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Final Report

**FALL 2001 WATER COLUMN
CHARACTERIZATION
REPORT**

**RHODE ISLAND REGION LONG-TERM DREDGED
MATERIAL DISPOSAL SITE EVALUATION PROJECT**

FINAL

Fall 2001 Water Column Characterization Report

**Rhode Island Region
Long-Term Dredged Material Disposal Site Evaluation Project**

**Contract Number DACW33-01-D-004
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to

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INTRODUCTION

The Rhode Island Region Long-Term Dredged Material Disposal Site Evaluation Project (RI Disposal Study) includes the collection of environmental baseline data at Rhode Island Sound Sites 16, 18, 69A, and 69B. Site 16 is the only site that had been used previously for disposal of dredge material. Site characterization efforts are designed to fulfill the baseline monitoring requirements defined in the Marine Protection Research and Sanctuaries Act (MPRSA) regulations at Part 228.13. This includes obtaining information on a contiguous area around each site, which will be used to evaluate secondary impacts from disposal, and also to assist in the identification of suitable reference areas for long-term monitoring.

Site characterization goals include documentation of existing physical, chemical, and biological conditions at the sites to (a) provide a basis for comparison of the biological value of the sites (habitat characterizations), (b) assess the suitability of each site for dredged material disposal (bathymetry, sediment type, hydrodynamics), and (c) assess potential short and long-term impacts from dredged material disposal at each site.

The purpose of the Fall 2001 water quality survey was to (1) collect water column data during late summer at Sites 18, 69A, and 69B, (2) determine the presence of and characterize any physical or biological stratification in the water column, such as thermoclines, haloclines, and zones of pronounced biological activity, and (3) obtain the typical values or range of values for the properties measured. This information was also needed for use in future modeling efforts and evaluations of particle settling and transport.

METHODS

An overview of the methods and protocols used in the collection and analysis of water samples during the October 2, 2001 water quality survey are presented in this section. Complete descriptions and details of those methods are presented in the project-specific Quality Assurance Project Plan (QAPP) (Battelle 2001).

Navigation

The Battelle-owned R/V *Aquamonitor* served as the sampling platform. Vessel positioning during water sampling operations was accomplished with the Battelle Ocean Sampling System (BOSS). This system consists of a Northstar dGPS interfaced to the BOSS computer. The Global Positioning System (GPS) receiver has six dedicated channels and is capable of locking onto six different satellites at one time. To correct the GPS calculations, the Northstar dGPS received correction data from one of three USCG dGPS broadcast sites: Montauk Point, NY, Chatham, MA, or Portsmouth Harbor, NH (Figure 1). Vessel position was obtained every five minutes while in transit.

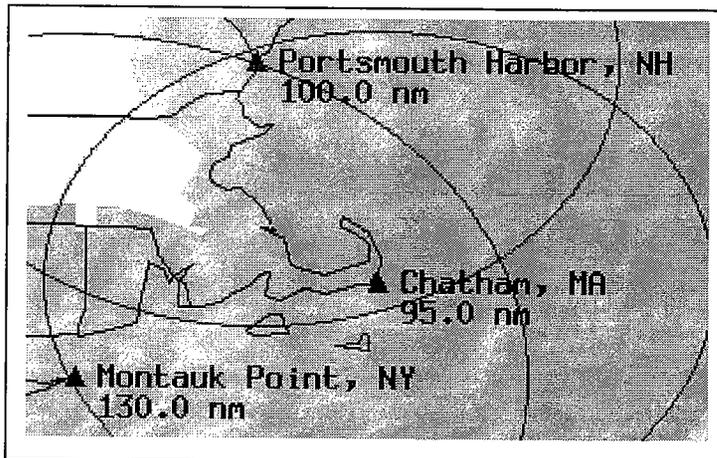


Figure 1. dGPS Master Stations Coverage

Vessel Handling

At each sampling station, the vessel was positioned about 300 meters upwind/upcurrent of the target station position so that the entire profile cast would be completed within a radius of 300m from the station. At each sampling station, the vessel was well within the targeted 300-m radius from station. The vessel heading was selected such that the underwater unit was deployed on the side of the boat facing the sun and relative to the prevailing seas, which minimized cable loading. The vessel maintained this position throughout the duration of the cast.

Hydrographic Profiling

Duplicate continuous hydrographic profiles were taken from near-surface (1-m to 2-m deep) to within 5 m of the seafloor at three sites (69A, 69B, and 18) using the BOSS integrated sampling/hydrographic profiling/navigation system. These *in situ* profiles provided real-time information on water properties and water column structure at the targeted sites. The real-time data derived from these profiles were used to determine sampling depths, and to direct water-sampling operations at each site. Hydrographic measurements were collected for conductivity, temperature, depth, dissolved oxygen, chlorophyll *a*, beam attenuation, irradiance, and altitude above seafloor. Salinity and water density ($\Sigma-t$) were calculated from conductivity, temperature, and depth measurements. Figure 2 shows the locations where hydrographic profiles and samples were collected. The sensor profiles for each sensor cast are presented in Appendix A.

Water Sampling

Discrete water samples were collected at the three sites during this survey. Sampling was accomplished in approximately 3 hours. Figure 2 shows the survey stations sampled within each study site. The rosette system, composed of the rosette sampling device, the water column profiling instrument package, and Go-Flo® sampling bottles, was used to collect discrete water samples at four depths: bottom, mid-depth (chlorophyll *a* max), mid-surface, and surface at each of the targeted sites. The water samples were subsampled onboard for a variety of laboratory analyses listed in Table 1. Table 2 provides the field data (date, time, coordinates, sample ID, and sampling depth) for each sampling depth by station. Sample collection and shipboard processing information is provided in Table 3.

Subsamples were taken from each discrete water sampling depth for polychlorinated biphenyls (PCB)/pesticides, metals, and total suspended solids (TSS). Chlorophyll *a* and dissolved oxygen (DO) samples were collected to confirm *in situ* data. PCB/pesticides and metals were collected in triplicate at each depth from the three sites (Table 1). A field duplicate sample was collected at bottom depth at Site 18 for PCB/pesticides and metals. Chlorophyll *a*, DO, and TSS samples were not collected in triplicate.

PCB/pesticides and total mercury samples (not filtered upon collection) were collected directly from the Go-Flo bottles into measurement-specific sample bottles using clean techniques. Water collected for the dissolved metals analyses (including dissolved mercury) were transferred directly from the Go-Flo bottles into a clean filtering apparatus (using clean metals methods) and filtered onboard using a vacuum pump. After filtration, the filtered water was transferred directly from the collection vessel of the filtering apparatus into clean sample bottles. Only the dissolved metals samples collected in Teflon® bottles were acidified onboard.

Filtration (through a glass fiber filter) for chlorophyll *a* analysis was conducted onboard the vessel immediately upon collection. All of the sample filters were folded, stored in aluminum foil, and frozen onboard until analysis. Dissolved oxygen samples were fixed onboard immediately after sampling. Samples were analyzed within 24 hours of initial fixing.

Samples for TSS analysis were collected but not filtered aboard the R/V *Aquamonitor*. They were stored in the dark and chilled (~4° C) until analysis. TSS samples from all three sites were delivered to the University of Rhode Island (URI) for processing and analysis following the survey.

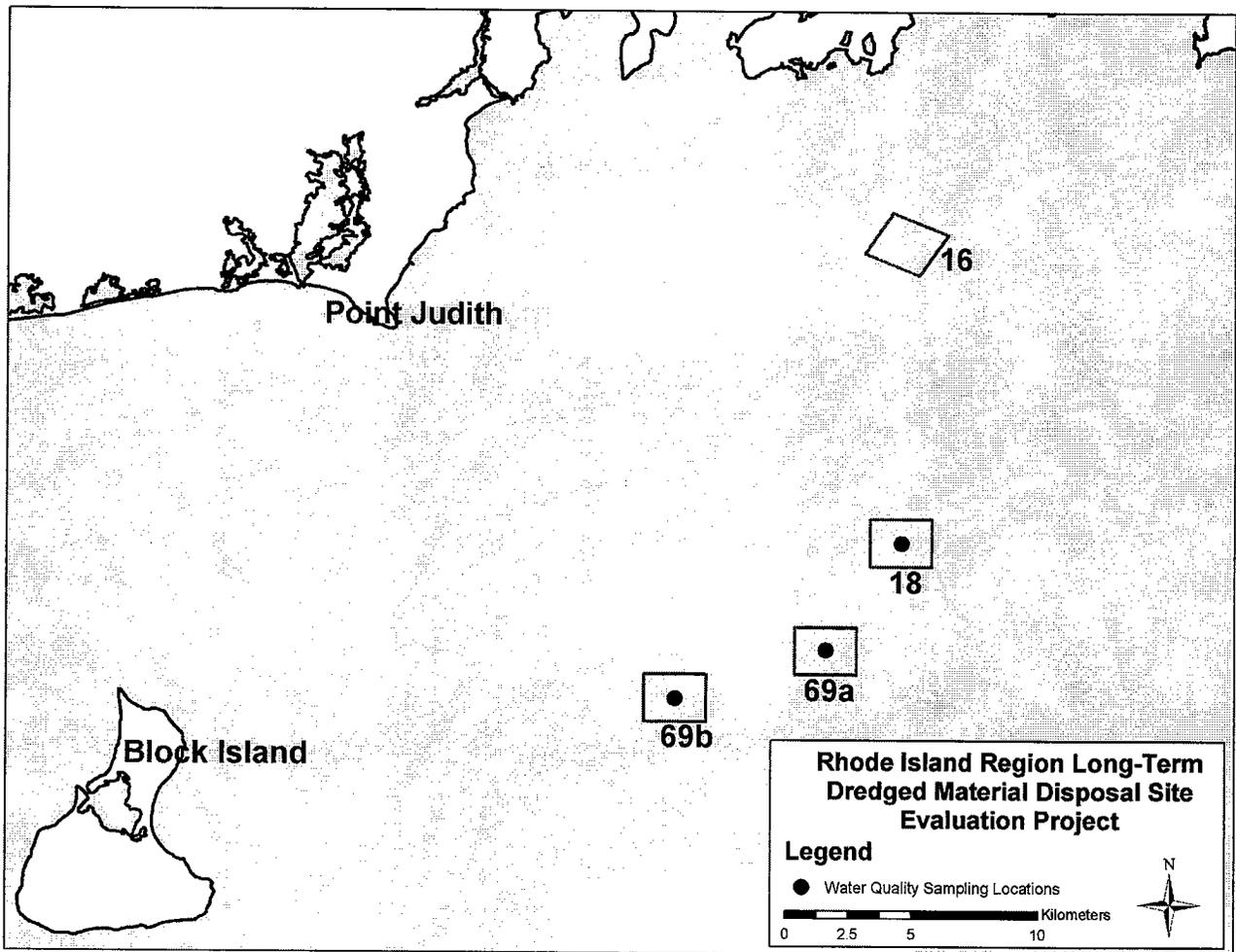


Figure 2. October 2001 Water Quality Sampling Locations.

Table 1. Samples Collected and Measurements Made During the October 2, 2001 Water Quality Survey.

Parameter	Number of Planned Sites	Planned Samples per Site	Total Planned Samples	Number of Actual Sites	Total Actual Samples
Metals ^a	3	12	36	3	36 (Teflon: 24/HDPE: 14)
PCB/Pesticides	3	12	36	3	36
Mercury	3	12	36	3	36
Chlorophyll <i>a</i> and phaeopigments ^b	3	4	12	3	12 ^b
Total suspended solids	3	4	12	3	12
Dissolved oxygen ^b	3	4	12	3	12 ^b

^a Ag, As, Cd, Cr, Cu, Ni, Pb, Se, and Zn.

^b Collected for sensor calibration only.

Table 2. Listing of Field Data from the October 2, 2001 Water Quality Survey.

Sample ID	Station ID	Longitude °W Xposition	Latitude °N Yposition	Sampling Depth (m)	Sample Date/Time	Weather Condition
RIS1W011	69B	-71.38036	41.23057	32.99	10/2/01 11:12 AM	Mostly sunny
RIS1W012	69B	-71.38035	41.23053	22.91	10/2/01 11:12 AM	Mostly sunny
RIS1W013	69B	-71.38035	41.23052	11.74	10/2/01 11:13 AM	Mostly sunny
RIS1W014	69B	-71.38033	41.23048	1.66	10/2/01 11:14 AM	Mostly sunny
RIS1W026	69A	-71.32663	41.24783	31.45	10/2/01 1:04 PM	Mostly sunny
RIS1W027	69A	-71.32653	41.24783	21.57	10/2/01 1:05 PM	Mostly sunny
RIS1W028	69A	-71.32640	41.24782	11.40	10/2/01 1:05 PM	Mostly sunny
RIS1W029	69A	-71.32633	41.24783	1.67	10/2/01 1:06 PM	Mostly sunny
RIS1W034	18	-71.29985	41.28572	33.47	10/2/01 1:57 PM	Mostly sunny
RIS1W035	18	-71.29950	41.28572	22.75	10/2/01 1:57 PM	Mostly sunny
RIS1W036	18	-71.29945	41.28573	12.84	10/2/01 1:58 PM	Mostly sunny
RIS1W037	18	-71.29945	41.28573	1.58	10/2/01 1:59 PM	Mostly sunny

Table 3. Sample Collection and Shipboard Processing for Water Samples.

Parameter	Station ID	Sample Volume (Target) (mL) ^a	Sample Containers ^c	Shipboard Processing/ Preservation ^c	Maximum Holding Time to Analysis
Hydrographic Profiles ^b	18, 69A, 69B	NA	NA	Record data to floppy diskette.	NA
Subsamples from PVC Rosette Bottles					
PCB/Pesticide	18, 69A, 69B	Full (with ½ inch headspace)	2 L pre-cleaned glass bottle	Store water at 4°C up to and during transport to Battelle.	7 days
Dissolved Metals/ Dissolved Mercury	69A, 69B	Full (w/ ½ inch headspace)	500 mL pre-cleaned Teflon® bottle	Pass through 0.45 µm filter. Acidify to pH 2. Store water at 4°C up to and during transport to Sequim.	6 months/ 28 days
Dissolved Metals	18	Full (w/ ½ inch headspace)	500 mL pre-cleaned high-density polyethylene (HDPE) bottle	Pass through 0.45 µm filter. Store water at 4°C up to and during transport to Sequim.	6 months
Total Mercury	18, 69A, 69B	Full (w/ ½ inch headspace)	500 mL pre-cleaned glass bottle	Store water at 4°C up to and during transport to Sequim.	28 days
Chlorophyll <i>a</i> and phaeopigments ^d	18, 69A, 69B	25 – 400 (400)	Whatman GF/F in foil	Pass through GF/F. Fix with a saturated MgCO ₃ solution. Freeze filter until analysis.	4 weeks
Total suspended solids	18, 69A, 69B	100 – 500 (500)	1-L dark bottle	Store water in 1-L dark bottle at 4°C up to and during transport to URI for filtration.	1 week
Dissolved oxygen ^d	18, 69A, 69B	300	300 mL glass BOD bottle	Fix per Oudot <i>et al</i> (1988) and APHA (1989). Titrate 2-24h later.	24 hours

GF/F: pre-ashed glass fiber filter

^aVolume processed for analysis.

^b*In situ* conductivity, temperature, pressure, dissolved oxygen, chlorophyll *a* fluorescence, transmissometry, irradiance, surface irradiance, bottom depth, navigational position

^cName brand items (*e.g.*, Nuclepore, Whatman) may be substituted with comparable items from a different manufacturer.

^dA limited number of chlorophyll *a* and DO samples were collected to confirm the *in situ* hydrographic profile data. These data are not presented in this report.

Water Analysis Tasks

Surface-water samples were analyzed for PCB congeners, chlorinated pesticides, metals, and TSS. General descriptions of the analytical methods used are provided below. Details of analytical methods are presented by Battelle (2001).

Chlorinated Pesticides and PCB Congeners

Water samples were extracted for chlorinated pesticides/PCB congeners following Battelle Duxbury Standard Operating Procedure (SOP) SOP 5-200. Briefly, 2-L of water (measured using a graduated cylinder) was transferred to a separatory funnel, extraction solvent was added (120 mL methylene chloride), and the sample was fortified with surrogate internal standard (SIS) compounds. Each sample was serially extracted three times using separatory-funnel techniques. The combined extract of each sample was dried over sodium sulfate and concentrated to 1 mL using Kuderna-Danish and nitrogen evaporation techniques. Alumina column and high-pressure

liquid chromatography (HPLC) (SOP 5-191) cleanup were performed. The final extract (0.5 mL) was fortified with recovery internal standard (RIS), solvent exchanged into hexane, and submitted for analysis.

Pesticides and PCB congeners were analyzed and quantified using gas chromatography/electron capture detection (GC/ECD) (Hewlett Packard 5890 Series 2 GC) using a 60-m DBS column and hydrogen as the carrier gas following Battelle SOP 5-128, including a second column for confirmation. Concentrations for all target analytes were determined by the method of internal standards, using SIS compounds for quantification. Results were reported on a volume basis.

Metals

Dissolved metals samples from Sites 69A and 69B were acidified in the field after collection, because Teflon bottles containing pre-measured aliquots of acid were available in the field for these samples. The remainder of the dissolved metals samples (i.e. those collected at Site 18 and total mercury samples from all sites) were acidified to pH <2 at Battelle Sequim. Water samples for metals analysis should be acidified as soon as possible after collection. When samples can be shipped from the field to the laboratory within 1 to 2 days, they should be kept cold and acidified on arrival at the laboratory. Acidified samples can be shipped at ambient temperature and do not have to be delivered to the laboratory within 1-2 days. Both procedures are acceptable and do not compromise the sample in any way.

Nine metals were analyzed in the water samples: silver (Ag), arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), lead (Pb), nickel (Ni), selenium (Se), and zinc (Zn). Total and dissolved mercury (Hg) were also analyzed.

Prior to analysis for Ag, As, Cd, Cr, Cu, Ni, Pb, and Zn, seawater samples were preconcentrated using iron (Fe) and palladium (Pd) according to Battelle SOP MSL-I-025, *Methods of Sample Preconcentration*, which is derived from the U.S. Environmental Protection Agency (EPA) Method 1640.

As, Cd, Cr, Cu, Ni, Pb, and Zn were analyzed by inductively-coupled-plasma-mass spectrometry (ICP-MS) following Battelle SOP MSL-I-022, *Determination of Elements in Aqueous and Digestate Samples by ICP-MS*, which is based on EPA Method 200.8. Equipment blank samples were not preconcentrated, but were analyzed directly by ICP-MS.

Ag was analyzed in the Fe-Pd preconcentrate by graphite-furnace atomic absorption (GFAA) following Battelle SOP MSL-I-029, *Determination of Metals in Aqueous and Digestate Samples by GFAA*, based on EPA Method 200.9.

Se was analyzed directly (with no preconcentration step) by hydride atomic absorption (HGAA) with flow-injection atomic spectroscopy (FIAS) following Battelle SOP MSL-I-030, *Determination of Metals in Aqueous and Digestate Samples by HGAA/FIAS*.

Total and dissolved mercury (Hg) were analyzed directly (with no preconcentration step) using cold-vapor atomic fluorescence (CVAF) spectroscopy according to Battelle SOP MSL-I-013, *Total Mercury in Aqueous Samples by CVAF*, which is derived from EPA Method 1631.

All results were reported in units of $\mu\text{g/L}$. None of the results were blank corrected.

Total Suspended Solids (TSS)

Within seven days of delivery to the URI analytical laboratory, samples for TSS determination were processed in a particulate-free area following procedures in Battelle SOP No. 5-053, *Suspended Particulate Matter Measurements (Total Suspended Solids [TSS])*. Using a vacuum-filter system, up to 500 mL of seawater were passed through a precleaned and preweighed 0.4-mm-pore-size, 47-mm-diameter Nuclepore® membrane filter. The filter was then rinsed three times with pH 8 deionized water to remove salt. Duplicate filters were processed in parallel for each sample. Filters were folded in quarters, placed in petri dishes, and dried in a class 100 clean bench for at least 48 hours, then stored at room temperature for gravimetric analysis. TSS was calculated as the net filter weight (loaded – tare weight divided by the volume filtered) and reported as the mean of the laboratory duplicate samples.

Data Quality Objectives

Table 4 provides the data quality objectives for accuracy, precision, completeness and comparability for chemical analyses. Appendix B shows the individual data results for each of the water samples and the associated quality control results for each of the analysis.

Accuracy

Analytical accuracy was evaluated based on percent recoveries of analytes in blank and matrix spike samples and the SIS that were added to every sample (organics only), as well as the results of the procedural blank and standard reference material (SRM) samples that were analyzed with each batch of up to 20 field samples. Specific accuracy goals are listed in Table 4. Achieved method detection limits (MDLs) and project quantitation limit goals (QLs) for analytes of interest are presented in Table 5 (TSS), Table 6 (PCB/Pests) and Table 7 (Metals).

Precision

Analytical precision was determined using the results from laboratory duplicate samples (matrix spikes and laboratory duplicates for organics samples, matrix spikes and laboratory triplicates for metals samples), with the relative percent differences (RPD) or relative standard deviation (RSD) serving as a measure of precision. Target RPDs and RSDs are provided in Table 4.

Completeness

The completeness of chemical analyses was ensured by comparing the chain-of-custody forms received by the laboratory with the list of samples analyzed.

Table 4. Data Quality Objectives for the Analysis of Water Samples.

QC Type and Frequency	Acceptance Criteria	Corrective Action
Procedural Blanks		
Organics 1 per analytical batch	< RL or associated samples > 10x blank values	Reextract and/or reanalyze; document corrective actions
Metals 1 per analytical batch	< 5X MDL or associated samples > 10x blank values	Reextract, reanalyze, and/or blank subtract; document corrective action
TSS (Method Blank) 3 per day (Filter Blank) 1 per 20 samples	≤ 5X MDL ≤ 5X MDL	Review with Project Manager; reanalyze or justify project records
Accuracy		
Surrogate Internal Standards (SIS)		
Organics	40-125% recovery	Reextract, reanalyze or justification documented
Laboratory Control Sample/ Matrix Spikes		
Organics 1 per analytical batch	40-120% recovery for 90% of analytes	LCS: Review with Project Manager; reanalyze or justify in project records
Metals 1 per analytical batch	70-130% recovery ^a	MS: Reextract, reanalyze or justification documented.
Standard Reference Material (SRM)		
Metals 1 per analytical batch	PD ≤ 25% from certified values (for certified values >5X MDL)	Reextract, reanalyze or justification documented.
Precision		
Field Duplicates		
Metals 1 per 20	≤50% RPD for at least 90% of analytes (for analytes detected at level >3X RL)	Inform Project Manager; Document in QA/QC Narrative
TSS 1 per 20	≤50% RPD	
Laboratory Duplicates		
Organics (MS/MSD/Lab Duplicates) 1 per analytical batch	≤ 30% RPD for at least 90% of analytes (for analytes detected at level >3x RL) ^a	Lab Duplicates: Review with Project Manager; reanalyze or justify project records MS/MSD: Reextract, reanalyze or justification documented.
Metals (MS/MSD) 1 per analytical batch	≤ 30% RPD ^a	
TSS (Lab Duplicates) Every sample	≤ 10% RPD (when TSS measured at level >10X MDL)	
Laboratory Triplicates		
Metals 1 per analytical batch	≤ 30% RSD	Document, justify deviations.

RL = Reporting Limit; MDL=Method Detection Limit; SRM=Standard Reference Material; PD=Percent Difference; SIS=Surrogate Internal Standard; MS/MSD = Matrix Spike/Matrix Spike Duplicate; RPD=Relative Percent Difference; RSD=Relative Standard Deviation;

^a Concentration of spiked analytes in MS/MSD must be >5x background concentration to be used for data quality assessment.

Table 5. Achieved Method Detection Limits for Total Suspended Solids in Waters.

Parameter	MDL ^a (mg/L)	Project QL Goal (mg/L)
Total Suspended Solids	0.1	Not available

^a Achievable MDLs are limits that an individual laboratory can achieve when performing a specific analytical method. The MDL values are three times the standard deviation of seven replicates of low-level samples.

Table 6. Achieved Method Detection Limits for Polychlorinated Biphenyls/Pesticides in Waters.

