound	1.5	1.2	0.6	3.2
Friday Harbor	1.5	1.6	0.6	2.7

Metals

Concentrations of chromium, copper, lead, and zinc are plotted in Figure 7. Complete results for each station are shown in Appendix C.

Overall concentrations of all metals were low (Table 3). More than half the results were below mean values obtained at the Mud Bay reference site. Mean concentration of metals at all harbors were an order of magnitude below the marine Sediment Quality Standards (SQS), which are shown in Table 4.

Table 3. Summary of Sediment Metals Concentrations (mg/kg) in Four San Juans Harbors

Metal	Roche Harbor		Friday Harbor		West Sound		Fisherman Bay		Reference (Mud Bay)	
	<i>Median</i>	<i>Maximum</i>	<i>Median</i>	<i>Maximum</i>	<i>Median</i>	<i>Maximum</i>	<i>Median</i>	<i>Maximum</i>	<i>Median</i>	<i>Maximum</i>
Chromium	17.9	20.2	22.8	29.3	16.3	24.9	11.4	20.4	27.5	29.2
Copper	17.7	70.0	34.5	82.9	25.2	136.0	7.1	23.1	18.2	19.1
Lead	9.9	40.9	10.9	43.0	7.2	76.4	2.1	4.0	5.6	6.3
Zinc	53.3	59.9	76.4	127.0	44.6	272.0	24.2	38.2	57.7	62.4

Table 4. Marine Sediment Quality Standards¹ and Guidelines

CHEMICAL PARAMETER	CONCENTRATION
Metals	mg/Kg, dry
Lead	450
Chromium	260
Copper	390
Zinc	410
PAHs	mg/Kg OC
Anthracene	220
Acenaphthylene	66
Acenaphthene	16
Phenanthrene	100
Fluorene	23
Naphthalene	99
2-Methylnaphthalene	38
LPAH ²	370
Pyrene	1,000
Benzo(g,h,i)perylene	31
Indeno(1,2,3-c,d)pyrene	34
Benzofluoranthene(s)	230
Fluoranthene	160
Chrysene	110
Benzo(a)pyrene	99
Dibenzo(a,h)anthracene	12
Benzo(a)anthracene	110
HPAH ³	960
Phthalates and Other SVOs	mg/Kg OC
Bis(2-ethylhexyl)phthalate	47
Dimethylphthalate	53
Diethylphthalate	61
Butylbenzylphthalate	4.9
1,4-Dichlorobenzene	3.1
Dibenzofuran	15
	µg/Kg, dry
Benzyl alcohol	57
4-Methylphenol	670
Phenol	420
Benzoic acid	650
Pentachlorophenol	360
Organotins	µg/Kg, dry
Tributyltin ⁴	73

¹Sediment Management Standards, WAC 173-204.

²Represents the sum of Anthracene, Acenaphthylene, Acenaphthene, Phenanthrene, Fluorene, and Naphthalene. The LPAH criterion is not the sum of the criterion values for the individual LPAH as listed.

³Represents the sum of Pyrene, Benzo(g,h,i)perylene, Indeno(1,2,3-c,d)pyrene, Benzofluoranthene(s), Fluoranthene, Chrysene, Benzo(a)pyrene, Dibenzo(a,h)anthracene, and Benzo(a)anthracene. The HPAH criterion is not the sum of the criterion values for the individual HPAH as listed.

⁴Puget Sound Dredge Disposal Analysis Interim Screening Level.

Chromium concentrations were highest in the Mud Bay samples, although they did not appear to be especially enriched (mean concentration was 28 mg/kg). The lead concentration in Station WS2 from West Sound was the only metals result substantially higher (14×) than reference sediments. This station also had the highest copper concentration, and zinc from WS2 was the only metals result approaching the SQS. Overall metals concentrations suggest West Sound has the greatest lead, copper, and zinc enrichment compared to other harbors.

Inner marina sediments (i.e., near docks, slips, boathouses, haulouts) appear to be more metals-rich than those from beyond the marina perimeter. Figure 8 shows metals concentrations pooled by location among harbors. There seems to be no difference in chromium concentrations. However, median lead and copper concentrations are substantially higher in sediments collected from inner harbors. Differences were smaller for zinc. Most of the inner harbor sediments have lead, copper, and zinc concentrations elevated above reference sediments, whereas outer harbor sediments are generally lower than the Mud Bay results.

Semivolatile Organics

Complete results of SVO analyses are shown in Appendix C. Forty-six SVOs were detected in sediments (Figure 9). Polycyclic aromatic hydrocarbons (PAHs) and alkyl-substituted PAHs comprised 96% of the most commonly detected (>90%) compounds. Phthalates, phenols, and several miscellaneous compounds were detected less frequently.

Total LPAH and HPAH (low and high molecular weight PAHs) concentrations were elevated above reference sediment values at all four harbors (Figure 10), although not exceeding SQS. Similarly, concentrations of some individual PAHs were elevated at all four harbors but below SQS, except at Station WS6 where the fluoranthene standard was exceeded (168 mg/kg OC vs. 160 mg/kg OC SQS).

Friday Harbor sediments were the most contaminated with the target SVOs; 76% of the highest concentrations were found at this harbor. Station FR7, located off the Texaco fuel dock, was particularly contaminated with PAHs. Overall, there was no apparent difference between inner and outer harbor sediments in PAH concentrations (Figure 11).

Tributyltin

The toxicity and bioaccumulation of TBT is a complex process that is affected by a number of factors, including organic carbon levels in sediment and water, pH, salinity, clay content, and the presence of inorganic constituents such as iron oxides (EPA, 1996b). Due to its complex behavior in the aquatic environment, no sediment quality criteria have been adopted for TBT in marine sediments. In 1988, the Puget Sound Dredge Disposal Analysis (PSDDA) agencies developed an interim screening level (ISL) for use in the PSDDA program, based on best available knowledge of the chemical and its properties (Michelsen *et al.*, 1996). The ISL was set at 30 ug/kg (as Sn). This corresponds to a concentration of 73 ug/kg (reported as TBT-ion). Exceedance of the ISL requires biological testing to be performed.

Concentrations of TBT are shown in Figure 12. Results for each station are provided in Appendix C. Concentrations were generally elevated above reference levels in all four harbors (Figure 12). Elevated TBT concentrations were most evident in West Sound sediments and the two highest values were from this harbor. Both values exceeded the PSDDA ISL of 73 ug/kg (67× for sample WS5, and 5× for WS2). Except for these two results, TBT sediment concentrations were near or below the ISL. Overall, TBT concentrations tended to be higher in samples from inner harbor sediments than from outer harbor sediments (Figure 13).

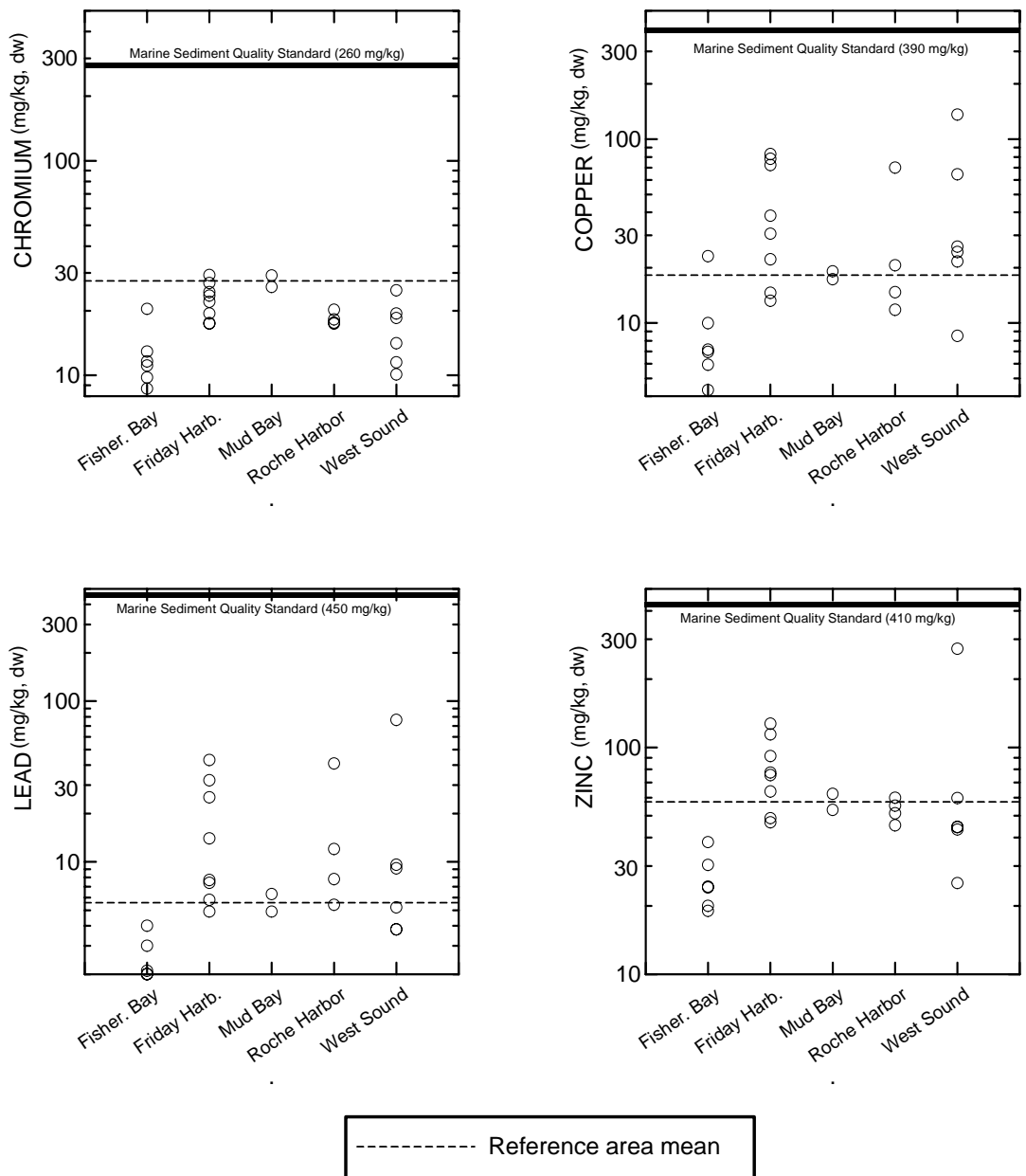


Figure 7. Metals Concentrations in San Juans Harbor Sediments.

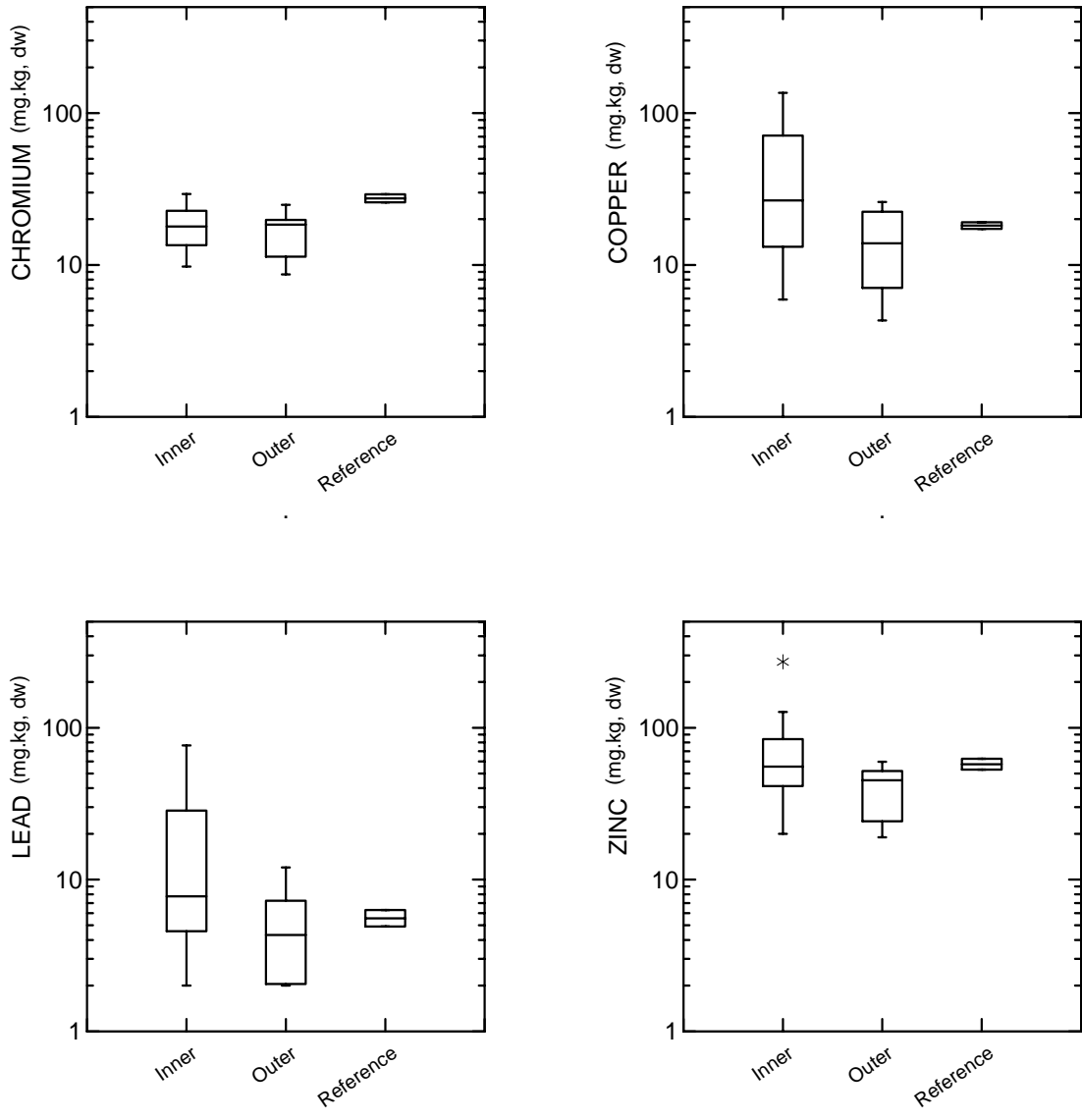


Figure 8. Box Plots Comparing Metals Concentrations in Inner and Outer San Juan Harbor Sediments.

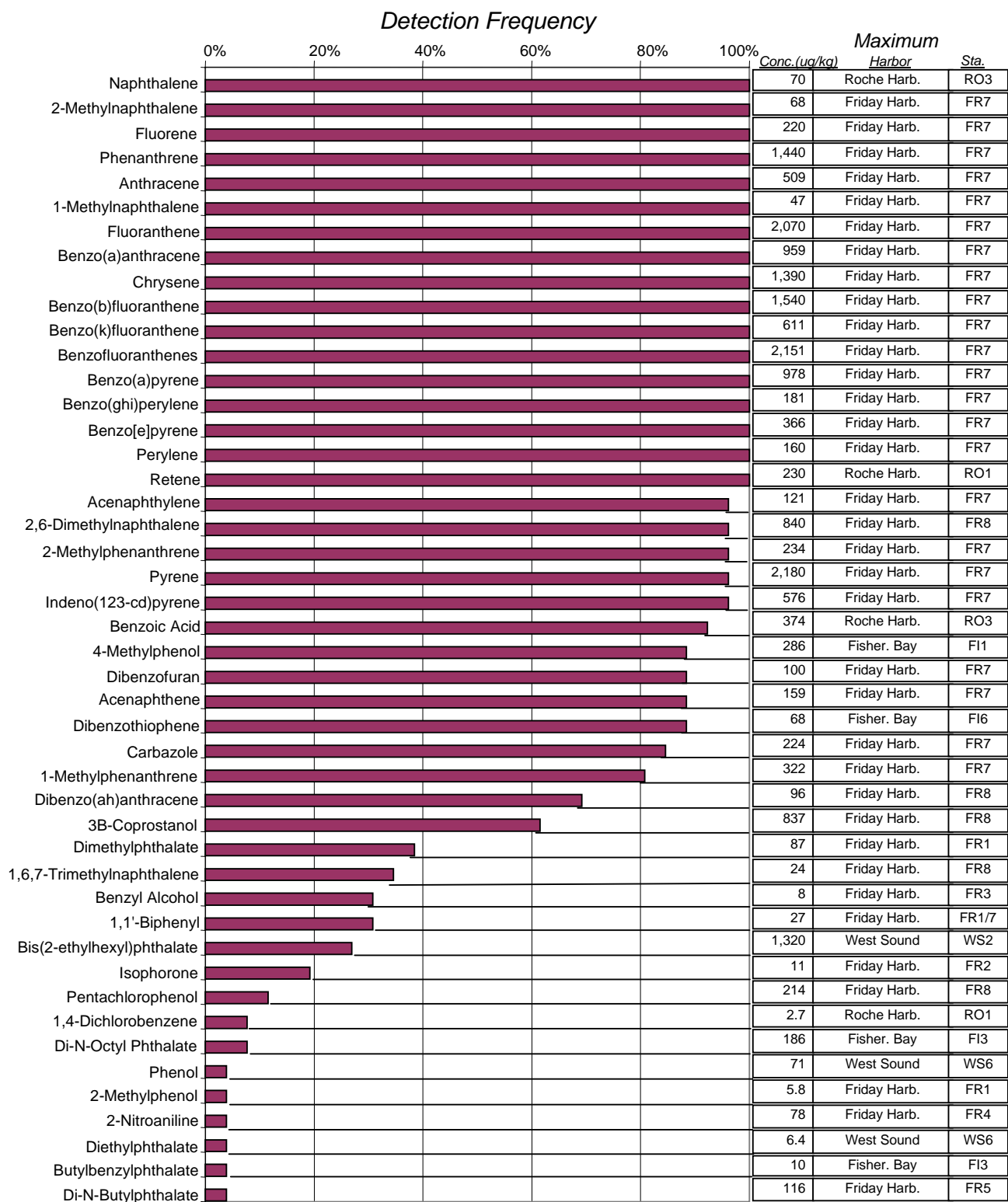


Figure 9. Detection Frequency and Maximum Concentrations of Organics in San Juans Harbor Sediments.

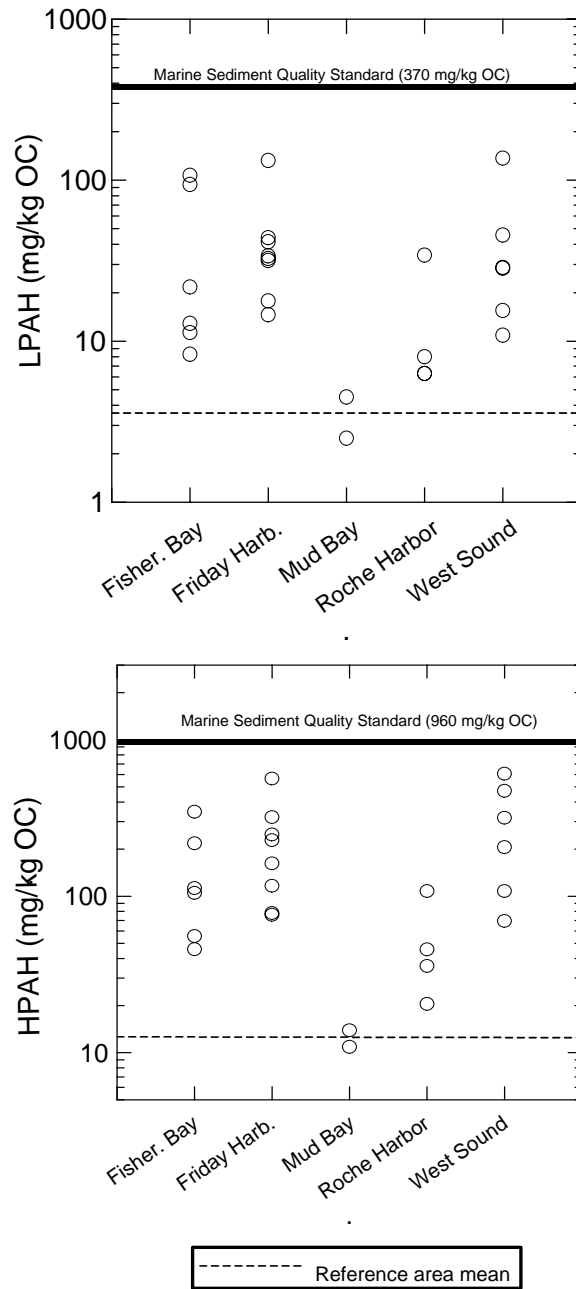


Figure 10. LPAH and HPAH Concentrations in San Juans Harbor Sediments.

