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TRACE LEVEL INORGANIC ANALYSIS OF MARINE AND ESTUARINE SAMPLES PREPARED FOR THE ESTUARINE ECOLOGICAL RISK ASSESSMENT CASE STUDY NSY PORTSMOUTH ME

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Prepared Under
Naval Command, Control, and Ocean Surveillance Center RDTE Div
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TRACE LEVEL INORGANIC ANALYSIS OF MARINE AND ESTUARINE SAMPLES

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Abstract

Three cruises were undertaken in the Fall of 1993, to collect water samples for trace metal analysis from the Piscataqua River Estuary and Portsmouth Harbor in the vicinity of the Portsmouth Naval Shipyard located on Seavey Island. For each cruise, dissolved metals were separated from particulate metals by filtration immediately following collection, using acid cleaned filtration equipment that was set up in a laminar flow clean bench aboard the Research Vessel *Gulf Challenger*. A precipitation step was used to preconcentrate the dissolved metals Cd, Cu, Ni, and Pb, prior to analysis by Graphite Furnace Atomic Absorption Spectrophotometry (GFAAS). Dissolved Fe, and Mn were analyzed by Direct Injection GFAAS techniques. Particulate samples were collected on pre-tared, acid cleaned membranes, and following particulate weight determinations, individual samples were acidified and analyzed for Cd, Cu, Ni, Pb, Fe, Mn, and Al, using GFAAS or Inductively Coupled Plasma Atomic Emission Spectroscopy (ICP/AES).

With the exception of Cd, dissolved metal concentrations generally tended to display linear or near linear relationships with salinity in waters surrounding Seavey Island, indicating that the distribution of dissolved metals along the salinity gradient were due to estuarine mixing of less saline water from the Piscataqua with more saline waters. Dissolved Cd concentrations did not show any trend with salinity. Particulate metal concentrations also covaried with salinity, with metal levels generally decreasing from less saline waters to the more saline waters toward the mouth of the estuary.

As part of our trace metal study, water samples were collected from seep sites located on Seavey Island in an effort to evaluate the level of contaminants leaving the island via seep streams. During each of the three cruises, a shore survey was conducted to establish areas where water was seeping from the island to estuarine waters. Two seep areas were identified and sampled adjacent to the Jamaica Island landfill in the back channel of Seavey Island. Only the dissolved component of the seeps was measured, and, in general, the concentrations of dissolved Cd, Cu, Ni, Pb, Fe, and Mn were elevated relative to estuarine waters sampled in the Seavey Island Back Channel.

Although the principal emphasis of this study was on trace metals in water, two other analytical components; the analysis of particulate metal exposure levels in a mussel dosing experiment, and the neutron activation analysis of trace metals in marine tissue and sediment samples, were part of this study. The results of our trace metal measurements for each study are reported.

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Introduction

The primary purpose of this study was to measure trace metal levels in waters surrounding Seavey Island in an effort to detect the presence of metal releases to estuarine waters resulting from routine operations at the Portsmouth Navy Shipyard. Though this may appear as a straightforward task, it is complicated by the introduction of sewage effluents into the estuary from sewage treatment plants located in Kittery, Maine, and Portsmouth, New Hampshire; both plants are located in close proximity to the Shipyard. The Kittery Sewage Treatment Plant is located upstream and to the west of Seavey Island while the Portsmouth Plant is located just to the south of the Shipyard (Figure 1). The relatively urbanized area surrounding the Shipyard can also be considered as potentially impacting the concentrations of metal in the estuary from non-point sources such as urban runoff. Thus the process of separating and assessing the impact of metal inputs from a variety of sources is not a simple as it may appear.

Since the mid-70's, advances have been made in the study of trace metals in seawater due to the development of ultra-clean techniques coupled with the introduction of a variety of commercially available plastic products. The use acid-cleaned Teflon®, polycarbonate, polysulfone and polyethylene products provide the raw starting materials to collect, store and prepare seawater samples under trace-metal clean conditions. Additionally, ultra-pure acids (commercially available or laboratory produced using quartz stills) and laminar flow clean benches are now considered standard equipment for preparing seawater samples. For laboratories that are practiced in trace metal analysis of seawater, there is always a concern for metal contamination, and only meticulous attention to detail can prevent or minimize the introduction of metal contaminants to a sample.

Methods and Materials

Methods Overview:

The methods used to collect, prepare, and analyze seawater and seep samples for trace metals are detailed in our Standard Operating Procedures (Appendix A). A brief overview of our operating procedures for the collection and processing of trace metal samples is presented below.

For the three sampling cruises of the Piscataqua River Estuary and Portsmouth Harbor, a Teflon®-coated Niskin sampler strung on Spectron® line was used collect water samples. We also used a nylon/polyproylene

block to deploy the sampler, so the entire sampling system was essentially made of plastic. All materials that would come in contact with a seawater sample were acid-cleaned prior to use. Once a water sample was collected, the Niskin sampler was brought onboard, and the sample was dispensed into an acid-cleaned polyethylene bottle. Each sample collected was immediately brought below deck and filtered through an acid-cleaned, pre-tared 0.4 µm pore size, 47 mm diameter, Nuclepore® membrane filter using Nalgene® polysulfone filtration units. The silicone gaskets that came with these filtration units were replaced with Teflon® o-rings. All shipboard filtering operations were carried out in a laminar flow clean bench. Subsequent to filtering a seawater sample, the filtrate was dispensed into an acid-cleaned polyethylene container and acidified to pH 2, using Ultrex® HCl (J.T. Baker). The shipboard operations and materials described here, are very similar to the seawater preparations described by Schiller and Boyle (1991), for the study of trace metal distributions in the Mississippi River.

We employ the ammonium pyrollidine dithiocarbamate-cobalt chloride (APDC-$CoCl_2$) technique to preconcentrate our dissolved samples prior to metal analysis using the procedures detailed by Bender and Gagner (1976). In this procedure, 2 ml of specially prepared $CoCl_2$ solution is added to a 250 ml seawater sample, which is followed by the addition of a specially prepared 2% APDC solution. The precipitate is allowed to form for about a half hour before it is collected by filtration on an acid-cleaned 0.4 µm pore size, 25 mm diameter, Nuclepore® membrane filter. The precipitate and membrane is then placed in an acid cleaned poly-vial and acidified with 5 ml of 1N HNO_3 that was prepared from concentrated Ultrex® HNO_3 (J.T. Baker) and Milli-Q deionized water (Millipore Corporation). The effective preconcentration factor using this procedure is 50 (i. e., 250 ml seawater into 5 ml 1 N HNO_3). The recovery of Cd, Cu, Ni, and Pb using this technique is on the order of 90% or greater for each element.

In terms of special reagent preparations, both the $CoCl_2$ and APDC solutions are "cleaned" prior to use. The APDC solution is cleaned by successive rinses with methyl iso-butyl ketone, and $CoCl_2$ is cleaned by passing the solution through an anion exchange resin (Appendix A).

For particulate metal determinations, pre-tared membranes used to collect particulate materials from seawater, were dried, re-weighed for particulate weight, and acidified with 4 ml of 2N HNO_3 that was prepared from concentrated Ultrex HNO_3 and Milli-Q deionized water (Appendix A).

Method Detection Limit Studies:

As part of our analytical effort, a Method Detection Limit (MDL) study was performed for dissolved and particulate metals analyzed for this project. For the dissolved metal MDL, NASS-4, an open ocean seawater Standard Reference Material (SRM), available through the National Research Council, Canada, was used to establish the MDL of preconcentration and direct injection techniques. Dissolved metal concentrations of Cd, Cu, Ni, Pb, Fe, and Mn, observed in unspiked and spiked aliquots of NASS-4, are reported in Table 1, along with the MDL and Limit of Quantification (LOQ) for each element. Cd, Cu, Ni, and Pb were preconcentrated prior to analysis using the APDC-$CoCl_2$ coprecipitation technique described in our Standard Operating Procedures (Appendix A). Fe, and Mn were measured by Direct Injection GFAAS.

SRM MESS-1, a marine sediment reference material, also available through the National Research Council, Canada, was used to perform the particulate MDL. Since there is no standard reference material for particulate metal, 0.231 g of MESS-1 was weighed and added to 500 ml, of 2N HNO_3. The sediment was allowed to react with 2N HNO_3 for thirty days, and following this period the acid was filtered through an acid cleaned 0.4 µm Nuclepore® membrane to remove sediment. The filtered sediment extract served as the surrogate standard material, and was used as our Laboratory Control Sample (LCS) in each particulate batch of samples. The operationally defined particulate metal concentrations of Cd, Cu, Ni, Pb, Fe, Mn, and Al, observed in unspiked and spiked aliquots of our particulate LCS, are reported in Table 2, along with the MDL and LOQ for each element.

Dissolved and Particulate Sample Batches:

The batch composition of preconcentrated seawater samples included:

- 1, Milli-Q water sample as a blank
- 1, NASS-4 SRM, unspiked
- 1, NASS-4 SRM, spiked
- 15, Seawater samples
- 1, duplicate seawater sample
- 1, spiked seawater sample.

The batch composition of Direct Injection metals (Fe, Mn) differed slightly from preconcentrated elements, and the batch composition of direct injection metals included:

1, NASS-4 SRM, unspiked (as blank check samples)
1, NASS-4 SRM, spiked
15, Seawater samples.

A total of eight dissolved metal batches was analyzed, and the batch data for each preconcentrated and direct injection metal is provided in Appendix B. In all instances, batch check samples fell within ± 15% of the expected value, and regression analysis of standard curves had R^2 values of 0.995 or greater. The Milli-Q blank metal concentration measured in each batch of preconcentrated samples is summarized in Table 3. Also summarized in Table 3, are the concentrations of Fe, and Mn, observed using NASS-4 SRM as the blank in the direct injection technique. Duplicate analysis of seawater samples analyzed with each batch of preconcentrated samples are reported in Table 4, along with the Relative Percent Difference of duplicate measurements. A summary of the percent recovery of metal spikes added to dissolved seawater and NASS-4 SRM samples for each batch of samples is presented in Tables 5, and 6, respectively.

The batch composition of particulate samples measured for Cd, Cu, Ni, and Pb included:

1, procedural blank
1, LCS (MESS-1), unspiked
1, LCS (MESS-1), spiked
15, particulate samples.

The batch composition of particulate samples measured for Al, Fe and Mn, by ICP/AES included:

1, 2N HNO_3 blank
1, LCS (MESS-1), unspiked
15, particulate samples.

Concentrations measured in particulate batch blanks are given in Table 7. Particulate blank samples were prepared in the same fashion as particulate samples, except that the membranes were not used in a filtration step. In Table 8, the metal concentrations measured in our LCS are compared to the certified metal concentrations in MESS-1. A summary of percent recovery of metal spikes added to the particulate LCS is provided in Table 9.

Results and Discussion

Dissolved and Particulate Metal Concentrations in the Water Column and Seep Sites:

A listing of variable names used to describe the data, a brief description of each variable, and data flags for water column and seep data sheets for Cruises I, II, and III are presented in Table 10.

Cruise I

Dissolved and particulate fractions: Relationships to salinity

Dissolved and particulate trace metal concentrations of water samples collected on September 14, and 15, 1993, i. e., during the first cruise of the Lower Piscataqua River Estuary are given in Table 11. Water column sampling station locations for Cruise I, are shown in Figure 1. A total of 21 stations were occupied during Cruise I, in the vicinity of Seavey Island. The salinity of water samples collected during Cruise I, ranged from about 31.3 o/oo to 31.8 o/oo, and particulate concentrations ranged roughly from 1 to 3 mg/L (Table 11). In general terms, particulate concentrations decreased with increasing salinity (Figure 2).

To establish the general trends in dissolved and particulate metal distributions within the lower portion of the Piscataqua River and Portsmouth Harbor, the metal data from Cruise I were plotted against salinity in x-y scatterplots. In the first set of graphs (Figures 3 through 9) both dissolved and particulate metal are plotted versus salinity on the same scale, after converting the particulate data from ug/g to ug/L. Plots of this nature reveal the relative importance of one metal phase to the other, and they can be used to show the metal to salinity relationship.

Dissolved and particulate Cd, Cu, Ni, Pb, Fe, and Mn, concentrations from Cruise I, are plotted versus salinity in Figures 3, 4, 5, 6, 7, 8, respectively. The relationship between particulate Al concentrations and salinity is depicted in Figure 9. Dissolved Cd concentrations were of the order of 0.027 parts per billion (ppb) over the salinity range sampled, and the dissolved Cd concentrations showed little trend with salinity (Figure 3). Dissolved Cd concentrations were everywhere greater than the corresponding particulate concentrations.

Dissolved and particulate Cu concentrations displayed inverse relationships with salinity (Figure 4) with dissolved concentrations showing a stronger

relationship to salinity (R^2=0.94) than particulate copper did (R^2=0.67, Figure 4). Dissolved Cu concentrations ranged from about 0.2 to 0.4 ppb, while particulate concentrations were below 0.1 ppb. The linear relationship between dissolved copper and salinity suggests that the simple mixing of less saline river water with more saline water is responsible for the distribution of copper within this region of the estuary. Higher copper concentrations in the less saline water to the west of Seavey Island indicate that the source or sources of copper to the estuary are upstream of the shipyard.

Dissolved and particulate Ni concentrations displayed distribution patterns similar to those of copper (Figure 5). Dissolved nickel concentrations ranged from about 0.25 to 0.35 ppb while particulate concentrations ranged from about 0.02 to 0.1 ppb. Although there is more variability in the nickel data, higher concentrations of both dissolved and particulate nickel were found in the lower salinity waters sampled, and each component showed general trends of decreasing concentration with increasing salinity.

For dissolved and particulate Pb, an inverse relationship with salinity was also noted for each component (Figure 6). All dissolved Pb concentrations measured from Cruise I, were below the MDL of 0.033 ppb, reported for this study (Table 1). However, there appeared to be a relationship between our dissolved Pb measurements and salinity (R^2=0.69, Figure 6), with concentrations ranging from 0.007 to 0.020 ppb. Particulate Pb concentrations were everywhere greater than the dissolved component, with particulate concentrations ranging from roughly 0.04 to 0.18 ppb. As with the other elements, the less saline waters sampled displayed the highest metal concentrations.

The distribution of Fe showed a similar pattern to that observed for Pb, in that particulate Fe concentrations exceeded dissolved concentrations throughout the study area.(Figure 7). Particulate Fe levels ranged from about 25 to 100 ppb, whereas dissolved Fe concentrations were on the order of a few parts per billion. A simple regression of particulate Fe concentration versus salinity revealed a fairly strong relationship (R^2=0.70, Figure 7), which indicates mixing as an important process controlling the distribution of this element in this portion of the estuary.

Dissolved and particulate Mn concentrations are plotted versus salinity in Figure 8. Dissolved Mn, ranging in concentration from 2 to 6 ppb, displayed a stronger relationship with salinity (R^2=0.96, Figure 8) than did the particulate concentrations of Mn (R^2=0.52, Figure 8). Again, the concentrations of the dissolved and the particulate components were higher

in lower salinity water, although this was more evident for the dissolved metal.

Particulate Al concentrations are shown plotted versus salinity in Figure 9, and similar to most other elements Al exhibited a fairly strong metal/salinity relationship in this area of the estuary (R^2=0.70).

Relationships of Metal Concentrations to Tidal Cycles

In an effort to determine variations in metal concentration in waters surrounding Seavey Island during different tidal regimes, dissolved and particulate metal concentrations were plotted versus salinity that were collected at various stages of the tidal cycle (Figures 10a, b for Cd, 11a, b, for Cu, 12a, b, for Ni, 13a, b, for Pb, 14a, b for Fe, 15a, b, for Mn, and 16 for Al). For these plots, the tidal cycle was divided into four regimes that corresponded to ebb, rising, flood, and falling tides. The purpose in plotting the data in this manner was to assess whether the variability in metal distributions around Seavey Island might be attributed to routine Navy operations on the island. An interesting aspect of these plots for both dissolved and particulate concentrations for each metal was that during the tidal extremes, i. e., flood and ebb, different metal-salinity relationships were evident in the study area. During de tide, the salinity of waters was lower in the sample region, and correspondingly higher metal concentrations occurred. During flood tide, salinities were higher and metal concentrations lower, as seawater from the Gulf of Maine poured into the estuary. Higher metal concentrations during ebb tide, and lower metal concentrations during flood tide were common to all metals measured.

Cruise II

Dissolved and particulate fractions: Relationships to salinity

Dissolved and particulate trace metal concentrations of water samples collected on October 19, and 20, 1993, during the second cruise of the Piscataqua River Estuary and Portsmouth Harbor are given in Table 12. Water column sampling station locations for Cruise II, are shown in Figures 17 and 18. A total of 26 stations were occupied during Cruise II, in the Piscataqua River Estuary and waters surrounding Seavey Island. Part of the focus of this cruise was to measure metal concentrations in less saline waters, in an attempt to identify the source or sources of metal to the lower estuary. Salinities of water samples collected during Cruise II, ranged from 26.9 o/oo to 31.9 o/oo, thus a broader range of metal salinity relationships could be examined. In general, the particulate concentration ranges

observed during Cruise II were comparable to those observed during Cruise I, with concentrations ranging from about 1 to 3.5 mg/L (Table 12), and as was the case for the first cruise, the particulate concentrations generally decreased with increasing salinity (Figure 19).

As with Cruise I, estuarine distributions of dissolved and particulate metal within the Piscataqua River and Portsmouth Harbor were examined by plotting metal data from Cruise II, versus salinity for all stations sampled (Figures 20 through 26). For these plots both dissolved and particulate metal are plotted versus salinity on the same scale, after transforming particulate data from ug/g (Table 12), to ug/L.

Dissolved and particulate Cd, Cu, Ni, Pb, Fe, and Mn, concentrations from Cruise II, are plotted versus salinity in Figures 20, 21, 22, 23, 24, and 25, respectively, and particulate Al concentrations versus salinity are shown in Figure 26. Dissolved Cd concentrations ranged from a low of 0.024 ppb, in the Piscataqua River, to 0.031 ppb, in Portsmouth Harbor (Table 12, Figure 20). The range of concentrations found for dissolved and particulate Cd during Cruise II were essentially the same as those for the Cruise I water column samples. Over the salinity range sampled, dissolved and particulate Cd showed little variation with respect to salinity, with R^2 values of 0.10, for dissolved concentrations, and 0.08, for particulate concentrations (Figure 20).

Dissolved Cu concentrations displayed an inverse relationship with salinity in higher salinity waters of Portsmouth Harbor (salinities greater than 31 o/oo, Figure 21). Dissolved Cu concentrations were more variable and seemingly not related to salinity in waters at salinities less than about 30.4 o/oo (Figure 21). Overall, Cruise II dissolved copper levels ranged from 0.2 to 0.4 ppb. Particulate Cu concentration were everywhere less than the dissolved component, with concentrations ranging from roughly 0.03 to 0.120 ug/L (Figure 22). Particulate copper concentrations generally decreased from less saline to more saline wasters, although greater variability in particulate concentrations were evident in Portsmouth Harbor (salinities greater than 31 o/oo, Figure 21). Similar to Cruise I, Cruise II copper concentrations were generally higher in water samples collected to the west of Seavey Island.

Dissolved and particulate Ni concentrations displayed distributions similar to those of copper (Figure 22), with dissolved nickel concentrations ranging from 0.22 to about 0.40 ppb, and particulate levels ranging from about 0.02 to 0.08 ppb. Dissolved Ni concentrations were inversely related to salinity in higher salinity waters of Portsmouth Harbor (salinities greater than 31

o/oo, Figure 22). In less saline waters, dissolved nickel concentrations were more variable (salinities less than 31 o/oo, Figure 22), especially in the salinity region of 30.4 o/oo, although the extent of variation was on the order of 0.12 ppb. Dissolved nickel concentrations in this salinity region varied from 0.22 to 0.34 ppb; the lower concentrations were collected from the Piscataqua River at Station 26 (Figure 18), whereas the higher concentrations were from samples collected at the US Rte. 1 Lift Bridge, Station 22 (Figure 17). Sampling during different tidal regimes may account for some of the variability observed in this region of the estuary. Particulate nickel showed greater variations in concentration in the lower portion of the estuary, but differences were on the order of about 0.04 ppb (Figure 22).

All dissolved Pb concentrations measured from Cruise II, were below the MDL of 0.033 ppb, reported for this study (Table 1). For water samples collected in the higher salinity region of Portsmouth Harbor, there appeared to be an inverse relationship between dissolved Pb and salinity, otherwise dissolved Pb showed no relationship with salinity (Figure 23). Particulate Pb concentrations were greater than the corresponding dissolved component throughout the estuary, with concentrations ranging from about 0.04 to 0.20 ppb (Figure 23). In Portsmouth Harbor, the highest concentrations of particulate Pb were associated with samples collected near the U.S. Rte. 1 Lift Bridge (Stations 11, and 23, Table 12), and at the mouth of Spruce Creek just to the east of Seavey Island (Station 18, Table 12).

The distribution of Fe showed a pattern similar to that observed for Pb, i. e., particulate Fe concentrations exceeded dissolved concentrations throughout the study area, and elevated particulate Fe levels were associated with the U.S. Rte. 1 Lift Bridge site and the mouth of Spruce Creek (Table 12). Particulate Fe levels ranged from about 25 to 130 ppb, whereas dissolved Fe concentrations ranged from about 1 to 10 ppb (Table 12, Figure 24). A simple regression of particulate Fe concentration versus salinity revealed a fairly strong relationship (R^2=0.77, Figure 24), but there were suggestions of contributions of particulate Fe from sources other than the Piscataqua River. Regression analysis of dissolved Fe to salinity revealed a somewhat stronger metal-salinity relationship, with an R^2=0.85 (Figure 24).

Dissolved and particulate Mn concentrations are plotted versus salinity in Figure 25. Dissolved Mn, ranging in concentration from 2 to 12 ppb, displayed a stronger relationship with salinity (R^2=0.89, Figure 25) than did particulate Mn (R^2=0.29, Figure 25). Concentrations of each component were higher in lower salinity water, though this was more pronounced for dissolved Mn.

Particulate Al concentrations are shown plotted versus salinity in Figure 26, and similar to particulate Fe and Pb, the particulate Al concentrations at the mouth of Spruce Creek sampling site (Station 18) were the highest in the Portsmouth Harbor region study region. Particulate Al concentrations ranged from about 25 to 100 ppb, and a fairly strong metal-salinity relationship was evident over the salinity range sampled (R^2=0.75, Figure 26).

Relationships of Metal Concentrations to Tidal Cycles

For Cruise II, metal concentrations of seawater samples collected from sites adjacent to Seavey Island were plotted versus salinity during different tidal regimes. The tidal cycle was divided into four regimes corresponding to ebb, rising, flood, and falling tides.and the data are presented in Figures 27a, b for Cd, 28a, b, for Cu, 29a, b, for Ni, 30a, b, for Pb, 31a, b for Fe, 32a, b, for Mn, and 33, for Al. The purpose in plotting the data in this manner was to assess whether the variability in metal distributions around Seavey Island might be attributed to routine Navy operations on the island or other sources in the sampling area.

Cruise II dissolved Cd concentrations in samples from the lower estuary showed little variation during different tidal regimes (Figure 27a). The same general case was noted for particulate Cd, although for Cd the highest concentrations observed during an outgoing or falling tide were found for samples collected from the US Rte. 1 Lift Bridge (Station 11) and the Head of the back channel at Seavey Island (Station 13), i. e., two stations in proximity to the Kittery Sewage Treatment Plant. During slack ebb tide, slight elevations in dissolved copper levels were noted for a sample collected in the vicinty of the seep sites (Figure X), at the Outer Back Channel site (Station 19, Figure 17), and for the surface water sample collected at the Inner Clarks Cove site (Station 20, Figure 17; Figure 28a). For each site, the dissolved Cu concentrations during slack ebb were higher than those observed during slack flood stage, by about 0.030 ppb. Particulate copper concentrations at ebb tide also were higher in samples collected at the Outer Back Channel, the mouth of Spruce Creek, and Inner Clarks Cove sites (Stations19, 18, and 20, respectively, Figure 17), (Figure 28b).

Dissolved nickel concentrations during slack ebb tide were elevated relative to those in samples collected in the vicinty of the seep sites during other tidal regimes (Figure X) at the Outer Back Channel site (Station 19, Figure 17) (Figure 29a). The Outer Back Channel site (Station 3, Figure 17) also was sampled during slack flood tide, and no dissolved nickel differences were observed in Back Channel sites compared to other sites in the vicinity.

Particulate nickel concentrations in the lower estuary varied considerably over the tidal cycle (Figure 29b). During the falling tide, the highest particulate Ni levels observed were collected from the US Rte 1 Lift Bridge and the Head of Back Channel sites (Stations 11 and 13, Figure 17) (Figure 29b). During the slack flood tide, the Inner Back Channel and Clarks Cove sites had the highest concentrations observed in the lower estuary (Figure 29b) (Stations 5, and 6, respectively, Figure 17).

Similar to distributions found for copper and nickel, dissolved lead concentrations at ebb tide were higher for samples collected at the Outer Back Channel and the mouth of Spruce Creek sites than at any other point during the tidal cycle (Stations19, 18, and respectively, Figure 17) (Figure 30a). Elevated particulate lead concentrations also were found for the Outer Back Channel and mouth of Spruce Creek sites during slack ebb tide (Figure 30b). During the falling tide, the highest particulate Pb levels observed were collected from the US Rte 1 Lift Bridge and the Head of Back Channel sites (Stations 11 and 13, Figure 17) (Figure 30b).

As with other metals, dissolved and particulate Fe were elevated at the Outer Back Channel and mouth of Spruce Creek sites during ebb tide (Figure 31a, b) and during falling tide at the US Rte 1 Lift Bridge and the Head of Back Channel sites (Figure 31b). Unlike the other metals, dissolved and particulate Mn concentrations displayed no concentration differences at stations sampled over the tidal regimes in the lower estuary (Figures 32a, b). Particulate Al levels were higher at the mouth of Spruce Creek during ebb tide than for any other samples collected in the vicinity (Figure 33).

Cruise III

Dissolved and particulate trace metal concentrations of water samples collected on November 16, and 17, 1993, during the third cruise of the Piscataqua River Estuary and Portsmouth Harbor are given in Table 13. Water column sampling station locations for Cruise II, are shown in Figures 34 and 35. A total of 25 stations was occupied in the Piscataqua River Estuary and waters surrounding Seavey Island during Cruise III. One focus of this cruise was to measure metal concentrations in less saline waters, in an attempt to identify the source or sources of metals to the lower estuary. Salinities of water samples collected during Cruise III, ranged from 19 o/oo to 32 o/oo; thus a broader range of metal salinity relationships were examined for this cruise than for the previous cruises. In general, the particulate concentration ranges observed during Cruise III were equivalent to those observed during Cruise I, and II, with concentrations ranging from

about 1 to 5 mg/L (Table 13). Also, the particulate concentrations generally decreased with increasing salinity (Figure 36).

Dissolved and particulate fractions: Relationships to salinity

As with the previous cruises, Cruise III estuarine distributions of dissolved and particulate metal within the Piscataqua River and Portsmouth Harbor, were examined by plotting metal data versus salinity for all stations sampled (Figures 37 through 43). For these plots, both dissolved and particulate metal are plotted versus salinity on the same scale after transforming the particulate data from ug/g (Table 13), to ug/L.

Dissolved and particulate Cd, Cu, Ni, Pb, Fe, and Mn concentrations from Cruise III are plotted versus salinity in Figures 37, 38, 39, 40, 41, and 42, respectively, and particulate Al concentrations versus salinity are shown in Figure 43. Dissolved Cd concentrations ranged from about 0.020 to 0.034 ppb over the salinity range sampled during Cruise III, and no correlation was found for this dissolved metal and salinity (Table 13, Figure 37). The Cruise III concentrations and distribution patterns of dissolved and particulate Cd were essentially the same as those found for the two previous cruises. Particulate Cd concentrations for Cruise III, were everywhere less than 0.005 ppb (Figure 37).

Overall, dissolved Cu concentrations ranged from about 0.2 to 0.5 ppb, and DCu displayed a curvilinear relationship with salinity within the study area (Figure 38). Particulate Cu concentration were everywhere less than the dissolved component, with concentrations ranging from roughly 0.02 to 0.2 ug/L (Figure 38). Less saline waters (< 26 o/oo) had higher particulate copper concentrations than intermediate salinity waters (>28 o/oo, <31.5 o/oo), (Figure 38). The lowest PCu levels found were for samples with salinities greater than 31.5 o/oo. Dissolved and particulate Cu concentrations found during this survey were on the same order as those found for the two previous cruises.

Dissolved nickel concentrations were inversely related to salinity (R^2=0.86, Figure 39), with concentrations ranging from about 0.25 ppb in high salinity waters to about 5 ppb in less saline waters. Particulate Ni concentrations were everywhere less than the dissolved component, and PNi showed less of a relationship with salinity (R^2=0.38, Figure 39).

Dissolved Pb concentrations measured from Cruise III (Table 13) were at or below the MDL of 0.033 ppb reported for this study (Table 1). However, dissolved Pb concentrations generally deceased from lower salinity to higher

salinity waters (Figure 40). Particulate Pb concentrations varied considerably over the salinity range sampled (Figure 40), with concentrations ranging from 0.1 ppb in the lower estuary to about 0.4 ppb in the Piscataqua River. Particulate Pb concentrations were greater than the corresponding dissolved component throughout the estuary.

The distribution of Fe showed a similar pattern to that observed for Pb, in that particulate Fe concentrations exceeded dissolved concentrations throughout the study area (Figure 41). Particulate Fe levels ranged from about 25 to 200 ppb, whereas dissolved Fe concentrations ranged from about 1 to 30 ppb (Table 13, Figure 41). A simple regression of particulate Fe concentration vs. salinity revealed a fairly strong relationship (R^2=0.92, Figure 41), although the regression analysis is biased by the single sample with a salinity of 26 o/oo (Figure 41). The regression of dissolved Fe to salinity revealed a similarly strong metal-salinity relationship, with an R^2=0.93 (Figure 41).

Dissolved and particulate Mn concentrations are plotted versus salinity in Figure 42. Dissolved Mn concentrations from 2 to 17 ppb throughout the study area, and DMn displayed a stronger relationship with salinity (R^2=0.99, Figure 42) than did the PMn (R^2=0.55, Figure 25). Concentrations of each component were higher in lower salinity water, though this was more pronounced for dissolved Mn.

Particulate Al concentrations are shown plotted versus salinity in Figure 43, and a fairly strong inverse metal-salinity relationship was evident over the salinity range sampled (R^2=0.89). As in the case of particulate Fe, the particulate Al-salinity regression is biased toward the single lower salinity sample; thus the regression should be considered simply as identifying a general trend.

Relationships of Metal Concentrations to Tidal Cycles

The metal concentrations of seawater samples collected during Cruise III from sites adjacent to Seavey Island were plotted versus salinity during different tidal regimes. As for the two prior cruises, the tidal cycle was divided into four regimes corresponding to ebb, rising, flood, and falling tides, and the data for Cruise III are presented in Figures 44a, b for Cd, 45a, b, for Cu, 46a, b, for Ni, 47a, b, for Pb, 48a, b for Fe, 49a, b, for Mn, and 50, for Al. Again, the purpose in plotting the data in this manner was to assess whether the variability in metal distributions around Seavey Island might be attributed to routine Navy operations on the island or other sources in the sampling area.

Cruise III dissolved Cd concentrations showed little variation in samples collected during different tidal regimes from sample locations in the lower estuary (Figure 44a). The same general case was noted for particulate Cd, with concentrations throughout the lower estuary on the order of 0.001 ± 0.001 ppb over the tidal cycle (Figure 44b).

Dissolved Cu and Ni concentrations similarly showed little variation over the tidal regimes for each metal in the lower estuary (Figures 45a, for Cu, and 46a, for Ni). During flood tide, salinities in the region were higher, and dissolved concentrations for each element were slightly lower than those during ebb tide conditions. Particulate Cu and Ni, appeared to be affected to a greater extent by tidal fluctuations than the dissolved component of each metal Figure 45b, for Cu, and 46b for Ni). Both particulate Cu and Ni concentrations during flood tide decreased by about a factor of two to three compared to ebb tide conditions.

The highest particulate Pb level observed over the course of the lower estuary tidal regimes was collected from the vicinity of Pierces Island on an outgoing tide (Station 8, Figure 34 and, Figure 47b). Other than for that single sample, tidal variations for concentrations of dissolved and particulate Pb displayed patterns similar to other elements.

Dissolved and particulate Fe, Mn, and particulate Al concentrations also fell within the generalized pattern of lower metal concentrations for each component during high tide, and higher metal concentrations during ebb tide. These results suggest that the flood tide brings with it cleaner more saline waters from the mouth of the estuary while the ebb tide is associated with less saline waters that have higher metal burdens (Figures 48a, b for Fe, Figures 49a, b, for Mn, and Figure 50, for Al).

Synopsis of Cruises I, II and III:

In summarizing the observations for Cruise III, it is interesting to note that the results are very similar to Cruise I, where it was found that metal-salinity distributions in the lower estuary could be explained, at least to a first order, by the mixing of less saline waters of the Piscataqua River with more saline waters of Portsmouth Harbor. In this regard, Cruise I and III were unlike Cruise II, where there appeared to be identifiable and measurable metal sources to the lower estuary. For the Cruise III samples there was no evidence for elevated metal characteristics at the Spruce Creek, Outer Back Channel, and Clark Cove sample sites as had been observed in Cruise II. The reason for this difference is probably related to the fact that Cruise III

sampling in the vicinity of these sites took place during flood and rising tide regimes, whereas these sites were sampled at ebb tide during Cruise II. Additionally, Seep Site 2 (Figure 51), which discharges directly into the Outer Back Channel area of Seavey Island, was not discharging water at the time of our seep sampling during Cruise III. The lack of seep flow, coupled with the water column sampling at flood and rising tides may account for differences in the metal concentrations in the Outer Back Channel area during Cruises II and III.

In summarizing the observations for Cruise II, it appears that metal concentrations within the lower estuary are affected by several different sources. There appears to be a source of metal to the estuary in the vicinity of the US Rte 1 Lift Bridge and the Head of the Seavey Island Back Channel because these sites displayed higher concentrations of dissolved and/or particulate metals relative to other sites when sampled on an outgoing tide. There also appears to be an influx of metal to the Outer Back Channel site (Station 4, and 19, Figure 17), possibly from seeps draining from Seavey Island to the Back Channel. Elevated metal concentrations were noted during the ebb tide sampling of this site (Station 19) but not for the flood stage (Station 4). Spruce Creek also appears to be a source of metal to the lower estuary because elevated metal concentrations were observed at this site, especially during ebb tide (Station 18). At the Spruce Creek sampling site, salinities were lower than those of the Seavey Island Back Channel sites during ebb tide, so it would appear that water discharging from Spruce Creek has a higher metal burden than surrounding sites.

Seeps:

During each of the three Fall 1993 cruises, a sampling team was brought ashore to conduct a survey of shoreline water seepage emanating from Seavey Island. Two seep sites were identified in the Jamaica Island landfill area (Seep Sites 1, and 2, Figure 51), where water was flowing over the surface from Seavey Island to Back Channel waters. During the Cruise I and II seep surveys, both seep sites were discharging water to the Back Channel, but during the Cruise III survey only Seep Site 1 was discharging (Table 14). For seep water collections, we followed the sampling conventions described in our Standard Operating Procedures (Appendix A).

The character of the seeps discharging to the estuary were very different. In all instances, Seep Site 1 had a less saline character than Seep Site 2 (Table 14). The salinity for Seep Site 1, ranged from about 13 o/oo to 19 o/oo over the course of the survey, whereas Seep Site 2 displayed more of a marine character with salinities ranging from about 30.7 o/oo to 31.0 o/oo (Table

14). The metal character of the seep streams was also very different, dissolved concentrations of Cd, Cu, Ni, and Pb were at least factor of 10 higher in Seep Site 2, than for Seep Site 1 (Table 14, Figures 52, 53, 54, and 55, for Cd, Cu, Ni, and Pb, respectively). In contrast, the concentrations of Fe and Mn were greater for Seep Site 1 than for Seep Site 2 (Table 14, Figures 56, and 57, for Fe, and Mn, respectively).

Relative to waters in the Outer Back Channel area of Seavey Island, the seep stream metal concentrations were equal to or greater than the estuarine waters which they entered, and in this regard, the seep streams could be considered as a source of metal to the immediate vicinity. For the three water column surveys adjacent to the seep sites, (five visits during Cruises I, II, and III), there was only a single occasion during which estuarine metal concentrations were elevated above surrounding water column sites. That occurrence was at ebb tide during the Cruise II while sampling in the vicinity of a seep.

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List of Standard Operating Procedures

SOP Number	Description
SOP-01	Bottle Cleaning Procedures
SOP-02	Nuclepore Membrane Cleaning Procedures
SOP-03	Collection and Filtration of Seawater Samples for Trace Metal Analysis
SOP-04	Collection and Preparation of Seep Water Samples
SOP-05	Post-cruise Laboratory Preparation of Dissolved and Particulate Metal Samples
SOP-06	Cleaning the Ammonium Pyrrolidine Dithiocarbarmate and Cobalt Chloride Solutions
SOP-07	Preconcentration of Dissolved Trace Metals from Seawater Samples
SOP-08	Analysis of Dissolved and Particulate Metal Samples
SOP-09	Preparation and Neutron Activation Analysis

Standard Operating Procedure: SOP-01

Bottle Cleaning Procedures used specifically in the collection and preconcentration of trace metals in seawater.

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Principle

Trace metal concentrations in seawater and estuarine waters are generally on the order of a few parts per billion or less. In order to maintain the integrity of a collected sample, botlles used for collection and preconcentration must be rigorously cleaned prior to use.

Special Apparatus or Materials

1. Bransonic Sonicator.
2. Low-density-polyethylene bottles (LDPE), 250 ml and 500 ml capacity.

Reagents

1. Nitric acid (Reagent Grade).
2. Nitric and hydrochloric acids (J.T. Baker Instra-Analyzed acids or equivalent).
3. Milli-Q deionized water (Millipore Corporation, or equivalent).
4. Ultrex hydrochloric acid (J.T. Baker, or equivalent).

Procedure

1. Rinse bottles with Milli-Q water and place rinsed bottles in soap and water bath overnight.
2. Remove from soap and water bath, rinse with Milli-Q water and place in deionized water bath overnight.
3. Remove bottles from deionized water bath, rinse with Milli-Q water, and soak bottles in dilute nitric acid at least overnight (the nitric acid soak solution is made using 5% v/v reagent grade acid and Milli-Q water).

4. Remove bottles from dilute nitric bath, and rinse thoroughly with Milli-Q water. Fill each bottle with 10% nitric acid using Instra-analyzed nitric acid and Milli-Q water. Sonicate bottles for eight hours, and allow acid to cool in bottles overnight.
5. Remove 10% nitric acid, and rinse bottles with Milli-Q water. Fill each bottle with 10% hydrochloric acid using Instra-analyzed HCl and Milli-Q water. Sonicate bottles for eight hours, and allow acid to cool in bottles overnight.
6. Remove 10% HCl, rinse bottles with Milli-Q water and fill eachbottle with Milli-Q water. To each bottle add 0.5 ml Ultrex HCl, and store until use.
7. Just prior to use rinse bottles with Milli-Q water and weigh bottles empty to determine bottle weight.

Notes

It is our practice to use a sonicator as part of our cleaning routine, and this step is primarily to heat the bottles containing acid rather than to actively agitate the plastic lining of the vessel. Though other laboratories employ a variety of cleaning protocols for trace metal bottles, we have found that this method provides consistently clean bottles. It cannot be stressed enough that the proper cleaning of materials is of paramount importance for low-level metal analyisis of seawater.

Standard Operating Procedure: SOP-02

Nuclepore Membrane Cleaning Procedures used specifically in the collection and preconcentration of trace metals in seawater.

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Principle

In an effort to minimize the contributions of trace metal to seawater samples from filtration and preconcentration steps, polycarbonate membranes used in these procedures are acid-cleaned prior to use. Following the acid cleaning steps, membranes that are used for suspended particulate weight determinations are dried and weighed, whereas membranes used in the preconcentration step are rinsed with deionized water prior to use.

Special Apparatus or Materials

1. Nuclepore membranes, 0.4µm pore size, 25mm and 47mm diameter (or equivalent polycarbonate membrane).
2. Petri dishes
3. Dessicator
4. Analytical balance
5. Static Gun (Zero Stat)
6. Plastic weighing dishes

Cleaning Procedure

1. Remove individual membranes from box , and place directly into a vessel containing 5-10% Instra-analyzed nitric acid (J.T. Baker or equivalent). Allow the membranes to soak in this initial acid solution for a few days.
2. After initial soak, discard acid, and rinse membranes with Milli-Q water several times. Fill vessel with Milli-Q water, and add Instra- analyzed nitric acid (J.T. Baker or equivalent) to make solution roughly 5% nitric acid. Again, allow the membranes to soak in this solution for a few days.

3. Following second soak, rinse membranes with Milli-Q water, fill vessel with Milli-Q water and add about 2 ml of Ultrex nitric acid per 200 ml of Milli-Q water. Allow the membranes to soak in this solution until operations concerning the membranes are imminent.

Nuclepore membranes used for preconcentration procedure

1. In our laboratory, 25mm diameter, 0.4μm pore size, Nuclepore membranes are used exclusively in the ammonium pyrrolidine dithiocarbamate (APDC)/cobalt chloride preconcentration step. The membranes are cleaned prior to use, following the steps detailed above, and the nitric acid soaked membranes are simply rinsed with Milli-Q water on the day preconcentrations are performed.

Nuclepore membranes used for suspended particulate weight and metal determinations

1. Nuclepore membranes (0.4μm pore size, 47 mm diameter) are cleaned following the steps above. Subsequent to the acid soaking of the membranes, the membranes are rinsed several times with Milli-Q water, and individual filters are placed in acid-cleaned petri dishes.
2. Prior to use, petri dishes were soaked in a 5% nitric acid solution, rinsed with Milli-Q water and dried in a laminar flow clean bench.
3. Petri dishes containing the wet membranes are then placed in a dessicator to dry.
4. Subsequent to drying, weight determinations are made on dry membranes. In the weighing process, dry membranes are removed from individual petri dishes with plastic forceps, shot with an anti- static gun, and placed in a tared polypropylene weighing dish that was acid-cleaned in the same fashion as petri dishes.
5. The weight of the membrane is recorded on the petri dish and in a log. Petri dishes containing weighed membranes are then placed in a covered plastic box for storage.

Standard Operating Procedure: SOP-03

Collection and filtration of seawater samples for trace metal analysis

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Principle

Shipboard collection of seawater samples for trace metal analysis presents a number of difficulties to the analyst in terms of maintaing the integrity of the water collected. There are so many potentials for contaminating water samples aboard a ship, that great care must be taken to collect and process the sample cleanly. Once a seawater sample is collected, all operations concerning filtration are carried out in a laminar flow clean bench in an effort to minimize contaminant exposure. The only materials allowed in a clean bench are those that have been acid cleaned.

Special Apparatus or Materials

1. Laminar flow clean bench (portable).
2. Niskin Bottles (Teflon coated bottles, with Teflon end caps and accessories, available through General Oceanics).
3. Nylon metering wheel (available through AGO Environmental)
4. 200 ft., Spectron line spliced onto 300 ft., Tenex line
5. Plastic coated, 15 lb. mushroom anchors (2).
6. Polysulfone filtration units (250ml capacity upper chamber, 500ml capacity receiving chamber (Nalgene), with Teflon o-rings.
7. Vacuum pump.
8. Carboy containing Milli-Q water.
9. Polypropylene buckets with lids (3).
10. Instra-analyzed HCl (J.T. Baker).
11. Squirt bottle.
12. Plastic forceps.
13. Acid-cleaned, and tared polyethylene bottles (SOP-1).
14. Pre-tared, pre-cleaned Nuclepore membranes (SOP-2).
15. Conductivity, temperature and depth probe (Hydrolab CTD).
16. Salinity bottles (125ml capacity polypropylene bottles).

Water Sample Collection Procedure

1. Spool 300 ft. of Tenex line onto hydrowinch such that the line covers the metal hydrowire, and lay the Spectron line atop the Tenex backing.
2. Attach nylon metering wheel to A-frame or davit, and run the Spectron line through the tackle and affix two plastic coated mushroom anchors to the end of the line.
3. On station, deploy CTD to characterize the water column, and record in a data log, the temperature and salinity at specified depths.(Our CTD was small enough that it could be deployed via a side davit by hand).
4. Deploy Niskin Bottle to specific depth, using the metering wheel readout as a guide. At depth send a messenger down the line to trigger the closure of the Niskin sampler. Retrieve sampler.
5. Once on deck, open the Niskin Bottle vent valve and the water sample valve. Fill salinity bottle with sampled water after rinsing twice. Open a pre-cleaned trace metal bottle (500 ml capacity), and place bottle in stream of seawater, rinse bottle at least twice, and fill bottle. Once filled, cap, label, and place bottle in plastic bag to reduce the potential of airborne contaminants affecting the sample.
6. Record in sample log the station location, sample depth, and sample time.

Seawater Filtration Procedure

1. In close proximity to the clean bench, three polypropylene buckets are set up. One bucket to contain a Milli-Q water bath, another to contain a 2% HCl in Milli-Q water bath, and the third to act as a liquid waste recepticle. In this area, set up the vacuum pump with vacuum tubing running to the clean bench.
2. Set up polysulfone filtration units in the clean bench after rinsing the units in the 2% HCl, and Milli-Q water baths.
3. Place an acid-cleaned, pre-tared Nuclepore membrane (0.4μm pore size, 47mm diameter) atop the filter holder, and affix the upper chamber.
4. Rinse filter unit with Milli-Q water, and discard rinse water.
5. From the seawater sample bottle, pour approximately 20 ml, of seawater into the filtration vessel and apply vacuum.
6. Swirl the filtered seawater collected in the filter flask and discard seawater.

7. Reconnect filter flask and introduce sample to filtering chamber.
8. Once the entire seawater sample has been dispensed from the collection bottle, thoroughly rinse the emptied bottle with Milli-Q water.
9. After filtration is complete, remove upper filter chamber from filtration flask, introduce an small aliquot (5-10 ml), of the filtered seawater to the seawater collection bottle as a rinse. Discard rinse, and fill collection bottle with remaining filtered seawater sample. Cap, and place bottle in a plastic bag for storage.
10. Reconnect the upper chamber of the filter unit to the filtration flask, and rinse membrane with small aliquots of Milli-Q water, with vacuum on.
11. Remove membrane to its petri dish, label and store.
12. Break down filtration unit, and rinse chambers in dilute HCl bath, followed by a rinse in the Milli-Q bath. Retrace steps starting at Step 3 for the next seawater sample.

Notes

Using 0.4 μm pore size membranes, we've established the operational definitions of the dissolved and particulate metal fractions. Metals retained on the membrane are operationally defined as particulate metal, whereas the metals passing through the membrane are defined as the dissolved fraction.

All materials used in the filtration process, including plastic forceps, squirt bottles, etc., are acid cleaned prior to use. Once the clean bench is set up, these materials are kept inside the bench to reduce the possibility of contaminating them.

In terms of acidyfing the dissolved metal samples, on short cruises of one to two days duration, we prefer to wait until we return to the laboratory before opening the dissolved metal bottles to acidify. On cruises of longer duration we acidfy the samples to pH 2, with Ultrex HCl in the clean bench.

Standard Operating Procedure: SOP-04

Collection and preparation of seep water samples.

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Principle

Seep samples were collected from Seavey Island in an effort to determine the concentrations of metal entering Portsmouth Harbor in the vicinity of Jamaica Island landfill. Only the dissolved metal component was considered for samples collected, and samples were filtered in the field to minimize the exchange between dissolved and particulate metal.

For the purpose of this study, seeps were defined as moving surface water that was draining away from the landfill area. On two occasions, two seeps were identified and sampled, and on the third occasion only one seep was identified and sampled.

During the sampling of seeps, great care was taken not to disturb surface sediments, so as to exclude sediment associated particles from the sample.

Special Apparatus or Materials

1. Acid cleaned 250 and 500 ml, polyethylene bottles.
2. Acid cleaned polypropylene syringes (50 ml capacity).
3. Teflon tubing with Luer-lock fittings.
4. Polypropylene filtration units (Swinex).
5. Acid cleaned Nuclepore membranes (0.4μm pore size, 25 mm diameter).
6. 125 ml, sample bottles for salinity measurements.

Seep Collection and Preparation Procedure

1. Dip 125 ml salinity bottle in seep stream, fill, label, and store.
2. Dip pre-cleaned 500 ml, bottle into seep stream and fill.
3. From this bottle, draw seep water into pre-cleaned syringe, attach filter unit, and express filtrate into an acid cleaned 250 ml

bottle.Repeat process until about 200 ml of filtered sample is collected.

4. Acidify seep samples to pH 2, with Ultrex HCl upon return to the laboratory.
5. Follow the APDC-cobalt chloride coprecipitation technique for the preconcentration of trace metals from water.

Standard Operating Procedure: SOP-05

Post-cruise laboratory preparation of dissolved and particulate metal samples.

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Principle

Post-cruise preparation of seawater samples involves the drying and weighing of particulate samples and the acidification of dissolved metal samples. Particulate metal samples should be placed in a dessicator to dry as early as possible following the cruise. Not as critical, but at the earliest convenience, dissolved metal samples should be weighed for volume of water filtered and acidified.

Special Apparatus or Materials

1. Dessicator with dessicant and aspriator valve.
2. Aspirator.
3. Ultrex hydrochloric and nitric acids (J.T. Baker).
4. Analytical Balance (Mettler or equivalent capable of reading to 0.01 mg).
5. Plastic weighing boat (acid cleaned and rinsed with Milli-Q water).
6. Plastic forceps.
7. Top-loading balance.
8. 5 ml capacity polypropylene vials with screw cap closure (acid cleaned).
9. Pipets, (Finnpipet or equivalent) one pipet capable of delivering 1-5 ml, the other capable of delvering 0.050-0.250 ml.
10. Pipet tips (acid cleaned in dilute nitric, and rinsed with Milli-Q water).

Particulate Preparation Procedure

1. Place petri dishes containing Nuclepore membranes used in the seawater filtration step into a dessicator. Petri dish covers should be loosely affixed to bottom plates, but not ajar.
2. Close the dessicator and apply a partial vacuum by using a water aspirator.
3. Prepare a plastic weighing boat for membrane weight determinations, by cleaning the boat in a dilute acid bath, rinsing with Milli-Q water, and drying it in a clean bench.
3. Allow membranes to dry in dessicator for 4-5 days.
4. Prior to particulate weight determinations, place acid cleaned weighing boat on analytical balance and tare.
5. Remove petri dishes from dessicator and determine individual membrane weights by placing membranes into the tared weighing boat using plastic forceps.
6. Calculate particulate weight on each filter by subtrating the membrane tare weight from the filtered sample weight. Record weight information in a log.
7. Following weight determinations, place individual weighed membranes in acid cleaned polypropylene vials and add 4.0 ml of 2N HNO_3 made up from Ultrex nitric acid and Milli-Q water. Allow particulate samples to soak in 2N HNO_3 for 30 days prior to trace metal mesurements.

<u>Dissolved Preparation Procedure</u>

1. Tared polyethylene bottles containing dissolved metal seawater samples are weighed using a top-loading balance. The empty bottle weight is subtracted from the total weight giving the weight of the water filtered. The weight of water filtered for individual samples is combined with the particulate weight data to calculate the weight of particulate matter collected per volume filtered. This information is normalized to particulate weight per liter (i.e., mg/L).
2. Following weight determinations, water samples were acidified to pH 2, by adding 0.550 ml Ultrex HCl to each 500 ml seawater sample. Pipet tips used for dispensing HCl were cleaned prior to use by soaking in a dilute nitric acid folloed by rinsing with Milli-Q water.

Standard Operating Procedure: SOP-06

Cleaning the ammonium pyrrolidine dithiocarbamate (APDC) and cobalt chloride solutions used in the APDC-$CoCl_2$ coprecipitation of trace metal from seawater samples.

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Principle

APDC and $CoCl_2$ solutions used in the preconcentration of dissolved metals from seawater, are cleaned before use in an effort to minimize the contribution of metals to the sample due to reagent additions. All plastic or glassware used in the cleaning of these reagents are acid cleaned by soaking in a dilute nitric acid bath.