Parameter	MDL ^a (ng/L)	Project QL Goal ^b (ng/L)
PCBs		
PCB8	8.00	30.53
PCB18	0.69	2.64
PCB28	0.87	3.31
PCB44	0.73	2.77
PCB52	0.72	2.73
PCB66	0.75	2.83
PCB101	0.57	2.19
PCB105	0.29	1.11
PCB118	0.43	1.65
PCB128	0.70	2.67
PCB138	0.66	2.54
PCB153	0.53	2.04
PCB170	0.51	1.94
PCB180	0.48	1.84
PCB187	0.43	1.65
PCB195	0.54	2.07
PCB206	0.61	2.32
PCB209	0.63	2.42
Pesticides		
4,4'-DDD	0.30	1.14
4,4'-DDE	0.42	1.59
4,4'-DDT	0.28	1.05
2,4'-DDD	0.37	1.43
2,4'-DDE	0.85	3.24
2,4'-DDT	0.99	3.78
Aldrin	1.41	5.41
alpha-Chlordane	0.54	2.07
Dieldrin	0.49	1.88
Endosulfan I	0.56	2.13
Endosulfan II	0.26	0.99
Endosulfan Sulfate	0.28	1.08
Endrin	0.49	1.88
gamma-BHC	0.48	1.84
Heptachlor	0.59	2.23
Heptachlor Epoxide	0.47	1.81
Toxaphene	83.35	Not available

^a Achievable MDLs are from a seven replicate MDL study and are based on a sample size of 1-L. Actual sample-specific MDLs varied depending upon sample processing factors – actual MDLs are reported with the analytical data in Appendix B.

^b The Project Quantitation Limit Goal (QL) = 3.18 * Target Laboratory MDL, as defined by NELAC (Battelle 2001).

Table 7. Achieved Method Detection Limits for Metals in Waters.

Parameter	MDL^a (µg/L)	Project QL Goal (µg/L)
Arsenic	0.03	0.32
Cadmium	0.0104	0.048
Chromium	0.0345	9.54
Copper	0.022	2.58
Lead	0.0164	0.016
Mercury	0.0002	0.0006
Nickel	0.0369	11.35
Selenium	0.075	0.318
Silver	0.01	0.095
Zinc	0.0223	3.82

^a Achievable MDLs are from a seven replicate MDL study and are based on a sample size of 500-mL. Actual sample-specific MDLs varied depending upon sample processing factors – actual MDLs are reported with the analytical data in Appendix B.

^b The Project Quantitation Limit Goal (QL) = 3.18 * Target Laboratory MDL, as defined by NELAC (Battelle 2001).

Deviations from the QAPP

During the course of the field survey, circumstances arose that lead to deviations from the sample collection protocols described in the quality assurance project plan (Battelle 2001). Each of these deviations had the potential to affect the quality of the data collected during the survey. After evaluating the water column data collected, it was determined that these deviations did not affect data quality.

The survey was originally scheduled to be conducted in early September as a combined sediment/Remote Ecological Monitoring of the Seafloor (REMOTS)/water column survey. However, poor weather, sea conditions, and difficult circumstances during the sediment sampling survey required the water quality survey to be postponed until October 2. The sediment survey was conducted from September 7 – October 12, 2002, and the REMOTS survey was conducted from September 26 – 28, 2002. The results of these two surveys are reported by Battelle (2002a, b, c, d).

During the water column survey, problems occurred with the computer receiving readings from the echo sounder. The echo sounder was disconnected from computer, and water column depths were manually entered into NavSam[®].

The dissolved oxygen instrument used to process the laboratory DO samples was not operating correctly, and the DO calibration samples could not be analyzed onboard the vessel as planned. The samples were analyzed the following day at Battelle, with the 24-hour holding time exceeded by 1-2 hours. Following the recommendation of Mr. Scott Libby, a Senior Ecologist at

Battelle, the DO laboratory data was not used to calibrate the *in situ* DO data due to the holding time exceedance. Though they are presented in this report as uncalibrated data, the *in situ* DO data are valid and can be used to compare trends at and between stations.

The *in situ* chlorophyll *a* data were not calibrated against the laboratory chlorophyll *a* data, because the linear regression calibration of the *in situ* versus the laboratory data did not meet the data quality objectives for the calibration. Though they are presented in this report as uncalibrated data, the *in situ* chlorophyll *a* data are valid and can be used to compare trends at and between stations. However, it cannot be assured that the magnitude of the values is correct.

An insufficient number of Teflon[®] bottles for mercury and metals analysis were brought on board. Therefore, all dissolved metals samples for Site 18 and one sample from Site 69A were collected in pre-cleaned high-density polyethylene (HDPE) bottles and not in Teflon[®] bottles as planned. For dissolved metals other than mercury, HDPE is an acceptable bottle type and their use does not compromise the data generated from the samples. For all three sites, total mercury samples were collected in pre-cleaned glass jars. Per discussion with senior scientists at Battelle's Marine Science Laboratory (MSL) and concurrence by Dr. Carlton Hunt of Battelle, it was determined that mercury would be analyzed from the dissolved metals samples collected in Teflon[®]. However, where dissolved metals samples were collected in HDPE, total mercury would be measured from the water collected into the glass jars, as HDPE is an unacceptable media for mercury analysis.

Field duplicate samples for metals were taken from the bottom depth at Site 18. However, the metals field duplicate sample was not transferred to the analytical laboratory within the sample holding time. As a result, field duplicate samples for metals were not analyzed.

During the survey, field blanks were collected for analysis, but the metals blank that was collected exceeded the holding time. As a result, the dissolved metals and mercury field blanks were retaken on November 1, 2001. The Milli-Q water for the new field blanks was collected onboard the R/V *Aquamonitor* in both Teflon[®] and HDPE bottles to represent the original samples that were collected.

General Data Treatment and Reduction

This section describes the data reduction performed on the October 2001 water quality data.

Specifics of data reduction and handling are listed below.

- All *in situ* data and sample collection information were loaded directly into the project database from Battelle's NavSam[®] software.
- *In situ* data were reported at depths where discrete water samples were collected.
- All analytical data were generated by Battelle laboratories and qualified when necessary (Table 8). Data were loaded directly into the project database. Data loading applications were provided to the subcontractor laboratory to facilitate the loading of the TSS data.

- All data were extracted directly from the database and exported into MS Excel® files, where graphical presentations were performed.
- All field triplicate samples were averaged by depth for reporting and data reduction.
- Contaminant data were reported as mean, standard deviation, and number of samples by station.
- Total PCB was calculated as the sum of twenty PCB congeners (Table 6). In case of a “not detected”, 1/2 the MDL value was used for the non-detected congeners.
- Total DDT was calculated as the sum of six DDT-related compounds: 2,4'-DDD, 2,4'-DDE, 2,4'-DDT, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT (Table 6).

Table 8. Data Qualifiers and Definitions for Water Analysis.

Qualifier	Definition
U	to indicate compounds that were not detected. For these samples, the MDL with the qualifier was reported as the sample value, and ½ the MDL was used when calculating totals (i.e. Total PCB and Total DDT), or calculating means.
a	to indicate compounds that were undetected in at least one of the sample replicates that were averaged.
f	to indicate compounds that were quantified but were below the MDL. The value measured was reported.
J	to indicate compounds that were quantified above the MDL but were below the Project QL Goal.
s	to indicate suspect data. “s”-flagged data were not included in any calculations or graphs.

RESULTS

In situ Data

Vertical stratification is defined for this report by the presence of a pycnocline with a density ($\text{Sigma} - t$) gradient of greater than 1.0 over a relatively narrow depth range (~10m). Using this definition, the averaged data of the two profile upcasts indicate that there was a weak stratification and thermocline at Stations 69A and 69B in the uppermost surface waters, perhaps due to diurnal heating or a rain event. Station 69B showed the greatest variation in water temperatures (17.2 - 16.1 °C) and salinity (31.9 – 32.2 PSU) from surface to bottom, with the surface waters being warmer and fresher (Table 9). Sites 69A and 18 showed similar trends to Site 69B but with less variation from surface to bottom (Appendix A).

Uncalibrated chlorophyll *a* concentrations (*in situ* fluorescence measurements) were generally low, ranging from 0.8 to 2.3 µg/L, and were lowest at Site 69B. A review of the profile data indicates that the highest chlorophyll concentrations (6-9 µg/L) were reached in a sharp subsurface chlorophyll maximum at Site 69A located at a depth of ~20 meters. This feature was not captured during the discrete sampling on the upcast.

Table 9. *In situ* Results for October 2001 Water Quality Survey in Rhode Island Sound.

Parameter	Station	Site 18				Site 69A			
	Depth (m)	1.59	13.09	22.69	33.15	1.55	11.41	21.3	31.48
Temperature	Unit	Value	Value	Value	Value	Value	Value	Value	Value
Temperature	°C	17	16.7	16.6	16.5	16.9	16.2	16.2	16.1
Salinity	PSU	32.1	32.1	32.1	32.1	32.1	32.1	32.1	32.1
Sigma-T	N/A	23.3	23.4	23.4	23.4	23.3	23.5	23.5	23.5
Beam Attenuation	m ⁻¹	0.7	0.7	0.6	0.6	0.5	0.5	0.5	0.5
Conductivity	mS/cm	41.6	41.3	41.2	41.2	41.5	40.9	40.8	40.8
<i>In situ</i> Dissolved Oxygen (DO) Concentration**	mg/L	7.5	7.4	7.5	7.1	7.1	7.2	7.6	7.3
<i>In situ</i> DO Saturation**	PCT	94	92.8	93.8	88	89.6	89.5	94.3	90.2
<i>In situ</i> Chlorophyll Fluorescence**	µg/L	0.9	1.5	2.2	1.8	1.2	1.7	2.1	1.8
Light	µEm ⁻² sec ⁻¹	1,123	97.7	14.4	2.5	1,451	187.5	32.5	6.4
Total Suspended Solids*	mg/L	0.65	0.73	1.42	0.8	0.51	0.78	0.63	0.61

Parameter	Station	Site 69B			
	Depth (m)	1.59	11.89	22.81	32.96
Temperature	Unit	Value	Value	Value	Value
Temperature	°C	17.2	16.2	16.1	16.1
Salinity	PSU	31.9	32.1	32.1	32.2
Sigma-T	N/A	23.1	23.5	23.5	23.5
Beam Attenuation	m ⁻¹	0.7	0.5	0.5	0.6
Conductivity	mS/cm	41.4	40.8	40.8	40.8
<i>In situ</i> Dissolved Oxygen (DO) Concentration**	mg/L	6.9	7.2	7	7.2
<i>In situ</i> DO Saturation**	PCT	87.3	88.6	86.9	88.9
<i>In situ</i> Chlorophyll Fluorescence**	µg/L	0.8	1.2	2.3	1.5
Light	µEm ⁻² sec ⁻¹	1,401	147.5	20.1	3.8
Total Suspended Solids*	mg/L	0.55	0.9	0.97	0.81

* Measured during laboratory analysis of water samples.

** Uncalibrated *in situ* data collected from field sensors. These data were not calibrated using the laboratory data, due to data quality issues (see Deviations from QAPP section).

Dissolved oxygen profiles were relatively similar at all three sites (Appendix A) and were generally above 88% saturation for all samples (Table 9). Concentrations were homogeneous from surface to bottom at the three sites with some variability at the surface, ranging from 6.9 mg/L at Site 69B to 7.6 mg/L at Site 69A. In general, the structure of the dissolved oxygen profile exhibited no appreciable increase or decrease in concentration with depth below the top 6 to 8m of the water column (Appendix A). The bottom-water DO concentrations ranged from 7.1 – 7.3mg/L.

The TSS in surface waters were similar at the three sites, ranging from 0.55 – 0.65 mg/L (Table 9). Mid-depth TSS values were generally higher than in surface or bottom waters (Figure 3). Average TSS values at each station (averaged over all depths) were higher at Site 18 (0.90 mg/L) than at Sites 69A (0.63 mg/L) and 69B (0.81 mg/L). The maximum TSS value of 1.42 mg/L was measured at Site 18 at a depth of 22.74 m (Figure 3). The depths of the maximum TSS values at Sites 18 and 69B corresponded with the depth of maximum chlorophyll *a* concentrations measured at these stations. There was no correlation between beam attenuation and TSS (Table 9).

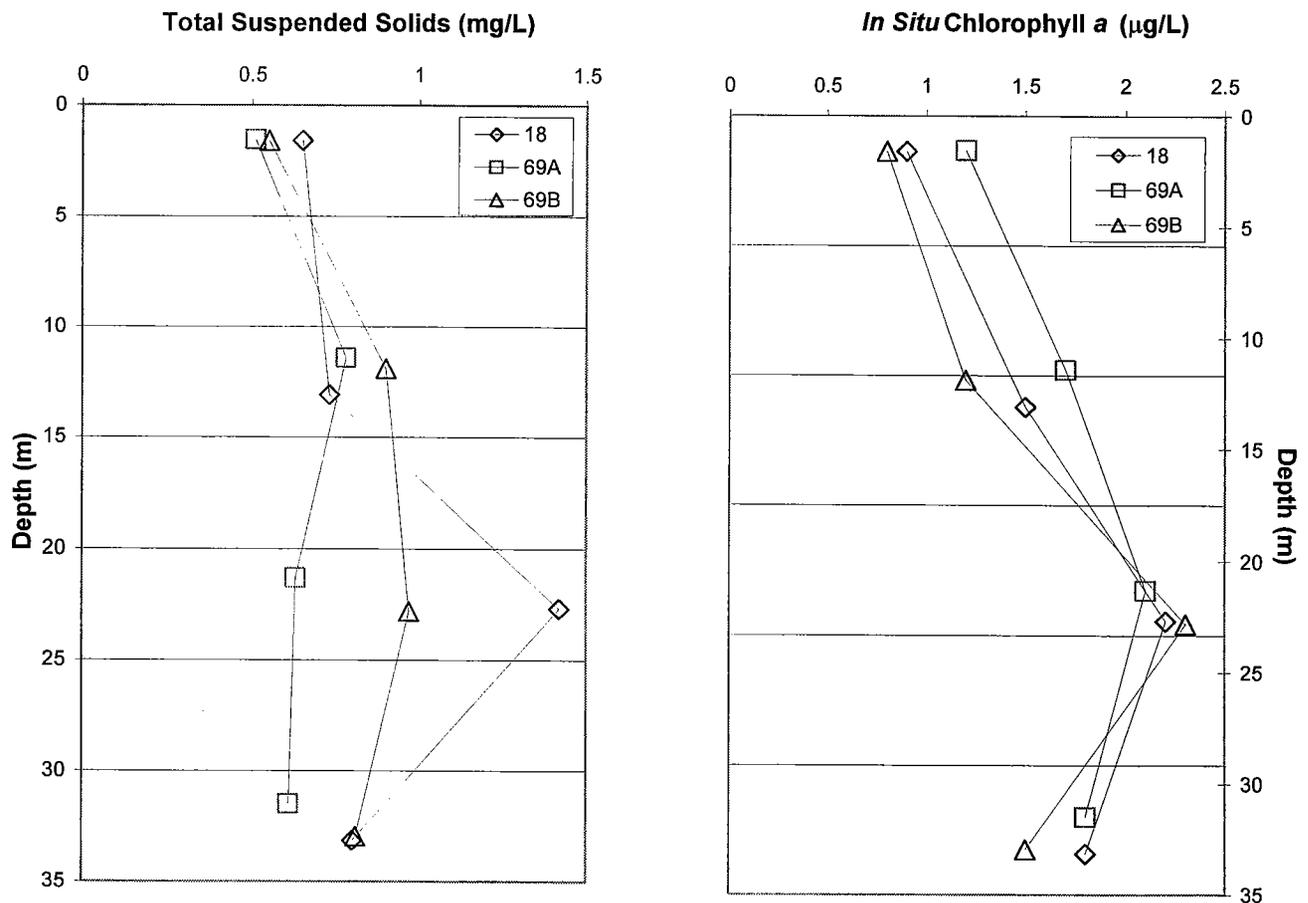


Figure 3. Total Suspended Solids (left) and *In Situ* Chlorophyll *a* (right) versus Depth at the Three Study Sites.

Contaminant Results

The results of the PCB/pesticide and trace metals analyses are presented in following sections.

PCB Congeners

PCB congeners were undetected in most of the water sample replicates from the three sites (Appendix B). PCB 195 was detected in one sample replicate from each of the three sites, but at concentrations below the MDL. One replicate from Site 18, RIS1W035-2, had detectable levels of all the target PCB congeners, possibly due to laboratory contamination. Concentrations of PCB 52, 105, 138, 153, 170, 180, and 187 were between the MDL and Project QL Goal. All other PCBs were detected at concentrations below the MDL. Concentrations of Total PCBs in each replicate ranged from not detected to 17.4 ng/L.

Concentrations of PCBs were fairly uniform with depth at the three sites (Table 10). PCBs were not detected in surface water at all three sites. At Site 18, PCBs were detected at mid-surface (PCB 195 and 206) and mid-depth (all target PCB congeners). PCBs 101, 195, 206, and 209 were detected in mid-surface waters at Site 69A. At Site 69B, PCB 195 and PCB 206 were detected in bottom waters.

Pesticides

Pesticides were also not detected in most of the water samples from the three study sites (Appendix B). The pesticides that were detected (g-BHC and dieldrin) were at concentrations below the MDL and Project QL Goal, respectively. One of the water replicates from Site 18, RIS1W035-2, contained detectable concentrations of most of the pesticides, though the detected concentrations were very low. The concentration of Total DDT in this replicate was 3.87 ng/L.

Pesticides had a distribution in the water column similar to that of PCBs (Table 11). Pesticides were not detected in surface water at all three sites. At Site 18, most of the target pesticides were detected at mid-depth. Dieldrin was detected at mid-surface and g-BHC was detected in bottom waters at Site 69A. At Site 69B, g-BHC was detected at bottom depth.

Table 10. Mean and Standard Deviation (SD) for Concentrations of PCBs in Unfiltered Water at Each Station in Rhode Island Sound, October 2001. Values are ng/L. n = 3.

Site	Site 18											
Depth (m)	1.57			12.83			22.74			33.46		
Parameter	Mean	SD	Q	Mean	SD	Q	Mean	SD	Q	Mean	SD	Q
Cl2(08)	4.00	0.00	U	4.00	0.00	U	2.81	2.05	a	4.00	0.00	U
Cl3(18)	0.35	0.00	U	0.35	0.00	U	0.42	0.13	a	0.35	0.00	U
Cl3(28)	0.44	0.00	U	0.44	0.00	U	0.41	0.04	a	0.44	0.00	U
Cl4(44)	0.37	0.00	U	0.37	0.00	U	0.44	0.14	a	0.37	0.00	U
Cl4(52)	0.36	0.00	U	0.36	0.00	U	0.49	0.22	a	0.36	0.00	U
Cl4(66)	0.38	0.00	U	0.38	0.00	U	0.44	0.10	a	0.38	0.00	U
Cl5(101)	0.29	0.00	U	0.29	0.00	U	0.35	0.12	a	0.29	0.00	U
Cl5(105)	0.15	0.00	U	0.15	0.00	U	0.34	0.34	a	0.15	0.00	U
Cl5(118)	0.22	0.00	U	0.22	0.00	U	0.28	0.11	a	0.22	0.00	U
Cl6(128)	0.35	0.00	U	0.35	0.00	U	0.38	0.05	a	0.35	0.00	U
Cl6(138)	0.33	0.00	U	0.33	0.00	U	0.53	0.34	a	0.33	0.00	U
Cl6(153)	0.27	0.00	U	0.27	0.00	U	0.40	0.24	a	0.27	0.00	U
Cl7(170)	0.26	0.00	U	0.26	0.00	U	0.42	0.28	a	0.26	0.00	U
Cl7(180)	0.24	0.00	U	0.24	0.00	U	0.34	0.17	a	0.24	0.00	U
Cl7(187)	0.22	0.00	U	0.22	0.00	U	0.31	0.17	a	0.22	0.00	U
Cl8(195)	0.27	0.00	U	0.28	0.01	a	0.33	0.11	a	0.27	0.00	U
Cl9(206)	0.31	0.00	U	0.31	0.00	U	0.36	0.09	a	0.31	0.00	U
Cl10(209)	0.32	0.00	U	0.32	0.01	a	0.37	0.09	a	0.32	0.00	U
Total PCB	9.07	0.00		9.08	0.02		9.43	0.61		9.07	0.00	
Site	Site 69A											
Depth (m)	1.66			11.39			21.57			31.44		
Parameter	Mean	SD	Q	Mean	SD	Q	Mean	SD	Q	Mean	SD	Q
Cl2(08)	4.00	0.00	U	8.67	1.15	U	10.00	0.00	U	10.00	0.00	U
Cl3(18)	0.35	0.00	U	0.75	0.10	U	0.87	0.00	U	0.87	0.00	U
Cl3(28)	0.44	0.00	U	0.94	0.12	U	1.08	0.00	U	1.08	0.00	U
Cl4(44)	0.37	0.00	U	0.79	0.11	U	0.91	0.00	U	0.91	0.00	U
Cl4(52)	0.36	0.00	U	0.78	0.10	U	0.90	0.00	U	0.90	0.00	U
Cl4(66)	0.38	0.00	U	0.81	0.11	U	0.93	0.00	U	0.93	0.00	U
Cl5(101)	0.29	0.00	U	0.54	0.19	a	0.72	0.00	U	0.72	0.00	U
Cl5(105)	0.15	0.00	U	0.31	0.04	U	0.36	0.00	U	0.36	0.00	U
Cl5(118)	0.22	0.00	U	0.47	0.06	U	0.55	0.00	U	0.55	0.00	U
Cl6(128)	0.35	0.00	U	0.76	0.10	U	0.88	0.00	U	0.88	0.00	U
Cl6(138)	0.33	0.00	U	0.72	0.10	U	0.83	0.00	U	0.83	0.00	U
Cl6(153)	0.27	0.00	U	0.58	0.08	U	0.67	0.00	U	0.67	0.00	U
Cl7(170)	0.26	0.00	U	0.55	0.07	U	0.64	0.00	U	0.64	0.00	U
Cl7(180)	0.24	0.00	U	0.52	0.07	U	0.60	0.00	U	0.60	0.00	U
Cl7(187)	0.22	0.00	U	0.47	0.06	U	0.54	0.00	U	0.54	0.00	U
Cl8(195)	0.27	0.00	U	0.48	0.24	a	0.68	0.00	U	0.68	0.00	U
Cl9(206)	0.31	0.00	U	0.51	0.30	a	0.76	0.00	U	0.76	0.00	U
Cl10(209)	0.32	0.00	U	0.54	0.32	a	0.79	0.00	U	0.79	0.00	U
Total PCB	9.07	0.00		19.18	3.12		22.68	0.00		22.68	0.00	

Table 10. (continued)

Site	Site 69B											
Depth (m)	1.65			11.73			22.9			32.99		
Parameter	Mean	SD	Q	Mean	SD	Q	Mean	SD	Q	Mean	SD	Q
Cl2(08)	5.33	2.31	U	4.00	0.00	U	4.00	0.00	U	5.33	2.31	U
Cl3(18)	0.46	0.20	U	0.35	0.00	U	0.35	0.00	U	0.46	0.20	U
Cl3(28)	0.58	0.25	U	0.44	0.00	U	0.44	0.00	U	0.58	0.25	U
Cl4(44)	0.49	0.21	U	0.37	0.00	U	0.37	0.00	U	0.49	0.21	U
Cl4(52)	0.48	0.21	U	0.36	0.00	U	0.36	0.00	U	0.48	0.21	U
Cl4(66)	0.50	0.21	U	0.38	0.00	U	0.38	0.00	U	0.50	0.21	U
Cl5(101)	0.38	0.16	U	0.29	0.00	U	0.29	0.00	U	0.38	0.16	U
Cl5(105)	0.19	0.08	U	0.15	0.00	U	0.15	0.00	U	0.19	0.08	U
Cl5(118)	0.29	0.13	U	0.22	0.00	U	0.22	0.00	U	0.29	0.13	U
Cl6(128)	0.47	0.20	U	0.35	0.00	U	0.35	0.00	U	0.47	0.20	U
Cl6(138)	0.44	0.19	U	0.33	0.00	U	0.33	0.00	U	0.44	0.19	U
Cl6(153)	0.36	0.16	U	0.27	0.00	U	0.27	0.00	U	0.36	0.16	U
Cl7(170)	0.34	0.15	U	0.26	0.00	U	0.26	0.00	U	0.34	0.15	U
Cl7(180)	0.32	0.14	U	0.24	0.00	U	0.24	0.00	U	0.32	0.14	U
Cl7(187)	0.29	0.12	U	0.22	0.00	U	0.22	0.00	U	0.29	0.12	U
Cl8(195)	0.36	0.16	U	0.27	0.00	U	0.27	0.00	U	0.26	0.02	a
Cl9(206)	0.41	0.18	U	0.31	0.00	U	0.31	0.00	U	0.26	0.07	a
Cl10(209)	0.42	0.18	U	0.32	0.00	U	0.32	0.00	U	0.42	0.18	U
Total PCB	12.10	5.24		9.07	0.00		9.07	0.00		11.85	4.81	

U = analyte undetected in all replicates; value is mean of ½ reported method detection limits (MDLs).

a = analyte undetected in at least one replicate. Means calculated using ½ reported method detection limit (MDL) for undetected replicate(s).