LPAH Concentrations are sum of Anthracene, Acenaphthylene, Acenaphthene, Phenanthrene, Fluorene, and Naphthalene. HPAH Concentrations are sum of Pyrene, Benzo(g,h,i)perylene, Indeno(1,2,3-c,d)pyrene, Benzofluoranthene(s), Fluoranthene, Chrysene, Benzo(a)pyrene, Dibenzo(a,h)anthracene, and Benzo(a)anthracene.

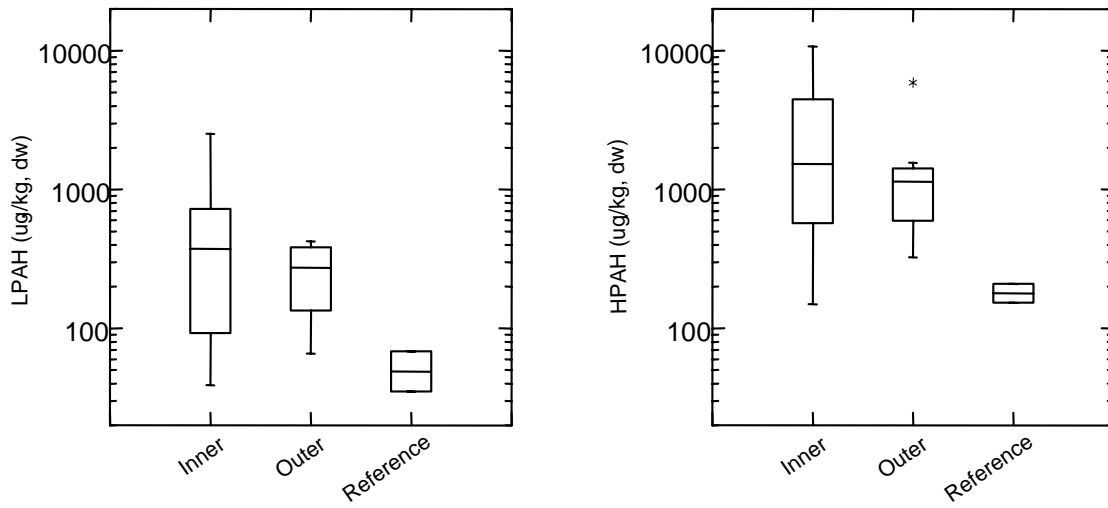


Figure 11. Box Plots Comparing PAH Concentrations in Inner and Outer San Juans Harbor Sediments.

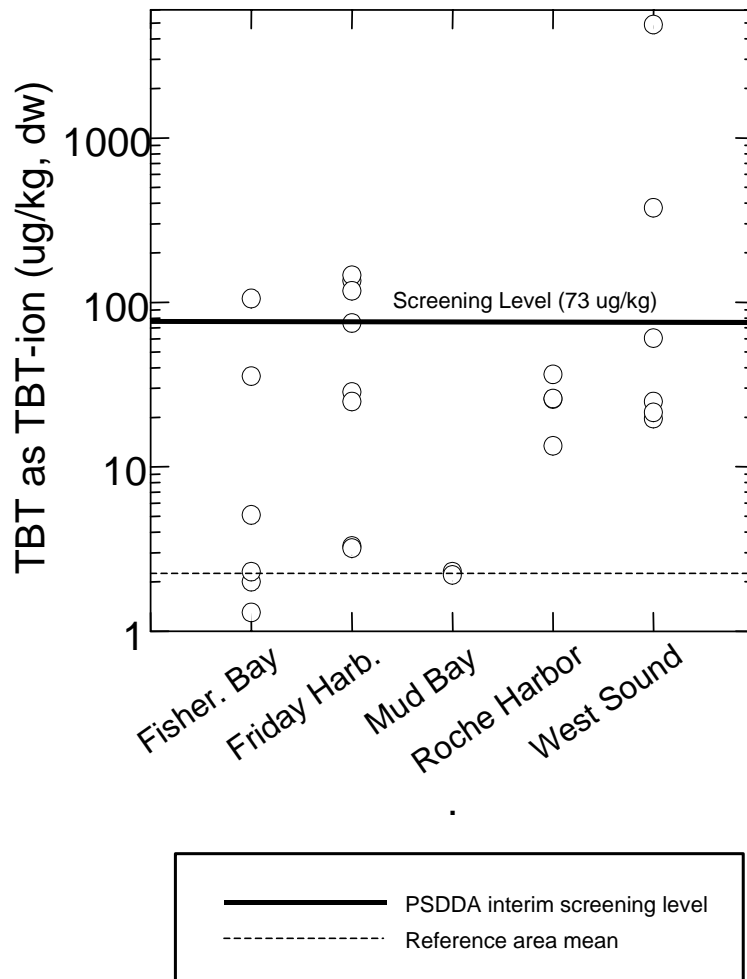


Figure 12. TBT Concentrations in San Juans Harbor Sediments.

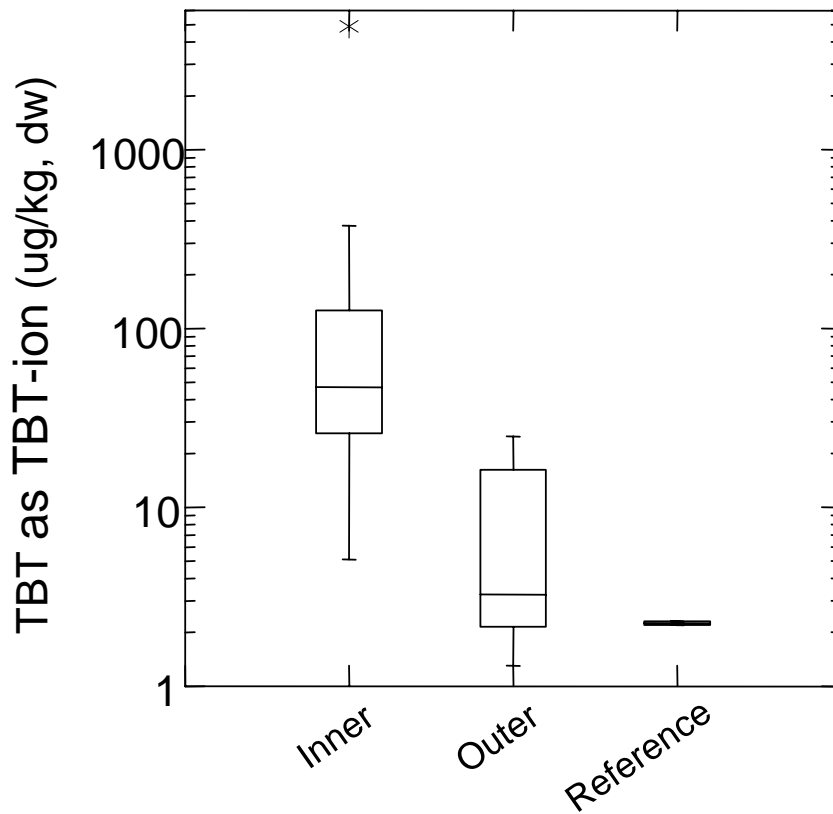


Figure 13. Box Plots Comparing TBT Concentrations in Inner and Outer San Juans Harbor Sediments.

Conclusions and Recommendations

Conclusions

Sediment chemical concentrations seen in this study are similar to Puget Sound reference areas (EPA, 1991). Sediment Quality Standards for organics and metals were not exceeded in sediment samples from the four San Juan Islands harbors surveyed, except for one sample from West Sound that exceeded the standard for fluoranthene. A Sediment Quality Standard has not been established for tributyltin. However, most samples were near or below the tributyltin PSDDA interim screening level. Two West Sound samples did exceed this level substantially.

For some organics there was a consistent elevation of concentrations above reference sediments in all four harbors. Examples include LPAHs, HPAHs, some individual PAH compounds (e.g., fluoranthene and anthracene), and tributyltin. However, the harbors were not consistently enriched relative to the reference area for other organics or for metals.

There were some differences between the harbors in sediment quality. For many of the SVOs, the highest concentrations were from Friday Harbor. For metals and tributyltin, the highest concentrations were from West Sound. The highest concentrations of PAHs (both LPAHs and HPAHs) were from Friday Harbor and West Sound.

In all four harbors, average inner harbor concentrations were higher than outer harbor concentrations for the majority of analytes. However, the differences were generally small in comparison with the variability within inner and outer harbor areas.

Recommendations

Tributyltin concentrations in bulk sediments from two stations in the West Sound marina area (WS2, WS5) substantially exceeded the PSDDA interim screening level of 73 $\mu\text{gTBT}/\text{kg}$. Biological testing of sediments from these locations should be considered to determine the potential for adverse biological effects.

Sampling of sediments in the vicinity of older defunct boatyards would give a more comprehensive representation of sediment quality in the San Juan Islands.

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Appendices

Appendix A

Station Locations and Descriptions

Table A-1. Station Locations for Survey of San Juans Harbor Sediments.

Location	Station	Sample No.	Date	Depth	Latitude			Longitude		
				(ft. above MLLW)	(deg)	(min)	(sec)	(deg)	(min)	(sec)
Mud Bay	MB1	97228230	27-May-97	9.6	48	27	8.6	122	50	34.6
Mud Bay	MB2	97228231	27-May-97	nr	48	27	29.5	122	49	48.4
Fisherman Bay	FI1	97228232	29-May-97	14	48	30	51.1	122	54	54.3
Fisherman Bay	FI2	97228233	29-May-97	17	48	30	54.7	122	54	52.5
Fisherman Bay	FI3	97228234/5	29-May-97	-0.5	48	30	53.4	122	54	48.1
Fisherman Bay	FI4	97228236	29-May-97	7	48	30	54.8	122	54	49.6
Fisherman Bay	FI5	97228237	29-May-97	18	48	30	52.7	122	54	53.0
Fisherman Bay	FI6	97228256	29-May-97	2	48	30	52.2	122	54	48.7
Roche Harbor	RO1	97228238	28-May-97	12.5	48	36	32.9	123	9	5.3
Roche Harbor	RO2	97228239	28-May-97	20.5	48	36	38.2	123	9	6.8
Roche Harbor	RO3	97228240	28-May-97	12.5	48	36	41.1	123	9	5.0
Roche Harbor	RO4	97228241	28-May-97	19.5	48	36	34.8	123	9	13.5
West Sound	WS1	97228244	28-May-97	5	48	37	43.9	122	57	24.4
West Sound	WS2	97228245	28-May-97	8	48	37	44.6	122	57	21.5
West Sound	WS3	97228246	28-May-97	30	48	37	47.5	122	57	27.4
West Sound	WS4	97228247	28-May-97	6	48	37	48.7	122	57	21.4
West Sound	WS5	97228248	28-May-97	23	48	37	46.7	122	57	24.5
West Sound	WS6	97228249	28-May-97	11	48	37	45.7	122	57	21.9
Friday Harbor	FR1	97228250	27-May-97	4	48	31	35.5	122	59	51.2
Friday Harbor	FR2	97228251	27-May-97	7	48	31	36.9	122	59	50.6
Friday Harbor	FR3	97228252	27-May-97	4	48	31	35.7	122	59	52.9
Friday Harbor	FR4	97228253	27-May-97	38	48	31	40.7	122	59	53.3
Friday Harbor	FR5	97228254	27-May-97	42	48	31	41.9	122	59	47.2
Friday Harbor	FR6	97228255	27-May-97	60	48	31	45.1	122	59	54.9
Friday Harbor	FR7	97228242	28-May-97	29.5	48	32	12.0	123	0	49.3
Friday Harbor	FR8	97228243	28-May-97	7.5	48	32	14.6	123	0	53.1

nr=not recorded
Datum= NAD83

Table A-2. Location and Sample Descriptions for Survey of San Juans Harbor Sediments.

Location	Station	Sample No.	Location Description	Sample Description
Mud Bay	MB1	97228230	center of bay	greenish-brown muck, strong sulfide odor
Mud Bay	MB2	97228231	NE end of bay near Pier E of rocks	dark brown/green, somewhat gritty with peices of clamshell
Fisherman Bay	FI1	97228232	outside marina perimeter, 100' off 3rd outer slip	nr
Fisherman Bay	FI2	97228233	outside marina perimeter, 100' off main entrance to marina	nr
Fisherman Bay	FI3	97228234	off boat ramp 100' N of pier end.	gritty silt
Fisherman Bay	FI3	97228235	off boat ramp 100' N of pier end.	replicate of 97228234
Fisherman Bay	FI4	97228236	100' off northermost set of slips	nr
Fisherman Bay	FI5	97228237	inside southern group of slips	nr
Fisherman Bay	FI6	97228256	200' off haulout (travel lift) pier	nr
Roche Harbor	RO1	97228238	30' off fuel dock	nr
Roche Harbor	RO2	97228239	off harbormaster's dock	nr
Roche Harbor	RO3	97228240	outside marina perimeter, off northernmost dock in Roche Harbor	nr
Roche Harbor	RO4	97228241	inside slips on SW side of marina	nr
West Sound	WS1	97228244	outside marina perimeter, 50' off northern end of Picnic Island	fine material with shell fragments
West Sound	WS2	97228245	inside 1st dock	nr
West Sound	WS3	97228246	outside marina perimeter, 100' off main entrance to marina	nr
West Sound	WS4	97228247	200' E of travel lift	nr
West Sound	WS5	97228248	center of main channel, 300' off travel lift	nr
West Sound	WS6	97228249	at end of travel lift	oil sheen, sulfide odor, numerous amphipods
Friday Harbor	FR1	97228250	off AJ marina railway 25' off pier	silty, dark brown, sulfide odor
Friday Harbor	FR2	97228251	between first 2 (boathouse slips	mud/silt, some metal and plastic debris, sulfide odor
Friday Harbor	FR3	97228252	150' off travel lift	nr
Friday Harbor	FR4	97228253	between 2nd and 3rd slips	nr
Friday Harbor	FR5	97228254	outside NE marina perimeter	silty, dark brown
Friday Harbor	FR6	97228255	outside W marina perimeter	nr
Friday Harbor	FR7	97228242	50' off Texaco fuel dock, W of ferry landing	nr
Friday Harbor	FR8	97228243	along main pier W of fuel dock and ferry landing, 300' off of bathrooms/showers	nr

nr=not recorded

Appendix B

Summary of Data Quality Results

- 1. Total Organic Carbon**
- 2. Metals**
- 3. Semivolatile Organics**
- 4. Butyltin**

Table B-1. Precision of TOC Analysis.

LAB REPLICATES

Sample No.	Analysis	Units	Result	LDP1	REP1	Mean	RSD
97228241	TOC104	mg/kg, dw	0.7	0.8	0.7	0.7	3%
97228241	TOC70	mg/kg, dw	0.7	0.7	0.7	0.7	3%
97228249	TOC104	mg/kg, dw	0.9	0.8	0.8	0.9	6%
97228249	TOC70	mg/kg, dw	0.9	0.8	0.8	0.8	6%

FIELD SPLITS

Sample No.	Analysis		No. -34	No. -35	Mean	RPD
97228234/5	TOC104	mg/kg, dw	1.3	1.1	1.2	17%
97228234/5	TOC70	mg/kg, dw	1.3	1.1	1.2	17%

LDP1=Lab duplicate

REP1=Replicate

RSD=Relative standard deviation

RPD=Relative percent difference

Table B-2. Data Quality of Metals Analysis.

LAB REPLICATES

Sample No.	Analysis	Units	Result	LDP1	Mean	RPD
97228232	Lead	mg/Kg dw	2 U	2 U		
97228232	Chromium	mg/Kg dw	11.8	10.4	11	13%
97228232	Copper	mg/Kg dw	7.05	6.87	7	3%
97228232	Zinc	mg/Kg dw	25.4	22.7	24	11%
97228255	Lead	mg/Kg dw	5.8	5.7	6	2%
97228255	Chromium	mg/Kg dw	19.4	20	20	3%
97228255	Copper	mg/Kg dw	13.2 J	13.3 J	13	1%
97228255	Zinc	mg/Kg dw	48.7	49.8	49	2%

MATRIX SPIKES

Sample No.	Analysis	Units	LMX1	LMX2	Mean	RPD
97228241	Lead	% recov.	94	92	93	2%
97228241	Chromium	% recov.	93	89	91	4%
97228241	Copper	% recov.	93	91	92	2%
97228241	Zinc	% recov.	90	88	89	2%
97228249	Lead	% recov.	92	95	94	3%
97228249	Chromium	% recov.	102	101	102	1%
97228249	Copper	% recov.	10	21	16	71%
97228249	Zinc	% recov.	89	100	95	12%

BLANKS

Sample No.	Analysis	Units	Result
M7162SB1	Lead	mg/Kg dw	2 U
M7162SB1	Chromium	mg/Kg dw	0.5 U
M7162SB1	Copper	mg/Kg dw	0.4 U
M7162SB1	Zinc	mg/Kg dw	2 U
M7162SB2	Lead	mg/Kg dw	2 U
M7162SB2	Chromium	mg/Kg dw	0.5 U
M7162SB2	Copper	mg/Kg dw	0.4 U
M7162SB2	Zinc	mg/Kg dw	2 U

FIELD SPLITS

Sample No.	Analysis	Units	No. -34	No. -35	Mean	RPD
97228234/5	Lead	mg/Kg dw	3.5	4.4	4.0	23%
97228234/5	Chromium	mg/Kg dw	21.2	19.5	20.4	8%
97228234/5	Copper	mg/Kg dw	30.5	15.6	23.1	65%
97228234/5	Zinc	mg/Kg dw	38.7	37.7	38.2	3%

LDP1=Lab duplicate

RPD=Relative percent difference

LMX=Laboratory matrix spike

U=Undetected at detection limit shown

J=Estimated concentration

Table B-3. Data Quality of Semivolatile Organics Analysis.

LAB REPLICATES						
(ug/kg, dry)						
Sample No.	Analysis	Result		LDP1	Mean	RPD
97228241	4-Nitroaniline	79	U	76	U	
97228241	4-Nitrophenol	79	U	76	U	
97228241	Benzyl Alcohol	16	U	15	U	
97228241	4-Bromophenyl-Phenylether	16	U	15	U	
97228241	Phenol, 4-Nonyl-	79	U	76	U	
97228241	2,4-Dimethylphenol	16	U	15	U	
97228241	4-Methylphenol	6.8	J	4	J	5 52%
97228241	1,4-Dichlorobenzene	16	U	15	U	
97228241	4-Chloroaniline	16	UJ	15	UJ	
97228241	2,2'-Oxybis[1-chloropropane]	16	U	15	U	
97228241	Phenol	17	U	15	U	
97228241	Pyridine	31	U	30	U	
97228241	Bis(2-Chloroethyl)Ether	16	U	15	U	
97228241	Bis(2-Chloroethoxy)Methane	16	U	15	U	
97228241	Undecanoic acid	171	NJ	nd		
97228241	Bis(2-Ethylhexyl) Phthalate	31	U	30	U	
97228241	Di-N-Octyl Phthalate	16	U	15	U	
97228241	Hexachlorobenzene	16	U	15	U	
97228241	Anthracene	7.1	J	3.9	J	6 58%
97228241	1,2,4-Trichlorobenzene	16	U	15	U	
97228241	2,4-Dichlorophenol	31	U	30	U	
97228241	2,4-Dinitrotoluene	31	U	30	U	
97228241	1,2-Diphenylhydrazine	16	U	15	U	
97228241	Pyrene	53		25		39 72%
97228241	Dimethylphthalate	16	U	15	U	
97228241	Dibenzofuran	6.2	J	3	J	5 70%
97228241	Dibenzothiophene	6.1	J	2.4	J	4 87%
97228241	Phytol	1000	NJ	770	NJ	885 26%
97228241	Ethanethioic acid, S-methyl ester	375	NJ	210	NJ	293 56%
97228241	Benzo(ghi)perylene	8.9	J	4.3	J	7 70%
97228241	Benzo[e]pyrene	13	J	6.2	J	10 71%
97228241	Indeno(1,2,3-cd)pyrene	4.2	J	0.47	J	2 160%
97228241	Perylene	31		13	J	22 82%
97228241	Benzo(b)fluoranthene	30		14	J	22 73%
97228241	Fluoranthene	46	J	22		34 71%
97228241	Benzo(k)fluoranthene	8.4	J	3.8	J	6 75%
97228241	Acenaphthylene	2.6	J	1.6	J	2 48%
97228241	Chrysene	25		12	J	19 70%
97228241	1,6,7-Trimethylnaphthalene	13	J	5.4	J	9 83%
97228241	2-Methylphenanthrene	12	J	6.6	J	9 58%
97228241	3-Penten-2-one, (E)-	54		366	NJ	210 149%
97228241	3B-Coprostanol	53		115	U	
97228241	Retene	226		25		126 160%
97228241	Benzo(a)pyrene	12	J	6.1	J	9 65%
97228241	2,4-Dinitrophenol	314	UJ	304	UJ	
97228241	4,6-Dinitro-2-Methylphenol	79	UJ	76	UJ	
97228241	Dibenzo(a,h)anthracene	1.4	J	30	U	
97228241	1,3-Dichlorobenzene	16	UJ	15	UJ	

LDP1=Lab duplicate

RPD=Relative percent difference

U=Undetected at detection limit shown

J=Estimated concentration

UJ=Undetected at the estimated limit shown

NJ=There is evidence the analyte is present. The associated value is an estimate.