Materials for APDC Preparation

1. Ammonium pyrrolidine dithiocarbamate (APDC, reagent grade).
2. Methyl iso-butyl ketone (MIBK, spectroscopy grade).
3. Nuclepore membrane (0.4μm pore size, 47mm diameter), acid cleaned.
4. 47mm filtration unit (Millipore Corp.).
5. Vacuum pump.
6. Plastic filtration flask and beaker.
7. Teflon separatory funnel, and 250 ml capacity Teflon bottle.

APDC Preparation

1. Weigh out 5 grams APDC in acid cleaned plastic beaker, and dissolve in 250 ml Milli-Q water.
2. Assemble filtration unit using the acid cleaned Nuclepore membrane.
3. Filter APDC solution (after stirring), through 0.4μm membrane and collect filtrate in an acid washed filtration flask.
4. Transfer filtered solution from filtration flask to separatory funnel.

5. Extract APDC solution with 20 ml aliquots of MIBK, 5 times. Discarding the MIBK after each extration.
6. After completing the MIBK extraction, collect the APDC in an acid cleaned Teflon bottle, and refrigerate until use.

Materials for $CoCl_2$ Preparation

1. Ultrex HCl (J.T. Baker).
2. Instra-analyzed HCl (J.T.Baker).
3. $CoCl_2 \cdot 6H_2O$ (reagent grade).
4. Dowex 1-X8 resin (100-200 mesh, chloride form).
5. Polypropylene or polyethylene column (about 1 cm x 20 cm), fitted with stopcock and gauze.
6. Teflon bottle, 500 ml capacity, acid cleaned.

$CoCl_2$ Preparation

1. Weigh 5-6 g Dowex 1-X8 resin in acid cleaned beaker. Add 30-50 ml of 0.1N HCl to beaker, swirl the solution to suspend the resin and pour the suspension into the column. Drain excess 0.1N HCl, but maintain sufficient volume to cover resin.
2. Condition column with 10 ml, 9N HCl (Instra-analyzed)
3. Dissolve 0.425 g $CoCl_2 \cdot 6H_2O$ in 150 ml of 9N HCl (Instra-analyzed), and apply to column.
4. Elute column with 40 ml, 4N HCl (Ultrex).
5. Discard blue/violet elutriate, collect rose/pink elutriate in the Teflon bottle (the rose/pink elutriate volume will vary from batch to batch, but generally about 8-12 ml of thlutriate is collected).
6. Dilute the rose/pink elutriate to 500 ml with Milli-Q water.

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Standard Operating Procedure: SOP-07

Preconcentration of dissolved trace metals from seawater samples using the ammonium pyrrolidine dithiocarbamate (APDC)-cobalt chloride coprecipitation technique

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Principle

Cobalt is added to acidified seawater samples followed by the addition of the APDC solution. The added reagents are mixed and metal-APDC complexes are allowed to form for at least a half hour. The complexes are filtered from seawater samples, using acid cleaned Nuclepore membranes (0.4µm pore size, 25mm diameter). Filtered complexes are dissolved in 1N HNO_3 and analyzed by atomic absorption specttrophotometry.

Special Apparatus and Materials

1. Acid cleaned, 250 ml capacity, polyethylene bottles.
2. Top loading balance.
3. Pre-cleaned APDC solution.
4. Pre-cleaned cobalt solution.
5. Acid cleaned Nuclepore membranes (0.4µm pore size, 25 mm diameter).
6. Polysulfone filtration units (Gelman or equivalent).
7. Vacuum pump.
8. Standard Reference Material (NASS-4 seawater reference material available through National Research Council, Canada).
9. Milli-Q water.
10. Pipets (pipet capable of delivering 1-5 ml, and one capable of delivering 0.75 µl), and acid cleaned pipet tips.
11. Laminar flow clean bench.

Preconcentration Procedure

1. Determine the tare weight of acid cleaned 250 ml preconcentration bottles using top loading balance.

2. In clean bench, pour about 250 ml of acidified seawater sample into the tared container. Rewigh the bottle to determine the preconcentration sample weight Record sample weight in log book.
3. Prepare standard reference seawater and blank sample using Milli-Q water, in the same fashion. To the Milli-Q water sample add 0.75 µl Ultrex HCl to bring sample to pH 2.
4. To each seawater, reference, and blank sample, add 2 ml cobalt solution, followed by the addition of 4.0 ml, APDC solution, mixing sample after each addition.
5. Allow metal-APDC complexes to form for at least a half hour.
6. Filter each sample, to collect the metal-APDC complex, using 0.4µm pore size membranes.
7. Rinse membranes with several small aliquots of Milli-Q water to remove residual salt, and place membrane with metal-APDC complex to an acid cleaned polypropylene vial.
8. Subsequent to filtration of all samples, add 5 ml of 1N HNO_3 (Ultrex nitric and Milli-Q water) to each vial, to dissolve metal-APDC complex. Following the addition of acid to the metal-APDCcomplex, samples are ready to analyze in about two days.

Notes

The preconcentration factor of samples prepared in the procedure described is about 50 (i. e., 250 ml sample/5 ml 1N HNO_3= 50). Other preconcentration factors can be obtained by varying the initial sample volume or the amount of acid added to dissolve the metal-APDC complex.

Polypropylene vials used to receive the metal-APDC membranes are pre-cleaned by soaking the vials in 10% nitric, followed by rinsing with Mill-Q water.

References

Bender and Gagner, J. Mar. Res., v. 34, 327, (1976)

Standard Operating Procedure: SOP-08

Analysis of dissolved and particulate metal samples using graphite furnace atomic absorption spectrophotometry (GFAAS), and inductively coupled plasma atomic emission spectroscopy (ICPAES).

Contact

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Principle

Dissolved Cd, Cu, Ni, and Pb were analyzed after preconcentration by GFAAS techniques, whereas Fe, and Mn, were analyzed by directly injecting seawater into the graphite furnace. For preconcentrated samples, standard metal curves were prepared using 1N HNO_3, the same matrix that was used to dissolve the metal-APDC complex. Direct injection seawater standards were prepared by adding Fe, and Mn, to NASS-4 seawater reference material.

Particultate Cd, Cu, Ni, and Pb were analyzed by GFAAS, and standard metal curves were prepared using 2N HNO_3. Particulate Al, Fe, and Mn standards were also made up in 2N HNO_3, but samples were analyzed using ICPAES.

In all instances, sample concentrations were determined by comparing sample measurements to the relationship established between standard absorbance or emission and standard concentrations.

Special Apparatus and Materials for GFAAS

1. Mixed metal standard (available through Perkin Elmer Corp.).
2. Individual metal standards (Aldrich Chemical Company).
3. Perkin Elmer Model 5000 Atomic Absortpion Spectrophotometer, equipped with a Model 500 Graphite Furnace, AS-40 Autosampler, and PRS-10 printer.
4. L'Vov platforms and pyrocoated graphite tubes.
5. Polystyrene autosampler cups.
6. Polypropylene vials.
7. Ultrex nitric acid (J.T. Baker).

8. Pipets and acid-cleaned pipet tips.

Special Apparatus and Materials for ICPAES

1. Mixed metal standard (available through Perkin Elmer Corp.).
2. Individual metal standards (Aldrich Chemical Company).
3. Fisons Model 3410 ICP (emission measurements were made subsequent to setting the instrument to the operating parameters recommended by the manufacturer).
4. Ultrex nitric acid (J.T. Baker).
5. Pipets, and acid cleaned pipet tips.

Analytical Protocols for GFAAS

1. Daily standard curve solutions were prepared by diluting the mixed metal standard with 1N HNO_3. Additionally, a daily check standard was prepared separately, using a single element standard solution. The concentration of the check standard was prepared to approximate the mid-point of the standard curve. Check standard solutions were analyzed throughout the analytical run, and the run was considered acceptable if the check sample fell within $\pm$ 15% of the expected value. Also analyzed throughout the analytical run were 1N or 2N HNO_3 blank solutions, which were used to check the analytical baseline for dissolved and particulate metals, respectively.

2. Instrument settings of the Perkin Elmer 5000 used for the measurement of dissolved and particulate elements are provided below. In the few cases where the sample absorbances fell outside the normal operating range, the sample was either diluted, or a new operating range was developed by either adjusting the gas flow during atomization, or extending the range of the standard curve.

3. All absorbance data was logged in either the dissolved or particulate GFAAS Log.

GFAAS Settings for Dissolved and Particulate Metal

Cadmium
Dissolved and Particulate
Monochrometer settings as specified in Perkin Elmer operating manual
Autosampler Settings: 15µl Sample injection, 10µl 1N HNO_3 Alt. Volume
L'Vov Platform, Peak Area Recorded

Furnace Settings:

Step	Dry-1	Dry-2	Dry-3	Char	Atom*	Burn
Temp,°C	110	130	150	250	1900	2600
Ramp, sec	3	15	7	7	0	3
Hold, sec	20	5	5	30	5	3

* Argon flow at 0 ml/min during atomization

Copper
Dissolved and Particulate
Monochrometer settings as specified in Perkin Elmer operating manual
Autosampler Settings: 20µl Sample injection, 10µl 1N HNO_3 Alt. Volume
L'Vov Platform, Peak Height Recorded

Furnace Settings:

Step	Dry-1	Dry-2	Dry-3	Char	Atom*	Burn
Temp,°C	110	140	160	950	2600	2700
Ramp, sec	3	12	10	10	0	1
Hold, sec	25	8	2	25	6	4

* Argon flow at 50 ml/min during atomization

Nickel
Dissolved and Particulate
Monochrometer settings as specified in Perkin Elmer operating manual
Autosampler Settings: 25µl Sample injection, 7µl 1N HNO_3 Alt. Volume
L'Vov Platform, Peak Area Recorded

Furnace Settings:

Step	Dry-1	Dry-2	Dry-3	Char	Atom*	Burn
Temp,°C	120	140	160	1100	2600	2700
Ramp, sec	3	12	10	10	0	1
Hold, sec	17	8	2	25	6	3

* Argon flow at 50 ml/min aduring atomization

Lead
Dissolved and Particulate
Monochrometer settings as specified in Perkin Elmer operating manual
Autosampler Settings: 25µl Sample injection
L'Vov Platform, Peak Area Recorded

Furnace Settings:

Step	Dry-1	Dry-2	Dry-3	Char	Atom*	Burn
Temp,°C	120	140	160	500	1900	2600
Ramp, sec	3	10	8	10	0	3
Hold, sec	25	10	2	30	6	3

* Argon flow at 0 ml/min aduring atomization

Manganese
Dissolved only
Monochrometer settings as specified in Perkin Elmer operating manual
Autosampler Settings: 10µl Sample injection, 10µl 1N HNO_3 Alt. Volume
L'Vov Platform, Peak Area Recorded

Furnace Settings:

Step	Dry-1	Dry-2	Dry-3	Char	Atom*	Burn
Temp,°C	120	140	160	1000	2400	2600
Ramp, sec	3	12	8	8	0	1
Hold, sec	25	4	2	25	5	2

* Argon flow at 50 ml/min aduring atomization

Iron
Dissolved only
Monochrometer settings as specified in Perkin Elmer operating manual
Autosampler Settings: 15µl Sample injection, 10µl 1N HNO_3 Alt. Volume
Pyrocoated tube, Peak Area Recorded

Furnace Settings:

Step	Dry-1	Dry-2	Dry-3	Char	Atom*	Burn
Temp,°C	120	140	160	1200	2400	2600
Ramp, sec	3	8	6	10	0	1
Hold, sec	25	6	6	20	5	3

* Argon flow at 0 ml/min aduring atomization

Analytical Protocols for ICPAES

1. As a first step, particulate samples measured by ICPAES were diluted by a factor of 2 with 2N HNO_3, due to the small volume of sample remaining for the determination of Al, Fe, and Mn. Thus a total of 4 ml, was available for the measurement of these elements.
2. Standard curves were prepared to encompass the expected range of particulate concentrations.
3. The analytical lines were selected, and the intensities of the analytical lines were calibrated with standard metal solutions.
4. Two or three emission measurements were made for each element at each analytical line, and the average of those readings were used to calculate the concentration of Al, Fe, and Mn in solution.

Standard Operating Procedure: SOP-09

Preparation and neutron activation analysis analysis of marine tissue and sediment samples.

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Principle

Marine tissue and sediment samples were prepared for neutron activation analysis by pelleting the material to be analyzed to conform to specified irradiation and counting geometries. Pelleted samples were introduced via pneumatic tube to the 2 MW nuclear research reactor at the Rhode Island Nuclear Science Center, which has a neutron flux of $4x10^{12}$ neutrons/cm^2/second. Two irradiation schemes were used to quantify the elements associated with each sample. For the short irradiation scheme, samples were introduced to the neutron flux for ~60 s, and after a short cooling period, they were counted on GeLi detectors to obtain the spectra produced by elements emitting gamma radiation. For the long irrdiation scheme, samples were irradiated for 2 days, and after a longer cooling period, the samples were counted and gamma-ray spectra obtained. A peak analysis was performed on the acquired data, and using algorithms and proprietary programs developed by our laboratory, the total metal content of the sample was determined. The elemental content of each sample is divided by the weight of sample to establish elemental concentrations.

Materials and Special Apparatus

1. Plastic spatulas.
2. Blender with plastic blending bowls, equipped with a specially constructed plastic cutting blade.
3. High density polyethylene bottles.
4. Drying oven.
5. Hydraulic pellet press, equipped with titanium tipped press parts and plastic sleeve.
6. Whatman No. 41 filters (8" x 10"), cut into quarter portions.
7. Analytical balance.
8. Acid cleaned pop-top polypropylene vials.

9. Standard Reference Materials (SRM 1566a, Oyster Tissue, available through the U.S. National Institute of Standards and Technology, and sediment SRM MESS-1, available through the National Research Council, Canada).
10. GeLi detectors.
11. 2 MW Research Reactor (irradiations were performed and samples counted at the Rhode Island Nuclear Science Center).
12. Micro-VAX computer station for gamma acquisition and data reduction.

Procedure for the Preparation of Tissue Samples for Activation Analysis

Marine tissue samples were prepared for analysis using trace metal clean techniques. As a first step, frozen tissue samples of mussels from each station were shucked from their shells using plastic spatula, and the whole tissue plus body fluids were placed in a tared, acid-cleaned plastic blending bowl. The sample was re-wighed to determine the wet weight of the sample. An acid-cleaned, all plastic cutting blade was inserted, and the tissues were homogenized using a blender. Subsequent to homogenizing the sample, homogenates were dispensed into pre-weighed, acid-cleaned high-density-polyethylene bottles, which were then placed in an oven to dry. Following the drying step, samples were re-weighed to determine dry weight.

Whole dry tissue samples were crushed to powder using a hydraulic press, and about 0.25 g of each powdered sample was weighed onto a one-quarter portion of a Whatman No. 41 Filter. The filter containing the sample was folded in a clean bench, and pressed into a pellet using a titanium tipped pellet press with a plastic sleeve. The pelleted sample was placed in an acid cleaned irradiation vial to await irradiation. An Oyster Tissue SRM (SRM 1566a) was weighed and pelleted in the same manner as other dried tissue samples.

Pelleted tissue and SRM samples were irradiated using the short irradiation and counting scheme. In this procedure, samples are exposed to the neutron flux for one minute, retrieved, transferred to a counting vial, placed on a GeLi detector, and counted for 500 seconds. The resulting gamma-ray spectra are saved for each sample. Following irradiations, peak analyses are performed for the individual spectra, and the raw-peak data are transformed to elemental weights of specific elements. The elemental content of each sample is transferred to a spreadsheet, where the concentration of elements are calculated using the dry sample weight .

Following short irradiations, samples were allowed to cool for two weeks before wrapping each sample in aluminum foil, and packaging the sample in an irradiation vessel (rabbit) for the long irradiation procedure. For long irradiations, rabbits containing tisssue samples were exposed to a neutron flux for up to 20 hours. Following the irradiation, samples were cooled for ten days before the counting. In a manner analogous to the procedures used for the short irradiations, gamma spectra were saved, a peak search was performed and the total elemental content of the sample was determined. Elemental data were tranferred to a spreadsheet, where they were converted to concentrations using dry tissue weight.

Procedure for the Preparation of Sediment Samples for Activation Analysis

Sediment SRM, MESS-1, samples were pelleted and irradiated using the same scheme as tissue samples. Long irradition and counting schemes followed the short irradiation scheme. However, owing to the high concentrations of trace elements associated with marine sediments, only about 60 mg of dry sediment weight were used in these determinations.

Cruise No.-Station No.	Latitude DD.MM.SS	Longitude DD.MM.SS	Depth Meters	Temp Celcius	Salinity o/oo
I-01	43.03.59	70.42.26	1	13.03	31.7
I-01	43.03.59	70.42.26	2	13.06	31.7
I-01	43.03.59	70.42.26	3	12.98	31.7
I-01	43.03.59	70.42.26	5	12.96	31.6
I-01	43.03.59	70.42.26	7	12.89	31.6
I-01	43.03.59	70.42.26	10	12.83	28.9
I-02	43.04.06	70.42.11	1	14.05	31.4
I-02	43.04.06	70.42.11	2	14.15	31.6
I-02	43.04.06	70.42.11	3	13.91	31.8
I-02	43.04.06	70.42.11	5	13.62	31.9
I-02	43.04.06	70.42.11	7	13.28	31.8
I-02	43.04.06	70.42.11	10	12.51	31.3
I-03	43.04.11	70.42.00	1	14.38	31.5
I-03	43.04.11	70.42.00	2	14.40	31.6
I-03	43.04.11	70.42.00	3	14.12	31.6
I-03	43.04.11	70.42.00	5	14.09	31.5
I-03	43.04.11	70.42.00	7	14.04	31.6
I-03	43.04.11	70.42.00	10	14.05	31.7
I-04	43.04.24	70.42.44	1	13.77	31.5
I-04	43.04.24	70.42.44	2	13.85	31.6
I-04	43.04.24	70.42.44	4	13.86	31.5
I-04	43.04.24	70.42.44	7	13.30	31.7
I-04	43.04.24	70.42.44	10	13.08	31.7
I-04	43.04.24	70.42.44	15	12.69	31.5
I-05			No CTD Data		
I-06			No CTD Data		
I-07	43.04.26	70.43.26	1	12.23	32.1
I-07	43.04.26	70.43.26	2	11.94	32.2
I-07	43.04.26	70.43.26	4	10.88	32.1
I-07	43.04.26	70.43.26	6	10.81	31.9
I-07	43.04.26	70.43.26	8	10.76	31.9
I-07	43.04.26	70.43.26	10	11.04	32.2
I-07	43.04.26	70.43.26	12	10.81	32.1
I-08			No CTD Data		
I-09			No CTD Data		
I-10	43.04.56	70.43.31	1	12.95	31.8
I-10	43.04.56	70.43.31	2	12.80	31.5
I-10	43.04.56	70.43.31	3	12.68	31.4
I-10	43.04.56	70.43.31	5	12.55	31.4
I-10	43.04.56	70.43.31	6	12.52	31.5
I-11			No CTD Data		
I-12			No CTD Data		
I-13	43.04.43	70.43.33	1	13.27	31.4
I-13	43.04.43	70.43.33	2	13.17	31.5

Cruise1-CTD

Cruise No.-Station No.	Latitude DD.MM.SS	Longitude DD.MM.SS	Depth Meters	Temp Celcius	Salinity o/oo
I-13	43.04.43	70.43.33	3	12.87	31.5
I-13	43.04.43	70.43.33	5	12.73	31.5
I-13	43.04.43	70.43.33	9	12.28	31.5
I-14	43.04.34	70.43.37	1	12.87	31.9
I-14	43.04.34	70.43.37	2	12.63	31.8
I-14	43.04.34	70.43.37	5	11.75	31.9
I-14	43.04.34	70.43.37	10	11.22	31.9
I-14	43.04.34	70.43.37	15	11.23	31.9
I-14	43.04.34	70.43.37	20	11.07	31.9
I-15			No CTD Data		
I-16			No CTD Data		
I-17			No CTD Data		
I-18			No CTD Data		
I-19			No CTD Data		
I-20			No CTD Data		
I-21			No CTD Data		

Cruise2-CTD

Cruise No.-Station No.	Latitude DD.MM.SS	Longitude DD.MM.SS	Depth Meters	Temp Celcius	Salinity o/oo
II-01	43.04.25	70.43.19	2	9.43	32.0
II-01	43.04.25	70.43.19	5	9.42	32.0
II-01	43.04.25	70.43.19	10	9.42	32.0
II-01	43.04.25	70.43.19	15	9.43	32.0
II-02	43.04.38	70.43.18	1.5	9.47	32.0
II-02	43.04.38	70.43.18	3	9.45	32.1
II-02	43.04.38	70.43.18	5.3	9.46	32.1
II-03	43.04.53	70.43.14	1	9.46	32.0
II-03	43.04.53	70.43.14	4	9.42	32.1
II-03	43.04.53	70.43.14	7	9.42	32.1
II-03	43.04.53	70.43.14	9	9.42	32.1
II-04	43.04.56	70.43.31	1	9.48	31.9
II-04	43.04.56	70.43.31	2	9.48	32.0
II-04	43.04.56	70.43.31	5	9.56	32.0
II-04	43.04.56	70.43.31	7	9.56	32.0
II-04	43.04.56	70.43.31	9	9.56	32.0
II-05	43.05.03	70.43.58	1	9.58	32.1
II-05	43.05.03	70.43.58	4	9.57	32.1
II-05	43.05.03	70.43.58	5.5	9.55	32.0
II-06	43.04.42	70.43.33	1	10.15	31.5
II-06	43.04.42	70.43.33	3	9.84	31.7
II-06	43.04.42	70.43.33	5	9.68	31.9
II-06	43.04.42	70.43.33	7	9.66	32.0
II-06	43.04.42	70.43.33	9	9.64	32.0
II-07	43.04.25	70.43.39	1	9.46	32.1
II-07	43.04.25	70.43.39	4	9.44	3.1
II-07	43.04.25	70.43.39	7	9.44	32.2
II-07	43.04.25	70.43.39	10	9.46	32.1
II-07	43.04.25	70.43.39	15	9.46	32.1
II-07	43.04.25	70.43.39	17	9.47	32.3
II-08	43.04.34	70.43.38	1	9.53	32.1
II-08	43.04.34	70.43.38	5	9.52	32.1
II-08	43.04.34	70.43.38	10	9.49	32.1
II-08	43.04.34	70.43.38	15	9.48	32.1
II-09	43.04..22	70.44.23	1	9.47	32.1
II-09	43.04..22	70.44.23	5	9.50	32.1
II-09	43.04..22	70.44.23	10	9.50	32.1
II-09	43.04..22	70.44.23	15	9.53	32.0
II-09	43.04..22	70.44.23	20	9.50	32.1
II-10	43.04.29	70.44.19	No CTD Data		
II-11	43.04.43	70.45.05	1	9.96	31.9
II-11	43.04.43	70.45.05	3	9.79	31.9
II-11	43.04.43	70.45.05	7	9.48	32.1
II-11	43.04.43	70.45.05	10	9.46	32.2

Cruise No.-Station No.	Latitude DD.MM.SS	Longitude DD.MM.SS	Depth Meters	Temp Celcius	Salinity o/oo
II-12	43.04.49	70.44.53	1	9.64	32.0
II-12	43.04.49	70.44.53	3	9.56	32.0
II-12	43.04.49	70.44.53	5	9.52	32.1
II-12	43.04.49	70.44.53	8	9.48	32.1
II-12	43.04.49	70.44.53	10	9.48	32.2
II-13	43.04.56	70.44.47	1	9.77	32.1
II-13	43.04.56	70.44.47	3	9.71	31.9
II-13	43.04.56	70.44.47	5	9.70	32.0
II-13	43.04.56	70.44.47	7	9.65	31.9
II-13	43.04.56	70.44.47	10	9.60	32.0
II-14	43.04.51	70.45.32	1	9.53	32.1
II-14	43.04.51	70.45.32	4	9.54	32.1
II-14	43.04.51	70.45.32	8	9.56	32.1
II-14	43.04.51	70.45.32	12	9.56	32.1
II-14	43.04.51	70.45.32	15	9.58	32.0
II-15	43.05.01	70.45.25	1	9.71	32.0
II-15	43.05.01	70.45.25	4	9.65	32.0
II-15	43.05.01	70.45.25	8	9.59	32.0
II-15	43.05.01	70.45.25	12	9.56	32.1
II-16	43.04.26	70.43.26	1	9.46	32.0
II-16	43.04.26	70.43.26	5	9.48	31.9
II-16	43.04.26	70.43.26	13	9.52	31.9
II-17	43.04.37	70.43.17	1	9.41	31.8
II-17	43.04.37	70.43.17	3	9.41	31.8
II-17	43.04.37	70.43.17	5	9.37	31.9
II-17	43.04.37	70.43.17	7	9.35	31.8
II-18	43.04.53	70.44.16	1	9.29	32.1
II-18	43.04.53	70.44.16	3	9.33	32.0
II-18	43.04.53	70.44.16	5	9.33	32.0
II-18	43.04.53	70.44.16	8	9.35	32.0
II-19	43.04.56	70.43.41	1	9.33	31.9
II-19	43.04.56	70.43.41	3	9.36	32.0
II-19	43.04.56	70.43.41	6	9.36	32.0
II-20	43.04.43	70.43.34	1	9.38	32.0
II-20	43.04.43	70.43.34	4	9.41	32.0
II-20	43.04.43	70.43.34	7	9.33	32.1
II-21	43.04.34	70.43.36	1	9.74	31.3
II-21	43.04.34	70.43.36	5	9.78	31.2
II-21	43.04.34	70.43.36	10	9.77	31.5
II-21	43.04.34	70.43.36	14	9.72	31.5
II-22	43.04.43	70.45.05	1	9.96	31.0
II-22	43.04.43	70.45.05	3	9.97	30.9
II-22	43.04.43	70.45.05	5	9.99	31.0
II-22	43.04.43	70.45.05	8	10.00	31.0

Cruise No.-Station No.	Latitude DD.MM.SS	Longitude DD.MM.SS	Depth Meters	Temp Celcius	Salinity o/oo
II-23	43.04.56	70.44.48	1	9.83	30.9
II-23	43.04.56	70.44.48	3	9.83	31.2
II-23	43.04.56	70.44.48	5	9.80	31.2
II-24	43.07.59	70.49.49	1	10.23	25.0
II-24	43.07.59	70.49.49	3	10.16	28.5
II-24	43.07.59	70.49.49	5	10.12	29.5
II-24	43.07.59	70.49.49	6	10.12	29.6
II-25	43.07.11	70.50.18	1	10.26	30.0
II-25	43.07.11	70.50.18	5	10.27	30.0
II-25	43.07.11	70.50.18	10	10.28	30.1
II-26	43.06.24	70.47.33	1	10.13	30.6
II-26	43.06.24	70.47.33	5	10.12	30.7
II-26	43.06.24	70.47.33	10	10.12	30.7

Cruise No.-Station No.	Latitude DD.MM.SS	Longitude DD.MM.SS	Depth Meters	Temp Celcius	Salinity o/oo
III-01	43.04.26	70.43.23	1	8.05	31.9
III-01	43.04.26	70.43.23	4	8.03	32.0
III-01	43.04.26	70.43.23	7	8.01	32.3
III-01	43.04.26	70.43.23	10	8.01	32.3
III-01	43.04.26	70.43.23	13	8.01	30.3
III-02	43.04.41	70.43.19	1	8.08	32.1
III-02	43.04.41	70.43.19	4	8.05	32.2
III-02	43.04.41	70.43.19	7	8.03	32.2
III-02	43.04.41	70.43.19	10	8.02	32.2
III-03	43.04.52	70.43.15	1	8.11	31.8
III-03	43.04.52	70.43.15	3	8.10	31.9
III-03	43.04.52	70.43.15	5	8.07	32.1
III-04	43.04.56	70.43.30	1	8.07	31.9
III-04	43.04.56	70.43.30	3	8.06	32.1
III-04	43.04.56	70.43.30	5	8.04	32.1
III-05	43.05.03	70.43.59	1	8.16	31.8
III-05	43.05.03	70.43.59	3	8.14	31.8
III-05	43.05.03	70.43.59	6	8.11	31.9
III-06	43.04.42	70.43.32	1	8.21	32.0
III-06	43.04.42	70.43.32	4	8.10	31.8
III-06	43.04.42	70.43.32	7	8.08	32.0
III-06	43.04.42	70.43.32	10	8.07	32.1
III-07	43.04.34	70.43.36	1	8.21	31.9
III-07	43.04.34	70.43.36	5	8.15	31.9
III-07	43.04.34	70.43.36	10	8.11	32.0
III-07	43.04.34	70.43.36	12	8.10	32.0
III-08	43.04.22	70.44.20	1	8.20	31.6
III-08	43.04.22	70.44.20	10	8.11	31.9
III-08	43.04.22	70.44.20	16	8.06	32.0
III-09	43.04.29	70.44.15	1	8.02	32.0
III-09	43.04.29	70.44.15	5	8.01	32.0
III-09	43.04.29	70.44.15	10	8.01	32.1
III-10	43.04.35	70.44.32	1	8.11	31.9
III-10	43.04.35	70.44.32	5	8.10	32.0
III-10	43.04.35	70.44.32	12	8.07	32.0
III-11	43.04.43	70.44.19	1	8.12	31.9
III-11	43.04.43	70.44.19	8	8.11	32.0
III-11	43.04.43	70.44.19	15	8.07	32.0
III-12	43.04.42	70.45.02	1	8.14	31.6
III-12	43.04.42	70.45.02	5	8.10	31.7
III-12	43.04.42	70.45.02	10	8.08	31.8
III-13	43.04.49	70.44.47	1	8.06	31.7
III-13	43.04.49	70.44.47	5	8.07	31.7
III-13	43.04.49	70.44.47	12	8.06	31.8

Cruise No.-Station No.	Latitude DD.MM.SS	Longitude DD.MM.SS	Depth Meters	Temp Celcius	Salinity o/oo
III-14	43.04.54	70.44.48	1	8.05	31.8
III-14	43.04.54	70.44.48	5	8.05	31.8
III-14	43.04.54	70.44.48	8.5	8.01	32.0
III-15	43.05.02	70.44.40	2	8.02	32.0
III-16	43.04.34	70.43.37	1	7.69	30.9
III-16	43.04.34	70.43.37	5	7.71	31.0
III-16	43.04.34	70.43.37	10	7.71	31.1
III-17	43.04.43	70.43.33	1	7.57	31.4
III-17	43.04.43	70.43.33	4	7.71	31.9
III-17	43.04.43	70.43.33	8	7.74	32.1
III-18	43.04.56	70.43.31	1	7.69	31.5
III-18	43.04.56	70.43.31	2.5	7.69	31.6
III-19	43.04.51	70.44.53	1	7.81	30.5
III-19	43.04.51	70.44.53	5	7.81	30.5
III-19	43.04.51	70.44.53	10	7.81	30.4
III-20	43.06.02	70.47.01	1	8.17	29.8
III-20	43.06.02	70.47.01	4	8.06	29.9
III-20	43.06.02	70.47.01	8	8.01	29.9
III-21	43.09.18	70.49.54	1	7.26	25.4
III-21	43.09.18	70.49.54	3	7.33	25.8
III-21	43.09.18	70.49.54	4.3	7.35	26.1
III-22	43.10.32	70.49.30	1	6.96	19.9
III-22	43.10.32	70.49.30	2.5	6.95	19.9
III-23	43.07.13	70.50.05	1	7.83	29.2
III-23	43.07.13	70.50.05	5	7.82	29.3
III-23	43.07.13	70.50.05	9	7.81	29.3
III-24	43.06.57	70.51.32	1	7.71	28.8
III-24	43.06.57	70.51.32	4	7.74	29.0
III-24	43.06.57	70.51.32	7.5	7.75	29.1
III-25	43.05.03	70.51.39	1	7.60	28.2
III-25	43.05.03	70.51.39	3	7.58	28.3
III-25	43.05.03	70.51.39	5	7.58	28.2

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Table 1. Method Detection Limits for Dissolved Metals

v. 950118						
NASS-4 SRM	Copper	Nickel	Cadmium	Lead	Iron	Manganese
Unspiked Seawater	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
NASS-4-1	0.201	0.216	0.016	0.008	BD	0.44
NASS-4-2	0.207	0.220	0.016	0.009	BD	0.44
NASS-4-3	0.211	0.232	0.017	0.015	BD	0.55
NASS-4-4	0.227	0.232	0.016	0.009	BD	0.55
NASS-4-5	0.210	0.235	0.016	0.008	BD	0.44
NASS-4-6	0.208	0.240	0.016	0.007	BD	0.60
NASS-4-7	0.213	0.233	0.017	0.007	BD	0.71
NASS-4-8	0.212	0.232	0.015	0.007	BD	0.66
Unspiked Average	0.211	0.230	0.016	0.009	BD	0.55
Unspiked Std Dev	0.007	0.008	0.001	0.003	BD	0.10
Expected NASS-4	0.228	0.228	0.016	0.013	0.105	0.38
Std Dev.	0.011	0.009	0.003	0.005	0.016	0.02
NASS-4 SPK						
Spiked Seawater						
NASS-4-1A	0.644	0.664	0.115	0.409	2.02	2.47
NASS-4-2A	0.652	0.659	0.114	0.398	2.02	2.27
NASS-4-3A	0.611	0.616	0.110	0.393	2.23	2.53
NASS-4-4A	0.621	0.612	0.107	0.381	2.34	2.53
NASS-4-5A	0.627	0.624	0.110	0.394	2.02	2.59
NASS-4-6A	0.623	0.615	0.112	0.416	2.02	2.59
NASS-4-7A	0.598	0.594	0.105	0.397	1.60	2.59
NASS-4-8A	0.600	0.621	0.105	0.389	2.13	2.66
Spiked Average	0.622	0.626	0.110	0.397	2.05	2.53
Spiked Std Dev	0.019	0.024	0.004	0.011	0.22	0.12
Spike Level, ug/L	0.400	0.400	0.100	0.400	2.00	2.00
% Spike Recovery	102.7	98.9	93.6	97.1	102.4	97.0
Dissolved MDL, ug/L	0.058	0.072	0.012	0.033	0.65	0.36
Dissolved LOQ, ug/L	0.192	0.239	0.038	0.110	2.17	1.19
BD, refers to Below Detection						

Table 2. Method Detection Limits for Particulate Metals

v. 950118							
MESS-1	Copper	Nickel	Cadmium	Lead	Aluminum	Iron	Manganese
Unspiked Sediment	ug/g	ug/g	ug/g	ug/g	mg/g	mg/g	mg/g
MESS-1 30D-1	19.16	19.19	0.52	24.28	12.31	20.17	0.30
MESS-1 30D-2	19.16	18.70	0.45	24.28	12.20	20.40	0.30
MESS-1 30D-3	19.16	19.68	0.58	23.44	12.03	19.97	0.28
MESS-1 30D-4	19.16	19.68	0.45	24.00	12.11	19.62	0.29
MESS-1 30D-5	18.57	19.19	0.52	23.72	12.31	19.79	0.29
MESS-1 30D-6	18.57	20.17	0.52	23.44	12.16	19.81	0.28
MESS-1 30D-7	19.16	19.19	0.58	23.72	12.23	19.76	0.29
MESS-1 30D-8	19.16	19.68	0.45	24.00	12.20	20.20	0.29
MESS-1 30D-9	18.57	19.68	0.52	24.00			
Unspiked Average, ug/g or mg/g	18.96	19.46	0.51	23.88	12.19	19.96	0.29
Unspiked Std Dev	0.30	0.43	0.05	0.32	0.09	0.27	0.01
MESS-1							
Spiked Sediment							
MESS-1 30D-1A	63.65	63.54	12.40	68.17	16.91	21.59	1.32
MESS-1 30D-2A	62.45	63.06	12.27	69.22	16.58	21.82	1.33
MESS-1 30D-3A	63.65	64.52	11.89	67.82	16.87	21.92	1.32
MESS-1 30D-4A	63.05	65.00	12.40	67.47	16.81	21.92	1.32
MESS-1 30D-5A	63.05	62.08	11.89	67.47	16.70	21.69	1.33
MESS-1 30D-6A	64.25	65.49	12.53	67.82	17.03	21.77	1.32
MESS-1 30D-7A	64.85	65.98	12.53	66.78	16.87	21.81	1.34
MESS-1 30D-8A	64.25	65.00	12.53	66.78			
MESS-1 30D-9A	64.85	64.52	12.79	66.78			
Spiked Average	63.78	64.36	12.36	67.59	16.82	21.79	1.33
Spiked Std Dev	0.84	1.24	0.30	0.80	0.15	0.12	0.01
Spike Level, ug/g or mg/g	43.29	43.29	10.82	43.29	5.4	10.8	1.08
% Recovery	103.5	103.7	109.5	101.0	97.0	109.0	97.0
Particulate MDL, ug/g or mg/g	2.51	3.72	0.90	2.40	0.48	0.38	0.03
Particulate LOQ, ug/g or mg/g	8.36	12.40	3.00	7.99	1.46	1.20	0.08

Table 3. Blank Concentrations for Dissolved Metals

		Metal concentrations measured in Milli-Q Water, ug/L.			
Batch	Sample				
No.	ID	Cd	Cu	Ni	Pb
1	Milli-Q-B1	-0.001	0.005	-0.007	-0.003
2	Milli-Q-B2	0.001	0.006	-0.013	-0.006
3	Milli-Q-B3	-0.001	-0.004	0.011	-0.003
4	Milli-Q-B4	0.000	-0.006	-0.001	-0.002
5	Milli-Q-B5	0.000	-0.002	0.018	0.000
6	Milli-Q-B6	0.000	0.010	0.025	0.000
7	Milli-Q-B7	-0.001	-0.018	0.013	-0.003
8	Milli-Q-B8	0.000	-0.006	0.013	-0.004
		Metal concentrations measured in NASS-4, ug/L.			
		Fe	Mn		
1	NASS-4	BD	0.53		
2	NASS-4	BD	0.58		
3	NASS-4	BD	0.41		
4	NASS-4	BD	0.43		
5	NASS-4	BD	0.42		
6	NASS-4	BD	BD		
7	NASS-4	BD	BD		
BD refers to Below Detection					

Table 4. Dissolved Metals--Duplicate Analyses

Batch Number	Sample ID	DCd, ug/L		DCd	DCu, ug/L		DCu	DNi, ug/L		DNi	DPb, ug/L		DPb
1	Cr-Sta-D	Sample	Duplicate	RPD	Sample	Duplicate	RPD	Sample	Duplicate	RPD	Sample	Duplicate	RPD
2													
3	I-03-1.5	0.024	0.024	0.0	0.355	0.387	8.6	0.279	0.287	2.8	0.016	0.018	11.8
4	I-13-2	0.027	0.028	3.6	0.328	0.334	1.8	0.292	0.304	4.0	0.015	0.019	23.5
5	II-06-1	0.030	0.029	3.4	0.331	0.338	2.1	0.294	0.302	2.7	0.022	0.021	4.7
6	II-19-2	0.029	0.028	3.5	0.303	0.286	5.8	0.349	0.330	5.6	0.032	0.040	22.2
7	III-04-2	0.028	0.028	0.0	0.217	0.216	0.5	0.265	0.274	3.3	0.010	0.010	0.0
8	III-Seep 1	0.019	0.022	14.6	0.650	0.672	3.3	1.552	1.469	5.5	0.036	0.038	5.4
	III-16-2	0.026	0.028	7.4	0.319	0.338	5.8	0.297	0.320	7.5	0.018	0.020	10.5
	III-23-5	0.031	0.034	9.2	0.330	0.355	7.3	0.349	0.349	0.0	0.023	0.026	12.2

RPD= (C1 - C2)/((C1 + C2)/2) x 100

Where: RPD = Relative Percent Difference
C1 = the larger of the two observed values
C2 = the smaller of the two obsrved values

Cr-Sta-D, refers to Cruise No., Station No. , and Depth of Sample

Table 5. Sample Spike Recoveries for Preconcentrated Dissolved Metals

			DCd, ug/L				DCu, ug/L		
Batch No.	Sample ID Cr-Sta-D	Observed Sample	Observed Spike	Spike Level	% Recovery	Observed Sample	Observed Spike	Spike Level	% Recovery
1	I-03-1.5	0.024	0.099	0.10	75.0	0.355	0.721	0.4	91.5
2	I-13-8	0.024	0.109	0.10	85.0	0.268	0.662	0.4	98.5
3	II-06-3	0.028	0.123	0.10	95.0	0.287	0.727	0.4	110.0
4	II-20-2	0.028	0.118	0.10	90.0	0.304	0.696	0.4	98.0
5	III-06-5	0.026	0.123	0.10	97.0	0.220	0.680	0.4	115.0
6	III-Seep 1	0.019	0.223	0.25	81.6	0.650	1.679	1.0	102.9
7	III-16-10	0.029	0.116	0.10	87.0	0.317	0.741	0.4	106.0
8	III-24-2	0.030	0.129	0.10	99.0	0.370	0.796	0.4	106.5

			DNi, ug/L				DPb, ug/L		
Batch No.	Sample ID Cr-Sta-D	Observed Sample	Observed Spike	Spike Level	% Recovery	Observed Sample	Observed Spike	Spike Level	% Recovery
1	I-03-1.5	0.279	0.633	0.4	88.5	0.016	0.317	0.4	75.3
2	I-13-8	0.247	0.63	0.4	95.8	0.012	0.389	0.4	94.3
3	II-06-3	0.276	0.716	0.4	110.0	0.021	0.455	0.4	108.5
4	II-20-2	0.292	0.696	0.4	101.0	0.024	0.458	0.4	108.5
5	III-06-5	0.278	0.697	0.4	104.8	0.012	0.414	0.4	100.5
6	III-Seep 1	1.552	2.506	1.0	95.4	0.036	0.898	1.0	86.2
7	III-16-10	0.292	0.694	0.4	100.5	0.017	0.454	0.4	109.3
8	III-24-2	0.363	0.801	0.4	109.5	0.020	0.467	0.4	111.8

% Recovery = 100 x (S - U/Csa)

Where: S = measured concentration of spiked aliquot
U = measured concentration in unspiked aliquot
Csa = actual concentration of spike added

Cr-Sta-D, refers to Cruise No., Station No., and Sample Depth

Table 6. NASS-4 Spike Recoveries for Preconcentrated Dissolved Metals

			DCd, ug/L				DCu, ug/L		
Batch No.	Sample ID	Observed Sample	Observed Spike	Spike Level	% Recovery	Observed Sample	Observed Spike	Spike Level	% Recovery
1	NASS-4	0.014	0.085	0.10	71.0	0.200	0.565	0.4	91.3
2	NASS-4	0.016	0.096	0.10	80.0	0.229	0.596	0.4	91.8
3	NASS-4	0.014	0.091	0.10	77.0	0.198	0.554	0.4	89.0
4	NASS-4	0.014	0.091	0.10	77.0	0.198	0.562	0.4	91.0
5	NASS-4	0.013	0.095	0.10	82.0	0.199	0.579	0.4	95.0
6	NASS-4	0.014	0.200	0.25	74.4	0.186	1.036	1.0	85.0
7	NASS-4	0.014	0.098	0.10	84.0	0.198	0.591	0.4	98.3
8	NASS-4	0.013	0.105	0.10	92.0	0.185	0.596	0.4	102.8

			DNi, ug/L				DPb, ug/L		
Batch No.	Sample ID	Observed Sample	Observed Spike	Spike Level	% Recovery	Observed Sample	Observed Spike	Spike Level	% Recovery
1	NASS-4	0.179	0.557	0.4	94.5	0.002	0.317	0.4	78.8
2	NASS-4	0.210	0.566	0.4	89.0	0.000	0.376	0.4	94.0
3	NASS-4	0.190	0.525	0.4	83.8	0.003	0.344	0.4	85.3
4	NASS-4	0.196	0.583	0.4	96.8	0.004	0.372	0.4	92.0
5	NASS-4	0.187	0.576	0.4	97.3	0.003	0.336	0.4	83.3
6	NASS-4	0.191	1.072	1.0	88.1	0.005	0.716	1.0	71.1
7	NASS-4	0.194	0.555	0.4	90.3	0.001	0.356	0.4	88.8
8	NASS-4	0.198	0.599	0.4	100.3	0.001	0.397	0.4	99.0

% Recovery = 100 x (S - U/Csa)

Where: S = measured concentration of spiked aliquot
U = measured concentration in unspiked aliquot
Csa = actual concentration of spike added

Cr-Sta-D, refers to Cruise No., Station No., and Sample Depth

Table 7. Particulate Blanks

	Metal concentrations of acid cleaned Nuclepore membranes used for particulate metal determinations.				
			Concentration in ug/g		
Batch No.	Sample ID	Cd	Cu	Ni	Pb
1	Pro-Blk-1	-0.04	-0.7	1.7	-0.4
2	Pro-Blk-1	nd	-0.6	-0.6	-0.5
3	Pro-Blk-2	-0.03	-0.6	-1.6	-0.4
4	Pro-Blk-2	nd	-0.6	0.5	nd
5	Pro-Blk-3	-0.06	-0.6	0.5	-0.7
6	Pro-Blk-3	nd	-0.4	-0.3	-0.7
7	Pro-Blk-3	-0.03	-0.5	0.0	nd
8	Header Tank	und	und	und	und
nd refers to not determined					
und refers to undetected					
Samples were essentially indistiguishable from background					

Table 8. Laboratory Control Sample Metal Concentrations

Element	Average MESS-1 LCS from MDL ug/g, or mg/g	Standard Deviation MESS-1 LCS from MDL ug/g, or mg/g	Certified MESS-1 ug/g, or mg/g	Standard Deviation MESS-1 ug/g, or mg/g	% Recovery of LCS
Cd, ug/g	0.51	0.05	0.59	0.1	86.4
Cu, ug/g	18.96	0.30	25.1	3.8	75.5
Ni, ug/g	19.46	0.43	29.5	2.7	66.0
Pb, ug/g	23.88	0.32	34.0	6.1	70.2
Al, mg/g	12.19	0.09	58		21.0
Fe, mg/g	19.96	0.27	31		64.4
Mn, mg/g	0.29	0.01	0.513	0.025	56.5

Table 9. Spike Recoveries for Particulate Metals

			PCd, ug/g				PCu, ug/g		
Batch No.	Sample ID	Observed Sample	Observed Spike	Spike Level	% Recovery	Observed Sample	Observed Spike	Spike Level	% Recovery
1	MESS-1 LCS	0.59	11.48	10.82	100.6	20.9	65.8	43.3	103.7
2	MESS-1 LCS	0.56	11.48	10.82	100.9	20.4	65.5	43.3	104.2
3	MESS-1 LCS	0.73	11.72	10.82	101.6	20.3	64.1	43.3	101.2
4	MESS-1 LCS	0.79	11.79	10.82	101.7	20.7	64.5	43.3	101.2
5	MESS-1 LCS	0.73	12.49	10.82	108.7	20.3	64.7	43.3	102.5
6	MESS-1 LCS	0.55	12.03	10.82	106.1	20.7	65.2	43.3	102.8
7	MESS-1 LCS	0.54	11.08	10.82	97.4	21.6	66.6	43.3	103.9
8	MESS-1 LCS	*				18.1	63.6	43.3	105.1

			PNi, ug/g				PPb, ug/g		
Batch No.	Sample ID	Observed Sample	Observed Spike	Spike Level	% Recovery	Observed Sample	Observed Spike	Spike Level	% Recovery
1	MESS-1 LCS	24.2	67.3	43.3	99.5	26.4	63.3	43.3	85.2
2	MESS-1 LCS	19.9	64.3	43.3	102.5	25.1	64.3	43.3	90.5
3	MESS-1 LCS	22.9	66.7	43.3	101.2	27.5	67.5	43.3	92.4
4	MESS-1 LCS	20.6	62.6	43.3	97.0	26.5	65.4	43.3	89.8
5	MESS-1 LCS	19.8	60.4	43.3	93.8	26.7	68.0	43.3	95.4
6	MESS-1 LCS	22.1	66.8	43.3	103.2	26.6	66.9	43.3	93.1
7	MESS-1 LCS	17.5	58.9	43.3	95.6	27.8	67.7	43.3	92.1
8	MESS-1 LCS	20.2	59.1	43.3	89.8	27.8	72.1	43.3	102.3

		PAl, mg/g	PFe, mg/g	PMn, mg/g
Batch No.	Sample ID	Observed Sample	Observed Sample	Observed Sample
1	MESS-1 LCS	12.3	20.4	0.30
2	MESS-1 LCS	12.2	20.4	0.29
3	MESS-1 LCS	12.0	20.5	0.28
4	MESS-1 LCS	12.0	21.0	0.27
5	MESS-1 LCS	11.7	20.7	0.28
6	MESS-1 LCS	11.9	20.7	0.27
7	MESS-1 LCS			
8	MESS-1 LCS			

Where: S = measured concentration of spiked aliquot
U = measured concentration in unspiked aliquot
Csa = actual concentration of spike added

Table 9. Spike Recoveries for Particulate Metals

Note for Table 9:									
Cr-Sta-D, refers to Cruise No., Station No., and Sample Depth									
Note: Batch 8 Cadmium samples were run along with Batch 7 samples									
Note: Al, Fe, and Mn were measured by ICP simultaneously with MDL Samples,									
thus the spiked samples were not included in the batch analysis									

Table 10. Key to Data Table Variables and Data Flags

Column	Variable	Description
A	Station Location	Approximate landmark location of Sample Site
B	Latitude, DD.MM.SS	Latitude in Degrees.Minutes.Seconds
C	Longitude, DD.MM.SS	Longitude in Degrees.Minutes.Seconds
D	Station ID, Cr-St-D	Refers to Cruise No., Station No., Depth in Meters
E	Sample Date, YYMMDD	Sample Date Year Month Day
F	Sample Time	Approximate Military time sample was collected
G	Salinity	Measured quantity in parts per thousand
H	Tide	Refers to Tide condition, SLE=Slack Ebb, R=Rising, SLF=Slack Flood, F=Falling
I	Particulate Wt., on Filter	Measured quantity in mg, refers to weight of particulate material collected on filter
J	Volume Filtered	Measued quanitity in ml, refers to amount of seawater filtered
K	Particulate Concentration	Measured quantity mg/L, relating particulate weight on filter to volume filtered
L	DCd, ug/L	Dissolved cadmium concentration in ug/L
M	DCdF	Data Flag for DCd
N	PCd, ug/g	Particulate cadmium concentration in ug/g
O	PCdF	Data Flag for PCd
P	DCu, ug/L	Dissolved copper concentration in ug/L
Q	DCuF	Data Flag for DCu
R	PCu, ug/g	Particulate copper concentration in ug/g
S	PCuF	Data Flag for PCu
T	DNi ug/lL	Dissolved nickel concentration in ug/L
U	DNiF	Data Flag for DNi
V	PNi, ug/g	Particulate nickel concentration in ug/g
W	PNiF	Data Flag for PNi
X	DPb, ug/L	Dissolved lead concentration in ug/L
Y	DPbF	Data Flag for DPb
Z	PPb, ug/g	Particulate lead concentration in ug/g
AA	PPbF	Data Flag for PPb
AB	DMn, ug/L	Dissolved manganese concentration in ug/L
AC	DMnF	Data Flag for DMn

Table 10 (Continued)

AD	PMn, mg/g	Particulate manganese concentration in mg/g
AE	PMnF	Data Flag for PMn
AF	DFe, ug/L	Dissolved iron concentration in ug/L
AG	DFeF	Data Flag for DFe
AH	PFe, mg/g	Particulate iron concentration in mg/g
AI	PFeF	Data Flag for PFe
AJ	PAl, mg/g	Particulate aluminum concentration in mg/g
AK	PAlF	Data Flag for PAl

Data Flags

f = reported value is below MDL
b = reported value is below LOQ
d = not quantified
x = no sample collected