Table 11. Mean and Standard Deviation (SD) for Concentrations of Pesticides in Unfiltered Water at Each Station in Rhode Island Sound, October 2001. Values are ng/L. n = 3.

Site	18											
Depth (m)	1.57			12.83			22.74			33.46		
Parameter	Mean	SD	Q	Mean	SD	Q	Mean	SD	Q	Mean	SD	Q
2,4 DDD	0.19	0.00	U	0.19	0.00	U	0.32	0.23	a	0.19	0.00	U
2,4 DDE	0.43	0.00	U	0.43	0.00	U	0.47	0.07	a	0.43	0.00	U
2,4 DDT	0.50	0.00	U	0.50	0.00	U	0.51	0.02	a	0.50	0.00	U
4,4 DDD	0.15	0.00	U	0.15	0.00	U	0.44	0.51	a	0.15	0.00	U
4,4 DDE	0.21	0.00	U	0.21	0.00	U	0.30	0.15	a	0.21	0.00	U
4,4 DDT	0.14	0.00	U	0.14	0.00	U	0.33	0.33	a	0.14	0.00	U
Aldrin	0.71	0.00	U	0.71	0.00	U	0.59	0.20	a	0.71	0.00	U
cis Chlordane	0.27	0.00	U	0.27	0.00	U	0.37	0.18	a	0.27	0.00	U
Dieldrin	0.25	0.00	U	0.25	0.00	U	0.59	0.61	a	0.25	0.00	U
Endosulfan I	0.28	0.00	U	0.28	0.00	U	0.28	0.00	U	0.28	0.00	U
Endosulfan II	0.13	0.00	U	0.13	0.00	U	0.13	0.00	U	0.13	0.00	U
Endosulfan sulfate	0.14	0.00	U	0.14	0.00	U	0.14	0.00	U	0.14	0.00	U
Endrin	0.25	0.00	U	0.25	0.00	U	0.38	0.23	a	0.25	0.00	U
g-BHC	0.24	0.00	U	0.24	0.00	U	0.35	0.18	a	0.24	0.00	U
Heptachlor	0.30	0.00	U	0.30	0.00	U	0.40	0.18	a	0.30	0.00	U
Heptachlor epoxide	0.24	0.00	U	0.24	0.00	U	0.36	0.21	a	0.24	0.00	U
Toxaphene	41.68	0.00	U	41.68	0.00	U	41.68	0.00	U	41.68	0.00	U
Site	69A											
Depth (m)	1.66			11.39			21.57			31.44		
Parameter	Mean	SD	Q	Mean	SD	Q	Mean	SD	Q	Mean	SD	Q
2,4 DDD	0.19	0.00	U	0.41	0.05	U	0.47	0.00	U	0.47	0.00	U
2,4 DDE	0.43	0.00	U	0.93	0.12	U	1.07	0.00	U	1.07	0.00	U
2,4 DDT	0.50	0.00	U	1.08	0.14	U	1.24	0.00	U	1.24	0.00	U
4,4 DDD	0.15	0.00	U	0.32	0.04	U	0.37	0.00	U	0.37	0.00	U
4,4 DDE	0.21	0.00	U	0.46	0.06	U	0.53	0.00	U	0.53	0.00	U
4,4 DDT	0.14	0.00	U	0.30	0.04	U	0.35	0.00	U	0.35	0.00	U
Aldrin	0.71	0.00	U	1.53	0.20	U	1.77	0.00	U	1.77	0.00	U
cis Chlordane	0.27	0.00	U	0.59	0.08	U	0.68	0.00	U	0.68	0.00	U
Dieldrin	0.25	0.00	U	0.91	0.63	a	0.61	0.00	U	0.61	0.00	U
Endosulfan I	0.28	0.00	U	0.60	0.08	U	0.70	0.00	U	0.70	0.00	U
Endosulfan II	0.13	0.00	U	0.28	0.04	U	0.32	0.00	U	0.32	0.00	U
Endosulfan sulfate	0.14	0.00	U	0.31	0.04	U	0.36	0.00	U	0.36	0.00	U
Endrin	0.25	0.00	U	0.53	0.07	U	0.62	0.00	U	0.62	0.00	U
g-BHC	0.24	0.00	U	0.52	0.07	U	0.60	0.00	U	0.64	0.06	a
Heptachlor	0.30	0.00	U	0.64	0.09	U	0.74	0.00	U	0.74	0.00	U
Heptachlor epoxide	0.24	0.00	U	0.52	0.07	U	0.60	0.00	U	0.60	0.00	U
Toxaphene	41.68	0.00	U	90.29	12.02	U	104.2	0.00	U	104.2	0.00	U

Table 11. (continued)

Site	69B											
	1.65			11.73			22.9			32.99		
Depth (m)	Mean	SD	Q	Mean	SD	Q	Mean	SD	Q	Mean	SD	Q
2,4 DDD	0.19	0.00	U	0.19	0.00	U	0.19	0.00	U	0.25	0.11	U
2,4 DDE	0.43	0.00	U	0.43	0.00	U	0.43	0.00	U	0.57	0.25	U
2,4 DDT	0.50	0.00	U	0.50	0.00	U	0.50	0.00	U	0.66	0.29	U
4,4 DDD	0.15	0.00	U	0.15	0.00	U	0.15	0.00	U	0.20	0.09	U
4,4 DDE	0.21	0.00	U	0.21	0.00	U	0.21	0.00	U	0.28	0.12	U
4,4 DDT	0.14	0.00	U	0.14	0.00	U	0.14	0.00	U	0.19	0.08	U
Aldrin	0.71	0.00	U	0.71	0.00	U	0.71	0.00	U	0.94	0.41	U
cis Chlordane	0.27	0.00	U	0.27	0.00	U	0.27	0.00	U	0.36	0.16	U
Dieldrin	0.25	0.00	U	0.25	0.00	U	0.25	0.00	U	0.33	0.14	U
Endosulfan I	0.28	0.00	U	0.28	0.00	U	0.28	0.00	U	0.37	0.16	U
Endosulfan II	0.13	0.00	U	0.13	0.00	U	0.13	0.00	U	0.17	0.07	U
Endosulfan sulfate	0.14	0.00	U	0.14	0.00	U	0.14	0.00	U	0.19	0.08	U
Endrin	0.25	0.00	U	0.25	0.00	U	0.25	0.00	U	0.33	0.14	U
g-BHC	0.24	0.00	U	0.24	0.00	U	0.24	0.00	U	0.32	0.14	a
Heptachlor	0.30	0.00	U	0.30	0.00	U	0.30	0.00	U	0.39	0.17	U
Heptachlor epoxide	0.24	0.00	U	0.24	0.00	U	0.24	0.00	U	0.32	0.14	U
Toxaphene	41.68	0.00	U	41.68	0.00	U	41.68	0.00	U	55.57	24.06	U

U = analyte undetected in all replicates; value is mean of ½ reported MDLs.

a = analyte undetected in at least one replicate. Means calculated using ½ reported MDL for undetected replicate(s).

Metals

Dissolved metals concentrations were very similar at the three sites (Table 12 and Appendix B). Dissolved As, dissolved Pb, and total Hg were detected above the Project QL Goal in all samples collected at the three sites. Average As concentrations were lowest at Site 69B (0.87 µg/L) and highest at Site 69A (1.82 µg/L). Concentrations of Pb ranged from 0.06 µg/L to 0.14 µg/L at Site 69A. Total Hg concentrations were very similar at the three sites (0.0007 – 0.0014 µg/L).

Dissolved Cd, Cr, Cu, Ni, Ag, and Zn were detected at concentrations above the MDL but below the Project QL Goal in all samples. Se was not detected in any of the sample replicates from all three stations.

Concentrations of dissolved Hg were less than total Hg on average, and therefore, the use of glass and HDPE sample containers did not affect the quality of the trace metal data.

One replicate at Site 69B had an unusually high value for Zn (220 µg/L). This value was about 200 times higher than the values detected in the other two replicates for that station and depth (Appendix B). In the case of this sample, the analyst noted that the Zn concentration was essentially the same for four Zn isotopes scanned by the ICP-MS, indicating that the elevated Zn was not likely the result of instrument interferences. In addition to Zn, concentrations of Cd, Cu, and Pb, also analyzed by ICP-MS, and Hg, analyzed by CVAF, were approximately 2 to 4 times

Table 12. Mean and Standard Deviation (SD) for Concentrations of Metals in Water at Each Station in Rhode Island Sound, October 2001. Values are $\mu\text{g/L}$. $n = 3$.

Site	Site 18											
Depth (m)	1.57			12.83			22.74			33.46		
Parameter	Mean	SD	Q	Mean	SD	Q	Mean	SD	Q	Mean	SD	Q
Arsenic ^a	1.08	0.07		1.10	0.10		1.08	0.12		1.06	0.06	
Cadmium ^a	0.03	0.001		0.03	0.002		0.03	0.004		0.03	0.001	
Chromium ^a	0.21	0.05		0.20	0.02		0.28	0.10		0.60	0.49	
Copper ^a	0.30	0.04		0.33	0.05		0.30	0.05		0.62	0.54	
Lead ^a	0.07	0.01		0.07	0.01		0.06	0.01		0.08	0.04	
Mercury ^a	0.0007	4.51E-05		0.0007	0.0001		0.0007	3.79E-05		0.0008	0.0001	
Total Mercury	0.0011	4.93E-05		0.0010	0.0003		0.0010	0.0003		0.0011	0.0003	
Nickel ^a	0.29	0.05		0.31	0.03		0.32	0.06		0.42	0.12	
Selenium ^a	0.04	0.00	U	0.04	0.00	U	0.04	0.00	U	0.04	0.00	U
Silver ^a	0.02	0.002		0.02	0.002		0.02	0.003		0.02	0.002	
Zinc ^a	0.84	0.08		1.40	0.35		1.35	0.38		1.36	0.84	
Site	Site 69A											
Depth (m)	1.66			11.39			21.57			31.44		
Parameter	Mean	SD	Q	Mean	SD	Q	Mean	SD	Q	Mean	SD	Q
Arsenic ^a	1.04	0.05		1.82	1.34		1.03	0.06		1.09	0.11	
Cadmium ^a	0.04	0.00		0.06	0.04		0.03	0.00		0.04	0.00	
Chromium ^a	0.31	0.10		0.46	0.32		0.22	0.06		0.25	0.06	
Copper ^a	0.35	0.10		0.63	0.43		0.30	0.02		0.29	0.06	
Lead ^a	0.06	0.03		0.12	0.12		0.07	0.02		0.14	0.04	
Mercury ^a	0.0008	5.29E-05		0.0005	0.0002		0.0004	7.37E-05		0.0007	0.0002	
Total Mercury	0.0013	NA ^b		0.0010	NA ^b		0.0010	NA ^b		0.0007	NA ^b	
Nickel ^a	0.74	0.32		0.70	0.57		0.47	0.12		0.36	0.08	
Selenium ^a	0.04	0.00	U	0.06	0.04	U	0.04	0.00	U	0.04	0.00	U
Silver ^a	0.02	0.002		0.04	0.03		0.02	0.01		0.02	0.002	
Zinc ^a	2.58	2.86		1.68	1.23		1.02	0.49		0.82	0.17	
Site	Site 69B											
Depth (m)	1.65			11.73			22.9			32.99		
Parameter	Mean	SD	Q	Mean	SD	Q	Mean	SD	Q	Mean	SD	Q
Arsenic ^a	1.01	0.05		0.87	0.07		1.67	1.15		0.99	0.05	
Cadmium ^a	0.04	0.01		0.03	0.00		0.06	0.04		0.04	0.01	
Chromium ^a	0.26	0.08		0.21	0.01		0.34	0.24		0.28	0.10	
Copper ^a	0.67	0.22		0.33	0.02		0.67	0.52		0.40	0.17	
Lead ^a	0.12	0.11		0.08	0.01		0.11	0.10		0.06	0.01	
Mercury ^a	0.0007	0.0003		0.0007	0.0003		0.0008	0.0002		0.0004	4.36E-05	
Total Mercury	0.0014	NA ^b		0.0009	NA ^b		0.0009	NA ^b		0.0012	NA ^b	
Nickel ^a	0.67	0.29		0.31	0.03		0.61	0.40		0.83	0.52	
Selenium ^a	0.04	0.00	U	0.04	0.00	U	0.04	0.00	U	0.06	0.04	U
Silver ^a	0.03	0.003		0.02	0.0004		0.04	0.03		0.02	0.002	
Zinc ^a	0.80 ^c	0.70 ^c		1.20	0.42		2.41	0.97		1.48	0.84	

^a Dissolved phase only.

^b $n = 1$.

^c $n = 2$. One sample replicate value for zinc was suspect.

U = analyte undetected in all replicates; value is mean of $\frac{1}{2}$ reported method detection limits (MDLs).

higher in this sample replicate as compared to the other two sample replicates at this sampling location. Because these elevated concentrations of Zn, and, to a lesser degree, Cd, Cu, Pb, and Hg, were observed in a single field sample in the analytical batch, and similar elevated concentrations of these metals were not observed in the method blanks or QC samples associated with the analytical batch, the high Zn in Replicate B from Site 69B could most likely be attributed to an isolated case of sample contamination. Because the contamination was observed in the same sample analyzed by both ICP-MS and CVAF for Hg, two separate sample processes, it was more likely a case of field contamination rather than laboratory contamination. Possible sources could have been airborne, shipboard or bottle contamination. The Zn value was considered to be an outlier, was marked as suspect, and was not included in the data interpretation.

Metals concentrations varied slightly with depth at each of the study sites, though no clear pattern was observed (Table 12). At Site 18, dissolved metal concentrations were generally higher and more variable at bottom depth. Dissolved metal concentrations were generally higher in mid-surface waters at Site 69A. Most dissolved metals were detected at higher concentrations at mid-depth at Site 69B. Total mercury concentrations were highest in surface waters at Sites 69A and 69B.

Quality Control Results

Accuracy

Laboratory-achieved MDLs were less than the project QLs for all target analytes. Therefore, the required level of detection for this project was achieved for the analyses performed.

Total suspended solids were measured at levels less than five times the MDL in all blank samples. Target organic analytes were not detected in the procedural blanks analyzed with the field samples. Dissolved metals were either not detected in the procedural blank or detected at concentrations less than five times the MDL. Total and dissolved mercury were not detected in the procedural blank samples.

Recoveries for all organic blank spike samples, matrix spike/matrix spike duplicate (MS/MSD) samples, and surrogate recoveries were within quality control (QC) acceptance criteria, except for 2,4 DDT (28%) in one matrix spike (MS) sample and for 2,4 DDE (133% and 127%) in one set of MS/MSD samples.

Blank spike (BS) recoveries for dissolved metals and total/dissolved mercury were within the QC criteria except for silver (38% and 36%) and chromium (67%). For silver, recoveries of initial and continuing calibration standards analyzed throughout the analytical run ranged from 84% to 101%, within the QC acceptance criteria of 15% (percent difference) from the standard's true value, demonstrating acceptable analytical performance of the GFAA. Acceptable accuracy of silver recovery was also demonstrated by the standard reference material analyses (see below). Recoveries of Ag in blank spike and MS/MSD samples, however, were consistently low, ranging

from 32% to 78%. If laboratory contamination was the suspected cause for the poor spike recovery, concentrations of Ag in the spike samples would have been over-recovered, not under-recovered, as was observed. Concentrations of Ag in the field samples themselves were low; nearly all sample concentrations were less than the Project QL Goal of 0.095 ug/L, and, therefore, were "J"-flagged. Sporadic elevated concentrations of Ag would also have been expected in the samples if contamination was present. Therefore, the analysts determined that the Ag standard used for spiking had degraded or was otherwise compromised. As for chromium, the low recovery in the BS sample seemed to be an anomaly. Since all the other QC samples met the criteria for Cr, reanalysis was deemed unnecessary and would have likely had no effect on the sample results.

MS/MSD recoveries for all target metals were within QC acceptance criteria with the exception of Ag, which was attributable to the same faulty spiking standard discussed above.

The standard reference materials (SRMs) CASS-4 and NASS-4 (for dissolved metals) and SRM 1641d (for mercury) were analyzed at a minimum frequency of 1 per 20 samples. In the absence of an SRM with a certified concentration for Ag, a laboratory-achieved consensus value was calculated for Ag to allow for assessment of accuracy of Ag recovery. SRM 1640, an aqueous laboratory control sample, was also analyzed for all ICP-MS metals and Se. SRM CASS-4 recoveries were within QC acceptance criteria with the exception of Ag in one replicate, and Cr, Ni, and Pb in both replicates. However, the certified concentrations of Cr, Ni, and Pb in CASS-4 were less than their respective project QL goals, and the results should not be used for data quality assessment. SRM NASS-4 recoveries were within QC acceptance criteria with the exception of Cd, Cr, Pb, and Zn. However, the certified concentrations of Cd, Cr, Pb, and Zn in NASS-4 were less than their respective project QL goals. SRMs 1641d and 1640 recoveries were within QC acceptance criteria for total dissolved mercury and for all ICP-MS metals and Se, respectively.

Precision

The RPDs for TSS exceeded the MPC of $\leq 10\%$ for four pairs of sample replicates. In cases where the RPD between TSS replicates exceeded the MPC, the mean concentration for TSS was detected at levels less than 10 times the MDL and, as a result, the RPD exceedance was not a true indicator of a data quality issue. Rather, there was inherently more error in the measurements made at the MDL level thereby resulting in the elevated RPDs. The RPDs for several pesticides were outside of the QC acceptance criteria for one set of MS/MSD samples. All MS/MSD samples had RPD values within the MPC of $\leq 30\%$ for all PCB congeners analyzed. The target organic analytes were not detected in any of laboratory duplicates, making the RPD for lab duplicates not applicable.

For metals, RPDs for MS/MSD samples were within the QC acceptance criteria accept, except for Ag (65%) in one MSD sample and Zn (32%) in the other MSD sample. Laboratory triplicate samples were analyzed for all dissolved metals and total/dissolved mercury. Relative standard deviation (RSD) of triplicate samples were within the QC acceptance criteria of $\pm 30\%$ for all detected metals with the exception of Cr in one set of triplicates (36%). However, the

concentrations of Cr in the set of triplicate samples were below the project QL goal and should not be used for data quality assessment.

Completeness

All of the field samples received by the laboratories were analyzed and results reported.

CONCLUSIONS AND DISCUSSION

The October 2001 water quality survey was completed successfully, with the collection and analysis of 100% of the planned water samples. Two water column profiles were successfully completed at each of the sites. Deviations from the QAPP did not affect the quality of data collected during this survey. Results in this report document the baseline water quality conditions at Rhode Island Sound Sites 18, 69A, and 69B in October 2001.

Weak stratification of the water column (i.e. thermocline or pycnocline) was observed during the October 2001 water quality survey. The water column at each site (Appendix A) was fairly homogeneous in relation to temperature, salinity, dissolved oxygen, and beam attenuation. The concentrations of dissolved oxygen in both the surface and bottom waters were well above the Rhode Island Department of Environmental Management dissolved oxygen criteria for Class SA waters (> 6.0 mg/L). The maximum chlorophyll *a* concentrations of 6-9 µg/L was measured at about ~20m at Site 69A (Appendix B).

Concentrations of organic contaminants were largely undetected in the 36 water samples collected from Rhode Island Sound in October 2001. Metals were detected at low concentrations in all samples, and concentrations were fairly uniform with depth. Detected levels of organic and inorganic contaminants in the water column were well below the ambient water quality guidelines for toxic pollutants (Table 13) adopted by Rhode Island Department of Environmental Management, as required by Section 303(c)(2)(B) of the Clean Water Act (RI DEM 2000).

Table 13. RI DEM Ambient Water Quality Guidelines for Toxic Pollutants.

Chemical Name	Aquatic Life Criteria (µg/L)		Maximum Measured Value (µg/L)
	Saltwater (Acute)	Saltwater (Chronic)	
Arsenic ^c	69	36	3.36
Cadmium ^c	42	9.3	0.11
Chromium VI ^c	1100	50	1.13
Copper ^c	4.8	3.1	1.26
Lead ^c	210	8.1	0.26
Mercury ^c	1.8	0.025	0.0015
Nickel ^c	74	8.2	1.38
Selenium ^c	290	71	0.23 ^d
Silver ^c	1.9	-	0.08
Zinc ^c	90	81	6
Polychlorinated Biphenyls ^b	-	0.03	0.023
Aldrin	1.3 ^a	-	0.0035
Chlordane	0.09 ^a	0.004	0.0014
4,4-DDT	0.13 ^a	0.001	0.0007
4,4-DDE	-	-	0.0011
4,4-DDD	-	-	0.0010
Dieldrin	0.71 ^a	0.0019	0.0016
Endosulfan (Alpha, Beta)	0.034 ^a	0.0087	0.0014 ^d
Endosulfan Sulfate	-	-	0.0007 ^d
Endrin	0.037 ^a	0.0023	0.0012
g-BHC (Lindane)	0.16 ^a	-	0.0012
Heptachlor	0.053 ^a	0.0036	0.0015
Heptachlor Epoxide	0.053 ^a	0.0036	0.0012
Toxaphene	0.21	0.0002	0.2084 ^d

- = No criteria recommendation.

^a The aquatic life criteria for these compounds were issued in 1980 utilizing the 1980 Guidelines for criteria development. The acute values shown are final acute values that, by the 1980 Guidelines, are instantaneous values as contrasted with a Criteria Maximum Concentration (CMC), which is a one-hour average.

^b Polychlorinated Biphenyls criteria apply to each of the following:

PCB 1016, PCB 1248, PCB 1242, PCB 1232, PCB 1254, PCB 1260, PCB 1221

^c Values for metals represent dissolved criteria using the EPA recommended conversion factors, as listed: As = 1.000; Cd = 0.994; Cr (VI) 0.993; Cu = 0.83; Pb = 0.951; Hg = 0.85 (see Note below);

Ni = 0.990; Se = 0.998; Ag = 0.85; Zn = 0.946

NOTE: Conversion factors on this table were calculated for acute criteria only.

Conversion factors for chronic criteria are not currently available. In the absence of chronic conversion factors, saltwater acute conversion factors were used. Chronic criteria for mercury cannot be converted to dissolved because it is based on mercury residues rather than toxicity.

^d Analyte was not detected in any of the sample replicates. The maximum sample-specific MDL is listed.

REFERENCES

- Battelle 2001. Final Quality Assurance Project Plan Rhode Island Sound Disposal Site Study. Task 1 QAPP: Field Sampling, Chemical, and Toxicity Testing. Prepared under Contract No. DACW33-01-D-0004, Delivery Order No. 02. September 2001. 408 pp + Appendices.
- Battelle. 2002a. Fall 2001 Sediment Characterization Report. In preparation.
- Battelle. 2002b. Fall 2001 REMOTS Survey Results. In preparation.
- Battelle. 2002c. Fall 2001 Benthic Community Characterization. In preparation.
- Battelle. 2002d. An Evaluation of the Toxicity of Sediments from the Brenton Reef, Rhode Island Sound Disposal Site to Two Species of Marine Amphipods. In preparation.
- RIDEM. State of Rhode Island and Providence Plantations Department of Environmental Management. 2000. Water Quality Regulations: Regulation EVM 112-88.97-1, Amended June 23, 2000. 34 pp.