Table B-3 - p.2. Data Quality of Semivolatile Organics Analysis.

LAB REPLICATES (ug/kg, dry)							
Sample No.	Analysis	Result		LDP1		Mean	RPD
97228241	Benzo(a)anthracene	1200	NJ	7.8	J	604	197%
97228241	Cholesterol	15	J	430	NJ	223	187%
97228241	Caffeine	16	U	15	U		
97228241	2,6-Dimethylnaphthalene	34		24		29	34%
97228241	Pentanoic acid, butyl ester	16	U	168	NJ		
97228241	4-Chloro-3-Methylphenol	79	U	15	U		
97228241	2,6-Dinitrotoluene	16	U	76	U		
97228241	N-Nitroso-Di-N-Propylamine	16	UJ	15	U		
97228241	Aniline	16	U	15	UJ		
97228241	N-Nitrosodimethylamine	346	J	15	U		
97228241	Benzoic Acid	16	UJ	149	J		
97228241	Hexachloroethane	16	U	15	UJ		
97228241	4-Chlorophenyl-Phenylether		REJ	15	U		
97228241	Hexachlorocyclopentadiene	16	U		REJ		
97228241	Isophorone	12	J	15	U		
97228241	1-Methylphenanthrene	2	J	5.4	J	4	92%
97228241	Acenaphthene	16	U	1.3	J		
97228241	Diethylphthalate	58	U	15	U		
97228241	Di-N-Butylphthalate	33	J	15	U		
97228241	Phenanthrene	16	U	15	J		
97228241	Butylbenzylphthalate	16	U	15	U		
97228241	N-Nitrosodiphenylamine	7	J	15	U		
97228241	Fluorene	3.5	J	3.6	J	4	3%
97228241	Carbazole	16	UJ	2.4	J		
97228241	Hexachlorobutadiene	79	U	15	UJ		
97228241	Pentachlorophenol	16	U	76	U		
97228241	2,4,6-Trichlorophenol	31	UJ	15	U		
97228241	2-Nitroaniline	79	U	30	UJ		
97228241	2-Nitrophenol	13	J	76	U		
97228241	1-Methylnaphthalene	8.9	J	6.5	J	8	31%
97228241	Naphthalene	17		5	J	11	109%
97228241	2-Methylnaphthalene	16	U	9.7	J		
97228241	2-Chloronaphthalene	63	U	15	U		
97228241	3,3'-Dichlorobenzidine	16	U	61	U		
97228241	1,1'-Biphenyl	157	UJ	15	U		
97228241	Benzidine	57		152	UJ		
97228241	2-Methylphenol	16	U	15	U		
97228241	1,2-Dichlorobenzene	16	U	15	U		
97228241	2-Chlorophenol	16	U	15	U		
97228241	2,4,5-Trichlorophenol	16	U	15	U		
97228241	Nitrobenzene	16	U	15	U		
97228241	3-Nitroaniline	31	UJ	30	UJ		
97228249	4-Nitroaniline	65	U	65	U		
97228249	4-Nitrophenol	163	UJ	161	UJ		
97228249	Benzyl Alcohol	65	U	65	U		
97228249	4-Bromophenyl-Phenylether	33	U	32	U		
97228249	Phenol, 4-Nonyl-	65	U	65	U		

LDP1=Lab duplicate

RPD=Relative percent difference

U=Undetected at detection limit shown

J=Estimated concentration

UJ=Undetected at the estimated limit shown

NJ=There is evidence the analyte is present. The associated value is an estimate.

REJ=Data are unusable for all purposes

Table B-3 - p.3. Data Quality of Semivolatile Organics Analysis.

LAB REPLICATES						
(ug/kg, dry)						
Sample No.	Analysis	Result		LDP1	Mean	RPD
97228249	2,4-Dimethylphenol	33	U	32	U	
97228249	4-Methylphenol	24	J	33		29 32%
97228249	1,4-Dichlorobenzene	163	U	161	U	
97228249	4-Chloroaniline	33	U	32	U	
97228249	2,2'-Oxybis[1-chloropropane]	163	U	161	U	
97228249	Phenol	71		65	U	
97228249	Pyridine	163	U	161	U	
97228249	Bis(2-Chloroethyl)Ether	163	U	161	U	
97228249	Bis(2-Chloroethoxy)Methane	33	U	32	U	
97228249	Bis(2-Ethylhexyl) Phthalate	95	UJ	90	UJ	
97228249	Di-N-Octyl Phthalate	33	U	32	U	
97228249	Hexachlorobenzene	33	U	32	U	
97228249	Anthracene	144		387		266 92%
97228249	1,2,4-Trichlorobenzene	65	U	65	U	
97228249	2,4-Dichlorophenol	65	U	65	U	
97228249	2,4-Dinitrotoluene	65	U	65	U	
97228249	1,2-Diphenylhydrazine	33	U	32	U	
97228249	Pyrene	745		1270		1008 52%
97228249	Dimethylphthalate	33	U	32	U	
97228249	Dibenzofuran	31	J	66		49 72%
97228249	Dibenzothiophene	18	J	66		42 114%
97228249	Phytol	2060	NJ	1860	NJ	1960 10%
97228249	Ethanethioic acid, S-methyl ester	474	NJ	557	NJ	516 16%
97228249	Benzo(ghi)perylene	113	J	94	J	104 18%
97228249	Benzo[e]pyrene	284		293		289 3%
97228249	Indeno(1,2,3-cd)pyrene	175		159		167 10%
97228249	Perylene	83		73		78 13%
97228249	Benzo(b)fluoranthene	735		732		734 0%
97228249	Fluoranthene	940	J	1910	J	1425 68%
97228249	Benzo(k)fluoranthene	246		267		257 8%
97228249	Acenaphthylene	34		47		41 32%
97228249	9-Hexadecenoic acid	9070	NJ	11100	NJ	10085 20%
97228249	Chrysene	743		946		845 24%
97228249	1,6,7-Trimethylnaphthalene	33	U	32	U	
97228249	2-Methylphenanthrene	56		129		93 79%
97228249	3B-Coprostanol	130	U	129	U	
97228249	Naphthalene, 1,2,3,4-tetrahydro-1,1	27	J	278	NJ	153 165%
97228249	Retene			41		41 100%
97228249	Benzo(a)pyrene	304		254		279 18%
97228249	Heptadecanoic acid	675	NJ	351	NJ	513 63%
97228249	2,4-Dinitrophenol	652	UJ	646	UJ	
97228249	4,6-Dinitro-2-Methylphenol	163	U	161	U	
97228249	Dibenzo(a,h)anthracene	75	UJ	68	UJ	
97228249	1,3-Dichlorobenzene	163	U	161	U	
97228249	Tetradecanoic acid	4090	NJ	3340	NJ	3715 20%
97228249	11-Hexadecenoic acid, methyl ester			354	NJ	354 100%
97228249	Benzo(a)anthracene	329		337		333 2%
97228249	Hexadecanoic acid	9770	NJ	9110	NJ	9440 7%

LDP1=Lab duplicate

RPD=Relative percent difference

U=Undetected at detection limit shown

J=Estimated concentration

UJ=Undetected at the estimated limit shown

NJ=There is evidence the analyte is present. The associated value is an estimate.

Table B-3 - p.4. Data Quality of Semivolatile Organics Analysis.

LAB REPLICATES (ug/kg, dry)							
Sample No.	Analysis	Result		LDP1		Mean	RPD
97228249	Octadecanoic acid	2140	NJ	1400	NJ	1770	42%
97228249	Tetradecanoic acid, 12-methyl-, (S)-	3600	NJ	3610	NJ	3605	0%
97228249	Cholesterol	1670	NJ	834	NJ	1252	67%
97228249	Caffeine	33	U	32	U		
97228249	2,6-Dimethylnaphthalene	129		120		125	7%
97228249	4-Chloro-3-Methylphenol	33	U	32	U		
97228249	2,6-Dinitrotoluene	163	U	161	U		
97228249	N-Nitroso-Di-N-Propylamine	33	U	32	U		
97228249	Aniline	163	U	161	U		
97228249	N-Nitrosodimethylamine	163	U	161	U		
97228249	Benzoic Acid	222		217		220	2%
97228249	Hexachloroethane	163	U	161	U		
97228249	4-Chlorophenyl-Phenylether	33	U	32	U		
97228249	Hexachlorocyclopentadiene		REJ		REJ		
97228249	Isophorone	33	U	32	U		
97228249	1-Methylphenanthrene	33	U	32	U		
97228249	Acenaphthene	21	J	42		32	67%
97228249	gamma-Sitosterol	2940	NJ	2010	NJ	2475	38%
97228249	Diethylphthalate	6.4	J	32	U		
97228249	Di-N-Butylphthalate	187	UJ	145	UJ		
97228249	Phenanthrene	299	J	1090	J	695	114%
97228249	Butylbenzylphthalate	33	U	32	U		
97228249	N-Nitrosodiphenylamine	33	U	32	U		
97228249	Fluorene	50		130		90	89%
97228249	Carbazole	50		132		91	90%
97228249	Hexachlorobutadiene	163	U	161	U		
97228249	Pentachlorophenol	163	U	161	U		
97228249	2,4,6-Trichlorophenol	65	U	65	U		
97228249	2-Nitroaniline	65	U	65	U		
97228249	2-Nitrophenol	65	U	65	U		
97228249	1-Methylnaphthalene	10	J	16	J	13	46%
97228249	Naphthalene	17	J	65	U		
97228249	2-Methylnaphthalene	20	J	23	J	22	14%
97228249	2-Chloronaphthalene	33	U	32	U		
97228249	3,3'-Dichlorobenzidine	130	U	129	U		
97228249	1,1'-Biphenyl	16	J	19	J	18	17%
97228249	Benzidine	326	U	323	U		
97228249	2-Methylphenol	65	U	65	U		
97228249	1,2-Dichlorobenzene	163	U	161	U		
97228249	2-Chlorophenol	163	U	161	U		
97228249	2,4,5-Trichlorophenol	33	U	32	U		
97228249	Nitrobenzene	65	U	65	U		
97228249	3-Nitroaniline	65	U	65	U	65	0%

LDP1=Lab duplicate

RPD=Relative percent difference

U=Undetected at detection limit shown

J=Estimated concentration

UJ=Undetected at the estimated limit shown

REJ=Data are unusable for all purposes

Table B-3 - p.5. Data Quality of Semivolatile Organics Analysis.

MATRIX SPIKES					
(% recovery)					
Sample No.	Analysis	LMX1	LMX2	Mean	RPD
97228233	Benzo(e)pyrene-d12	71	68	70	4%
97228233	4-Nitroaniline	53	62	58	16%
97228233	4-Nitrophenol	61	62	62	2%
97228233	Benzyl Alcohol	68	70	69	3%
97228233	4-Bromophenyl-Phenylether	68	66	67	3%
97228233	Phenol, 4-Nonyl-	75	72	74	4%
97228233	2,4-Dimethylphenol	70	71	71	1%
97228233	4-Methylphenol	53	55	54	4%
97228233	1,4-Dichlorobenzene	48	48	48	0%
97228233	4-Chloroaniline	11	16	14	37%
97228233	2,2'-Oxybis[1-chloropropane]	68	64	66	6%
97228233	Phenol	66	66	66	0%
97228233	Pyridine	NAF	NAF		
97228233	Bis(2-Chloroethyl)Ether	69	69	69	0%
97228233	Bis(2-Chloroethoxy)Methane	71	70	71	1%
97228233	Bis(2-Ethylhexyl) Phthalate	79	74	77	7%
97228233	Di-N-Octyl Phthalate	83	80	82	4%
97228233	Hexachlorobenzene	67	65	66	3%
97228233	Anthracene	63	63	63	0%
97228233	1,2,4-Trichlorobenzene	56	56	56	0%
97228233	2,4-Dichlorophenol	64	65	65	2%
97228233	2,4-Dinitrotoluene	69	68	69	1%
97228233	1,2-Diphenylhydrazine	66	68	67	3%
97228233	Pyrene	58	57	58	2%
97228233	Dimethylphthalate	65	67	66	3%
97228233	Dibenzofuran	60	64	62	6%
97228233	Dibenzothiophene	66	65	66	2%
97228233	D14-Terphenyl	83	80	82	4%
97228233	D10-Pyrene	87	82	85	6%
97228233	Benzo(ghi)perylene	51	49	50	4%
97228233	Benzo[e]pyrene	60	58	59	3%
97228233	Indeno(1,2,3-cd)pyrene	65	62	64	5%
97228233	Perylene	52	51	52	2%
97228233	Benzo(b)fluoranthene	68	73	71	7%
97228233	Fluoranthene	49	51	50	4%
97228233	Benzo(k)fluoranthene	65	62	64	5%
97228233	Acenaphthylene	63	66	65	5%
97228233	Chrysene	63	61	62	3%
97228233	1,2-Dichlorobenzene-D4	49	47	48	4%
97228233	1,6,7-Trimethylnaphthalene	71	70	71	1%
97228233	2-Methylphenanthrene	62	59	61	5%
97228233	2-Fluorobiphenyl	64	63	64	2%
97228233	3B-Coprostanol	NAF	NAF		
97228233	2-Fluorophenol	69	70	70	1%
97228233	D5-Nitrobenzene	68	67	68	1%
97228233	D5-Phenol	71	70	71	1%
97228233	Retene	NAF	NAF		
97228233	Benzo(a)pyrene	61	61	61	0%
97228233	2,4-Dinitrophenol	59	57	58	3%
97228233	4,6-Dinitro-2-Methylphenol	63	64	64	2%
97228233	Dibenzo(a,h)anthracene	61	61	61	0%
97228233	1,3-Dichlorobenzene	45	46	46	2%

LMX=Laboratory matrix spike

RPD=Relative percent difference

NAF=Not analyzed for

Table B-3 - p.6. Data Quality of Semivolatile Organics Analysis.

MATRIX SPIKES						
(% recovery)						
Sample No.	Analysis	LMX1	LMX2	Mean	RPD	
97228233	Benzo(a)anthracene	63	61	62	3%	
97228233	Caffeine		NAF	NAF		
97228233	2,6-Dimethylnaphthalene		NAF	NAF		
97228233	4-Chloro-3-Methylphenol	67	68	68	1%	
97228233	2,6-Dinitrotoluene	67	68	68	1%	
97228233	N-Nitroso-Di-N-Propylamine	67	68	68	1%	
97228233	Aniline	12	21	17	55%	
97228233	N-Nitrosodimethylamine	55	52	54	6%	
97228233	Benzoic Acid	56	40	48	33%	
97228233	Hexachloroethane	23	23	23	0%	
97228233	4-Chlorophenyl-Phenylether	64	65	65	2%	
97228233	Hexachlorocyclopentadiene	0	0	0		
97228233	Isophorone	68	67	68	1%	
97228233	1-Methylphenanthrene	62	60	61	3%	
97228233	Acenaphthene	64	65	65	2%	
97228233	Diethylphthalate	65	67	66	3%	
97228233	Di-N-Butylphthalate	70	68	69	3%	
97228233	Phenanthrene	43	43	43	0%	
97228233	Butylbenzylphthalate	85	85	85	0%	
97228233	N-Nitrosodiphenylamine	82	85	84	4%	
97228233	Fluorene	61	60	61	2%	
97228233	Carbazole		NAF	NAF		
97228233	Hexachlorobutadiene	46	44	45	4%	
97228233	Pentachlorophenol	70	69	70	1%	
97228233	2,4,6-Trichlorophenol	66	66	66	0%	
97228233	2-Nitroaniline	35	41	38	16%	
97228233	2-Nitrophenol	71	72	72	1%	
97228233	1-Methylnaphthalene		NAF	NAF		
97228233	Naphthalene	58	59	59	2%	
97228233	2-Methylnaphthalene	62	62	62	0%	
97228233	2-Chloronaphthalene	62	63	63	2%	
97228233	3,3'-Dichlorobenzidine		NAF	NAF		
97228233	1,1'-Biphenyl	69	68	69	1%	
97228233	Benidine		NAF	NAF		
97228233	D4-2-Chlorophenol	71	71	71	0%	
97228233	2-Methylphenol	70	70	70	0%	
97228233	1,2-Dichlorobenzene	50	51	51	2%	
97228233	2-Chlorophenol	68	69	69	1%	
97228233	2,4,5-Trichlorophenol	65	68	67	5%	
97228233	Nitrobenzene	64	64	64	0%	
97228233	3-Nitroaniline	37	41	39	10%	
97228255	Benzo(e)pyrene-d12	94	98	96	4%	
97228255	4-Nitroaniline	52	49	51	6%	
97228255	4-Nitrophenol	89	95	92	7%	
97228255	Benzyl Alcohol	99	108	104	9%	
97228255	4-Bromophenyl-Phenylether	100	106	103	6%	
97228255	Phenol, 4-Nonyl-	115	112	114	3%	
97228255	2,4-Dimethylphenol	95	99	97	4%	
97228255	4-Methylphenol	91	100	96	9%	
97228255	1,4-Dichlorobenzene	73	75	74	3%	
97228255	4-Chloroaniline	25	21	23	17%	
97228255	2,2'-Oxybis[1-chloropropane]	83	87	85	5%	

LMX=Laboratory matrix spike

RPD=Relative percent difference

NAF=Not analyzed for

Table B-3 - p.7. Data Quality of Semivolatile Organics Analysis.