Table 11. Data for Cruise #1

Sample Location	Sample Time	Latitude DD.MM.SS	Longitude DD.MM.SS	Station ID Cr-St-Depth	Sample Date YYMMDD	Tide	Salinity	Weight on Filter, mg	Volume Filtered, ml	Particulate Concentration, mg/L	DCd ug/L	DCdF	PCd ug/g	PCdF
Port Hbr., Stielman Rocks	15:30	43.03.59	70.42.26	I-01-1.5	930914	SLE	31.51	1.16	881.5	1.32	0.027	b	0.50	b,f
Port Hbr., Stielman Rocks	15:30	43.03.59	70.42.26	I-01-8	930914	SLE	31.54	1.05	785.1	1.34	0.024	b	0.40	b,f
Port Hbr., Outer Mid-channel	15:45	43.04.06	70.42.11	I-02-CTD	930914	SLE								
Port Hbr., Gerrish Island	16:30	43.04.11	70.42.00	I-03-1.5	930914	SLE	31.35	1.26	841.1	1.50	0.024	b	0.20	b,f
Port Hbr., Gerrish Island	16:30	43.04.11	70.42.00	I-03-8	930914	SLE	31.39	1.43	975.8	1.47	0.027	b	0.50	b,f
Port Hbr., Salamander Pt.	8:45	43.04.24	70.42.44	I-04-2	930915	R	31.44	0.98	510.8	1.92	0.029	b		a,b,f
Port Hbr., Salamander Pt.	8:45	43.04.24	70.42.44	I-04-10	930915	R	31.47	1.07	504.6	2.12	0.027	b		a,b,f
Port Hbr., Inner Mid-channel	9:30	43.04.35	70.42.42	I-05-2	930915	R	31.69	0.54	511.0	1.06	0.024	b		a,b,f
Port Hbr., Kittery Pt.	9:45	43.04.44	70.42.41	I-06-2	930915	R	31.53	0.60	523.1	1.15	0.026	b		a,b,f
Port Hbr., Kittery Pt.	9:45	43.04.44	70.42.41	I-06-10	930915	R	31.56	0.71	527.7	1.35	0.024	b		a,b,f
Port Hbr., New Castle Isl.	10:00	43.04.26	70.43.26	I-07-2	930915	SLF	31.67	0.67	527.2	1.27	0.026	b		a,b,f
Port Hbr., New Castle Isl.	10:00	43.04.26	70.43.26	I-07-10	930915	SLF	31.68	0.77	510.5	1.51	0.023	b		a,b,f
Port Hbr., Outer Clark Cove	10:30	43.04.39	70.43.19	I-08-2	930915	SLF	31.61	0.47	498.2	0.94	0.026	b		a,b,f
Port Hbr., Mouth Spruce Crk.	10:45	43.04.51	70.43.15	I-09-2	930915	SLF	31.59	0.54	500.6	1.08	0.027	b		a,b,f
Port Hbr., Mouth Spruce Crk.	10:45	43.04.51	70.43.15	I-09-10	930915	SLF	31.61	0.72	490.5	1.47	0.024	b		a,b,f
Seavey Isl., Outer Back Channel	11:00	43.04.56	70.43.31	I-10-2	930915	SLF	31.60	0.48	485.5	0.99	0.026	b		a,b,f
Seavey Isl., Outer Back Channel	11:00	43.04.56	70.43.31	I-10-5	930915	SLF	31.60	0.52	482.5	1.08	0.027	b	0.21	b,f
Seavey Isl., Inner Back Channel	12:40	43.05.02	70.43.54	I-11-2	930915	F	31.60	0.46	492.5	0.93	0.026	b	0.52	b,f
Port Hbr., B.Bowen Station	13:05			I-12	930915	F								
Port Hbr., Inner Clark Cove	14:10	43.04.43	70.43.33	I-13-2	930915	F	31.55	0.55	501.8	1.10	0.027	b	0.92	b
Port Hbr., Inner Clark Cove	14:10	43.04.43	70.43.33	I-13-9	930915	F	31.61	0.79	506.0	1.56	0.024	b	0.81	b,f
Port Hbr., Sullivan Pt. (Ver. Site)	14:20	43.04.34	70.43.37	I-14-2	930915	F	31.63	0.44	496.6	0.89	0.028	b	0.24	b,f
Port Hbr., Sullivan Pt. (Ver. Site)	14:20	43.04.34	70.43.37	I-14-9	930915	F	31.70	0.43	486.5	0.88	0.027	b	0.25	b,f
Port Hbr., Pierces Isl.	16:15	43.04.35	70.44.32	I-15-2	930915	SLE	31.41	0.94	482.7	1.95	0.028	b	0.54	b,f
Port Hbr., B.Bowen Station	16:30			I-16	930915	SLE								
Port Hbr., Seavey Isl.	17:50	43.04.44	70.44.24	I-17-2	930915	SLE	31.45	0.97	488.3	1.99	0.026	b	0.25	b,f
Port Hbr., US1 Lift Bridge (South)	18:00	43.04.43	70.45.05	I-18-2	930915	SLE	31.37	1.23	484.6	2.54	0.027	b	0.30	b,f
Port Hbr., US1 Lift Bridge (North)	18:10	43.04.51	70.44.53	I-19-2	930915	SLE	31.40	1.14	476.0	2.40	0.029	b	0.33	b,f
Piscataqua R., Noble Isl. (South)	18:20	43.05.11	70.45.46	I-20-2	930915	SLE	31.35	0.98	488.3	2.01	0.029	b	0.38	b,f
Piscataqua R., Noble Isl. (North)	18:30	43.05.18	70.45.41	I-21-2	930915	R	31.35	1.18	502.2	2.35	0.028	b	0.43	b,f

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Table 11. Data for Cruise #1

Sample Location	Sample Time	DCu ug/L	DCuF	PCu ug/g	PCuF	DNi ug/L	DNiF	PNi ug/g	PNiF	DPb ug/L	DPbF	PPb ug/g	PPbF	DMn ug/L	DMnF	PMn mg/g	PMnF	DFe ug/L	DFeF
Port Hbr., Stielman Rocks	15:30	0.311		35.2		0.277		35.3		0.018	b,f	53.1		3.6		0.75		3.3	
Port Hbr., Stielman Rocks	15:30	0.283		33.5		0.267		34.2		0.013	b,f	59.6		3.1		0.84		1.9	b
Port Hbr., Outer Mid-channel	15:45																		
Port Hbr., Gerrish Island	16:30	0.355		36.0		0.279		35.5		0.016	b,f	63.8		4.8		0.76		3.5	
Port Hbr., Gerrish Island	16:30	0.375		40.3		0.277		45.4		0.020	b,f	65.2		4.2		0.86		2.5	
Port Hbr., Salamander Pt.	8:45	0.356		38.2		0.272		37.9		0.017	b,f	68.9		4.0		0.93		2.0	b
Port Hbr., Salamander Pt.	8:45	0.331		25.6		0.250		31.2		0.015	b,f	40.0		3.9		0.63		2.0	b
Port Hbr., Inner Mid-channel	9:30	0.238		29.9		0.243		43.1		0.005	b,f	51.9		2.2		1.05		1.6	b
Port Hbr., Kittery Pt.	9:45	0.300		30.7		0.258		34.5		0.012	b,f	56.6		3.4		0.75		1.9	b
Port Hbr., Kittery Pt.	9:45	0.291		30.7		0.259		52.3		0.008	b,f	47.8		3.1		0.66		1.8	b
Port Hbr., New Castle Isl.	10:00	0.246		37.5		0.241		30.9		0.007	b,f	62.5		2.4		0.99		1.5	b
Port Hbr., New Castle Isl.	10:00	0.240		25.3		0.255		31.8		0.007	b,f	40.3		2.2		0.78		1.5	b
Port Hbr., Outer Clark Cove	10:30	0.286		34.4		0.280		46.8		0.009	b,f	59.7		2.6		0.98		1.2	b
Port Hbr., Mouth Spruce Crk.	10:45	0.285		34.1		0.279		40.7		0.010	b,f	61.1		2.8		0.95		1.6	b
Port Hbr., Mouth Spruce Crk.	10:45	0.284		34.9		0.272		30.5		0.008	b,f	45.8		2.8		0.86		1.5	b
Seavey Isl., Outer Back Channel	11:00	0.295		31.3		0.254		43.2		0.013	b,f	54.3		3.1		0.93		2.1	b
Seavey Isl., Outer Back Channel	11:00	0.270		39.9		0.258		32.5		0.008	b,f	64.5		2.9		1.07		2.1	b
Seavey Isl., Inner Back Channel	12:40	0.283		37.7		0.280		28.6		0.010	b,f	64.3		3.1		0.86		1.5	b
Port Hbr., B.Bowen Station	13:05																		
Port Hbr., Inner Clark Cove	14:10	0.328		47.9		0.292		23.9		0.015	b,f	57.4			d	0.76			d
Port Hbr., Inner Clark Cove	14:10	0.268		39.1		0.247		29.3		0.012	b,f	52.5			d	0.61			d
Port Hbr., Sullivan Pt. (Ver. Site)	14:20	0.278		31.7		0.278		27.1		0.013	b,f	58.2		2.9		0.90		1.4	b
Port Hbr., Sullivan Pt. (Ver. Site)	14:20	0.239		27.2		0.265		30.6		0.005	b,f	48.0		2.3		0.82		1.0	b
Port Hbr., Pierces Isl.	16:15	0.369		35.2		0.314		28.5		0.013	b,f	61.0		4.2		0.89		2.3	
Port Hbr., B.Bowen Station	16:30																		
Port Hbr., Seavey Isl.	17:50	0.342		31.8		0.286		23.8		0.010	b,f	77.5		4.3		0.68		2.2	
Port Hbr., US1 Lift Bridge (South)	18:00	0.389		29.7		0.320		27.9		0.016	b,f	55.5		4.6		0.76		2.1	b
Port Hbr., US1 Lift Bridge (North)	18:10	0.385		33.0		0.310		26.8		0.015	b,f	64.2		4.7		0.93		2.2	
Piscataqua R., Noble Isl. (South)	18:20	0.398		36.1		0.300		27.4		0.016	b,f	71.7		5.1		1.02		2.4	b
Piscataqua R., Noble Isl. (North)	18:30	0.396		33.8		0.293		22.7		0.015	b,f	65.4		5.3		0.83		2.2	

Table 11. Data for Cruise #1

Sample Location	Sample Time	PFe mg/g	PFeF	PAl mg/g	PAlF
Port Hbr., Stielman Rocks	15:30	33.2		31.9	
Port Hbr., Stielman Rocks	15:30	34.2		32.8	
Port Hbr., Outer Mid-channel	15:45				
Port Hbr., Gerrish Island	16:30	36.2		34.3	
Port Hbr., Gerrish Island	16:30	40.3		37.5	
Port Hbr., Salamander Pt.	8:45	39.6		37.9	
Port Hbr., Salamander Pt.	8:45	25.8		23.4	
Port Hbr., Inner Mid-channel	9:30	32.8		31.3	
Port Hbr., Kittery Pt.	9:45	33.8		30.4	
Port Hbr., Kittery Pt.	9:45	27.4		24.7	
Port Hbr., New Castle Isl.	10:00	34.8		32.2	
Port Hbr., New Castle Isl.	10:00	28.3		24.1	
Port Hbr., Outer Clark Cove	10:30	38.4		30.9	
Port Hbr., Mouth Spruce Crk.	10:45	36.8		29.7	
Port Hbr., Mouth Spruce Crk.	10:45	29.4		24.3	
Seavey Isl., Outer Back Channel	11:00	31.2		26.9	
Seavey Isl., Outer Back Channel	11:00	39.0		36.7	
Seavey Isl., Inner Back Channel	12:40	35.0		31.1	
Port Hbr., B.Bowen Station	13:05				
Port Hbr., Inner Clark Cove	14:10	32.8		28.8	
Port Hbr., Inner Clark Cove	14:10	31.8		27.9	
Port Hbr., Sullivan Pt. (Ver. Site)	14:20	35.0		30.7	
Port Hbr., Sullivan Pt. (Ver. Site)	14:20	31.3		27.6	
Port Hbr., Pierces Isl.	16:15	34.8		28.8	
Port Hbr., B.Bowen Station	16:30				
Port Hbr., Seavey Isl.	17:50	32.6		27.9	
Port Hbr., US1 Lift Bridge (South)	18:00	33.1		27.9	
Port Hbr., US1 Lift Bridge (North)	18:10	38.3		32.1	
Piscataqua R., Noble Isl. (South)	18:20	41.1		31.4	
Piscataqua R., Noble Isl. (North)	18:30	36.8		27.6	

Table 12. Data for Cruise #2

Sample Location	Sample Time	Latitude DD.MM.SS	Longitude DD.MM.SS	Station ID Cr-St-Depth	Sample Date YYMMDD	Tide	Salinity	Particulate Weight on Filter, mg	Volume Filtered, ml	Particulate Concentration, mg/L	DCd ug/L	DCdF	PCd ug/g	PCdF
Port Hbr., New Castle Isl.	13:30	43.04.25	70.43.19	II-01-2	931019	R	31.77	0.97	516.8	1.88	0.028	b	1.49	b
Port Hbr., New Castle Isl.	13:30	43.04.25	70.43.19	II-01-15	931019	R	31.92	0.91	509.5	1.79	0.027	b	0.55	b,f
Port Hbr., Outer Clarks Cove	13:50	43.04.38	70.43.18	II-02-2	931019	R	31.89	0.79	492.4	1.60	0.029	b	0.64	b,f
Port Hbr., Mouth Spruce Crk.	14:05	43.04.53	70.43.14	II-03-2	931019	SLF	31.87	0.81	496.8	1.63	0.026	b	0.61	b,f
Seavey Isl., Outer Back Channel	14:25	43.04.56	70.43.31	II-04-2	931019	SLF	31.79	0.78	465.1	1.68	0.028	b	0.48	b,f
Seavey Isl., Inner Back Channel	14:45	43.05.03	70.43.58	II-05-1	931019	SLF	31.61	0.77	464.5	1.66	0.028	b	0.49	b,f
Seavey Isl., Inner Back Channel	14:45	43.05.03	70.43.58	II-05-5	931019	SLF	31.71	0.87	468.4	1.86	0.026	b	0.71	b,f
Port Hbr., Inner Clarks Cove	15:10	43.04.42	70.43.33	II-06-1	931019	SLF	31.27	0.79	481.7	1.64	0.030	b	0.47	b,f
Port Hbr., Inner Clarks Cove	15:10	43.04.42	70.43.33	II-06-3	931019	SLF	31.37	0.81	486.7	1.66	0.028	b	0.76	b,f
Port Hbr., Inner Clarks Cove	15:10	43.04.42	70.43.33	II-06-10	931019	SLF	31.72	0.84	500.8	1.68	0.027	b	0.59	b,f
Port Hbr., New Castle Isl.	15:45	43.04.25	70.43.42	II-07-CTD	931019	F								
Port Hbr., Sullivan Pt. (Ver. Site)	16:00	43.04.34	70.43.38	II-08-1	931019	F	31.85	0.61	494.3	1.23	0.029	b	1.01	b
Port Hbr., Sullivan Pt. (Ver. Site)	16:00	43.04.34	70.43.38	II-08-5	931019	F	32.33	0.65	482.0	1.35	0.026	b	0.58	b,f
Port Hbr., Goat Isl.	16:20	43.04.22	70.44.23	II-09-2	931019	F	31.37	0.84	502.9	1.67	0.029	b	0.74	b,f
Port Hbr., Henderson Pt.	16:35	43.04.29	70.44.19	II-10-2	931019	F	31.91	0.65	497.2	1.31	0.031	b	0.95	b
Port Hbr., US1 Lift Bridge (South)	16:45	43.04.43	70.45.05	II-11-2	931019	F	31.55	0.97	487.2	1.99	0.030	b	1.01	b
Port Hbr., Seavey Isl. Pier No. 2	16:55	43.04.49	70.44.53	II-12-CTD	931019	F								
Seavey Isl., Head Back Channel	17:00	43.04.56	70.44.47	II-13-2	931019	F	31.62	1.13	490.9	2.30	0.030	b	0.87	b,f
Seavey Isl., Head Back Channel	17:00	43.04.56	70.44.47	II-13-9.5	931019	F	31.62	0.85	509.4	1.67	0.030	b	0.44	b,f
Port Hbr., Nobles Isl.	17:15	43.04.52	70.45.32	II-14-CTD	931019	F								
Port Hbr., Badgers Isl.	17:25	43.05.01	70.45.25	II-15-2	931019	F	31.74	0.87	489.2	1.78	0.030	b	0.85	b,f
Port Hbr., New Castle Isl.	8:20	43.04.26	70.43.26	II-16-2	931020	F	31.31	0.86	506.5	1.70	0.027	b	0.56	b,f
Port Hbr., New Castle Isl.	8:20	43.04.26	70.43.26	II-16-10	931020	F	31.41	0.85	497.9	1.74	0.026	b	0.14	b,f
Port Hbr., Outer Clarks Cove	9:00	43.04.40	70.43.18	II-17-CTD	931020	SLE								
Port Hbr., Mouth Spruce Crk.	9:20	43.04.53	70.44.16	II-18-2	931020	SLE	31.47	0.95	495.0	1.92	0.028	b	0.63	b,f
Port Hbr., Mouth Spruce Crk.	9:20	43.04.53	70.44.16	II-18-7	931020	SLE	31.56	0.92	504.9	1.82	0.027	b	0.52	b,f
Seavey Isl., Outer Back Channel	9:40	43.04.56	70.43.31	II-19-2	931020	SLE	31.69	0.80	495.6	1.61	0.029	b	0.90	b
Seavey Isl., Outer Back Channel	9:40	43.04.56	70.43.31	II-19-5	931020	SLE	31.66	0.75	499.6	1.50	0.027	b	0.80	b,f
Port Hbr., Inner Clarks Cove	10:00	43.04.43	70.43.34	II-20-2	931020	SLE	31.59	0.47	504.5	0.93	0.028	b	1.02	b
Port Hbr., Inner Clarks Cove	10:00	43.04.43	70.43.34	II-20-6	931020	SLE	31.77	0.7	497.0	1.41	0.026	b	0.86	b,f
Port Hbr., Sullivan Pt. (Ver Site)	10:20	43.04.34	70.43.36	II-21-2	931020	SLE	30.93	0.73	468.4	1.50	0.027	b	0.49	b,f
Port Hbr., Sullivan Pt. (Ver Site)	10:20	43.04.34	70.43.36	II-21-12	931020	SLE	31.01	0.86	513.2	1.68	0.028	b	0.70	b,f
Port Hbr., US1 Lift Bridge (South)	11:15	43.04.43	70.45.05	II-22-2	931020	R	30.42	0.8	498.2	1.61	0.029	b	0.60	b,f
Port Hbr., US1 Lift Bridge (South)	11:15	43.04.43	70.45.05	II-22-6	931020	R	30.43	0.93	505.2	1.84	0.028	b	0.65	b,f
Seavey Isl., Head Back Channel	11:25	43.04.56	70.44.48	II-23-2	931020	R	30.73	0.71	493.8	1.44	0.028	b	0.68	b,f
Piscataqua Riv. at Stacy Crk.	12:00	43.07.59	70.49.49	II-24-2	931020	R	26.92	1.16	479.2	2.42	0.023	b	0.73	b,f
Piscataqua Riv. at Stacy Crk.	12:00	43.07.59	70.49.49	II-24-5	931020	R	26.92	1.74	504.3	3.45	0.028	b	0.55	b,f
Dover Point	12:30	43.07.11	70.50.18	II-25-2	931020	R	30.49	0.85	504.5	1.68	0.030	b	0.99	b
Piscataqua River Channel	13:00	43.06.24	70.47.33	II-26-2	931020	R	30.5	x		x	0.027	b	x	
Piscataqua River Channel	13:00	43.06.24	70.47.33	II-26-10	931020	R	30.38	x		x	0.024	b	x	

Table 12. Data for Cruise #2

Sample Location	Sample Time	DCu ug/L	DCuF	PCu ug/g	PCuF	DNi ug/L	DNiF	PNi ug/g	PNiF	DPb ug/L	DPbF	PPb ug/g	PPbF	DMn ug/L	DMnF	PMn mg/g	PMnF	DFe ug/L	DFeF
Port Hbr., New Castle Isl.	13:30	0.236		26.0		0.256		22.5		0.007	b,f	43.7		1.9		0.69		1.3	b
Port Hbr., New Castle Isl.	13:30	0.218		22.8		0.250		22.7		0.002	b,f	36.9		1.6		0.67		1.2	b
Port Hbr., Outer Clarks Cove	13:50	0.217				0.255		19.8		0.002	b,f	31.2		1.8		0.55		1.3	b
Port Hbr., Mouth Spruce Crk.	14:05	0.210		18.3		0.253		30.7		0.006	b,f	35.1		1.6		0.55		1.4	b
Seavey Isl., Outer Back Channel	14:25	0.240		23.3		0.272		25.5		0.011	b,f	37.7		2.1		0.41		1.6	b
Seavey Isl., Inner Back Channel	14:45	0.266		28.1		0.273		30.7		0.018	b,f	55.8		2.7		0.57		2.2	
Seavey Isl., Inner Back Channel	14:45	0.254		34.0		0.260		32.9		0.012	b,f	47.2		2.3		0.43		2.1	b
Port Hbr., Inner Clarks Cove	15:10	0.331		40.3		0.294		34.7		0.022	b,f	60.6		3.7		0.54		2.8	
Port Hbr., Inner Clarks Cove	15:10	0.287		37.9		0.276		39.9		0.021	b,f	57.9		3.3		0.53		3.2	
Port Hbr., Inner Clarks Cove	15:10	0.255		27.1		0.278		32.6		0.014	b,f	45.4		2.7		0.53		2.4	
Port Hbr., New Castle Isl.	15:45																		
Port Hbr., Sullivan Pt. (Ver. Site)	16:00	0.229		18.7		0.262		34.7		0.010	b,f	41.8		2.0		0.70		1.4	b
Port Hbr., Sullivan Pt. (Ver. Site)	16:00	0.229		22.8		0.235	b	32.5		0.010	b,f	45.2		1.9		0.62		2.3	
Port Hbr., Goat Isl.	16:20	0.299		27.1		0.289		29.6		0.021	b,f	55.8		3.6		0.41		2.7	
Port Hbr., Henderson Pt.	16:35	0.216		15.8		0.266		26.8		0.007	b,f	34.7		1.8		0.56		1.4	b
Port Hbr., US1 Lift Bridge (South)	16:45	0.295		35.2		0.280		34.6		0.022	b,f	61.4		3.2		0.58		2.6	
Port Hbr., Seavey Isl. Pier No. 2	16:55																		
Seavey Isl., Head Back Channel	17:00	0.288		29.2		0.289		28.6		0.019	b,f	46.7		2.7		0.50		2.3	
Seavey Isl., Head Back Channel	17:00	0.273		33.5		0.290		33.7		0.016	b,f	57.5		2.6		0.55		2.3	
Port Hbr., Nobles Isl.	17:15																		
Port Hbr., Badgers Isl.	17:25	0.251		26.2		0.274		34.3		0.015	b,f	48.3		2.2		0.56		2.3	
Port Hbr., New Castle Isl.	8:20	0.309		35.0		0.297		23.4		0.021	b,f	59.1		3.4		0.63		2.5	
Port Hbr., New Castle Isl.	8:20	0.282		25.9		0.295		16.6		0.019	b,f	40.6		2.8		0.39		2.6	
Port Hbr., Outer Clarks Cove	9:00																		
Port Hbr., Mouth Spruce Crk.	9:20	0.290		41.4		0.298		26.2		0.031	b,f	70.7		3.4		0.49		3.5	
Port Hbr., Mouth Spruce Crk.	9:20	0.273		37.7		0.290		23.1		0.027	b,f	67.7		3.1		0.48		2.7	
Seavey Isl., Outer Back Channel	9:40	0.303		50.6		0.349		26.6		0.032	b,f	71.9		2.8		0.67		3.7	
Seavey Isl., Outer Back Channel	9:40	0.278		43.2		0.301		23.6		0.022	b,f	53.7		2.6		0.41		3.3	
Port Hbr., Inner Clarks Cove	10:00	0.304		39.4		0.292		27.5		0.024	b,f	49.0		2.9		0.55		3.5	
Port Hbr., Inner Clarks Cove	10:00	0.227		47.9		0.292		23.6		0.014	b,f	49.3		2.3		0.60		3.1	
Port Hbr., Sullivan Pt. (Ver Site)	10:20	0.320		39.6		0.288		25.9		0.018	b,f	68.3		3.9		0.73		3.2	
Port Hbr., Sullivan Pt. (Ver Site)	10:20	0.335		35.0		0.308		26.1		0.017	b,f	63.6		3.8		0.63		3.6	
Port Hbr., US1 Lift Bridge (South)	11:15	0.356		34.7		0.320		22.1		0.020	b,f	61.1		4.9		0.53		3.6	
Port Hbr., US1 Lift Bridge (South)	11:15	0.356		38.6		0.313		29.3		0.017	b,f	70.1		4.9		0.68		3.7	
Seavey Isl., Head Back Channel	11:25	0.352		34.2		0.271		24.9		0.018	b,f	62.1		4.4		0.60		3.6	
Piscataqua Riv. at Stacy Crk.	12:00	0.374		42.9		0.334		26.6		0.034	b	86.8		11.0		0.53		13.2	
Piscataqua Riv. at Stacy Crk.	12:00	0.400		33.2		0.355		21.2		0.028	b,f	58.4		8.3		0.43		8.4	
Dover Point	12:30	0.404		32.7		0.336		20.8		0.021	b,f		f	6.8		0.54		4.9	
Piscataqua River Channel	13:00	0.362		x		0.262		x		0.016	b,f	x		5.6		x		3.7	
Piscataqua River Channel	13:00	0.319		x		0.223	b	x		0.051	f	x		5.7		x		3.9	

Table 12. Data for Cruise #2

Sample Location	Sample Time	PFe mg/g	PFeF	PAl mg/g	PAlF
Port Hbr., New Castle Isl.	13:30	29.8		22.3	
Port Hbr., New Castle Isl.	13:30	24.7		18.2	
Port Hbr., Outer Clarks Cove	13:50	24.0		18.2	
Port Hbr., Mouth Spruce Crk.	14:05	25.4		23.1	
Seavey Isl., Outer Back Channel	14:25	24.2		21.1	
Seavey Isl., Inner Back Channel	14:45	28.1		24.8	
Seavey Isl., Inner Back Channel	14:45	27.7		23.9	
Port Hbr., Inner Clarks Cove	15:10	32.7		28.3	
Port Hbr., Inner Clarks Cove	15:10	31.8		28.2	
Port Hbr., Inner Clarks Cove	15:10	27.2		22.0	
Port Hbr., New Castle Isl.	15:45				
Port Hbr., Sullivan Pt. (Ver. Site)	16:00	26.8		20.8	
Port Hbr., Sullivan Pt. (Ver. Site)	16:00	28.7		21.5	
Port Hbr., Goat Isl.	16:20	28.9		21.8	
Port Hbr., Henderson Pt.	16:35	24.6			I
Port Hbr., US1 Lift Bridge (South)	16:45	33.8			I
Port Hbr., Seavey Isl. Pier No. 2	16:55				
Seavey Isl., Head Back Channel	17:00	27.3			I
Seavey Isl., Head Back Channel	17:00	30.1		25.8	
Port Hbr., Nobles Isl.	17:15				
Port Hbr., Badgers Isl.	17:25	27.7		21.7	
Port Hbr., New Castle Isl.	8:20	35.0		29.2	
Port Hbr., New Castle Isl.	8:20	26.3		22.6	
Port Hbr., Outer Clarks Cove	9:00				
Port Hbr., Mouth Spruce Crk.	9:20	38.2		34.5	
Port Hbr., Mouth Spruce Crk.	9:20	35.6		30.0	
Seavey Isl., Outer Back Channel	9:40	35.0		30.1	
Seavey Isl., Outer Back Channel	9:40	29.1		25.0	
Port Hbr., Inner Clarks Cove	10:00	30.1		26.5	
Port Hbr., Inner Clarks Cove	10:00	31.4		28.0	
Port Hbr., Sullivan Pt. (Ver Site)	10:20	37.6		32.1	
Port Hbr., Sullivan Pt. (Ver Site)	10:20	35.3		30.2	
Port Hbr., US1 Lift Bridge (South)	11:15	38.3		32.7	
Port Hbr., US1 Lift Bridge (South)	11:15	39.9		33.2	
Seavey Isl., Head Back Channel	11:25	38.4		31.2	
Piscataqua Riv. at Stacy Crk.	12:00	44.5		34.6	
Piscataqua Riv. at Stacy Crk.	12:00	35.9		27.1	
Dover Point	12:30	37.2		29.8	
Piscataqua River Channel	13:00	x		x	
Piscataqua River Channel	13:00	x		x	

Table 13. Data for Cruise #3

Sample Location	Sample Time	Latitude DD.MM.SS	Longitude DD.MM.SS	Station ID Cr-St-Depth	Sample Date YYMMDD	Tide	Salinity	Weight on Filter, mg	Volume Filtered, ml	Particulate Concentration, mg/L	DCd ug/L	DCdF	PCd ug/g	PCdF
Port Hbr., New Castle Isl.	12:40	43.04.26	70.43.23	III-01-2	931116	SLF	32.01	0.54	498.2	1.08	0.021	b	0.43	b,f
Port Hbr., New Castle Isl.	12:40	43.04.26	70.43.23	III-01-13	931116	SLF	32.09	0.65	486.2	1.34	0.027	b	0.93	b
Port Hbr., Outer Clarks Cove	13:00	43.04.41	70.43.19	III-02-2	931116	SLF	31.91	0.42	481.7	0.87	0.026	b	0.85	b,f
Port Hbr., Mouth Spruce Crk.	13:15	43.04.52	70.43.15	III-03-2	931116	SLF	31.92	0.56	487.3	1.15	0.025	b	1.52	b
Seavey Isl., Outer Back Channel	13:35	43.04.56	70.43.30	III-04-2	931116	SLF	31.91	0.67	482.6	1.39	0.028	b	0.53	b,f
Seavey Isl., Inner Back Channel	13:45	43.05.03	70.43.59	III-05-2	931116	SLF	31.84	0.63	487.0	1.29	0.027	b	0.56	b,f
Seavey Isl., Inner Back Channel	13:45	43.05.03	70.43.59	III-05-6	931116	SLF	31.75	0.53	495.1	1.07	0.031	b	0.67	b,f
Port Hbr., Inner Clarks Cove	14:05	43.04.42	70.43.32	III-06-1	931116	F	31.68	0.52	500.5	1.04	0.025	b	0.45	b,f
Port Hbr., Inner Clarks Cove	14:05	43.04.42	70.43.32	III-06-5	931116	F	31.72	0.54	481.5	1.12	0.026	b	0.89	b,f
Port Hbr., Inner Clarks Cove	14:05	43.04.42	70.43.32	III-06-8.5	931116	F	31.82	0.62	480.7	1.29	0.029	b	0.77	b,f
Port Hbr., Sullivan Pt. (Ver. Site)	15:20	43.04.34	70.43.36	III-07-2	931116	F	31.74	0.68	497.1	1.37	0.026	b	0.89	b,f
Port Hbr., Sullivan Pt. (Ver. Site)	15:20	43.04.34	70.43.36	III-07-6	931116	F	31.73	0.68	483.2	1.41	0.028	b	0.89	b,f
Port Hbr., Sullivan Pt. (Ver. Site)	15:20	43.04.34	70.43.36	III-07-12	931116	F	31.74	0.65	482.6	1.35	0.024	b	0.74	b,f
Port Hbr., Shapleigh Isl.	15:40	43.04.22	70.44.20	III-08-2	931116	F	31.83	0.78	482.2	1.62	0.024	b	0.77	b,f
Port Hbr., Shapleigh Isl.	15:40	43.04.22	70.44.20	III-08-20	931116	F	31.78	0.57	473.4	1.20	0.024	b	0.41	b,f
Port Hbr., Henderson Pt.	15:55	43.04.29	70.44.15	III-09-2	931116	F	31.75	0.79	500.1	1.58	0.023	b	0.22	b,f
Port Hbr., Pierces Isl.	16:05	43.04.35	70.44.32	III-10-2	931116	F	31.70	0.60	490.7	1.22	0.022	b	0.49	b,f
Port Hbr., Pierces Isl.	16:05	43.04.35	70.44.32	III-10-12	931116	F	31.70	0.64	487.5	1.31	0.024	b	0.46	b,f
Port Hbr., Seavey Isl.	16:15	43.04.43	70.44.19	III-11-2	931116	F	31.72	0.74	443.8	1.67	0.025	b	0.39	b,f
Port Hbr., Seavey Isl.	16:15	43.04.43	70.44.19	III-11-12	931116	F	31.74	0.66	488.5	1.35	0.025	b	0.44	b,f
Port Hbr., US1 Lift Bridge (South)	16:30	43.04.43	70.45.02	III-12-CTD	931116	F								
Port Hbr., Seavey Isl. Pier No. 2	16:40	43.04.49	70.44.47	III-13-5	931116	SLE	31.47	0.92	485.4	1.90	0.023	b	0.71	b,f
Port Hbr., Badgers Isl.	16:50	43.04.54	70.44.48	III-14-2	931116	SLE	31.73	0.90	487.7	1.85	0.025	b	0.59	b,f
Seavey Isl., Head of Back Channel	16:55	43.05.02	70.44.40	III-15-2	931116	SLE	31.74	1.10	482.1	2.28	0.024	b	0.48	b,f
Port Hbr., Sullivan Pt. (Ver. Site)	9:00	43.04.34	70.43.37	III-16-2	931117	R	30.28	0.89	486.6	1.83	0.026	b	0.19	b,f
Port Hbr., Sullivan Pt. (Ver. Site)	9:00	43.04.34	70.43.37	III-16-10	931117	R	30.63	0.91	485.6	1.87	0.029	b	0.19	b,f
Port Hbr., Inner Clarks Cove	9:15	43.04.43	70.43.33	III-17-2	931117	R	31.31	0.66	479.5	1.38	0.025	b	0.44	b,f
Port Hbr., Inner Clarks Cove	9:15	43.04.43	70.43.33	III-17-7	931117	R	31.68	0.74	507.4	1.46	0.023	b	0.55	b,f
Seavey Isl., Ouetr Back Channel	9:30	43.04.56	70.43.31	III-18-2	931117	R	31.27	0.88	512.7	1.72	0.028	b	0.47	b,f
Port Hbr., Seavey Isl. Pier No. 2	9:50	43.04.51	70.44.53	III-19-CTD	931117	R								
Piscataqua Riv., Power Plant	10:05	43.06.02	70.47.01	III-20-2	931117	R	29.85	1.06	491.6	2.16	0.029	b	0.27	b,f
Piscataqua Riv., at Sturgeon Crk.	10:30	43.09.18	70.49.54	III-21-2.5	931117	R	25.32	2.45	489.6	5.00	0.030	b	0.71	b,f
Piscataqua Riv., at Cocheco Riv.	11:10	43.10.32	70.49.30	III-22-1	931117	R	19.65	1.06	322.7	3.29	0.027	b	0.67	b,f
Dover Point	11:50	43.07.13	70.50.05	III-23-5	931117	R	28.89	0.89	485.6	1.83	0.031	b	0.47	b,f
Little Bay at Durham Point	12:10	43.06.57	70.51.32	III-24-2	931117	R	28.61	0.94	497.6	1.89	0.030	b	0.30	b,f
Great Bay at Thomas Point	12:30	43.05.03	70.51.39	III-25-2	931117	R	27.97	1.18	463.5	2.55	0.033	b	0.36	b,f

Table 13. Data for Cruise #3

DCu ug/L	DCuF	PCu ug/g	PCuF	DNi ug/L	DNiF	PNi ug/g	PNiF	DPb ug/L	DPbF	PPb ug/g	PPbF	DMn ug/L	DMnF	PMn mg/g	PMnF	DFe ug/L	DFeF	PFe mg/g	PFeF	PAl mg/g	PAlF
0.157	b	21.7		0.211	b	17.2		0.005	b,f	36.2		1.2		0.65		1.2	b	25.6		23.2	
0.195		18.0		0.262		16.1		0.008	b,f	32.9		1.0	b	0.71		1.2	b	24.6		21.9	
0.196		22.3		0.254		13.6		0.008	b,f	48.7		1.4		0.81		1.4	b	31.5		31.0	
0.208		27.2		0.266		20.8		0.009	b,f	44.9		1.2		0.71		1.5	b	28.4		28.4	
0.217		28.0		0.265		21.0		0.010	b,f	47.2		1.5		0.65		3.2		29.0		26.4	
0.226		26.0		0.275		22.3		0.011	b,f	42.8		1.8		0.73		1.6	b	29.6		27.4	
0.249		30.9		0.285		31.0		0.018	b,f	57.9		1.7		0.87		1.4	b	35.5		29.1	
0.214		45.1		0.269		31.6		0.016	b,f	68.0		2.3		0.82		0.9	b	38.8		34.6	
0.220		39.1		0.278		34.8		0.012	b,f	65.5		1.9		0.89		2.2		37.0		34.1	
0.219		34.0		0.286		34.2		0.011	b,f	61.5		1.8		0.81		1.9	b	37.5			
0.232		32.7		0.255		24.2		0.016	b,f	60.2		2.1		0.82		1.4	b	29.2		24.3	
0.255		31.0		0.282		29.4		0.019	b,f	60.2		2.1		0.71		1.7	b	31.2		28.2	
0.247		28.8		0.288		27.1		0.017	b,f	57.2		2.0		0.79		1.7	b	32.1		29.1	
0.228		25.5		0.284		34.8		0.012	b,f	121.6		1.9		0.67		1.6	b	28.5		24.9	
0.237		30.8		0.294		30.9		0.011	b,f	62.0		1.6		0.96		1.4	b	38.5		33.1	
0.239		33.6		0.273		26.1		0.011	b,f	42.6		1.9		0.57		1.3	b	27.8		26.9	
0.223		42.3		0.261		38.8		0.011	b,f	74.2		1.9		0.93		1.7	b	40.2		40.4	
0.244		37.8		0.284		32.2		0.014	b,f	66.8		1.8		0.87		1.4	b	37.5		35.4	
0.243		29.5		0.262		27.8		0.010	b,f	54.1		1.8		0.56		1.4	b	30.6		29.2	
0.253		36.7		0.289		33.2		0.012	b,f	68.9		1.7		0.87		2.0	b	37.6		34.1	
0.250		31.4		0.269		25.3		0.014	b,f	54.3		2.0		0.79		1.4	b	29.8		26.4	
0.257		29.5		0.265		24.4		0.015	b,f	46.5		1.8		0.57		1.7	b	27.8		23.1	
0.236		26.3		0.270		21.2		0.012	b,f	37.2		1.8		0.51		1.2	b	23.6		20.9	
0.319		31.1		0.297		26.2		0.018	b,f	54.1		3.6		0.50		3.5		30.8		29.1	
0.317		33.0		0.292		25.6		0.017	b,f	58.9		3.5		0.66		3.5		34.1		26.3	
0.248		40.2		0.289		29.1		0.017	b,f	62.0		2.4		0.65		2.1	b	36.0		31.7	
0.214		39.0		0.274		24.2		0.017	b,f	50.4		2.1		0.51		2.4		32.8		28.1	
0.294		39.5		0.343		31.1		0.028	b,f	62.0		2.8		0.63		2.6		33.8		29.6	
0.334		33.9		0.350		28.4		0.018	b,f	55.7		4.1		0.52		3.3		32.0		26.4	
0.433		40.1		0.451		25.0		0.038	b	76.2		10.1		0.40		10.0		36.8		24.3	
0.466		47.4		0.495		19.6		0.053	b	86.6		17.0			I	25.4			I		I
0.330		32.3		0.349		23.3		0.023	b,f	58.3		5.5			I	5.3			I		I
0.370		29.5		0.363		26.2		0.020	b,f	60.5		5.9			I	4.8			I		I
0.372		29.6		0.357		23.1		0.019	b,f	65.1		6.7			I	4.4			I		I

Table 14. Seep Data

Sample Location	Sample Time	Latitude DD.MM.SS	Longitude DD.MM.SS	Station ID Cr-Seep No.	Date YYMMDD	Tide	Salinity	Filtered, ml	DCd ug/L	DCdF
Seavey Island Back Channel	14:00	43.04.54	70.43.36	I-Seep 1	930914	E	12.75	75.4	0.015	
Seavey Island Back Channel	14:00	43.04.55	70.43.37	I-Seep 2	930914	E	30.98	81.5	0.298	
Seavey Island Back Channel	8:00	43.04.54	70.43.36	II-Seep 1	931020	SLE	18.60	82.9	0.035	
Seavey Island Back Channel	8:00	43.04.54	70.43.36	II-Seep 1 Rep	931020	SLE	18.60	77.0	0.033	
Seavey Island Back Channel	8:00	43.04.55	70.43.37	II-Seep 2	931020	SLE	30.70	88.9	0.486	
Seavey Island Back Channel	8:00	43.04.55	70.43.37	II-Seep 2 Rep	931020	SLE	30.70	78.9	0.495	
Seavey Island Back Channel	8:30	43.04.54	70.43.36	III-Seep 1	931117	R	16.97	63.3	0.022	
Seavey Island Back Channel	8:30	43.04.54	70.43.36	III-Seep 1 Rep	931117	R	16.97	72.9	0.020	

Sample Location	Sample Time	DCu ug/L	DCuF	DNi ug/L	DNiF	DPb ug/L	DPbF	DMn ug/L	DMnF	DFe ug/L	DFeF
Seavey Island Back Channel	14:00	0.912		1.245		0.046		227.2		76.3	
Seavey Island Back Channel	14:00	10.923		16.818		8.365		7.3		9.9	
Seavey Island Back Channel	8:00	1.126		1.733		0.042		260.4		78.1	
Seavey Island Back Channel	8:00	1.022		1.679		0.042		272.6		86.4	
Seavey Island Back Channel	8:00	11.840		27.766		6.901		20.6		20.3	
Seavey Island Back Channel	8:00	11.740		26.668		6.415		25.4		20.8	
Seavey Island Back Channel	8:30	0.794		1.813		0.032		381.5		134.1	
Seavey Island Back Channel	8:30	0.727		1.622		0.032		389.8		137.7	

Portsmouth Navy Shipyard Study, Cruise 1, 2, 3 Seavey Island Seep Data
v.950118

Batch 1 Particulate Al, Fe, and Mn				Date of Analysis:		12/20/94											
Cruise No.	Station No.	Depth M	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Filter Adjusted Volume, ml	Particulate Concentration mg/L	Al ICP Conc, ug/ml	Fe ICP Conc, ug/ml	Mn ICP Conc, ug/ml	Dilution Factor	Dilution Corrected Al, ug/ml	Dilution Corrected Fe, ug/ml	Dilution Corrected Mn, ug/ml	Particulate Al, mg/g	Particulate Fe, mg/g	Particulate Mn, mg/g
	MESS-1	30D	LCS		231	500.0	462.00	5.66	9.4	0.138	1	5.660	9.400	.138	12.25	20.35	0.30
1	1	1.5		31.5	1.16	881.5	1.32	4.62	4.81	0.109	2	9.240	9.620	.218	31.86	33.17	0.75
1	1	8		31.54	1.05	785.1	1.34	3.22	3.36	0.083	2.67	8.597	8.971	.222	32.75	34.18	0.84
1	3	1.5		31.35	1.26	841.1	1.50	4.05	4.27	0.09	2.67	10.814	11.401	.240	34.33	36.19	0.76
1	3	8		31.39	1.43	975.8	1.47	5.02	5.4	0.115	2.67	13.403	14.418	.307	37.49	40.33	0.86
1	4	2		31.44	0.98	510.8	1.92	3.48	3.63	0.085	2.67	9.292	9.692	.227	37.92	39.56	0.93
1	4	10		31.47	1.07	504.6	2.12	2.34	2.58	0.063	2.67	6.248	6.889	.168	23.36	25.75	0.63
1	5	2		31.69	0.54	511.0	1.06	1.58	1.66	0.053	2.67	4.219	4.432	.142	31.25	32.83	1.05
1	6	2		31.53	0.6	523.1	1.15	1.71	1.9	0.042	2.67	4.566	5.073	.112	30.44	33.82	0.75
1	6	10		31.56	0.71	527.7	1.35	1.64	1.82	0.044	2.67	4.379	4.859	.117	24.67	27.38	0.66
1	7	2		31.67	0.67	527.2	1.27	2.02	2.18	0.062	2.67	5.393	5.821	.166	32.20	34.75	0.99
1	7	10		31.68	0.77	510.5	1.51	1.74	2.04	0.056	2.67	4.646	5.447	.150	24.13	28.30	0.78
1	8	2		31.61	0.47	498.2	0.94	1.36	1.69	0.043	2.67	3.631	4.512	.115	30.90	38.40	0.98
1	9	2		31.59	0.54	500.6	1.08	1.5	1.86	0.048	2.67	4.005	4.966	.128	29.67	36.79	0.95
1	9	10		31.61	0.72	490.5	1.47	1.64	1.98	0.058	2.67	4.379	5.287	.155	24.33	29.37	0.86
1	10	2		31.6	0.48	485.5	0.99	1.21	1.4	0.042	2.67	3.231	3.738	.112	26.92	31.15	0.93

Batch 1 Particulate Cadmium				Date of Analysis:		7/11/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Filter Adjusted Volume, ml	Particulate Concentration mg/L	Cadmium Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Particulate Cd ug/g
	ProBlk1							0	0.0012263	-0.04		-0.04
	MESS-1	30D			231	500.0	462.00	0.009	-0.0077737	0.27	0.59	0.59
	MESS-1	30D	Spk		231	500.0	462.00	0.119	-0.1177737	5.30	11.48	11.48
1	1	1.5		31.5	1.16	881.5	1.32	0.005	-0.0037737	0.13	0.46	0.46
1	1	8		31.54	1.05	785.1	1.34	0.004	-0.0027737	0.10	0.37	0.37
1	3	1.5		31.35	1.26	841.1	1.50	0.003	-0.0017737	0.06	0.20	0.20
1	3	8		31.39	1.43	975.8	1.47	0.006	-0.0047737	0.17	0.47	0.47
1	4	2		31.44	0.98	510.8	1.92	0	0.0012263	-0.04	-0.17	-0.17
1	4	10		31.47	1.07	504.6	2.12	-0.002	0.0032263	-0.11	-0.42	-0.42
1	5	2		31.69	0.54	511.0	1.06	0	0.0012263	-0.04	-0.32	-0.32
1	6	2		31.53	0.6	523.1	1.15	-0.003	0.0042263	-0.15	-0.98	-0.98
1	6	10		31.56	0.71	527.7	1.35	-0.002	0.0032263	-0.11	-0.63	-0.63
1	7	2		31.67	0.67	527.2	1.27	0	0.0012263	-0.04	-0.25	-0.25
1	7	10		31.68	0.77	510.5	1.51	-0.001	0.0022263	-0.08	-0.40	-0.40
1	8	2		31.61	0.47	498.2	0.94	-0.001	0.0022263	-0.08	-0.66	-0.66
1	9	2		31.59	0.54	500.6	1.08	-0.001	0.0022263	-0.08	-0.57	-0.57
1	9	10		31.61	0.72	490.5	1.47	-0.005	0.0062263	-0.22	-1.20	-1.20
1	10	2		31.6	0.48	485.5	0.99	-0.004	0.0052263	-0.18	-1.51	-1.51
			Blk Ck1					-0.001	0.0022263	-0.08		
			Blk Ck2					0	0.0012263	-0.04		
			Blk Ck3					-0.005	0.0062263	-0.22		
			Blk Ck4					-0.006	0.0072263	-0.25		
			Blk Ck5					-0.003	0.0042263	-0.15		
			Cd Ck1					0.117	-0.1157737	5.18		
			Cd Ck2					0.113	-0.1117737	4.93		
			Cd Ck3					0.113	-0.1117737	4.93		
			Cd Ck4					0.116	-0.1147737	5.12		
			Cd Ck5					0.118	-0.1167737	5.24		

Batch 1 Particulate Copper Date of Analysis: 7/11/94

Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Filtrate Adjusted Volume, ml	Particulate Concentration mg/L	Copper Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Particulate Cu ug/g
	ProBlk							0		-.729		-0.7
	MESS-1	30D			231	500.0	462.00	0.037		9.647	20.88	20.9
	MESS-1	30D	Spk		231	500.0	462.00	0.111		30.401	65.80	65.8
1	1	1.5		31.5	1.16	881.5	1.32	0.039		10.208	35.20	35.2
1	1	8		31.54	1.05	785.1	1.34	0.034		8.806	33.55	33.5
1	3	1.5		31.35	1.26	841.1	1.50	0.043		11.330	35.97	36.0
1	3	8		31.39	1.43	975.8	1.47	0.054		14.415	40.32	40.3
1	4	2		31.44	0.98	510.8	1.92	0.036		9.367	38.23	38.2
1	4	10		31.47	1.07	504.6	2.12	0.027		6.843	25.58	25.6
1	5	2		31.69	0.54	511.0	1.06	0.017		4.038	29.91	29.9
1	6	2		31.53	0.6	523.1	1.15	0.019		4.599	30.66	30.7
1	6	10		31.56	0.71	527.7	1.35	0.022		5.441	30.65	30.7
1	7	2		31.67	0.67	527.2	1.27	0.025		6.282	37.50	37.5
1	7	10		31.68	0.77	510.5	1.51	0.02		4.880	25.35	25.3
1	8	2		31.61	0.47	498.2	0.94	0.017		4.038	34.37	34.4
1	9	2		31.59	0.54	500.6	1.08	0.019		4.599	34.07	34.1
1	9	10		31.61	0.72	490.5	1.47	0.025		6.282	34.90	34.9
1	10	2		31.6	0.48	485.5	0.99	0.018		3.758	31.32	31.3
			Blk Ck1					0		-.729		
			Blk Ck2					0		-.729		
			Blk Ck3					0		-.729		
			Blk Ck4					0		-.729		
			Blk Ck5					0		-.729		
			Cu Ck1					0.076		20.585		
			Cu Ck2					0.076		20.585		
			Cu Ck3					0.08		21.707		
			Cu Ck4					0.079		21.426		
			Cu Ck5					0.08		21.707		

Batch 1 Particulate Nickel Date of Analysis: 7/18/94

Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Nickel Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Particulate Ni ug/g
	ProBlk							0.004		1.706		1.71
	MESS-1	30D			231	500.0	462.00	0.034		11.182	24.20	24.20
	MESS-1	30D	Spk		231	500.0	462.00	0.097		31.083	67.28	67.28
1	1	1.5		31.5	1.16	881.5	1.32	0.031		10.235	35.29	35.29
1	1	8		31.54	1.05	785.1	1.34	0.027		8.971	34.18	34.18
1	3	1.5		31.35	1.26	841.1	1.50	0.034		11.182	35.50	35.50
1	3	8		31.39	1.43	975.8	1.47	0.05		16.237	45.42	45.42
1	4	2		31.44	0.98	510.8	1.92	0.028		9.287	37.91	37.91
1	4	10		31.47	1.07	504.6	2.12	0.025		8.339	31.18	31.18
1	5	2		31.69	0.54	511.0	1.06	0.017		5.812	43.05	43.05
1	6	2		31.53	0.6	523.1	1.15	0.015		5.181	34.54	34.54
1	6	10		31.56	0.71	527.7	1.35	0.028		9.287	52.32	52.32
1	7	2		31.67	0.67	527.2	1.27	0.015		5.181	30.93	30.93
1	7	10		31.68	0.77	510.5	1.51	0.018		6.128	31.83	31.83
1	8	2		31.61	0.47	498.2	0.94	0.016		5.496	46.78	46.78
1	9	2		31.59	0.54	500.8	1.08	0.016		5.496	40.71	40.71
1	9	10		31.61	0.72	490.5	1.47	0.016		5.496	30.54	30.54
1	10	2		31.6	0.48	485.5	0.99	0.015		5.181	43.17	43.17
			Blk Ck1					0.001		.758		
			Blk Ck2					0.008		2.338		
			Blk Ck3					0.005		2.022		
			Blk Ck4					-0.001		.126		
			Blk Ck5					0.005		2.022		
			Ni Ck1					0.066		21.291		
			Ni Ck2					0.072		23.186		
			Ni Ck3					0.071		22.870		
			Ni Ck4					0.069		22.238		
			Ni Ck5					0.073		23.502		