APPENDIX A

Hydrographic Data Plots

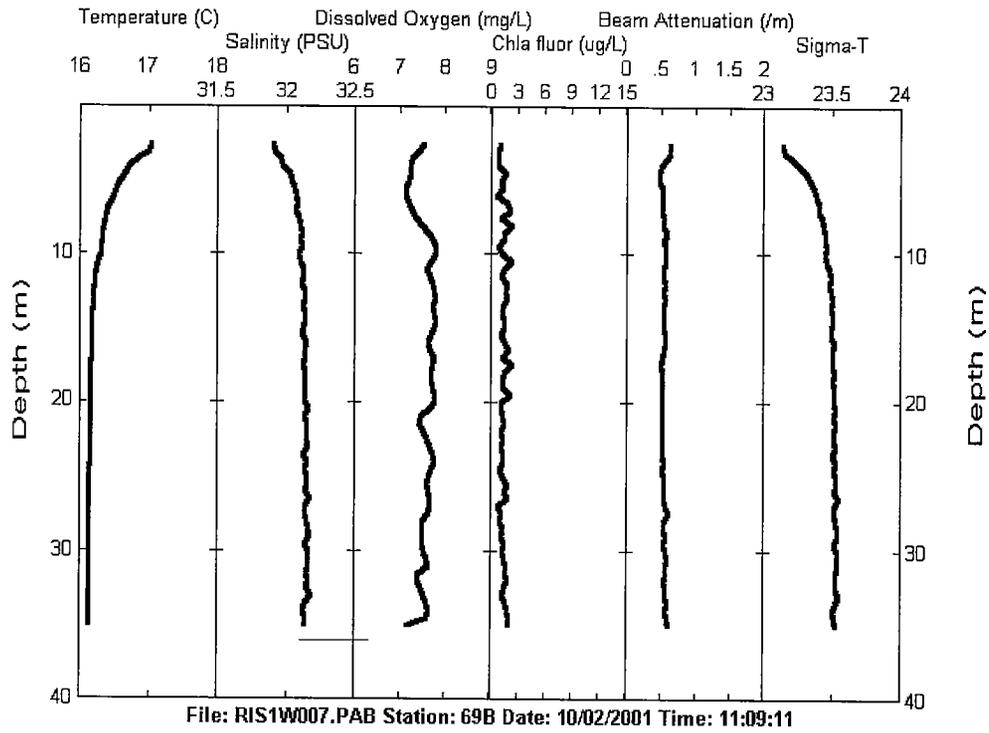


Figure A-1. Station 69B Downcast – Replicate 1.

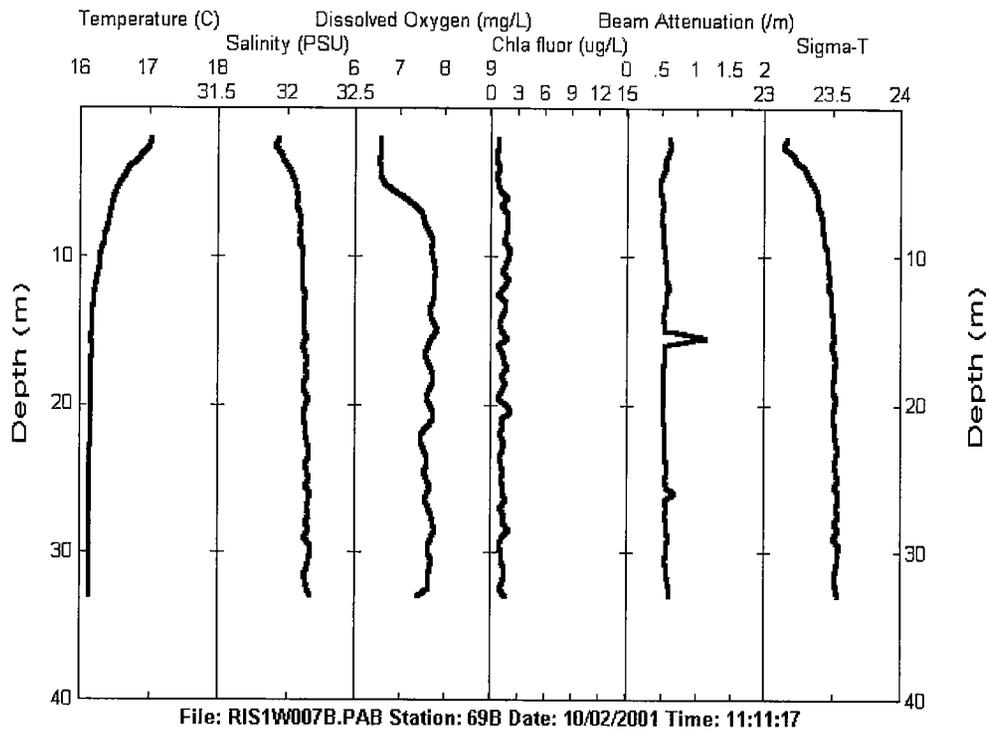


Figure A-2. Station 69B Downcast – Replicate 2.

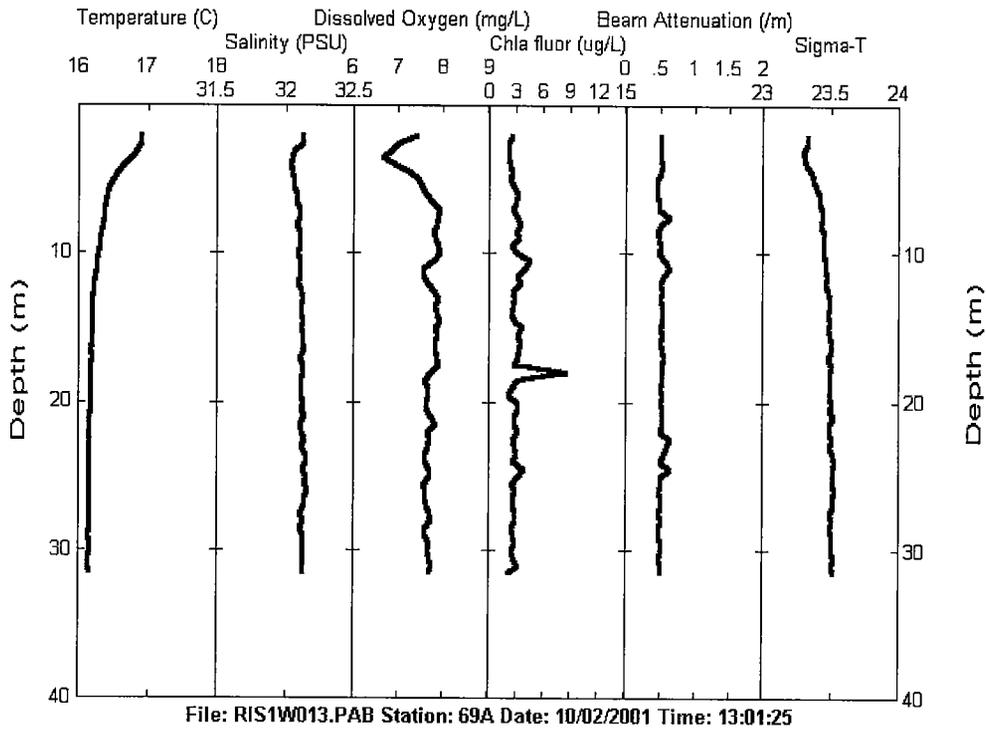


Figure A-3. Station 69A Downcast – Replicate 1.

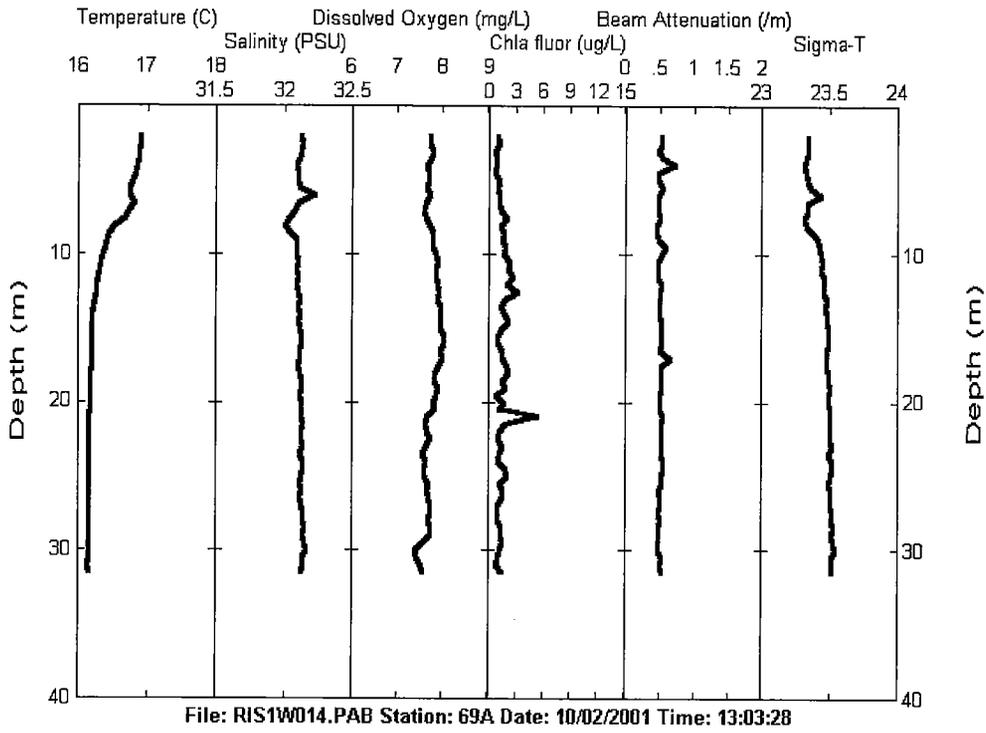


Figure A-4. Station 69A Downcast – Replicate 2.

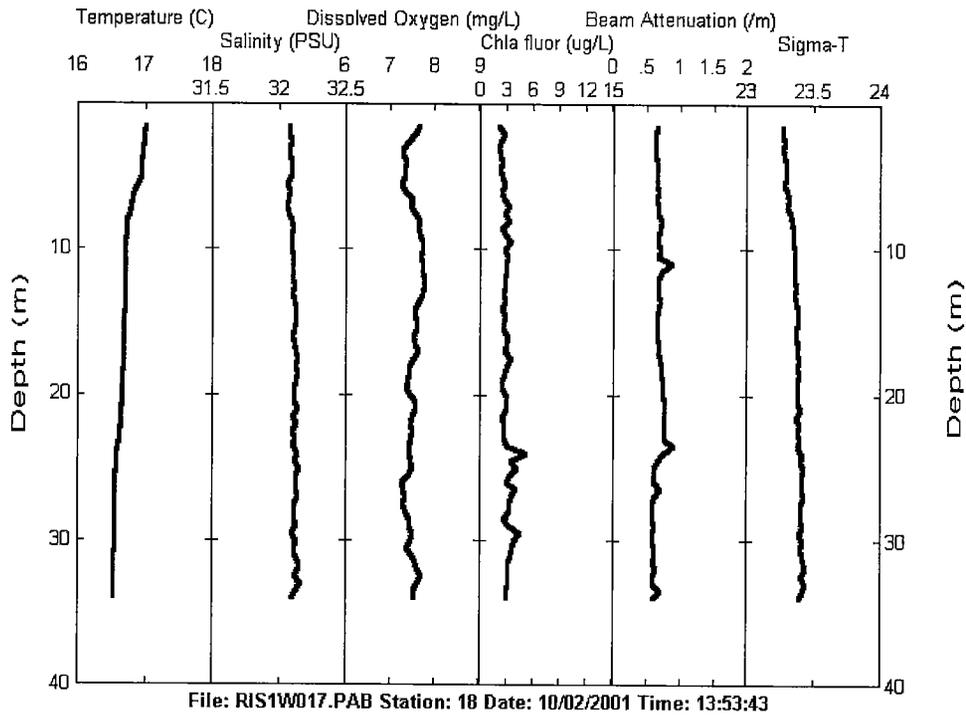


Figure A-5. Station 18 Downcast – Replicate 1.

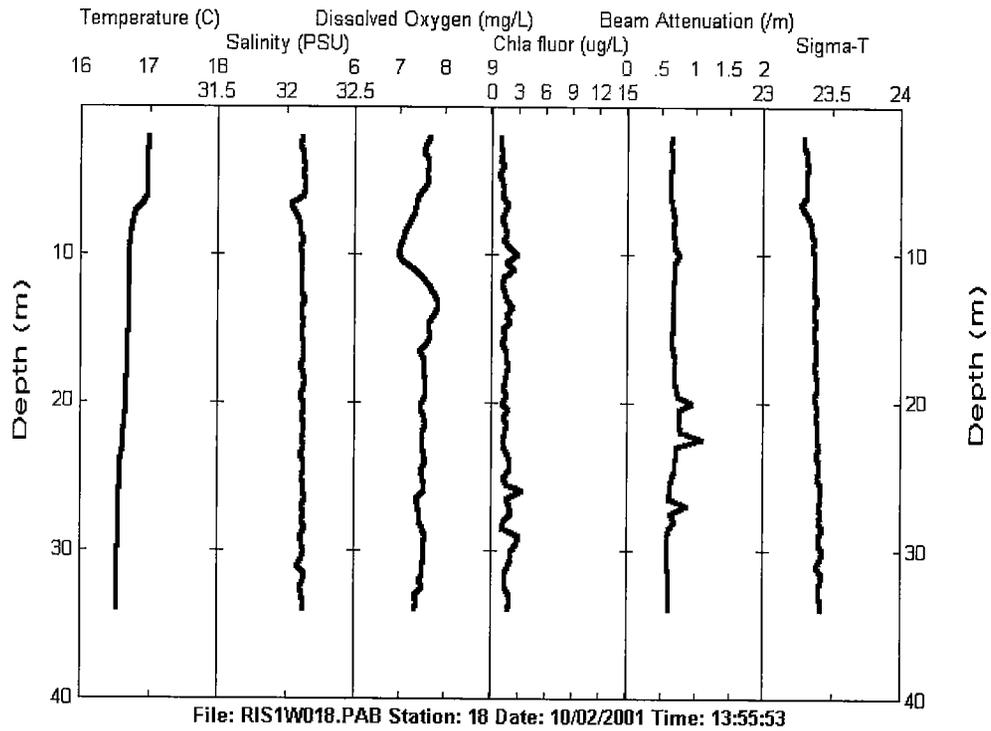


Figure A-6. Station 18 Downcast – Replicate 2.

APPENDIX B

Water Contaminant Sample and Quality Control Data

Definition of Data Qualifiers in Analytical Data Tables

Lab Qualifier	Database Qualifier	Definition
B	B	compound detected at <10 times blank concentration
C and C156	C and C156	PCB 156 and PCB 157 coelute when analyzed by high-resolution mass spectrometry (HRMS). Data for both compounds reported as PCB156
"<" Value with U qualifier	U	compound not detected; MDL reported as value
F	F	result obtained from second column confirmation analysis.
J	J	compound quantified above the MDL but were below the Project QL Goal
N	N	QC value outside accuracy or precision QC criteria
n	n	QC value outside QC criteria but meets contingency criteria
U	f	compound quantified but value reported was below the MDL.

¹ The flagging conventions changed from the time the data were generated by the analytical labs until the time they were loaded into the project database. The lab qualifiers are used in Appendix B and the database qualifiers are used in the text and tables in the report.

Definition of Acronyms in Analytical Data Tables

ACRONYM	Definition
AVG	Average
DUP	Duplicate
EDL	Estimated Detection Limit
EML	Estimated Minimum Level
LCS	Laboratory Control Sample
M_Blank	Method Blank
MS/MSD	Matrix Spike/Matrix Spike Duplicate
PB	Procedural Blank
PD	Percent difference
Q	Qualifier
QL	Quantitation Limit
Rec	Recovery
RPD	Relative Percent Difference
SRM	Standard Reference Material
ssMDL	Sample specific Method Detection Limit
STD	Standard Deviation
TEQ	Toxic Equivalent

QA/QC Summary

Pesticide/PCB – Water QA/QC SUMMARY
QC Batches 01 – 552 & 01 – 553

PROJECT: Rhode Island Sound Disposal Site Study
PARAMETER: Pesticides/PCB
LABORATORY: Battelle, Duxbury, MA
MATRIX: Water
SAMPLE CUSTODY: Water samples were collected on 10/2/01. Samples were received at Battelle Labs, Duxbury, MA on 10/4/01. All samples were received in good condition and no custody issues were noted. Cooler temperatures were all recorded at 4°C (+/- 2 °C). Water samples were stored in the walk-in refrigerator at 4°C until sample preparation could begin.

QA/QC DATA QUALITY OBJECTIVES:

	Reference Method	Blank	Surrogate Recovery	LCS/MS Recovery	SRM % Diff.	Sample Replicate Relative Precision
Pesticide PCB	General NS&T	< RL, or associated samples >10X blank values	40-125% Recovery	40-120% Recovery for at least 90% of analytes. Must be >5x background level.	NA	RPD ≤ 30% for at least 90% of analytes (for analytes detected > 3x RL in dups. and >5x background for MS/MSD)

METHOD: Water samples were extracted for Organics following general NS&T methodologies. Approximately 2 L of water were spiked with SIS and extracted three times with dichloromethane. The combined extract was dried over anhydrous sodium sulfate, concentrated, then cleaned using alumina column and HPLC techniques. Extracts were then further concentrated and fortified with RIS for Pesticide/PCB analysis. Pesticide/PCB extracts were solvent exchanged into hexane, and then analyzed using gas chromatography/electron capture detection (GC/ECD), following general NS&T methods. Quantification was performed using RIS compounds.

HOLDING TIMES: Water samples were stored at 4°C until extraction could begin. All samples were extracted within the 7-day holding time and extracts were analyzed within 40 days.

Samples were extracted in two analytical batches.

Batch	Extraction Date	Analysis Date
01-552	10/9/01	11/3/01 – 11/8/01
01-553	10/9/01	11/8/01 – 11/10/01

BLANKS: A procedural blank (PB) was prepared with the analytical batch. Blanks were analyzed to ensure the sample extraction and analysis methods were free of contamination.

01-552 – 0 exceedences noted.

01-553 – 0 exceedences noted

Comments – None.

Pesticide/PCB – Water QA/QC SUMMARY
QC Batches 01 – 552 & 01 – 553

LABORATORY CONTROL SAMPLE (Blank Spike) A laboratory control sample (LCS) was prepared the analytical batch. The percent recoveries of Pesticides and PCBs were calculated to measure data quality in terms of accuracy.

01-552 – 0 exceedences noted.
01-553 – 0 exceedences noted.

Comments – None.

MATRIX SPIKES/MATRIX SPIKE DUPLICATE: A matrix spike (MS) sample was prepared with the analytical batch. The percent recoveries of Pesticides and PCB were calculated to measure data quality in terms of accuracy. The relative percent difference (RPD) between the two samples was calculated to measure data in terms of precision.

01-552 – 11 exceedences noted (1 % recovery, 10 RPD).
01-553 – 2 exceedences (% recovery only)

Comments – 01-552 - 2,4 DDT was under recovered (28%), in sample ZL31MS. All other percent recoveries were acceptable for both the MS and MSD. Accuracy for 2,4 DDT was demonstrated in sample ZL30LCS and ZL32MSD. The exceeding percent recovery was flagged with an “N” and no further corrective action was taken. In batch 01-552 there was also 10 RPD exceedences between the MS and MSD. These exceedences were flagged with an “N” and no further corrective action was taken.
01-553 – 2,4 DDE was over recovered in both sample ZL35MS and ZL36MSD. These two exceedences were flagged with an “N” and no further corrective action was taken. All RPDs between these two samples were excellent, ranging from 1.4% to 9.5%.

SURROGATES: Two surrogate compounds were added prior to extraction, including PCB (34) and PCB (112). The recovery of each surrogate compound was calculated to measure data quality in terms of accuracy (extraction efficiency).

01-552 – 0 exceedences noted.
01-553 – 0 exceedences noted.

Comments – None.

DUPLICATES: Duplicate samples for sediments were prepared with the analytical batch. The RPD between replicate analyses for Pesticide/PCB is calculated to measure data quality in terms of precision.

01-552 – 0 exceedences noted.
01-553 – 0 exceedences noted.

Comments – Samples in both batches had no significant detections of pesticides or PCBs. Therefore, no useful data for the calculation of RPDs between duplicates was obtained.

SRM: NA

Analytical Data



Field Sample Data

Project Name Rhode Island Sound Disposal Site Study - Task 7
 Project Number G487001-T7WATERDUX

Client ID	RIS1W011-1	RIS1W011-2	RIS1W011-3	RIS1W012-1
Site ID	69B	69B	69B	69B
Battelle ID	W7693	W7694	W7695	W7696
Sample Type	Water	Water	Water	Water
Batch ID	01-552	01-552	01-552	01-552
Extraction Date	10/9/2001	10/9/2001	10/9/2001	10/9/2001
Analysis Date	11/5/2001	11/5/2001	11/5/2001	11/5/2001
Sample Volume (L)	1.00	2.00	2.00	2.00
Reporting Units	ng/L	ng/L	ng/L	ng/L

4,4 DDD	< 0.60 U	< 0.30 U	< 0.30 U	< 0.30 U
4,4 DDE	< 0.84 U	< 0.42 U	< 0.42 U	< 0.42 U
4,4 DDT	< 0.56 U	< 0.28 U	< 0.28 U	< 0.28 U
2,4 DDD	< 0.75 U	< 0.37 U	< 0.37 U	< 0.37 U
2,4 DDE	< 1.71 U	< 0.85 U	< 0.85 U	< 0.85 U
2,4 DDT	< 1.99 U	< 0.99 U	< 0.99 U	< 0.99 U
Total DDD	NA	NA	NA	NA
Total DDE	NA	NA	NA	NA
Total DDT	NA	NA	NA	NA
Aldrin	< 2.83 U	< 1.41 U	< 1.41 U	< 1.41 U
cis Chlordane	< 1.08 U	< 0.54 U	< 0.54 U	< 0.54 U
Dieldrin	< 0.98 U	< 0.49 U	< 0.49 U	< 0.49 U
Endosulfan I	< 1.11 U	< 0.56 U	< 0.56 U	< 0.56 U
Endosulfan II	< 0.51 U	< 0.26 U	< 0.26 U	< 0.26 U
Endosulfan sulfate	< 0.56 U	< 0.28 U	< 0.28 U	< 0.28 U
Endrin	< 0.98 U	< 0.49 U	< 0.49 U	< 0.49 U
g-BHC	< 0.96 U	0.25 U	< 0.48 U	< 0.48 U
Heptachlor	< 1.17 U	< 0.59 U	< 0.59 U	< 0.59 U
Heptachlor epoxide	< 0.95 U	< 0.47 U	< 0.47 U	< 0.47 U
Toxaphene	< 166.70 U	< 83.35 U	< 83.35 U	< 83.35 U
Cl2(08)	< 16.00 U	< 8.00 U	< 8.00 U	< 8.00 U
Cl3(18)	< 1.39 U	< 0.69 U	< 0.69 U	< 0.69 U
Cl3(28)	< 1.73 U	< 0.87 U	< 0.87 U	< 0.87 U
Cl4(44)	< 1.45 U	< 0.73 U	< 0.73 U	< 0.73 U
Cl4(52)	< 1.44 U	< 0.72 U	< 0.72 U	< 0.72 U
Cl4(66)	< 1.49 U	< 0.75 U	< 0.75 U	< 0.75 U
Cl5(101)	< 1.14 U	< 0.57 U	< 0.57 U	< 0.57 U
Cl5(105)	< 0.58 U	< 0.29 U	< 0.29 U	< 0.29 U
Cl5(118)	< 0.87 U	< 0.43 U	< 0.43 U	< 0.43 U
Cl6(128)	< 1.40 U	< 0.70 U	< 0.70 U	< 0.70 U
Cl6(138)	< 1.33 U	< 0.66 U	< 0.66 U	< 0.66 U
Cl6(153)	< 1.07 U	< 0.53 U	< 0.53 U	< 0.53 U
Cl7(170)	< 1.02 U	< 0.51 U	< 0.51 U	< 0.51 U
Cl7(180)	< 0.96 U	< 0.48 U	< 0.48 U	< 0.48 U
Cl7(187)	< 0.86 U	< 0.43 U	< 0.43 U	< 0.43 U
Cl8(195)	0.23 U	< 0.54 U	< 0.54 U	< 0.54 U
Cl9(206)	0.18 U	< 0.61 U	< 0.61 U	< 0.61 U
Cl10(209)	< 1.27 U	< 0.63 U	< 0.63 U	< 0.63 U
Total PCB	17.40	9.07	9.07	9.07

Surrogate Recoveries:

Cl3(34)	70	65	70	65
Cl5(112)	81	87	78	78

U = Not detected or concentration < MDL ;
 project DL goal reported
 <= MDL



Field Sample Data

Project Name Rhode Island Sound C
 Project Number G487001-T7WATERD

Client ID	RIS1W012-2	RIS1W012-3	RIS1W013-1	RIS1W013-2
Site ID	69B	69B	69B	69B
Battelle ID	W7697	W7698	W7699	W7700
Sample Type	Water	Water	Water	Water
Batch ID	01-552	01-552	01-552	01-552
Extraction Date	10/9/2001	10/9/2001	10/9/2001	10/9/2001
Analysis Date	11/6/2001	11/6/2001	11/6/2001	11/6/2001
Sample Volume (L)	2.00	2.00	2.00	2.00
Reporting Units	ng/L	ng/L	ng/L	ng/L

4,4 DDD	< 0.30 U	< 0.30 U	< 0.30 U	< 0.30 U
4,4 DDE	< 0.42 U	< 0.42 U	< 0.42 U	< 0.42 U
4,4 DDT	< 0.28 U	< 0.28 U	< 0.28 U	< 0.28 U
2,4 DDD	< 0.37 U	< 0.37 U	< 0.37 U	< 0.37 U
2,4 DDE	< 0.85 U	< 0.85 U	< 0.85 U	< 0.85 U
2,4 DDT	< 0.99 U	< 0.99 U	< 0.99 U	< 0.99 U
Total DDD	NA	NA	NA	NA
Total DDE	NA	NA	NA	NA
Total DDT	NA	NA	NA	NA
Aldrin	< 1.41 U	< 1.41 U	< 1.41 U	< 1.41 U
cis Chlordane	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U
Dieldrin	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U
Endosulfan I	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U
Endosulfan II	< 0.26 U	< 0.26 U	< 0.26 U	< 0.26 U
Endosulfan sulfate	< 0.28 U	< 0.28 U	< 0.28 U	< 0.28 U
Endrin	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U
g-BHC	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U
Heptachlor	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U
Heptachlor epoxide	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 U
Toxaphene	< 83.35 U	< 83.35 U	< 83.35 U	< 83.35 U
Cl2(08)	< 8.00 U	< 8.00 U	< 8.00 U	< 8.00 U
Cl3(18)	< 0.69 U	< 0.69 U	< 0.69 U	< 0.69 U
Cl3(28)	< 0.87 U	< 0.87 U	< 0.87 U	< 0.87 U
Cl4(44)	< 0.73 U	< 0.73 U	< 0.73 U	< 0.73 U
Cl4(52)	< 0.72 U	< 0.72 U	< 0.72 U	< 0.72 U
Cl4(66)	< 0.75 U	< 0.75 U	< 0.75 U	< 0.75 U
Cl5(101)	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U
Cl5(105)	< 0.29 U	< 0.29 U	< 0.29 U	< 0.29 U
Cl5(118)	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U
Cl6(128)	< 0.70 U	< 0.70 U	< 0.70 U	< 0.70 U
Cl6(138)	< 0.66 U	< 0.66 U	< 0.66 U	< 0.66 U
Cl6(153)	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U
Cl7(170)	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U
Cl7(180)	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U
Cl7(187)	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U
Cl8(195)	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U
Cl9(206)	< 0.61 U	< 0.61 U	< 0.61 U	< 0.61 U
Cl10(209)	< 0.63 U	< 0.63 U	< 0.63 U	< 0.63 U
Total PCB	9.07	9.07	9.07	9.07

Surrogate Recoveries:

Cl3(34)	62	66	69	74
Cl5(112)	76	77	80	86

U = Not detected or concentration < MDL ;
 project DL goal reported
 < = MDL



Field Sample Data

Project Name Rhode Island Sound C
 Project Number G487001-T7WATERD

Client ID	RIS1W013-3	RIS1W014-1	RIS1W014-2	RIS1W014-3
Site ID	69B	69B	69B	69B
Battelle ID	W7701	W7702	W7703	W7704
Sample Type	Water	Water	Water	Water
Batch ID	01-552	01-552	01-552	01-552
Extraction Date	10/9/2001	10/9/2001	10/9/2001	10/9/2001
Analysis Date	11/6/2001	11/6/2001	11/6/2001	11/6/2001
Sample Volume (L)	2.00	1.00	2.00	2.00
Reporting Units	ng/L	ng/L	ng/L	ng/L

4,4 DDD	< 0.30 U	< 0.60 U	< 0.30 U	< 0.30 U
4,4 DDE	< 0.42 U	< 0.84 U	< 0.42 U	< 0.42 U
4,4 DDT	< 0.28 U	< 0.56 U	< 0.28 U	< 0.28 U
2,4 DDD	< 0.37 U	< 0.75 U	< 0.37 U	< 0.37 U
2,4 DDE	< 0.85 U	< 1.71 U	< 0.85 U	< 0.85 U
2,4 DDT	< 0.99 U	< 1.99 U	< 0.99 U	< 0.99 U
Total DDD	NA	NA	NA	NA
Total DDE	NA	NA	NA	NA
Total DDT	NA	NA	NA	NA
Aldrin	< 1.41 U	< 2.83 U	< 1.41 U	< 1.41 U
cis Chlordane	< 0.54 U	< 1.08 U	< 0.54 U	< 0.54 U
Dieldrin	< 0.49 U	< 0.98 U	< 0.49 U	< 0.49 U
Endosulfan I	< 0.56 U	< 1.11 U	< 0.56 U	< 0.56 U
Endosulfan II	< 0.26 U	< 0.51 U	< 0.26 U	< 0.26 U
Endosulfan sulfate	< 0.28 U	< 0.56 U	< 0.28 U	< 0.28 U
Endrin	< 0.49 U	< 0.98 U	< 0.49 U	< 0.49 U
g-BHC	< 0.48 U	< 0.96 U	< 0.48 U	< 0.48 U
Heptachlor	< 0.59 U	< 1.17 U	< 0.59 U	< 0.59 U
Heptachlor epoxide	< 0.47 U	< 0.95 U	< 0.47 U	< 0.47 U
Toxaphene	< 83.35 U	< 166.70 U	< 83.35 U	< 83.35 U
Cl2(08)	< 8.00 U	< 16.00 U	< 8.00 U	< 8.00 U
Cl3(18)	< 0.69 U	< 1.39 U	< 0.69 U	< 0.69 U
Cl3(28)	< 0.87 U	< 1.73 U	< 0.87 U	< 0.87 U
Cl4(44)	< 0.73 U	< 1.45 U	< 0.73 U	< 0.73 U
Cl4(52)	< 0.72 U	< 1.44 U	< 0.72 U	< 0.72 U
Cl4(66)	< 0.75 U	< 1.49 U	< 0.75 U	< 0.75 U
Cl5(101)	< 0.57 U	< 1.14 U	< 0.57 U	< 0.57 U
Cl5(105)	< 0.29 U	< 0.58 U	< 0.29 U	< 0.29 U
Cl5(118)	< 0.43 U	< 0.87 U	< 0.43 U	< 0.43 U
Cl6(128)	< 0.70 U	< 1.40 U	< 0.70 U	< 0.70 U
Cl6(138)	< 0.66 U	< 1.33 U	< 0.66 U	< 0.66 U
Cl6(153)	< 0.53 U	< 1.07 U	< 0.53 U	< 0.53 U
Cl7(170)	< 0.51 U	< 1.02 U	< 0.51 U	< 0.51 U
Cl7(180)	< 0.48 U	< 0.96 U	< 0.48 U	< 0.48 U
Cl7(187)	< 0.43 U	< 0.86 U	< 0.43 U	< 0.43 U
Cl8(195)	< 0.54 U	< 1.09 U	< 0.54 U	< 0.54 U
Cl9(206)	< 0.61 U	< 1.22 U	< 0.61 U	< 0.61 U
Cl10(209)	< 0.63 U	< 1.27 U	< 0.63 U	< 0.63 U
Total PCB	9.07	18.14	9.07	9.07

Surrogate Recoveries:

Cl3(34)	75	64	66	70
Cl5(112)	89	74	77	81

U = Not detected or concentration < MDL ;
 project DL goal reported
 < = MDL



Field Sample Data

Project Name Rhode Island Sound C
 Project Number G487001-T7WATERD

Client ID	RIS1W027-2	RIS1W027-3	RIS1W028-1
Site ID	69A	69A	69A
Battelle ID	W7709-R	W7710-R	W7711-R
Sample Type	Water	Water	Water
Batch ID	01-552	01-552	01-552
Extraction Date	10/9/2001	10/9/2001	10/9/2001
Analysis Date	11/7/2001	11/7/2001	11/7/2001
Sample Volume (L)	2.00	2.00	2.00
Reporting Units	ng/L	ng/L	ng/L

4,4 DDD	< 0.74 U	< 0.74 U	< 0.74 U
4,4 DDE	< 1.05 U	< 1.05 U	< 1.05 U
4,4 DDT	< 0.70 U	< 0.70 U	< 0.70 U
2,4 DDD	< 0.93 U	< 0.93 U	< 0.93 U
2,4 DDE	< 2.13 U	< 2.13 U	< 2.13 U
2,4 DDT	< 2.48 U	< 2.48 U	< 2.48 U
Total DDD	NA	NA	NA
Total DDE	NA	NA	NA
Total DDT	NA	NA	NA
Aldrin	< 3.53 U	< 3.53 U	< 3.53 U
cis Chlordane	< 1.35 U	< 1.35 U	< 1.35 U
Dieldrin	< 1.22 U	< 1.22 U	< 1.22 U
Endosulfan I	< 1.39 U	< 1.39 U	< 1.39 U
Endosulfan II	< 0.64 U	< 0.64 U	< 0.64 U
Endosulfan sulfate	< 0.71 U	< 0.71 U	< 0.71 U
Endrin	< 1.23 U	< 1.23 U	< 1.23 U
g-BHC	< 1.20 U	< 1.20 U	< 1.20 U
Heptachlor	< 1.47 U	< 1.47 U	< 1.47 U
Heptachlor epoxide	< 1.19 U	< 1.19 U	< 1.19 U
Toxaphene	< 208.35 U	< 208.35 U	< 208.35 U
Cl2(08)	< 20.00 U	< 20.00 U	< 20.00 U
Cl3(18)	< 1.73 U	< 1.73 U	< 1.73 U
Cl3(28)	< 2.16 U	< 2.16 U	< 2.16 U
Cl4(44)	< 1.82 U	< 1.82 U	< 1.82 U
Cl4(52)	< 1.79 U	< 1.79 U	< 1.79 U
Cl4(66)	< 1.86 U	< 1.86 U	< 1.86 U
Cl5(101)	< 1.43 U	< 1.43 U	< 1.43 U
Cl5(105)	< 0.72 U	< 0.72 U	< 0.72 U
Cl5(118)	< 1.09 U	< 1.09 U	< 1.09 U
Cl6(128)	< 1.75 U	< 1.75 U	< 1.75 U
Cl6(138)	< 1.66 U	< 1.66 U	< 1.66 U
Cl6(153)	< 1.33 U	< 1.33 U	< 1.33 U
Cl7(170)	< 1.27 U	< 1.27 U	< 1.27 U
Cl7(180)	< 1.20 U	< 1.20 U	< 1.20 U
Cl7(187)	< 1.08 U	< 1.08 U	< 1.08 U
Cl8(195)	< 1.36 U	< 1.36 U	< 1.36 U
Cl9(206)	< 1.52 U	< 1.52 U	< 1.52 U
Cl10(209)	< 1.58 U	< 1.58 U	< 1.58 U
Total PCB	22.68	22.68	22.68

Surrogate Recoveries:

Cl3(34)	68	76	74
Cl5(112)	84	92	91

U = Not detected or concentration < MDL ;
 project DL goal reported
 < = MDL



Procedural Blank Data

Project Name Rhode Island Sound Disposal Site Study - Task 7
Project Number G487001-T7WATERDUX

Client ID NA
Battelle ID ZL29PB
Sample Type Water
Batch ID 01-552
Extraction Date 10/9/2001
Analysis Date 11/3/2001
Sample Volume (L) 2.00
Reporting Units ng/L

4,4 DDD	< 0.30 U
4,4 DDE	< 0.42 U
4,4 DDT	< 0.28 U
2,4 DDD	< 0.37 U
2,4 DDE	< 0.85 U
2,4 DDT	< 0.99 U
Total DDD	NA
Total DDE	NA
Total DDT	NA
Aldrin	< 1.41 U
cis Chlordane	< 0.54 U
Dieldrin	< 0.49 U
Endosulfan I	< 0.56 U
Endosulfan II	< 0.26 U
Endosulfan sulfate	< 0.28 U
Endrin	< 0.49 U
g-BHC	< 0.48 U
Heptachlor	< 0.59 U
Heptachlor epoxide	< 0.47 U
Toxaphene	< 83.35 U
Cl2(08)	< 8.00 U
Cl3(18)	< 0.69 U
Cl3(28)	< 0.87 U
Cl4(44)	< 0.73 U
Cl4(52)	< 0.72 U
Cl4(66)	< 0.75 U
Cl5(101)	< 0.57 U
Cl5(105)	< 0.29 U
Cl5(118)	< 0.43 U
Cl6(128)	< 0.70 U
Cl6(138)	< 0.66 U
Cl6(153)	< 0.53 U
Cl7(170)	< 0.51 U
Cl7(180)	< 0.48 U
Cl7(187)	< 0.43 U
Cl8(195)	0.11 U
Cl9(206)	0.12 U
Cl10(209)	0.10 U
Total PCB	8.50

Surrogate Recoveries:

Cl3(34) 72
Cl5(112) 84

U = Not detected or concentration < MDL; project DL goal reported
< = MDL



Laboratory Control Spike Data

Project Name Rhode Island Sound Disposal Site Study - Task 7
 Project Number G487001-T7WATERDUX

Client ID	NA		
Battelle ID	ZL30LCS		
Sample Type	Water		
Batch ID	01-552		
Extraction Date	10/9/2001		
Analysis Date	11/3/2001		
Sample Volume (L)	2.00		
Reporting Units	FN73	ng/L	% Recovery
4,4 DDD	60.01	26.18	87
4,4 DDE	60.00	27.77	93
4,4 DDT	60.00	28.11	94
2,4 DDD	60.02	26.61	89
2,4 DDE	60.19	20.59	68
2,4 DDT	60.19	14.71	49
Aldrin	60.02	23.17	77
cis Chlordane	60.30	24.67	82
Dieldrin	60.00	28.03	93
Endosulfan I	60.00	23.23	77
Endosulfan II	60.01	15.92	53
Endosulfan sulfate	60.00	25.79	86
Endrin	60.01	26.29	88
g-BHC	60.00	21.46	72
Heptachlor	60.00	23.92	80
Heptachlor epoxide	60.00	24.09	80
Toxaphene	NA	< 83.35 U	NA
Cl2(08)	60.12	26.36 J	88
Cl3(18)	60.12	26.53	88
Cl3(28)	60.00	23.77	79
Cl4(44)	60.00	24.44	81
Cl4(52)	60.36	24.45	81
Cl4(66)	60.00	24.44	81
Cl5(101)	60.24	24.46	81
Cl5(105)	60.00	27.18	91
Cl5(118)	60.12	26.88	89
Cl6(128)	60.36	27.18	90
Cl6(138)	60.12	26.79	89
Cl6(153)	60.12	27.57	92
Cl7(170)	60.24	27.53	91
Cl7(180)	60.24	26.33	87
Cl7(187)	60.00	26.53	88
Cl8(195)	60.24	25.26	84
Cl9(206)	60.12	23.93	80
Cl10(209)	60.00	23.37	78

Surrogate Recoveries:

Cl3(34)	70
Cl5(112)	82

U = Not detected or concentration < MDL; project DL goal reported
 J = Detected at concentration between project QL goal and MDL
 < = MDL



Matrix Spike Data

Project Name Rhode Island Sound Disposal Site Study - Task 7
 Project Number G487001-T7WATERDUX

Client ID	RIS1W014-1	RIS1W014-1	RIS1W014-1						
Site	69B	69B	69B						
Battelle ID	W7702	ZL31MS	ZL32MSD						
Sample Type	Water	Water	Water						
Batch ID	01-552	01-552	01-552						
Extraction Date	10/9/2001	10/9/2001	10/9/2001						
Analysis Date	11/6/2001	11/5/2001	11/5/2001						
Sample Volume (L)	1.00	0.50	0.50						
Reporting Units	ng/L	ng/L	ng/L						
	FN73			%		%	%		
				Recovery		Recovery	RPD		
4,4 DDD	60.01	< 0.60 U	75.85	63		103.07	86	30.4	N
4,4 DDE	60.00	< 0.84 U	92.99	77		126.66	106	30.7	N
4,4 DDT	60.00	< 0.56 U	88.42	74		112.43	94	23.9	
2,4 DDD	60.02	< 0.75 U	80.51	67		108.29	90	29.4	
2,4 DDE	60.19	< 1.71 U	73.82	61		85.19	71	14.3	
2,4 DDT	60.19	< 1.99 U	33.63	28	N	57.90	48	53.0	N
Aldrin	60.02	< 2.83 U	73.12	61		99.26	83	30.3	N
cis Chlordane	60.30	< 1.08 U	78.31	65		107.74	89	31.6	N
Dieldrin	60.00	< 0.98 U	90.21	75		121.80	101	29.8	
Endosulfan I	60.00	< 1.11 U	68.04	57		100.32	84	38.3	N
Endosulfan II	60.01	< 0.51 U	49.45	41		58.83	49	17.3	
Endosulfan sulfate	60.00	< 0.56 U	82.59	69		105.22	88	24.1	
Endrin	60.01	< 0.98 U	79.56	66		110.42	92	32.5	N
g-BHC	60.00	< 0.96 U	59.12	49		87.06	73	38.2	N
Heptachlor	60.00	< 1.17 U	68.45	57		94.31	79	31.8	N
Heptachlor epoxide	60.00	< 0.95 U	71.43	60		100.78	84	34.1	N
Toxaphene	NA	< 166.70 U	< 333.40 U	NA		< 333.40 U	NA	NA	
Cl2(08)	60.12	< 16.00 U	78.90	66		90.47	75	13.7	
Cl3(18)	60.12	< 1.39 U	88.32	73		100.92	84	13.3	
Cl3(28)	60.00	< 1.73 U	80.32	67		102.80	86	24.6	
Cl4(44)	60.00	< 1.45 U	84.63	71		104.19	87	20.7	
Cl4(52)	60.36	< 1.44 U	83.67	69		102.29	85	20.0	
Cl4(66)	60.00	< 1.49 U	82.22	69		106.79	89	26.0	
Cl5(101)	60.24	< 1.14 U	82.86	69		106.55	88	25.0	
Cl5(105)	60.00	< 0.58 U	91.23	76		118.56	99	26.1	
Cl5(118)	60.12	< 0.87 U	92.31	77		115.50	96	22.3	
Cl6(128)	60.36	< 1.40 U	93.68	78		116.53	97	21.7	
Cl6(138)	60.12	< 1.33 U	96.80	81		114.99	96	17.2	
Cl6(153)	60.12	< 1.07 U	94.84	79		119.26	99	22.8	
Cl7(170)	60.24	< 1.02 U	111.04	92		114.81	95	3.3	
Cl7(180)	60.24	< 0.96 U	89.47	74		109.31	91	20.0	
Cl7(187)	60.00	< 0.86 U	92.07	77		112.28	94	19.8	
Cl8(195)	60.24	< 1.09 U	86.25	72		104.71	87	19.3	
Cl9(206)	60.12	< 1.22 U	83.24	69		95.89	80	14.1	
Cl10(209)	60.00	< 1.27 U	82.51	69		93.29	78	12.3	

Surrogate Recoveries:

Cl3(34)	64	60	74
Cl5(112)	74	71	88

U = Not detected or concentration < MDL; project DL goal reported

J = Detected at concentration between project QL goal and MDL

< = MDL

N = QC value outside of accuracy goal



Sample Duplicate Data

Project Name Rhode Island Sound Disposal Site Study - Task 7
 Project Number G487001-T7WATERDUX

Client ID	RIS1W011-1	RIS1W011-1	
Site	69B	69B	
Battelle ID	W7693	W7693DUP-R	
Sample Type	Water	Water	
Batch ID	01-552	01-552	
Extraction Date	10/9/2001	10/9/2001	
Analysis Date	11/5/2001	11/8/2001	
Sample Volume (L)	1.00	1.00	
Reporting Units	ng/L	ng/L	% RPD

4,4 DDD	< 0.60 U	< 1.49 U	NA
4,4 DDE	< 0.84 U	< 2.10 U	NA
4,4 DDT	< 0.56 U	< 1.39 U	NA
2,4 DDD	< 0.75 U	< 1.87 U	NA
2,4 DDE	< 1.71 U	< 4.27 U	NA
2,4 DDT	< 1.99 U	< 4.96 U	NA
Total DDD	NA	NA	NA
Total DDE	NA	NA	NA
Total DDT	NA	NA	NA
Aldrin	< 2.83 U	< 7.07 U	NA
cis Chlordane	< 1.08 U	< 2.69 U	NA
Dieldrin	< 0.98 U	< 2.45 U	NA
Endosulfan I	< 1.11 U	< 2.77 U	NA
Endosulfan II	< 0.51 U	< 1.28 U	NA
Endosulfan sulfate	< 0.56 U	< 1.41 U	NA
Endrin	< 0.98 U	< 2.45 U	NA
g-BHC	< 0.96 U	< 2.41 U	NA
Heptachlor	< 1.17 U	< 2.94 U	NA
Heptachlor epoxide	< 0.95 U	< 2.37 U	NA
Toxaphene	< 166.70 U	< 416.70 U	NA
Cl2(08)	< 16.00 U	< 40.01 U	NA
Cl3(18)	< 1.39 U	< 3.46 U	NA
Cl3(28)	< 1.73 U	< 4.32 U	NA
Cl4(44)	< 1.45 U	< 3.64 U	NA
Cl4(52)	< 1.44 U	< 3.59 U	NA
Cl4(66)	< 1.49 U	< 3.73 U	NA
Cl5(101)	< 1.14 U	< 2.86 U	NA
Cl5(105)	< 0.58 U	< 1.44 U	NA
Cl5(118)	< 0.87 U	< 2.17 U	NA
Cl6(128)	< 1.40 U	< 3.50 U	NA
Cl6(138)	< 1.33 U	< 3.31 U	NA
Cl6(153)	< 1.07 U	< 2.66 U	NA
Cl7(170)	< 1.02 U	< 2.54 U	NA
Cl7(180)	< 0.96 U	< 2.40 U	NA
Cl7(187)	< 0.86 U	< 2.16 U	NA
Cl8(195)	0.23 U	< 2.71 U	NA
Cl9(206)	0.18 U	< 3.04 U	NA
Cl10(209)	< 1.27 U	< 3.16 U	NA
Total PCB	17.40	45.36	NA

Surrogate Recoveries:

Cl3(34)	70	75
Cl5(112)	81	85

U = Not detected or concentration < MDL; project DL goal reported
 < = MDL



Field Sample Data

Project Name Rhode Island Sound Disposal Site Study - Task 7
 Project Number G487001-T7WATERDUX