MATRIX SPIKES						
(% recovery)						
Sample No.	Analysis	LMX1	LMX2	Mean	RPD	
97228255	Phenol	89	98	94	10%	
97228255	Pyridine		NAF	NAF		
97228255	Bis(2-Chloroethyl)Ether	77	88	83	13%	
97228255	Bis(2-Chloroethoxy)Methane	86	96	91	11%	
97228255	Bis(2-Ethylhexyl) Phthalate	99	116	108	16%	
97228255	Di-N-Octyl Phthalate	109	119	114	9%	
97228255	Hexachlorobenzene	92	101	97	9%	
97228255	Anthracene	95	103	99	8%	
97228255	1,2,4-Trichlorobenzene	81	87	84	7%	
97228255	2,4-Dichlorophenol	98	105	102	7%	
97228255	2,4-Dinitrotoluene	88	92	90	4%	
97228255	1,2-Diphenylhydrazine	93	97	95	4%	
97228255	Pyrene	89	102	96	14%	
97228255	Dimethylphthalate	99	99	99	0%	
97228255	Dibenzofuran	98	97	98	1%	
97228255	Dibenzothiophene	96	96	96	0%	
97228255	D14-Terphenyl	94	105	100	11%	
97228255	D10-Pyrene	96	101	99	5%	
97228255	Benzo(ghi)perylene	94	97	96	3%	
97228255	Benzo[e]pyrene	92	94	93	2%	
97228255	Indeno(1,2,3-cd)pyrene	101	104	103	3%	
97228255	Perylene	99	124	112	22%	
97228255	Benzo(b)fluoranthene	91	103	97	12%	
97228255	Fluoranthene	99	106	103	7%	
97228255	Benzo(k)fluoranthene	94	105	100	11%	
97228255	Acenaphthylene	85	88	87	3%	
97228255	Chrysene	87	95	91	9%	
97228255	1,2-Dichlorobenzene-D4	65	68	67	5%	
97228255	1,6,7-Trimethylnaphthalene	104	107	106	3%	
97228255	2-Methylphenanthrene	98	97	98	1%	
97228255	2-Fluorobiphenyl	87	90	89	3%	
97228255	3B-Coprostanol		NAF	NAF		
97228255	2-Fluorophenol	84	88	86	5%	
97228255	D5-Nitrobenzene	88	86	87	2%	
97228255	D5-Phenol	88	93	91	6%	
97228255	Retene		NAF	NAF		
97228255	Benzo(a)pyrene	97	101	99	4%	
97228255	2,4-Dinitrophenol	86	85	86	1%	
97228255	4,6-Dinitro-2-Methylphenol	85	82	84	4%	
97228255	Dibenzo(a,h)anthracene	102	106	104	4%	
97228255	1,3-Dichlorobenzene	71	74	73	4%	
97228255	Benzo(a)anthracene	92	101	97	9%	
97228255	Caffeine		NAF	NAF		
97228255	2,6-Dimethylnaphthalene		NAF	NAF		
97228255	4-Chloro-3-Methylphenol	96	105	101	9%	
97228255	2,6-Dinitrotoluene	82	90	86	9%	
97228255	N-Nitroso-Di-N-Propylamine	75	85	80	13%	
97228255	Aniline	20	17	19	16%	
97228255	N-Nitrosodimethylamine	61	67	64	9%	
97228255	Benzoic Acid	66	83	75	23%	
97228255	Hexachloroethane	20	19	20	5%	
97228255	4-Chlorophenyl-Phenylether	90	95	93	5%	
97228255	Hexachlorocyclopentadiene		REJ	REJ		

LMX=Laboratory matrix spike

RPD=Relative percent difference

REJ=Data are unusable for all purposes

NAF=Not analyzed for

Table B-3 - p.8. Data Quality of Semivolatile Organics Analysis.

MATRIX SPIKES					
(% recovery)					
Sample No.	Analysis	LMX1	LMX2	Mean	RPD
97228255	Isophorone	86	96	91	11%
97228255	1-Methylphenanthrene	96	102	99	6%
97228255	Acenaphthene	88	89	89	1%
97228255	Diethylphthalate	95	98	97	3%
97228255	Di-N-Butylphthalate	118	89	104	28%
97228255	Phenanthrene	95	102	99	7%
97228255	Butylbenzylphthalate	105	123	114	16%
97228255	N-Nitrosodiphenylamine	100	110	105	10%
97228255	Fluorene	94	98	96	4%
97228255	Carbazole	NAF	NAF		
97228255	Hexachlorobutadiene	78	84	81	7%
97228255	Pentachlorophenol	94	85	90	10%
97228255	2,4,6-Trichlorophenol	104	105	105	1%
97228255	2-Nitroaniline	40	38	39	5%
97228255	2-Nitrophenol	72	77	75	7%
97228255	1-Methylnaphthalene	NAF	NAF		
97228255	Naphthalene	83	93	88	11%
97228255	2-Methylnaphthalene	95	106	101	11%
97228255	2-Chloronaphthalene	94	94	94	0%
97228255	3,3'-Dichlorobenzidine	NAF	NAF		
97228255	1,1'-Biphenyl	101	96	99	5%
97228255	Benzidine	NAF	NAF		
97228255	D4-2-Chlorophenol	81	88	85	8%
97228255	2-Methylphenol	88	94	91	7%
97228255	1,2-Dichlorobenzene	75	79	77	5%
97228255	2-Chlorophenol	84	94	89	11%
97228255	2,4,5-Trichlorophenol	102	108	105	6%
97228255	Nitrobenzene	95	96	96	1%
97228255	3-Nitroaniline	44	39	42	12%

LMX=Laboratory matrix spike

RPD=Relative percent difference

NAF=Not analyzed for

Table B-3 - p.9. Data Quality of Semivolatile Organics Analysis.

BLANKS			
(ug/kg, dry)			
Sample No.	Analysis	Result	
OBS7279A1	4-Nitroaniline	100	U
OBS7279A1	4-Nitrophenol	100	U
OBS7279A1	Benzyl Alcohol	20	U
OBS7279A1	4-Bromophenyl-Phenylether	20	U
OBS7279A1	Phenol, 4-Nonyl-	100	U
OBS7279A1	2,4-Dimethylphenol	20	U
OBS7279A1	4-Methylphenol	20	U
OBS7279A1	1,4-Dichlorobenzene	20	U
OBS7279A1	4-Chloroaniline	20	U
OBS7279A1	Heptane, 2,6-dimethyl-	42	NJ
OBS7279A1	2,2'-Oxybis[1-chloropropane]	20	U
OBS7279A1	Toluene	27	NJ
OBS7279A1	Phenol	11	J
OBS7279A1	2,5-Hexanedione	30	NJ
OBS7279A1	Pyridine	40	U
OBS7279A1	Bis(2-Chloroethyl)Ether	20	U
OBS7279A1	Bis(2-Chloroethoxy)Methane	20	U
OBS7279A1	Bis(2-Ethylhexyl) Phthalate	6	J
OBS7279A1	Di-N-Octyl Phthalate	20	U
OBS7279A1	Hexachlorobenzene	20	U
OBS7279A1	Anthracene	20	U
OBS7279A1	1,2,4-Trichlorobenzene	20	U
OBS7279A1	2,4-Dichlorophenol	40	U
OBS7279A1	2,4-Dinitrotoluene	40	U
OBS7279A1	1,2-Diphenylhydrazine	20	U
OBS7279A1	2-Pentanone, 4-hydroxy-4-methyl-	3440	NJ
OBS7279A1	Pyrene	0.95	J
OBS7279A1	Dimethylphthalate	20	U
OBS7279A1	Dibenzofuran	20	U
OBS7279A1	Dibenzothiophene	20	U
OBS7279A1	3-Penten-2-one, 4-methyl-	43	NJ
OBS7279A1	Benzo(ghi)perylene	20	U
OBS7279A1	Benzo[e]pyrene	20	U
OBS7279A1	Indeno(1,2,3-cd)pyrene	100	U
OBS7279A1	Perylene	20	U
OBS7279A1	Benzo(b)fluoranthene	20	U
OBS7279A1	Fluoranthene	0.83	J
OBS7279A1	Benzo(k)fluoranthene	20	U
OBS7279A1	Acenaphthylene	20	U
OBS7279A1	Chrysene	20	U
OBS7279A1	Heptane, 2,4-dimethyl-	52	NJ
OBS7279A1	Heptane, 2,5-dimethyl-	119	NJ
OBS7279A1	Octane, 3-methyl-	65	NJ
OBS7279A1	Octane, 4-methyl-	54	NJ
OBS7279A1	1,6,7-Trimethylnaphthalene	20	U
OBS7279A1	2-Methylphenanthrene	20	U
OBS7279A1	7-Oxabicyclo[4.1.0]heptane	274	NJ
OBS7279A1	3B-Coprostanol	80	U
OBS7279A1	Retene	20	U
OBS7279A1	Benzo(a)pyrene	20	U
OBS7279A1	2,4-Dinitrophenol	400	UJ
OBS7279A1	4,6-Dinitro-2-Methylphenol	100	UJ

U=Undetected at detection limit shown

J=Estimated concentration

UJ=Undetected at the estimated limit shown

NJ=There is evidence the analyte is present. The associated value is an estimate.

Table B-3 - p.10. Data Quality of Semivolatile Organics Analysis.

BLANKS			
(ug/kg, dry)			
Sample No.	Analysis	Result	
OBS7279A1	Dibenzo(a,h)anthracene	40	U
OBS7279A1	1,3-Dichlorobenzene	20	U
OBS7279A1	Benzo(a)anthracene	20	U
OBS7279A1	Hexadecanoic acid	57	NJ
OBS7279A1	Caffeine	20	U
OBS7279A1	2,6-Dimethylnaphthalene	20	U
OBS7279A1	2-Hexanone	66	NJ
OBS7279A1	4-Chloro-3-Methylphenol	20	U
OBS7279A1	2,6-Dinitrotoluene	100	U
OBS7279A1	N-Nitroso-Di-N-Propylamine	20	U
OBS7279A1	Aniline	20	U
OBS7279A1	N-Nitrosodimethylamine	20	U
OBS7279A1	Benzoic Acid	200	UJ
OBS7279A1	Hexachloroethane	20	U
OBS7279A1	4-Chlorophenyl-Phenylether	20	U
OBS7279A1	Hexachlorocyclopentadiene		REJ
OBS7279A1	Isophorone	20	U
OBS7279A1	2-Cyclohexen-1-ol	52	NJ
OBS7279A1	1-Methylphenanthrene	20	U
OBS7279A1	Acenaphthene	20	U
OBS7279A1	Diethylphthalate	2.3	J
OBS7279A1	Di-N-Butylphthalate	5.1	J
OBS7279A1	Phenanthrene	20	U
OBS7279A1	Butylbenzylphthalate	20	U
OBS7279A1	N-Nitrosodiphenylamine	20	U
OBS7279A1	Fluorene	20	U
OBS7279A1	Carbazole	20	U
OBS7279A1	Hexachlorobutadiene	20	U
OBS7279A1	Pentachlorophenol	100	U
OBS7279A1	2,4,6-Trichlorophenol	20	U
OBS7279A1	2-Nitroaniline	40	U
OBS7279A1	2-Nitrophenol	100	U
OBS7279A1	1-Methylnaphthalene	20	U
OBS7279A1	Naphthalene	20	U
OBS7279A1	2-Methylnaphthalene	20	U
OBS7279A1	2-Chloronaphthalene	20	U
OBS7279A1	3,3'-Dichlorobenzidine	80	U
OBS7279A1	1,1'-Biphenyl	1.2	J
OBS7279A1	Benzidine	200	UJ
OBS7279A1	2-Cyclohexen-1-one	55	NJ
OBS7279A1	2-Methylphenol	20	U
OBS7279A1	1,2-Dichlorobenzene	20	U
OBS7279A1	2-Chlorophenol	20	U
OBS7279A1	2,4,5-Trichlorophenol	20	U
OBS7279A1	Nitrobenzene	20	U
OBS7279A1	3-Nitroaniline	40	U
OBS7279A2	4-Nitroaniline	100	U
OBS7279A2	4-Nitrophenol	100	U
OBS7279A2	Benzyl Alcohol	20	U
OBS7279A2	4-Bromophenyl-Phenylether	20	U
OBS7279A2	Phenol, 4-Nonyl-	100	U
OBS7279A2	2,4-Dimethylphenol	20	U

U=Undetected at detection limit shown

J=Estimated concentration

UJ=Undetected at the estimated limit shown

NJ=There is evidence the analyte is present. The associated value is an estimate.

REJ=Data are unusable for all purposes

Table B-3 - p.11. Data Quality of Semivolatile Organics Analysis.

BLANKS				
(ug/kg, dry)				
Sample No.	Analysis	Result		
OBS7279A2	4-Methylphenol	20		U
OBS7279A2	1,4-Dichlorobenzene	20		U
OBS7279A2	4-Chloroaniline	20		U
OBS7279A2	Heptane, 2,6-dimethyl-	23		NJ
OBS7279A2	2,2'-Oxybis[1-chloropropane]	20		U
OBS7279A2	Toluene	30		NJ
OBS7279A2	Phenol	7.6		J
OBS7279A2	2,5-Hexanedione	38		NJ
OBS7279A2	Pyridine	40		U
OBS7279A2	Bis(2-Chloroethyl)Ether	20		U
OBS7279A2	Bis(2-Chloroethoxy)Methane	20		U
OBS7279A2	Bis(2-Ethylhexyl) Phthalate	25		J
OBS7279A2	Di-N-Octyl Phthalate	20		U
OBS7279A2	Hexachlorobenzene	20		U
OBS7279A2	Anthracene	20		U
OBS7279A2	1,2,4-Trichlorobenzene	20		U
OBS7279A2	2,4-Dichlorophenol	40		U
OBS7279A2	2,4-Dinitrotoluene	40		U
OBS7279A2	1,2-Diphenylhydrazine	20		U
OBS7279A2	2-Pentanone, 4-hydroxy-4-methyl-	5080		NJ
OBS7279A2	Pyrene	20		U
OBS7279A2	Dimethylphthalate	20		U
OBS7279A2	Dibenzofuran	20		U
OBS7279A2	Dibenzothiophene	20		U
OBS7279A2	3-Penten-2-one, 4-methyl-	45		NJ
OBS7279A2	Benzo(ghi)perylene	20		U
OBS7279A2	Benzo[e]pyrene	20		U
OBS7279A2	Indeno(1,2,3-cd)pyrene	100		U
OBS7279A2	Perylene	20		U
OBS7279A2	Benzo(b)fluoranthene	20		U
OBS7279A2	Fluoranthene	20		U
OBS7279A2	Benzo(k)fluoranthene	20		U
OBS7279A2	Acenaphthylene	20		U
OBS7279A2	Chrysene	20		U
OBS7279A2	Heptane, 2,4-dimethyl-	67		NJ
OBS7279A2	Heptane, 2,5-dimethyl-	148		NJ
OBS7279A2	Octane, 3-methyl-	76		NJ
OBS7279A2	Octane, 4-methyl-	60		NJ
OBS7279A2	1,6,7-Trimethylnaphthalene	20		U
OBS7279A2	2-Methylphenanthrene	20		U
OBS7279A2	Cyclotetradecane	57		NJ
OBS7279A2	Heptane, 2,3-dimethyl-	201		NJ
OBS7279A2	Octane, 2-methyl-	56		NJ
OBS7279A2	3B-Coprostanol	80		U
OBS7279A2	Retene	20		U
OBS7279A2	Benzo(a)pyrene	20		U
OBS7279A2	2,4-Dinitrophenol	400		UJ
OBS7279A2	2-Butanol, 3-methyl-, acetate	23		NJ
OBS7279A2	4,6-Dinitro-2-Methylphenol	100		UJ
OBS7279A2	Dibenzo(a,h)anthracene	40		U
OBS7279A2	1,3-Dichlorobenzene	20		U

LDP1=Lab duplicate

U=Undetected at detection limit shown

J=Estimated concentration

UJ=Undetected at the estimated limit shown

NJ=There is evidence the analyte is present. The associated value is an estimate.

Table B-3 - p.12. Data Quality of Semivolatile Organics Analysis.

BLANKS				
(ug/kg, dry)				
Sample No.	Analysis	Result		
OBS7279A2	Benzo(a)anthracene	20	U	
OBS7279A2	2-Pentanone, 3-methyl-	263	NJ	
OBS7279A2	Hexadecanoic acid	107	NJ	
OBS7279A2	Caffeine	20	U	
OBS7279A2	2,6-Dimethylnaphthalene	20	U	
OBS7279A2	4-Chloro-3-Methylphenol	20	U	
OBS7279A2	2,6-Dinitrotoluene	100	U	
OBS7279A2	N-Nitroso-Di-N-Propylamine	20	U	
OBS7279A2	Aniline	20	U	
OBS7279A2	N-Nitrosodimethylamine	20	U	
OBS7279A2	Benzoic Acid	200	UJ	
OBS7279A2	Hexachloroethane	20	U	
OBS7279A2	4-Chlorophenyl-Phenylether	20	U	
OBS7279A2	Hexachlorocyclopentadiene		REJ	
OBS7279A2	Isophorone	20	U	
OBS7279A2	1-Methylphenanthrene	20	U	
OBS7279A2	Acenaphthene	20	U	
OBS7279A2	Diethylphthalate	2.2	J	
OBS7279A2	Di-N-Butylphthalate	13	J	
OBS7279A2	Phenanthrene	20	U	
OBS7279A2	Butylbenzylphthalate	20	U	
OBS7279A2	N-Nitrosodiphenylamine	20	U	
OBS7279A2	Fluorene	20	U	
OBS7279A2	Carbazole	20	U	
OBS7279A2	Hexachlorobutadiene	20	U	
OBS7279A2	Pentachlorophenol	100	U	
OBS7279A2	2,4,6-Trichlorophenol	20	U	
OBS7279A2	2-Nitroaniline	40	U	
OBS7279A2	2-Nitrophenol	100	U	
OBS7279A2	1-Methylnaphthalene	20	U	
OBS7279A2	Naphthalene	20	U	
OBS7279A2	2-Methylnaphthalene	20	U	
OBS7279A2	2-Chloronaphthalene	20	U	
OBS7279A2	3,3'-Dichlorobenzidine	80	U	
OBS7279A2	1,1'-Biphenyl	2.1	J	
OBS7279A2	Benzidine	200	UJ	
OBS7279A2	2-Methylphenol	20	U	
OBS7279A2	1,2-Dichlorobenzene	20	U	
OBS7279A2	2-Chlorophenol	20	U	
OBS7279A2	2,4,5-Trichlorophenol	20	U	
OBS7279A2	Nitrobenzene	20	U	
OBS7279A2	3-Nitroaniline	40	U	
OBS7323A1	C1-Naphthalenes	36	NJ	
OBS7323A1	C2 -Naphthalenes	36	NJ	
OBS7323A1	C3 -Naphthalenes	36	NJ	
OBS7323A1	C4 -Naphthalenes	36	NJ	
OBS7323A1	C1-Fluorenes	36	NJ	
OBS7323A1	C2-Fluorenes	36	NJ	
OBS7323A1	C3-Fluorenes	36	NJ	
OBS7323A1	C1-Dibenzothiophenes	36	NJ	
OBS7323A1	C2-Dibenzothiophenes	36	NJ	
OBS7323A1	C3-Dibenzothiophenes	36	NJ	
OBS7323A1	C1-Phenanthrenes/Anthracenes	36	NJ	

U=Undetected at detection limit shown

J=Estimated concentration

UJ=Undetected at the estimated limit shown

NJ=There is evidence the analyte is present. The associated value is an estimate.

REJ=Data are unusable for all purposes

Table B-3 - p.13. Data Quality of Semivolatile Organics Analysis.