Batch 1	Particulate Lead			Date of Analysis:		7/25/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Lead Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Particulate Pb ug/g
	ProBlk							-0.002		-.395		-0.4
	MESS-1	30D			231	500.0	462.00	0.049		12.193	26.39	26.4
	MESS-1	30D	Spk		231	500.0	462.00	0.118		29.224	63.26	63.3
1	1	1.5		31.5	1.16	881.5	1.32	0.062		15.402	53.11	53.1
1	1	8		31.54	1.05	785.1	1.34	0.063		15.649	59.61	59.6
1	3	1.5		31.35	1.26	841.1	1.50	0.081		20.092	63.78	63.8
1	3	8		31.39	1.43	975.8	1.47	0.094		23.301	65.18	65.2
1	4	2		31.44	0.98	510.8	1.92	0.068		16.883	68.91	68.9
1	4	10		31.47	1.07	504.6	2.12	0.043		10.712	40.05	40.0
1	5	2		31.69	0.54	511.0	1.06	0.028		7.010	51.93	51.9
1	6	2		31.53	0.6	523.1	1.15	0.034		8.491	56.61	56.6
1	6	10		31.56	0.71	527.7	1.35	0.034		8.491	47.84	47.8
1	7	2		31.67	0.67	527.2	1.27	0.042		10.466	62.48	62.5
1	7	10		31.68	0.77	510.5	1.51	0.031		7.750	40.26	40.3
1	8	2		31.61	0.47	498.2	0.94	0.028		7.010	59.66	59.7
1	9	2		31.59	0.54	500.6	1.08	0.033		8.244	61.07	61.1
1	9	10		31.61	0.72	490.5	1.47	0.033		8.244	45.80	45.8
1	10	2		31.6	0.48	485.5	0.99	0.026		6.516	54.30	54.3
			Blk Ck1					-0.003		-.642		
			Blk Ck2					-0.003		-.642		
			Blk Ck3					-0.002		-.395		
			Blk Ck4					-0.002		-.395		
			Blk Ck5					-0.003		-.642		
			Pb Ck1					0.082		20.339		
			Pb Ck2					0.082		20.339		
			Pb Ck3					0.082		20.339		
			Pb Ck4					0.085		21.079		
			Pb Ck5					0.083		20.585		

Batch 2 Particulate Al, Fe, Mn				Date of Analysis:		12/20/94											
Cruise No.	Station No.	Depth M	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Al ICP Conc, ug/ml	Fe ICP Conc, ug/ml	Mn ICP Conc, ug/ml	Dilution Factor	Dilution Corrected Al, ug/ml	Dilution Corrected Fe, ug/ml	Dilution Corrected Mn, ug/ml	Particulate Al, mg/g	Particulate Fe, mg/g	Particulate Mn, mg/g
	MESS-1	30D			231	500.0	462.00	5.645	9.411	0.134	1	5.645	9.411	.134	12.22	20.37	0.29
1	10	5		31.6	0.52	482.5	1.08	1.785	1.898	0.052	2.67	4.766	5.068	.139	36.66	38.98	1.07
1	11	2		31.6	0.46	492.5	0.93	1.339	1.506	0.037	2.67	3.575	4.021	.099	31.09	34.97	0.86
1	13	2		31.55	0.55	501.8	1.10	1.485	1.689	0.039	2.67	3.965	4.510	.104	28.84	32.80	0.76
1	13	8		31.61	0.79	506.0	1.56	2.064	2.35	0.045	2.67	5.511	6.275	.120	27.90	31.77	0.61
1	14	2		31.63	0.44	496.6	0.89	1.265	1.441	0.037	2.67	3.378	3.847	.099	30.71	34.98	0.90
1	14	15		31.7	0.43	486.5	0.88	1.11	1.262	0.033	2.67	2.964	3.370	.088	27.57	31.34	0.82
1	15	2		31.41	0.94	482.7	1.95	2.535	3.063	0.078	2.67	6.768	8.178	.208	28.80	34.80	0.89
1	17	2		31.45	0.97	488.3	1.99	2.532	2.963	0.062	2.67	6.760	7.911	.166	27.88	32.62	0.68
1	18	2		31.37	1.23	484.6	2.54	3.215	3.811	0.088	2.67	8.584	10.175	.235	27.92	33.09	0.76
1	19	2		31.4	1.14	476.0	2.39	3.425	4.093	0.099	2.67	9.145	10.928	.264	32.09	38.34	0.93
1	20	2		31.35	0.98	488.3	2.01	2.884	3.775	0.094	2.67	7.700	10.079	.251	31.43	41.14	1.02
1	21	2		31.35	1.18	502.2	2.35	3.05	4.064	0.092	2.67	8.144	10.851	.246	27.61	36.78	0.83
2	1	2		31.769	0.97	516.8	1.88	2.027	2.707	0.063	2.67	5.412	7.228	.168	22.32	29.80	0.69
2	1	15		31.916	0.91	509.5	1.79	1.55	2.108	0.057	2.67	4.139	5.628	.152	16.19	24.74	0.67
2	2	2		31.889	0.79	492.4	1.60	1.347	1.778	0.041	2.67	3.596	4.747	.109	18.21	24.04	0.55

Batch 2 Particulate Cadmium				Date of Analysis:		7/11/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Cadmium Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Particulate Cd ug/g
	ProBlk											
	MESS-1	30D			231	500.0	462.00	0.01	-0.0078162	0.26	0.56	0.56
	MESS-1	30D	Spk		231	500.0	462.00	0.129	-0.1268162	5.30	11.48	11.48
1	10	5		31.6	0.52	482.5	1.08	0.003	-0.0008162	0.03	0.21	0.21
1	11	2		31.6	0.46	492.5	0.93	0.004	-0.0018162	0.06	0.52	0.52
1	13	2		31.55	0.55	501.8	1.10	0.006	-0.0038162	0.13	0.92	0.92
1	13	8		31.61	0.79	506.0	1.56	0.007	-0.0048162	0.16	0.81	0.81
1	14	2		31.63	0.44	496.6	0.89	0.003	-0.0008162	0.03	0.24	0.24
1	14	15		31.7	0.43	486.5	0.88	0.003	-0.0008162	0.03	0.25	0.25
1	15	2		31.41	0.94	482.7	1.95	0.006	-0.0038162	0.13	0.54	0.54
1	17	2		31.45	0.97	488.3	1.99	0.004	-0.0018162	0.06	0.25	0.25
1	18	2		31.37	1.23	484.6	2.54	0.005	-0.0028162	0.09	0.30	0.30
1	19	2		31.4	1.14	476.0	2.39	0.005	-0.0028162	0.09	0.33	0.33
1	20	2		31.35	0.98	488.3	2.01	0.005	-0.0028162	0.09	0.38	0.38
1	21	2		31.35	1.18	502.2	2.35	0.006	-0.0038162	0.13	0.43	0.43
2	1	2		31.769	0.97	516.8	1.88	0.013	-0.0108162	0.36	1.49	1.49
2	1	15		31.916	0.91	509.5	1.79	0.006	-0.0038162	0.13	0.55	0.55
2	2	2		31.889	0.79	492.4	1.60	0.006	-0.0038162	0.13	0.64	0.64
			Blk Ck1					0.002	0.0001838	-0.01		
			Blk Ck2					0.001	0.0011838	-0.04		
			Blk Ck3					0	0.0021838	-0.07		
			Blk Ck4					0.003	-0.0008162	0.03		
			Blk Ck5					0.001	0.0011838	-0.04		
			Cd Ck1					0.126	-0.1238162	5.13		
			Cd Ck2					0.125	-0.1228162	5.08		
			Cd Ck3					0.126	-0.1238162	5.13		
			Cd Ck4					0.13	-0.1278162	5.36		
			Cd Ck5					0.128	-0.1258162	5.25		

Batch 2 Particulate Copper — Date of Analysis: 7/11/94

Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Copper Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Particulate Cu ug/g
	ProBlk							0:001		-.451	-0.5457161	-0.55
	MESS-1	30D			231		0.46	0.036		9.405	20.36	20.36
	MESS-1	30D	Spk		231		0.46	0.11		30.242	65.46	65.46
1	10	5		31.6	0.52	482.5	1.08	0.021		5.181	39.85	39.85
1	11	2		31.6	0.46	492.5	0.93	0.018		4.336	37.71	37.71
1	13	2		31.55	0.55	501.8	1.10	0.026		6.589	47.92	47.92
1	13	8		31.61	0.79	506.0	1.56	0.03		7.715	39.06	39.06
1	14	2		31.63	0.44	496.6	0.89	0.015		3.492	31.74	31.74
1	14	15		31.7	0.43	486.5	0.88	0.013		2.928	27.24	27.24
1	15	2		31.41	0.94	482.7	1.95	0.032		8.278	35.23	35.23
1	17	2		31.45	0.97	488.3	1.99	0.03		7.715	31.82	31.82
1	18	2		31.37	1.23	484.6	2.54	0.035		9.123	29.67	29.67
1	19	2		31.4	1.14	476.0	2.39	0.036		9.405	33.00	33.00
1	20	2		31.35	0.98	488.3	2.01	0.034		8.842	36.09	36.09
1	21	2		31.35	1.18	502.2	2.35	0.038		9.968	33.79	33.79
2	1	2		31.769	0.97	516.8	1.88	0.025		6.307	26.01	26.01
2	1	15		31.916	0.91	509.5	1.79	0.021		5.181	22.77	22.77
2	2	2		31.889	0.79	492.4	1.60	ND		#VALUE!	#VALUE!	#VALUE!
			Blk Ck1					0		-.732		
			Blk Ck2					0		-.732		
			Blk Ck3					0		-.732		
			Blk Ck4					0		-.732		
			Blk Ck5					0		-.732		
			Cu Ck1					0.077		20.949		
			Cu Ck2					0.078		21.231		
			Cu Ck3					0.08		21.794		
			Cu Ck4					0.079		21.513		
			Cu Ck5					0.081		22.076		

Batch 2 Particulate Nickel — Date of Analysis: 7/18/94

Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Nickel Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Particulate Ni ug/g
	ProBlk							-0.002		-.435	-0.5457161	-0.55
	MESS-1	30D			231		0.46	0.029		9.193	19.90	19.90
	MESS-1	30D	Spk		231		0.46	0.095		29.689	64.26	64.26
1	10	5		31.6	0.52	492.5	1.08	0.013		4.224	32.49	32.49
1	11	2		31.6	0.46	492.5	0.93	0.01		3.292	28.63	28.63
1	13	2		31.55	0.55	501.8	1.10	0.01		3.292	23.94	23.94
1	13	8		31.61	0.79	506.0	1.56	0.018		5.776	29.25	29.25
1	14	2		31.63	0.44	496.6	0.89	0.009		2.981	27.10	27.10
1	14	15		31.7	0.43	486.5	0.88	0.01		3.292	30.62	30.62
1	15	2		31.41	0.94	482.7	1.95	0.021		6.708	28.54	28.54
1	17	2		31.45	0.97	488.3	1.99	0.018		5.776	23.82	23.82
1	18	2		31.37	1.23	484.6	2.54	0.027		8.571	27.87	27.87
1	19	2		31.4	1.14	476.0	2.39	0.024		7.640	26.81	26.81
1	20	2		31.35	0.98	488.3	2.01	0.021		6.708	27.38	27.38
1	21	2		31.35	1.18	502.2	2.35	0.021		6.708	22.74	22.74
2	1	2		31.769	0.97	516.8	1.88	0.017		5.466	22.54	22.54
2	1	15		31.916	0.91	509.5	1.79	0.016		5.155	22.66	22.66
2	2	2		31.889	0.79	492.4	1.60	0.012		3.913	19.81	19.81
			Blk Ck1					-0.002		-.435		
			Blk Ck2					-0.004		-1.056		
			Blk Ck3					-0.003		-.745		
			Blk Ck4					-0.004		-1.056		
			Blk Ck5					-0.002		-.435		
			Ni Ck1					0.066		20.683		
			Ni Ck2					0.066		20.683		
			Ni Ck3					0.068		21.304		
			Ni Ck4					0.066		20.683		
			Ni Ck5					0.069		21.615		

Batch 2 Particulate Lead — Date of Analysis: 7/25/94

Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Lead Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Particulate Pb ug/g
	ProBlk							-0.002		-.546	-0.5457161	-0.5
	MESS-1	30D			231	500.0	462.00	0.047		11.609	25.13	25.1
	MESS-1	30D	Spk		231	500.0	462.00	0.12		29.717	64.32	64.3
1	13	2		31.55	0.55	501.8	1.10	0.032		7.888	57.37	57.4
1	13	8		31.61	0.79	506.0	1.56	0.042		10.369	52.50	52.5
1	10	5		31.6	0.52	482.5	1.08	0.034		8.384	64.49	64.5
1	11	2		31.6	0.46	492.5	0.93	0.03		7.392	64.28	64.3
1	14	2		31.63	0.44	496.6	0.89	0.026		6.400	58.18	58.2
1	14	15		31.7	0.43	486.5	0.88	0.021		5.159	48.00	48.0
1	15	2		31.41	0.94	482.7	1.95	0.058		14.337	61.01	61.0
1	17	2		31.45	0.97	488.3	1.99	0.076		18.802	77.54	77.5
1	18	2		31.37	1.23	484.6	2.54	0.069		17.066	55.50	55.5
1	19	2		31.4	1.14	476.0	2.39	0.074		18.306	64.23	64.2
1	20	2		31.35	0.98	488.3	2.01	0.071		17.562	71.68	71.7
1	21	2		31.35	1.18	502.2	2.35	0.078		19.299	65.42	65.4
2	1	2		31.769	0.97	516.8	1.88	0.043		10.617	43.78	43.8
2	1	15		31.916	0.91	509.5	1.79	0.034		8.384	36.85	36.9
2	2	2		31.889	0.79	492.4	1.60	0.025		6.152	31.15	31.1
			Blk Ck1					-0.001		-.298		
			Blk Ck2					-0.002		-.546		
			Blk Ck3					-0.003		-.794		
			Blk Ck4					-0.003		-.794		
			Blk Ck5					-0.003		-.794		
			Pb Ck1					0.082		20.291		
			Pb Ck2					0.082		20.291		
			Pb Ck3					0.083		20.539		
			Pb Ck4					0.086		21.283		
			Pb Ck5					0.083		20.539		

Batch 3 Particulate Al, Fe, Mn				Date of Analysis:		12/22/94											
Cruise No.	Station No.	Depth M	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Al ICP Conc, ug/ml	Fe ICP Conc, ug/ml	Mn ICP Conc, ug/ml	Dilution Factor	Dilution Corrected Al, ug/ml	Dilution Corrected Fe, ug/ml	Dilution Corrected Mn, ug/ml	Particulate Al, mg/g	Particulate Fe, mg/g	Particulate Mn, mg/g
	MESS-1	30D			231	500.0	462.00	5.537	9.45	0.131	1	5.537	9.450	.131	11.98	20.45	0.28
2	3	2		31.87	0.81	496.8	1.63	1.755	1.926	0.042	2.67	4.686	5.142	.112	23.14	25.39	0.55
2	4	2		31.79	0.78	465.1	1.68	1.541	1.769	0.03	2.67	4.114	4.723	.080	21.10	24.22	0.41
2	5	1		31.61	0.77	464.5	1.66	1.787	2.024	0.041	2.67	4.771	5.404	.109	24.79	28.07	0.57
2	5	5		31.71	0.87	468.4	1.86	1.948	2.258	0.035	2.67	5.201	6.029	.093	23.91	27.72	0.43
2	6	1		31.27	0.79	481.7	1.64	2.092	2.419	0.04	2.67	5.586	6.459	.107	28.28	32.70	0.54
2	6	3		31.37	0.81	486.7	1.66	2.135	2.414	0.04	2.67	5.700	6.445	.107	28.15	31.83	0.53
2	6	10		31.72	0.84	500.8	1.68	1.728	2.142	0.042	2.67	4.614	5.719	.112	21.97	27.23	0.53
2	8	1		31.85	0.61	494.3	1.23	1.185	1.529	0.04	2.67	3.164	4.082	.107	20.75	26.77	0.70
2	8	5		32.33	0.65	482.0	1.35	1.311	1.749	0.038	2.67	3.500	4.670	.101	21.54	28.74	0.62
2	9	2		31.37	0.84	502.9	1.67	1.714	2.275	0.032	2.67	4.576	6.074	.085	21.79	28.93	0.41
2	10	2		31.91	0.65	497.2	1.31	lost	1.499	0.034	2.67	lost	4.002	.091	lost	24.63	0.56
2	11	2		31.55	0.97	487.2	1.99	lost	3.068	0.053	2.67	lost	8.192	.142	lost	33.78	0.58
2	13	2		31.62	1.13	490.9	2.30	lost	2.884	0.053	2.67	lost	7.700	.142	lost	27.26	0.50
2	13	9.5		31.62	0.85	509.4	1.67	2.049	2.397	0.044	2.67	5.471	6.400	.117	25.75	30.12	0.55
2	15	2		31.74	0.87	489.2	1.78	1.766	2.256	0.046	2.67	4.715	6.024	.123	21.68	27.69	0.56

Batch 3 Particulate Cadmium				Date of Analysis:		9/23/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Cadmium Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Particulate Cd ug/g
	ProBlk2							0	0.00088781	-0.03		-0.03
	MESS-1	30D			231	500.0	462.00	0.012	-0.0111122	0.34	0.73	0.73
	MESS-1	30D	Spk		231	500.0	462.00	0.139	-0.1381122	5.41	11.72	11.72
2	3	2		31.87	0.81	496.8	1.63	0.005	-0.0041122	0.12	0.61	0.61
2	4	2		31.79	0.78	465.1	1.68	0.004	-0.0031122	0.09	0.48	0.48
2	5	1		31.61	0.77	464.5	1.66	0.004	-0.0031122	0.09	0.49	0.49
2	5	5		31.71	0.87	468.4	1.86	0.006	-0.0051122	0.15	0.71	0.71
2	6	1		31.27	0.79	481.7	1.64	0.004	-0.0031122	0.09	0.47	0.47
2	6	3		31.37	0.81	486.7	1.66	0.006	-0.0051122	0.15	0.76	0.76
2	6	10		31.72	0.84	500.8	1.68	0.005	-0.0041122	0.12	0.59	0.59
2	8	1		31.85	0.61	494.3	1.23	0.006	-0.0051122	0.15	1.01	1.01
2	8	5		32.33	0.65	482.0	1.35	0.004	-0.0031122	0.09	0.58	0.58
2	9	2		31.37	0.84	502.9	1.67	0.006	-0.0051122	0.15	0.74	0.74
2	10	2		31.91	0.65	497.2	1.31	0.006	-0.0051122	0.15	0.95	0.95
2	11	2		31.55	0.97	487.2	1.99	0.009	-0.0081122	0.25	1.01	1.01
2	13	2		31.62	1.13	490.9	2.30	0.009	-0.0081122	0.25	0.87	0.87
2	13	9.5		31.62	0.85	509.4	1.67	0.004	-0.0031122	0.09	0.44	0.44
2	15	2		31.74	0.87	489.2	1.78	0.007	-0.0061122	0.18	0.85	0.85
			Blk Ck1					0.003	-0.0021122	0.06		
			Blk Ck2					0.001	-0.0001122	0.00		
			Blk Ck3					0.002	-0.0011122	0.03		
			Blk Ck4					0.001	-0.0001122	0.00		
			Blk Ck5					0.002	-0.0011122	0.03		
			Cd Ck1					0.129	-0.1281122	4.87		
			Cd Ck2					0.133	-0.1321122	5.08		
			Cd Ck3					0.133	-0.1321122	5.08		
			Cd Ck4					0.137	-0.1361122	5.30		
			Cd Ck5					0.135	-0.1341122	5.19		

Batch 3 Particulate Copper				Date of Analysis:		7/12/94											
Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Copper Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Particulate Cu ug/g					
	ProBlk2							0.001		-.569		-0.6					
	MESS-1	30D			231	500.0	462.00	0.036		9.390	20.33	20.3					
	MESS-1	30D	Spk		231	500.0	462.00	0.107		29.593	64.05	64.1					
2	3	2		31.87	0.81	496.8	1.63	0.016		3.699	18.27	18.3					
2	4	2		31.79	0.78	465.1	1.68	0.019		4.553	23.35	23.3					
2	5	1		31.61	0.77	464.5	1.66	0.022		5.406	28.09	28.1					
2	5	5		31.71	0.87	468.4	1.86	0.029		7.398	34.02	34.0					
2	6	1		31.27	0.79	481.7	1.64	0.031		7.967	40.34	40.3					
2	6	3		31.37	0.81	486.7	1.66	0.03		7.683	37.94	37.9					
2	6	10		31.72	0.84	500.8	1.68	0.023		5.691	27.10	27.1					
2	8	1		31.85	0.61	494.3	1.23	0.013		2.846	18.66	18.7					
2	8	5		32.33	0.65	482.0	1.35	0.016		3.699	22.76	22.8					
2	9	2		31.37	0.84	502.9	1.67	0.023		5.691	27.10	27.1					
2	10	2		31.91	0.65	497.2	1.31	0.012		2.561	15.76	15.8					
2	11	2		31.55	0.97	487.2	1.99	0.033		8.537	35.20	35.2					
2	13	2		31.62	1.13	490.9	2.30	0.032		8.252	29.21	29.2					
2	13	9.5		31.62	0.85	509.4	1.67	0.028		7.114	33.48	33.5					
2	15	2		31.74	0.87	489.2	1.78	0.023		5.691	26.17	26.2					
			Blk Ck1					0.001		-.569							
			Blk Ck2					0.001		-.569							
			Blk Ck3					0		-.854							
			Blk Ck4					0		-.854							
			Blk Ck5					0.001		-.569							
			Cu Ck1					0.075		20.488							
			Cu Ck2					0.075		20.488							
			Cu Ck3					0.076		20.772							
			Cu Ck4					0.077		21.057							
			Cu Ck5					0.077		21.057							

Batch 3 Particulate Nickel				Date of Analysis:		7/18/94											
Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Nickel Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Particulate Ni ug/g					
	ProBlk2							-0.002		-1.556		-1.6					
	MESS-1	30D			231	500.0	462.00	0.037		10.578	22.90	22.9					
	MESS-1	30D	Spk		231	500.0	462.00	0.102		30.800	66.67	66.7					
2	3	2		31.87	0.81	496.8	1.63	0.023		6.222	30.73	30.7					
2	4	2		31.79	0.78	465.1	1.68	0.019		4.978	25.53	25.5					
2	5	1		31.61	0.77	464.5	1.66	0.022		5.911	30.71	30.7					
2	5	5		31.71	0.87	468.4	1.86	0.026		7.156	32.90	32.9					
2	6	1		31.27	0.79	481.7	1.64	0.025		6.844	34.66	34.7					
2	6	3		31.37	0.81	486.7	1.66	0.029		8.089	39.94	39.9					
2	6	10		31.72	0.84	500.8	1.68	0.025		6.844	32.59	32.6					
2	8	1		31.85	0.61	494.3	1.23	0.02		5.289	34.68	34.7					
2	8	5		32.33	0.65	482.0	1.35	0.02		5.289	32.55	32.5					
2	9	2		31.37	0.84	502.9	1.67	0.023		6.222	29.63	29.6					
2	10	2		31.91	0.65	497.2	1.31	0.017		4.356	26.80	26.8					
2	11	2		31.55	0.97	487.2	1.99	0.03		8.400	34.64	34.6					
2	13	2		31.62	1.13	490.9	2.30	0.029		8.089	28.63	28.6					
2	13	9.5		31.62	0.85	509.4	1.67	0.026		7.156	33.67	33.7					
2	15	2		31.74	0.87	489.2	1.78	0.027		7.467	34.33	34.3					
			Blk Ck1					0		-.933							
			Blk Ck2					0.007		1.244							
			Blk Ck3					0.007		1.244							
			Blk Ck4					0.004		.311							
			Blk Ck5					0.007		1.244							
			Ni Ck1					0.064		18.978							
			Ni Ck2					0.075		22.400							
			Ni Ck3					0.076		22.711							
			Ni Ck4					0.072		21.467							
			Ni Ck5					0.078		23.333							

Batch 3 Particulate Lead — Date of Analysis: 7/26/94

Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Lead Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Particulate Pb ug/g
	ProBlk							0.001		-.438		-0.4
	MESS-1	30D			231	500.0	462.00	0.055		12.696	27.48	27.5
	MESS-1	30D	Spk		231	500.0	462.00	0.131		31.182	67.49	67.5
2	6	3		31.37	0.81	486.7	1.66	0.051		11.724	57.89	57.9
2	6	1		31.27	0.79	481.7	1.64	0.052		11.967	60.59	60.6
2	3	2		31.87	0.81	496.8	1.63	0.032		7.102	35.07	35.1
2	4	2		31.79	0.78	465.1	1.68	0.033		7.345	37.67	37.7
2	5	1		31.61	0.77	464.5	1.66	0.047		10.751	55.85	55.8
2	5	5		31.71	0.87	468.4	1.86	0.045		10.264	47.19	47.2
2	6	10		31.72	0.84	500.8	1.68	0.042		9.534	45.40	45.4
2	8	1		31.85	0.61	494.3	1.23	0.029		6.373	41.79	41.8
2	8	5		32.33	0.65	482.0	1.35	0.033		7.345	45.20	45.2
2	9	2		31.37	0.84	502.9	1.67	0.051		11.724	55.83	55.8
2	10	2		31.91	0.65	497.2	1.31	0.026		5.643	34.73	34.7
2	11	2		31.55	0.97	487.2	1.99	0.064		14.885	61.38	61.4
2	13	2		31.62	1.13	490.9	2.30	0.057		13.183	46.66	46.7
2	13	9.5		31.62	0.85	509.4	1.67	0.053		12.210	57.46	57.5
2	15	2		31.74	0.87	489.2	1.78	0.046		10.507	48.31	48.3
			Blk Ck1					0.001		-.438		
			Blk Ck2					0.001		-.438		
			Blk Ck3					0		-.681		
			Blk Ck4					0.002		-.195		
			Blk Ck5					0.002		-.195		
			Pb Ck1					0.087		20.480		
			Pb Ck2					0.088		20.723		
			Pb Ck3					0.089		20.966		
			Pb Ck4					0.09		21.209		
			Pb Ck5					0.091		21.453		

Batch 4 Particulate Al, Fe, Mn				Date of Analysis:		12/22/94											
Cruise No.	Station No.	Depth M	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Al ICP Conc, ug/ml	Fe ICP Conc, ug/ml	Mn ICP Conc, ug/ml	Dilution Factor	Dilution Corrected Al, ug/ml	Dilution Corrected Fe, ug/ml	Dilution Corrected Mn, ug/ml	Particulate Al, mg/g	Particulate Fe, mg/g	Particulate Mn, mg/g
	MESS-1	30D			231	500.0	462.00	5.529	9.697	0.123	1	5.529	9.697	.123	11.97	20.99	0.27
2	16	2		31.31	0.86	506.5	1.70	2.351	2.817	0.051	2.67	6.277	7.521	.136	29.20	34.98	0.63
2	16	10		31.41	0.85	487.9	1.74	1.799	2.096	0.031	2.67	4.803	5.596	.083	22.60	26.34	0.39
2	18	2		31.47	0.95	495.0	1.92	3.066	3.401	0.044	2.67	8.186	9.081	.117	34.47	38.23	0.49
2	18	7		31.56	0.92	504.9	1.82	2.586	3.063	0.041	2.67	6.905	8.178	.109	30.02	35.56	0.48
2	19	2		31.69	0.8	495.6	1.61	2.251	2.618	0.05	2.67	6.010	6.990	.134	30.05	34.95	0.67
2	19	5		31.66	0.75	499.6	1.50	1.754	2.043	0.029	2.67	4.683	5.455	.077	24.98	29.09	0.41
2	20	2		31.59	0.47	504.5	0.93	1.166	1.325	0.024	2.67	3.113	3.538	.064	26.50	30.11	0.55
2	20	6		31.77	0.7	497.0	1.41	1.835	2.056	0.039	2.67	4.899	5.490	.104	28.00	31.37	0.60
2	21	2		30.93	0.73	486.4	1.50	2.193	2.57	0.05	2.67	5.855	6.862	.134	32.08	37.60	0.73
2	21	12		31.01	0.86	513.2	1.68	2.429	2.846	0.051	2.67	6.485	7.599	.136	30.16	35.34	0.63
2	22	2		30.42	0.8	498.2	1.61	2.451	2.872	0.04	2.67	6.544	7.668	.107	32.72	38.34	0.53
2	22	6		30.43	0.93	505.2	1.84	2.891	3.473	0.059	2.67	7.719	9.273	.158	33.20	39.88	0.68
2	23	2		30.73	0.71	493.8	1.44	2.073	2.553	0.04	2.67	5.535	6.817	.107	31.18	38.40	0.60
2	24	2		26.92	1.16	479.2	2.42	3.761	4.833	0.058	2.67	10.042	12.904	.155	34.63	44.50	0.53
2	24	5		28.97	1.74	504.3	3.45	4.416	5.855	0.07	2.67	11.791	15.633	.187	27.11	35.94	0.43
2	25	2		30.49	0.85	504.5	1.68	2.368	2.962	0.043	2.67	6.323	7.909	.115	29.75	37.22	0.54

Batch 4 Particulate Cadmium				Date of Analysis:		9/26/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Cadmium Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Particulate Cd ug/g
	ProBlk2											
	MESS-1	30D			231	500.0	462.00	0.012	-0.012	0.36	0.79	0.79
	MESS-1	30D	Spk		231	500.0	462.00	0.138	-0.138	5.45	11.79	11.79
2	16	2		31.31	0.86	506.5	1.70	0.004	-0.004	0.12	0.56	0.56
2	16	10		31.41	0.85	487.9	1.74	0.001	-0.001	0.03	0.14	0.14
2	18	2		31.47	0.95	495.0	1.92	0.005	-0.005	0.15	0.63	0.63
2	18	7		31.56	0.92	504.9	1.82	0.004	-0.004	0.12	0.52	0.52
2	19	2		31.69	0.8	495.6	1.61	0.006	-0.006	0.18	0.90	0.90
2	19	5		31.66	0.75	499.6	1.50	0.005	-0.005	0.15	0.80	0.80
2	20	2		31.59	0.47	504.5	0.93	0.004	-0.004	0.12	1.02	1.02
2	20	6		31.77	0.7	497.0	1.41	0.005	-0.005	0.15	0.86	0.86
2	21	2		30.93	0.73	486.4	1.50	0.003	-0.003	0.09	0.49	0.49
2	21	12		31.01	0.86	513.2	1.68	0.005	-0.005	0.15	0.70	0.70
2	22	2		30.42	0.8	498.2	1.61	0.004	-0.004	0.12	0.60	0.60
2	22	6		30.43	0.93	505.2	1.84	0.005	-0.005	0.15	0.65	0.65
2	23	2		30.73	0.71	493.8	1.44	0.004	-0.004	0.12	0.68	0.68
2	24	2		26.92	1.16	479.2	2.42	0.007	-0.007	0.21	0.73	0.73
2	24	5		28.97	1.74	504.3	3.45	0.008	-0.008	0.24	0.55	0.55
2	25	2		30.49	0.85	504.5	1.68	0.007	-0.007	0.21	0.99	0.99
			Blk Ck1					0.001	-0.001	0.03		
			Blk Ck2					-0.001	0.001	-0.03		
			Blk Ck3					0	0	0.00		
			Blk Ck4					0.003	-0.003	0.09		
			Blk Ck5					0	0	0.00		
			Cd Ck1					0.129	-0.129	4.95		
			Cd Ck2					0.13	-0.13	5.00		
			Cd Ck3					0.133	-0.133	5.16		
			Cd Ck4					0.133	-0.133	5.16		
			Cd Ck5					0.135	-0.135	5.28		

Batch 4 Particulate Copper				Date of Analysis:		7/12/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Copper Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Particulate Cu ug/g
	ProBlk2							0.001		-.579		-0.6
	MESS-1	30D			231	500.0	462.00	0.036		9.546	20.66	20.7
	MESS-1	30D	Spk		231	500.0	462.00	0.106		29.794	64.49	64.5
2	16	2		31.31	0.86	506.5	1.70	0.029		7.521	34.98	35.0
2	16	10		31.41	0.85	487.9	1.74	0.022		5.496	25.86	25.9
2	18	2		31.47	0.95	495.0	1.92	0.037		9.835	41.41	41.4
2	18	7		31.56	0.92	504.9	1.82	0.033		8.678	37.73	37.7
2	19	2		31.69	0.8	495.6	1.61	0.038		10.124	50.62	50.6
2	19	5		31.66	0.75	499.6	1.50	0.031		8.099	43.20	43.2
2	20	2		31.59	0.47	504.5	0.93	0.019		4.628	39.39	39.4
2	20	6		31.77	0.7	497.0	1.41	0.032		8.389	47.93	47.9
2	21	2		30.93	0.73	486.4	1.50	0.028		7.231	39.62	39.6
2	21	12		31.01	0.86	513.2	1.68	0.029		7.521	34.98	35.0
2	22	2		30.42	0.8	498.2	1.61	0.027		6.942	34.71	34.7
2	22	6		30.43	0.93	505.2	1.84	0.034		8.967	38.57	38.6
2	23	2		30.73	0.71	493.8	1.44	0.024		6.074	34.22	34.2
2	24	2		26.92	1.16	479.2	2.42	0.046		12.438	42.89	42.9
2	24	5		28.97	1.74	504.3	3.45	0.053		14.463	33.25	33.2
2	25	2		30.49	0.85	504.5	1.68	0.027		6.942	32.67	32.7
			Blk Ck1					0.001		-.579		
			Blk Ck2					0.001		-.579		
			Blk Ck3					0		-.868		
			Blk Ck4					0		-.868		
			Blk Ck5					0		-.868		
			Cu Ck1					0.074		20.537		
			Cu Ck2					0.075		20.827		
			Cu Ck3					0.076		21.116		
			Cu Ck4					0.077		21.405		
			Cu Ck5					0.077		21.405		

Batch 4 Particulate Nickel — Date of Analysis: 7/20/94

Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Nickel Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Particulate Ni ug/g
	ProBlk2							0.004		.538		0.5
	MESS-1	30D			231	500.0	462.00	0.034		9.505	20.57	20.6
	MESS-1	30D	Spk		231	500.0	462.00	0.099		28.933	62.62	62.6
2	16	2		31.31	0.86	506.5	1.70	0.019		5.021	23.36	23.4
2	16	10		31.41	0.85	487.9	1.74	0.014		3.527	16.60	16.6
2	18	2		31.47	0.95	495.0	1.92	0.023		6.217	26.18	26.2
2	18	7		31.56	0.92	504.9	1.82	0.02		5.320	23.13	23.1
2	19	2		31.69	0.8	495.6	1.61	0.02		5.320	26.60	26.6
2	19	5		31.66	0.75	499.6	1.50	0.017		4.424	23.59	23.6
2	20	2		31.59	0.47	504.5	0.93	0.013		3.228	27.47	27.5
2	20	6		31.77	0.7	497.0	1.41	0.016		4.125	23.57	23.6
2	21	2		30.93	0.73	486.4	1.50	0.018		4.722	25.88	25.9
2	21	12		31.01	0.86	513.2	1.68	0.021		5.619	26.14	26.1
2	22	2		30.42	0.8	498.2	1.61	0.017		4.424	22.12	22.1
2	22	6		30.43	0.93	505.2	1.84	0.025		6.815	29.31	29.3
2	23	2		30.73	0.71	493.8	1.44	0.017		4.424	24.92	24.9
2	24	2		26.92	1.16	479.2	2.42	0.028		7.711	26.59	26.6
2	24	5		28.97	1.74	504.3	3.45	0.033		9.206	21.16	21.2
2	25	2		30.49	0.85	504.5	1.68	0.017		4.424	20.82	20.8
			Blk Ck1					0.004		.538		
			Blk Ck2					0.002		-.060		
			Blk Ck3					0.002		-.060		
			Blk Ck4					0		-.658		
			Blk Ck5					0		-.658		
			Ni Ck1					0.071		20.564		
			Ni Ck2					0.066		19.069		
			Ni Ck3					0.07		20.265		
			Ni Ck4					0.069		19.966		
			Ni Ck5					0.065		18.770		

Batch 4 Particulate Lead — Date of Analysis: 7/27/94

Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Lead Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Particulate Pb ug/g
	ProBlk											
	MESS-1	30D			231	500.0	462.00	0.054		12.226	26.46	26.5
	MESS-1	30D	Spk		231	500.0	462.00	0.129		30.206	65.38	65.4
2	16	2		31.31	0.86	506.5	1.70	0.056		12.706	59.10	59.1
2	16	10		31.41	0.85	487.9	1.74	0.039		8.630	40.61	40.6
2	18	2		31.47	0.95	495.0	1.92	0.073		16.781	70.66	70.7
2	18	7		31.56	0.92	504.9	1.82	0.068		15.582	67.75	67.7
2	19	2		31.69	0.8	495.6	1.61	0.063		14.384	71.92	71.9
2	19	5		31.66	0.75	499.6	1.50	0.045		10.069	53.70	53.7
2	20	2		31.59	0.47	504.5	0.93	0.027		5.753	48.97	49.0
2	20	6		31.77	0.7	497.0	1.41	0.039		8.630	49.32	49.3
2	21	2		30.93	0.73	486.4	1.50	0.055		12.466	68.31	68.3
2	21	12		31.01	0.86	513.2	1.68	0.06		13.664	63.56	63.6
2	22	2		30.42	0.8	498.2	1.61	0.054		12.226	61.13	61.1
2	22	6		30.43	0.93	505.2	1.84	0.071		16.301	70.11	70.1
2	23	2		30.73	0.71	493.8	1.44	0.049		11.027	62.13	62.1
2	24	2		26.92	1.16	479.2	2.42	0.108		25.171	86.80	86.8
2	24	5		28.97	1.74	504.3	3.45	0.109		25.411	58.42	58.4
			Blk Ck1					0		-.719		

Batch 5 Particulate Al, Fe, Mn				Date of Analysis:		12/22/94						
Cruise No.	Station No.	Depth M	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Al ICP Conc, ug/ml	Fe ICP Conc, ug/ml	Mn ICP Conc, ug/ml	Dilution Factor	Dilution Corrected Al, ug/ml
	MESS-1	30D			231	500.0	462.00	5.386	9.547	0.128	1	5.386
3	1	2		32.01	0.54	498.2	1.08	1.173	1.295	0.033	2.67	3.132
3	1	13		32.09	0.65	486.2	1.34	1.333	1.494	0.043	2.67	3.559
3	2	2		31.91	0.42	481.7	0.87	1.22	1.24	0.032	2.67	3.257
3	3	2		31.92	0.56	487.3	1.15	1.488	1.489	0.037	2.67	3.973
3	4	2		31.91	0.67	482.6	1.39	1.658	1.822	0.041	2.67	4.427
3	5	2		31.84	0.63	487.0	1.29	1.607	1.743	0.043	2.67	4.291
3	5	6		31.75	0.53	495.1	1.07	1.445	1.763	0.043	2.67	3.858
3	6	1		31.68	0.52	500.5	1.04	1.682	1.887	0.04	2.67	4.491
3	6	5		31.72	0.54	481.5	1.12	1.722	1.869	0.045	2.67	4.598
3	6	8.5		31.82	0.62	480.7	1.29	lost	2.179	0.047	2.67	lost
3	7	2		31.74	0.68	497.1	1.37	1.545	1.858	0.052	2.67	4.125
3	7	6		31.73	0.68	483.2	1.41	1.797	1.988	0.045	2.67	4.798
3	7	12		31.74	0.65	482.6	1.35	1.773	1.951	0.048	2.67	4.734
3	8	2		31.83	0.78	482.2	1.62	1.815	2.082	0.049	2.67	4.846
3	8	20		31.78	0.57	473.4	1.20	1.767	2.056	0.051	2.67	4.718

Batch 5 Particulate Cadmium				Date of Analysis:		9/26/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Cadmium Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Particulate Cd ug/g
	ProBlk3							0	0.0020967	-0.06		-0.06
	MESS-1	30D			231	500.0	462.00	0.013	-0.0109033	0.34	0.73	0.73
	MESS-1	30D	Spk		231	500.0	462.00	0.144	-0.1419033	5.77	12.49	12.49
3	1	2		32.01	0.54	498.2	1.08	0.004	-0.0019033	0.06	0.43	0.43
3	1	13		32.09	0.65	486.2	1.34	0.007	-0.0049033	0.15	0.93	0.93
3	2	2		31.91	0.42	481.7	0.87	0.005	-0.0029033	0.09	0.85	0.85
3	3	2		31.92	0.56	487.3	1.15	0.009	-0.0069033	0.21	1.52	1.52
3	4	2		31.91	0.67	482.6	1.39	0.005	-0.0029033	0.09	0.53	0.53
3	5	2		31.84	0.63	487.0	1.29	0.005	-0.0029033	0.09	0.56	0.56
3	5	6		31.75	0.53	495.1	1.07	0.005	-0.0029033	0.09	0.67	0.67
3	6	1		31.68	0.52	500.5	1.04	0.004	-0.0019033	0.06	0.45	0.45
3	6	5		31.72	0.54	481.5	1.12	0.006	-0.0039033	0.12	0.89	0.89
3	6	8.5		31.82	0.62	480.7	1.29	0.006	-0.0039033	0.12	0.77	0.77
3	7	2		31.74	0.68	497.1	1.37	0.007	-0.0049033	0.15	0.89	0.89
3	7	6		31.73	0.68	483.2	1.41	0.007	-0.0049033	0.15	0.89	0.89
3	7	12		31.74	0.65	482.6	1.35	0.006	-0.0039033	0.12	0.74	0.74
3	8	2		31.83	0.78	482.2	1.62	0.007	-0.0049033	0.15	0.77	0.77
3	8	20		31.78	0.57	473.4	1.20	0.004	-0.0019033	0.06	0.41	0.41
			Blk Ck1					0.001	0.0010967	-0.03		
			Blk Ck2					0.002	9.67E-05	0.00		
			Blk Ck3					0.001	0.0010967	-0.03		
			Blk Ck4					0.002	9.67E-05	0.00		
			Blk Ck5					0.001	0.0010967	-0.03		
			Cd Ck1					0.137	-0.1349033	5.36		
			Cd Ck2					0.135	-0.1329033	5.24		
			Cd Ck3					0.136	-0.1339033	5.30		
			Cd Ck4					0.139	-0.1369033	5.47		
			Cd Ck5					0.141	-0.1389033	5.59		

Batch 5 Particulate Copper — Date of Analysis: 7/13/94

Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Copper Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Particulate Cu ug/g
	ProBlk							0		-.586		-0.6
	MESS-1	30D			231	500.0	462.00	0.034		9.372	20.29	20.3
	MESS-1	30D	Spk		231	500.0	462.00	0.104		29.874	64.66	64.7
3	1	2		32.01	0.54	498.2	1.08	0.012		2.929	21.70	21.7
3	1	13		32.09	0.65	486.2	1.34	0.012		2.929	18.02	18.0
3	2	2		31.91	0.42	481.7	0.87	0.01		2.343	22.32	22.3
3	3	2		31.92	0.56	487.3	1.15	0.015		3.808	27.20	27.2
3	4	2		31.91	0.67	482.6	1.39	0.018		4.686	27.98	28.0
3	5	2		31.84	0.63	487.0	1.29	0.016		4.100	26.03	26.0
3	5	6		31.75	0.53	495.1	1.07	0.016		4.100	30.95	30.9
3	6	1		31.66	0.52	500.5	1.04	0.022		5.858	45.06	45.1
3	6	5		31.72	0.54	481.5	1.12	0.02		5.272	39.05	39.1
3	6	8.5		31.82	0.62	480.7	1.29	0.02		5.272	34.01	34.0
3	7	2		31.74	0.68	497.1	1.37	0.021		5.565	32.73	32.7
3	7	6		31.73	0.68	483.2	1.41	0.02		5.272	31.01	31.0
3	7	12		31.74	0.65	482.6	1.35	0.018		4.686	28.84	28.8
3	8	2		31.83	0.78	482.2	1.62	0.019		4.979	25.53	25.5
3	8	20		31.78	0.57	473.4	1.20	0.017		4.393	30.83	30.8
			Blk Ck1					0		-.586		
			Blk Ck2					0		-.586		
			Blk Ck3					-0.001		-.879		
			Blk Ck4					0		-.586		
			Blk Ck5					0		-.586		
			Cu Ck1					0.072		20.502		
			Cu Ck2					0.072		20.502		
			Cu Ck3					0.073		20.795		
			Cu Ck4					0.074		21.088		
			Cu Ck5					0.074		21.088		

Batch 5 Particulate Nickel				Date of Analysis:		7/20/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Nickel Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Particulate Ni ug/g
	ProBlk3							0.002		.536		0.5
	MESS-1	30D			231	500.0	462.00	0.031		9.167	19.84	19.8
	MESS-1	30D	Spk		231	500.0	462.00	0.094		27.917	60.43	60.4
3	1	2		32.01	0.54	498.2	1.08	0.008		2.321	17.20	17.2
3	1	13		32.09	0.65	486.2	1.34	0.009		2.619	16.12	16.1
3	2	2		31.91	0.42	481.7	0.87	0.005		1.429	13.61	13.6
3	3	2		31.92	0.56	487.3	1.15	0.01		2.917	20.83	20.8
3	4	2		31.91	0.67	482.6	1.39	0.012		3.512	20.97	21.0
3	5	2		31.84	0.63	487.0	1.29	0.012		3.512	22.30	22.3
3	5	6		31.75	0.53	495.1	1.07	0.014		4.107	31.00	31.0
3	6	1		31.68	0.52	500.5	1.04	0.014		4.107	31.59	31.6
3	6	5		31.72	0.54	481.5	1.12	0.016		4.702	34.83	34.8
3	6	8.5		31.82	0.62	480.7	1.29	0.018		5.298	34.18	34.2
3	7	2		31.74	0.68	497.1	1.37	0.014		4.107	24.16	24.2
3	7	6		31.73	0.68	483.2	1.41	0.017		5.000	29.41	29.4
3	7	12		31.74	0.65	482.6	1.35	0.015		4.405	27.11	27.1
3	8	2		31.83	0.78	482.2	1.62	0.023		6.786	34.80	34.8
3	8	20		31.78	0.57	473.4	1.20	0.015		4.405	30.91	30.9
			Blk Ck1					0.001		.238		
			Blk Ck2					0.001		.238		
			Blk Ck3					-0.001		-.357		
			Blk Ck4					0.001		.238		
			Blk Ck5					-0.002		-.655		
			Ni Ck1					0.068		20.179		
			Ni Ck2					0.067		19.881		
			Ni Ck3					0.069		20.476		
			Ni Ck4					0.07		20.774		
			Ni Ck5					0.065		19.286		

Batch 5 Particulate Lead				Date of Analysis:		7/25/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Lead Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Particulate Pb ug/g
	ProBlk							0		-.698		-0.7
	MESS-1	30D			231	500.0	462.00	0.056		12.326	26.68	26.7
	MESS-1	30D	Spk		231	500.0	462.00	0.138		31.395	67.96	68.0
3	1	2		32.01	0.54	498.2	1.08	0.024		4.884	36.18	36.2
3	1	13		32.09	0.65	486.2	1.34	0.026		5.349	32.92	32.9
3	2	2		31.91	0.42	481.7	0.87	0.025		5.116	48.73	48.7
3	3	2		31.92	0.56	487.3	1.15	0.03		6.279	44.85	44.9
3	4	2		31.91	0.67	482.6	1.39	0.037		7.907	47.21	47.2
3	5	2		31.84	0.63	487.0	1.29	0.032		6.744	42.82	42.8
3	5	6		31.75	0.53	495.1	1.07	0.036		7.674	57.92	57.9
3	6	1		31.68	0.52	500.5	1.04	0.041		8.837	67.98	68.0
3	6	5		31.72	0.54	481.5	1.12	0.041		8.837	65.46	65.5
3	6	8.5		31.82	0.62	480.7	1.29	0.044		9.535	61.52	61.5
3	7	2		31.74	0.68	497.1	1.37	0.047		10.233	60.19	60.2
3	7	6		31.73	0.68	483.2	1.41	0.047		10.233	60.19	60.2
3	7	12		31.74	0.65	482.6	1.35	0.043		9.302	57.25	57.2
3	8	2		31.83	0.78	482.2	1.62	0.105		23.721	121.65	121.6
3	8	20		31.78	0.57	473.4	1.20	0.041		8.837	62.02	62.0
			Blk Ck1					0.001		-.465		
			Blk Ck2					-0.001		-.930		
			Blk Ck3					-0.001		-.930		
			Blk Ck4					0.001		-.465		
			Blk Ck5					0		-.698		
			Pb Ck1					0.09		20.233		
			Pb Ck2					0.091		20.465		
			Pb Ck3					0.093		20.930		
			Pb Ck4					0.095		21.395		
			Pb Ck5					0.094		21.163		

Batch 7 Particulate Cadmium				Date of Analysis:		9/29/94						
				Sample		Rinse	Particulate			Abs/Conc.		
Cruise	Sample	Depth	Sample	Salinity,	Particulate	Adjusted	Concentration	Cadmium	Polynomial	Regression		Particulate Cd
No.	No.	M	Type	o/oo	Weight, mg	Volume, ml	mg/L	Abs.	Factor c	Equation		ug/g
	ProBlk									-.256		-0.3
	MESS-1	30D			231		0.46	0.007	-0.0069448	0.25	0.54	0.54
	MESS-1	30D	Spk		231		0.46	0.114	-0.1139448	5.12	11.08	11.08
3	22	1		19.65	1.06	322.7	3.29	0.005	-0.0049448	0.18	0.67	0.67
3	23	5		28.89	0.89	485.6	1.83	0.003	-0.0029448	0.11	0.47	0.47
3	24	2		28.61	0.94	497.6	1.89	0.002	-0.0019448	0.07	0.30	0.30
3	25	2		27.97	1.18	463.5	2.55	0.003	-0.0029448	0.11	0.36	0.36
3	Seep 1			16.97	0.28	340.0	0.82	0.001	-0.0009448	0.03	0.48	0.48
3	Seep 1		Dup	16.97	0.27	318.7	0.85	0.002	-0.0019448	0.07	1.03	1.03
			Blk Ck1					-0.001	0.00105522	-0.04		
			Blk Ck2					0	5.5224E-05	0.00		
			Blk Ck3					-0.001	0.00105522	-0.04		
			Blk Ck4					0	5.5224E-05	0.00		
			Blk Ck5					-0.001	0.00105522	-0.04		
			Cd Ck1					0.114	-0.1139448	5.12		
			Cd Ck2					0.113	-0.1129448	5.06		
			Cd Ck3					0.112	-0.1119448	5.00		
			Cd Ck4					0.113	-0.1129448	5.06		
			Cd Ck5					0.116	-0.1159448	5.24		

Batch 7 Particulate Copper				Date of Analysis:		7/14/94						
				Sample		Rinse	Particulate			Abs/Conc.		
Cruise	Sample	Depth	Sample	Salinity,	Particulate	Adjusted	Concentration	Copper	Polynomial	Regression		Particulate Cu
No.	No.	M	Type	o/oo	Weight, mg	Volume, ml	mg/L	Abs.	Factor c	Equation		ug/g
	ProBlk							-0.001		-.513		-0.5
	MESS-1	30D			231		0.46	0.04		10.000	21.65	21.6
	MESS-1	30D	Spk		231		0.46	0.121		30.769	66.60	66.6
3	22	1		19.65	1.06	322.7	3.29	0.05		12.564	47.41	47.4
3	23	5		28.89	0.89	485.6	1.83	0.029		7.179	32.27	32.3
3	24	2		28.61	0.94	497.6	1.89	0.028		6.923	29.46	29.5
3	25	2		27.97	1.18	463.5	2.55	0.035		8.718	29.55	29.6
3	Seep 1			16.97	0.28	340.0	0.82	0.098		24.872	355.31	355.3
3	Seep 1		Dup	16.97	0.27	318.7	0.85	0.104		26.410	391.26	391.3
			Blk Ck1					0		-.256		
			Blk Ck2					-0.001		-.513		
			Blk Ck3					-0.001		-.513		
			Blk Ck4					-0.001		-.513		
			Cu Ck1					0.084		21.282		
			Cu Ck2					0.082		20.769		
			Cu Ck3					0.083		21.026		
			Cu Ck4					0.084		21.282		

Batch 7 Particulate Nickel — Date of Analysis: 7/21/94

Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Nickel Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Particulate Ni ug/g
	ProBlk2							-0.001		.000		0.0
	MESS-1	30D			231		0.46	0.024		8.102	17.54	17.5
	MESS-1	30D	Spk		231		0.46	0.083		27.222	58.92	58.9
3	22	1		19.65	1.06	322.7	3.29	0.015		5.185	19.57	19.6
3	23	5		28.89	0.89	485.6	1.83	0.015		5.185	23.30	23.3
3	24	2		28.61	0.94	497.6	1.89	0.018		6.157	26.20	26.2
3	25	2		27.97	1.18	463.5	2.55	0.02		6.806	23.07	23.1
3	Seep 1			16.97	0.28	340.0	0.82	0.003		1.296	18.52	18.5
3	Seep 1		Dup	16.97	0.27	318.7	0.85	0.003		1.296	19.20	19.2
			Blk Ck1					0		.324		
			Blk Ck2					-0.003		-.648		
			Blk Ck3					-0.002		-.324		
			Ni Ck1					0.062		20.417		
			Ni Ck2					0.057		18.796		
			Ni Ck3					0.063		20.741		

Batch 7 Particulate Lead				Date of Analysis:		7/29/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Lead Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Particulate Pb ug/g
	ProBlk											
	MESS-1	30D			231		0.46	0.053		12.822	27.75	27.8
	MESS-1	30D	Spk		231		0.46	0.127		31.283	67.71	67.7
3	21	2.5		25.32	2.45	489.6	5.00	0.039		9.330	76.16	76.2
3	22	1		19.65	1.06	322.7	3.29	0.02		4.590	86.61	86.6
3	23	5		28.89	0.89	485.6	1.83	0.012		2.594	58.30	58.3
3	24	2		28.61	0.94	497.6	1.89	0.013		2.844	60.51	60.5
3	25	2		27.97	1.18	463.5	2.55	0.017		3.842	65.11	65.1
3	Seep 1			16.97	0.28	340.0	0.82	0.009		1.846	131.86	131.9
3	Seep 1		Dup	16.97	0.27	318.7	0.85	0.007		1.347	99.79	99.8
			Blk Ck1					0		-.399		
			Blk Ck2					-0.001		-.649		
			Blk Ck3					0.001		-.150		
			Pb Ck1					0.081		19.807		
			Pb Ck2					0.084		20.556		
			Pb Ck3					0.082		20.057		

Note: All samples in this batch were diluted by a factor of 5 prior to analysis.
The dilution factor wqas taken into account for concentration calculation.