Client ID	RIS1W028-2	RIS1W028-3	RIS1W029-1	RIS1W029-2
Site	69A	69A	69A	69A
Battelle ID	W7712	W7713	W7714	W7715
Sample Type	Water	Water	Water	Water
Batch ID	01-553	01-553	01-553	01-553
Extraction Date	10/9/2001	10/9/2001	10/9/2001	10/9/2001
Analysis Date	11/8/2001	11/8/2001	11/8/2001	11/8/2001
Sample Volume (L)	1.00	1.00	2.00	2.00
Reporting Units	ng/L	ng/L	ng/L	ng/L
<hr/>				
4,4 DDD	< 0.60 U	< 0.60 U	< 0.30 U	< 0.30 U
4,4 DDE	< 0.84 U	< 0.84 U	< 0.42 U	< 0.42 U
4,4 DDT	< 0.56 U	< 0.56 U	< 0.28 U	< 0.28 U
2,4 DDD	< 0.75 U	< 0.75 U	< 0.37 U	< 0.37 U
2,4 DDE	< 1.71 U	< 1.71 U	< 0.85 U	< 0.85 U
2,4 DDT	< 1.99 U	< 1.99 U	< 0.99 U	< 0.99 U
Total DDD	NA	NA	NA	NA
Total DDE	NA	NA	NA	NA
Total DDT	NA	NA	NA	NA
Aldrin	< 2.83 U	< 2.83 U	< 1.41 U	< 1.41 U
cis Chlordane	< 1.08 U	< 1.08 U	< 0.54 U	< 0.54 U
Dieldrin	1.63 J	< 0.98 U	< 0.49 U	< 0.49 U
Endosulfan I	< 1.11 U	< 1.11 U	< 0.56 U	< 0.56 U
Endosulfan II	< 0.51 U	< 0.51 U	< 0.26 U	< 0.26 U
Endosulfan sulfate	< 0.56 U	< 0.56 U	< 0.28 U	< 0.28 U
Endrin	< 0.98 U	< 0.98 U	< 0.49 U	< 0.49 U
g-BHC	< 0.96 U	< 0.96 U	< 0.48 U	< 0.48 U
Heptachlor	< 1.17 U	< 1.17 U	< 0.59 U	< 0.59 U
Heptachlor epoxide	< 0.95 U	< 0.95 U	< 0.47 U	< 0.47 U
Toxaphene	< 166.70 U	< 166.70 U	< 83.35 U	< 83.35 U
Cl2(08)	< 16.00 U	< 16.00 U	< 8.00 U	< 8.00 U
Cl3(18)	< 1.39 U	< 1.39 U	< 0.69 U	< 0.69 U
Cl3(28)	< 1.73 U	< 1.73 U	< 0.87 U	< 0.87 U
Cl4(44)	< 1.45 U	< 1.45 U	< 0.73 U	< 0.73 U
Cl4(52)	< 1.44 U	< 1.44 U	< 0.72 U	< 0.72 U
Cl4(66)	< 1.49 U	< 1.49 U	< 0.75 U	< 0.75 U
Cl5(101)	0.35 U	< 1.14 U	< 0.57 U	< 0.57 U
Cl5(105)	< 0.58 U	< 0.58 U	< 0.29 U	< 0.29 U
Cl5(118)	< 0.87 U	< 0.87 U	< 0.43 U	< 0.43 U
Cl6(128)	< 1.40 U	< 1.40 U	< 0.70 U	< 0.70 U
Cl6(138)	< 1.33 U	< 1.33 U	< 0.66 U	< 0.66 U
Cl6(153)	< 1.07 U	< 1.07 U	< 0.53 U	< 0.53 U
Cl7(170)	< 1.02 U	< 1.02 U	< 0.51 U	< 0.51 U
Cl7(180)	< 0.96 U	< 0.96 U	< 0.48 U	< 0.48 U
Cl7(187)	< 0.86 U	< 0.86 U	< 0.43 U	< 0.43 U
Cl8(195)	0.22 U	< 1.09 U	< 0.54 U	< 0.54 U
Cl9(206)	0.17 U	< 1.22 U	< 0.61 U	< 0.61 U
Cl10(209)	0.18 U	< 1.27 U	< 0.63 U	< 0.63 U
Total PCB	16.71	18.14	9.07	9.07

Surrogate Recoveries:

Cl3(34)	65	63	62	62
Cl5(112)	76	73	81	74

U = Not detected or concentration < MDL;
 project DL goal reported
 < = MDL



Field Sample Data

Project Name Rhode Island :
Project Number G487001-T7W

Client ID	RIS1W029-3	RIS1W034-1	RIS1W034-2	RIS1W034-3
Site	69A	18	18	18
Battelle ID	W7716	W7717	W7718	W7719
Sample Type	Water	Water	Water	Water
Batch ID	01-553	01-553	01-553	01-553
Extraction Date	10/9/2001	10/9/2001	10/9/2001	10/9/2001
Analysis Date	11/9/2001	11/9/2001	11/9/2001	11/9/2001
Sample Volume (L)	2.00	2.00	2.00	2.00
Reporting Units	ng/L	ng/L	ng/L	ng/L
<hr/>				
4,4 DDD	< 0.30 U	< 0.30 U	< 0.30 U	< 0.30 U
4,4 DDE	< 0.42 U	< 0.42 U	< 0.42 U	< 0.42 U
4,4 DDT	< 0.28 U	< 0.28 U	< 0.28 U	< 0.28 U
2,4 DDD	< 0.37 U	< 0.37 U	< 0.37 U	< 0.37 U
2,4 DDE	< 0.85 U	< 0.85 U	< 0.85 U	< 0.85 U
2,4 DDT	< 0.99 U	< 0.99 U	< 0.99 U	< 0.99 U
Total DDD	NA	NA	NA	NA
Total DDE	NA	NA	NA	NA
Total DDT	NA	NA	NA	NA
Aldrin	< 1.41 U	< 1.41 U	< 1.41 U	< 1.41 U
cis Chlordane	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U
Dieldrin	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U
Endosulfan I	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U
Endosulfan II	< 0.26 U	< 0.26 U	< 0.26 U	< 0.26 U
Endosulfan sulfate	< 0.28 U	< 0.28 U	< 0.28 U	< 0.28 U
Endrin	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U
g-BHC	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U
Heptachlor	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U
Heptachlor epoxide	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 U
Toxaphene	< 83.35 U	< 83.35 U	< 83.35 U	< 83.35 U
Cl2(08)	< 8.00 U	< 8.00 U	< 8.00 U	< 8.00 U
Cl3(18)	< 0.69 U	< 0.69 U	< 0.69 U	< 0.69 U
Cl3(28)	< 0.87 U	< 0.87 U	< 0.87 U	< 0.87 U
Cl4(44)	< 0.73 U	< 0.73 U	< 0.73 U	< 0.73 U
Cl4(52)	< 0.72 U	< 0.72 U	< 0.72 U	< 0.72 U
Cl4(66)	< 0.75 U	< 0.75 U	< 0.75 U	< 0.75 U
Cl5(101)	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U
Cl5(105)	< 0.29 U	< 0.29 U	< 0.29 U	< 0.29 U
Cl5(118)	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U
Cl6(128)	< 0.70 U	< 0.70 U	< 0.70 U	< 0.70 U
Cl6(138)	< 0.66 U	< 0.66 U	< 0.66 U	< 0.66 U
Cl6(153)	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U
Cl7(170)	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U
Cl7(180)	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U
Cl7(187)	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U
Cl8(195)	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U
Cl9(206)	< 0.61 U	< 0.61 U	< 0.61 U	< 0.61 U
Cl10(209)	< 0.63 U	< 0.63 U	< 0.63 U	< 0.63 U
Total PCB	9.07	9.07	9.07	9.07
<hr/>				

Surrogate Recoveries:

Cl3(34)	71	70	75	69
Cl5(112)	83	81	86	79

U = Not detected or concentration < MDL;
project DL goal reported
< = MDL



Field Sample Data

Project Name Rhode Island :
Project Number G487001-T7W

Client ID	RIS1W035-1	RIS1W035-2	RIS1W035-3	RIS1W036-1
Site	18	18	18	18
Battelle ID	W7720	W7721	W7722	W7723
Sample Type	Water	Water	Water	Water
Batch ID	01-553	01-553	01-553	01-553
Extraction Date	10/9/2001	10/9/2001	10/9/2001	10/9/2001
Analysis Date	11/9/2001	11/9/2001	11/9/2001	11/10/2001
Sample Volume (L)	2.00	2.00	2.00	2.00
Reporting Units	ng/L	ng/L	ng/L	ng/L

4,4 DDD	< 0.30 U	1.03 J	< 0.30 U	< 0.30 U
4,4 DDE	< 0.42 U	0.47 J	< 0.42 U	< 0.42 U
4,4 DDT	< 0.28 U	0.71 J	< 0.28 U	< 0.28 U
2,4 DDD	< 0.37 U	0.58 J	< 0.37 U	< 0.37 U
2,4 DDE	< 0.85 U	0.55 U	< 0.85 U	< 0.85 U
2,4 DDT	< 0.99 U	0.53 U	< 0.99 U	< 0.99 U
Total DDD	NA	1.60	NA	NA
Total DDE	NA	1.03	NA	NA
Total DDT	NA	1.23	NA	NA
Aldrin	< 1.41 U	0.35 U	< 1.41 U	< 1.41 U
cis Chlordane	< 0.54 U	0.58 J	< 0.54 U	< 0.54 U
Dieldrin	< 0.49 U	1.29 J	< 0.49 U	< 0.49 U
Endosulfan I	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U
Endosulfan II	< 0.26 U	< 0.26 U	< 0.26 U	< 0.26 U
Endosulfan sulfate	< 0.28 U	< 0.28 U	< 0.28 U	< 0.28 U
Endrin	< 0.49 U	0.64 J	< 0.49 U	< 0.49 U
g-BHC	< 0.48 U	0.56 J	< 0.48 U	< 0.48 U
Heptachlor	< 0.59 U	0.61 J	< 0.59 U	< 0.59 U
Heptachlor epoxide	< 0.47 U	0.61 J	< 0.47 U	< 0.47 U
Toxaphene	< 83.35 U	< 83.35 U	< 83.35 U	< 83.35 U
Cl2(08)	< 8.00 U	0.44 U	< 8.00 U	< 8.00 U
Cl3(18)	< 0.69 U	0.57 U	< 0.69 U	< 0.69 U
Cl3(28)	< 0.87 U	0.37 U	< 0.87 U	< 0.87 U
Cl4(44)	< 0.73 U	0.60 U	< 0.73 U	< 0.73 U
Cl4(52)	< 0.72 U	0.75 J	< 0.72 U	< 0.72 U
Cl4(66)	< 0.75 U	0.56 U	< 0.75 U	< 0.75 U
Cl5(101)	< 0.57 U	0.49 U	< 0.57 U	< 0.57 U
Cl5(105)	< 0.29 U	0.74 J	< 0.29 U	< 0.29 U
Cl5(118)	< 0.43 U	0.41 U	< 0.43 U	< 0.43 U
Cl6(128)	< 0.70 U	0.44 U	< 0.70 U	< 0.70 U
Cl6(138)	< 0.66 U	0.92 J	< 0.66 U	< 0.66 U
Cl6(153)	< 0.53 U	0.68 J	< 0.53 U	< 0.53 U
Cl7(170)	< 0.51 U	0.74 J	< 0.51 U	< 0.51 U
Cl7(180)	< 0.48 U	0.53 J	< 0.48 U	< 0.48 U
Cl7(187)	< 0.43 U	0.51 J	< 0.43 U	< 0.43 U
Cl8(195)	< 0.54 U	0.46 U	< 0.54 U	0.29 U
Cl9(206)	< 0.61 U	0.46 U	< 0.61 U	< 0.61 U
Cl10(209)	< 0.63 U	0.47 U	< 0.63 U	0.33 U
Total PCB	9.07	10.13	9.07	9.11

Surrogate Recoveries:

Cl3(34)	52	67	67	68
Cl5(112)	62	78	74	79

U = Not detected or concentration < MDL;
project DL goal reported
<= MDL



Field Sample Data

Project Name Rhode Island :
Project Number G487001-T7W

Client ID	RIS1W036-2	RIS1W036-3	RIS1W037-1	RIS1W037-2
Site	18	18	18	18
Battelle ID	W7724	W7725	W7726	W7727
Sample Type	Water	Water	Water	Water
Batch ID	01-553	01-553	01-553	01-553
Extraction Date	10/9/2001	10/9/2001	10/9/2001	10/9/2001
Analysis Date	11/10/2001	11/10/2001	11/10/2001	11/10/2001
Sample Volume (L)	2.00	2.00	2.00	2.00
Reporting Units	ng/L	ng/L	ng/L	ng/L
<hr/>				
4,4 DDD	< 0.30 U	< 0.30 U	< 0.30 U	< 0.30 U
4,4 DDE	< 0.42 U	< 0.42 U	< 0.42 U	< 0.42 U
4,4 DDT	< 0.28 U	< 0.28 U	< 0.28 U	< 0.28 U
2,4 DDD	< 0.37 U	< 0.37 U	< 0.37 U	< 0.37 U
2,4 DDE	< 0.85 U	< 0.85 U	< 0.85 U	< 0.85 U
2,4 DDT	< 0.99 U	< 0.99 U	< 0.99 U	< 0.99 U
Total DDD	NA	NA	NA	NA
Total DDE	NA	NA	NA	NA
Total DDT	NA	NA	NA	NA
Aldrin	< 1.41 U	< 1.41 U	< 1.41 U	< 1.41 U
cis Chlordane	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U
Dieldrin	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U
Endosulfan I	< 0.56 U	< 0.56 U	< 0.56 U	< 0.56 U
Endosulfan II	< 0.26 U	< 0.26 U	< 0.26 U	< 0.26 U
Endosulfan sulfate	< 0.28 U	< 0.28 U	< 0.28 U	< 0.28 U
Endrin	< 0.49 U	< 0.49 U	< 0.49 U	< 0.49 U
g-BHC	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U
Heptachlor	< 0.59 U	< 0.59 U	< 0.59 U	< 0.59 U
Heptachlor epoxide	< 0.47 U	< 0.47 U	< 0.47 U	< 0.47 U
Toxaphene	< 83.35 U	< 83.35 U	< 83.35 U	< 83.35 U
Cl2(08)	< 8.00 U	< 8.00 U	< 8.00 U	< 8.00 U
Cl3(18)	< 0.69 U	< 0.69 U	< 0.69 U	< 0.69 U
Cl3(28)	< 0.87 U	< 0.87 U	< 0.87 U	< 0.87 U
Cl4(44)	< 0.73 U	< 0.73 U	< 0.73 U	< 0.73 U
Cl4(52)	< 0.72 U	< 0.72 U	< 0.72 U	< 0.72 U
Cl4(66)	< 0.75 U	< 0.75 U	< 0.75 U	< 0.75 U
Cl5(101)	< 0.57 U	< 0.57 U	< 0.57 U	< 0.57 U
Cl5(105)	< 0.29 U	< 0.29 U	< 0.29 U	< 0.29 U
Cl5(118)	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U
Cl6(128)	< 0.70 U	< 0.70 U	< 0.70 U	< 0.70 U
Cl6(138)	< 0.66 U	< 0.66 U	< 0.66 U	< 0.66 U
Cl6(153)	< 0.53 U	< 0.53 U	< 0.53 U	< 0.53 U
Cl7(170)	< 0.51 U	< 0.51 U	< 0.51 U	< 0.51 U
Cl7(180)	< 0.48 U	< 0.48 U	< 0.48 U	< 0.48 U
Cl7(187)	< 0.43 U	< 0.43 U	< 0.43 U	< 0.43 U
Cl8(195)	< 0.54 U	< 0.54 U	< 0.54 U	< 0.54 U
Cl9(206)	< 0.61 U	< 0.61 U	< 0.61 U	< 0.61 U
Cl10(209)	< 0.63 U	< 0.63 U	< 0.63 U	< 0.63 U
Total PCB	9.07	9.07	9.07	9.07
<hr/>				
<i>Surrogate Recoveries:</i>				
Cl3(34)	68	69	64	68
Cl5(112)	79	83	75	85

U = Not detected or concentration < MDL;
project DL goal reported
< = MDL



Field Sample Data

Project Name Rhode Island :
 Project Number G487001-T7W

Client ID	RIS1W037-3	Rinsate Blank	3 of 4 STA 18
Site	18		18
Battelle ID	W7728	W7729	W7730
Sample Type	Water	Water	Water
Batch ID	01-553	01-553	01-553
Extraction Date	10/9/2001	10/9/2001	10/9/2001
Analysis Date	11/10/2001	11/10/2001	11/10/2001
Sample Volume (L)	2.00	2.00	2.00
Reporting Units	ng/L	ng/L	ng/L
<hr/>			
4,4 DDD	< 0.30 U	< 0.30 U	< 0.30 U
4,4 DDE	< 0.42 U	< 0.42 U	< 0.42 U
4,4 DDT	< 0.28 U	< 0.28 U	< 0.28 U
2,4 DDD	< 0.37 U	< 0.37 U	< 0.37 U
2,4 DDE	< 0.85 U	< 0.85 U	< 0.85 U
2,4 DDT	< 0.99 U	< 0.99 U	< 0.99 U
Total DDD	NA	NA	NA
Total DDE	NA	NA	NA
Total DDT	NA	NA	NA
Aldrin	< 1.41 U	< 1.41 U	< 1.41 U
cis Chlordane	< 0.54 U	< 0.54 U	< 0.54 U
Dieldrin	< 0.49 U	< 0.49 U	< 0.49 U
Endosulfan I	< 0.56 U	< 0.56 U	< 0.56 U
Endosulfan II	< 0.26 U	< 0.26 U	< 0.26 U
Endosulfan sulfate	< 0.28 U	< 0.28 U	< 0.28 U
Endrin	< 0.49 U	< 0.49 U	< 0.49 U
g-BHC	< 0.48 U	< 0.48 U	< 0.48 U
Heptachlor	< 0.59 U	< 0.59 U	< 0.59 U
Heptachlor epoxide	< 0.47 U	< 0.47 U	< 0.47 U
Toxaphene	< 83.35 U	< 83.35 U	< 83.35 U
Cl2(08)	< 8.00 U	< 8.00 U	< 8.00 U
Cl3(18)	< 0.69 U	< 0.69 U	< 0.69 U
Cl3(28)	< 0.87 U	< 0.87 U	< 0.87 U
Cl4(44)	< 0.73 U	< 0.73 U	< 0.73 U
Cl4(52)	< 0.72 U	< 0.72 U	< 0.72 U
Cl4(66)	< 0.75 U	< 0.75 U	< 0.75 U
Cl5(101)	< 0.57 U	< 0.57 U	< 0.57 U
Cl5(105)	< 0.29 U	< 0.29 U	< 0.29 U
Cl5(118)	< 0.43 U	< 0.43 U	< 0.43 U
Cl6(128)	< 0.70 U	< 0.70 U	< 0.70 U
Cl6(138)	< 0.66 U	< 0.66 U	< 0.66 U
Cl6(153)	< 0.53 U	< 0.53 U	< 0.53 U
Cl7(170)	< 0.51 U	< 0.51 U	< 0.51 U
Cl7(180)	< 0.48 U	< 0.48 U	< 0.48 U
Cl7(187)	< 0.43 U	< 0.43 U	< 0.43 U
Cl8(195)	< 0.54 U	< 0.54 U	< 0.54 U
Cl9(206)	< 0.61 U	< 0.61 U	< 0.61 U
Cl10(209)	< 0.63 U	< 0.63 U	< 0.63 U
Total PCB	9.07	9.07	9.07
<hr/>			

Surrogate Recoveries:

Cl3(34)	79	71	62
Cl5(112)	86	89	72

U = Not detected or concentration < MDL;
 project DL goal reported
 < = MDL



Sample Duplicate Data

Project Name Rhode Island Sound Disposal Site Study - Task 7
 Project Number G487001-T7WATERDUX

Client ID	RIS1W028-2	RIS1W028-2	
Site	69A	69A	
Battelle ID	W7712	W7712DUP	
Sample Type	Water	Water	
Batch ID	01-553	01-553	
Extraction Date	10/9/2001	10/9/2001	
Analysis Date	11/8/2001	11/10/2001	
Sample Volume (L)	1.00	1.00	
Reporting Units	ng/L	ng/L	% RPD

4,4 DDD	< 0.60 U	< 0.60 U	NA
4,4 DDE	< 0.84 U	< 0.84 U	NA
4,4 DDT	< 0.56 U	< 0.56 U	NA
2,4 DDD	< 0.75 U	< 0.75 U	NA
2,4 DDE	< 1.71 U	< 1.71 U	NA
2,4 DDT	< 1.99 U	< 1.99 U	NA
Total DDD	NA	NA	NA
Total DDE	NA	NA	NA
Total DDT	NA	NA	NA
Aldrin	< 2.83 U	< 2.83 U	NA
cis Chlordane	< 1.08 U	< 1.08 U	NA
Dieldrin	1.63 J	< 0.98 U	NA
Endosulfan I	< 1.11 U	< 1.11 U	NA
Endosulfan II	< 0.51 U	< 0.51 U	NA
Endosulfan sulfate	< 0.56 U	< 0.56 U	NA
Endrin	< 0.98 U	< 0.98 U	NA
g-BHC	< 0.96 U	< 0.96 U	NA
Heptachlor	< 1.17 U	< 1.17 U	NA
Heptachlor epoxide	< 0.95 U	< 0.95 U	NA
Toxaphene	< 166.70 U	< 166.70 U	NA
Cl2(08)	< 16.00 U	< 16.00 U	NA
Cl3(18)	< 1.39 U	< 1.39 U	NA
Cl3(28)	< 1.73 U	< 1.73 U	NA
Cl4(44)	< 1.45 U	< 1.45 U	NA
Cl4(52)	< 1.44 U	< 1.44 U	NA
Cl4(66)	< 1.49 U	< 1.49 U	NA
Cl5(101)	0.35 U	< 1.14 U	NA
Cl5(105)	< 0.58 U	< 0.58 U	NA
Cl5(118)	< 0.87 U	< 0.87 U	NA
Cl6(128)	< 1.40 U	< 1.40 U	NA
Cl6(138)	< 1.33 U	< 1.33 U	NA
Cl6(153)	< 1.07 U	< 1.07 U	NA
Cl7(170)	< 1.02 U	< 1.02 U	NA
Cl7(180)	< 0.96 U	< 0.96 U	NA
Cl7(187)	< 0.86 U	< 0.86 U	NA
Cl8(195)	0.22 U	< 1.09 U	NA
Cl9(206)	0.17 U	< 1.22 U	NA
Cl10(209)	0.18 U	< 1.27 U	NA
Total PCB	16.71	18.14	NA

Surrogate Recoveries:

Cl3(34)	65	71
Cl5(112)	76	81

U = Not detected or concentration < MDL; project DL goal reported
 < = MDL

Project Name Rhode Island Sound Disposal Site Study - Task 7
Project Number G487001-T7WATERDUX

Client ID	RIS1W028-3	RIS1W028-3	RIS1W028-3						
Site	69A	69A	69A						
Battelle ID	W7713	ZL35MS	ZL36MSD						
Sample Type	Water	Water	Water						
Batch ID	01-553	01-553	01-553						
Extraction Date	10/9/2001	10/9/2001	10/9/2001						
Analysis Date	11/8/001	11/8/2001	11/8/2001						
Sample Volume (L)	1	0.50	0.50						
Reporting Units	ng/L	ng/L	ng/L						
	FN73			% Recovery		% Recovery	% RPD		
4,4 DDD	60.01	< 0.60 U	117.82	98		113.37	94	3.9	
4,4 DDE	60.00	< 0.84 U	126.85	106		123.36	103	2.8	
4,4 DDT	60.00	< 0.56 U	127.75	106		122.20	102	4.4	
2,4 DDD	60.02	< 0.75 U	125.10	104		117.42	98	6.3	
2,4 DDE	60.19	< 1.71 U	159.83	133	N	152.74	127	N	4.5
2,4 DDT	60.19	< 1.99 U	81.90	68		90.11	75	9.5	
Aldrin	60.02	< 2.83 U	102.80	86		99.18	83	3.6	
cis Chlordane	60.30	< 1.08 U	114.70	95		110.38	92	3.8	
Dieldrin	60.00	< 0.98 U	127.02	106		123.21	103	3.0	
Endosulfan I	60.00	< 1.11 U	97.73	81		95.94	80	1.9	
Endosulfan II	60.01	< 0.51 U	111.84	93		113.40	94	1.4	
Endosulfan sulfate	60.00	< 0.56 U	116.10	97		111.41	93	4.1	
Endrin	60.01	< 0.98 U	118.20	98		109.07	91	8.0	
g-BHC	60.00	< 0.96 U	98.75	82		95.46	80	3.4	
Heptachlor	60.00	< 1.17 U	106.02	88		100.75	84	5.1	
Heptachlor epoxide	60.00	< 0.95 U	108.65	91		104.35	87	4.0	
Toxaphene	NA	< 166.70 U	< 333.40 U	NA		< 333.40 U	NA	NA	
Cl2(08)	60.12	< 16.00 U	90.14	75		87.36	73	3.1	
Cl3(18)	60.12	< 1.39 U	97.57	81		93.05	77	4.7	
Cl3(28)	60.00	< 1.73 U	102.11	85		96.49	80	5.7	
Cl4(44)	60.00	< 1.45 U	104.37	87		101.23	84	3.1	
Cl4(52)	60.36	< 1.44 U	104.43	87		96.34	80	8.1	
Cl4(66)	60.00	< 1.49 U	108.55	90		102.27	85	6.0	
Cl5(101)	60.24	< 1.14 U	107.84	90		101.20	84	6.4	
Cl5(105)	60.00	< 0.58 U	119.28	99		113.08	94	5.3	
Cl5(118)	60.12	< 0.87 U	115.13	96		108.77	90	5.7	
Cl6(128)	60.36	< 1.40 U	118.20	98		114.03	94	3.6	
Cl6(138)	60.12	< 1.33 U	115.42	96		109.51	91	5.3	
Cl6(153)	60.12	< 1.07 U	118.26	98		108.03	90	9.0	
Cl7(170)	60.24	< 1.02 U	120.37	100		117.42	97	2.5	
Cl7(180)	60.24	< 0.96 U	117.19	97		112.11	93	4.4	
Cl7(187)	60.00	< 0.86 U	114.65	96		109.38	91	4.7	
Cl8(195)	60.24	< 1.09 U	116.67	97		112.73	94	3.4	
Cl9(206)	60.12	< 1.22 U	122.31	102		118.42	98	3.2	
Cl10(209)	60.00	< 1.27 U	120.73	101		117.31	98	2.9	