BLANKS				
(ug/kg, dry)				
Sample No.	Analysis	Result		
OBS7323A1	C2-Phenanthrenes/Anthracenes	36		NJ
OBS7323A1	C3-Phenanthrenes/Anthracenes	36		NJ
OBS7323A1	C4-Phenanthrenes/Anthracenes	36		NJ
OBS7323A1	C1-Fluoranthene/Pyrene	36		NJ
OBS7323A1	C1-Chrysenes	36		NJ
OBS7323A1	C2-Chrysenes	36		NJ
OBS7323A1	C3-Chrysenes	36		NJ
OBS7323A1	C4-Chrysenes	36		NJ
OBS7323A1	4-Nitroaniline	29		U
OBS7323A1	4-Nitrophenol	71		U
OBS7323A1	Benzyl Alcohol	14		U
OBS7323A1	4-Bromophenyl-Phenylether	14		U
OBS7323A1	Phenol, 4-Nonyl-	71		U
OBS7323A1	2,4-Dimethylphenol	14		U
OBS7323A1	4-Methylphenol	14		U
OBS7323A1	1,4-Dichlorobenzene	14		U
OBS7323A1	4-Chloroaniline	14		U
OBS7323A1	2,2'-Oxybis[1-chloropropane]	14		U
OBS7323A1	Toluene	61		NJ
OBS7323A1	Phenol	16		
OBS7323A1	2,5-Hexanedione	66		NJ
OBS7323A1	Pyridine	29		U
OBS7323A1	Bis(2-Chloroethyl)Ether	14		U
OBS7323A1	Ethanol, 2-butoxy-	52		NJ
OBS7323A1	Bis(2-Chloroethoxy)Methane	14		U
OBS7323A1	1-Octadecanol	123		NJ
OBS7323A1	Bis(2-Ethylhexyl) Phthalate	14		J
OBS7323A1	Di-N-Octyl Phthalate	29		U
OBS7323A1	Hexachlorobenzene	14		U
OBS7323A1	Anthracene	14		U
OBS7323A1	1,2,4-Trichlorobenzene	14		U
OBS7323A1	2,4-Dichlorophenol	29		U
OBS7323A1	2,4-Dinitrotoluene	29		U
OBS7323A1	1,2-Diphenylhydrazine	14		U
OBS7323A1	2-Pentanone, 4-hydroxy-4-methyl-	8740		NJ
OBS7323A1	Pyrene	14		U
OBS7323A1	Dimethylphthalate	71		U
OBS7323A1	Dibenzofuran	14		U
OBS7323A1	Dibenzothiophene	14		U
OBS7323A1	3-Penten-2-one, 4-methyl-	65		NJ
OBS7323A1	Heptane	110		NJ
OBS7323A1	Hexane, 3-ethyl-2-methyl-	359		NJ
OBS7323A1	Benzo(ghi)perylene	71		U
OBS7323A1	Benzo[e]pyrene	14		U
OBS7323A1	Indeno(1,2,3-cd)pyrene	29		U
OBS7323A1	Perylene	14		U
OBS7323A1	Benzo(b)fluoranthene	71		U
OBS7323A1	Fluoranthene	14		U
OBS7323A1	Benzo(k)fluoranthene	14		U
OBS7323A1	Acenaphthylene	14		U
OBS7323A1	Chrysene	14		U
OBS7323A1	Heptane, 2,5-dimethyl-	382		NJ
OBS7323A1	Octane, 3-methyl-	204		NJ
OBS7323A1	Octane, 4-methyl-	142		NJ
OBS7323A1	1,6,7-Trimethylnaphthalene	14		U

U=Undetected at detection limit shown

NJ=There is evidence the analyte is present. The associated value is an estimate.

Table B-3 - p.14. Data Quality of Semivolatile Organics Analysis.

BLANKS				
(ug/kg, dry)				
Sample No.	Analysis	Result		
OBS7323A1	2-Methylphenanthrene	14		U
OBS7323A1	Heptane, 2,3-dimethyl-	176		NJ
OBS7323A1	Octane, 2-methyl-	59		NJ
OBS7323A1	3B-Coprostanol	71		U
OBS7323A1	Retene	14		U
OBS7323A1	Benzo(a)pyrene	14		U
OBS7323A1	2,4-Dinitrophenol	286		U
OBS7323A1	4,6-Dinitro-2-Methylphenol	71		U
OBS7323A1	Dibenzo(a,h)anthracene	29		U
OBS7323A1	1,3-Dichlorobenzene	14		U
OBS7323A1	Benzo(a)anthracene	14		U
OBS7323A1	Hexadecanoic acid	157		NJ
OBS7323A1	Caffeine	14		U
OBS7323A1	2,6-Dimethylnaphthalene	14		U
OBS7323A1	4-Chloro-3-Methylphenol	29		U
OBS7323A1	2,6-Dinitrotoluene	71		U
OBS7323A1	N-Nitroso-Di-N-Propylamine	14		U
OBS7323A1	Aniline	14		U
OBS7323A1	N-Nitrosodimethylamine	14		U
OBS7323A1	Benzoic Acid	143		U
OBS7323A1	Hexachloroethane	14		U
OBS7323A1	17-Pentatriacontene	55		NJ
OBS7323A1	4-Chlorophenyl-Phenylether	14		U
OBS7323A1	Hexachlorocyclopentadiene			REJ
OBS7323A1	Isophorone	14		U
OBS7323A1	1-Methylphenanthrene	14		U
OBS7323A1	Acenaphthene	14		U
OBS7323A1	Diethylphthalate	71		U
OBS7323A1	Di-N-Butylphthalate	8.4		J
OBS7323A1	Phenanthrene	1		J
OBS7323A1	Butylbenzylphthalate	14		U
OBS7323A1	N-Nitrosodiphenylamine	14		U
OBS7323A1	Fluorene	14		U
OBS7323A1	Carbazole	14		U
OBS7323A1	Hexachlorobutadiene	14		U
OBS7323A1	Pentachlorophenol	71		U
OBS7323A1	2,4,6-Trichlorophenol	29		U
OBS7323A1	2-Nitroaniline	71		U
OBS7323A1	2-Nitrophenol	71		U
OBS7323A1	1-Methylnaphthalene	14		U
OBS7323A1	Naphthalene	14		U
OBS7323A1	2-Methylnaphthalene	14		U
OBS7323A1	2-Chloronaphthalene	14		U
OBS7323A1	3,3'-Dichlorobenzidine	29		U
OBS7323A1	1,1'-Biphenyl	3.2		J
OBS7323A1	Benzidine	143		U
OBS7323A1	2-Methylphenol	14		U
OBS7323A1	1,2-Dichlorobenzene	14		U
OBS7323A1	2-Chlorophenol	14		U
OBS7323A1	2,4,5-Trichlorophenol	14		U
OBS7323A1	Glycine, N-methyl-N-(1-oxododecyl)	44		NJ
OBS7323A1	Nitrobenzene	14		U
OBS7323A1	3-Nitroaniline	71		U
OBS7323A2	4-Nitroaniline	29		U

U=Undetected at detection limit shown

J=Estimated concentration

NJ=There is evidence the analyte is present. The associated value is an estimate.

REJ=Data are unusable for all purposes

Table B-3 - p.15. Data Quality of Semivolatile Organics Analysis.

BLANKS				
(ug/kg, dry)				
Sample No.	Analysis	Result		
OBS7323A2	4-Nitrophenol	71		U
OBS7323A2	Benzyl Alcohol	14		U
OBS7323A2	4-Bromophenyl-Phenylether	14		U
OBS7323A2	Phenol, 4-Nonyl-	71		
OBS7323A2	2,4-Dimethylphenol	14		U
OBS7323A2	4-Methylphenol	14		U
OBS7323A2	1,4-Dichlorobenzene	14		U
OBS7323A2	4-Chloroaniline	14		U
OBS7323A2	2,2'-Oxybis[1-chloropropane]	14		U
OBS7323A2	Phenol	12		J
OBS7323A2	2,5-Hexanedione	55		NJ
OBS7323A2	Pyridine	29		U
OBS7323A2	Bis(2-Chloroethyl)Ether	14		U
OBS7323A2	Ethanol, 2-butoxy-	46		NJ
OBS7323A2	Bis(2-Chloroethoxy)Methane	14		U
OBS7323A2	Bis(2-Ethylhexyl) Phthalate	36		
OBS7323A2	Di-N-Octyl Phthalate	29		U
OBS7323A2	Hexachlorobenzene	14		U
OBS7323A2	Anthracene	14		U
OBS7323A2	1,2,4-Trichlorobenzene	14		U
OBS7323A2	2,4-Dichlorophenol	29		U
OBS7323A2	2,4-Dinitrotoluene	29		U
OBS7323A2	1,2-Diphenylhydrazine	14		U
OBS7323A2	2-Pentanone, 4-hydroxy-4-methyl-	6260		NJ
OBS7323A2	Pyrene	5.5		J
OBS7323A2	Dimethylphthalate	71		U
OBS7323A2	Dibenzofuran	14		U
OBS7323A2	Dibenzothiophene	14		U
OBS7323A2	3-Penten-2-one, 4-methyl-	57		NJ
OBS7323A2	Isopropyl Palmitate	111		NJ
OBS7323A2	Benzo(ghi)perylene	71		U
OBS7323A2	Benzo[e]pyrene	14		U
OBS7323A2	Indeno(1,2,3-cd)pyrene	29		U
OBS7323A2	Perylene	14		U
OBS7323A2	Benzo(b)fluoranthene	71		U
OBS7323A2	Fluoranthene	1.4		J
OBS7323A2	Benzo(k)fluoranthene	14		U
OBS7323A2	Acenaphthylene	14		U
OBS7323A2	Chrysene	14		U
OBS7323A2	Octane, 3-methyl-	127		NJ
OBS7323A2	Octane, 4-methyl-	76		NJ
OBS7323A2	1,6,7-Trimethylnaphthalene	14		U
OBS7323A2	2-Methylphenanthrene	1.4		J
OBS7323A2	Heptane, 2,3-dimethyl-	306		NJ
OBS7323A2	Pyrrolidine, 3-methyl-	92		NJ
OBS7323A2	3B-Coprostanol	71		U
OBS7323A2	1,2-Benzenedicarboxylic acid, dihep	47		NJ
OBS7323A2	Retene	14		U
OBS7323A2	Benzo(a)pyrene	14		U
OBS7323A2	2,4-Dinitrophenol	286		U
OBS7323A2	4,6-Dinitro-2-Methylphenol	71		U
OBS7323A2	Dibenzo(a,h)anthracene	29		U
OBS7323A2	1,3-Dichlorobenzene	14		U
OBS7323A2	Benzo(a)anthracene	14		U

U=Undetected at detection limit shown

J=Estimated concentration

NJ=There is evidence the analyte is present. The associated value is an estimate.

Table B-3 - p.16. Data Quality of Semivolatile Organics Analysis.

BLANKS				
(ug/kg, dry)				
Sample No.	Analysis	Result		
OBS7323A2	Caffeine	14		U
OBS7323A2	2,6-Dimethylnaphthalene	14		U
OBS7323A2	4-Chloro-3-Methylphenol	29		U
OBS7323A2	2,6-Dinitrotoluene	71		U
OBS7323A2	N-Nitroso-Di-N-Propylamine	14		U
OBS7323A2	Aniline	14		U
OBS7323A2	N-Nitrosodimethylamine	14		U
OBS7323A2	1-Pentadecanol	136		NJ
OBS7323A2	Benzoic Acid	143		U
OBS7323A2	Hexachloroethane	14		U
OBS7323A2	4-Chlorophenyl-Phenylether	14		U
OBS7323A2	Hexachlorocyclopentadiene			REJ
OBS7323A2	Isophorone	14		U
OBS7323A2	1-Methylphenanthrene	1.2		J
OBS7323A2	Acenaphthene	14		U
OBS7323A2	Diethylphthalate	1.1		J
OBS7323A2	1,2-Benzenedicarboxylic acid, bis(2-	64		NJ
OBS7323A2	Di-N-Butylphthalate	36		
OBS7323A2	Phenanthrene	1.2		J
OBS7323A2	Butylbenzylphthalate	14		U
OBS7323A2	N-Nitrosodiphenylamine	14		U
OBS7323A2	Fluorene	14		U
OBS7323A2	Carbazole	14		U
OBS7323A2	Hexachlorobutadiene	14		U
OBS7323A2	Pentachlorophenol	71		U
OBS7323A2	2,4,6-Trichlorophenol	29		U
OBS7323A2	2-Nitroaniline	71		U
OBS7323A2	2-Nitrophenol	71		U
OBS7323A2	1-Methylnaphthalene	14		U
OBS7323A2	Naphthalene	14		U
OBS7323A2	2-Methylnaphthalene	14		U
OBS7323A2	2-Chloronaphthalene	14		U
OBS7323A2	3,3'-Dichlorobenzidine	29		U
OBS7323A2	1,1'-Biphenyl	2.8		J
OBS7323A2	Benzidine	143		U
OBS7323A2	2-Cyclohexen-1-one	85		NJ
OBS7323A2	2-Methylphenol	14		U
OBS7323A2	1,2-Dichlorobenzene	14		U
OBS7323A2	2-Chlorophenol	14		U
OBS7323A2	2,4,5-Trichlorophenol	14		U
OBS7323A2	Nitrobenzene	14		U
OBS7323A2	3-Nitroaniline	71		U

U=Undetected at detection limit shown

J=Estimated concentration

NJ=There is evidence the analyte is present. The associated value is an estimate.

REJ=Data are unusable for all purposes

Table B-3 - p.17. Data Quality of Semivolatile Organics Analysis.

FIELD SPLITS (ug/kg, dry)							
Sample No.	Analysis	No. -34		No. -35		Mean	RPD
97228234/5	4-Nitroaniline	30	U	80	U		
97228234/5	4-Nitrophenol	75	U	80	U		
97228234/5	Benzyl Alcohol	15	U	7.2	J		
97228234/5	4-Bromophenyl-Phenylether	15	U	16	U		
97228234/5	Phenol, 4-Nonyl-	75	U	80	U		
97228234/5	2,4-Dimethylphenol	15	U	16	U		
97228234/5	4-Methylphenol	150		7	J	79	182%
97228234/5	1,4-Dichlorobenzene	15	U	16	U		
97228234/5	4-Chloroaniline	15	UJ	16	UJ		
97228234/5	2,2'-Oxybis[1-chloropropane]	15	U	16	U		
97228234/5	Phenol	34	U	31	U		
97228234/5	Pyridine	30	U	32	U		
97228234/5	Bis(2-Chloroethyl)Ether	15	U	16	U		
97228234/5	Bis(2-Chloroethoxy)Methane	15	U	16	U		
97228234/5	Bis(2-Ethylhexyl) Phthalate	30	UJ	266			
97228234/5	Di-N-Octyl Phthalate	186	J	16	U		
97228234/5	Hexachlorobenzene	15	U	16	U		
97228234/5	Anthracene	13	J	15	J	14	14%
97228234/5	1,2,4-Trichlorobenzene	15	U	16	U		
97228234/5	2,4-Dichlorophenol	30	U	32	U		
97228234/5	2,4-Dinitrotoluene	30	U	32	U		
97228234/5	1,2-Diphenylhydrazine	15	U	16	U		
97228234/5	Pyrene	126	J	146		136	15%
97228234/5	Dimethylphthalate	6.8	J	6.4	J	7	6%
97228234/5	Dibenzofuran	2.2	J	5.6	J	4	87%
97228234/5	Dibenzothiophene	15	U	4.9	J		
97228234/5	Phytol	454	NJ	nd			
97228234/5	Ethanethioic acid, S-methyl ester	91	NJ	nd			
97228234/5	3-Penten-2-one, 4-methyl-	nd		1400	NJ		
97228234/5	Benzo(ghi)perylene	21	J	20	J	21	5%
97228234/5	Benzo[e]pyrene	18	J	34		26	62%
97228234/5	Indeno(1,2,3-cd)pyrene	19	J	20	J	20	5%
97228234/5	Perylene	7.2	J	13	J	10	57%
97228234/5	Benzo(b)fluoranthene	58	J	81		70	33%
97228234/5	Fluoranthene	93	J	153	J	123	49%
97228234/5	Benzo(k)fluoranthene	19	J	31		25	48%
97228234/5	Acenaphthylene	4.6	J	8.1	J	6	55%
97228234/5	Chrysene	91	J	77		84	17%
97228234/5	1,6,7-Trimethylnaphthalene	15	U	16	U		
97228234/5	2-Methylphenanthrene	30		14	J	22	73%
97228234/5	3-Penten-2-one, (E)-	nd		549	NJ		
97228234/5	Cholesta-5,22-dien-3-ol, (3.beta.)-	584	NJ	874	NJ	729	40%
97228234/5	3B-Coprostanol	260	J	204	J	232	24%
97228234/5	Ergost-5-en-3-ol, (3.beta.)-	nd		604	NJ		
97228234/5	Ergosta-5,22-dien-3-ol, (3.beta.,22E)	nd		928	NJ		
97228234/5	Retene	15	UJ	30			

RPD=Relative percent difference

U=Undetected at detection limit shown

J=Estimated concentration

UJ=Undetected at the estimated limit shown

NJ=There is evidence the analyte is present. The associated value is an estimate.

Table B-3 - p.18. Data Quality of Semivolatile Organics Analysis.

FIELD SPLITS							
(ug/kg, dry)							
Sample No.	Analysis	No. -34		No. -35		Mean	RPD
97228234/5	Benzo(a)pyrene	21	J	38		30	58%
97228234/5	Isophytol	nd		1100	NJ		
97228234/5	2,4-Dinitrophenol	298	U	320	UJ		
97228234/5	4,6-Dinitro-2-Methylphenol	75	U	80	UJ		
97228234/5	Dibenzo(a,h)anthracene	30	U	3.8	J		
97228234/5	1,3-Dichlorobenzene	15	UJ	16	UJ		
97228234/5	Tetradecanoic acid	424	NJ	409	NJ	417	4%
97228234/5	Benzo(a)anthracene	36	J	39		38	8%
97228234/5	Caffeine	15	U	16	U		
97228234/5	2,6-Dimethylnaphthalene	7.1	J	19		13	91%
97228234/5	4-Chloro-3-Methylphenol	30	U	16	U		
97228234/5	2,6-Dinitrotoluene	75	U	80	U		
97228234/5	N-Nitroso-Di-N-Propylamine	15	U	16	U		
97228234/5	Aniline	15	UJ	16	UJ		
97228234/5	3-Penten-2-one	92	NJ	nd			
97228234/5	N-Nitrosodimethylamine	15	U	16	U		
97228234/5	Benzoic Acid	141	J	590	J	366	123%
97228234/5	Hexachloroethane	15	UJ	16	UJ		
97228234/5	4-Chlorophenyl-Phenylether	15	U	16	U		
97228234/5	Hexachlorocyclopentadiene		REJ		REJ		
97228234/5	Isophorone	15	U	16	U		
97228234/5	1-Methylphenanthrene	22		8.3	J	15	90%
97228234/5	Acenaphthene	1.7	J	4.4	J	3	89%
97228234/5	Diethylphthalate	75	U	16	U		
97228234/5	1,2-Benzenedicarboxylic acid, bis(2-	560	NJ	nd			
97228234/5	Di-N-Butylphthalate	15	U	23	U		
97228234/5	Phenanthrene	44	J	76	J	60	53%
97228234/5	Butylbenzylphthalate	15	UJ	10	J		
97228234/5	N-Nitrosodiphenylamine	15	U	16	U		
97228234/5	Fluorene	6.7	J	7.6	J	7	13%
97228234/5	Carbazole	11	J	10	J	11	10%
97228234/5	Octadecanedioic acid	nd		240	NJ		
97228234/5	Hexachlorobutadiene	15	UJ	16	UJ		
97228234/5	Pentachlorophenol	75	U	80	U		
97228234/5	2,4,6-Trichlorophenol	30	U	16	U		
97228234/5	2-Nitroaniline	75	UJ	32	UJ		
97228234/5	2-Nitrophenol	75	U	80	U		
97228234/5	1-Methylnaphthalene	2.2	J	7.4	J	5	108%
97228234/5	Naphthalene	3.9	J	15	J	9	117%
97228234/5	2-Methylnaphthalene	4.9	J	10	J	7	68%
97228234/5	2-Chloronaphthalene	15	U	16	U		
97228234/5	3,3'-Dichlorobenzidine	30	UJ	64	U		
97228234/5	1,1'-Biphenyl	15	U	16	U		
97228234/5	Benzidine	149	U	160	UJ		
97228234/5	2-Methylphenol	15	U	16	U		
97228234/5	1,2-Dichlorobenzene	15	U	16	U		
97228234/5	2-Chlorophenol	15	U	16	U		
97228234/5	2,4,5-Trichlorophenol	15	U	16	U		
97228234/5	Nitrobenzene	15	U	16	U		
97228234/5	3-Nitroaniline	75	UJ	32	UJ		

RPD=Relative percent difference

U=Undetected at detection limit shown

J=Estimated concentration

UJ=Undetected at the estimated limit shown

NJ=There is evidence the analyte is present. The associated value is an estimate.

REJ=Data are unusable for all purposes

nd=Not detected, quantitation limit not established

Table B-4. Data Quality of Butyltin Analysis.