Batch 8 Particulate Cadmium			Date of Analysis:		9/29/94						
Elutriate Sample No.	Sample Desc.	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Cadmium Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Particulate Cd ug/g
ProBlk											
MESS-1	30D			231	500.0	462.00					
MESS-1	30D	Spk		231	500.0	462.00					
113159	Header		31.4	0	357.2	0.00	-0.003	0.00305222	-0.11		und
113161	T3		31.4	6.43	234.3	27.45	0.015	-0.0149478	0.55	0.34	0.34
113162	T4		31.4	6.74	214.9	31.37	0.021	-0.0209478	0.77	0.46	0.46
113163	T19		31.4	4.49	217.8	20.62	0.005	-0.0049478	0.18	0.16	0.16
113165	T6		31.4	4.39	241.3	18.20	0.004	-0.0039478	0.14	0.13	0.13
113166	T29		31.4	7.59	221.1	34.33	0.006	-0.0059478	0.21	0.11	0.11
113167	T13		31.4	4.39	216.9	20.24	0.034	-0.0339478	1.28	1.16	1.16
113168	T18		31.4	4.03	232.0	17.37	0.031	-0.0309478	1.16	1.15	1.15
113169	T12		31.4	5.32	215.0	24.75	0.01	-0.0099478	0.36	0.27	0.27
113170	T31		31.4	6.75	233.7	28.88	0.005	-0.0049478	0.18	0.11	0.11
		Blk Ck1									
		Blk Ck2									
		Blk Ck3									
		Blk Ck4									
		Cd Ck1									
		Cd Ck2									
		Cd Ck3									
		Cd Ck4									

Batch 8 Particulate Copper			Date of Analysis:		7/14/94						
Elutriate Sample No.	Sample Desc.	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Copper Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Particulate Cu ug/g
ProBlk											
MESS-1	30D			231	500.0	462.00	0.018	-0.0191	8.37	18.12	18.1
MESS-1	30D	Spk		231	500.0	462.00	0.064	-0.0651	29.41	63.65	63.6
113159	Header		31.4	0	357.2	0.00	-0.001	-0.0001	0.04	#DIV/0!	Und
113161	T3		31.4	6.43	234.3	27.45	0.262	-0.2631	141.92	88.29	88.3
113162	T4		31.4	6.74	214.9	31.37	0.27	-0.2711	147.71	87.66	87.7
113163	T19		31.4	4.49	217.8	20.62	0.209	-0.2101	106.86	95.20	95.2
113165	T6		31.4	4.39	241.3	18.20	0.172	-0.1731	85.02	77.47	77.5
113166	T29		31.4	7.59	221.1	34.33	nd	#VALUE!	#VALUE!	#VALUE!	
113167	T13		31.4	4.39	216.9	20.24	0.187	-0.1881	93.66	85.34	85.3
113168	T18		31.4	4.03	232.0	17.37	0.189	-0.1901	94.84	94.13	94.1
113169	T12		31.4	5.32	215.0	24.75	0.213	-0.2141	109.34	82.21	82.2
113170	T31		31.4	6.75	233.7	28.88	0.241	-0.2421	127.40	75.50	75.5
		Blk Ck1					-0.001	-0.0001	0.04		
		Blk Ck2					-0.001	-0.0001	0.04		
		Blk Ck3					-0.001	-0.0001	0.04		
		Blk Ck4					-0.001	-0.0001	0.04		
		Cu Ck1					0.198	-0.1991	100.18		
		Cu Ck2					0.201	-0.2021	101.99		
		Cu Ck3					0.202	-0.2031	102.59		
		Cu Ck4					0.205	-0.2061	104.41		

Batch 8 Particulate Nickel			Date of Analysis:		7/14/94						
Elutriate Sample No.	Sample Desc.	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Nickel Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Particulate Ni ug/g
MESS-1	30D			231	500.0	462.00	0.015	-0.0154364	9.33	20.20	20.2
MESS-1	30D	Spk		231	500.0	462.00	0.044	-0.0444364	27.32	59.13	59.1
113159	Header		31.4	0	357.2	0.00	0.001	-0.0014364	0.86		
113161	T3		31.4	6.43	234.3	27.45	0.085	-0.0854364	53.86	33.51	33.5
113162	T4		31.4	6.74	214.9	31.37	0.098	-0.0984364	62.59	37.14	37.1
113163	T19		31.4	4.49	217.8	20.62	0.067	-0.0674364	42.04	37.45	37.4
113165	T6		31.4	4.39	241.3	18.20	0.068	-0.0684364	42.69	38.89	38.9
113166	T29		31.4	7.59	221.1	34.33	0.098	-0.0984364	62.59	32.98	33.0
113167	T13		31.4	4.39	216.9	20.24	0.067	-0.0674364	42.04	38.30	38.3
113168	T18		31.4	4.03	232.0	17.37	0.063	-0.0634364	39.45	39.15	39.2
113169	T12		31.4	5.32	215.0	24.75	0.074	-0.0744364	46.60	35.04	35.0
113170	T31		31.4	6.75	233.7	28.88	0.09	-0.0904364	57.20	33.90	33.9
		Blk Ck1					0.001	-0.0014364	0.86		
		Blk Ck2					-0.001	0.00056364	-0.34		
		Blk Ck3					0	-0.0004364	0.26		
		Blk Ck4					0	-0.0004364	0.26		
		Ni Ck1					0.144	-0.1444364	94.80		
		Ni Ck2					0.141	-0.1414364	92.63		
		Ni Ck3					0.149	-0.1494364	98.44		
		Ni Ck4					0.152	-0.1524364	100.64		

Batch 8 and 8a Particulate Pb			Date of Analysis:		7/29/94						
Elutriate Sample No.	Sample Desc.	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Lead Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Particulate Pb ug/g
ProBlk											
MESS-1	30D			231	500.0	462.00	0.016		12.85	27.81	27.8
MESS-1	30D	Spk		231	500.0	462.00	0.041		33.30	72.07	72.1
113159	Header		31.4	0	357.2	0.00	-0.001		-1.06	ND	ND
113165	T6		31.4	4.39	241.3	18.20	0.038		30.84	281.02	281.0
113166	T29		31.4	7.59	221.1	34.33	0.071		57.84	304.80	304.8
113167	T13		31.4	4.39	216.9	20.24	0.019		15.30	139.41	139.4
113168	T18		31.4	4.03	232.0	17.37	0.012		9.57	95.03	95.0
		Blk Ck1					-0.001		-1.06		
		Blk Ck2					-0.004		-3.51		
		Blk Ck3					-0.001		-1.06		
		Blk Ck4					0		-0.24		
		Pb Ck1					0.064		52.11		
		Pb Ck2					0.065		52.93		
		Pb Ck3					0.065		52.93		
		Pb Ck4					0.066		53.75		
MESS-1	30D			231	500	462.00	0.014	-0.0168027	12.11	26.21	26.2
MESS-1	30D	Spk		231	500	462.00	0.041	-0.0438027	32.67	70.71	70.7
113161	T3		31.4	6.43	234.3	27.44	0.053	-0.0558027	42.31	13161	13161.1
113162	T4		31.4	6.74	214.9	31.36	0.056	-0.0588027	44.78	13287	13287.3
113163	T19		31.4	4.49	217.8	20.62	0.032	-0.0348027	25.65	11426	11426.3
113169	T12		31.4	5.32	215	24.74	0.059	-0.0618027	47.27	17769	17769.3
113170	T31		31.4	6.75	233.7	28.88	0.068	-0.0708027	54.88	16260	16259.6
		Blk Ck1					-0.002	-0.0008027	0.57		
		Blk Ck2					-0.003	0.0001973	-0.14		
		Blk Ck3					-0.001	-0.0018027	1.28		
		Pb Ck1					0.061	-0.0638027	48.94		
		Pb Ck2					0.064	-0.0668027	51.47		
		Pb Ck3					0.063	-0.0658027	50.62		

PNSY Batch 1 (Dissolved)

Batch 1 Dissolved Cadmium				Date of Analysis:		5/5/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Cadmium Abs.	Polynomial Factor c	Abs/Conc. Polynomial Equation		Dissolved Cd ug/L
	Milli-Q		Blk	258.6	0.0001	258.6	51.71	-0.002	0.0022	-0.07	-0.07	-0.001
	NASS-4			258.4	31.3	250.5	50.10	0.023	-0.0228	0.70	0.70	0.014
	NASS-4		Spk	259.9	31.3	252.0	50.40	0.117	-0.1168	4.28	4.28	0.085
1	3	1.5		261.9	31.35	254.0	50.79	0.039	-0.0388	1.22	1.22	0.024
1	3	1.5	Dup	259.1	31.35	251.2	50.25	0.038	-0.0378	1.19	1.19	0.024
1	3	1.5	Spk	268.3	31.35	260.2	52.03	0.134	-0.1338	5.14	5.14	0.099
1	1	1.5		259.4	31.5	251.5	50.30	0.043	-0.0428	1.36	1.36	0.027
1	1	8		258.8	31.54	250.8	50.17	0.039	-0.0388	1.22	1.22	0.024
1	3	8		254.5	31.39	246.8	49.35	0.042	-0.0418	1.33	1.33	0.027
1	4	2		254.3	31.44	246.6	49.31	0.045	-0.0448	1.43	1.43	0.029
1	4	10		254.5	31.47	246.7	49.34	0.042	-0.0418	1.33	1.33	0.027
1	5	2		256.7	31.69	248.8	49.77	0.038	-0.0378	1.19	1.19	0.024
1	6	2		252.4	31.53	244.6	48.93	0.041	-0.0408	1.29	1.29	0.026
1	6	10		255.8	31.56	247.9	49.59	0.038	-0.0378	1.19	1.19	0.024
1	7	2		258.5	31.67	250.6	50.12	0.041	-0.0408	1.29	1.29	0.026
1	7	10		255.4	31.68	247.5	49.51	0.037	-0.0368	1.16	1.16	0.023
1	8	2		251.9	31.61	244.2	48.84	0.04	-0.0398	1.26	1.26	0.026
1	9	2		257.2	31.59	249.3	49.87	0.043	-0.0428	1.36	1.36	0.027
1	9	10		253.6	31.61	245.8	49.17	0.038	-0.0378	1.19	1.19	0.024
1	10	2		261	31.6	253.0	50.60	0.041	-0.0408	1.29	1.29	0.026
			Blk Ck1					0.001	-0.0008	0.02		
			Blk Ck2					0	0.0002	-0.01		
			Blk Ck3					-0.002	0.0022	-0.07		
			Blk Ck4					0	0.0002	-0.01		
			Blk Ck5					0.001	-0.0008	0.02		
			Cd Ck1					0.141	-0.1408	5.53		
			Cd Ck2					0.139	-0.1388	5.41		
			Cd Ck3					0.136	-0.1358	5.25		
			Cd Ck4					0.142	-0.1418	5.58		
			Cd Ck5					0.144	-0.1438	5.70		

Batch 1 Dissolved Copper Date of Analysis: 2/18/94

Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Copper Abs.	Polynomial Factor c	Abs/Conc. Polynomial Equation		Dissolved Cu ug/L
	Milli-Q		Blk	258.6	0.0001	258.6	51.71	0.001	-0.0010829	0.23	0.23	0.005
	NASS-4			258.4	31.3	250.5	50.10	0.045	-0.0450829	10.03	10.03	0.200
	NASS-4		Spk	259.9	31.3	252.0	50.40	0.121	-0.1210829	28.48	28.48	0.565
1	3	1.5		261.9	31.35	254.0	50.79	0.079	-0.0790829	18.01	18.01	0.355
1	3	1.5	Dup	259.1	31.35	251.2	50.25	0.085	-0.0850829	19.46	19.46	0.387
1	3	1.5	Spk	268.3	31.35	260.2	52.03	0.155	-0.1550829	37.54	37.54	0.721
1	1	1.5		259.4	31.5	251.5	50.30	0.069	-0.0690829	15.62	15.62	0.311
1	1	8		258.8	31.54	250.8	50.17	0.063	-0.0630829	14.20	14.20	0.283
1	3	8		254.5	31.39	246.8	49.35	0.081	-0.0810829	18.49	18.49	0.375
1	4	2		254.3	31.44	246.6	49.31	0.077	-0.0770829	17.53	17.53	0.356
1	4	10		254.5	31.47	246.7	49.34	0.072	-0.0720829	16.33	16.33	0.331
1	5	2		256.7	31.69	248.8	49.77	0.053	-0.0530829	11.87	11.87	0.238
1	6	2		252.4	31.53	244.6	48.93	0.065	-0.0650829	14.67	14.67	0.300
1	6	10		255.8	31.56	247.9	49.59	0.064	-0.0640829	14.44	14.44	0.291
1	7	2		258.5	31.67	250.6	50.12	0.055	-0.0550829	12.33	12.33	0.246
1	7	10		255.4	31.68	247.5	49.51	0.053	-0.0530829	11.87	11.87	0.240
1	8	2		251.9	31.61	244.2	48.84	0.062	-0.0620829	13.97	13.97	0.286
1	9	2		257.2	31.59	249.3	49.87	0.063	-0.0630829	14.20	14.20	0.285
1	9	10		253.6	31.61	245.8	49.17	0.062	-0.0620829	13.97	13.97	0.284
1	10	2		261	31.6	253.0	50.60	0.066	-0.0660829	14.91	14.91	0.295
			Blk Ck1					0.001	-0.0010829	0.23		
			Blk Ck2					0	-8.287E-05	0.02		
			Blk Ck3					0.001	-0.0010829	0.23		
			Blk Ck4					0	-8.287E-05	0.02		
			Blk Ck5					0	-8.287E-05	0.02		
			Cu Ck1					0.197	-0.1970829	49.64		
			Cu Ck2					0.203	-0.2030829	51.47		
			Cu Ck3					0.213	-0.2130829	54.57		
			Cu Ck4					0.209	-0.2090829	53.32		
			Cu Ck5					0.213	-0.2130829	54.57		

Batch 1	Dissolved Iron			Date of Analysis:		10/25/94						
				Sample			Abs/Conc.					
Cruise	Sample	Depth	Sample	Salinity,	Sample	Polynomial	Regression		Dissolved Fe			
No.	No.	M	Type	o/oo	Absorban	Factor c	Equation		ug/L			
	NASS+2			31.3	0.023		2.28	2.28	2.28			
1	1	1.5		31.5	0.033		3.32	3.32	3.32			
1	1	8		31.54	0.019		1.87	1.87	1.87			
1	3	1.5		31.35	0.035		3.53	3.53	3.53			
1	3	8		31.39	0.025		2.49	2.49	2.49			
1	4	2		31.44	0.02		1.97	1.97	1.97			
1	4	10		31.47	0.02		1.97	1.97	1.97			
1	5	2		31.69	0.016		1.56	1.56	1.56			
1	6	2		31.53	0.019		1.87	1.87	1.87			
1	6	10		31.56	0.018		1.76	1.76	1.76			
1	7	2		31.67	0.015		1.45	1.45	1.45			
1	7	10		31.68	0.015		1.45	1.45	1.45			
1	8	2		31.61	0.013		1.24	1.24	1.24			
1	9	2		31.59	0.016		1.56	1.56	1.56			
1	9	10		31.61	0.015		1.45	1.45	1.45			
1	10	2		31.6	0.021		2.07	2.07	2.07			
1	10	5			0.021		2.07	2.07	2.07			
1	11	2			0.015		1.45	1.45	1.45			
1	14	2			0.014		1.35	1.35	1.35			
1	14	15			0.011		1.04	1.04	1.04			
			Blk Ck1		0.002		0.10					
			Blk Ck2		0		-0.10					
			Blk Ck3		0.002		0.10					
			Blk Ck4		0.003		0.21					
			Blk Ck5		0.002		0.10					
			Fe Ck1		0.051		5.19					
			Fe Ck2		0.053		5.39					
			Fe Ck3		0.05		5.08					
			Fe Ck4		0.049		4.98					
			Fe Ck5		0.05		5.08					

Batch 1	Dissolved Manganese			Date of Analysis:		10/12/94						
				Sample			Abs/Conc.					
Cruise	Sample	Depth	Sample	Salinity,	Sample	Polynomial	Regression		Dissolved Mn			
No.	No.	M	Type	o/oo	Absorban	Factor c	Equation		ug/L			
	NASS+2			31.3	0.04		1.94	1.94	1.94			
1	1	1.5		31.5	0.068		3.59	3.59	3.59			
1	1	8		31.54	0.059		3.06	3.06	3.06			
1	3	1.5		31.35	Rerun							
1	3	8		31.39	Rerun							
1	4	2		31.44	Rerun							
1	4	10		31.47	0.074		3.94	3.94	3.94			
1	5	2		31.69	0.044		2.18	2.18	2.18			
1	6	2		31.53	0.064		3.35	3.35	3.35			
1	6	10		31.56	0.059		3.06	3.06	3.06			
1	7	2		31.67	0.047		2.35	2.35	2.35			
1	7	10		31.68	0.044		2.18	2.18	2.18			
1	8	2		31.61	0.051		2.59	2.59	2.59			
1	9	2		31.59	0.055		2.82	2.82	2.82			
1	9	10		31.61	0.055		2.82	2.82	2.82			
1	10	2		31.6	0.059		3.06	3.06	3.06			
1	10	5			0.057		2.94	2.94	2.94			
1	11	2			0.059		3.06	3.06	3.06			
1	14	2			0.056		2.88	2.88	2.88			
			Blk Ck1		0.009		0.53					
			Blk Ck2		0.01		0.59					
			Blk Ck3		0.011		0.65					
			Blk Ck4		0.01		0.59					
			Blk Ck5		0.01		0.59					
			Mn Ck1		0.036		1.71					
			Mn Ck2		0.038		1.82					
			Mn Ck3		0.041		2.00					
			Mn Ck4		0.04		1.94					
			Mn Ck5		0.037		1.76					

Batch 1 Dissolved Nickel				Date of Analysis:		5/17/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Nickel Abs.	Polynomial Factor c	Abs/Conc. Polynomial Equation		Dissolved Ni ug/L
	Milli-Q		Blk	258.6	0.0001	258.6	51.71	-0.002	0.00138182	-0.34	-0.34	-0.007
	NASS-4			258.4	31.3	250.5	50.10	0.035	-0.0356182	8.97	8.97	0.179
	NASS-4		Spk	259.9	31.3	252.0	50.40	0.106	-0.1066182	28.09	28.09	0.557
1	3	1.5		261.9	31.35	254.0	50.79	0.055	-0.0556182	14.18	14.18	0.279
1	3	1.5	Dup	259.1	31.35	251.2	50.25	0.056	-0.0566182	14.44	14.44	0.287
1	3	1.5	Spk	268.3	31.35	260.2	52.03	0.123	-0.1236182	32.95	32.95	0.633
1	1	1.5		259.4	31.5	251.5	50.30	0.054	-0.0546182	13.92	13.92	0.277
1	1	8		258.8	31.54	250.8	50.17	0.052	-0.0526182	13.39	13.39	0.267
1	3	8		254.5	31.39	246.8	49.35	0.053	-0.0536182	13.65	13.65	0.277
1	4	2		254.3	31.44	246.6	49.31	0.052	-0.0526182	13.39	13.39	0.272
1	4	10		254.5	31.47	246.7	49.34	0.048	-0.0486182	12.34	12.34	0.250
1	5	2		256.7	31.69	248.8	49.77	0.047	-0.0476182	12.08	12.08	0.243
1	6	2		252.4	31.53	244.6	48.93	0.049	-0.0496182	12.61	12.61	0.258
1	6	10		255.8	31.56	247.9	49.59	0.05	-0.0506182	12.87	12.87	0.259
1	7	2		258.5	31.67	250.6	50.12	0.047	-0.0476182	12.08	12.08	0.241
1	7	10		255.4	31.68	247.5	49.51	0.049	-0.0496182	12.61	12.61	0.255
1	8	2		251.9	31.61	244.2	48.84	0.053	-0.0536182	13.65	13.65	0.280
1	9	2		257.2	31.59	249.3	49.87	0.054	-0.0546182	13.92	13.92	0.279
1	9	10		253.6	31.61	245.8	49.17	0.052	-0.0526182	13.39	13.39	0.272
1	10	2		261	31.6	253.0	50.60	0.05	-0.0506182	12.87	12.87	0.254
			Blk Ck1					-0.004	0.00338182	-0.83		
			Blk Ck2					0.004	-0.0046182	1.14		
			Blk Ck3					-0.003	0.00238182	-0.59		
			Blk Ck4					0.003	-0.0036182	0.89		
			Blk Ck5					-0.004	0.00338182	-0.83		
			Ni Ck1					0.077	-0.0776182	20.06		
			Ni Ck2					0.078	-0.0786182	20.34		
			Ni Ck3					0.074	-0.0746182	19.25		
			Ni Ck4					0.082	-0.0826182	21.43		
			Ni Ck5					0.078	-0.0786182	20.34		

PNSY Batch 1 (Dissolved)

Batch 1	Dissolved Lead			Date of Analysis:		8/9/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Lead Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Dissolved Pb ug/L
	Milli-Q		Blk	258.6	0.0001	258.6	51.71	0.001		-0.17	-0.17	-0.003
	NASS-4			258.4	31.3	250.5	50.10	0.004		0.08	0.08	0.002
	NASS-4		Spk	259.9	31.3	252.0	50.40	0.193		15.98	15.98	0.317
1	3	1.5		261.9	31.35	254.0	50.79	0.013		0.84	0.84	0.016
1	3	1.5	Dup	259.1	31.35	251.2	50.25	0.014		0.92	0.92	0.018
1	3	1.5	Spk	268.3	31.35	260.2	52.03	0.199		16.48	16.48	0.317
1	1	1.5		259.4	31.5	251.5	50.30	0.014		0.92	0.92	0.018
1	1	8		258.8	31.54	250.8	50.17	0.011		0.67	0.67	0.013
1	3	8		254.5	31.39	246.8	49.35	0.015		1.01	1.01	0.020
1	4	2		254.3	31.44	246.6	49.31	0.013		0.84	0.84	0.017
1	4	10		254.5	31.47	246.7	49.34	0.012		0.75	0.75	0.015
1	5	2		256.7	31.69	248.8	49.77	0.006		0.25	0.25	0.005
1	6	2		252.4	31.53	244.6	48.93	0.01		0.58	0.58	0.012
1	6	10		255.8	31.56	247.9	49.59	0.008		0.42	0.42	0.008
1	7	2		258.5	31.67	250.6	50.12	0.007		0.33	0.33	0.007
1	7	10		255.4	31.68	247.5	49.51	0.007		0.33	0.33	0.007
1	8	2		251.9	31.61	244.2	48.84	0.008		0.42	0.42	0.009
1	9	2		257.2	31.59	249.3	49.87	0.009		0.50	0.50	0.010
1	9	10		253.6	31.61	245.8	49.17	0.008		0.42	0.42	0.008
1	10	2		261	31.6	253.0	50.60	0.011		0.67	0.67	0.013
			Blk Ck1					0.001		-0.17		
			Blk Ck2					0.001		-0.17		
			Blk Ck3					0		-0.26		
			Blk Ck4					0.001		-0.17		
			Blk Ck5					0		-0.26		
			Pb Ck1					0.127		10.43		
			Pb Ck2					0.125		10.26		
			Pb Ck3					0.125		10.26		
			Pb Ck4					0.13		10.68		
			Pb Ck5					0.13		10.68		

Batch 2 Dissolved Cadmium				Date of Analysis:	5/5/94							
Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Cadmium Abs.	Polynomial Factor c	Abs/Conc. Polynomial Equation		Dissolved Cd ug/L
	Milli-Q		Blk	252	0.0001	251.9	50.39	0.002	-0.0011818	0.03	0.03	0.001
	NASS-4			260.4	31.3	252.5	50.49	0.028	-0.0271818	0.80	0.80	0.016
	NASS-4		Spk	258.5	31.3	250.6	50.12	0.134	-0.1331818	4.82	4.82	0.096
1	13	2		254.4	31.55	246.6	49.32	0.045	-0.0441818	1.34	1.34	0.027
1	13	2	Dup	221.1	31.55	214.3	42.86	0.04	-0.0391818	1.18	1.18	0.028
1	13	8		249.1	31.61	241.5	48.30	0.04	-0.0391818	1.18	1.18	0.024
1	13	8	Spk	234.9	31.61	227.7	45.54	0.137	-0.1361818	4.97	4.97	0.109
1	10	5		260.7	31.6	252.7	50.54	0.045	-0.0441818	1.34	1.34	0.027
1	11	2		261	31.6	253.0	50.60	0.044	-0.0431818	1.31	1.31	0.026
1	14	2		257.1	31.63	249.2	49.84	0.046	-0.0451818	1.37	1.37	0.028
1	14	15		259.4	31.7	251.4	50.29	0.046	-0.0451818	1.37	1.37	0.027
1	15	2		259.1	31.41	251.2	50.24	0.047	-0.0461818	1.40	1.40	0.028
1	17	2		255.1	31.45	247.3	49.45	0.043	-0.0421818	1.28	1.28	0.026
1	18	2		258.6	31.37	250.7	50.14	0.046	-0.0451818	1.37	1.37	0.027
1	19	2		258	31.4	250.1	50.02	0.049	-0.0481818	1.47	1.47	0.029
1	20	2		261.8	31.35	253.8	50.77	0.049	-0.0481818	1.47	1.47	0.029
1	21	2		254.1	31.35	246.4	49.28	0.047	-0.0461818	1.40	1.40	0.028
2	1	2		257.4	31.769	249.4	49.89	0.047	-0.0461818	1.40	1.40	0.028
2	1	15		252.1	31.916	244.3	48.86	0.044	-0.0431818	1.31	1.31	0.027
2	2	2		258.8	31.889	250.8	50.15	0.048	-0.0471818	1.44	1.44	0.029
			Blk Ck1					0	0.00081818	-0.02		
			Blk Ck2					0.002	-0.0011818	0.03		
			Blk Ck3					0.001	-0.0001818	0.01		
			Blk Ck4					0.001	-0.0001818	0.01		
			Blk Ck5					-0.001	0.00181818	-0.05		
			Cd Ck1					0.137	-0.1361818	4.97		
			Cd Ck2					0.14	-0.1391818	5.12		
			Cd Ck3					0.145	-0.1441818	5.39		
			Cd Ck4					0.147	-0.1461818	5.49		
			Cd Ck5					0.143	-0.1421818	5.28		

Batch 2 Dissolved Copper				Date of Analysis:		2/19/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Copper Abs.	Polynomial Factor c	Abs/Conc. Polynomial Equation		Dissolved Cu ug/L
	Milli-Q		Blk	252	0.0001	251.9	50.39	0.001	-0.0014309	0.31	0.31	0.006
	NASS-4			260.4	31.3	252.5	50.49	0.052	-0.0524309	11.56	11.56	0.229
	NASS-4		Spk	258.5	31.3	250.6	50.12	0.128	-0.1284309	29.88	29.88	0.596
1	13	2		254.4	31.55	246.6	49.32	0.072	-0.0724309	16.19	16.19	0.328
1	13	2	Dup	221.1	31.55	214.3	42.86	0.064	-0.0644309	14.32	14.32	0.334
1	13	8		249.1	31.61	241.5	48.30	0.058	-0.0584309	12.94	12.94	0.268
1	13	8	Spk	234.9	31.61	227.7	45.54	0.129	-0.1294309	30.14	30.14	0.662
1	10	5		260.7	31.6	252.7	50.54	0.061	-0.0614309	13.63	13.63	0.270
1	11	2		261	31.6	253.0	50.60	0.064	-0.0644309	14.32	14.32	0.283
1	14	2		257.1	31.63	249.2	49.84	0.062	-0.0624309	13.86	13.86	0.278
1	14	15		259.4	31.7	251.4	50.29	0.054	-0.0544309	12.02	12.02	0.239
1	15	2		259.1	31.41	251.2	50.24	0.082	-0.0824309	18.55	18.55	0.369
1	17	2		255.1	31.45	247.3	49.45	0.075	-0.0754309	16.89	16.89	0.342
1	18	2		258.6	31.37	250.7	50.14	0.086	-0.0864309	19.50	19.50	0.389
1	19	2		258	31.4	250.1	50.02	0.085	-0.0854309	19.26	19.26	0.385
1	20	2		261.8	31.35	253.8	50.77	0.089	-0.0894309	20.22	20.22	0.398
1	21	2		254.1	31.35	246.4	49.28	0.086	-0.0864309	19.50	19.50	0.396
2	1	2		257.4	31.769	249.4	49.89	0.053	-0.0534309	11.79	11.79	0.236
2	1	15		252.1	31.916	244.3	48.86	0.048	-0.0484309	10.65	10.65	0.218
2	2	2		258.8	31.889	250.8	50.15	0.049	-0.0494309	10.88	10.88	0.217
			Blk Ck1					0	-0.0004309	0.09		
			Blk Ck2					0	-0.0004309	0.09		
			Blk Ck3					0	-0.0004309	0.09		
			Blk Ck4					0.001	-0.0014309	0.31		
			Blk Ck5					0	-0.0004309	0.09		
			Cu Ck1					0.197	-0.1974309	48.68		
			Cu Ck2					0.203	-0.2034309	50.44		
			CuCk3					0.201	-0.2014309	49.85		
			Cu Ck4					0.201	-0.2014309	49.85		
			Cu Ck5					0.201	-0.2014309	49.85		

Batch 2 Dissolved Iron				Date of Analysis:		10/26/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Sample Absorbanc	Polynomial Factor c	Abs/Conc. Regression Equation		Dissolved Fe ug/L			
	NASS+2			31.3	0.019		2.21	2.21	2.21			
1	15	2			0.02		2.33	2.33	2.33			
1	17	2			0.019		2.21	2.21	2.21			
1	18	2			0.018		2.09	2.09	2.09			
1	19	2			0.019		2.21	2.21	2.21			
1	20	2			0.021		2.44	2.44	2.44			
1	21	2			0.019		2.21	2.21	2.21			
2	1	2			0.011		1.27	1.27	1.27			
2	1	15			0.01		1.15	1.15	1.15			
2	2	2			0.011		1.27	1.27	1.27			
2	3	2			0.012		1.39	1.39	1.39			
2	4	2			0.014		1.62	1.62	1.62			
2	5	1			0.019		2.21	2.21	2.21			
2	5	5			0.018		2.09	2.09	2.09			
2	6	1			0.024		2.80	2.80	2.80			
			Blk Ck1		0		-0.02					
			Blk Ck2		0.002		0.21					
			Blk Ck3		-0.001		-0.14					
			Blk Ck4		0		-0.02					
			Fe Ck1		0.043		5.03					
			Fe Ck2		0.042		4.91					
			Fe Ck3		0.045		5.26					
			Fe Ck4		0.047		5.50					

Batch 2 Dissolved Manganese				Date of Analysis:		10/14/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Sample Absorban	Polynomial Factor c	Abs/Conc. Regression Equation		Dissolved Mn ug/L			
	NASS+2			31.3	0.041		1.99	1.99	1.99			
1	3	1.5			0.086		4.76	4.76	4.76			
1	3	8			0.077		4.21	4.21	4.21			
1	4	2			0.073		3.96	3.96	3.96			
			Blk Ck1		0.011		0.68					
			Blk Ck2		0.013		0.80					
			Mn Ck1		0.037		1.75					
			Mn Ck2		0.043		2.12					
Batch 2a Dissolved Manganese				Date of Analysis:		10/14/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Sample Absorban	Polynomial Factor c	Abs/Conc. Regression Equation		Dissolved Mn ug/L			
	NASS+2			31.3	0.041		2.22	2.22	2.22			
1	14	15			0.042		2.28	2.28	2.28			
1	15	2			0.072		4.21	4.21	4.21			
1	17	2			0.073		4.27	4.27	4.27			
1	18	2			0.078		4.59	4.59	4.59			
1	19	2			0.079		4.65	4.65	4.65			
1	20	2			0.086		5.10	5.10	5.10			
1	21	2			0.089		5.30	5.30	5.30			
			Blk Ck1		0.009		0.58					
			Blk Ck2		0.007		0.45					
			Blk Ck3		0.006		0.38					
			Mn Ck1		0.035		1.83					
			Mn Ck2		0.035		1.83					
			Mn Ck3		0.037		1.96					

Batch 2 Dissolved Nickel — Date of Analysis: 5/18/94

Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Nickel Abs.	Polynomial Factor c	Abs/Conc. Polynomial Equation		Dissolved Ni ug/L
	Milli-Q		Blk	252	0.0001	251.9	50.39	0		-0.66	-0.66	-0.013
	NASS-4			260.4	31.3	252.5	50.49	0.041		10.58	10.58	0.210
	NASS-4		Spk	258.5	31.3	250.6	50.12	0.106		28.39	28.39	0.566
1	13	2		254.4	31.55	246.6	49.32	0.055		14.42	14.42	0.292
1	13	2	Dup	221.1	31.55	214.3	42.86	0.05		13.05	13.05	0.304
1	13	8		249.1	31.61	241.5	48.30	0.046		11.95	11.95	0.247
1	13	8	Spk	234.9	31.61	227.7	45.54	0.107		28.67	28.67	0.630
1	10	5		260.7	31.6	252.7	50.54	0.05		13.05	13.05	0.258
1	11	2		261	31.6	253.0	50.60	0.054		14.14	14.14	0.280
1	14	2		257.1	31.63	249.2	49.84	0.053		13.87	13.87	0.278
1	14	15		259.4	31.7	251.4	50.29	0.051		13.32	13.32	0.265
1	15	2		259.1	31.41	251.2	50.24	0.06		15.79	15.79	0.314
1	17	2		255.1	31.45	247.3	49.45	0.054		14.14	14.14	0.286
1	18	2		258.6	31.37	250.7	50.14	0.061		16.06	16.06	0.320
1	19	2		258	31.4	250.1	50.02	0.059		15.51	15.51	0.310
1	20	2		261.8	31.35	253.8	50.77	0.058		15.24	15.24	0.300
1	21	2		254.1	31.35	246.4	49.28	0.055		14.42	14.42	0.293
2	1	2		257.4	31.769	249.4	49.89	0.049		12.77	12.77	0.256
2	1	15		252.1	31.916	244.3	48.86	0.047		12.22	12.22	0.250
2	2	2		258.8	31.889	250.8	50.15	0.049		12.77	12.77	0.255
			Blk Ck1					0.002		-0.11		
			Blk Ck2					0		-0.66		
			Blk Ck3					0.006		0.99		
			Blk Ck4					0.004		0.44		
			Blk Ck5					-0.001		-0.93		
			Ni Ck1					0.075		19.90		
			Ni Ck2					0.077		20.45		
			Ni Ck3					0.08		21.27		
			Ni Ck4					0.076		20.17		
			Ni Ck5					0.08		21.27		

PNSY Batch 2 (Dissolved)

Batch 2 Dissolved Lead				Date of Analysis:		8/10/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Lead Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Dissolved Pb ug/L
	Milli-Q		Blk	252	0.0001	251.9	50.39	-0.003		-0.32	-0.32	-0.006
	NASS-4			260.4	31.3	252.5	50.49	0.001		0.01	0.01	0.000
	NASS-4		Spk	258.5	31.3	250.6	50.12	0.231		18.87	18.87	0.376
1	13	2		254.4	31.55	246.6	49.32	0.01		0.75	0.75	0.015
1	13	2	Dup	221.1	31.55	214.3	42.86	0.011		0.83	0.83	0.019
1	13	8		249.1	31.61	241.5	48.30	0.008		0.58	0.58	0.012
1	13	8	Spk	234.9	31.61	227.7	45.54	0.217		17.72	17.72	0.389
1	10	5		260.7	31.6	252.7	50.54	0.006		0.42	0.42	0.008
1	11	2		261	31.6	253.0	50.60	0.007		0.50	0.50	0.010
1	14	2		257.1	31.63	249.2	49.84	0.009		0.66	0.66	0.013
1	14	15		259.4	31.7	251.4	50.29	0.004		0.25	0.25	0.005
1	15	2		259.1	31.41	251.2	50.24	0.009		0.66	0.66	0.013
1	17	2		255.1	31.45	247.3	49.45	0.007		0.50	0.50	0.010
1	18	2		258.6	31.37	250.7	50.14	0.011		0.83	0.83	0.016
1	19	2		258	31.4	250.1	50.02	0.01		0.75	0.75	0.015
1	20	2		261.8	31.35	253.8	50.77	0.011		0.83	0.83	0.016
1	21	2		254.1	31.35	246.4	49.28	0.01		0.75	0.75	0.015
2	1	2		257.4	31.769	249.4	49.89	0.005		0.34	0.34	0.007
2	1	15		252.1	31.916	244.3	48.86	0.002		0.09	0.09	0.002
2	2	2		258.8	31.889	250.8	50.15	0.002		0.09	0.09	0.002
			Blk Ck1					-0.002		-0.24		
			Blk Ck2					-0.004		-0.40		
			Blk Ck3					-0.005		-0.48		
			Blk Ck4					-0.005		-0.48		
			Blk Ck5					-0.005		-0.48		
			Pb Ck1					0.125		10.17		
			Pb Ck2					0.129		10.50		
			Pb Ck3					0.131		10.67		
			Pb Ck4					0.133		10.83		
			Pb Ck5					0.136		11.08		

Batch 3 Dissolved Cadmium				Date of Analysis:		5/6/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Cadmium Abs.	Polynomial Factor c	Abs/Conc. Polynomial Equation		Dissolved Cd ug/L
	Milli-Q		Blk	260.6	0.0001	260.6	52.12	0.001	0.0010636	-0.03	-0.03	-0.001
	NASS-4			265.9	31.3	257.8	51.57	0.027	-0.0249364	0.75	0.75	0.014
	NASS-4		Spk	264.3	31.3	256.3	51.26	0.131	-0.1289364	4.65	4.65	0.091
2	6	3		222.2	31.37	215.4	43.09	0.042	-0.0399364	1.22	1.22	0.028
2	6	3	Spk	207.2	31.37	200.9	40.18	0.137	-0.1349364	4.94	4.94	0.123
2	6	1		213.2	31.27	206.7	41.35	0.042	-0.0399364	1.22	1.22	0.030
2	6	1	Dup	217	31.27	210.4	42.08	0.042	-0.0399364	1.22	1.22	0.029
2	3	2		264.3	31.87	256.1	51.23	0.046	-0.0439364	1.35	1.35	0.026
2	4	2		271	31.79	262.7	52.53	0.049	-0.0469364	1.45	1.45	0.028
2	5	1		259.8	31.61	251.8	50.37	0.048	-0.0459364	1.42	1.42	0.028
2	5	5		256.8	31.71	248.9	49.78	0.045	-0.0429364	1.32	1.32	0.026
2	6	10		255	31.72	247.2	49.43	0.046	-0.0439364	1.35	1.35	0.027
2	8	1		260.7	31.85	252.7	50.53	0.049	-0.0469364	1.45	1.45	0.029
2	8	5		266.7	32.33	258.3	51.67	0.046	-0.0439364	1.35	1.35	0.026
2	9	2		264	31.37	256.0	51.19	0.05	-0.0479364	1.48	1.48	0.029
2	10	2		256.3	31.91	248.4	49.67	0.051	-0.0489364	1.52	1.52	0.031
2	11	2		263	31.55	255.0	50.99	0.052	-0.0499364	1.55	1.55	0.030
2	13	2		264.3	31.62	256.2	51.24	0.052	-0.0499364	1.55	1.55	0.030
2	13	9.5		263.5	31.62	255.4	51.08	0.051	-0.0489364	1.52	1.52	0.030
2	15	2		254	31.74	246.2	49.24	0.05	-0.0479364	1.48	1.48	0.030
			Blk Ck1					0.002	0.0000636	0.00		
			Blk Ck2					0	0.0020636	-0.06		
			Blk Ck3					0	0.0020636	-0.06		
			Blk Ck4					0.001	0.0010636	-0.03		
			Blk Ck5					0.001	0.0010636	-0.03		
			Cd Ck1					0.142	-0.1399364	5.20		
			Cd Ck2					0.144	-0.1419364	5.30		
			Cd Ck3					0.144	-0.1419364	5.30		
			Cd Ck4					0.147	-0.1449364	5.46		
			Cd Ck5					0.146	-0.1439364	5.41		

PNSY Batch 3 (Dissolved)

Batch 3 Dissolved Copper				Date of Analysis:		5/6/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Copper Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Dissolved Cu ug/L
	Milli-Q		Blk	260.6	0.0001	260.6	52.12	0		-0.2139037	-0.21	-0.004
	NASS-4			265.9	31.3	257.8	51.57	0.039		10.2139037	10.21	0.198
	NASS-4		Spk	264.3	31.3	256.3	51.26	0.107		28.3957219	28.40	0.554
2	6	3		222.2	31.37	215.4	43.09	0.047		12.3529412	12.35	0.287
2	6	3	Spk	207.2	31.37	200.9	40.18	0.11		29.197861	29.20	0.727
2	6	1		213.2	31.27	206.7	41.35	0.052		13.6898396	13.69	0.331
2	6	1	Dup	217	31.27	210.4	42.08	0.054		14.2245989	14.22	0.338
2	3	2		264.3	31.87	256.1	51.23	0.041		10.7486631	10.75	0.210
2	4	2		271	31.79	262.7	52.53	0.048		12.6203209	12.62	0.240
2	5	1		259.8	31.61	251.8	50.37	0.051		13.4224599	13.42	0.266
2	5	5		256.8	31.71	248.9	49.78	0.048		12.6203209	12.62	0.254
2	6	10		255	31.72	247.2	49.43	0.048		12.6203209	12.62	0.255
2	8	1		260.7	31.85	252.7	50.53	0.044		11.5508021	11.55	0.229
2	8	5		266.7	32.33	258.3	51.67	0.045		11.8181818	11.82	0.229
2	9	2		264	31.37	256.0	51.19	0.058		15.2941176	15.29	0.299
2	10	2		256.3	31.91	248.4	49.67	0.041		10.7486631	10.75	0.216
2	11	2		263	31.55	255.0	50.99	0.057		15.026738	15.03	0.295
2	13	2		264.3	31.62	256.2	51.24	0.056		14.7593583	14.76	0.288
2	13	9.5		263.5	31.62	255.4	51.08	0.053		13.9572193	13.96	0.273
2	15	2		254	31.74	246.2	49.24	0.047		12.3529412	12.35	0.251
			Blk Ck1					0		-0.2139037		
			Blk Ck2					0		-0.2139037		
			Blk Ck3					0		-0.2139037		
			Blk Ck4					0.001		0.05347594		
			Blk Ck5					0		-0.2139037		
			Cu Ck1					0.078		20.6417112		
			Cu Ck2					0.08		21.1764706		
			Cu Ck3					0.08		21.1764706		
			Cu Ck4					0.082		21.7112299		
			Cu Ck5					0.082		21.7112299		

Batch 3 Dissolved Iron				Date of Analysis:		10/26/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Sample Absorban	Polynomial Factor c	Abs/Conc. Regression Equation		Dissolved Fe ug/L			
	NASS+2			31.3	0.02		2.37	2.37	2.37			
2	6	3			0.027		3.18	3.18	3.18			
2	6	10			0.02		2.37	2.37	2.37			
2	8	1			0.012		1.44	1.44	1.44			
2	8	5			0.019		2.25	2.25	2.25			
2	9	2			0.023		2.72	2.72	2.72			
2	10	2			0.012		1.44	1.44	1.44			
2	11	2			0.022		2.60	2.60	2.60			
2	13	2			0.019		2.25	2.25	2.25			
2	13	9.5			0.019		2.25	2.25	2.25			
2	15	2			0.019		2.25	2.25	2.25			
2	16	2			0.021		2.48	2.48	2.48			
2	16	10			0.022		2.60	2.60	2.60			
2	18	2			0.03		3.53	3.53	3.53			
2	18	7			0.023		2.72	2.72	2.72			
2	19	2			0.031		3.65	3.65	3.65			
2	19	5			0.028		3.30	3.30	3.30			
2	20	2			0.03		3.53	3.53	3.53			
2	20	6			0.026		3.06	3.06	3.06			
2	21	2			0.027		3.18	3.18	3.18			
			Blk Ck1		-0.001		-0.07					
			Blk Ck2		0.001		0.16					
			Blk Ck3		0.002		0.28					
			Blk Ck4		-0.002		-0.19					
			Blk Ck5		0.002		0.28					
			Fe Ck1		0.045		5.27					
			Fe Ck2		0.045		5.27					
			Fe Ck3		0.045		5.27					
			Fe Ck4		0.045		5.27					
			Fe Ck5		0.04		4.69					

Batch 3 Dissolved Manganese Date of Analysis: 10/17/94

Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Sample Absorban	Polynomial Factor c	Abs/Conc. Regression Equation		Dissolved Mn ug/L
	NASS+2			31.3	0.04		1.98	1.98	1.98
2	1	2	11		0.039		1.92	1.92	1.92
2	1	15			0.034		1.63	1.63	1.63
2	2	2			0.037		1.81	1.81	1.81
2	3	2			0.034		1.63	1.63	1.63
2	4	2			0.042		2.10	2.10	2.10
2	5	1			0.053		2.74	2.74	2.74
2	5	5			0.046		2.33	2.33	2.33
2	6	1			0.07		3.73	3.73	3.73
2	6	3			0.062		3.26	3.26	3.26
2	6	10			0.052		2.68	2.68	2.68
2	8	1			0.04		1.98	1.98	1.98
2	8	5			0.039		1.92	1.92	1.92
2	9	2			0.068		3.61	3.61	3.61
2	10	2			0.036		1.75	1.75	1.75
2	11	2			0.06		3.15	3.15	3.15
2	13	2			0.052		2.68	2.68	2.68
2	13	9.5			0.05		2.56	2.56	2.56
2	15	2			0.043		2.16	2.16	2.16
2	16	2			0.064		3.38	3.38	3.38
			Blk Ck1		0.007		0.41		
			Blk Ck2		0.007		0.41		
			Blk Ck3		0.009		0.52		
			Blk Ck4		0.008		0.47		
			Blk Ck5		0.013		0.76		
			Mn Ck1		0.037		1.81		
			Mn Ck2		0.037		1.81		
			Mn Ck3		0.041		2.04		
			Mn Ck4		0.041		2.04		
			Mn Ck5		0.037		1.81		

Batch 3 Dissolved Nickel Date of Analysis: 5/27/94

Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Nickel Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Dissolved Ni ug/L
	Milli-Q		Blk	260.6	0.0001	260.6	52.12	0.003		0.57938953	0.58	0.011
	NASS-4			265.9	31.3	257.8	51.57	0.038		9.7969503	9.80	0.190
	NASS-4		Spk	264.3	31.3	256.3	51.26	0.103		26.9152774	26.92	0.525
2	6	3		222.2	31.37	215.4	43.09	0.046		11.9038213	11.90	0.276
2	6	3	Spk	207.2	31.37	200.9	40.18	0.11		28.7587896	28.76	0.716
2	6	1		213.2	31.27	206.7	41.35	0.047		12.1671802	12.17	0.294
2	6	1	Dup	217	31.27	210.4	42.08	0.049		12.693898	12.69	0.302
2	3	2		264.3	31.87	256.1	51.23	0.05		12.9572569	12.96	0.253
2	4	2		271	31.79	262.7	52.53	0.055		14.2740512	14.27	0.272
2	5	1		259.8	31.61	251.8	50.37	0.053		13.7473335	13.75	0.273
2	5	5		256.8	31.71	248.9	49.78	0.05		12.9572569	12.96	0.260
2	6	10		255	31.72	247.2	49.43	0.053		13.7473335	13.75	0.278
2	8	1		260.7	31.85	252.7	50.53	0.051		13.2206157	13.22	0.262
2	8	5		266.7	32.33	258.3	51.67	0.047		12.1671802	12.17	0.235
2	9	2		264	31.37	256.0	51.19	0.057		14.800769	14.80	0.289
2	10	2		256.3	31.91	248.4	49.67	0.051		13.2206157	13.22	0.266
2	11	2		263	31.55	255.0	50.99	0.055		14.2740512	14.27	0.280
2	13	2		264.3	31.62	256.2	51.24	0.057		14.800769	14.80	0.289
2	13	9.5		263.5	31.62	255.4	51.08	0.057		14.800769	14.80	0.290
2	15	2		254	31.74	246.2	49.24	0.052		13.4839746	13.48	0.274
			Blk Ck1					0.003		0.57938953		
			Blk Ck2					0.001		0.05267178		
			Blk Ck3					-0.003		-1.0007637		
			Blk Ck4					-0.002		-0.7374049		
			Blk Ck5					-0.001		-0.474046		
			Ni Ck1					0.077		20.0679466		
			Ni Ck2					0.079		20.5946643		
			Ni Ck3					0.077		20.0679466		
			Ni Ck4					0.079		20.5946643		
			Ni Ck5					0.079		20.5946643		

Batch 3 Dissolved Lead				Date of Analysis:		8/10/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Lead Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Dissolved Pb ug/L
	Milli-Q		Blk	260.6	0.0001	260.6	52.12	0.001		-0.1661797	-0.17	-0.003
	NASS-4			265.9	31.3	257.8	51.57	0.005		0.13974761	0.14	0.003
	NASS-4		Spk	264.3	31.3	256.3	51.26	0.234		17.654088	17.65	0.344
2	6	3		222.2	31.37	215.4	43.09	0.015		0.90456597	0.90	0.021
2	6	3	Spk	207.2	31.37	200.9	40.18	0.242		18.2659426	18.27	0.455
2	6	1		213.2	31.27	206.7	41.35	0.015		0.90456597	0.90	0.022
2	6	1	Dup	217	31.27	210.4	42.08	0.015		0.90456597	0.90	0.021
2	3	2		264.3	31.87	256.1	51.23	0.007		0.29271128	0.29	0.006
2	4	2		271	31.79	262.7	52.53	0.011		0.59863862	0.60	0.011
2	5	1		259.8	31.61	251.8	50.37	0.015		0.90456597	0.90	0.018
2	5	5		256.8	31.71	248.9	49.78	0.011		0.59863862	0.60	0.012
2	6	10		255	31.72	247.2	49.43	0.012		0.67512046	0.68	0.014
2	8	1		260.7	31.85	252.7	50.53	0.01		0.52215679	0.52	0.010
2	8	5		266.7	32.33	258.3	51.67	0.01		0.52215679	0.52	0.010
2	9	2		264	31.37	256.0	51.19	0.017		1.05752964	1.06	0.021
2	10	2		256.3	31.91	248.4	49.67	0.008		0.36919312	0.37	0.007
2	11	2		263	31.55	255.0	50.99	0.018		1.13401147	1.13	0.022
2	13	2		264.3	31.62	256.2	51.24	0.016		0.9810478	0.98	0.019
2	13	9.5		263.5	31.62	255.4	51.08	0.014		0.82808413	0.83	0.016
2	15	2		254	31.74	246.2	49.24	0.013		0.75160229	0.75	0.015
			Blk Ck1					0.002		-0.0896979		
			Blk Ck2					0		-0.2426616		
			Blk Ck3					0		-0.2426616		
			Blk Ck4					-0.001		-0.3191434		
			Blk Ck5					-0.001		-0.3191434		
			Pb Ck1					0.138		10.3118317		
			Pb Ck2					0.142		10.6177591		
			Pb Ck3					0.147		11.0001683		
			Pb Ck4					0.148		11.0766501		
			Pb Ck5					0.151		11.3060956		