Surrogate Recoveries:

Cl3(34)	63	76	73
Cl5(112)	73	85	80

U = Not detected or concentration < MDL; project DL goal reported

J = Detected at concentration between project QL goal and MDL

< = MDL

N = QC value outside of accuracy goal



Laboratory Control Spike Data

Project Name Rhode Island Sound Disposal Site Study - Task 7
 Project Number G487001-T7WATERDUX

Client ID	NA		
Battelle ID	ZL34LCS		
Sample Type	Water		
Batch ID	01-553		
Extraction Date	10/9/2001		
Analysis Date	11/8/2001		
Sample Volume (L)	2.00		
Reporting Units	FN73	ng/L	% Recovery
4,4 DDD	60.01	16.55	55
4,4 DDE	60.00	17.25	57
4,4 DDT	60.00	18.28	61
2,4 DDD	60.02	16.85	56
2,4 DDE	60.19	14.10	47
2,4 DDT	60.19	12.85	43
Aldrin	60.02	14.38	48
cis Chlordane	60.30	15.30	51
Dieldrin	60.00	18.01	60
Endosulfan I	60.00	16.01	53
Endosulfan II	60.01	16.48	55
Endosulfan sulfate	60.00	16.67	56
Endrin	60.01	16.80	56
g-BHC	60.00	14.74	49
Heptachlor	60.00	15.62	52
Heptachlor epoxide	60.00	15.57	52
Toxaphene	NA	< 83.35 U	NA
Cl2(08)	60.12	14.87 J	49
Cl3(18)	60.12	16.45	55
Cl3(28)	60.00	15.17	51
Cl4(44)	60.00	15.33	51
Cl4(52)	60.36	15.72	52
Cl4(66)	60.00	15.37	51
Cl5(101)	60.24	15.31	51
Cl5(105)	60.00	16.98	57
Cl5(118)	60.12	16.74	56
Cl6(128)	60.36	16.59	55
Cl6(138)	60.12	16.72	56
Cl6(153)	60.12	18.82	63
Cl7(170)	60.24	18.75	62
Cl7(180)	60.24	17.68	59
Cl7(187)	60.00	17.07	57
Cl8(195)	60.24	18.04	60
Cl9(206)	60.12	19.76	66
Cl10(209)	60.00	20.14	67

Surrogate Recoveries:

Cl3(34)	63
Cl5(112)	67

U = Not detected or concentration < MDL; project DL goal reported
 J = Detected at concentration between project QL goal and MDL
 < = MDL



Procedural Blank Data

Project Name Rhode Island Sound Disposal Site Study - Task 7
Project Number G487001-T7WATERDUX

Client ID NA
Battelle ID ZL33PB
Sample Type Water
Batch ID 01-553
Extraction Date 10/9/2001
Analysis Date 11/8/2001
Sample Volume (L) 2.00
Reporting Units ng/L

4,4 DDD	< 0.30 U
4,4 DDE	< 0.42 U
4,4 DDT	< 0.28 U
2,4 DDD	< 0.37 U
2,4 DDE	< 0.85 U
2,4 DDT	< 0.99 U
Total DDD	NA
Total DDE	NA
Total DDT	NA
Aldrin	< 1.41 U
cis Chlordane	< 0.54 U
Dieldrin	< 0.49 U
Endosulfan I	< 0.56 U
Endosulfan II	< 0.26 U
Endosulfan sulfate	< 0.28 U
Endrin	< 0.49 U
g-BHC	< 0.48 U
Heptachlor	< 0.59 U
Heptachlor epoxide	< 0.47 U
Toxaphene	< 83.35 U
Cl2(08)	< 8.00 U
Cl3(18)	< 0.69 U
Cl3(28)	< 0.87 U
Cl4(44)	< 0.73 U
Cl4(52)	< 0.72 U
Cl4(66)	< 0.75 U
Cl5(101)	< 0.57 U
Cl5(105)	< 0.29 U
Cl5(118)	< 0.43 U
Cl6(128)	< 0.70 U
Cl6(138)	< 0.66 U
Cl6(153)	< 0.53 U
Cl7(170)	< 0.51 U
Cl7(180)	< 0.48 U
Cl7(187)	< 0.43 U
Cl8(195)	< 0.54 U
Cl9(206)	< 0.61 U
Cl10(209)	< 0.63 U
Total PCB	9.07

Surrogate Recoveries:

Cl3(34)	76
Cl5(112)	86

U = Not detected or concentration < MDL; project DL goal reported
< = MDL

QA/QC Summary

PROJECT: Rhode Island Sound Disposal Study
PARAMETER: Metals (Dissolved)
LABORATORY: Battelle Marine Sciences Laboratory, Sequim, Washington
MATRIX: Seawater and Equipment Blanks

SAMPLE CUSTODY AND PROCESSING: Thirty-six seawater samples and two freshwater equipment blank samples were received for metals analysis. All samples were received in good condition (i.e., all sample containers were intact). Samples were preserved with 2% nitric acid to a pH of < 2. (One of the equipment blank samples [1722-200] was received pre-preserved with 2% nitric acid.) Samples were assigned a Battelle Central File (CF) identification number (1722) and were entered into Battelle's log-in system.

The following lists information on sample receipt and processing activities:

	Lab Sample IDs:	1722-133a through -144c	1722-200, -201
	Description:	Seawater samples	Equipment blanks
Sampling date		10/2/01	11/1/01
Sample shipping date		10/4/01	11/1/01
Laboratory arrival date		10/5/01	11/2/01
Cooler temperature on arrival ^(a)		Cooler 1: 4.5°C, Cooler 2: 4.2°C, Cooler 3: 4.9°C	4.2°C
Fe-Pd preconcentration		12/6/01	NA
ICP-MS analysis (As, Cd, Cr, Cu, Ni, Pb, Zn)		11/19/01 (1721-5)	11/20/01
FIAS analysis (As)		11/1/01	11/1/01

DATA QUALITY OBJECTIVES:

Analyte	Analytical Method	Range of Recovery	Relative Precision	SRM Accuracy	Project Detection Limit Goal (µg/L)	Project Quantitation Limit Goal (µg/L)	Achieved Detection Limits (µg/L)
Ag	GFAA	70-130%	<30%	<25%	0.5	0.095	0.01
As	ICP-MS	70-130%	<30%	<25%	0.5	0.32	0.03
Cd	ICP-MS	70-130%	<30%	<25%	0.5	0.048	0.0104
Cr	ICP-MS	70-130%	<30%	<25%	1.0	9.54	0.0345
Cu	ICP-MS	70-130%	<30%	<25%	0.5	2.58	0.022
Ni	ICP-MS	70-130%	<30%	<25%	10	0.016	0.0164
Pb	ICP-MS	70-130%	<30%	<25%	0.5	11.35	0.0369
Se	FIAS	70-130%	<30%	<25%	0.5	0.318	0.075
Zn	ICP-MS	70-130%	<30%	<25%	20	3.82	0.0223

(b) ICP-MS Model 6100/ICP-MS Model 5000

METHODS:

Nine metals were analyzed: silver (Ag), arsenic (As), cadmium (Cd), chromium (Cr) copper (Cu), lead (Pb), nickel (Ni), selenium (Se), and zinc (Zn). Hg was also analyzed. Cd, Cr, Cu, Ni, Pb, and Zn were analyzed by inductively coupled plasma-mass spectrometry (ICP-MS) following Battelle SOP MSL-I-022, *Determination of Elements in Aqueous and Digestate Samples by ICP-MS*, which is based on EPA Method 200.8. Prior to ICP-MS analysis for As, Cd, Cr, Cu, Ni, Pb, and Zn, seawater samples were preconcentrated using iron (Fe) and palladium (Pd) according to Battelle SOP MSL-I-025, *Methods of Sample Preconcentration*, which is derived from EPA Method 1640. Equipment blank samples were not preconcentrated, but were analyzed directly by ICP-MS.

Ag was analyzed in the Fe-Pd preconcentrate by graphite furnace atomic absorption (GFAA) following Battelle SOP MSL-I-029, *Determination of Metals in Aqueous and Digestate Samples by GFAA*, based on EPA Method 200.9.

QA/QC NARRATIVE

Se was analyzed directly (with no preconcentration step) by hydride atomic absorption (HGAA) with flow injection atomic spectroscopy (FIAS) following Battelle SOP MSL-I-030, *Determination of Metals in Aqueous and Digestate Samples by HGAA/FIAS*.

All results were reported in units of µg/L. None of the results were blank corrected.

HOLDING TIMES: The recommended holding time for metals analyses is 6 months from sample collection for all metals (except Hg, which is reported separately). Water samples were analyzed for metals within 6 months of collection.

DETECTION LIMITS: Laboratory-achieved detection limits based on annual MDL studies for each metal were less than project detection limit goals for all metals.

METHOD BLANKS: Method blanks were analyzed at a minimum frequency of 1 per 20 samples. Metals concentrations in all blanks corresponding to seawater were either undetected or detected at concentrations less their project quantitation limits (QL). Blank samples with concentrations greater than the MDL and less than the QL were flagged with a "J".

BLANK SPIKE ACCURACY: Blank spike samples were analyzed at a minimum frequency of 1 per 20 samples and spiked at 1.0 µg/L for Ag, As, Cd, Cr, Cu, Ni, Pb, Se, and Zn. BS recoveries among all metals analyzed were within the QC acceptance criteria of 70% to 130% with the exception of Ag (38% and 36%). However, after analysis, it was determined by ICP-MS analysts that the Ag standard used for spiking had degraded or was otherwise compromised. Therefore, the results of the BS analysis for Ag should not be used for data quality assessment. Acceptable accuracy of Ag recovery could be demonstrated by one of the SRM analyses. The data were flagged to indicate that the recoveries did not meet QC acceptance criteria. No further corrective action was taken.

One blank spike sample spiked at 1.0 µg/L for all ICP-MS metals was analyzed with the equipment blanks (fresh water). This is a direct analysis; no preconcentration step is involved. Recoveries of all metals were within the QC acceptance criteria of 70% to 130% with the exception of Cr (67%).

MATRIX SPIKE/MATRIX SPIKE DUPLICATE ACCURACY: MS/MSD samples were analyzed at a minimum frequency of 1 per 20 samples for all metals. MS/MSDs were spiked at two concentrations: 1.0 µg/L for Ag; and 5 µg/L for As, Cd, Cr, Cu, Ni, Pb, Se, and Zn. Matrix spike recoveries for all metals analyzed were within QC acceptance criteria of 70%-130% recovery with the exception of Ag (attributable to the same faulty spiking standard discussed under Blank Spike Accuracy above) and Zn (32% recovery) in one MSD. The data were flagged to indicate that the recoveries did not meet QC acceptance criteria. No further corrective action was taken. Acceptable accuracy of recovery of Zn could be demonstrated by the BS sample and by SRM recovery.

REPLICATE PRECISION: Laboratory triplicate samples were analyzed at a minimum frequency of 1 per 20 samples for all metals. Replicate precision was expressed as the relative standard deviation (RSD) of triplicate sample results. RSDs were within the QC acceptance criteria of ±30% for all detected metals with the exception of Cr in one set of triplicates (36% RSD); however, note that the concentrations of Cr in the set of triplicate samples are below the project QL goal ("J"-flagged) and should not be used for data quality assessment.

QA/QC NARRATIVE

**STANDARD
REFERENCE
MATERIAL
ACCURACY:**

SRMs CASS-4 (certified for As, Cd, Cr, Cu, Ni, Pb, Se, and Zn) and NASS-4 (certified for Hg), were analyzed at a minimum frequency of 1 per 20 samples. In the absence of an SRM with a certified concentration for Ag, a laboratory-achieved consensus value was calculated for Ag (see Miscellaneous Documentation Form) to allow for assessment of accuracy of Ag recovery. SRM 1640, an aqueous laboratory control sample, was also analyzed for all ICP-MS metals and Se.

Accuracy of recovery of SRM analytes was expressed as the percent difference (PD) between the measured and certified SRM concentration. SRM CASS-4 recoveries were within QC acceptance criteria of $\pm 25\%$ (PD) with the exception of Ag in one replicate, and Cr, Ni, and Pb in both replicates. However, the certified concentrations of Ag, Cr, Ni, and Pb in CASS-4 are less than their respective project QL goals, therefore, the results should not be used for data quality assessment.

SRM NASS-4 recoveries were within QC acceptance criteria with the exception of Cd, Cr, Pb, and Zn, however, the certified concentrations of Ag, Cr, Ni, and Pb in NASS-4 are less than their respective project QL goals.

SRM 1640 recoveries were within QC acceptance criteria for all ICP-MS metals and Se.

Sample Data

RHODE ISLAND SOUND DISPOSAL SITE STUDY
 DISSOLVED METALS IN WATER

(concentrations in µg/L - data are not blank corrected)

MSL Code	Field Code ID	Site	Analysis:										Zn
			GFAA	Ag	As	Cd	Cr	Cu	Ni	Pb	Se	Zn	
EQUIPMENT BLANKS													
1722-200	RISISME1		0.01 U ^(e)	0.136	ICP-MS	0.00395 J	3.66 J	0.124 J	0.152 J	0.0411	0.260 ^(a)	0.401 J	
1722-201	RISISME2		0.01 U ^(e)	0.0722	ICP-MS	0.00621 J	2.53 J	0.126 J	0.142 J	0.0852	0.312 ^(e)	0.366 J	
FIELD SAMPLES													
1722-133a R1	RIS1W011TM1	69B	0.0255 J	1.04	ICP-MS	0.035 J	0.203 J	0.264 J	0.355 J	0.0476	0.075 U	1.15 J	
1722-133a R2	RIS1W011TM1	69B	--	--	ICP-MS	--	--	--	--	--	0.075 U	--	
1722-133a R3	RIS1W011TM1	69B	0.0225 J	0.956	ICP-MS	0.0533	0.388 J	0.588 J	1.38 J	0.0649	0.075 U	2.44 J	
1722-133b	RIS1W011TM2	69B	0.0254 J	0.969	ICP-MS	0.0363 J	0.253 J	0.357 J	0.758 J	0.0566	0.075 U	0.851 J	
1722-133c	RIS1W011TM3	69B			ICP-MS						0.075 U		
1722-134a R1	RIS1W012TM1	69B	0.0244 J	0.995	ICP-MS	0.0337 J	0.190 J	0.423 J	0.345 J	0.0702	0.075 U	1.06 J	
1722-134a R2	RIS1W012TM1	69B	0.0232 J	1.03	ICP-MS	0.0362 J	0.205 J	0.496 J	0.366 J	0.0790	--	1.27 J	
1722-134a R3	RIS1W012TM1	69B	0.0237 J	0.972	ICP-MS	0.0351 J	0.219 J	0.404 J	0.348 J	0.0681	--	1.12 J	
1722-134b	RIS1W012TM2	69B	0.0189 J	0.970	ICP-MS	0.0315 J	0.220 J	0.428 J	0.491 J	0.0515	0.075 U	1.53 J	
1722-134c	RIS1W012TM3	69B	0.0213 J	1.05	ICP-MS	0.0292 J	0.189 J	0.317 J	0.279 J	0.0471	0.075 U	2.24 J	
1722-135a	RIS1W013TM1	69B	0.0251 J	0.815	ICP-MS	0.0343 J	0.209 J	0.334 J	0.278 J	0.0638	0.075 U	1.59 J	
1722-135b	RIS1W013TM2	69B	0.0250 J	0.836	ICP-MS	0.0390 J	0.218 J	0.351 J	0.311 J	0.0806	0.075 U	1.27 J	
1722-135c	RIS1W013TM3	69B	0.0243 J	0.944	ICP-MS	0.0305 J	0.202 J	0.304 J	0.329 J	0.0607	0.075 U	0.752 J	
1722-136a	RIS1W014TM1	69B	0.0215 J	0.971	ICP-MS	0.0344 J	0.178 J	0.515 J	0.336 J	0.0570	0.075 U	1.12 J	
1722-136b	RIS1W014TM2	69B	0.0261 J	1.07	ICP-MS	0.0579	0.347 J	0.920 J	0.876 J	0.254	0.075 U	220 J	
1722-136c	RIS1W014TM3	69B	0.0282 J	1.00	ICP-MS	0.0361 J	0.264 J	0.577 J	0.785 J	0.0559	0.075 U	1.29 J	
1722-137a	RIS1W026TM1	69A	0.0215 J	1.21	ICP-MS	0.0402 J	0.268 J	0.352 J	0.448 J	0.179	0.075 U	0.707 J	
1722-137b	RIS1W026TM2	69A	0.0182 J	1.05	ICP-MS	0.0343 J	0.185 J	0.267 J	0.309 J	0.109	0.075 U	0.737 J	
1722-137c	RIS1W026TM3	69A	0.0228 J	0.995	ICP-MS	0.0312 J	0.291 J	0.244 J	0.318 J	0.121	0.075 U	1.01 J	
1722-138a	RIS1W027TM1	69A	0.0219 J	1.07	ICP-MS	0.0343 J	0.288 J	0.323 J	0.598 J	0.0694	0.075 U	0.801 J	
1722-138b	RIS1W027TM2	69A	0.0231 J	1.05	ICP-MS	0.0327 J	0.198 J	0.287 J	0.431 J	0.0501	0.075 U	0.684 J	
1722-138c	RIS1W027TM3	69A	0.0199 J	0.966	ICP-MS	0.0312 J	0.183 J	0.281 J	0.371 J	0.0942	0.075 U	1.58 J	
1722-139a R1	RIS1W028TM1	69A	0.0280 J	1.03	ICP-MS	0.0334 J	0.220 J	0.346 J	0.406 J	0.0764	0.075 U	0.954 J	
1722-139a R2	RIS1W028TM1	69A	0.0228 J	1.12	ICP-MS	0.0335 J	0.214 J	0.379 J	0.420 J	0.0795	0.075 U	0.94 J	
1722-139a R3	RIS1W028TM1	69A	0.0249 J	1.21	ICP-MS	0.0404 J	0.388 J	0.401 J	0.524 J	0.0994	0.075 U	1.11 J	
1722-139b	RIS1W028TM2	69A	0.0228 J	0.981	ICP-MS	0.0351 J	0.219 J	0.331 J	0.386 J	0.0508	0.075 U	0.578 J	
1722-139c	RIS1W028TM3	69A	0.0211 J	1.12	ICP-MS	0.0345 J	0.348 J	0.441 J	0.350 J	0.0606	0.075 U	1.47 J	
1722-140a	RIS1W029TM1	69A	0.0220 J	1.09	ICP-MS	0.0365 J	0.321 J	0.459 J	1.10 J	0.0986	0.075 U	1.02 J	
1722-140b	RIS1W029TM2	69A	0.0282 J	1.05	ICP-MS	0.0335 J	0.214 J	0.301 J	0.635 J	0.0457	0.075 U	0.841 J	
1722-140c	RIS1W029TM3	69A	0.0192 J	0.986	ICP-MS	0.0381 J	0.409 J	0.286 J	0.475 J	0.0451	0.075 U	5.88 J	

Quality Control Data

RHODE ISLAND SOUND DISPOSAL SITE STUDY
 DISSOLVED METALS IN WATER

MSL Code	Field Code ID	Analysis:	Site	(concentrations in µg/L - data are not blank corrected)											
				GFAA	ICP-MS	ICP-MS	ICP-MS	FIAS	ICP-MS						
				Ag	As	Cd	Cr	Cu	Ni	Pb	Pb	Se	Zn		
METHOD BLANKS															
Blank (Rinsate Blanks - 111901-6100A)				0.01 U ^(a)	0.03 U	0.0104 U	0.360 J	0.022 U	0.0369 U	0.0164 U	0.075 U ^(a)	0.075 U ^(a)	0.0223 U		
Blank R1				0.0205 J	0.03 U	0.0104 U	0.0680 J	0.0461 J	0.0369 U	0.0297 J	0.075 U	0.075 U	0.105 J		
Blank R2				0.0248 J	0.0314 J	0.0104 U	0.0612 J	0.0454 J	0.0369 U	0.0289 J	0.075 U	0.075 U	0.0965 J		
			Mean Blank	0.0227	0.03 U	0.0104 U	0.0646 J	0.0458 J	0.0369 U	0.0293 J	0.075 U	0.075 U	0.101 J		
BLANK SPIKE ACCURACY															
Blank Spike (111901-6100A)				0.908 ^(a)	0.909	1.00	1.03 J	0.908	0.893 J	0.962	0.968 ^(a)	0.968 ^(a)	0.924 J		
Spike Concentration				1.0	1.0	1.0	1.00	1.0	1.0	1.0	1.0	1.0	1.0		
Blank				0.01 U ^(a)	0.03 U	0.0104 U	0.360 J	0.022 U	0.0369 U	0.0164 U	0.075 U ^(a)	0.075 U ^(a)	0.0223 U		
Percent Recovery				90%	91%	100%	67% N	91%	89%	96%	97%	97%	92%		
Blank Spike 1				0.406	0.866	4.65	4.46 J	4.54	4.45 J	4.50	5.86	5.86	5.28		
Blank Spike 2				0.381	0.820	4.51	4.35 J	4.53	4.27 J	4.65	5.86	5.86	4.95		
Spike Concentration				1.0	1.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		
Average Blank				0.0227	0.03 U	0.0104 U	0.0646 J	0.0458 J	0.0369 U	0.0293 J	0.075 U	0.075 U	0.101 J		
Percent Recovery, BS 1				38% N	87%	93%	88%	90%	89%	89%	117%	117%	104%		
Percent Recovery, BS 2				36% N	82%	90%	86%	90%	85%	92%	117%	117%	97%		
MATRIX SPIKE ACCURACY															
Spike Concentration				--	--	--	--	--	--	--	5.0	5.0	--		
1722-135a			69B	--	--	--	--	--	--	--	0.075 U	0.075 U	--		
1722-135a MS				--	--	--	--	--	--	--	5.67	5.67	--		
Amount Recovered				--	--	--	--	--	--	--	5.67	5.67	--		
Percent Recovery				--	--	--	--	--	--	--	113%	113%	--		
Spike Concentration				--	--	--	--	--	--	--	5.0	5.0	--		
1722-135a			69B	--	--	--	--	--	--	--	0.075 U	0.075 U	--		
1722-135a MSD				--	--	--	--	--	--	--	6.50	6.50	--		
Amount Recovered				--	--	--	--	--	--	--	6.50	6.50	--		
Percent Recovery				--	--	--	--	--	--	--	130%	130%	--		
RPD				--	--	--	--	--	--	--	14%	14%	--		
Spike Concentration				--	--	--	--	--	--	--	5.0	5.0	--		
1722-142a			18	--	--	--	--	--	--	--	0.075 U	0.075 U	--		
1722-142a MS				--	--	--	--	--	--	--	6.00	6.00	--		
Amount Recovered				--	--	--	--	--	--	--	6.00	6.00	--		
Percent Recovery				--	--	--	--	--	--	--	120%	120%	--		

RHODE ISLAND SOUND DISPOSAL SITE STUDY
 DISSOLVED METALS IN WATER

(concentrations in µg/L - data are not blank corrected)