LAB REPLICATES

(ug/kg, dry)

Sample No.	Analysis	Result	LDP1	Mean	RPD
97228241	Monobutyltin Chloride	24 UJ	68 UJ		
97228241	Tributyltin Chloride	3.4 J	55 J	29	177%
97228241	Tetrabutyltin Chloride	3.9 UJ	3.8 UJ		
97228241	Dibutyltin Chloride	4 UJ	71 J		
97228249	Monobutyltin Chloride	63 UJ	62 J		
97228249	Tributyltin Chloride	68 J	100 J	84	38%
97228249	Tetrabutyltin Chloride	3.3 UJ	3.3 UJ		
97228249	Dibutyltin Chloride	30 J	35 J	33	15%

MATRIX SPIKES

(% recovery)

Sample No.	Analysis	LMX1	LMX2	Mean	RPD
97228233	Monobutyltin Chloride	8	27	18	109%
97228233	Tributyltin Chloride	33	85	59	88%
97228233	Tetrabutyltin Chloride	31	75	53	83%
97228233	Dibutyltin Chloride	81	173	127	72%

FIELD SPLITS

(ug/kg, dry)

Sample No.	Analysis	No. -34	No. -35	Mean	RPD
97228234/5	Monobutyltin Chloride	176 J	42 UJ		
97228234/5	Tributyltin Chloride	198 J	39 J	119	134%
97228234/5	Tetrabutyltin Chloride	1.5 J	0.58 J	1	88%
97228234/5	Dibutyltin Chloride	81 J	21 J	51	118%

STANDARD REFERENCE MATERIAL (PACS-2)

(ug/kg, dry)

Sample No.	Analysis	No. -02	No. -03	Mean	RPD	Certified Values
PAC72402/3	Monobutyltin Chloride	1000 UJ	1560 J			450+/-50
PAC72402/3	Tributyltin Chloride	808 J	2180 J	1494	92%	980+/-130
PAC72402/3	Tetrabutyltin Chloride	173 UJ	143 UJ			nc
PAC72402/3	Dibutyltin Chloride	640 J	1410 J	1025	75%	1090+/-150

LDP1=Lab duplicate

UJ=Undetected at the estimated limit shown

J=Estimated concentration

LMX=Laboratory matrix spike

RPD=Relative percent difference

=Outside of certified value range

Appendix C

Summary of Analytical Results

- 1. Metals**
- 2. Semivolatile Organics**
- 3. Butyltin**

Table C-1. Metals Concentrations in San Juans Harbor Sediments (mg/kg, dw).

Harbor	Station	Chromium	Copper	Lead	Zinc
Mud Bay	MB1	25.8	17.3	4.9	53.0
Mud Bay	MB2	29.2	19.1	6.3	62.4
Fisherman Bay	FI1	11.1	7.0	2.0 U	24.1
Fisherman Bay	FI2	8.7	4.3	2.0 U	19.0
Fisherman Bay	FI3	20.4	23.1	4.0	38.2
Fisherman Bay	FI4	11.6	7.2	2.1	24.3
Fisherman Bay	FI5	12.9	10.0	3.0	30.3
Fisherman Bay	FI6	9.8	5.9	2.0 U	20.0
Roche Harbor	RO1	17.6	70.0	40.9	59.9
Roche Harbor	RO2	18.2	14.7	7.8	51.2
Roche Harbor	RO3	20.2	20.6	12.0	55.3
Roche Harbor	RO4	17.4	11.8	5.4	45.3
West Sound	WS1	19.4	26.0	3.8	43.4
West Sound	WS2	18.5	136.0	76.4	272.0
West Sound	WS3	24.9	24.3 J	9.1	59.7
West Sound	WS4	10.1	8.5 J	3.8	25.2
West Sound	WS5	14.1	21.6 J	9.6	44.6
West Sound	WS6	11.5	64.4 J	5.2	44.5
Friday Harbor	FR1	17.4	82.9 J	43.0	75.4
Friday Harbor	FR2	23.5	30.6 J	7.7	91.5
Friday Harbor	FR3	24.4	72.3 J	25.2	77.4
Friday Harbor	FR4	22.0	22.2 J	7.4	63.9
Friday Harbor	FR5	17.5	14.6 J	4.9	46.7
Friday Harbor	FR6	19.4	13.2 J	5.8	48.7
Friday Harbor	FR7	26.9	78.2	32.2	114.0
Friday Harbor	FR8	29.3	38.3	14.0	127.0

J=Estimated concentration

U=Undetected at detection limit shown

Table C-2. Semivolatile Organic Compounds in San Juans Harbor Sediments, including Tentatively Identified Coumpounds (ug/kg, dw).

Harbor	Sample No.	Station	Pyridine	N-Nitrosodimethylamine	Aniline	Phenol	Bis(2-Chloroethyl)Ether	2-Chlorophenol	1,3-Dichlorobenzene	1,4-Dichlorobenzene	1,2-Dichlorobenzene
Mud Bay	97228230	MB1	50 U	25 U	25 UJ	53 U	25 U	25 U	25 UJ	25 U	25 U
Mud Bay	97228231	MB2	41 U	20 U	20 UJ	33 U	20 U	20 U	20 UJ	20 U	20 U
Fisherman Bay	97228232	F11	27 U	14 U	14 UJ	31 U	14 U	14 U	14 UJ	14 U	14 U
Fisherman Bay	97228233	F12	26 U	13 U	13 UJ	24 U	13 U	13 U	13 UJ	13 U	13 U
Fisherman Bay	97228234/5	F13	30 U	15 U	15 UJ	31 U	15 U	15 U	15 UJ	15 U	15 U
Fisherman Bay	97228236	F14	27 U	13 U	13 UJ	36 U	13 U	13 U	13 UJ	13 U	13 U
Fisherman Bay	97228237	F15	29 U	15 U	15 UJ	15 U	15 U	15 U	15 UJ	15 U	15 U
Fisherman Bay	97228256	F16	24 U	12 U	12 UJ	15 U	12 U	12 U	12 UJ	12 U	12 U
Roche Harbor	97228238	RO1	34 U	17 U	17 UJ	26 U	17 U	17 U	17 UJ	17 U	17 U
Roche Harbor	97228239	RO2	33 U	17 U	17 UJ	17 U	17 U	17 U	17 UJ	17 U	17 U
Roche Harbor	97228240	RO3	34 U	17 U	17 UJ	31 U	17 U	17 U	17 UJ	1.1 J	17 U
Roche Harbor	97228241	RO4	30 U	15 U	15 UJ	15 U	15 U	15 U	15 UJ	15 U	15 U
West Sound	97228244	WS1	34 U	17 U	17 UJ	18 U	17 U	17 U	17 UJ	17 U	17 U
West Sound	97228245	WS2	214 U	214 U	214 U	85 U	214 U	214 U	214 U	214 U	214 U
West Sound	97228246	WS3	39 U	20 U	20 UJ	21 U	20 U	20 U	20 UJ	20 U	20 U
West Sound	97228247	WS4	27 U	14 U	14 UJ	17 U	14 U	14 U	14 UJ	14 U	14 U
West Sound	97228248	WS5	148 U	148 U	148 U	59 U	148 U	148 U	148 U	148 U	148 U
West Sound	97228249	WS6	161 U	161 U	161 U	71 LDU	161 U	161 U	161 U	161 U	161 U
Friday Harbor	97228250	FR1	178 U	178 U	178 U	71 U	178 U	178 U	178 U	178 U	178 U
Friday Harbor	97228251	FR2	39 U	19 U	19 UJ	33 U	19 U	19 U	19 UJ	19 U	19 U
Friday Harbor	97228252	FR3	40 U	20 U	20 UJ	20 U	20 U	20 U	20 UJ	20 U	20 U
Friday Harbor	97228253	FR4	167 U	167 U	167 UJ	33 UJ	167 U	167 U	167 U	167 U	167 U
Friday Harbor	97228254	FR5	31 U	15 U	15 UJ	15 U	15 U	15 U	15 UJ	15 U	15 U
Friday Harbor	97228255	FR6	153 U	153 U	153 UJ	61 U	153 U	153 U	153 U	153 U	153 U
Friday Harbor	97228242	FR7	211 U	211 U	211 U	38 UJ	211 U	211 U	211 U	211 U	211 U
Friday Harbor	97228243	FR8	238 U	238 U	238 U	95 U	238 U	238 U	238 U	238 U	238 U

U=Undetected at detection limit shown
 J=Estimated concentration
 UJ=Undetected at the estimated limit shown
 RE-J=Data are unusable for all purposes
 LDU=Lab duplicate undetected
 FSU=Field split undetected

Table C-2. Semivolatile Organic Compounds in San Juans Harbor Sediments, including Tentatively Identified Compounds (ug/kg, dw).

Harbor	Sample No.	Station	Benzyl Alcohol	2-Methylphenol	2,2'-Oxybis[1-chloropropane]	N-Nitroso-Di-N-Propylamine	4-Methylphenol	Hexachloroethane	Nitrobenzene	Isophorone	2-Nitrophenol	2,4-Dimethylphenol
Mud Bay	97228230	MB1	25 U	25 U	25 U	25 U	81	25 UJ	25 U	25 U	126 U	25 U
Mud Bay	97228231	MB2	20 U	20 U	20 U	20 U	11 J	20 UJ	20 U	5.2 J	102 U	20 U
Fisherman Bay	97228232	F11	14 U	14 U	14 U	14 U	286	14 UJ	14 U	2.8 J	69 U	14 U
Fisherman Bay	97228233	F12	13 U	13 U	13 U	13 U	208	13 UJ	13 U	13 U	65 U	13 U
Fisherman Bay	97228234/5	F13	7.2 JFSU	15 U	15 U	15 U	80 J	15 UJ	15 U	15 U	75 U	15 U
Fisherman Bay	97228236	F14	13 U	13 U	13 U	13 U	154	13 UJ	13 U	13 U	67 U	13 U
Fisherman Bay	97228237	F15	5.2 J	15 U	15 U	15 U	6.7 J	15 UJ	15 U	15 U	73 U	15 U
Fisherman Bay	97228256	F16	12 U	12 U	12 U	12 U	4.6 J	12 UJ	12 U	12 U	61 U	12 U
Roche Harbor	97228238	RO1	17 U	17 U	17 U	17 U	20	17 UJ	17 U	17 U	86 U	17 U
Roche Harbor	97228239	RO2	17 U	17 U	17 U	17 U	5 J	17 UJ	17 U	17 U	84 U	17 U
Roche Harbor	97228240	RO3	7.8 J	17 U	17 U	17 U	21	17 UJ	17 U	7.9 J	86 U	17 U
Roche Harbor	97228241	RO4	15 U	15 U	15 U	15 U	5 J	15 UJ	15 U	15 U	76 U	15 U
West Sound	97228244	WS1	7.9 J	17 U	17 U	17 U	13 J	17 UJ	17 U	17 U	86 U	17 U
West Sound	97228245	WS2	85 U	85 U	214 U	43 U	23 J	214 U	85 U	43 U	85 U	43 U
West Sound	97228246	WS3	4.9 J	20 U	20 U	20 U	31	20 UJ	20 U	20 U	97 U	20 U
West Sound	97228247	WS4	5.4 J	14 U	14 U	14 U	17	14 UJ	14 U	14 U	68 U	14 U
West Sound	97228248	WS5	59 U	59 U	148 U	30 U	22 J	148 U	59 U	30 U	59 U	30 U
West Sound	97228249	WS6	65 U	65 U	161 U	32 U	28 J	161 U	65 U	32 U	65 U	32 U
Friday Harbor	97228250	FR1	71 U	5.8 J	178 U	36 U	27 J	178 U	71 U	36 U	71 U	36 U
Friday Harbor	97228251	FR2	19 U	19 U	19 U	19 U	11 J	19 UJ	19 U	11 J	97 U	19 U
Friday Harbor	97228252	FR3	8 J	20 U	20 U	20 U	12 J	20 UJ	20 U	4.8 J	100 U	20 U
Friday Harbor	97228253	FR4	67 U	67 U	167 U	33 U	33 U	167 UJ	67 U	33 U	67 U	33 U
Friday Harbor	97228254	FR5	6.2 J	15 U	15 U	15 U	3.2 J	15 UJ	15 U	15 U	77 U	15 U
Friday Harbor	97228255	FR6	61 U	61 U	153 U	31 U	31 U	153 UJ	61 U	31 U	61 U	31 U
Friday Harbor	97228242	FR7	84 U	84 U	211 U	42 U	39 J	211 U	84 U	42 U	84 U	42 U
Friday Harbor	97228243	FR8	95 U	95 U	238 U	48 U	48 U	238 U	95 U	48 U	95 U	48 U

U=Undetected at detection limit shown
 J=Estimated concentration
 UJ=Undetected at the estimated limit shown
 REJ=Data are unusable for all purposes
 LDU=Lab duplicate undetected
 FSU=Field split undetected

Table C-2. Semivolatile Organic Compounds in San Juans Harbor Sediments, including Tentatively Identified Compounds (ug/kg, dw).

Harbor	Sample No.	Station	Bis(2-Chloroethoxy)Methane	Benzoic Acid	2,4-Dichlorophenol	1,2,4-Trichlorobenzene	Naphthalene	4-Chloroaniline	Hexachlorobutadiene	4-Chloro-3-Methylphenol	2-Methylnaphthalene
Mud Bay	97228230	MB1	25 U	213 J	50 U	25 U	6.1 J	25 UJ	25 UJ	50 U	8.8 J
Mud Bay	97228231	MB2	20 U	337 J	41 U	20 U	10 J	20 UJ	20 UJ	20 U	15 J
Fisherman Bay	97228232	F11	14 U	138 J	27 U	14 U	15	14 UJ	14 UJ	27 U	11 J
Fisherman Bay	97228233	F12	13 U	132 J	26 U	13 U	6.9 J	13 UJ	13 UJ	26 U	13 J
Fisherman Bay	97228234/5	F13	15 U	366 J	30 U	15 U	9 J	15 UJ	15 UJ	16 U	7 J
Fisherman Bay	97228236	F14	13 U	150 J	27 U	13 U	5 J	13 UJ	13 UJ	27 U	4.4 J
Fisherman Bay	97228237	F15	15 U	292 J	29 U	15 U	11 J	15 UJ	15 UJ	15 U	16
Fisherman Bay	97228256	F16	12 U	172 J	24 U	12 U	2.3 J	12 UJ	12 UJ	12 U	2.8 J
Roche Harbor	97228238	RO1	17 U	116 J	34 U	17 U	19	17 UJ	17 UJ	17 U	28
Roche Harbor	97228239	RO2	17 U	130 J	33 U	17 U	3.5 J	17 UJ	17 UJ	17 U	7 J
Roche Harbor	97228240	RO3	17 U	374 J	34 U	17 U	70	17 UJ	17 UJ	17 U	52
Roche Harbor	97228241	RO4	15 U	248 J	30 U	15 U	7 J	15 UJ	15 UJ	15 U	13 J
West Sound	97228244	WS1	17 U	279 J	34 U	17 U	6.2 J	17 UJ	17 UJ	17 U	7.5 J
West Sound	97228245	WS2	43 U	306	85 U	85 U	25 J	43 U	214 U	43 U	29 J
West Sound	97228246	WS3	20 U	230 J	39 U	20 U	10 J	20 UJ	20 UJ	20 U	14 J
West Sound	97228247	WS4	14 U	212 J	27 U	14 U	4.2 J	14 UJ	14 UJ	14 U	4.7 J
West Sound	97228248	WS5	30 U	201	59 U	59 U	36 J	30 U	148 U	30 U	37
West Sound	97228249	WS6	32 U	220	65 U	65 U	41 JLDU	32 U	161 U	32 U	22 J
Friday Harbor	97228250	FR1	36 U	247	71 U	71 U	40 J	36 U	178 U	36 U	31 J
Friday Harbor	97228251	FR2	19 U	194 J	39 U	19 U	14 J	19 UJ	19 UJ	19 U	19 J
Friday Harbor	97228252	FR3	20 U	178 J	40 U	20 U	8.9 J	20 UJ	20 UJ	20 U	14 J
Friday Harbor	97228253	FR4	33 U	193	67 U	67 U	21 J	33 UJ	167 U	33 U	34
Friday Harbor	97228254	FR5	15 U	223 J	31 U	15 U	7.8 J	15 UJ	15 UJ	15 U	13 J
Friday Harbor	97228255	FR6	31 U	162	61 U	61 U	13 J	31 UJ	153 U	31 U	24 J
Friday Harbor	97228242	FR7	42 U	211 U	84 U	84 U	69 J	42 U	211 U	42 U	68
Friday Harbor	97228243	FR8	48 U	238 U	95 U	95 U	30 J	48 U	238 U	48 U	42 J

U=Undetected at detection limit shown
 J=Estimated concentration
 UJ=Undetected at the estimated limit shown
 REJ=Data are unusable for all purposes
 LDU=Lab duplicate undetected
 FSU=Field split undetected

Table C-2. Semivolatile Organic Compounds in San Juans Harbor Sediments, including Tentatively Identified Compounds (ug/kg, dw).

Harbor	Sample No.	Station	1-Methylnaphthalene	Hexachlorocyclopentadiene	2,4,6-Trichlorophenol	2,4,5-Trichlorophenol	1,1'-Biphenyl	2-Chloronaphthalene	2,6-Dimethylnaphthalene	2-Nitroaniline	Dimethylphthalate
Mud Bay	97228230	MB1	7.1 J	REJ	50 U	25 U	25 U	25 U	62	126 UJ	126 U
Mud Bay	97228231	MB2	11 J	REJ	20 U	20 U	20 U	20 U	63	41 UJ	20 U
Fisherman Bay	97228232	F11	7 J	REJ	27 U	14 U	14 U	14 U	28	69 UJ	69 U
Fisherman Bay	97228233	F12	19	REJ	26 U	13 U	13 U	13 U	29	65 UJ	65 U
Fisherman Bay	97228234/5	F13	4.8 J	REJ	16 U	15 U	15 U	15 U	13 J	32 UJ	6.6 J
Fisherman Bay	97228236	F14	3.4 J	REJ	27 U	13 U	13 U	13 U	28	67 UJ	67 U
Fisherman Bay	97228237	F15	7.5 J	REJ	15 U	15 U	15 U	15 U	41	29 UJ	11 J
Fisherman Bay	97228256	F16	1.4 J	REJ	12 U	12 U	12 U	12 U	8.5 J	24 UJ	12 U
Roche Harbor	97228238	RO1	17 J	REJ	17 U	17 U	17 U	17 U	55	34 UJ	17 U
Roche Harbor	97228239	RO2	5.2 J	REJ	17 U	17 U	17 U	17 U	26	33 UJ	17 U
Roche Harbor	97228240	RO3	38	REJ	17 U	17 U	16 J	17 U	73	34 UJ	17 U
Roche Harbor	97228241	RO4	10 J	REJ	15 U	15 U	15 U	15 U	29	30 UJ	15 U
West Sound	97228244	WS1	4.8 J	REJ	17 U	17 U	17 U	17 U	46	34 UJ	4.8 J
West Sound	97228245	WS2	15 J	REJ	85 U	43 U	18 J	43 U	196	85 U	20 J
West Sound	97228246	WS3	9.6 J	REJ	20 U	20 U	20 U	20 U	55	39 UJ	20 U
West Sound	97228247	WS4	2.4 J	REJ	14 U	14 U	14 U	14 U	17	27 UJ	14 U
West Sound	97228248	WS5	16 J	REJ	59 U	30 U	19 J	30 U	97	59 U	31
West Sound	97228249	WS6	13 J	REJ	65 U	32 U	18 J	32 U	124	65 U	32 U
Friday Harbor	97228250	FR1	18 J	REJ	71 U	36 U	27 J	36 U	144	71 U	87
Friday Harbor	97228251	FR2	13 J	REJ	19 U	19 U	10 J	19 U	72	39 UJ	21
Friday Harbor	97228252	FR3	11 J	REJ	20 U	20 U	20 U	20 U	75	40 UJ	23
Friday Harbor	97228253	FR4	21 J	REJ	67 U	33 U	17 UJ	33 U	67 UJ	78	18 J
Friday Harbor	97228254	FR5	9.8 J	REJ	15 U	15 U	15 U	15 U	24	31 UJ	15 U
Friday Harbor	97228255	FR6	17 J	REJ	61 U	31 U	13 UJ	31 U	55	61 UJ	31 U
Friday Harbor	97228242	FR7	47	REJ	84 U	42 U	27 J	42 U	182	84 U	42 U
Friday Harbor	97228243	FR8	32 J	REJ	95 U	48 U	24 J	48 U	840	95 U	46 J

U=Undetected at detection limit shown
 J=Estimated concentration
 UJ=Undetected at the estimated limit shown
 REJ=Data are unusable for all purposes
 LDU=Lab duplicate undetected
 FSU=Field split undetected

Table C-2. Semivolatile Organic Compounds in San Juans Harbor Sediments, including Tentatively Identified Compounds (ug/kg, dw).