PNSY Batch 4 (Dissolved)

Batch 4 Dissolved Cadmium				Date of Analysis:		5/6/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Cadmium Abs.	Polynomial Factor c	Abs/Conc. Polynomial Equation		Dissolved Cd ug/L
	Milli-Q		Blk	249.8	0.0001	249.8	49.96	0.002	0.0001727	0.00	0.00	0.000
	NASS-4			264.2	31.3	256.2	51.24	0.028	-0.0258273	0.72	0.72	0.014
	NASS-4		Spk	267.9	31.3	259.8	51.95	0.134	-0.1318273	4.71	4.71	0.091
2	20	2		214.9	31.59	208.3	41.66	0.043	-0.0408273	1.17	1.17	0.028
2	20	2	Spk	212.6	31.59	206.1	41.22	0.137	-0.1348273	4.88	4.88	0.118
2	19	2		215.5	31.69	208.9	41.78	0.045	-0.0428273	1.23	1.23	0.029
2	19	2	Dup	223.5	31.69	216.6	43.33	0.045	-0.0428273	1.23	1.23	0.028
2	16	2		262.3	31.31	254.3	50.87	0.05	-0.0478273	1.38	1.38	0.027
2	16	10		255	31.41	247.2	49.45	0.047	-0.0448273	1.29	1.29	0.026
2	18	2		261.2	31.47	253.2	50.65	0.051	-0.0488273	1.41	1.41	0.028
2	18	7		268.4	31.56	260.2	52.04	0.051	-0.0488273	1.41	1.41	0.027
2	19	5		258.6	31.66	250.7	50.13	0.049	-0.0468273	1.35	1.35	0.027
2	20	6		253.2	31.77	245.4	49.08	0.047	-0.0448273	1.29	1.29	0.026
2	21	2		261.1	30.93	253.3	50.65	0.05	-0.0478273	1.38	1.38	0.027
2	21	12		257.5	31.01	249.8	49.95	0.05	-0.0478273	1.38	1.38	0.028
2	22	2		260.7	30.42	253.0	50.60	0.052	-0.0498273	1.45	1.45	0.029
2	22	6		253	30.43	245.5	49.11	0.05	-0.0478273	1.38	1.38	0.028
2	23	2		267.4	30.73	259.4	51.89	0.053	-0.0508273	1.48	1.48	0.028
2	24	2		261	26.92	254.2	50.83	0.043	-0.0408273	1.17	1.17	0.023
2	24	5		261.1	28.97	253.7	50.75	0.052	-0.0498273	1.45	1.45	0.028
			Blk Ck1					0.001	0.0011727	-0.03		
			Blk Ck2					0.001	0.0011727	-0.03		
			Blk Ck3					0	0.0021727	-0.06		
			Blk Ck4					0.002	0.0001727	0.00		
			Blk Ck5					0.001	0.0011727	-0.03		
			Cd Ck1					0.149	-0.1468273	5.61		
			Cd Ck2					0.147	-0.1448273	5.48		
			Cd Ck3					0.147	-0.1448273	5.48		
			Cd Ck4					0.15	-0.1478273	5.67		
			Cd Ck5					0.15	-0.1478273	5.67		

PNSY Batch 4 (Dissolved)

Batch 4 Dissolved Copper				Date of Analysis:		5/12/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Copper Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Dissolved Cu ug/L
	Milli-Q		Blk	249.8	0.0001	249.8	49.96	0.001		-0.31	-0.31	-0.006
	NASS-4			264.2	31.3	256.2	51.24	0.042		10.12	10.12	0.198
	NASS-4		Spk	267.9	31.3	259.8	51.95	0.117		29.20	29.20	0.562
2	20	2		214.9	31.59	208.3	41.66	0.052		12.67	12.67	0.304
2	20	2	Spk	212.6	31.59	206.1	41.22	0.115		28.69	28.69	0.696
2	19	2		215.5	31.69	208.9	41.78	0.052		12.67	12.67	0.303
2	19	2	Dup	223.5	31.69	216.6	43.33	0.051		12.41	12.41	0.286
2	16	2		262.3	31.31	254.3	50.87	0.064		15.72	15.72	0.309
2	16	10		255	31.41	247.2	49.45	0.057		13.94	13.94	0.282
2	18	2		261.2	31.47	253.2	50.65	0.06		14.70	14.70	0.290
2	18	7		268.4	31.56	260.2	52.04	0.058		14.19	14.19	0.273
2	19	5		258.6	31.66	250.7	50.13	0.057		13.94	13.94	0.278
2	20	6		253.2	31.77	245.4	49.08	0.046		11.14	11.14	0.227
2	21	2		261.1	30.93	253.3	50.65	0.066		16.23	16.23	0.320
2	21	12		257.5	31.01	249.8	49.95	0.068		16.74	16.74	0.335
2	22	2		260.7	30.42	253.0	50.60	0.073		18.01	18.01	0.356
2	22	6		253	30.43	245.5	49.11	0.071		17.50	17.50	0.356
2	23	2		267.4	30.73	259.4	51.89	0.074		18.26	18.26	0.352
2	24	2		261	26.92	254.2	50.83	0.077		19.03	19.03	0.374
2	24	5		261.1	28.97	253.7	50.75	0.082		20.30	20.30	0.400
			Blk Ck1					0		-0.56		
			Blk Ck2					0		-0.56		
			Blk Ck3					-0.001		-0.81		
			Blk Ck4					0		-0.56		
			Blk Ck5					0		-0.56		
			Cu Ck1					0.082		20.30		
			Cu Ck2					0.082		20.30		
			Cu Ck3					0.083		20.55		
			Cu Ck4					0.084		20.81		
			Cu Ck5					0.084		20.81		

Batch 4 Dissolved Iron — Date of Analysis: 10/27/94

Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Sample Absorbance	Polynomial Factor c	Abs/Conc. Regression Equation		Dissolved Fe ug/L
	NASS+2			31.3	0.02		2.21	2.21	2.21
2	21	12			0.032		3.59	3.59	3.59
2	22	2			0.032		3.59	3.59	3.59
2	22	6			0.033		3.70	3.70	3.70
2	23	2			0.032		3.59	3.59	3.59
2	24	2			0.116		13.24	13.24	13.24
2	24	5			0.074		8.41	8.41	8.41
2	25	2			0.043		4.85	4.85	4.85
2	26	2			0.033		3.70	3.70	3.70
2	26	10			0.035		3.93	3.93	3.93
3	1	2			0.011		1.17	1.17	1.17
3	1	13			0.011		1.17	1.17	1.17
3	2	2			0.013		1.40	1.40	1.40
3	3	2			0.014		1.52	1.52	1.52
3	4	2			0.029		3.24	3.24	3.24
3	5	2			0.015		1.63	1.63	1.63
3	5	6			0.013		1.40	1.40	1.40
3	6	1			0.009		0.94	0.94	0.94
3	6	5			0.02		2.21	2.21	2.21
3	6	8.5			0.017		1.86	1.86	1.86
			Blk Ck1		0.002		0.14		
			Blk Ck2		0.002		0.14		
			Blk Ck3		0.005		0.48		
			Blk Ck4		0.002		0.14		
			Blk Ck5		0.001		0.02		
			Fe Ck1		0.047		5.31		
			Fe Ck2		0.045		5.08		
			Fe Ck3		0.047		5.31		
			Fe Ck4		0.048		5.43		
			Fe Ck5		0.046		5.20		

Batch 4 Dissolved Manganese Date of Analysis: 10/17/94

Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Sample Absorban	Polynomial Factor c	Abs/Conc. Regression Equation		Dissolved Mn ug/L
	NASS+2			31.3	0.038		1.95	1.95	1.95
2	16	10	11		0.051		2.76	2.76	2.76
2	18	2			0.061		3.38	3.38	3.38
2	18	7			0.056		3.07	3.07	3.07
2	19	2			0.051		2.76	2.76	2.76
2	19	5			0.049		2.63	2.63	2.63
2	20	2			0.054		2.94	2.94	2.94
2	20	6			0.044		2.32	2.32	2.32
2	21	2			0.07		3.94	3.94	3.94
2	21	12			0.067		3.75	3.75	3.75
2	22	2			0.085		4.87	4.87	4.87
2	22	6			0.086		4.93	4.93	4.93
2	23	2			0.077		4.37	4.37	4.37
2	24	2			Rerun				
2	24	5			Rerun				
2	25	2			0.116		6.79	6.79	6.79
2	26	2			0.096		5.55	5.55	5.55
2	26	10			0.099		5.73	5.73	5.73
			Blk Ck1		0.007		0.43		
			Blk Ck2		0.006		0.37		
			Blk Ck3		0.007		0.43		
			Blk Ck4		0.009		0.56		
			Blk Ck5		0.009		0.56		
			Mn Ck1		0.036		1.83		
			Mn Ck2		0.037		1.89		
			Mn Ck3		0.034		1.70		
			Mn Ck4		0.035		1.76		
			Mn Ck5		0.035		1.76		

Batch 4 Dissolved Nickel				Date of Analysis:		5/19/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Nickel Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Dissolved Ni ug/L
	Milli-Q		Blk	249.8	0.0001	249.8	49.96	-0.001		-0.05	-0.05	-0.001
	NASS-4			264.2	31.3	256.2	51.24	0.037		10.05	10.05	0.196
	NASS-4		Spk	267.9	31.3	259.8	51.95	0.113		30.27	30.27	0.583
2	20	2		214.9	31.59	208.3	41.66	0.045		12.18	12.18	0.292
2	20	2	Spk	212.6	31.59	206.1	41.22	0.107		28.67	28.67	0.696
2	19	2		215.5	31.69	208.9	41.78	0.054		14.57	14.57	0.349
2	19	2	Dup	223.5	31.69	216.6	43.33	0.053		14.31	14.31	0.330
2	16	2		262.3	31.31	254.3	50.87	0.056		15.11	15.11	0.297
2	16	10		255	31.41	247.2	49.45	0.054		14.57	14.57	0.295
2	18	2		261.2	31.47	253.2	50.65	0.056		15.11	15.11	0.298
2	18	7		268.4	31.56	260.2	52.04	0.056		15.11	15.11	0.290
2	19	5		258.6	31.66	250.7	50.13	0.056		15.11	15.11	0.301
2	20	6		253.2	31.77	245.4	49.08	0.053		14.31	14.31	0.292
2	21	2		261.1	30.93	253.3	50.65	0.054		14.57	14.57	0.288
2	21	12		257.5	31.01	249.8	49.95	0.057		15.37	15.37	0.308
2	22	2		260.7	30.42	253.0	50.60	0.06		16.17	16.17	0.320
2	22	6		253	30.43	245.5	49.11	0.057		15.37	15.37	0.313
2	23	2		267.4	30.73	259.4	51.89	0.052		14.04	14.04	0.271
2	24	2		261	26.92	254.2	50.83	0.063		16.97	16.97	0.334
2	24	5		261.1	28.97	253.7	50.75	0.067		18.03	18.03	0.355
			Blk Ck1					0.002		0.74		
			Blk Ck2					0		0.21		
			Blk Ck3					0.002		0.74		
			Blk Ck4					-0.003		-0.59		
			Blk Ck5					0		0.21		
			Ni Ck1					0.076		20.43		
			Ni Ck2					0.079		21.22		
			Ni Ck3					0.079		21.22		
			Ni Ck4					0.079		21.22		
			Ni Ck5					0.083		22.29		

PNSY Batch 4 (Dissolved)

Batch 4 Dissolved Lead				Date of Analysis:		8/11/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Lead Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Dissolved Pb ug/L
	Milli-Q		Blk	249.8	0.0001	249.8	49.96	0.001		-0.10	-0.10	-0.002
	NASS-4			264.2	31.3	256.2	51.24	0.005		0.19	0.19	0.004
	NASS-4		Spk	267.9	31.3	259.8	51.95	0.269		19.32	19.32	0.372
2	20	2		214.9	31.59	208.3	41.66	0.016		0.99	0.99	0.024
2	20	2	Spk	212.6	31.59	206.1	41.22	0.263		18.88	18.88	0.458
2	19	2		215.5	31.69	208.9	41.78					
2	19	2	Dup	223.5	31.69	216.6	43.33	0.026		1.72	1.72	0.040
2	16	2		262.3	31.31	254.3	50.87	0.017		1.06	1.06	0.021
2	16	10		255	31.41	247.2	49.45	0.015		0.92	0.92	0.019
2	18	2		261.2	31.47	253.2	50.65	0.024		1.57	1.57	0.031
2	18	7		268.4	31.56	260.2	52.04	0.022		1.43	1.43	0.027
2	19	5		258.6	31.66	250.7	50.13					
2	20	6		253.2	31.77	245.4	49.08					
2	21	2		261.1	30.93	253.3	50.65					
2	21	12		257.5	31.01	249.8	49.95					
2	22	2		260.7	30.42	253.0	50.60					
2	22	6		253	30.43	245.5	49.11					
2	23	2		267.4	30.73	259.4	51.89					
2	24	2		261	26.92	254.2	50.83					
2	24	5		261.1	28.97	253.7	50.75					
			Blk Ck1					0.001		-0.10		
			Blk Ck2					0.001		-0.10		
			Blk Ck3					0		-0.17		
			Blk Ck4									
			Blk Ck5									
			Pb Ck1					0.145		10.33		
			Pb Ck2					0.157		11.20		
			Pb Ck3					0.164		11.71		
			Pb Ck4									
			Pb Ck5									

Batch 4a Dissolved Lead — Date of Analysis: 8/11/94

Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Lead Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Dissolved Pb ug/L
	Milli-Q		Blk	249.8	0.0001	249.8	49.96					
	NASS-4			264.2	31.3	256.2	51.24					
	NASS-4		Spk	267.9	31.3	259.8	51.95					
2	20	2		214.9	31.59	208.3	41.66					
2	20	2	Spk	212.6	31.59	206.1	41.22					
2	19	2		215.5	31.69	208.9	41.78	0.02		1.34	1.34	0.032
2	19	2	Dup	223.5	31.69	216.6	43.33					
2	16	2		262.3	31.31	254.3	50.87					
2	16	10		255	31.41	247.2	49.45					
2	18	2		261.2	31.47	253.2	50.65					
2	18	7		268.4	31.56	260.2	52.04					
2	19	5		258.6	31.66	250.7	50.13	0.017		1.10	1.10	0.022
2	20	6		253.2	31.77	245.4	49.08	0.012		0.69	0.69	0.014
2	21	2		261.1	30.93	253.3	50.65	0.015		0.94	0.94	0.018
2	21	12		257.5	31.01	249.8	49.95	0.014		0.85	0.85	0.017
2	22	2		260.7	30.42	253.0	50.60	0.016		1.02	1.02	0.020
2	22	6		253	30.43	245.5	49.11	0.014		0.85	0.85	0.017
2	23	2		267.4	30.73	259.4	51.89	0.015		0.94	0.94	0.018
2	24	2		261	26.92	254.2	50.83	0.025		1.74	1.74	0.034
2	24	5		261.1	28.97	253.7	50.75	0.021		1.42	1.42	0.028
			Blk Ck1					0.001		-0.20		
			Blk Ck2					0		-0.28		
			Blk Ck3					-0.002		-0.44		
			Blk Ck4							-0.28		
			Blk Ck5							-0.28		
			Pb Ck1					0.133		10.47		
			Pb Ck2					0.134		10.55		
			Pb Ck3					0.135		10.63		
			Pb Ck4									

PNSY Batch 5 (Dissolved)

Batch 5 Dissolved Cadmium				Date of Analysis:		5/10/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Cadmium Abs.	Polynomial Factor c	Abs/Conc. Polynomial Equation		Dissolved Cd ug/L
	Milli-Q		Blk	241.8	0.0001	241.8	48.36	0.003	-1.82E-05	0.00	0.00	0.000
	NASS-4			251.7	31.3	244.1	48.81	0.026	-0.0230182	0.66	0.66	0.013
	NASS-4		Spk	251.8	31.3	244.2	48.83	0.136	-0.1330182	4.62	4.62	0.095
3	6	5		197.3	31.72	191.2	38.25	0.037	-0.0340182	0.98	0.98	0.026
3	6	5	Spk	198.9	31.72	192.8	38.56	0.139	-0.1360182	4.76	4.76	0.123
3	4	2		231.1	31.91	224.0	44.79	0.046	-0.0430182	1.26	1.26	0.028
3	4	2	Dup	194.9	31.91	188.9	37.77	0.04	-0.0370182	1.08	1.08	0.028
2	25	2		258.8	30.49	251.1	50.23	0.054	-0.0510182	1.51	1.51	0.030
2	26	2		75.7	30.5	73.5	14.69	0.017	-0.0140182	0.39	0.39	0.027
2	26	10		77.5	30.38	75.2	15.04	0.016	-0.0130182	0.37	0.37	0.024
3	1	2		259.5	32.01	251.5	50.29	0.039	-0.0360182	1.05	1.05	0.021
3	1	13		263.6	32.09	255.4	51.08	0.05	-0.0470182	1.39	1.39	0.027
3	2	2		261.8	31.91	253.7	50.74	0.048	-0.0450182	1.32	1.32	0.026
3	3	2		259.7	31.92	251.7	50.33	0.046	-0.0430182	1.26	1.26	0.025
3	5	2		250.5	31.84	242.8	48.55	0.047	-0.0440182	1.29	1.29	0.027
3	5	6		264.6	31.75	256.5	51.29	0.057	-0.0540182	1.61	1.61	0.031
3	6	1		251.9	31.68	244.2	48.83	0.044	-0.0410182	1.20	1.20	0.025
3	6	8.5		259.4	31.82	251.4	50.28	0.052	-0.0490182	1.45	1.45	0.029
3	7	2		249.9	31.74	242.2	48.44	0.046	-0.0430182	1.26	1.26	0.026
3	7	2a		253.6	31.73	245.8	49.16	0.049	-0.0460182	1.35	1.35	0.028
			Blk Ck1					0.001	0.0019818	-0.05		
			Blk Ck2					0.002	0.0009818	-0.03		
			Blk Ck3					0.002	0.0009818	-0.03		
			Blk Ck4					0.003	-1.82E-05	0.00		
			Blk Ck5					0.003	-1.82E-05	0.00		
			Cd Ck1					0.147	-0.1440182	5.15		
			Cd Ck2					0.15	-0.1470182	5.31		
			Cd Ck3					0.152	-0.1490182	5.41		
			Cd Ck4					0.154	-0.1510182	5.52		
			Cd Ck5					0.154	-0.1510182	5.52		

Batch 5 Dissolved Copper — Date of Analysis: 5/13/94

Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Copper Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Dissolved Cu ug/L
	Milli-Q		Blk	241.8	0.0001	241.8	48.36	0.002		-0.10	-0.10	-0.002
	NASS-4			251.7	31.3	244.1	48.81	0.04		9.70	9.70	0.199
	NASS-4		Spk	251.8	31.3	244.2	48.83	0.112		28.27	28.27	0.579
3	6	5		197.3	31.72	191.2	38.25	0.035		8.41	8.41	0.220
3	6	5	Spk	198.9	31.72	192.8	38.56	0.104		26.21	26.21	0.680
3	4	2		231.1	31.91	224.0	44.79	0.04		9.70	9.70	0.217
3	4	2	Dup	194.9	31.91	188.9	37.77	0.034		8.15	8.15	0.216
2	25	2		258.8	30.49	251.1	50.23	0.081		20.27	20.27	0.404
2	26	2		75.7	30.5	73.5	14.69	0.023		5.31	5.31	0.362
2	26	10		77.5	30.38	75.2	15.04	0.021		4.80	4.80	0.319
3	1	2		259.5	32.01	251.5	50.29	0.033		7.89	7.89	0.157
3	1	13		263.6	32.09	255.4	51.08	0.041		9.96	9.96	0.195
3	2	2		261.8	31.91	253.7	50.74	0.041		9.96	9.96	0.196
3	3	2		259.7	31.92	251.7	50.33	0.043		10.47	10.47	0.208
3	5	2		250.5	31.84	242.8	48.55	0.045		10.99	10.99	0.226
3	5	6		264.6	31.75	256.5	51.29	0.052		12.79	12.79	0.249
3	6	1		251.9	31.68	244.2	48.83	0.043		10.47	10.47	0.214
3	6	8.5		259.4	31.82	251.4	50.28	0.045		10.99	10.99	0.219
3	7	2		249.9	31.74	242.2	48.44	0.046		11.25	11.25	0.232
3	7	2a		253.6	31.73	245.8	49.16	0.051		12.54	12.54	0.255
			Blk Ck1					0.001		-0.36		
			Blk Ck2					0.001		-0.36		
			Blk Ck3					0.001		-0.36		
			Blk Ck4					0.001		-0.36		
			Blk Ck5					0		-0.62		
			Cu Ck1					0.081		20.27		
			Cu Ck2					0.082		20.53		
			Cu Ck3					0.084		21.05		
			Cu Ck4					0.085		21.30		
			Cu Ck5					0.085		21.30		

Batch 5 Dissolved Iron				Date of Analysis:		10/27/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Sample Absorban	Polynomial Factor c	Abs/Conc. Regression Equation		Dissolved Fe ug/L			
	NASS+2			31.3	0.017		2.21	2.21	2.21			
3	7	2			0.011		1.42	1.42	1.42			
3	7	6			0.013		1.69	1.69	1.69			
3	7	12			0.013		1.69	1.69	1.69			
3	8	2			0.012		1.56	1.56	1.56			
3	8	20			0.011		1.42	1.42	1.42			
3	9	2			0.01		1.29	1.29	1.29			
3	10	2			0.013		1.69	1.69	1.69			
3	10	12			0.011		1.42	1.42	1.42			
3	11	2			0.011		1.42	1.42	1.42			
3	11	12			0.015		1.95	1.95	1.95			
3	13	5			0.011		1.42	1.42	1.42			
3	14	2			0.013		1.69	1.69	1.69			
3	15	2			0.009		1.16	1.16	1.16			
3	16	2			0.027		3.53	3.53	3.53			
3	16	10			0.027		3.53	3.53	3.53			
3	17	2			0.016		2.08	2.08	2.08			
3	17	7			0.018		2.35	2.35	2.35			
3	18	2			0.02		2.61	2.61	2.61			
3	20	2			0.025		3.27	3.27	3.27			
			Blk Ck1		0.003		0.37					
			Blk Ck2		0		-0.03					
			Blk Ck3		-0.002		-0.29					
			Blk Ck4		0.004		0.50					
			Blk Ck5		0.001		0.11					
			Fe Ck1		0.034		4.46					
			Fe Ck2		0.039		5.11					
			Fe Ck3		0.04		5.25					
			Fe Ck4		0.04		5.25					
			Fe Ck5		0.038		4.98					

Batch 5 Dissolved Manganese Date of Analysis: 10/19/94

Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Sample Absorban	Polynomial Factor c	Abs/Conc. Regression Equation		Dissolved Mn ug/L
	NASS+2			31.3	0.035		2.08	2.08	2.08
3	1	2	11		0.022		1.17	1.17	1.17
3	1	13			0.02		1.03	1.03	1.03
3	2	2			0.025		1.38	1.38	1.38
3	3	2			0.023		1.24	1.24	1.24
3	4	2			0.027		1.52	1.52	1.52
3	5	2			0.031		1.80	1.80	1.80
3	5	6			0.029		1.66	1.66	1.66
3	6	1			0.038		2.29	2.29	2.29
3	6	5			0.033		1.94	1.94	1.94
3	6	8.5			0.031		1.80	1.80	1.80
3	7	2			0.035		2.08	2.08	2.08
3	7	6			0.035		2.08	2.08	2.08
3	7	12			0.034		2.01	2.01	2.01
3	8	2			0.032		1.87	1.87	1.87
3	8	20			0.028		1.59	1.59	1.59
3	9	2			0.032		1.87	1.87	1.87
3	10	2			0.033		1.94	1.94	1.94
3	10	12			0.031		1.80	1.80	1.80
3	11	2			0.031		1.80	1.80	1.80
			Blk Ck1		0.006		0.42		
			Blk Ck2		0.004		0.28		
			Blk Ck3		0.006		0.42		
			Blk Ck4		0.004		0.28		
			Blk Ck5		0.005		0.35		
			Mn Ck1		0.032		1.87		
			Mn Ck2		0.031		1.80		
			Mn Ck3		0.033		1.94		
			Mn Ck4		0.035		2.08		
			Mn Ck5		0.033		1.94		

PNSY Batch 5 (Dissolved)

Batch 5 Dissolved Nickel				Date of Analysis:		5/19/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Nickel Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Dissolved Ni ug/L
	Milli-Q		Blk	241.8	0.0001	241.8	48.36	0.004		0.85	0.85	0.018
	NASS-4			251.7	31.3	244.1	48.81	0.037		9.11	9.11	0.187
	NASS-4		Spk	251.8	31.3	244.2	48.83	0.113		28.14	28.14	0.576
3	6	5		197.3	31.72	191.2	38.25	0.043		10.62	10.62	0.278
3	6	5	Spk	198.9	31.72	192.8	38.56	0.108		26.89	26.89	0.697
3	4	2		231.1	31.91	224.0	44.79	0.048		11.87	11.87	0.265
3	4	2	Dup	194.9	31.91	188.9	37.77	0.042		10.36	10.36	0.274
2	25	2		258.8	30.49	251.1	50.23	0.068		16.87	16.87	0.336
2	26	2		75.7	30.5	73.5	14.69	0.016		3.86	3.86	0.262
2	26	10		77.5	30.38	75.2	15.04	0.014		3.35	3.35	0.223
3	1	2		259.5	32.01	251.5	50.29	0.043		10.62	10.62	0.211
3	1	13		263.6	32.09	255.4	51.08	0.054		13.37	13.37	0.262
3	2	2		261.8	31.91	253.7	50.74	0.052		12.87	12.87	0.254
3	3	2		259.7	31.92	251.7	50.33	0.054		13.37	13.37	0.266
3	5	2		250.5	31.84	242.8	48.55	0.054		13.37	13.37	0.275
3	5	6		264.6	31.75	256.5	51.29	0.059		14.62	14.62	0.285
3	6	1		251.9	31.68	244.2	48.83	0.053		13.12	13.12	0.269
3	6	8.5		259.4	31.82	251.4	50.28	0.058		14.37	14.37	0.286
3	7	2		249.9	31.74	242.2	48.44	0.05		12.37	12.37	0.255
3	7	2a		253.6	31.73	245.8	49.16	0.056		13.87	13.87	0.282
			Blk Ck1					0.003		0.60		
			Blk Ck2					0.004		0.85		
			Blk Ck3					0.002		0.35		
			Blk Ck4					0.004		0.85		
			Blk Ck5					0.001		0.10		
			Ni Ck1					0.081		20.13		
			Ni Ck2					0.081		20.13		
			Ni Ck3					0.083		20.63		
			Ni Ck4					0.085		21.13		
			Ni Ck5					0.084		20.88		

Batch 5 Dissolved Lead — Date of Analysis: 8/11/94

Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Lead Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Dissolved Pb ug/L
	Milli-Q		Blk	241.8	0.0001	241.8	48.36	0.001		0.00	0.00	0.000
	NASS-4			251.7	31.3	244.1	48.81	0.003		0.16	0.16	0.003
	NASS-4		Spk	251.8	31.3	244.2	48.83	0.215		16.41	16.41	0.336
3	6	5		197.3	31.72	191.2	38.25	0.007		0.46	0.46	0.012
3	6	5	Spk	198.9	31.72	192.8	38.56	0.209		15.95	15.95	0.414
3	4	2		231.1	31.91	224.0	44.79	0.007		0.46	0.46	0.010
3	4	2	Dup	194.9	31.91	188.9	37.77	0.006		0.39	0.39	0.010
2	25	2		258.8	30.49	251.1	50.23	0.015		1.08	1.08	0.021
2	26	2		75.7	30.5	73.5	14.69	0.004		0.23	0.23	0.016
2	26	10		77.5	30.38	75.2	15.04	0.011		0.77	0.77	0.051
3	1	2		259.5	32.01	251.5	50.29	0.004		0.23	0.23	0.005
3	1	13		263.6	32.09	255.4	51.08	0.006		0.39	0.39	0.008
3	2	2		261.8	31.91	253.7	50.74	0.006		0.39	0.39	0.008
3	3	2		259.7	31.92	251.7	50.33	0.007		0.46	0.46	0.009
3	5	2		250.5	31.84	242.8	48.55	0.008		0.54	0.54	0.011
3	5	6		264.6	31.75	256.5	51.29	0.013		0.92	0.92	0.018
3	6	1		251.9	31.68	244.2	48.83	0.011		0.77	0.77	0.016
3	6	8.5		259.4	31.82	251.4	50.28	0.008		0.54	0.54	0.011
3	7	2		249.9	31.74	242.2	48.44	0.011		0.77	0.77	0.016
3	7	2a		253.6	31.73	245.8	49.16	0.013		0.92	0.92	0.019
			Blk Ck1					0.001		0.00		
			Blk Ck2					0		-0.07		
			Blk Ck3					0		-0.07		
			Blk Ck4					0		-0.07		
			Blk Ck5					0.002		0.08		
			Pb Ck1					0.134		10.20		
			Pb Ck2					0.137		10.43		
			Pb Ck3					0.135		10.28		
			Pb Ck4					0.141		10.74		
			Pb Ck5					0.14		10.66		

PNSY Batch 6 (Dissolved)

Batch 6 Cadmium Seep Samples					Date of Analysis:		5/4/94					
Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Cadmium Abs.	Polynomial Factor c	Abs/Conc. Polynomial Equation		Dissolved Cd ug/L
	Milli-Q		Blk	113.9	0.0001	113.9	28.46	0.001	0.0001909	-0.01	-0.01	0.000
	NASS-4			111.1	31.3	107.7	26.92	0.013	-0.0118091	0.37	0.37	0.014
	NASS-4		Spk	104	31.3	100.8	25.20	0.131	-0.1298091	5.03	5.03	0.200
3	Seep 1	Boat		90.14	16.97	88.6	22.16	0.015	-0.0138091	0.43	0.43	0.019
3	Seep 1	Boat	Dup	92.76	16.97	91.2	22.80	0.017	-0.0158091	0.49	0.49	0.022
3	Seep 1	Boat	Spk	94.65	16.97	93.1	23.27	0.134	-0.1328091	5.19	5.19	0.223
1	Seep 1			75.35	12.75	74.4	18.60	0.01	-0.0088091	0.27	0.27	0.015
1	Seep 2			81.53	30.98	79.1	19.77	0.02	-0.0188091	0.59	0.59	0.298
2	Seep 1			82.93	18.6	81.4	20.35	0.024	-0.0228091	0.72	0.72	0.035
2	Seep 1	Rep		76.98	18.6	75.6	18.89	0.021	-0.0198091	0.62	0.62	0.033
2	Seep 2			88.87	30.7	86.2	21.56	0.034	-0.0328091	1.05	1.05	0.486
2	Seep 2	Rep		78.85	30.7	76.5	19.13	0.031	-0.0298091	0.95	0.95	0.495
3	Seep 1			63.25	16.97	62.2	15.55	0.012	-0.0108091	0.33	0.33	0.022
3	Seep 1	Rep		72.92	16.97	71.7	17.93	0.013	-0.0118091	0.37	0.37	0.020
3	Seep 1	Unf		89.14	16.97	87.7	21.91	0.019	-0.0178091	0.56	0.56	0.025
3	Seep 1	Unf	Rep	90.75	16.97	89.2	22.31	0.018	-0.0168091	0.52	0.52	0.024
			Blk Ck1					0.002	-0.0008091	0.03		
			Blk Ck2					0.002	-0.0008091	0.03		
			Blk Ck3					0.004	-0.0028091	0.09		
			Blk Ck4					0.001	0.0001909	-0.01		
			Blk Ck5					0.002	-0.0008091	0.03		
			Cd Ck1					0.133	-0.1318091	5.14		
			Cd Ck2					0.135	-0.1338091	5.25		
			Cd Ck3					0.139	-0.1378091	5.47		
			Cd Ck4					0.138	-0.1368091	5.42		
			Cd Ck5					0.139	-0.1378091	5.47		

Note: Seeps ISS2, IISS2, and II SS2REP concentrations reflect correction of 10 for dilution during analysis.

Batch 6 Copper	SEEP Samples											
Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Copper Abs.	Polynomial Factor c	Abs/Conc. Polynomial Equation		Dissolved Cu ug/L
	Milli-Q		Blk	113.9	0.0001	113.9	28.46	0.001	-0.0013481	0.29	0.29	0.010
	NASS-4			111.1	31.3	107.7	26.92	0.023	-0.0233481	5.01	5.01	0.186
	NASS-4		Spk	104	31.3	100.8	25.20	0.114	-0.1143481	26.11	26.11	1.036
3	Seep 1	Boat		90.14	16.97	88.6	22.16	0.065	-0.0653481	14.41	14.41	0.650
3	Seep 1	Boat	Dup	92.76	16.97	91.2	22.80	0.069	-0.0693481	15.33	15.33	0.672
3	Seep 1	Boat	Spk	94.65	16.97	93.1	23.27	0.164	-0.1643481	39.07	39.07	1.679
1	Seep 1			75.35	12.75	74.4	18.60	0.076	-0.0763481	16.96	16.96	0.912
1	Seep 2			81.53	30.98	79.1	19.77	0.216	-0.2163481	53.98	53.98	10.923
2	Seep 1			82.93	18.6	81.4	20.35	0.101	-0.1013481	22.92	22.92	1.126
2	Seep 1	Rep		76.98	18.6	75.6	18.89	0.086	-0.0863481	19.32	19.32	1.022
2	Seep 2			88.87	30.7	86.2	21.56	0.247	-0.2473481	63.80	63.80	11.840
2	Seep 2	Rep		78.85	30.7	76.5	19.13	0.223	-0.2233481	56.13	56.13	11.740
3	Seep 1			63.25	16.97	62.2	15.55	0.056	-0.0563481	12.35	12.35	0.794
3	Seep 1	Rep		72.92	16.97	71.7	17.93	0.059	-0.0593481	13.03	13.03	0.727
3	Seep 1	Unf		89.14	16.97	87.7	21.91	0.111	-0.1113481	25.37	25.37	1.158
3	Seep 1	Unf	Rep	90.75	16.97	89.2	22.31	0.113	-0.1133481	25.86	25.86	1.159
			Blk Ck1					0.001	-0.0013481	0.29		
			Blk Ck2					0	-0.0003481	0.07		
			Blk Ck3					0	-0.0003481	0.07		
			Blk Ck4					0.001	-0.0013481	0.29		
			Blk Ck5					0.001	-0.0013481	0.29		
			Cu Ck1					0.202	-0.2023481	49.80		
			Cu Ck2					0.199	-0.1993481	48.92		
			Cu Ck3					0.201	-0.2013481	49.50		
			Cu Ck4					0.206	-0.2063481	50.98		
			Cu Ck5					0.204	-0.2043481	50.39		

Note: Seeps ISS2, IISS2, and II SS2REP concentrations reflect correction for dilution during analysis.

PNSY Batch 6 (Dissolved)

Batch 6 Dissolved Iron				Date of Analysis:		10/19/94						
				Sample			Abs/Conc.					
Cruise	Sample	Depth	Sample	Salinity,	Sample	Polynomial	Regression	Dilution		Dissolved Fe		
No.	No.	M	Type	o/oo	Absorban	Factor c	Equation	Factor		ug/L		
	NASS+2			31.3	0.02		2.11			2.11		
3	21	2.5			0.019		1.99	5.00	9.95	9.95		
3	22	1			0.045		5.07	5.00	25.35	25.35		
3	23	5			0.047		5.31	1.00	5.31	5.31		
3	24	2			0.043		4.83	1.00	4.83	4.83		
3	25	2			0.039		4.36	1.00	4.36	4.36		
			Blk Ck1		0.001		-0.14					
			Blk Ck2		0.003		0.09					
			Blk Ck3		0.003		0.09					
			Fe Ck1		0.05		5.66					
			Fe Ck2		0.051		5.78					
			Fe Ck3		0.047		5.31					

Batch 6 Dissolved Manganese				Date of Analysis:	10/19/94							
Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Sample Absorban	Polynomial Factor c	Abs/Conc. Regression Equation		Dissolved Mn ug/L			
	NASS+2			31.3	0.039		2.06	2.06	2.06			
3	11	12			0.032		1.65	1.65	1.65			
3	13	5			0.037		1.95	1.95	1.95			
3	14	2			0.034		1.77	1.77	1.77			
3	15	2			0.034		1.77	1.77	1.77			
3	16	2			0.065		3.59	3.59	3.59			
3	16	10			0.063		3.47	3.47	3.47			
3	17	2			0.045		2.42	2.42	2.42			
3	17	7			0.04		2.12	2.12	2.12			
3	18	2			0.052		2.83	2.83	2.83			
			Blk Ck1		0.007		0.41					
			Blk Ck2		0.006		0.35					
			Blk Ck3		0.009		0.53					
			Mn Ck1		0.033		1.71					
			Mn Ck2		0.034		1.77					
			Mn Ck3		0.04		2.12					

Batch 6 Dissolved Manganese				Date of Analysis:	10/19/94							
Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Sample Absorban	Polynomial Factor c	Abs/Conc. Regression Equation		Dissolved Mn ug/L			
	NASS+10			31.3	0.12		10.62	10.62	10.62			
2	24	2			0.124		10.99	10.99	10.99			
2	24	5			0.094		8.25	8.25	8.25			
3	20	2			0.049		4.13	4.13	4.13			
3	21	2.5			0.114		10.08	10.08	10.08			
3	22	1			0.19		17.03	17.03	17.03			
3	23	5			0.064		5.50	5.50	5.50			
3	24	2			0.068		5.87	5.87	5.87			
3	25	2			0.077		6.69	6.69	6.69			
			Blk Ck1		0.005		0.11					
			Blk Ck2		0.002		-0.16					
			Blk Ck3		0.004		0.02					
			Mn Ck1		0.089		7.79					
			Mn Ck2		0.091		7.97					
			Mn Ck3		0.082		7.15					

Batch 6 Dissolved Nickel (Seeps) Date of Analysis: 5/3/94

Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Nickel Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Dissolved Ni ug/L
	Milli-Q		Blk	113.9	0.0001	113.9	28.46	0.004		0.72	0.72	0.025
	NASS-4			111.1	31.3	107.7	26.92	0.019		5.15	5.15	0.191
	NASS-4		Spk	104	31.3	100.8	25.20	0.093		27.00	27.00	1.072
3	Seep 1	Boat		90.14	16.97	88.6	22.16	0.118		34.39	34.39	1.552
3	Seep 1	Boat	Dup	92.76	16.97	91.2	22.80	0.115		33.50	33.50	1.469
3	Seep 1	Boat	Spk	94.65	16.97	93.1	23.27	0.199		58.31	58.31	2.506
1	Seep 1			75.35	12.75	74.4	18.60	0.08		23.16	23.16	1.245
1	Seep 2			81.53	30.98	79.1	19.77	0.283		83.12	83.12	16.818
2	Seep 1			82.93	18.6	81.4	20.35	0.121		35.27	35.27	1.733
2	Seep 1	Rep		76.98	18.6	75.6	18.89	0.109		31.73	31.73	1.679
2	Seep 2			88.87	30.7	86.2	21.56					27.766
2	Seep 2	Rep		78.85	30.7	76.5	19.13					26.668
3	Seep 1			63.25	16.97	62.2	15.55	0.097		28.19	28.19	1.813
3	Seep 1	Rep		72.92	16.97	71.7	17.93	0.1		29.07	29.07	1.622
3	Seep 1	Unf		89.14	16.97	87.7	21.91	0.123		35.87	35.87	1.637
3	Seep 1	Unf	Rep	90.75	16.97	89.2	22.31	0.126		36.75	36.75	1.647
			Blk Ck1					0.006		1.31		
			Blk Ck2					0		-0.46		
			Blk Ck3					0.003		0.42		
			Blk Ck4					0.005		1.01		
			Blk Ck5					0.003		0.42		
			Ni Ck1					0.146		42.66		
			Ni Ck2					0.145		42.36		
			Ni Ck3					0.145		42.36		
			Ni Ck4					0.151		44.14		
			Ni Ck5					0.149		43.54		

Note: 1. Seeps ISS2, IISS2, and II SS2REP concentrations reflect correction for dilution during analysis.

Note: 2. IISS2 samples were rerun in B8, and brought over from B8 after data crunch.

Batch 6 Dissolved Lead (Seeps)					Date of Analysis:		4/29/94					
Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Lead Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Dissolved Pb ug/L
	Milli-Q		Blk	113.9	0.0001	113.9	28.46	-0.001	0.00013448	-0.01	-0.01	0.000
	NASS-4			111.1	31.3	107.7	26.92	0.001	-0.0018655	0.14	0.14	0.005
	NASS-4		Spk	104	31.3	100.8	25.20	0.23	-0.2308655	18.06	18.06	0.716
3	Seep 1	Boat		90.14	16.97	88.6	22.16	0.01	-0.0108655	0.79	0.79	0.036
3	Seep 1	Boat	Dup	92.76	16.97	91.2	22.80	0.011	-0.0118655	0.86	0.86	0.038
3	Seep 1	Boat	Spk	94.65	16.97	93.1	23.27	0.263	-0.2638655	20.90	20.90	0.898
1	Seep 1			75.35	12.75	74.4	18.60	0.011	-0.0118655	0.86	0.86	0.046
1	Seep 2			81.53	30.98	79.1	19.77	0.212	-0.2128655	16.54	16.54	8.365
2	Seep 1			82.93	18.6	81.4	20.35	0.011	-0.0118655	0.86	0.86	0.042
2	Seep 1	Rep		76.98	18.6	75.6	18.89	0.01	-0.0108655	0.79	0.79	0.042
2	Seep 2			88.87	30.7	86.2	21.56	0.192	-0.1928655	14.88	14.88	6.901
2	Seep 2	Rep		78.85	30.7	76.5	19.13	0.16	-0.1608655	12.27	12.27	6.415
3	Seep 1			63.25	16.97	62.2	15.55	0.006	-0.0068655	0.50	0.50	0.032
3	Seep 1	Rep		72.92	16.97	71.7	17.93	0.007	-0.0078655	0.57	0.57	0.032
3	Seep 1	Unf		89.14	16.97	87.7	21.91	0.045	-0.0458655	3.37	3.37	0.154
3	Seep 1	Unf	Rep	90.75	16.97	89.2	22.31	0.044	-0.0448655	3.30	3.30	0.148
			Blk Ck1					-0.001	0.00013448	-0.01		
			Blk Ck2					-0.002	0.00113448	-0.08		
			Blk Ck3					-0.002	0.00113448	-0.08		
			Blk Ck4					-0.003	0.00213448	-0.15		
			Blk Ck5					-0.003	0.00213448	-0.15		
			Pb Ck1					0.127	-0.1278655	9.64		
			Pb Ck2					0.131	-0.1318655	9.96		
			Pb Ck3					0.132	-0.1328655	10.04		
			Pb Ck4					0.132	-0.1328655	10.04		
			Pb Ck5					0.133	-0.1338655	10.12		

Batch 7 Dissolved Cadmium				Date of Analysis:		5/11/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Cadmium Abs.	Polynomial Factor c	Abs/Conc. Polynomial Equation		Dissolved Cd ug/L
	Milli-Q		Blk	244.2	0.0001	244.2	48.84	0	0.0014091	-0.05	-0.05	-0.001
	NASS-4			249	31.3	241.4	48.29	0.02	-0.0185909	0.66	0.66	0.014
	NASS-4		Spk	239.4	31.3	232.1	46.43	0.107	-0.1055909	4.54	4.54	0.098
3	16	10		223.7	30.63	217.1	43.41	0.036	-0.0345909	1.27	1.27	0.029
3	16	10	Spk	211.5	30.63	205.2	41.04	0.111	-0.1095909	4.77	4.77	0.116
3	16	2		238.7	30.28	231.7	46.34	0.034	-0.0325909	1.19	1.19	0.026
3	16	2	Dup	195	30.28	189.3	37.85	0.031	-0.0295909	1.07	1.07	0.028
3	7	12		246.3	31.74	238.7	47.74	0.033	-0.0315909	1.15	1.15	0.024
3	8	2		249.8	31.83	242.1	48.42	0.033	-0.0315909	1.15	1.15	0.024
3	8	20		250.8	31.78	243.1	48.62	0.034	-0.0325909	1.19	1.19	0.024
3	9	2		249.3	31.75	241.6	48.33	0.032	-0.0305909	1.11	1.11	0.023
3	10	2		255.2	31.7	247.4	49.47	0.031	-0.0295909	1.07	1.07	0.022
3	10	12		254.8	31.7	247.0	49.39	0.034	-0.0325909	1.19	1.19	0.024
3	11	2		260.4	31.72	252.4	50.48	0.036	-0.0345909	1.27	1.27	0.025
3	11	12		265.1	31.74	256.9	51.39	0.036	-0.0345909	1.27	1.27	0.025
3	13	5		248	31.47	240.4	48.09	0.032	-0.0305909	1.11	1.11	0.023
3	14	2		261.9	31.73	253.8	50.77	0.036	-0.0345909	1.27	1.27	0.025
3	15	2		262.9	31.74	254.8	50.96	0.035	-0.0335909	1.23	1.23	0.024
3	17	2		250.4	31.31	242.8	48.56	0.035	-0.0335909	1.23	1.23	0.025
3	17	7		253.6	31.68	245.8	49.16	0.033	-0.0315909	1.15	1.15	0.023
			Blk Ck1					0	0.0014091	-0.05		
			Blk Ck2					-0.001	0.0024091	-0.08		
			Blk Ck3					-0.003	0.0044091	-0.15		
			Blk Ck4					-0.001	0.0024091	-0.08		
			Blk Ck5					0	0.0014091	-0.05		
			Cd Ck1					0.114	-0.1125909	4.95		
			Cd Ck2					0.114	-0.1125909	4.95		
			Cd Ck3					0.116	-0.1145909	5.07		
			Cd Ck4					0.118	-0.1165909	5.20		
			Cd Ck5					0.12	-0.1185909	5.32		

Batch 7 Dissolved Copper				Date of Analysis:		5/16/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Copper Abs.	Polynomial Factor c	Abs/Conc. Polynomial Equation		Dissolved Cu ug/L
	Milli-Q		Blk	244.2	0.0001	244.2	48.84	-0.002		-0.89	-0.89	-0.018
	NASS-4			249	31.3	241.4	48.29	0.04		9.55	9.55	0.198
	NASS-4		Spk	239.4	31.3	232.1	46.43	0.112		27.44	27.44	0.591
3	16	10		223.7	30.63	217.1	43.41	0.057		13.77	13.77	0.317
3	16	10	Spk	211.5	30.63	205.2	41.04	0.124		30.43	30.43	0.741
3	16	2		238.7	30.28	231.7	46.34	0.061		14.77	14.77	0.319
3	16	2	Dup	195	30.28	189.3	37.85	0.053		12.78	12.78	0.338
3	7	12		246.3	31.74	238.7	47.74	0.049		11.78	11.78	0.247
3	8	2		249.8	31.83	242.1	48.42	0.046		11.04	11.04	0.228
3	8	20		250.8	31.78	243.1	48.62	0.048		11.53	11.53	0.237
3	9	2		249.3	31.75	241.6	48.33	0.048		11.53	11.53	0.239
3	10	2		255.2	31.7	247.4	49.47	0.046		11.04	11.04	0.223
3	10	12		254.8	31.7	247.0	49.39	0.05		12.03	12.03	0.244
3	11	2		260.4	31.72	252.4	50.48	0.051		12.28	12.28	0.243
3	11	12		265.1	31.74	256.9	51.39	0.054		13.03	13.03	0.253
3	13	5		248	31.47	240.4	48.09	0.05		12.03	12.03	0.250
3	14	2		261.9	31.73	253.8	50.77	0.054		13.03	13.03	0.257
3	15	2		262.9	31.74	254.8	50.96	0.05		12.03	12.03	0.236
3	17	2		250.4	31.31	242.8	48.56	0.05		12.03	12.03	0.248
3	17	7		253.6	31.68	245.8	49.16	0.044		10.54	10.54	0.214
			Blk Ck1					-0.002		-0.89		
			Blk Ck2					-0.001		-0.65		
			Blk Ck3					-0.002		-0.89		
			Blk Ck4					-0.002		-0.89		
			Blk Ck5					-0.001		-0.65		
			Cu Ck1					0.084		20.48		
			Cu Ck2					0.088		21.48		
			Cu Ck3					0.09		21.97		
			Cu Ck4					0.089		21.73		
			Cu Ck5					0.092		22.47		

Batch 7 Dissolved Iron				Date of Analysis:		10/29/94						
				Sample			Abs/Conc.		Dilutio			
Cruise	Sample		Sample	Salinity,	Sample	Polynomial	Regression	Dilution	Corrected	Dissolved Fe		
No.	No.		Type	o/oo	Absorban	Factor c	Equation	Factor	Concentration	ug/L		
	NASS+10			31.3	0.042		10.66	1.00	10.66	10.66		
1	Seep Site 2				0.039		9.92	1.00	9.92	9.92		
2	Seep Site 2				0.04		10.17	2.00	20.34	20.34		
2	Seep Site 2		Rep		0.041		10.42	2.00	20.83	20.83		
			Blk Ck1		0		0.30					
			Blk Ck2		0		0.30					
			Fe Ck1		0.041		10.42					
			Fe Ck2		0.039		9.92					
Batch 7a Dissolved Iron			Date of Analysis:			10/29/94						
				Sample			Abs/Conc.		Dilutio			
Cruise	Sample		Sample	Salinity,	Sample	Polynomial	Regression	Dilution	Corrected	Dissolved Fe		
No.	No.		Type	o/oo	Absorban	Factor c	Equation	Factor	Concentration	ug/L		
	NASS+20				0.048		20.72					
1	Seep Site 1				0.086		38.14	2	76.29	76.287		
2	Seep Site 1				0.088		39.06	2	78.12	78.122		
2	Seep Site 1		Rep		0.097		43.19	2	86.38	86.376		
3	Seep Site 1				0.149		67.03	2	134.07	134.070		
3	Seep Site 1		Rep		0.153		68.87	2	137.74	137.738		
			Blk Ck1		0.003		0.08					
			Blk Ck2		0.004		0.54					
			Fe Ck1		0.046		19.80					
			Fe Ck2		0.048		20.72					

Batch 7 Dissolved Manganese				Date of Analysis:		33175.000						
				Sample			Abs/Conc.		Dilutio			
Cruise	Sample		Sample	Salinity,	Sample	Polynomial	Regression	Dilution	Corrected	Dissolved Mn		
No.	No.		Type	o/oo	Absorban	Factor c	Equation	Factor	Concentration	ug/L		
	NASS+20			31.3	0.05	-0.049	19.18	1.00	19.18	19.18		
1	Seep Site 1				0.11	-0.109	45.44	5.00	227.22	227.22		
1	Seep Site 2				0.011	-0.010	3.64	2.00	7.28	7.28		
2	Seep Site 1				0.124	-0.123	52.09	5.00	260.44	260.44		
2	Seep Site 1		Rep		0.129	-0.128	54.52	5.00	272.59	272.59		
2	Seep Site 2				0.028	-0.027	10.29	2.00	20.57	20.57		
2	Seep Site 2		Rep		0.034	-0.033	12.68	2.00	25.36	25.36		
3	Seep Site 1				0.171	-0.170	76.30	5.00	381.52	381.52		
3	Seep Site 1		Rep		0.174	-0.173	77.97	5.00	389.84	389.84		
			Blk Ck1		-0.002	0.003	-1.32					
			Blk Ck2		0.002	-0.001	0.19					
			Blk Ck3		0.001	0.000	-0.19					
			Mn Ck1		0.088	-0.087	35.43					
			Mn Ck2		0.098	-0.097	39.92					
			Mn Ck3		0.099	-0.098	40.38					