MSL Code	Analysis: Field Code ID	Site	GFAA	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS	FIAS	ICP-MS
			Ag	As	Cd	Cr	Cu	Ni	Pb	Se	Zn			
MATRIX SPIKE ACCURACY cont.														
Spike Concentration														
1722-142a	RIS1W035TM1	18	--	--	--	--	--	--	--	--	--	--	5.0	--
1722-142a MSD													0.075 U	--
Amount Recovered													5.92	--
Percent Recovery													5.92	--
													118%	--
	RPD												1%	--
Spike Concentration														
1722-136c	RIS1W014TM3	69B	1.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	--	5.0
1722-136c MS														1.29 J
Amount Recovered			0.0282 J	1.00	0.0361 J	0.264 J	0.577	0.785 J	0.0559	4.46	4.88			4.88
Percent Recovery			0.384	5.27	4.31	4.99 J	4.72	4.94 J	4.46	4.40	3.59			72%
			0.356	4.27	4.27	4.73	4.14	4.16	88%	83%	88%			
			36% N	85%	85%	95%	83%	83%						
Spike Concentration														
1722-136c	RIS1W014TM3	69B	1.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	--	5.0
1722-136c MSD														1.29 J
Amount Recovered			0.0282 J	1.00	0.0361 J	0.264 J	0.577	0.785 J	0.0559	4.60	4.82			4.82
Percent Recovery			0.729	5.51	4.47	5.00 J	4.77	5.14 J	4.54	4.36	3.53			71%
			0.701	4.51	4.43	4.74	4.19	4.36	91%	87%	91%			
			70% N	90%	89%	95%	84%	87%						
	RPD		65% N	5%	4%	0%	1%	5%	3%					
Spike Concentration														
1722-140c	RIS1W029TM3	69A	1.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	--	5.0
1722-140c MS														5.88
Amount Recovered			0.0192 J	0.986	0.0381 J	0.409 J	0.286	0.475 J	0.0451	5.06	10.9			10.9
Percent Recovery			0.329	6.06	4.9	5.2 J	4.93	5.05 J	5.01	5.01	5.02			100%
			0.310	5.07	4.86	4.79	4.64	4.58	100%	92%	100%			
			31% N	101%	97%	96%	93%	92%						
Spike Concentration														
1722-140c	RIS1W029TM3	69A	1.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	--	5.0
1722-140c MSD														5.88
Amount Recovered			0.0192 J	0.986	0.0381 J	0.409 J	0.286	0.475 J	0.0451	4.69	9.52			9.52
Percent Recovery			0.317	5.44	4.79	5.03 J	4.72	4.81 J	4.64	4.34	3.64			73%
			0.298	4.45	4.75	4.62	4.43	4.34	93%	87%	93%			
			30% N	89%	95%	92%	89%	87%						
	RPD		4% N	13%	2%	4%	5%	5%	8%					

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RHODE ISLAND SOUND DISPOSAL SITE STUDY
 DISSOLVED METALS IN WATER

(concentrations in µg/L - data are not blank corrected)

MSL Code	Field Code ID	Site	Analysis:									
			GFAA	ICP-MS	As	Cd	Cr	Cu	ICP-MS	Ni	ICP-MS	Pb
REPLICATE PRECISION												
1722-133a R1	RIS1W011TM1	69B	0.0255	1.04	0.0350 J	0.203 J	0.264	0.355 J	0.0476	0.075 U	1.15 J	
1722-133a R2	RIS1W011TM1	69B	--	--	--	--	--	--	--	0.075 U	--	
1722-133a R3	RIS1W011TM1	69B	--	--	--	--	--	--	--	0.075 U	--	
	RSD											
1722-134a R1	RIS1W012TM1	69B	0.0244	0.995	0.0337 J	0.190 J	0.423	0.345 J	0.0702	0.075 U	1.06 J	
1722-134a R2	RIS1W012TM1	69B	0.0232	1.03	0.0362 J	0.205 J	0.436	0.366 J	0.0790	--	1.27 J	
1722-134a R3	RIS1W012TM1	69B	0.0237	0.972	0.0351 J	0.219 J	0.404	0.348 J	0.0681	--	1.12 J	
	RSD		3%	3%	4%	7%	4%	3%	8%	--	9%	
1722-139a R1	RIS1W028TM1	69A	0.0280	1.03	0.0334 J	0.220 J	0.346	0.406 J	0.0764	0.075 U	0.954 J	
1722-139a R2	RIS1W028TM1	69A	0.0228	1.12	0.0335 J	0.214 J	0.379	0.420 J	0.0795	0.075 U	0.940 J	
1722-139a R3	RIS1W028TM1	69A	0.0249	1.21	0.0404 J	0.388 J	0.401	0.524 J	0.0894	0.075 U	1.11 J	
	RSD		10%	8%	11%	36% N	7%	14%	15%	--	9%	

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RHODE ISLAND SOUND DISPOSAL SITE STUDY
 DISSOLVED METALS IN WATER

(concentrations in µg/L - data are not blank corrected)

MSL Code	Field Code ID	Site	Analysis:												
			GFAA	Ag	As	Cd	Cr	Cu	Ni	Pb	Se	Zn			
STANDARD REFERENCE MATERIAL ACCURACY															
1640d (111901-6100A)			7.02 ^(a)	23.8	40.6	77.2	24.2	25.8	23.3 ^(a)						
1640 Direct			--	23.5	38.1	81.0	26.7	25.9	24.8						
1640 Direct			--	28.5	38.9	86.8	28.1	28.7	24.7						
	certified value		7.62	22.8	38.6	85.2	27.4	27.9	22.0						
	range		±0.25	±0.36	±1.6	±1.2	±0.8	±0.14	±0.51						
	% difference		8%	4%	5%	9%	12%	8%	6%						
1640d (111901-6100A)			--	3%	1%	5%	3%	7%	13%						
1640 Direct			--	6%	1%	2%	3%	3%	12%						
1640 Direct			--												
CASS-4 r1			0.0272 J	0.976	0.0341 J	0.232 J	0.351 J	0.0397	--						0.477 J
CASS-4 r2			0.0290 J	0.962	0.0393 J	0.221 J	0.349 J	0.0399	--						0.447 J
	certified value		0.0224 ^(b)	1.11	0.026	0.144	0.314	0.0098 ^(c)							0.381
	range		±0.005	±0.16	±0.003	±0.029	±0.03	±0.0036							±0.057
	% difference		21%	12%	31% N	61% N	12%	305% N							25% N
	% difference		29%	13%	51% N	53% N	11%	307% N							17%
NASS-4 r1			0.0227	1.12	0.0290 J	0.178 J	0.259 J	0.0372	--						0.590 J
NASS-4 r2			0.0261	1.03	0.0261 J	0.168 J	0.235 J	0.0375	--						0.247 J
	certified value		NC	1.26	0.016	0.115	0.228	0.013 ^(c)							0.115
	range			±0.09	±0.003	±0.01	±0.009	±0.005							±0.018
	% difference		NA	11%	81% N	55% N	14%	186% N							413% N
	% difference		NA	18%	63% N	46% N	3%	188% N							115% N

U Not detected at or above DL shown

J Reported above the achieved DL but below Project QL Goal

-- No analysis/not applicable

N Outside project DQOs (70-130% Spike Recoveries; ≤20% RPD/RSD and SRMs)

^(a) Analyzed by ICP-MS

^(b) SRM not certified for Ag; value presented is laboratory consensus value (refer to Miscellaneous Documentation)

^(c) SRM certified value is below laboratory-achieved MDL

NC Not certified

NA Not applicable

RPD Relative percent difference

RSD Relative standard deviation

QA/QC Summary

QA/QC NARRATIVE

PROJECT: Rhode Island Sound Disposal Study
PARAMETER: Mercury (Dissolved and Total)
LABORATORY: Battelle Marine Sciences Laboratory, Sequim, Washington
MATRIX: Seawater and Equipment Blanks

SAMPLE CUSTODY AND PROCESSING: Mercury analyses were requested on 56 seawater samples and two freshwater equipment blank samples. All samples were received in good condition (i.e., all sample containers were intact). Samples were preserved with 2% nitric acid to a pH of < 2. (One of the equipment blank samples [1722-200] was received pre-preserved with 2% nitric acid.) Samples were assigned a Battelle Central File (CF) identification number (1722) and were entered into Battelle's log-in system.

The following lists information on sample receipt and processing activities:

	Lab Sample IDs: 1722-133a through -156c	1722-200, -201
	Description: Seawater samples	Equipment blanks
Sampling date	10/2/01	11/1/01
Sample shipping date	10/4/01	11/1/01
Laboratory arrival date	10/5/01	11/2/01
Cooler temperature on arrival ^(a)	Cooler 1: 4.5°C, Cooler 2: 4.2°C, Cooler 3: 4.9°C	4.2°C
CVAF analysis (Hg)	11/12/01, 11/13/01, 11/15/01	11/12/01

DATA QUALITY OBJECTIVES:

Analyte	Analytical Method	Range of Recovery	Relative Precision	SRM Accuracy	Project Detection Limit Goal ($\mu\text{g/L}$)	Project Quantitation Limit Goal ($\mu\text{g/L}$)	Achieved Detection Limits ($\mu\text{g/L}$)
Hg	CVAF	70-130%	<30%	<25%	0.2	0.0006	0.0002

METHODS: Hg was analyzed directly (with no preconcentration step) using cold-vapor atomic fluorescence (CVAF) spectroscopy according to Battelle SOP MSL-I-013, *Total Mercury in Aqueous Samples by CVAF*, which is derived from EPA Method 1631.

All results were reported in units of $\mu\text{g/L}$. None of the results were blank corrected.

Nine other metals were analyzed under this project and are reported separately: silver (Ag), arsenic (As), cadmium (Cd), chromium (Cr) copper (Cu), lead (Pb), nickel (Ni), selenium (Se), and zinc (Zn).

HOLDING TIMES: The recommended holding time for Hg analysis is 28 days from sample collection. Water samples were analyzed for Hg beyond the 28-day holding time by approximately 14 days. It is unlikely that exceeding the holding time affected the results. EPA Method 1631, *Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry*, Revision D (draft) states that acid-preserved water samples are stable for 90 days from collection.

DETECTION LIMITS: Laboratory-achieved detection limits based on annual MDL studies for Hg were less than the project detection limit goal.

METHOD BLANKS: Method blanks were analyzed at a minimum frequency of 1 per 20 samples. Hg was undetected in all method blanks.

QA/QC NARRATIVE

**BLANK SPIKE
ACCURACY:**

Blank spike samples spiked at 0.005 $\mu\text{g/L}$ for Hg were analyzed at a minimum frequency of 1 per 20 samples. All BS recoveries for Hg were within the QC acceptance criteria of 70% to 130%.

**MATRIX
SPIKE/MATRIX
SPIKE DUPLICATE
ACCURACY:**

MS/MSD samples spiked at 0.005 $\mu\text{g/L}$ for Hg were analyzed at a minimum frequency of 1 per 20 samples. All MS/MSD recoveries for Hg were within QC acceptance criteria of 70%-130%.

**REPLICATE
PRECISION:**

Laboratory triplicate samples were analyzed at a minimum frequency of 1 per 20 samples for Hg. Replicate precision was expressed as the relative standard deviation (RSD) of triplicate sample results. All replicate analysis RSDs were within the QC acceptance criteria of $\pm 30\%$ for Hg.

**STANDARD
REFERENCE
MATERIAL
ACCURACY:**

SRM 1641d was analyzed at a minimum frequency of 1 per 20 samples. Accuracy of recovery of SRM analytes was expressed as the percent difference (PD) between the measured and certified SRM concentration. All SRM 1641d recoveries were within QC acceptance criteria of $\pm 25\%$ (PD).

Analytical Data

RHODE ISLAND SOUND DISPOSAL SITE STUDY
METALS IN WATER-MERCURY

(concentrations in µg/L - data are not blank corrected)

MSL Code	Field Code ID	Site	Dissolved or Total	Sample Container	CVAF Batch ID	Hg
<u>EQUIPMENT BLANKS</u>						
1722-200	RISISME1	NA	Total	Teflon	111201HGA1	0.000183 J
1722-201	RISISME2	NA	Total	Teflon	111201HGA1	0.00102
<u>FIELD SAMPLES</u>						
1722-133a	RIS1W011TM1	69B	Dissolved	Teflon	111201HGA1	0.000474 J
1722-133b	RIS1W011TM2	69B	Dissolved	Teflon	111201HGA1	0.000394 J
1722-133c	RIS1W011TM3	69B	Dissolved	Teflon	111201HGA1	0.000399 J
1722-134a R1	RIS1W012TM1	69B	Dissolved	Teflon	111201HGA1	0.000473 J
1722-134a R2	RIS1W012TM1	69B	Dissolved	Teflon	111201HGA1	0.000489 J
1722-134b	RIS1W012TM2	69B	Dissolved	Teflon	111201HGA1	0.000737
1722-134c	RIS1W012TM3	69B	Dissolved	Teflon	111201HGA1	0.000645
1722-135a	RIS1W013TM1	69B	Dissolved	Teflon	111201HGA1	0.000524 J
1722-135b	RIS1W013TM2	69B	Dissolved	Teflon	111201HGA1	0.000968
1722-135c	RIS1W013TM3	69B	Dissolved	Teflon	111201HGA1	0.000464 J
1722-136a	RIS1W014TM1	69B	Dissolved	Teflon	111201HGA1	0.000580 J
1722-136b	RIS1W014TM2	69B	Dissolved	Teflon	111201HGA1	0.00112
1722-136c	RIS1W014TM3	69B	Dissolved	Teflon	111201HGA1	0.000489 J
1722-137a	RIS1W026TM1	69A	Dissolved	Teflon	111201HGA1	0.000511 J
1722-137b	RIS1W026TM2	69A	Dissolved	Teflon	111201HGA1	0.000689
1722-137c	RIS1W026TM3	69A	Dissolved	HDPE	111201HGA1	0.000834
1722-138a	RIS1W027TM1	69A	Dissolved	Teflon	111301HGA1	0.000304 J
1722-138b	RIS1W027TM2	69A	Dissolved	Teflon	111301HGA1	0.000444 J
1722-138c	RIS1W027TM3	69A	Dissolved	Teflon	111301HGA1	0.000406 J
1722-139a	RIS1W028TM1	69A	Dissolved	Teflon	111301HGA1	0.000701
1722-139b	RIS1W028TM2	69A	Dissolved	Teflon	111301HGA1	0.000323 J
1722-139c	RIS1W028TM3	69A	Dissolved	Teflon	111301HGA1	0.000462 J
1722-140a	RIS1W029TM1	69A	Dissolved	Teflon	111301HGA1	0.000832
1722-140b	RIS1W029TM2	69A	Dissolved	Teflon	111301HGA1	0.000731
1722-140c	RIS1W029TM3	69A	Dissolved	Teflon	111301HGA1	0.000750
1722-141a	RIS1W034TM1	18	Dissolved	HDPE	111301HGA1	0.000678
1722-141b R1	RIS1W034TM2	18	Dissolved	HDPE	111301HGA1	0.000869
1722-141b R2	RIS1W034TM2	18	Dissolved	HDPE	111301HGA1	0.000941
1722-141c	RIS1W034TM3	18	Dissolved	HDPE	111301HGA1	0.000697
1722-142a	RIS1W035TM1	18	Dissolved	HDPE	111301HGA1	0.000663
1722-142b	RIS1W035TM2	18	Dissolved	HDPE	111301HGA1	0.000719
1722-142c	RIS1W035TM3	18	Dissolved	HDPE	111301HGA1	0.000649
1722-143a	RIS1W036TM1	18	Dissolved	HDPE	111301HGA1	0.000585 J
1722-143b	RIS1W036TM2	18	Dissolved	HDPE	111301HGA1	0.000676
1722-143c	RIS1W036TM3	18	Dissolved	HDPE	111301HGA1	0.000837
1722-144a	RIS1W037TM1	18	Dissolved	HDPE	111301HGA1	0.000741
1722-144b	RIS1W037TM2	18	Dissolved	HDPE	111301HGA1	0.000686
1722-144c	RIS1W037TM3	18	Dissolved	HDPE	111301HGA1	0.000648

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**RHODE ISLAND SOUND DISPOSAL SITE STUDY
 METALS IN WATER-MERCURY**

(concentrations in µg/L - data are not blank corrected)

MSL Code	Field Code ID	Site	Dissolved or Total	Sample Container	CVAF Batch ID	Hg
1722-145a	RIS1W011MY1	69B	Total	Glass	111501HGA1	0.00117
1722-146a	RIS1W012MY1	69B	Total	Glass	111501HGA1	0.000912
1722-147a	RIS1W013MY1	69B	Total	Glass	111501HGA1	0.000893
1722-148a	RIS1W014MY1	69B	Total	Glass	111501HGA1	0.00137
1722-149a	RIS1W026MY1	69A	Total	Glass	111501HGA1	0.000702
1722-150a	RIS1W027MY1	69A	Total	Glass	111501HGA1	0.000974
1722-151a	RIS1W028MY1	69A	Total	Glass	111501HGA1	0.00100
1722-152a	RIS1W029MY1	69A	Total	Glass	111501HGA1	0.00125
1722-153a R1	RIS1W034MY1	18	Total	Glass	111501HGA1	0.00153
1722-153a R2	RIS1W034MY1	18	Total	Glass	111501HGA1	0.00139
1722-153b	RIS1W034MY2	18	Total	Glass	111501HGA1	0.000958
1722-153c	RIS1W034MY3	18	Total	Glass	111501HGA1	0.00102
1722-154a	RIS1W035MY1	18	Total	Glass	111501HGA1	0.00134
1722-154b	RIS1W035MY2	18	Total	Glass	111501HGA1	0.000732
1722-154c	RIS1W035MY3	18	Total	Glass	111501HGA1	0.000935
1722-155a	RIS1W036MY1	18	Total	Glass	111501HGA1	0.000762
1722-155b	RIS1W036MY2	18	Total	Glass	111501HGA1	0.000819
1722-155c	RIS1W036MY3	18	Total	Glass	111501HGA1	0.00138
1722-156a	RIS1W037MY1	18	Total	Glass	111501HGA1	0.00104
1722-156b	RIS1W037MY2	18	Total	Glass	111501HGA1	0.00105
1722-156c	RIS1W037MY3	18	Total	Glass	111501HGA1	0.00113

DETECTION LIMITS

Project DL Goal	0.2
Project QL Goal	0.0006
Achieved Detection Limit	0.0002

METHOD BLANKS

Blank R1	111201HGA1	0.0002 U
Blank R2	111201HGA1	0.0002 U
Blank R3	111201HGA1	0.0002 U
<i>Mean Blank</i>		<i>0.0002 U</i>
Blank R1	111301HGA1	0.0002 U
Blank R2	111301HGA1	0.0002 U
Blank R3	111301HGA1	0.0002 U
<i>Mean Blank</i>		<i>0.0002 U</i>
Blank R1	111501HGA1	0.0002 U
Blank R2	111501HGA1	0.0002 U
Blank R3	111501HGA1	0.0002 U
<i>Mean Blank</i>		<i>0.0002 U</i>

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RHODE ISLAND SOUND DISPOSAL SITE STUDY
METALS IN WATER-MERCURY

(concentrations in $\mu\text{g/L}$ - data are not blank corrected)

MSL Code	Field Code ID	Site	Dissolved or Total	Sample Container	CVAF Batch ID	Hg
<u>BLANK SPIKE ACCURACY</u>						
Blank Spike 1					111201HGA1	0.00534
Blank Spike 2					111201HGA1	0.00529
Spike Concentration						0.00488
Blank 110901						0.000511
Percent Recovery, BS 1						99%
Percent Recovery, BS 2						98%
Blank Spike 1					111301HGA1	0.00503
Blank Spike 2					111301HGA1	0.00495
Spike Concentration						0.00492
Blank 111201						0.0002 U
Percent Recovery, BS 1						102%
Percent Recovery, BS 2						101%
Blank Spike 1					111501HGA1	0.00510
Blank Spike 2					111501HGA1	0.00509
Spike Concentration						0.00488
Blank 111401						0.0002 U
Percent Recovery, BS 1						105%
Percent Recovery, BS 2						104%
<u>MATRIX SPIKE/MATRIX SPIKE DUPLICATE ACCURACY AND PRECISION</u>						
Spike Concentration						0.0120
1722-136b	RIS1W014TM2	69B			111201HGA1	0.00112
1722-136b MS					111201HGA1	0.0142
Concentration Recovered						0.0131
Percent Recovery						109%
Spike Concentration						0.0121
1722-136b	RIS1W014TM2	69B			111201HGA1	0.00112
1722-136b MSD					111201HGA1	0.0145
Concentration Recovered						0.0134
Percent Recovery						111%
	RPD					1%
Spike Concentration						0.0118
1722-144a	RIS1W037TM1	18			111301HGA1	0.000741
1722-144a MS					111301HGA1	0.0125
Concentration Recovered						0.0118
Percent Recovery						100%

RHODE ISLAND SOUND DISPOSAL SITE STUDY
METALS IN WATER-MERCURY

(concentrations in µg/L - data are not blank corrected)

MSL Code	Field Code ID	Site	Dissolved or Total	Sample Container	CVAF Batch ID	Hg
Spike Concentration						0.0115
1722-144a	RIS1W037TM1	18			111301HGA1	0.000741
1722-144a MSD					111301HGA1	0.0123
Concentration Recovered						0.0116
Percent Recovery						101%
RPD						1%
Spike Concentration						0.0120
1722-154c	RIS1W035MY3	18			111501HGA1	0.000935
1722-154c MS					111501HGA1	0.0134
Concentration Recovered						0.0125
Percent Recovery						104%
Spike Concentration						0.0121
1722-154c	RIS1W035MY3	18			111501HGA1	0.000935
1722-154c MSD					111501HGA1	0.0145
Concentration Recovered						0.0136
Percent Recovery						112%
RPD						8%
<u>REPLICATE PRECISION</u>						
1722-134a R1	RIS1W012TM1	69B			111201HGA1	0.000473
1722-134a R2	RIS1W012TM1	69B			111201HGA1	0.000489
RPD						3%
1722-141b R1	RIS1W034TM2	18			111301HGA1	0.000869
1722-141b R2	RIS1W034TM2	18			111301HGA1	0.000941
RPD						8%
1722-153a R1	RIS1W034MY1	18			111501HGA1	0.00153
1722-153a R2	RIS1W034MY1	18			111501HGA1	0.00139
RPD						10%
<u>STANDARD REFERENCE MATERIAL ACCURACY</u>						
1641D-1					111201HGA1	1650
1641D-2					111301HGA1	1580
1641D-3					111501HGA1	1660
						Certified Value
						1590
						Range
						±40
1641D-1						% Difference
						4%
1641D-2						% Difference
						1%
1641D-3						% Difference
						4%

U Not detected at or above DL shown
 J Reported above the achieved DL but below Project QL Goal
 RPD Relative percent difference

TOTAL SUSPENDED SOLIDS DATA FOR RHODE ISLAND SOUND
 (DATA HAS NOT BEEN CORRECTED FOR BLANK)

DATE WEIGHED	DATE FILTERED	STATION	CODE	DEPTH	DEPTH (m)	VOLUME FILTERED (ml)	TARE (mg)	GROSS (mg)	TSS (mg/L)
10/23/01	10/3/2001	69A	026	B	31.4	300	14.909	15.100	0.64
						300	15.649	15.826	0.59
10/23/01	10/3/2001	69A	027	MB	21.6	300	14.668	14.840	0.57
						300	15.838	16.041	0.68
10/23/01	10/3/2001	69A	028	MS	11.4	300	15.062	15.283	0.74
						300	15.020	15.267	0.82
10/23/01	10/3/2001	69A	029	S	1.7	300	14.621	14.772	0.50
						300	14.708	14.862	0.51
10/23/01	10/3/2001	69B	011	B	33.0	300	14.479	14.729	0.83
						300	14.795	15.032	0.79
10/23/01	10/3/2001	69B	012	MB	22.9	300	15.766	16.077	1.04
						300	15.601	15.870	0.90
10/23/01	10/3/2001	69B	013	MS	11.7	300	14.661	14.920	0.86
						300	14.624	14.907	0.94
10/23/01	10/3/2001	69B	014	S	1.7	300	15.080	15.246	0.55
						300	15.118	15.284	0.55
10/23/01	10/3/2001	18	034	B	33.5	300	15.456	15.698	0.81
						300	14.755	14.992	0.79
10/23/01	10/3/2001	18	035	MB	22.7	300	14.973	15.406	1.44
						300	14.979	15.400	1.40
10/23/01	10/3/2001	18	036	MS	12.8	300	15.529	15.758	0.76
						300	15.538	15.746	0.69
10/23/01	10/3/2001	18	037	S	1.6	300	15.510	15.689	0.60
						300	15.446	15.659	0.71
10/23/01	10/3/2001	DI				200	14.394	14.437	0.21
						200	14.540	14.552	0.06
10/23/01	10/3/2001	FSW				200	14.813	14.855	0.21
						200	14.472	14.496	0.12