Harbor	Sample No.	Station	2,6-Dinitrotoluene	Acenaphthylene	3-Nitroaniline	Acenaphthene	2,4-Dinitrophenol	4-Nitrophenol	1,6,7-Trimethylnaphthalene	Dibenzofuran	2,4-Dinitrotoluene	Diethylphthalate
Mud Bay	97228230	MB1	126 U	25 U	126 UJ	25 U	504 U	126 U	25 U	4 J	50 U	126 U
Mud Bay	97228231	MB2	102 U	3.3 J	41 UJ	2.2 J	408 UJ	102 U	8.2 J	5.2 J	41 U	20 U
Fisherman Bay	97228232	F11	69 U	17	69 UJ	15	274 U	69 U	14 U	18	27 U	69 U
Fisherman Bay	97228233	F12	65 U	12 J	65 UJ	12 J	259 U	65 U	13 U	4.8 J	26 U	65 U
Fisherman Bay	97228234/5	F13	75 U	6.4 J	32 UJ	3.0 J	298 U	75 U	15 U	3.9 J	30 U	16 U
Fisherman Bay	97228236	F14	67 U	6.2 J	67 UJ	3.1 J	268 U	67 U	13 U	3.1 J	27 U	67 U
Fisherman Bay	97228237	F15	73 U	14 J	29 UJ	19	292 UJ	73 U	15 U	15	29 U	15 U
Fisherman Bay	97228256	F16	61 U	4.2 J	24 UJ	1.7 J	244 UJ	61 U	12 U	2.1 J	24 U	12 U
Roche Harbor	97228238	RO1	86 U	8.5 J	34 UJ	4.8 J	343 UJ	86 U	20	10 J	34 U	17 U
Roche Harbor	97228239	RO2	84 U	2.6 J	33 UJ	2.1 J	334 UJ	84 U	5.2 J	3.4 J	33 U	17 U
Roche Harbor	97228240	RO3	86 U	16 J	34 UJ	18	344 UJ	86 U	17	21	34 U	17 U
Roche Harbor	97228241	RO4	76 U	2.1 J	30 UJ	2 J	304 UJ	76 U	9 J	5 J	30 U	15 U
West Sound	97228244	WS1	86 U	23	34 UJ	10 J	342 UJ	86 U	17 U	14 J	34 U	17 U
West Sound	97228245	WS2	214 U	71	85 U	22 UJ	854 UJ	214 UJ	12 J	29 UJ	85 U	19 UJ
West Sound	97228246	WS3	97 U	13 J	39 UJ	8.6 J	390 UJ	97 U	20 U	12 J	39 U	20 U
West Sound	97228247	WS4	68 U	4.7 J	27 UJ	5 J	272 UJ	68 U	14 U	8.2 J	27 U	14 U
West Sound	97228248	WS5	148 U	30	59 U	50	592 UJ	148 UJ	30 U	42	59 U	30 U
West Sound	97228249	WS6	161 U	40	65 U	32 J	646 UJ	161 UJ	32 U	48 J	65 U	6.4 JLDU
Friday Harbor	97228250	FR1	178 U	59	71 U	33 J	712 UJ	178 UJ	36 U	24 UJ	71 U	36 U
Friday Harbor	97228251	FR2	97 U	15 J	39 UJ	7 J	388 UJ	97 U	19 U	12 J	39 U	19 U
Friday Harbor	97228252	FR3	100 U	24	40 UJ	9.5 J	399 UJ	100 U	4.5 J	10 J	40 U	20 U
Friday Harbor	97228253	FR4	167 U	42	67 UJ	18 J	667 UJ	167 UJ	33 UJ	67 U	33 U	33 U
Friday Harbor	97228254	FR5	77 U	6.6 J	31 UJ	2.9 J	308 UJ	77 U	4.2 J	6.3 J	31 U	15 U
Friday Harbor	97228255	FR6	153 U	9.2 J	61 UJ	9.8 J	611 UJ	153 UJ	31 U	13 J	61 U	17 UJ
Friday Harbor	97228242	FR7	211 U	121	84 U	159	843 UJ	211 UJ	42 U	100	84 U	42 U
Friday Harbor	97228243	FR8	238 U	83	95 U	29 UJ	953 UJ	238 UJ	24 J	40 J	95 U	17 UJ

U=Undetected at detection limit shown
 J=Estimated concentration
 UJ=Undetected at the estimated limit shown
 REJ=Data are unusable for all purposes
 LDU=Lab duplicate undetected
 FSU=Field split undetected

Table C-2. Semivolatile Organic Compounds in San Juans Harbor Sediments, including Tentatively Identified Compounds (ug/kg, dw).

Harbor	Sample No.	Station	Fluorene	4-Chlorophenyl-Phenylether	4-Nitroaniline	4,6-Dinitro-2-Methylphenol	N-Nitrosodiphenylamine	1,2-Diphenylhydrazine	4-Bromophenyl-Phenylether	Hexachlorobenzene	Pentachlorophenol
Mud Bay	97228230	MB1	5 J	25 U	50 U	126 U	25 U	25 U	25 U	25 U	126 U
Mud Bay	97228231	MB2	7.2 J	20 U	102 U	102 U	20 U	20 U	20 U	20 U	102 U
Fisherman Bay	97228232	F11	25	14 U	27 U	69 U	14 U	14 U	14 U	14 U	69 U
Fisherman Bay	97228233	F12	37	13 U	26 U	65 U	13 U	13 U	13 U	13 U	65 U
Fisherman Bay	97228234/5	F13	7.2 J	15 U	30 U	75 U	15 U	15 U	15 U	15 U	75 U
Fisherman Bay	97228236	F14	5.9 J	13 U	27 U	67 U	13 U	13 U	13 U	13 U	67 U
Fisherman Bay	97228237	F15	17	15 U	73 U	73 U	15 U	15 U	15 U	15 U	73 U
Fisherman Bay	97228256	F16	2.5 J	12 U	61 U	61 U	12 U	12 U	12 U	12 U	61 U
Roche Harbor	97228238	RO1	11 J	17 U	86 U	86 U	17 U	17 U	17 U	17 U	86 U
Roche Harbor	97228239	RO2	5.4 J	17 U	84 U	84 U	17 U	17 U	17 U	17 U	84 U
Roche Harbor	97228240	RO3	33	17 U	86 U	86 U	17 U	17 U	17 U	17 U	86 U
Roche Harbor	97228241	RO4	5 J	15 U	76 U	76 U	15 U	15 U	15 U	15 U	76 U
West Sound	97228244	WS1	31	17 U	86 U	86 U	17 U	17 U	17 U	17 U	86 U
West Sound	97228245	WS2	76	43 U	85 U	214 U	43 U	43 U	43 U	43 U	214 U
West Sound	97228246	WS3	18 J	20 U	97 U	97 U	20 U	20 U	20 U	20 U	97 U
West Sound	97228247	WS4	9.3 J	14 U	68 U	68 U	14 U	14 U	14 U	14 U	68 U
West Sound	97228248	WS5	59	30 U	59 U	148 U	30 U	30 U	30 U	30 U	148 U
West Sound	97228249	WS6	90	32 U	65 U	161 U	32 U	32 U	32 U	32 U	161 U
Friday Harbor	97228250	FR1	41	36 U	71 U	178 U	36 U	36 U	36 U	36 U	178 U
Friday Harbor	97228251	FR2	24	19 U	97 U	97 U	19 U	19 U	19 U	19 U	97 U
Friday Harbor	97228252	FR3	23	20 U	100 U	100 U	20 U	20 U	20 U	20 U	110
Friday Harbor	97228253	FR4	34	33 U	67 U	167 U	33 U	33 U	33 U	33 U	167 U
Friday Harbor	97228254	FR5	8.7 J	15 U	77 U	77 U	15 U	15 U	15 U	15 U	81
Friday Harbor	97228255	FR6	20 J	31 U	61 U	153 U	31 U	31 U	31 U	31 U	153 U
Friday Harbor	97228242	FR7	220	42 U	84 U	211 U	42 U	42 U	42 U	42 U	211 U
Friday Harbor	97228243	FR8	70	48 U	95 U	238 U	48 U	48 U	48 U	48 U	214 J

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 RE-J=Data are unusable for all purposes
 LDU=Lab duplicate undetected
 FSU=Field split undetected

Table C-2. Semivolatile Organic Compounds in San Juans Harbor Sediments, including Tentatively Identified Compounds (ug/kg, dw).

Harbor	Sample No.	Station	Dibenzothiophene	Phenanthrene	Anthracene	Caffeine	Carbazole	Phenol, 4-Nonyl-	2-Methylphenanthrene	1-Methylphenanthrene	D-N-Butylphthalate	Fluoranthene
Mud Bay	97228230	MB1	25 U	19 J	4.9 J	25 U	25 U	126 U	25 U	25 U	25 U	22 J
Mud Bay	97228231	MB2	4.2 J	36 J	9.3 J	20 U	2.6 J	102 U	13 J	8.3 J	28 U	38 J
Fisherman Bay	97228232	F11	15	284 J	67	14 U	31	69 U	27	18	14 U	513 J
Fisherman Bay	97228233	F12	11 J	252 J	34	13 U	3.8 J	35 U	26	22	13 U	141 J
Fisherman Bay	97228234/5	F13	10 JFSU	60 J	14 J	15 U	10 J	75 U	22 J	15 J	15 U	123 J
Fisherman Bay	97228236	F14	3 J	35 J	11 J	13 U	13 U	67 U	10 J	13 J	13 U	71 J
Fisherman Bay	97228237	F15	9.7 J	87 J	31	15 U	9.4 J	73 U	11 J	6.3 J	109 U	256 J
Fisherman Bay	97228256	F16	68	18 J	10 J	12 U	4.5 J	61 U	3.6 J	1.8 J	28 U	43 J
Roche Harbor	97228238	RO1	17 U	61 J	23	17 U	8.6 J	86 U	18	26	42 U	131 J
Roche Harbor	97228239	RO2	2.3 J	25 J	9.6 J	17 U	3.2 J	84 U	8.2 J	8.6 J	85 U	42 J
Roche Harbor	97228240	RO3	16 J	214 J	59	17 U	27	86 U	37	31	79 U	252 J
Roche Harbor	97228241	RO4	4.2 J	24 J	5.5 J	15 U	3.0 J	76 U	9 J	8.7 J	15 U	34 J
West Sound	97228244	WS1	23	194 J	95	17 U	34	86 U	46	45	52 U	1780 E
West Sound	97228245	WS2	24 J	353 J	383	43 UJ	132	73 UJ	66	43 U	73 UJ	1260 J
West Sound	97228246	WS3	8 J	85 J	61	20 U	21	97 U	19 J	16 J	87 U	206 J
West Sound	97228247	WS4	6 J	44 J	18	14 U	6.2 J	68 U	6.7 J	5.2 J	47 U	101 J
West Sound	97228248	WS5	20 J	256 J	116	30 U	38	59 U	41	30 U	105 UJ	943 J
West Sound	97228249	WS6	42 J	694 J	266	32 U	91	65 U	92	32 U	145 UJ	1425 J
Friday Harbor	97228250	FR1	21 J	235 J	131	36 U	55	71 U	61	36 U	203 UJ	906 J
Friday Harbor	97228251	FR2	10 J	99 J	421	19 U	42	97 U	26	16 J	58 U	217 J
Friday Harbor	97228252	FR3	15 J	198 J	75	20 U	28	100 U	43	29	105 U	431 J
Friday Harbor	97228253	FR4	12 J	190	108	33 U	33 U	67 U	45	68	205 UJ	792
Friday Harbor	97228254	FR5	4.5 J	46 J	20	15 U	11 J	77 U	13 J	10 J	116	82 J
Friday Harbor	97228255	FR6	5.9 J	88 J	70	31 U	31 U	61 U	25 J	23 J	300 UJ	184 J
Friday Harbor	97228242	FR7	42 U	1440 J	509	42 U	224	84 U	234	322	358 UJ	2070 J
Friday Harbor	97228243	FR8	27 J	457	259	48 U	89	95 U	91	205	124 UJ	1680 J

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 UJ=Undetected at the estimated limit shown
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 FSU=Field split undetected

Table C-2. Semivolatile Organic Compounds in San Juans Harbor Sediments, including Tentatively Identified Compounds (ug/kg, dw).

Harbor	Sample No.	Station	Benzidine	Pyrene	Retene	Butylbenzylphthalate	Benzo(a)anthracene	3,3'-Dichlorobenzidine	Chrysene	Bis(2-Ethylhexyl) Phthalate	Dl-N-Octyl Phthalate
Mud Bay	97228230	MB1	252 U	25 UJ	18 J	25 UJ	13 J	50 UJ	11 J	50 UJ	50 UJ
Mud Bay	97228231	MB2	204 UJ	49	22	20 U	18 J	82 U	21	41 U	20 U
Fisherman Bay	97228232	F11	137 U	422	28	14 U	88	27 U	181	32 U	27 U
Fisherman Bay	97228233	F12	130 U	217 J	11 J	13 UJ	65 J	26 UJ	63 J	64 UJ	26 UJ
Fisherman Bay	97228234/5	F13	149 U	136 J	30 FSU	10 JFSU	38 J	30 UJ	84 J	266 FSU	186 JFSU
Fisherman Bay	97228236	F14	134 U	68 J	12 J	13 UJ	25 J	27 UJ	36 J	27 UJ	27 UJ
Fisherman Bay	97228237	F15	146 UJ	236	7.5 J	15 U	73	58 U	156	54 U	15 U
Fisherman Bay	97228256	F16	122 UJ	47	6.8 J	12 U	29	49 U	59	77 U	56
Roche Harbor	97228238	RO1	172 UJ	167	230	17 U	49	69 U	109	61 U	17 U
Roche Harbor	97228239	RO2	167 UJ	52	62	17 U	23	67 U	61	77 U	17 U
Roche Harbor	97228240	RO3	172 UJ	314	192	17 U	105	69 U	156	129 U	17 U
Roche Harbor	97228241	RO4	152 UJ	39	126	15 U	11 J	61 U	18 J	30 U	15 U
West Sound	97228244	WS1	171 UJ	1370	19	17 U	305	69 U	944	71 U	17 U
West Sound	97228245	WS2	427 U	1560	43 U	43 U	432	171 U	1190	1320	43 U
West Sound	97228246	WS3	195 UJ	278	32	20 U	123	78 U	215	66 U	20 U
West Sound	97228247	WS4	136 UJ	125	12 J	14 U	47	54 U	106	27 U	14 U
West Sound	97228248	WS5	296 U	731	36	30 U	307	118 U	562	119	30 U
West Sound	97228249	WS6	323 U	1008	34 J	32 U	333	129 U	844	90 UJ	32 U
Friday Harbor	97228250	FR1	356 U	827	65	36 U	299	142 U	521	121	36 U
Friday Harbor	97228251	FR2	194 UJ	241	30	19 U	80	78 U	172	67 U	19 U
Friday Harbor	97228252	FR3	200 UJ	570	35	20 U	176	80 U	328	77 U	20 U
Friday Harbor	97228253	FR4	334 U	854	48	33 U	222	133 U	372	47 UJ	33 U
Friday Harbor	97228254	FR5	154 UJ	129	29	15 U	45	62 U	74	64 U	15 U
Friday Harbor	97228255	FR6	306 U	186	38	31 U	120	122 U	152	29 J	31 U
Friday Harbor	97228242	FR7	421 U	2180	99	42 U	959	168 U	1390	436	42 U
Friday Harbor	97228243	FR8	476 U	1370	53	48 U	511	191 U	920	642	48 U

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 REJ=Data are unusable for all purposes
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 FSU=Field split undetected

Table C-2. Semivolatile Organic Compounds in San Juans Harbor Sediments, including Tentatively Identified Compounds (ug/kg, dw).

Harbor	Sample No.	Station	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo[e]pyrene	Benzo(a)pyrene	Perylene	3B-Coprostanol	Indeno(1,2,3-cd)pyrene	Dibenzo(a,h)anthracene	Benzo(ghi)perylene
Mud Bay	97228230	MB1	44 J	5.9 J	8.3 J	8.9 J	22 J	126 UJ	20 J	50 UJ	28 J
Mud Bay	97228231	MB2	26	12 J	13 J	20 J	44	213 J	8.8 J	2 J	14 J
Fisherman Bay	97228232	F11	145	48	54	64	20 J	80	42	19 J	36 J
Fisherman Bay	97228233	F12	67 J	20 J	31 J	59 J	14 J	102 J	35 J	15 J	36 J
Fisherman Bay	97228234/5	F13	70 J	25 J	26 J	30 J	10 J	232 J	20 J	3.8 JFSU	20 J
Fisherman Bay	97228236	F14	44 J	12 J	14 J	21 J	8.6 J	106 J	17 J	12 J	19 J
Fisherman Bay	97228237	F15	99	35	38	41	17	184 J	15 J	3.1 J	14 J
Fisherman Bay	97228256	F16	49	21	20	25	8.5 J	84 J	8.4 J	24 U	9.3 J
Roche Harbor	97228238	RO1	131	51	54	44	28	276 J	23 J	4 J	22 J
Roche Harbor	97228239	RO2	47	16 J	19	18	17	135 J	4.8 J	1.6 J	8.4 J
Roche Harbor	97228240	RO3	160	64	77	111	57	298 J	65 J	12 J	55 J
Roche Harbor	97228241	RO4	22 J	6.1 J	10 J	9 J	22 J	63 U	2.3 J	1.4 JLDU	6.6 J
West Sound	97228244	WS1	849	267	325	178	44	274 J	96	29 J	67 J
West Sound	97228245	WS2	979	367	379	391	99	171 U	240	102 UJ	160 J
West Sound	97228246	WS3	200	67	80	81	48	78 U	37 J	9.8 J	32 J
West Sound	97228247	WS4	112	36	46	34	11 J	116 J	14 J	4.1 J	13 J
West Sound	97228248	WS5	609	184	240	237	63	118 U	142	61 UJ	85 J
West Sound	97228249	WS6	734	256	288	279	78	129 U	167	68 UJ	104 J
Friday Harbor	97228250	FR1	564	189	215	247	94	142 U	190	78 UJ	132 J
Friday Harbor	97228251	FR2	159	54	66	65	59	319 J	35 J	7.3 J	33 J
Friday Harbor	97228252	FR3	317	103	129	136	60	257 J	76 J	15 J	59 J
Friday Harbor	97228253	FR4	353	153	137	190	82	133 U	133 UJ	133 UJ	71
Friday Harbor	97228254	FR5	67	25	27	34	32	88 J	16 J	3.5 J	16 J
Friday Harbor	97228255	FR6	137	47	52	79	55	122 U	61 J	45 J	34 J
Friday Harbor	97228242	FR7	1540	611	618	978	301	168 U	576	172 UJ	419 J
Friday Harbor	97228243	FR8	844	336	366	384	160	837	247	96	181 J

U=Undetected at detection limit shown
 J=Estimated concentration
 UJ=Undetected at the estimated limit shown
 REJ=Data are unusable for all purposes
 LDU=Lab duplicate undetected
 FSU=Field split undetected

Table C-3.

Comparison of Semivolatile Organics in San Juans Marina Sediments to Sediment Management Standards.