Batch 7 Dissolved Nickel				Date of Analysis:		5/23/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Nickel Abs.	Polynomial Factor c	Abs/Conc. Polynomial Equation		Dissolved Ni ug/L
	Milli-Q		Blk	244.2	0.0001	244.2	48.84	0.002		0.65	0.65	0.013
	NASS-4			249	31.3	241.4	48.29	0.034		9.38	9.38	0.194
	NASS-4		Spk	239.4	31.3	232.1	46.43	0.094		25.75	25.75	0.555
3	16	10		223.7	30.63	217.1	43.41	0.046		12.66	12.66	0.292
3	16	10	Spk	211.5	30.63	205.2	41.04	0.104		28.48	28.48	0.694
3	16	2		238.7	30.28	231.7	46.34	0.05		13.75	13.75	0.297
3	16	2	Dup	195	30.28	189.3	37.85	0.044		12.11	12.11	0.320
3	7	12		246.3	31.74	238.7	47.74	0.05		13.75	13.75	0.288
3	8	2		249.8	31.83	242.1	48.42	0.05		13.75	13.75	0.284
3	8	20		250.8	31.78	243.1	48.62	0.052		14.29	14.29	0.294
3	9	2		249.3	31.75	241.6	48.33	0.048		13.20	13.20	0.273
3	10	2		255.2	31.7	247.4	49.47	0.047		12.93	12.93	0.261
3	10	12		254.8	31.7	247.0	49.39	0.051		14.02	14.02	0.284
3	11	2		260.4	31.72	252.4	50.48	0.048		13.20	13.20	0.262
3	11	12		265.1	31.74	256.9	51.39	0.054		14.84	14.84	0.289
3	13	5		248	31.47	240.4	48.09	0.047		12.93	12.93	0.269
3	14	2		261.9	31.73	253.8	50.77	0.049		13.48	13.48	0.265
3	15	2		262.9	31.74	254.8	50.96	0.05		13.75	13.75	0.270
3	17	2		250.4	31.31	242.8	48.56	0.051		14.02	14.02	0.289
3	17	7		253.6	31.68	245.8	49.16	0.049		13.48	13.48	0.274
			Blk Ck1					0.001		0.38		
			Blk Ck2					0.003		0.93		
			Blk Ck3					0.001		0.38		
			Blk Ck4					-0.002		-0.44		
			Blk Ck5					0.003		0.93		
			Ni Ck1					0.078		21.39		
			Ni Ck2					0.078		21.39		
			Ni Ck3					0.078		21.39		
			Ni Ck4					0.08		21.93		
			Ni Ck5					0.081		22.21		

Batch 7 Dissolved Lead Date of Analysis: 8/12/94

Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Lead Abs.	Polynomial Factor c	Abs/Conc. Polynomial Equation		Dissolved Pb ug/L
	Milli-Q		Blk	244.2	0.0001	244.2	48.84	0		-0.16	-0.16	-0.003
	NASS-4			249	31.3	241.4	48.29	0.003		0.07	0.07	0.001
	NASS-4		Spk	239.4	31.3	232.1	46.43	0.221		16.53	16.53	0.356
3	16	10		223.7	30.63	217.1	43.41	0.012		0.75	0.75	0.017
3	16	10	Spk	211.5	30.63	205.2	41.04	0.249		18.64	18.64	0.454
3	16	2		238.7	30.28	231.7	46.34	0.013		0.82	0.82	0.018
3	16	2	Dup	195	30.28	189.3	37.85	0.012		0.75	0.75	0.020
3	7	12		246.3	31.74	238.7	47.74	0.013		0.82	0.82	0.017
3	8	2		249.8	31.83	242.1	48.42	0.01		0.60	0.60	0.012
3	8	20		250.8	31.78	243.1	48.62	0.009		0.52	0.52	0.011
3	9	2		249.3	31.75	241.6	48.33	0.009		0.52	0.52	0.011
3	10	2		255.2	31.7	247.4	49.47	0.009		0.52	0.52	0.011
3	10	12		254.8	31.7	247.0	49.39	0.011		0.67	0.67	0.014
3	11	2		260.4	31.72	252.4	50.48	0.009		0.52	0.52	0.010
3	11	12		265.1	31.74	256.9	51.39	0.01		0.60	0.60	0.012
3	13	5		248	31.47	240.4	48.09	0.011		0.67	0.67	0.014
3	14	2		261.9	31.73	253.8	50.77	0.012		0.75	0.75	0.015
3	15	2		262.9	31.74	254.8	50.96	0.01		0.60	0.60	0.012
3	17	2		250.4	31.31	242.8	48.56	0.013		0.82	0.82	0.017
3	17	7		253.6	31.68	245.8	49.16	0.013		0.82	0.82	0.017
			Blk Ck1					0.002		-0.01		
			Blk Ck2					0.002		-0.01		
			Blk Ck3					0		-0.16		
			Blk Ck4					-0.002		-0.31		
			Blk Ck5					-0.002		-0.31		
			Pb Ck1					0.14		10.41		
			Pb Ck2					0.145		10.79		
			Pb Ck3					0.148		11.02		
			Pb Ck4					0.152		11.32		
			Pb Ck5					0.152		11.32		

Batch 6 Particulate Al, Fe, Mn				Date of Analysis:		12/22/94											
Cruise No.	Station No.	Depth M	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Al ICP Conc, ug/ml	Fe ICP Conc, ug/ml	Mn ICP Conc, ug/ml	Dilution Factor	Dilution Corrected Al, ug/ml	Dilution Corrected Fe, ug/ml	Dilution Corrected Mn, ug/ml	Particulate Al, mg/g	Particulate Fe, mg/g	Particulate Mn, mg/g
	MESS-1	30D	LCS		231	500.0	462.00	5.474	9.547	0.126	1	5.474	9.547	.126	11.85	20.66	0.27
3	9	2		31.75	0.79	500.1	1.58	1.987	2.054	0.042	2.67	5.305	5.484	.112	26.86	27.77	0.57
3	10	2		31.7	0.6	490.7	1.22	2.267	2.257	0.052	2.67	6.053	6.026	.139	40.35	40.17	0.93
3	10	12		31.7	0.64	487.5	1.31	2.12	2.244	0.052	2.67	5.660	5.991	.139	35.38	37.45	0.87
3	11	2		31.72	0.74	443.8	1.67	2.022	2.119	0.039	2.67	5.399	5.658	.104	29.18	30.58	0.56
3	11	12		31.74	0.66	488.5	1.35	2.11	2.324	0.054	2.67	5.634	6.205	.144	34.14	37.61	0.87
3	13	5		31.47	0.92	485.4	1.90	2.27	2.567	0.068	2.67	6.061	6.854	.182	26.35	29.80	0.79
3	14	2		31.73	0.9	487.7	1.85	1.944	2.34	0.048	2.67	5.190	6.248	.128	23.07	27.77	0.57
3	15	2		31.74	1.1	482.1	2.28	2.154	2.428	0.053	2.67	5.751	6.483	.142	20.91	23.57	0.51
3	16	2		30.28	0.89	486.6	1.83	2.422	2.57	0.042	2.67	6.467	6.862	.112	29.06	30.84	0.50
3	16	10		30.63	0.91	485.6	1.87	2.244	2.909	0.056	2.67	5.991	7.767	.150	26.34	34.14	0.66
3	17	2		31.31	0.66	479.5	1.38	1.959	2.222	0.04	2.67	5.231	5.933	.107	31.70	35.96	0.65
3	17	7		31.68	0.74	507.4	1.46	1.946	2.275	0.035	2.67	5.196	6.074	.093	28.09	32.83	0.51
3	18	2		31.27	0.88	512.7	1.72	2.441	2.784	0.052	2.67	6.517	7.433	.139	29.62	33.79	0.63
3	20	2		29.85	1.06	491.6	2.16	2.623	3.18	0.052	2.67	7.003	8.491	.139	26.43	32.04	0.52
3	21	2.5		25.32	2.45	489.6	5.00	5.576	6.435	0.091	2.67	14.888	22.521	.243	24.31	36.77	0.40

Batch 6 Particulate Cadmium				Date of Analysis:		9/26/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Cadmium Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Particulate Cd ug/g
	ProBlk3											
	MESS-1	30D			231	500.0	462.00	0.012	-0.0084507	0.25	0.55	0.55
	MESS-1	30D	Spk		231	500.0	462.00	0.146	-0.1424507	5.56	12.03	12.03
3	9	2		31.75	0.79	500.1	1.58	0.005	-0.0014507	0.04	0.22	0.22
3	10	2		31.7	0.6	490.7	1.22	0.006	-0.0024507	0.07	0.49	0.49
3	10	12		31.7	0.64	487.5	1.31	0.006	-0.0024507	0.07	0.46	0.46
3	11	2		31.72	0.74	443.8	1.67	0.006	-0.0024507	0.07	0.39	0.39
3	11	12		31.74	0.66	488.5	1.35	0.006	-0.0024507	0.07	0.44	0.44
3	13	5		31.47	0.92	485.4	1.90	0.009	-0.0054507	0.16	0.71	0.71
3	14	2		31.73	0.9	487.7	1.85	0.008	-0.0044507	0.13	0.59	0.59
3	15	2		31.74	1.1	482.1	2.28	0.008	-0.0044507	0.13	0.48	0.48
3	16	2		30.28	0.89	486.6	1.83	0.005	-0.0014507	0.04	0.19	0.19
3	16	10		30.63	0.91	485.6	1.87	0.005	-0.0014507	0.04	0.19	0.19
3	17	2		31.31	0.66	479.5	1.38	0.006	-0.0024507	0.07	0.44	0.44
3	17	7		31.68	0.74	507.4	1.46	0.007	-0.0034507	0.10	0.55	0.55
3	18	2		31.27	0.88	512.7	1.72	0.007	-0.0034507	0.10	0.47	0.47
3	20	2		29.85	1.06	491.6	2.16	0.006	-0.0024507	0.07	0.27	0.27
3	21	2.5		25.32	2.45	489.6	5.00	0.018	-0.0144507	0.44	0.71	0.71
			Blk Ck1					0.001	0.0025493	-0.08		
			Blk Ck2					0.001	0.0025493	-0.08		
			Blk Ck3					0.004	-0.0004507	0.01		
			Blk Ck4					0.001	0.0025493	-0.08		
			Blk Ck5					0.002	0.0015493	-0.05		
			Cd Ck1					0.139	-0.1354507	5.17		
			Cd Ck2					0.139	-0.1354507	5.17		
			Cd Ck3					0.142	-0.1384507	5.33		
			Cd Ck4					0.142	-0.1384507	5.33		
			Cd Ck5					0.142	-0.1384507	5.33		

Batch 6 Particulate Copper — Date of Analysis: 7/13/94

Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Copper Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Particulate Cu ug/g
	ProBlk3							0		-.411		-0.4
	MESS-1	30D			231	500.0	462.00	0.034		9.572	20.72	20.7
	MESS-1	30D	Spk		231	500.0	462.00	0.104		30.126	65.21	65.2
3	9	2		31.75	0.79	500.1	1.58	0.024		6.636	33.60	33.6
3	10	2		31.7	0.6	490.7	1.22	0.023		6.342	42.28	42.3
3	10	12		31.7	0.64	487.5	1.31	0.022		6.049	37.80	37.8
3	11	2		31.72	0.74	443.8	1.67	0.02		5.461	29.52	29.5
3	11	12		31.74	0.66	488.5	1.35	0.022		6.049	36.66	36.7
3	13	5		31.47	0.92	485.4	1.90	0.026		7.223	31.41	31.4
3	14	2		31.73	0.9	487.7	1.85	0.024		6.636	29.49	29.5
3	15	2		31.74	1.1	482.1	2.28	0.026		7.223	26.27	26.3
3	16	2		30.28	0.89	486.6	1.83	0.025		6.930	31.14	31.1
3	16	10		30.63	0.91	485.6	1.87	0.027		7.517	33.04	33.0
3	17	2		31.31	0.66	479.5	1.38	0.024		6.636	40.22	40.2
3	17	7		31.68	0.74	507.4	1.46	0.026		7.223	39.04	39.0
3	18	2		31.27	0.88	512.7	1.72	0.031		8.691	39.51	39.5
3	20	2		29.85	1.06	491.6	2.16	0.032		8.985	33.91	33.9
3	21	2.5		25.32	2.45	489.6	5.00	0.085		24.547	40.08	40.1
			Blk Ck1					0		-.411		
			Blk Ck2					0		-.411		
			Blk Ck3					-0.001		-.705		
			Blk Ck4					-0.001		-.705		
			Blk Ck5					-0.001		-.705		
			Cu Ck1					0.071		20.436		
			Cu Ck2					0.073		21.024		
			Cu Ck3					0.073		21.024		
			Cu Ck4					0.074		21.317		
			Cu Ck5					0.075		21.611		

Batch 6 Particulate Nickel — Date of Analysis: 7/21/94

Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Nickel Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Particulate Ni ug/g
	ProBlk3							-0.003		-.271		-0.3
	MESS-1	30D			231	500.0	462.00	0.028		10.222	22.13	22.1
	MESS-1	30D	Spk		231	500.0	462.00	0.089		30.870	66.82	66.8
3	9	2		31.75	0.79	500.1	1.58	0.013		5.145	26.05	26.1
3	10	2		31.7	0.6	490.7	1.22	0.015		5.822	38.81	38.8
3	10	12		31.7	0.64	487.5	1.31	0.013		5.145	32.16	32.2
3	11	2		31.72	0.74	443.8	1.67	0.013		5.145	27.81	27.8
3	11	12		31.74	0.66	488.5	1.35	0.014		5.484	33.23	33.2
3	13	5		31.47	0.92	485.4	1.90	0.015		5.822	25.31	25.3
3	14	2		31.73	0.9	487.7	1.85	0.014		5.484	24.37	24.4
3	15	2		31.74	1.1	482.1	2.28	0.015		5.822	21.17	21.2
3	16	2		30.28	0.89	486.6	1.83	0.015		5.822	26.17	26.2
3	16	10		30.63	0.91	485.6	1.87	0.015		5.822	25.59	25.6
3	17	2		31.31	0.66	479.5	1.38	0.012		4.807	29.13	29.1
3	17	7		31.68	0.74	507.4	1.46	0.011		4.468	24.15	24.2
3	18	2		31.27	0.88	512.7	1.72	0.018		6.837	31.08	31.1
3	20	2		29.85	1.06	491.6	2.16	0.02		7.514	28.36	28.4
3	21	2.5		25.32	2.45	489.6	5.00	0.043		15.300	24.98	25.0
			Blk Ck1					-0.003		-.271		
			Blk Ck2					0		.745		
			Blk Ck3					-0.001		.406		
			Blk Ck4					-0.004		-.609		
			Blk Ck5					0		.745		
			Ni Ck1					0.057		20.039		
			Ni Ck2					0.061		21.393		
			Ni Ck3					0.06		21.054		
			Ni Ck4					0.059		20.716		
			Ni Ck5					0.064		22.408		

Batch 6 Particulate Lead — Date of Analysis: 7/27/94

Cruise No.	Sample No.	Depth M	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	Lead Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Particulate Pb ug/g
	ProBlk									-.682		-0.7
	MESS-1	30D			231	500.0	462.00	0.057		12.273	26.56	26.6
	MESS-1	30D	Spk		231	500.0	462.00	0.139		30.909	66.90	66.9
3	9	2		31.75	0.79	500.1	1.58	0.04		8.409	42.58	42.6
3	10	2		31.7	0.6	490.7	1.22	0.052		11.136	74.24	74.2
3	10	12		31.7	0.64	487.5	1.31	0.05		10.682	66.76	66.8
3	11	2		31.72	0.74	443.8	1.67	0.047		10.000	54.05	54.1
3	11	12		31.74	0.66	488.5	1.35	0.053		11.364	68.87	68.9
3	13	5		31.47	0.92	485.4	1.90	0.058		12.500	54.35	54.3
3	14	2		31.73	0.9	487.7	1.85	0.049		10.455	46.46	46.5
3	15	2		31.74	1.1	482.1	2.28	0.048		10.227	37.19	37.2
3	16	2		30.28	0.89	486.6	1.83	0.056		12.045	54.14	54.1
3	16	10		30.63	0.91	485.6	1.87	0.062		13.409	58.94	58.9
3	17	2		31.31	0.66	479.5	1.38	0.048		10.227	61.98	62.0
3	17	7		31.68	0.74	507.4	1.46	0.044		9.318	50.37	50.4
3	18	2		31.27	0.88	512.7	1.72	0.063		13.636	61.98	62.0
3	20	2		29.85	1.06	491.6	2.16	0.068		14.773	55.75	55.7
3	21	2.5		25.32	2.45	489.6	5.00	0.191		42.727	69.76	69.8

Batch 8 Dissolved Cadmium				Date of Analysis:		5/11/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Cadmium Abs.	Polynomial Factor c	Abs/Conc. Polynomial Equation		Dissolved Cd ug/L
	Milli-Q		Blk	250.3	0.0001	250.3	50.06	0.001	0.0006818	-0.02	-0.02	0.000
	NASS-4			237.2	31.3	230.0	46.00	0.018	-0.0163182	0.61	0.61	0.013
	NASS-4		Spk	246.6	31.3	239.1	47.82	0.112	-0.1103182	5.04	5.04	0.105
3	24	2		217.4	28.61	211.4	42.27	0.035	-0.0333182	1.29	1.29	0.030
3	24	2	Spk	215.6	28.61	209.6	41.92	0.118	-0.1163182	5.41	5.41	0.129
3	23	5		218.7	28.89	212.6	42.51	0.036	-0.0343182	1.33	1.33	0.031
3	23	5	Dup	207	28.89	201.2	40.24	0.037	-0.0353182	1.37	1.37	0.034
3	18	2		234.6	31.27	227.5	45.50	0.035	-0.0333182	1.29	1.29	0.028
3	20	2		241.1	29.85	234.1	46.82	0.037	-0.0353182	1.37	1.37	0.029
3	21	2.5		242.6	25.32	236.6	47.32	0.038	-0.0363182	1.41	1.41	0.030
3	22	1		201.2	19.65	197.3	39.46	0.03	-0.0283182	1.08	1.08	0.027
3	25	2		251.1	27.97	244.3	48.85	0.043	-0.0413182	1.62	1.62	0.033

Batch 8 Dissolved Copper				Date of Analysis:		5/16/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Copper Abs.	Polynomial Factor c	Abs/Conc. Polynomial Equation		Dissolved Cu ug/L
	Milli-Q		Blk	250.3	0.0001	250.3	50.06	-0.002	0.00146364	-0.30	-0.30	-0.006
	NASS-4			237.2	31.3	230.0	46.00	0.04	-0.0405364	8.53	8.53	0.185
	NASS-4		Spk	246.6	31.3	239.1	47.82	0.126	-0.1265364	28.50	28.50	0.596
3	24	2		217.4	28.61	211.4	42.27	0.072	-0.0725364	15.63	15.63	0.370
3	24	2	Spk	215.6	28.61	209.6	41.92	0.145	-0.1455364	33.35	33.35	0.796
3	23	5		218.7	28.89	212.6	42.51	0.065	-0.0655364	14.04	14.04	0.330
3	23	5	Dup	207	28.89	201.2	40.24	0.066	-0.0665364	14.27	14.27	0.355
3	18	2		234.6	31.27	227.5	45.50	0.062	-0.0625364	13.37	13.37	0.294
3	20	2		241.1	29.85	234.1	46.82	0.072	-0.0725364	15.63	15.63	0.334
3	21	2.5		242.6	25.32	236.6	47.32	0.093	-0.0935364	20.49	20.49	0.433
3	22	1		201.2	19.65	197.3	39.46	0.084	-0.0845364	18.38	18.38	0.466
3	25	2		251.1	27.97	244.3	48.85	0.083	-0.0835364	18.15	18.15	0.372

Batch 8 Dissolved Nickel				Date of Analysis:		5/23/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Nickel Abs.	Polynomial Factor c	Abs/Conc. Polynomial Equation		Dissolved Ni ug/L
	Milli-Q		Blk	250.3	0.0001	250.3	50.06	0.002		0.26	0.26	0.005
	NASS-4			237.2	31.3	230.0	46.00	0.036		9.11	9.11	0.198
	NASS-4		Spk	246.6	31.3	239.1	47.82	0.111		28.62	28.62	0.599
3	24	2		217.4	28.61	211.4	42.27	0.06		15.35	15.35	0.363
3	24	2	Spk	215.6	28.61	209.6	41.92	0.13		33.57	33.57	0.801
3	23	5		218.7	28.89	212.6	42.51	0.058		14.83	14.83	0.349
3	23	5	Dup	207	28.89	201.2	40.24	0.055		14.05	14.05	0.349
3	18	2		234.6	31.27	227.5	45.50	0.061		15.61	15.61	0.343
3	20	2		241.1	29.85	234.1	46.82	0.064		16.39	16.39	0.350
3	21	2.5		242.6	25.32	236.6	47.32	0.083		21.34	21.34	0.451
3	22	1		201.2	19.65	197.3	39.46	0.076		19.52	19.52	0.495
3	25	2		251.1	27.97	244.3	48.85	0.068		17.43	17.43	0.357
2	Seep 2			88.87	30.7	86.2	21.56	0.116		29.93	29.93	27.766
2	Seep 2	Rep		78.85	30.7	76.5	19.13	0.099		25.50	25.50	26.668
			Blk Ck1					0.001		0.00		
			Blk Ck2					0.004		0.78		
			Blk Ck3					0.004		0.78		
			Blk Ck4					0.007		1.56		
			Blk Ck5					0.006		1.30		
			Ni Ck1					0.08		20.56		
			Ni Ck2					0.083		21.34		
			Ni Ck3					0.084		21.60		
			Ni Ck4					0.088		22.64		
			Ni Ck5					0.085		21.86		

Batch 8 Dissolved Lead				Date of Analysis:		8/12/94						
Cruise No.	Sample No.	Depth M	Sample Type	Sample Wt., g	Sample Salinity, o/oo	Sample Wt. Salinity Correction	Pre-Concentration Factor	Lead Abs.	Polynomial Factor c	Abs/Conc. Regression Equation		Dissolved Pb ug/L
	Milli-Q		Blk	250.3	0.0001	250.3	50.06	-0.001		-0.21	-0.21	-0.004
	NASS-4			237.2	31.3	230.0	46.00	0.003		0.07	0.07	0.001
	NASS-4		Spk	246.6	31.3	239.1	47.82	0.273		19.00	19.00	0.397
3	24	2		217.4	28.61	211.4	42.27	0.014		0.84	0.84	0.020
3	24	2	Spk	215.6	28.61	209.6	41.92	0.281		19.56	19.56	0.467
3	23	5		218.7	28.89	212.6	42.51	0.016		0.98	0.98	0.023
3	23	5	Dup	207	28.89	201.2	40.24	0.017		1.05	1.05	0.026
3	18	2		234.6	31.27	227.5	45.50	0.02		1.26	1.26	0.028
3	20	2		241.1	29.85	234.1	46.82	0.014		0.84	0.84	0.018
3	21	2.5		242.6	25.32	236.6	47.32	0.028		1.82	1.82	0.038
3	22	1		201.2	19.65	197.3	39.46	0.032		2.10	2.10	0.053
3	25	2		251.1	27.97	244.3	48.85	0.015		0.91	0.91	0.019

List of Figures for Cruise 1

Figure Number	Description
1	Cruise #1: Sampling Locations
2	Cruise #1: Particulate Concentration vs. Salinity
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4	Cruise #1: Dissolved and Particulate Copper vs. Salinity
5	Cruise #1: Dissolved and Particulate Nickel vs. Salinity
6	Cruise #1: Dissolved and Particulate Lead vs. Salinity
7	Cruise #1: Dissolved and Particulate Iron vs. Salinity
8	Cruise #1: Dissolved and Particulate Manganese vs. Salinity
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13a	Cruise #1: Dissolved Lead vs. Salinity under Different Tidal Regimes
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14a	Cruise #1: Dissolved Iron vs. Salinity under Different Tidal Regimes
14b	Cruise #1: Particulate Iron vs. Salinity under Different Tidal Regimes
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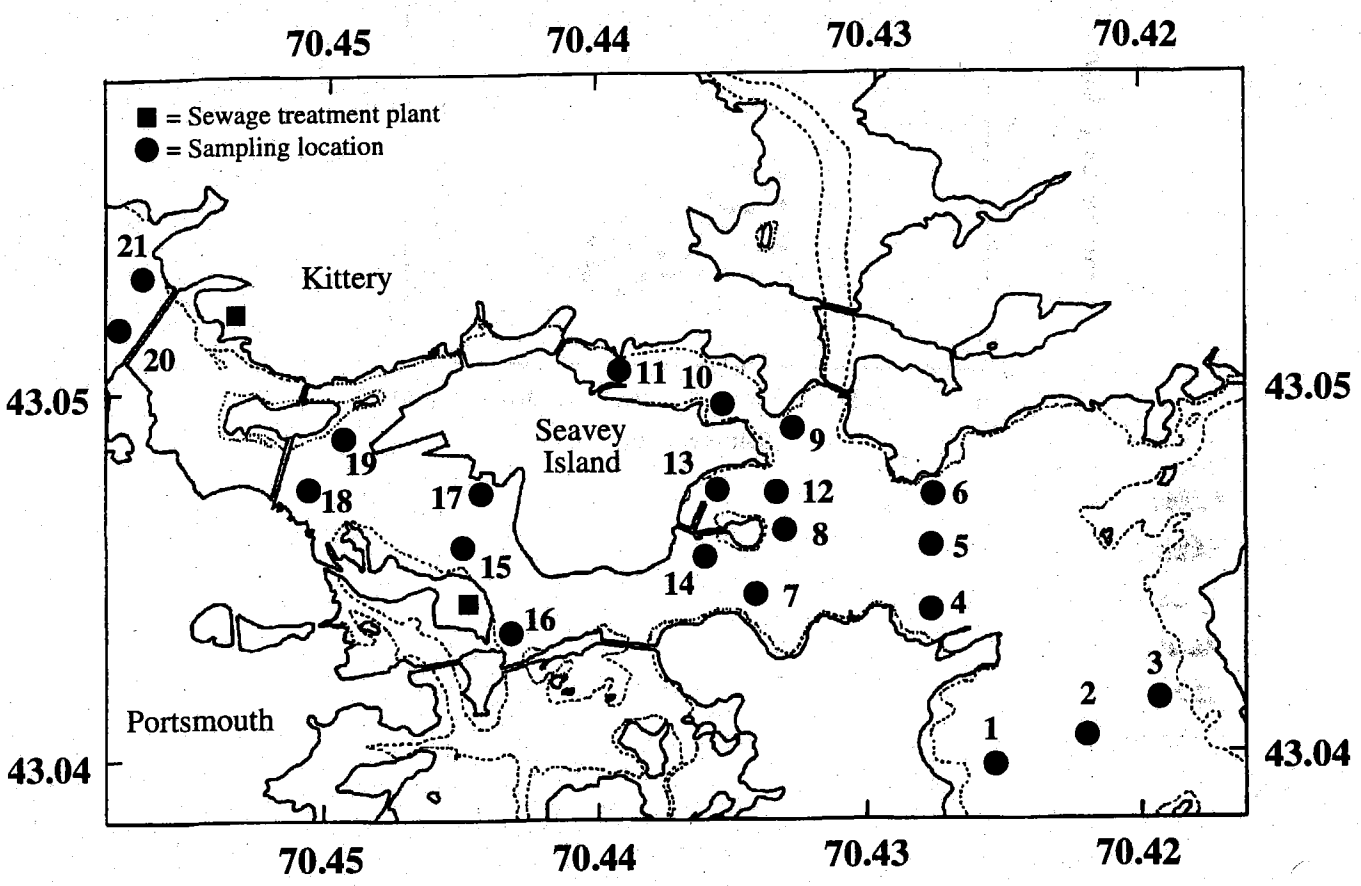
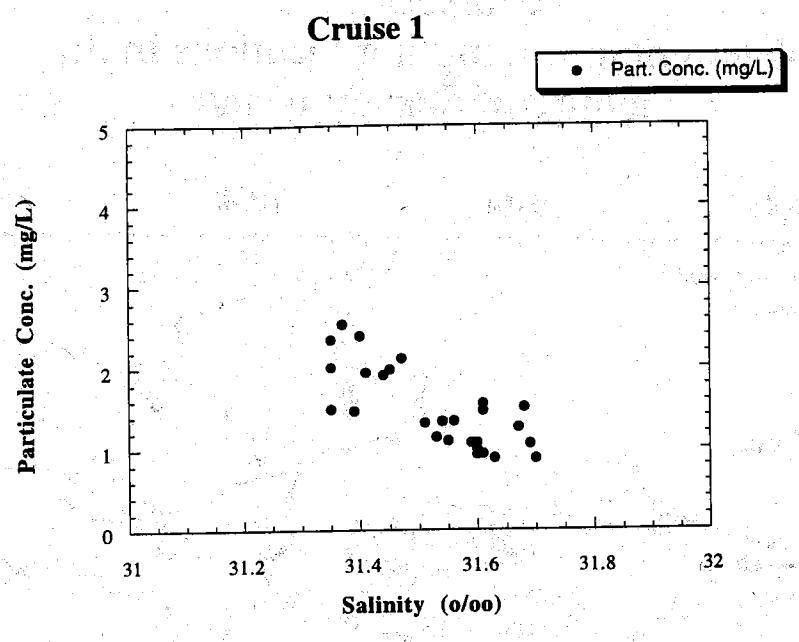
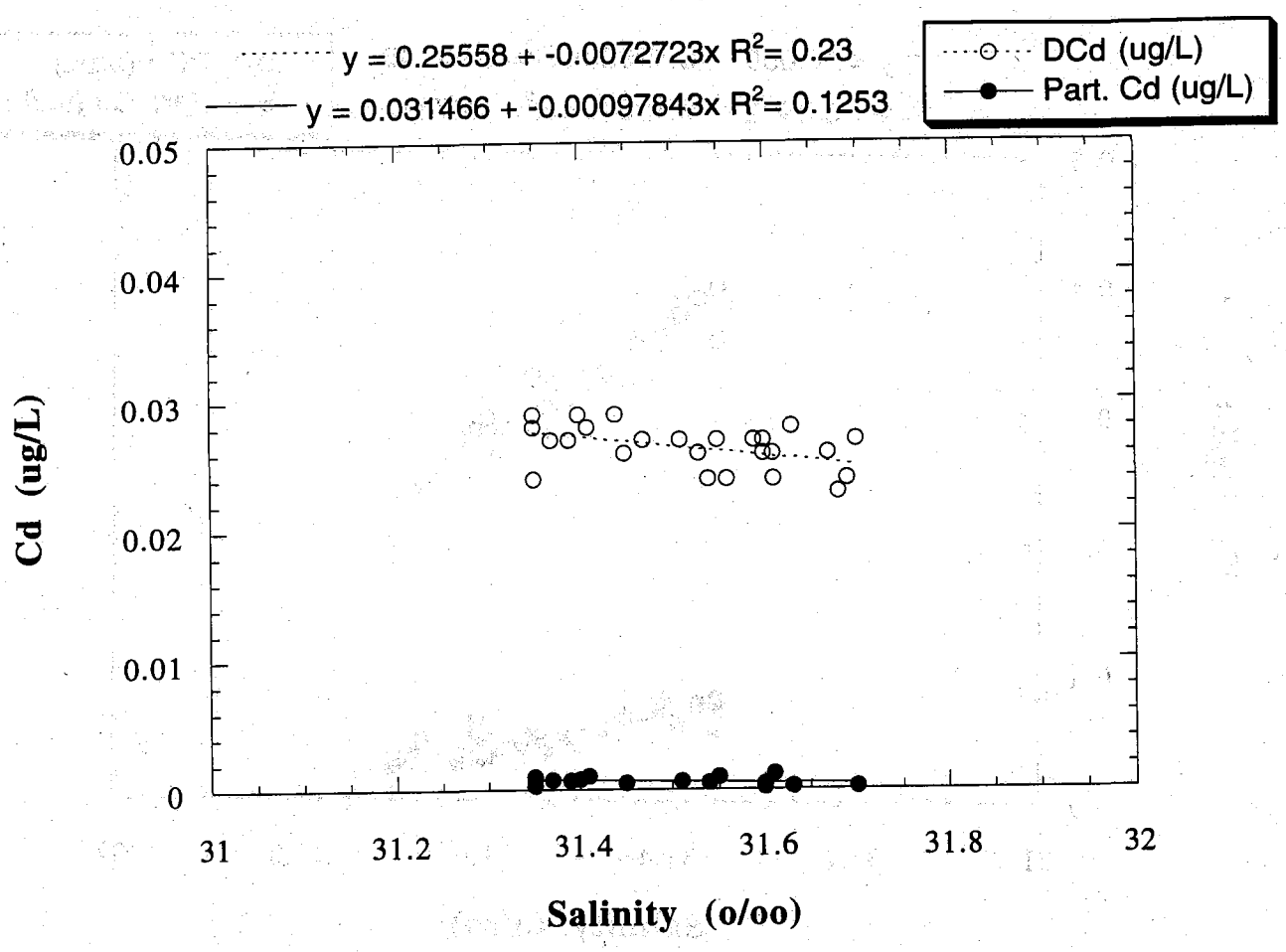
16	Cruise #1: Particulate Aluminum vs. Salinity under Different Tidal Regimes

Cruise 1
Water column sampling locations in the vicinity of Seavey Island

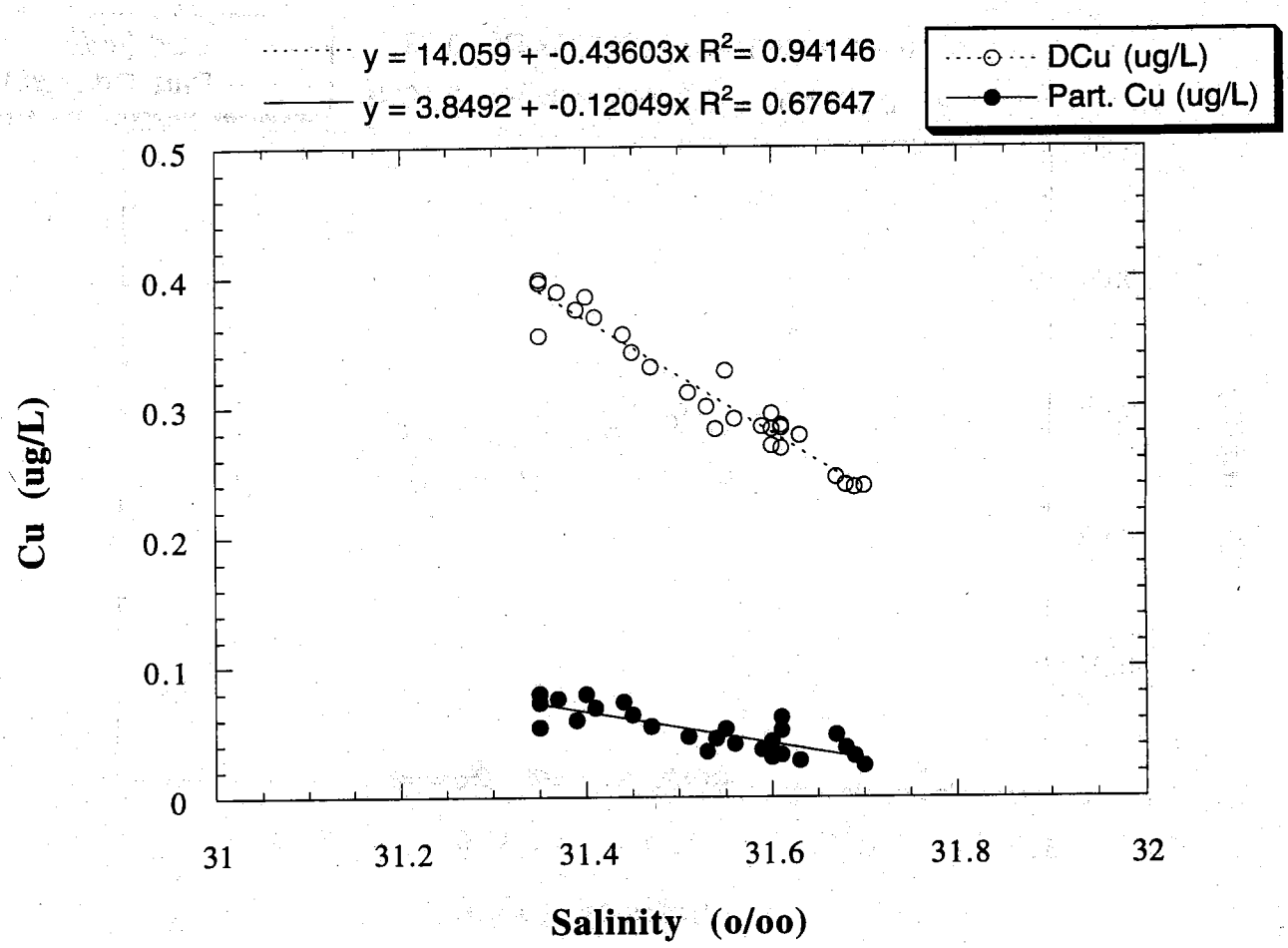



Cruise 1
Part. Conc. (mg/L)
Particulate Conc. (mg/L)
0
1
2
3
4
5
31
31.2
31.4
31.6
31.8
32
Salinity (o/oo)

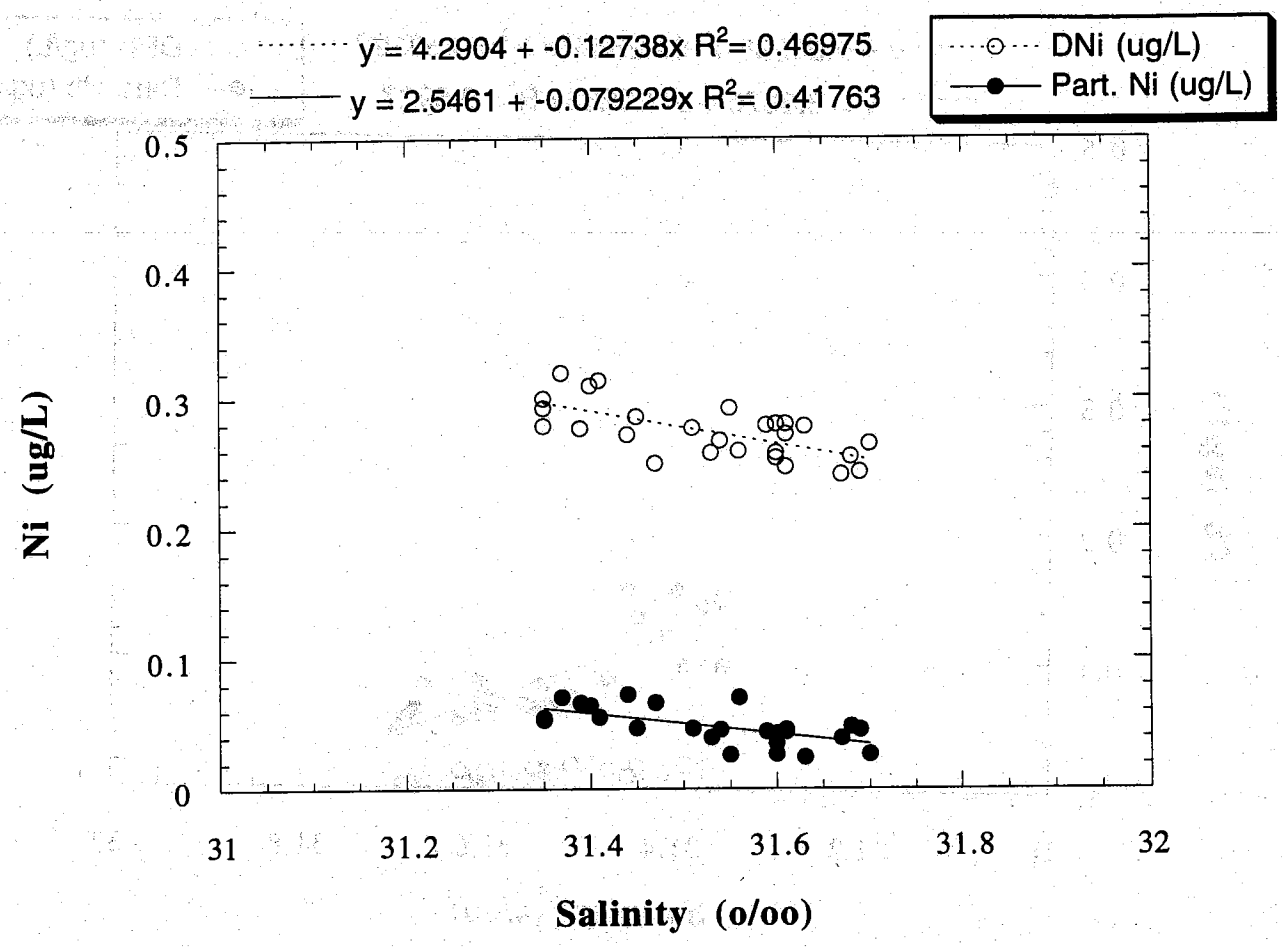
Cruise 1


y = 0.25558 + -0.0072723x R²= 0.23
y = 0.031466 + -0.00097843x R²= 0.1253
DCd (ug/L)
Part. Cd (ug/L)
0.05
0.04
0.03
0.02
0.01
0
Cd (ug/L)
31
31.2
31.4
31.6
31.8
32
Salinity (o/oo)

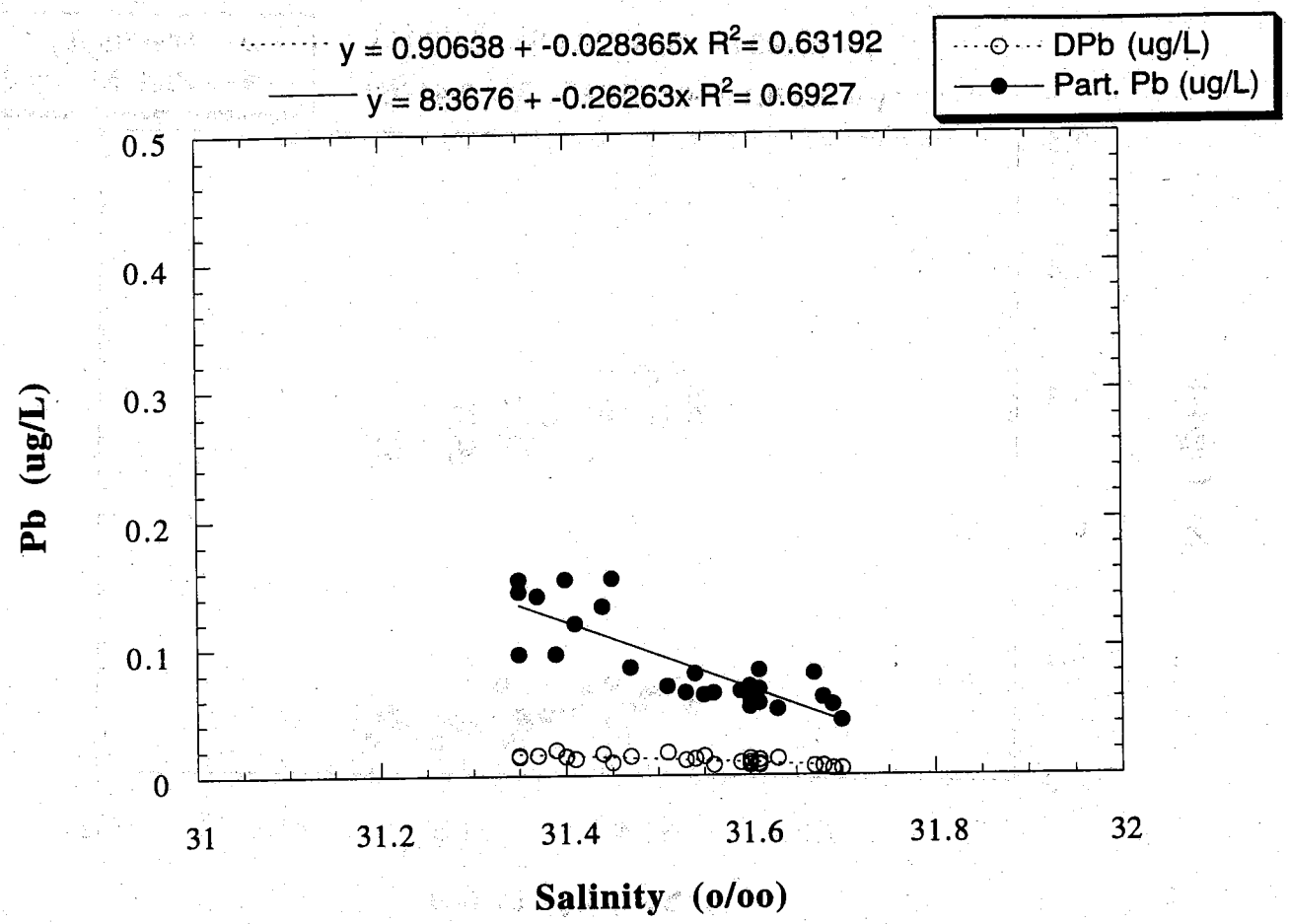
Cruise 1


y = 14.059 + -0.43603x R2= 0.94146
y = 3.8492 + -0.12049x R2= 0.67647
DCu (ug/L)
Part. Cu (ug/L)
0.5
0.4
0.3
0.2
0.1
0
Cu (ug/L)
31
31.2
31.4
31.6
31.8
32
Salinity (o/oo)

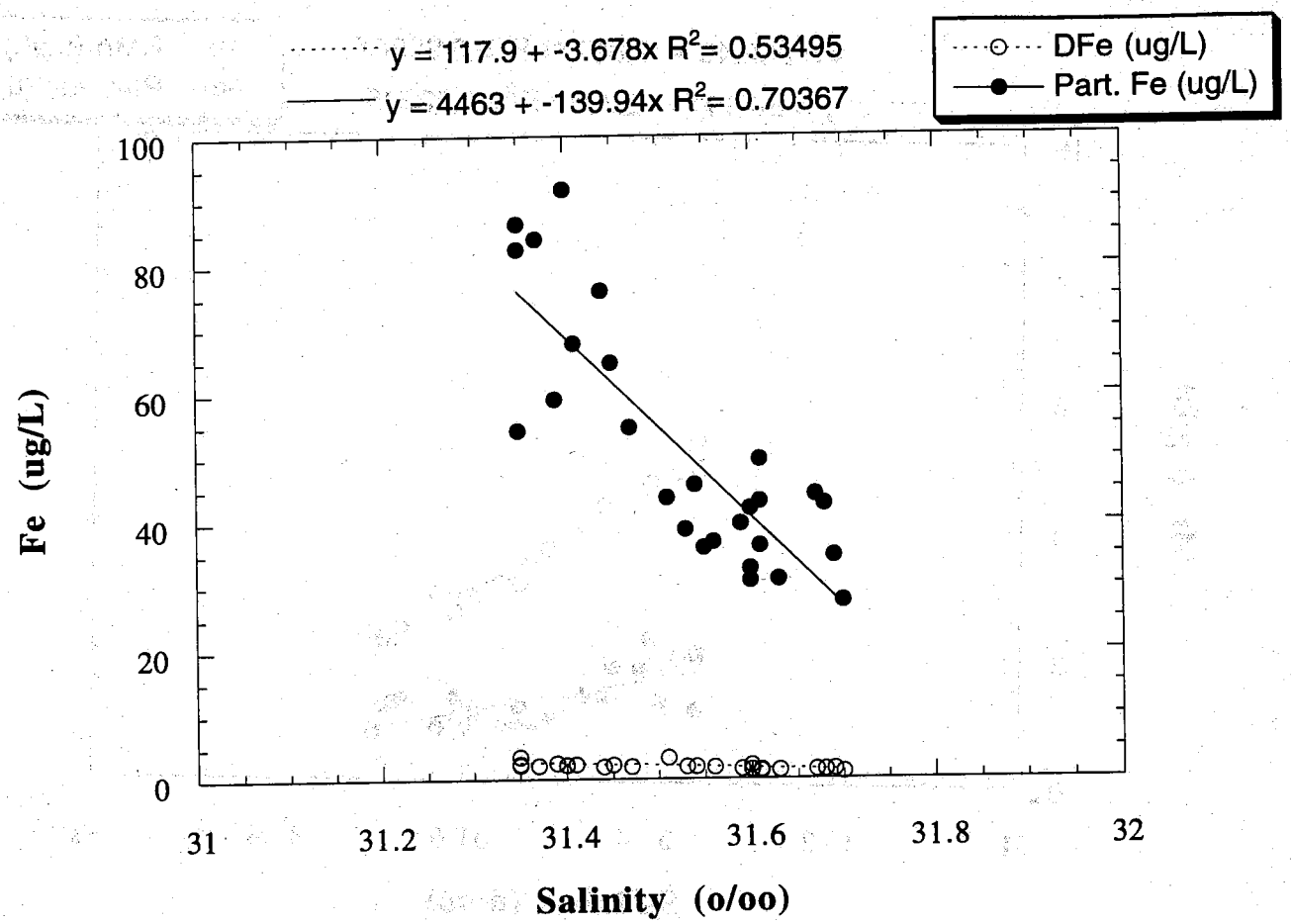
Cruise 1


y = 4.2904 + -0.12738x R²= 0.46975
y = 2.5461 + -0.079229x R²= 0.41763
DNi (ug/L)
Part. Ni (ug/L)
0.5
0.4
0.3
0.2
0.1
0
Ni (ug/L)
31
31.2
31.4
31.6
31.8
32
Salinity (o/oo)