Harbor	Sample No. Station	mean TOC %	Phenol (ug/Kg dw)	2-Methylphenol (ug/Kg dw)	4-Methylphenol (ug/Kg dw)	Benzoic Acid (ug/Kg dw)	Benzyl Alcohol (ug/Kg dw)	Pentachlorophenol (ug/Kg dw)
Mud Bay	97228230 MB1	1.4	53 U	25 U	81	213 J	25 U	126 U
Mud Bay	97228231 MB2	1.5	33 U	20 U	11 J	337 J	20 U	102 U
Fisherman Bay	97228232 F11	0.5	31 U	14 U	286	138 J	14 U	69 U
Fisherman Bay	97228233 F12	0.3	24 U	13 U	208	132 J	13 U	65 U
Fisherman Bay	97228234/5 F13	1.2	31 U	15 U	80 J	366 J	7.2 JFSU	75 U
Fisherman Bay	97228236 F14	0.6	36 U	13 U	154	150 J	13 U	67 U
Fisherman Bay	97228237 F15	0.8	15 U	15 U	6.7 J	292 J	5.2 J	73 U
Fisherman Bay	97228256 F16	0.3	15 U	12 U	4.6 J	172 J	12 U	61 U
Roche Harbor	97228238 RO1	1.6	26 U	17 U	20	116 J	17 U	86 U
Roche Harbor	97228239 RO2	0.8	17 U	17 U	5 J	130 J	17 U	84 U
Roche Harbor	97228240 RO3	1.2	31 U	17 U	21	374 J	7.8 J	86 U
Roche Harbor	97228241 RO4	0.7	15 U	15 U	5 J	248 J	15 U	76 U
West Sound	97228244 WS1	1.3	18 U	17 U	13 J	279 J	7.9 J	86 U
West Sound	97228245 WS2	3.2	85 U	85 U	23 J	306	85 U	214 U
West Sound	97228246 WS3	1.8	21 U	20 U	31	230 J	4.9 J	97 U
West Sound	97228247 WS4	0.6	17 U	14 U	17	212 J	5.4 J	68 U
West Sound	97228248 WS5	1.2	59 U	59 U	22 J	201	59 U	148 U
West Sound	97228249 WS6	0.9	71 LDU	65 U	28 J	220	65 U	161 U
Friday Harbor	97228250 FR1	1.7	71 U	5.8 J	27 J	247	71 U	178 U
Friday Harbor	97228251 FR2	1.4	33 U	19 U	11 J	194 J	19 U	97 U
Friday Harbor	97228252 FR3	1.9	20 U	20 U	12 J	178 J	8 J	110
Friday Harbor	97228253 FR4	0.9	33 UJ	67 U	33 U	193	67 U	167 U
Friday Harbor	97228254 FR5	0.6	15 U	15 U	3.2 J	223 J	6.2 J	81
Friday Harbor	97228255 FR6	0.6	61 U	61 U	31 U	162	61 U	153 U
Friday Harbor	97228242 FR7	1.9	38 UJ	84 U	39 J	211 U	84 U	211 U
Friday Harbor	97228243 FR8	2.7	95 U	95 U	48 U	238 U	95 U	214 J

U=Undetected at detection limit shown

J=Estimated concentration

UJ=Undetected at the estimated limit shown

JFSU=Field split - undetected at the estimated limit shown

LDU=Lab duplicate - undetected at detection limit shown

Table C-3.

Comparison of Semivolatile Organics in San Juans Marina Sediments to Sediment Management Standards.

Harbor	Sample No. Station	1,4-Dichlorobenzene (ug/Kg dw)	1,4-Dichlorobenzene (mg/Kg OC)	Dimethylphthalate (mg/Kg OC)	Dibenzofuran (mg/Kg OC)	Diethylphthalate (mg/Kg OC)
Mud Bay	97228230 MB1	25 U			0.3 J	
Mud Bay	97228231 MB2	20 U			0.3 J	
Fisherman Bay	97228232 F11	14 U			4.0	
Fisherman Bay	97228233 F12	13 U			1.5 J	
Fisherman Bay	97228234/5 F13	15 U		0.6 J	0.3 J	
Fisherman Bay	97228236 F14	13 U			0.5 J	
Fisherman Bay	97228237 F15	15 U		1.3 J	1.8	
Fisherman Bay	97228256 F16	12 U			0.7 J	
Roche Harbor	97228238 RO1	2.7 J	0.2 J		0.6 J	
Roche Harbor	97228239 RO2	17 U			0.4 J	
Roche Harbor	97228240 RO3	1.1 J	0.1 J		1.8	
Roche Harbor	97228241 RO4	15 U			0.7 J	
West Sound	97228244 WS1	17 U		0.4 J	1.1 J	
West Sound	97228245 WS2	214 U		0.6 J		
West Sound	97228246 WS3	20 U			0.7 J	
West Sound	97228247 WS4	14 U			1.5 J	
West Sound	97228248 WS5	148 U		2.6	3.5	
West Sound	97228249 WS6	161 U			5.6 J	0.8 JLDU
Friday Harbor	97228250 FR1	178 U		5.1		
Friday Harbor	97228251 FR2	19 U		1.5	0.9 J	
Friday Harbor	97228252 FR3	20 U		1.2	0.5 J	
Friday Harbor	97228253 FR4	167 U		1.9 J		
Friday Harbor	97228254 FR5	15 U			1.0 J	
Friday Harbor	97228255 FR6	153 U			2.0 J	
Friday Harbor	97228242 FR7	211 U			5.3	
Friday Harbor	97228243 FR8	238 U		1.7 J	1.5 J	

U=Undetected at detection limit shown

J=Estimated concentration

JLDU=Lab duplicate - undetected at the estimated limit shown

Table C-3. Comparison of Semivolatile Organics in San Juans Marina Sediments to Sediment Management Standards.

Harbor	Sample No.	Station	Butylbenzylphthalate (mg/Kg OC)	Bis(2-Ethylhexyl) Phthalate (mg/Kg OC)	Naphthalene (mg/Kg OC)	2-Methylnaphthalene (mg/Kg OC)	Acenaphthylene (mg/Kg OC)
Marine Sediment Quality Standard	4.9	47	99	38	66		
Mud Bay	97228230	MB1	0.4 J	0.6 J	0.2 J		
Mud Bay	97228231	MB2	0.7 J	1.0 J	3.8		
Fisherman Bay	97228232	F11	3.3	2.4 J	3.6 J		
Fisherman Bay	97228233	F12	2.1 J	3.9 J	0.5 J		
Fisherman Bay	97228234/5	F13	0.8 J	0.6 J	1.1 J		
Fisherman Bay	97228236	F14	0.9 J	0.8 J	1.7 J		
Fisherman Bay	97228237	F15	1.3 J	1.9	1.4 J		
Fisherman Bay	97228256	F16	0.8 J	0.9 J	0.5 J		
Roche Harbor	97228238	RO1	1.2	1.8	0.3 J		
Roche Harbor	97228239	RO2	0.5 J	0.9 J	1.3 J		
Roche Harbor	97228240	RO3	5.8	4.3	0.3 J		
Roche Harbor	97228241	RO4	1.0 J	1.8 J	0.3 J		
West Sound	97228244	WS1	0.5 J	0.6 J	1.8		
West Sound	97228245	WS2	0.8 J	0.9 J	2.2		
West Sound	97228246	WS3	0.6 J	0.8 J	0.7 J		
West Sound	97228247	WS4	0.8 J	0.9 J	0.9 J		
West Sound	97228248	WS5	3.0 J	3.1	2.5		
West Sound	97228249	WS6	4.8 JLDU	2.5 J	4.7		
Friday Harbor	97228250	FR1	2.4 J	1.8 J	3.5		
Friday Harbor	97228251	FR2	1.0 J	1.4 J	1.1 J		
Friday Harbor	97228252	FR3	0.5 J	0.7 J	1.3		
Friday Harbor	97228253	FR4	2.2 J	3.6	4.5		
Friday Harbor	97228254	FR5	1.2 J	2.1 J	1.0 J		
Friday Harbor	97228255	FR6	2.0 J	3.7 J	1.4 J		
Friday Harbor	97228242	FR7	3.6 J	3.6	6.4		
Friday Harbor	97228243	FR8	1.1 J	1.6 J	3.1		

J=Estimated concentration

JLDU=Lab duplicate - undetected at the estimated limit shown

JFSU=Field split - undetected at the estimated limit shown

Table C-3. Comparison of Semivolatile Organics in San Juans Marina Sediments to Sediment Management Standards.

Harbor	Sample No. Station	Acenaphthene (mg/Kg OC)	Fluorene (mg/Kg OC)	Phenanthrene (mg/Kg OC)	Anthracene (mg/Kg OC)	LPAH (mg/Kg OC)	Fluoranthene (mg/Kg OC)	Pyrene (mg/Kg OC)
Marine Sediment Quality Standard		16	23	100	220	370	160	1000
Mud Bay	97228230 MB1	0.4 J	0.4 J	1.4 J	0.4 J	3	2 J	
Mud Bay	97228231 MB2	0.1 J	0.5 J	2.4 J	0.6 J	5	3 J	3
Fisherman Bay	97228232 F11	3.3	5.6	63.1 J	14.9	94	114 J	94
Fisherman Bay	97228233 F12	3.6 J	11.2	76.4 J	10.3	107	43 J	66 J
Fisherman Bay	97228234/5 F13	0.3 J	0.6 J	5.0 J	1.2 J	8	10 J	11 J
Fisherman Bay	97228236 F14	0.5 J	1.0 J	6.0 J	1.9 J	11	12 J	12 J
Fisherman Bay	97228237 F15	2.3	2.1	10.5 J	3.8	22	31 J	29
Fisherman Bay	97228256 F16	0.6 J	0.8 J	6.0 J	3.3 J	13	14 J	16
Roche Harbor	97228238 RO1	0.3 J	0.7 J	3.8 J	1.4	8	8 J	10
Roche Harbor	97228239 RO2	0.3 J	0.7 J	3.3 J	1.3 J	6	5 J	7
Roche Harbor	97228240 RO3	1.5	2.8	17.8 J	4.9	34	21 J	26
Roche Harbor	97228241 RO4	0.3 J	0.7 J	3.3 J	0.8 J	6	5 J	5
West Sound	97228244 WS1	0.8 J	2.5	15.5 J	7.6	29	142 E	110
West Sound	97228245 WS2		2.4	11.0 J	12.0	28	39 J	49
West Sound	97228246 WS3	0.5 J	1.0 J	4.7 J	3.4	11	11 J	15
West Sound	97228247 WS4	0.9 J	1.7 J	8.0 J	3.3	15	18 J	23
West Sound	97228248 WS5	4.2	4.9	21.3 J	9.7	46	79 J	61
West Sound	97228249 WS6	3.8 J	10.6	81.6 J	31.3	137	168 J	119
Friday Harbor	97228250 FR1	1.9 J	2.4	13.8 J	7.7	32	53 J	49
Friday Harbor	97228251 FR2	0.5 J	1.7	7.1 J	30.1	41	16 J	17
Friday Harbor	97228252 FR3	0.5 J	1.2	10.4 J	3.9	18	23 J	30
Friday Harbor	97228253 FR4	1.9 J	3.6	20.2	11.5	44	84	91
Friday Harbor	97228254 FR5	0.5 J	1.4 J	7.3 J	3.2	15	13 J	20
Friday Harbor	97228255 FR6	1.5 J	3.1 J	13.6 J	10.9	33	29 J	29
Friday Harbor	97228242 FR7	8.4	11.6	75.8 J	26.8	133	109 J	115
Friday Harbor	97228243 FR8		2.6	17.2	9.8	34	63 J	52

J=Estimated concentration

=Exceeds Sediment Quality Standard

Table C-3. Comparison of Semivolatile Organics in San Juans Marina Sediments to Sediment Management Standards.

Harbor	Sample No. Station	Benzo(a)anthracene (mg/Kg OC)	Chrysene (mg/Kg OC)	Benzo(k)fluoranthene (ug/Kg dw)	Benzofluoranthenes (mg/Kg OC)	Benzo(a)pyrene (mg/Kg OC)	Indeno(1,2,3-cd)pyrene (mg/Kg OC)
Marine Sediment Quality Standard		110	110	na	230	99	34
Mud Bay	97228230 MB1	0.9 J	0.8 J	5.9 J	4 J	0.6 J	1.4 J
Mud Bay	97228231 MB2	1.2 J	1.4	12 J	3 J	1.3 J	0.6 J
Fisherman Bay	97228232 F11	19.6	40.2	48	43	14.2	9.3
Fisherman Bay	97228233 F12	19.7 J	19.1 J	20 J	26 J	17.9 J	10.6 J
Fisherman Bay	97228234/5 F13	3.2 J	7.0 J	25 J	8 J	2.5 J	1.7 J
Fisherman Bay	97228236 F14	4.3 J	6.2 J	12 J	10 J	3.6 J	2.9 J
Fisherman Bay	97228237 F15	8.8	18.9	35	16	5.0	1.8 J
Fisherman Bay	97228256 F16	9.7	19.7	21	23	8.3	2.8 J
Roche Harbor	97228238 RO1	3.1	6.8	51	11	2.8	1.4 J
Roche Harbor	97228239 RO2	3.0	8.0	16 J	8 J	2.4	0.6 J
Roche Harbor	97228240 RO3	8.8	13.0	64	19	9.3	5.4 J
Roche Harbor	97228241 RO4	1.5 J	2.5 J	6.1 J	4 J	1.2 J	0.3 J
West Sound	97228244 WS1	24.4	75.5	267	89	14.2	7.7
West Sound	97228245 WS2	13.5	37.2	367	42	12.2	7.5
West Sound	97228246 WS3	6.8	11.9	67	15	4.5	2.1 J
West Sound	97228247 WS4	8.5	19.3	36	27	6.2	2.5 J
West Sound	97228248 WS5	25.6	46.8	184	66	19.8	11.8
West Sound	97228249 WS6	39.2	99.3	256	116	32.8	19.6
Friday Harbor	97228250 FR1	17.6	30.6	189	44	14.5	11.2
Friday Harbor	97228251 FR2	5.7	12.3	54	15	4.6	2.5 J
Friday Harbor	97228252 FR3	9.3	17.3	103	22	7.2	4.0 J
Friday Harbor	97228253 FR4	23.6	39.6	153	54	20.2	
Friday Harbor	97228254 FR5	7.1	11.7	25	15	5.4	2.5 J
Friday Harbor	97228255 FR6	18.6	23.6	47	29	12.2	9.5 J
Friday Harbor	97228242 FR7	50.5	73.2	611	113	51.5	30.3
Friday Harbor	97228243 FR8	19.3	34.7	336	45	14.5	9.3

J=Estimated concentration

Table C-3.

Comparison of Semivolatile Organics in San Juans Marina Sediments to Sediment Management Standards.

Harbor	Sample No. Station	Dibenzo(a,h)anthracene (mg/Kg OC)	Benzo(ghi)perylene (mg/Kg OC)	HPAH (mg/Kg OC)	Di-N-Octyl Phthalate (mg/Kg OC)
Marine Sediment Quality Standard		12	31	960	58
Mud Bay	97228230 MB1		2.0 J	11	3.6 UJ
Mud Bay	97228231 MB2	0.1 J	0.9 J	14	1.3 U
Fisherman Bay	97228232 F11	4.2 J	8.0 J	346	6.0 U
Fisherman Bay	97228233 F12	4.5 J	10.9 J	218	7.9 UJ
Fisherman Bay	97228234/5 F13	0.3 JFSU	1.7 J	46	15.5 JFSU
Fisherman Bay	97228236 F14	2.1 J	3.2 J	56	4.6 UJ
Fisherman Bay	97228237 F15	0.4 J	1.7 J	112	1.8 U
Fisherman Bay	97228256 F16	8.0 U	3.1 J	105	18.7
Roche Harbor	97228238 RO1	0.3 J	1.4 J	46	1.1 U
Roche Harbor	97228239 RO2	0.2 J	1.1 J	36	2.2 U
Roche Harbor	97228240 RO3	1.0 J	4.6 J	108	1.4 U
Roche Harbor	97228241 RO4	0.2 JLDU	0.9 J	21	2.1 U
West Sound	97228244 WS1	2.3 J	5.4 J	471	1.4 U
West Sound	97228245 WS2		5.0 J	206	1.3 U
West Sound	97228246 WS3	0.5 J	1.8 J	69	1.1 U
West Sound	97228247 WS4	0.7 J	2.4 J	108	2.5 U
West Sound	97228248 WS5		7.1 J	317	2.5 U
West Sound	97228249 WS6		12.2 J	606	3.8 U
Friday Harbor	97228250 FR1		7.8 J	228	2.1 U
Friday Harbor	97228251 FR2	0.5 J	2.4 J	76	1.4 U
Friday Harbor	97228252 FR3	0.8 J	3.1 J	116	1.1 U
Friday Harbor	97228253 FR4		7.6	320	3.5 U
Friday Harbor	97228254 FR5	0.6 J	2.5 J	78	2.4 U
Friday Harbor	97228255 FR6	7.0 J	5.3 J	162	4.8 U
Friday Harbor	97228242 FR7		22.1 J	564	2.2 U
Friday Harbor	97228243 FR8	3.6	6.8 J	248	1.8 U

U=Undetected at detection limit shown

J=Estimated concentration

UJ=Undetected at the estimated limit shown

JFSU=Field split - undetected at the estimated limit shown

Table C-4. Butyltin Compounds in San Juan Harbor Sediments

		Monobutyltin Chloride ug/Kg dw	Diobutyltin Chloride ug/Kg dw	Tributyltin Chloride ug/Kg dw	Tetraobutyltin Chloride ug/Kg dw	TBT+ ug/Kg dw
Mud Bay	97228230 MB1	60 UJ	5.9 UJ	2.6 J	5.8 UJ	2.3 J
Mud Bay	97228231 MB2	40 UJ	3.9 J	4.9 UJ	4.9 UJ	4.4 UJ
Fisherman Bay	97228232 FI1	25 UJ	4.4 J	2.2 J	3.2 UJ	2.0 J
Fisherman Bay	97228233 FI2	22 UJ	3 UJ	2.9 UJ	2.9 UJ	2.6 UJ
Fisherman Bay	97228234/5 FI3	176 JFSU	51 J	119 J	1.0 J	105.5 J
Fisherman Bay	97228236 FI4	27 UJ	2.6 J	2.6 J	2.4 UJ	2.3 J
Fisherman Bay	97228237 FI5	67 J	10 J	40 J	2.6 UJ	35.6 J
Fisherman Bay	97228256 FI6	14 UJ	2.1 J	5.7 J	3 UJ	5.1 J
Roche Harbor	97228238 RO1	97 J	67 J	41 J	3.4 UJ	36.5 J
Roche Harbor	97228239 RO2	25 UJ	5 J	29 J	3.2 UJ	25.8 J
Roche Harbor	97228240 RO3	39 UJ	5.9 J	15 J	3.3 UJ	13.4 J
Roche Harbor	97228241 RO4	24 UJ	71 JLDU	29 J	3.8 UJ	26.0 J
West Sound	97228244 WS1	22 UJ	9.3 J	28 J	3.6 UJ	24.9 J
West Sound	97228245 WS2	145 J	74 J	422 E	2.1 J	375.6 E
West Sound	97228246 WS3	54 UJ	24 J	22 J	4.7 UJ	19.6 J
West Sound	97228247 WS4	38 UJ	11 J	24 J	2.9 UJ	21.4 J
West Sound	97228248 WS5	95 J	138 E	5500 E	17 J	4895.0 E
West Sound	97228249 WS6	63 UJ	30 J	68 J	3.3 UJ	60.5 J
Friday Harbor	97228250 FR1	220 J	199 E	152 J	2.9 J	135.3 J
Friday Harbor	97228251 FR2	61 UJ	27 J	32 J	4.5 UJ	28.5 J
Friday Harbor	97228252 FR3	137 J	65 J	84 J	4.9 UJ	74.8 J
Friday Harbor	97228253 FR4	44 UJ	6.6 J	28 J	4.1 UJ	24.9 J
Friday Harbor	97228254 FR5	20 UJ	6.1 J	3.7 J	3.6 UJ	3.3 J
Friday Harbor	97228255 FR6	20 UJ	3.8 UJ	3.6 J	3.7 UJ	3.2 J
Friday Harbor	97228242 FR7	108 J	35 J	164 J	4 J	146.0 J
Friday Harbor	97228243 FR8	67 UJ	35 J	132 J	5.7 UJ	117.5 J

U=Undetected at detection limit shown

J=Estimated concentration

UJ=Undetected at the estimated limit shown

E=Estimate; exceeds calibration range

LDU=Lab duplicate undetected

FSU=Field split undetected