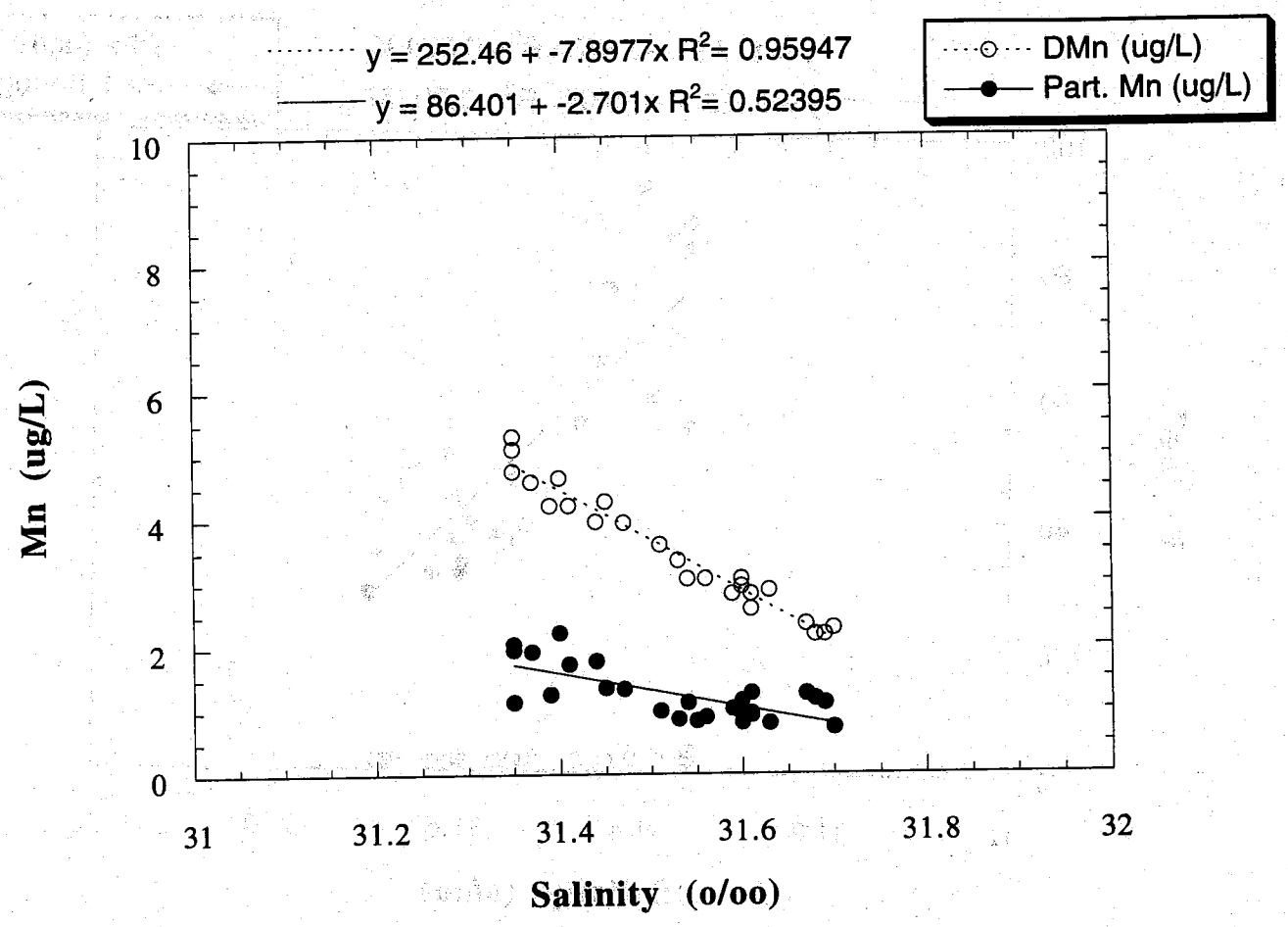
Cruise 1

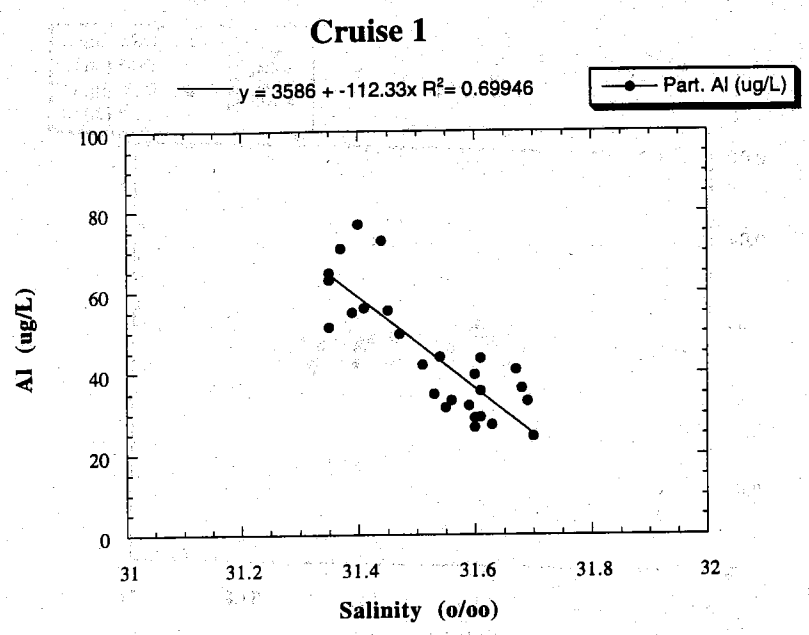

y = 0.90638 + -0.028365x R2= 0.63192
y = 8.3676 + -0.26263x R2= 0.6927
DPb (ug/L)
Part. Pb (ug/L)
0.5
0.4
0.3
0.2
0.1
0
Pb (ug/L)
31
31.2
31.4
31.6
31.8
32
Salinity (o/oo)

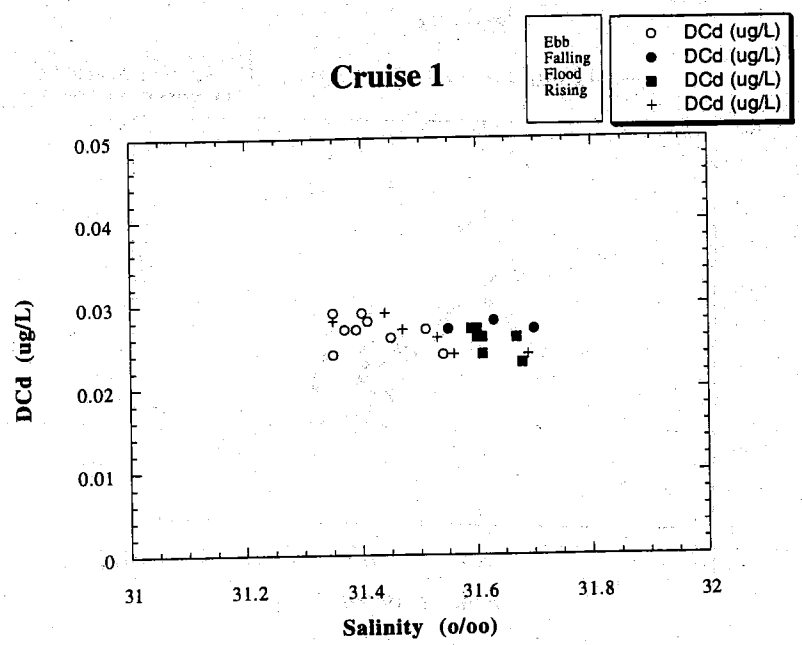
Cruise 1

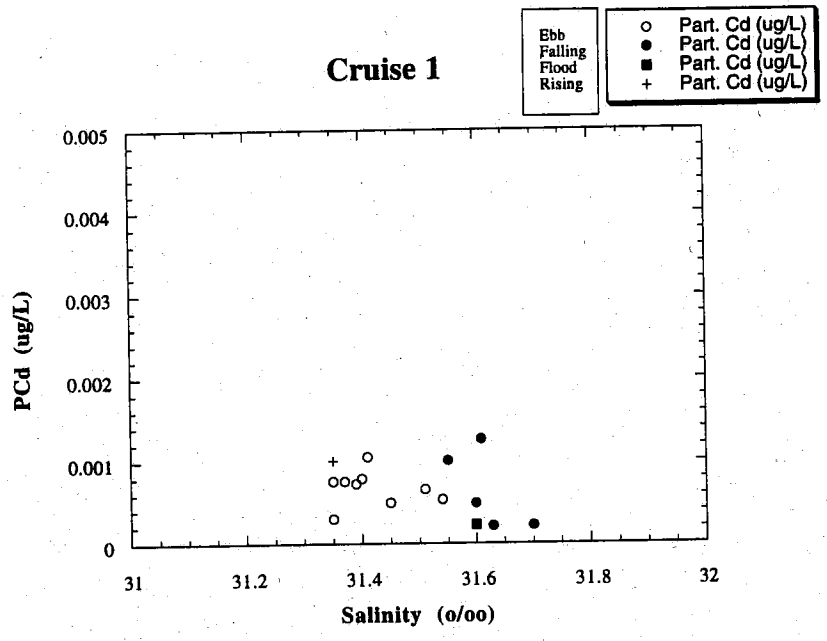

y = 117.9 + -3.678x R²= 0.53495
y = 4463 + -139.94x R²= 0.70367
DFe (ug/L)
Part. Fe (ug/L)
Fe (ug/L)
100
80
60
40
20
0
31
31.2
31.4
31.6
31.8
32
Salinity (o/oo)

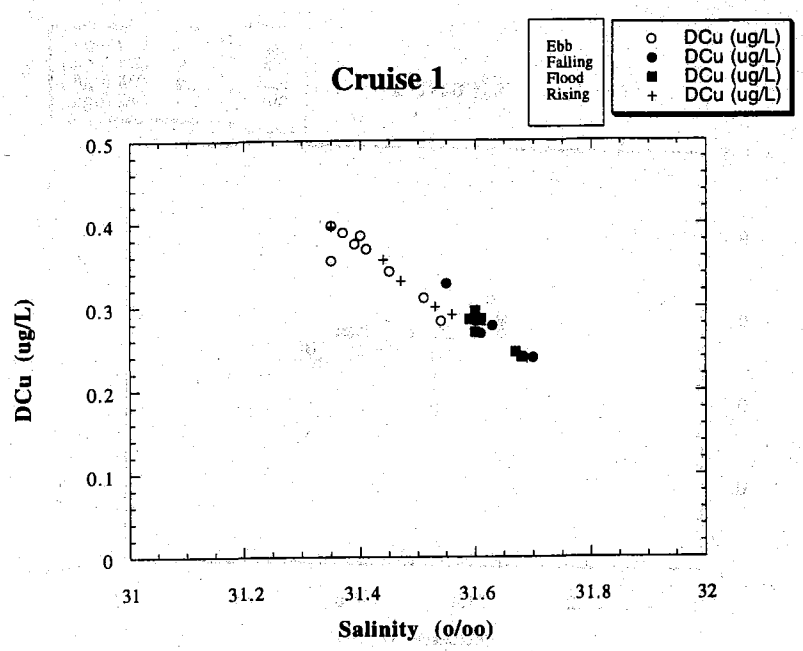
Cruise 1

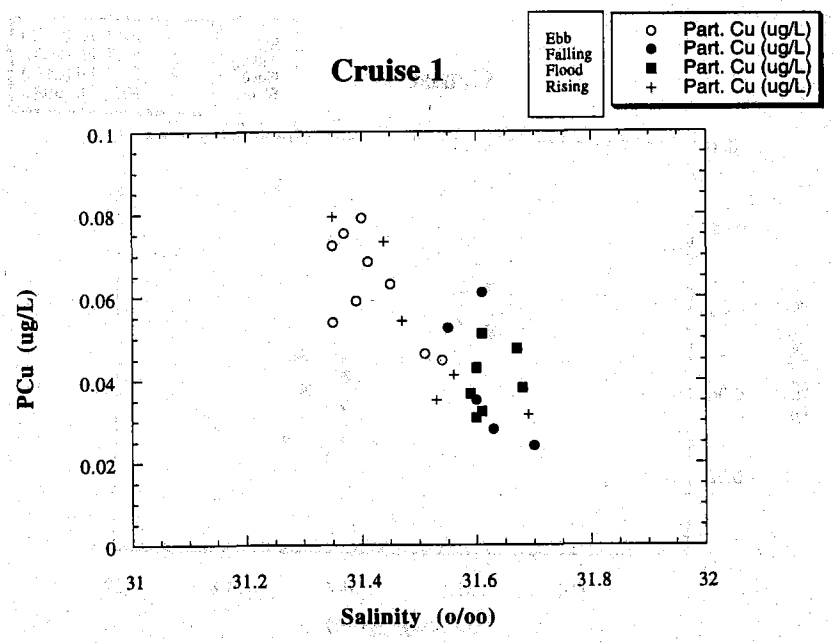

y = 252.46 + -7.8977x R²= 0.95947
y = 86.401 + -2.701x R²= 0.52395
DMn (ug/L)
Part. Mn (ug/L)
Mn (ug/L)
10
8
6
4
2
0
31
31.2
31.4
31.6
31.8
32
Salinity (o/oo)

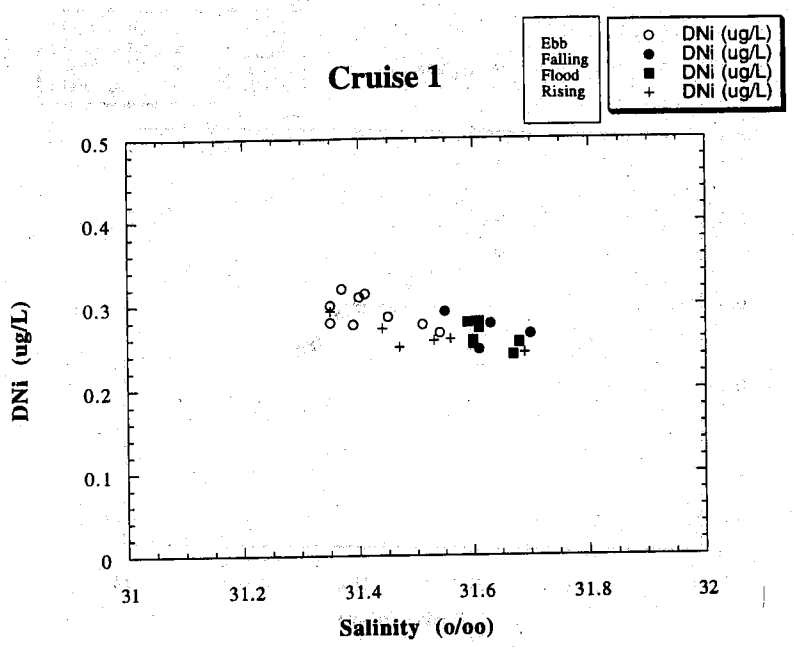

Cruise 1
y = 3586 + -112.33x R²= 0.69946
Part. Al (ug/L)
Al (ug/L)
100
80
60
40
20
0
31
31.2
31.4
31.6
31.8
32
Salinity (o/oo)

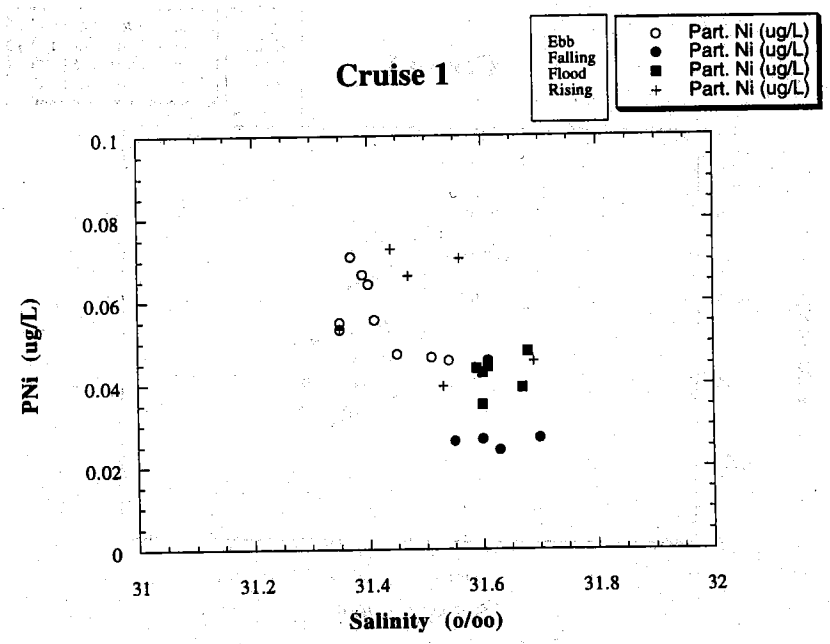

Cruise 1
Ebb
Falling
Flood
Rising
DCd (ug/L)
DCd (ug/L)
DCd (ug/L)
DCd (ug/L)
0.05
0.04
0.03
0.02
0.01
0
DCd (ug/L)
31
31.2
31.4
31.6
31.8
32
Salinity (o/oo)

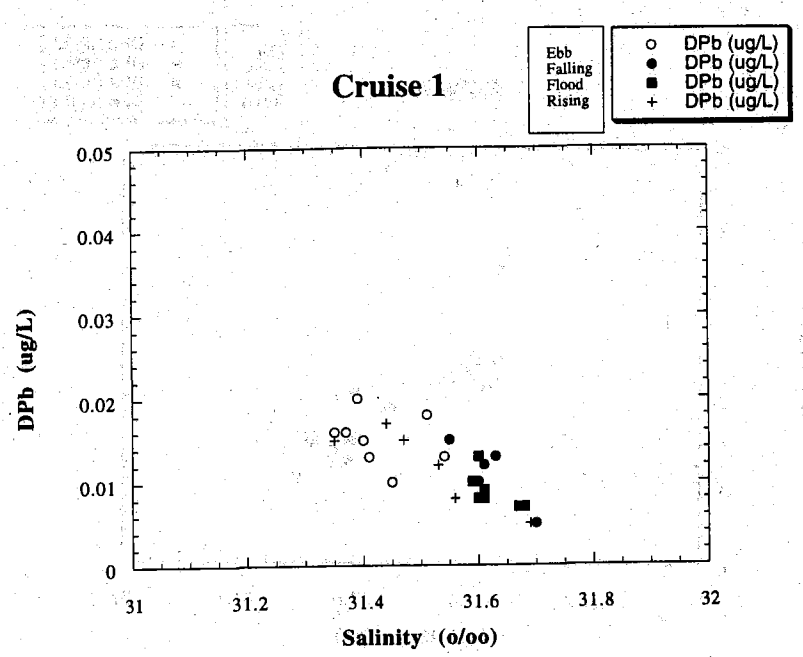

Cruise 1
Ebb
Falling
Flood
Rising
Part. Cd (ug/L)
Part. Cd (ug/L)
Part. Cd (ug/L)
Part. Cd (ug/L)
0.005
0.004
0.003
0.002
0.001
0
PCd (ug/L)
31
31.2
31.4
31.6
31.8
32
Salinity (o/oo)

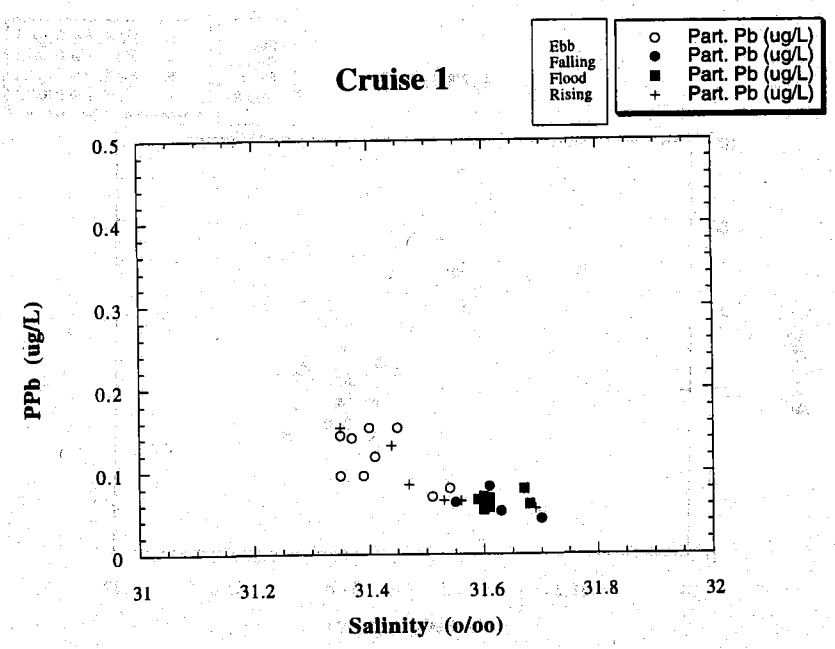

Cruise 1
Ebb
Falling
Flood
Rising
DCu (ug/L)
DCu (ug/L)
DCu (ug/L)
DCu (ug/L)
DCu (ug/L)
0.5
0.4
0.3
0.2
0.1
0
31
31.2
31.4
31.6
31.8
32
Salinity (o/oo)

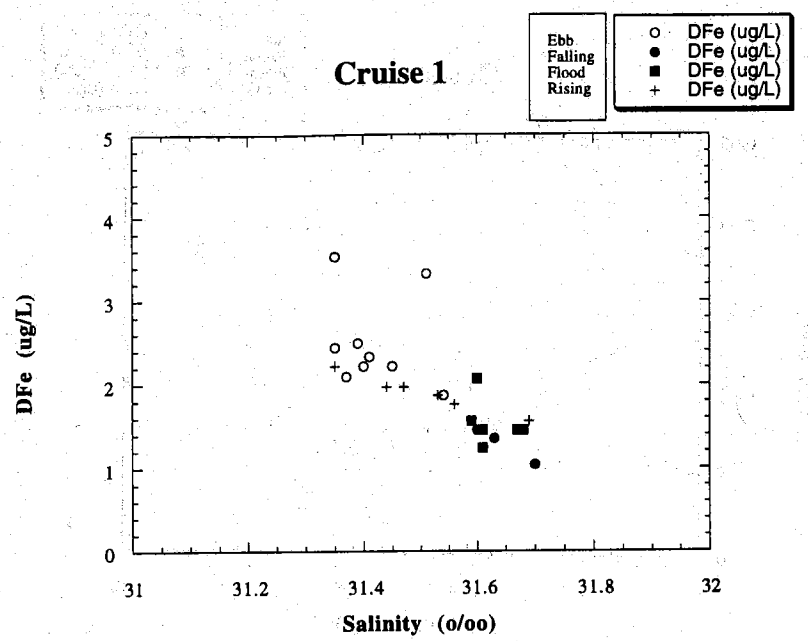

Cruise 1
Ebb
Falling
Flood
Rising
Part. Cu (ug/L)
Part. Cu (ug/L)
Part. Cu (ug/L)
Part. Cu (ug/L)
PCu (ug/L)
0.1
0.08
0.06
0.04
0.02
0
31
31.2
31.4
31.6
31.8
32
Salinity (o/oo)

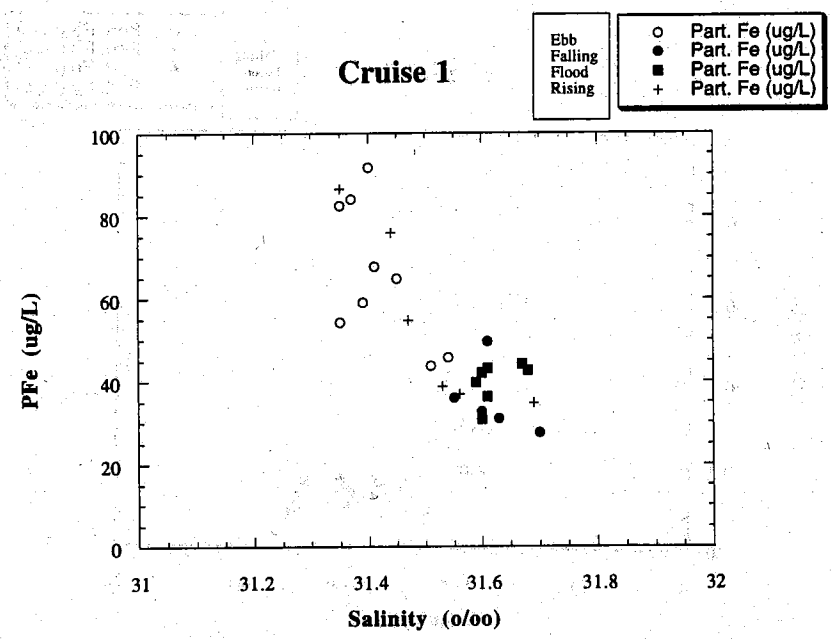

Cruise 1
Ebb
Falling
Flood
Rising
DNi (ug/L)
DNi (ug/L)
DNi (ug/L)
DNi (ug/L)
0.5
0.4
0.3
0.2
0.1
0
DNi (ug/L)
31
31.2
31.4
31.6
31.8
32
Salinity (o/oo)

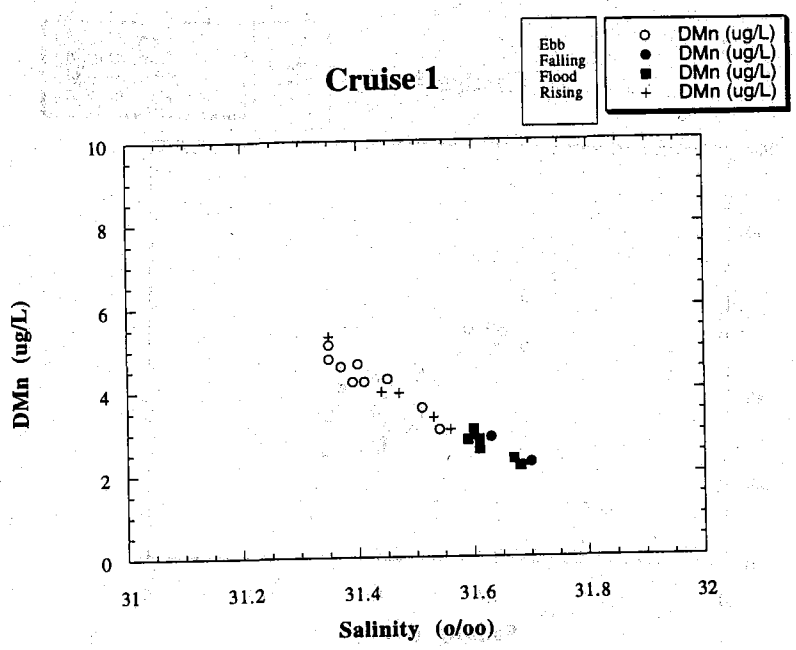

Cruise 1
Ebb
Falling
Flood
Rising
Part. Ni (ug/L)
Part. Ni (ug/L)
Part. Ni (ug/L)
Part. Ni (ug/L)
0.1
0.08
0.06
0.04
0.02
0
PNi (ug/L)
31
31.2
31.4
31.6
31.8
32
Salinity (o/oo)

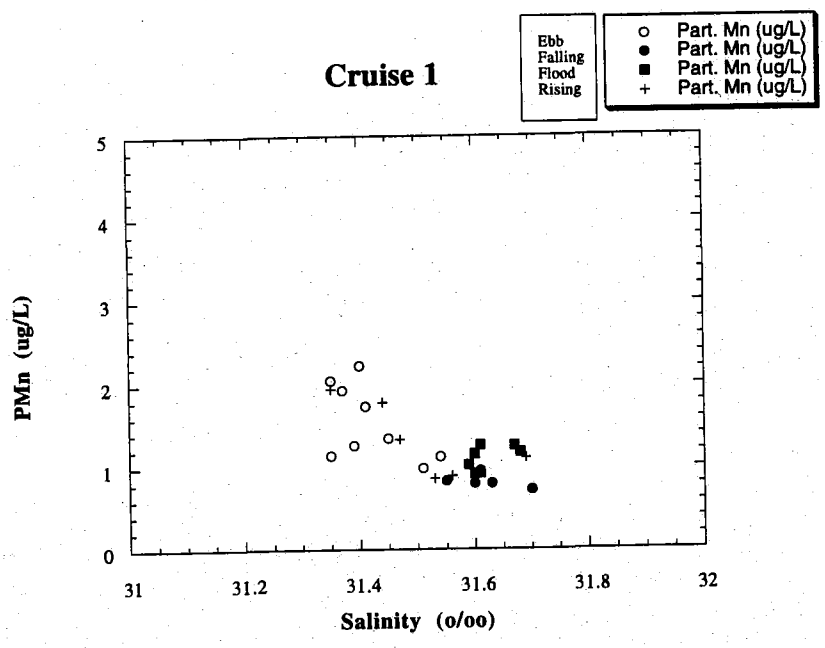

Cruise 1
Ebb
Falling
Flood
Rising
DPb (ug/L)
DPb (ug/L)
DPb (ug/L)
DPb (ug/L)
DPb (ug/L)
0.05
0.04
0.03
0.02
0.01
0
31
31.2
31.4
31.6
31.8
32
Salinity (o/oo)

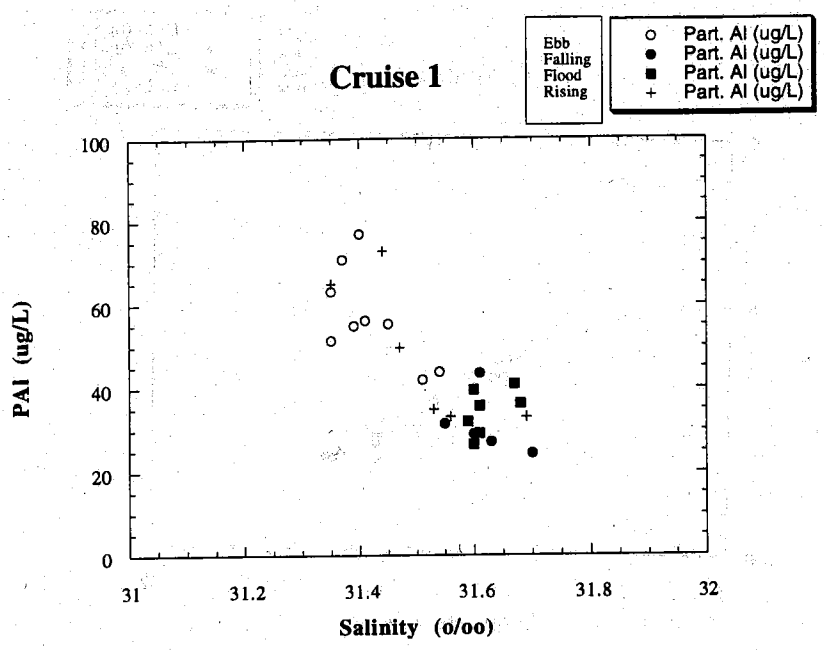

Cruise 1
Ebb
Falling
Flood
Rising
Part. Pb (ug/L)
Part. Pb (ug/L)
Part. Pb (ug/L)
Part. Pb (ug/L)
PPb (ug/L)
0.5
0.4
0.3
0.2
0.1
0
31
31.2
31.4
31.6
31.8
32
Salinity (o/oo)


Cruise 1
Ebb
Falling
Flood
Rising
DFe (ug/L)
DFe (ug/L)
DFe (ug/L)
DFe (ug/L)
DFe (ug/L)
0
1
2
3
4
5
31
31.2
31.4
31.6
31.8
32
Salinity (o/oo)


Cruise 1
Ebb
Falling
Flood
Rising
Part. Fe (ug/L)
Part. Fe (ug/L)
Part. Fe (ug/L)
Part. Fe (ug/L)
PFe (ug/L)
0
20
40
60
80
100
31
31.2
31.4
31.6
31.8
32
Salinity (o/oo)


Cruise 1
Ebb
Falling
Flood
Rising
DMn (ug/L)
DMn (ug/L)
DMn (ug/L)
DMn (ug/L)
DMn (ug/L)
10
8
6
4
2
0
31
31.2
31.4
31.6
31.8
32
Salinity (o/oo)


Cruise 1
Ebb
Falling
Flood
Rising
Part. Mn (ug/L)
Part. Mn (ug/L)
Part. Mn (ug/L)
Part. Mn (ug/L)
PMn (ug/L)
5
4
3
2
1
0
31
31.2
31.4
31.6
31.8
32
Salinity (o/oo)


Cruise 1
Ebb
Falling
Flood
Rising
Part. Al (ug/L)
Part. Al (ug/L)
Part. Al (ug/L)
Part. Al (ug/L)
PAl (ug/L)
100
80
60
40
20
0
31
31.2
31.4
31.6
31.8
32
Salinity (o/oo)

List of Figures for Cruise 2

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20	Cruise #2: Dissolved and Particulate Cadmium vs. Salinity
21	Cruise #2: Dissolved and Particulate Copper vs. Salinity
22	Cruise #2: Dissolved and Particulate Nickel vs. Salinity
23	Cruise #2: Dissolved and Particulate Lead vs. Salinity
24	Cruise #2: Dissolved and Particulate Iron vs. Salinity
25	Cruise #2: Dissolved and Particulate Manganese vs. Salinity
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29b	Cruise #2: Particulate Nickel vs. Salinity under Different Tidal Regimes
30a	Cruise #2: Dissolved Lead vs. Salinity under Different Tidal Regimes
30b	Cruise #2: Particulate Lead vs. Salinity under Different Tidal Regimes
31a	Cruise #2: Dissolved Iron vs. Salinity under Different Tidal Regimes
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32b	Cruise #2: Particulate Manganese vs. Salinity under Different Tidal Regimes
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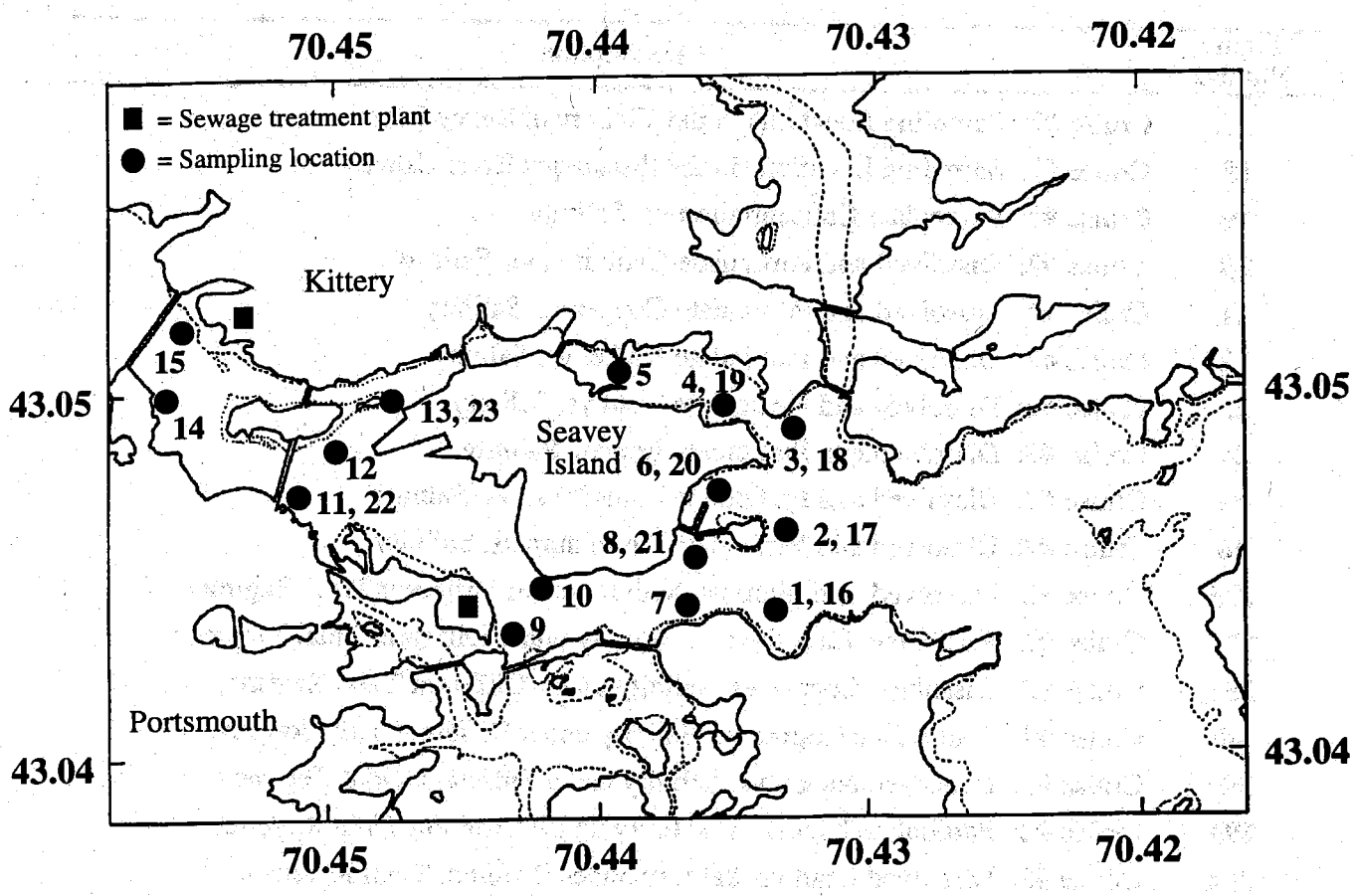
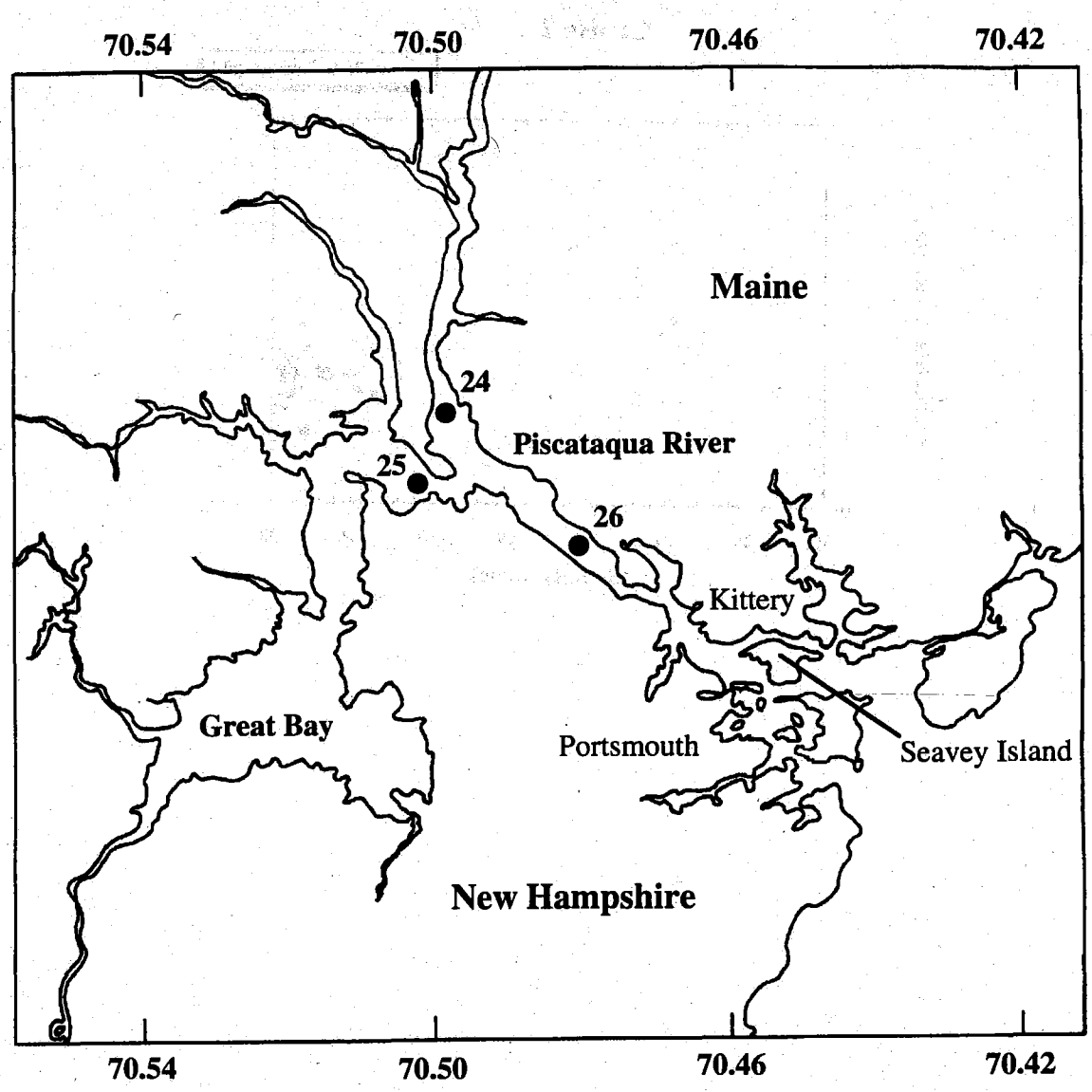
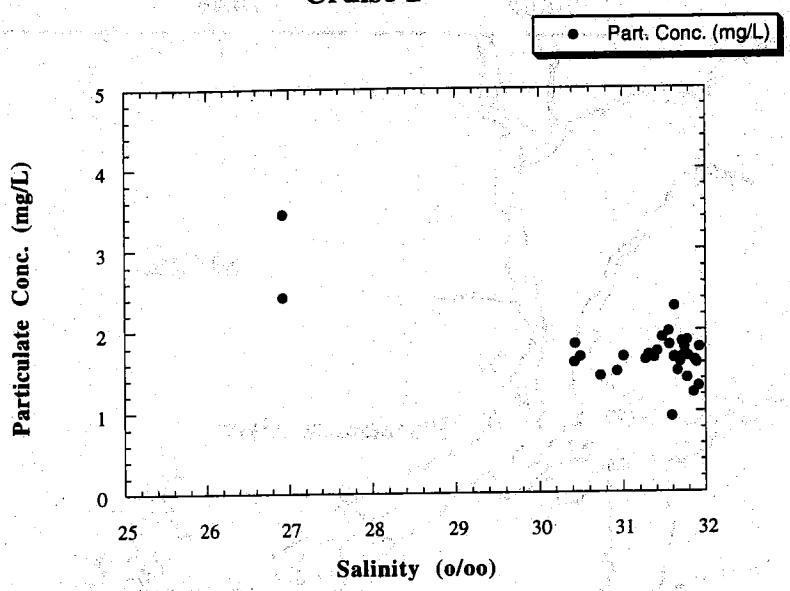
Cruise 2
Water column sampling locations in the vicinity of Seavey Island



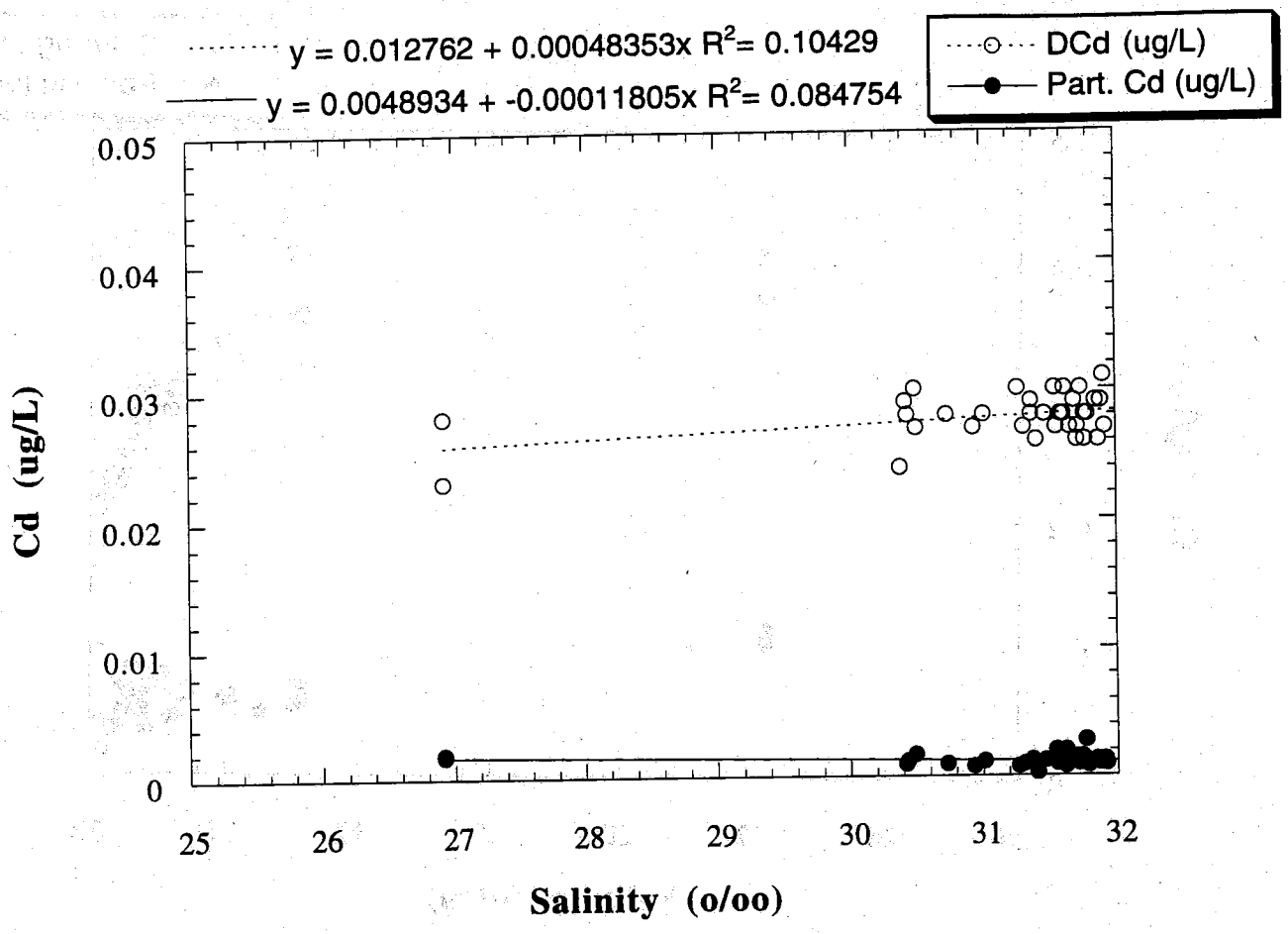
Cruise 2
Piscataqua River Estuary
Water Sampling Locations



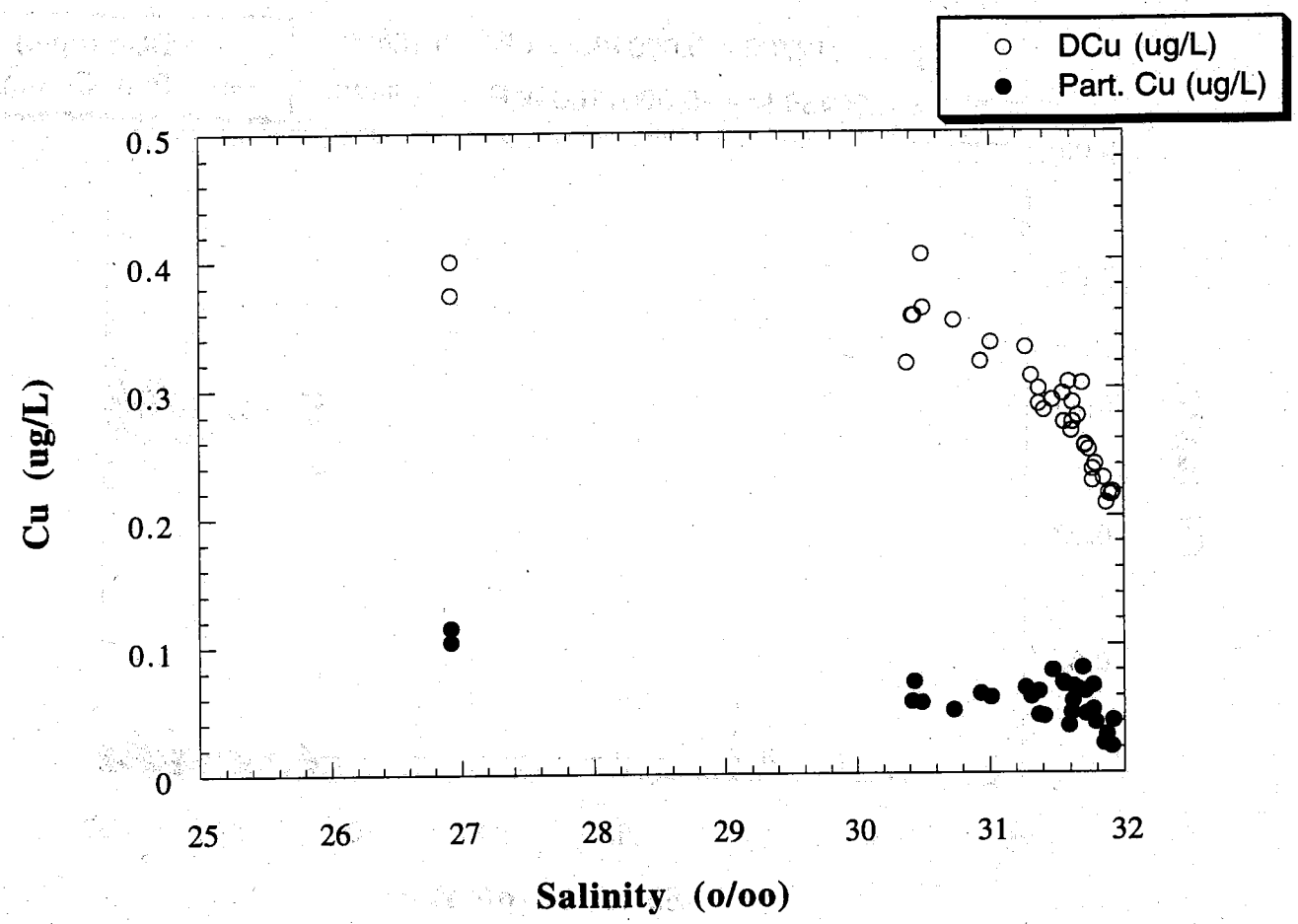
Cruise 2


Part. Conc. (mg/L)
Particulate Conc. (mg/L)
0
1
2
3
4
5
25
26
27
28
29
30
31
32
Salinity (o/oo)

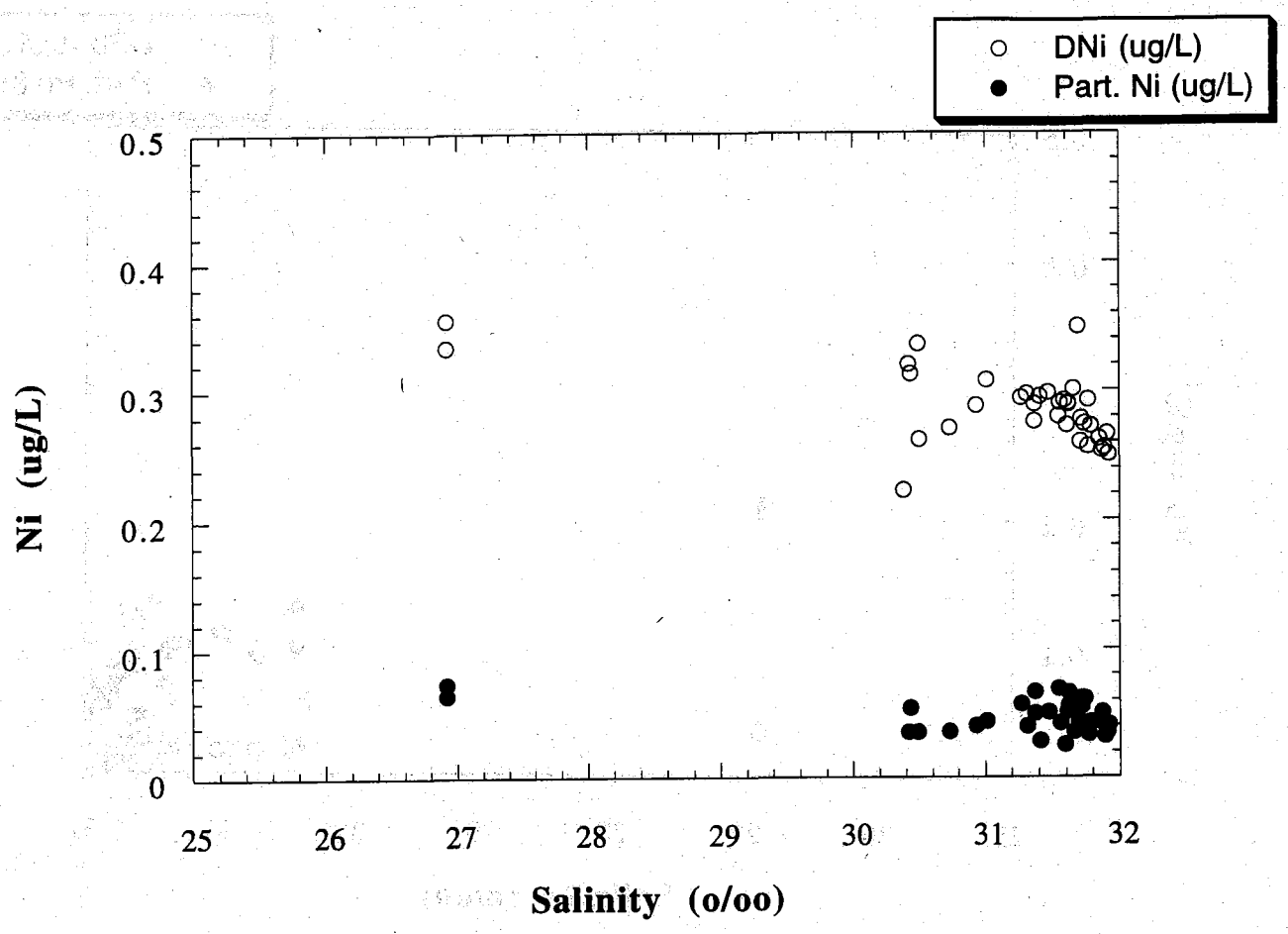
Cruise 2


y = 0.012762 + 0.00048353x R²= 0.10429
y = 0.0048934 + -0.00011805x R²= 0.084754
DCd (ug/L)
Part. Cd (ug/L)
0.05
0.04
0.03
0.02
0.01
0
Cd (ug/L)
25
26
27
28
29
30
31
32
Salinity (o/oo)

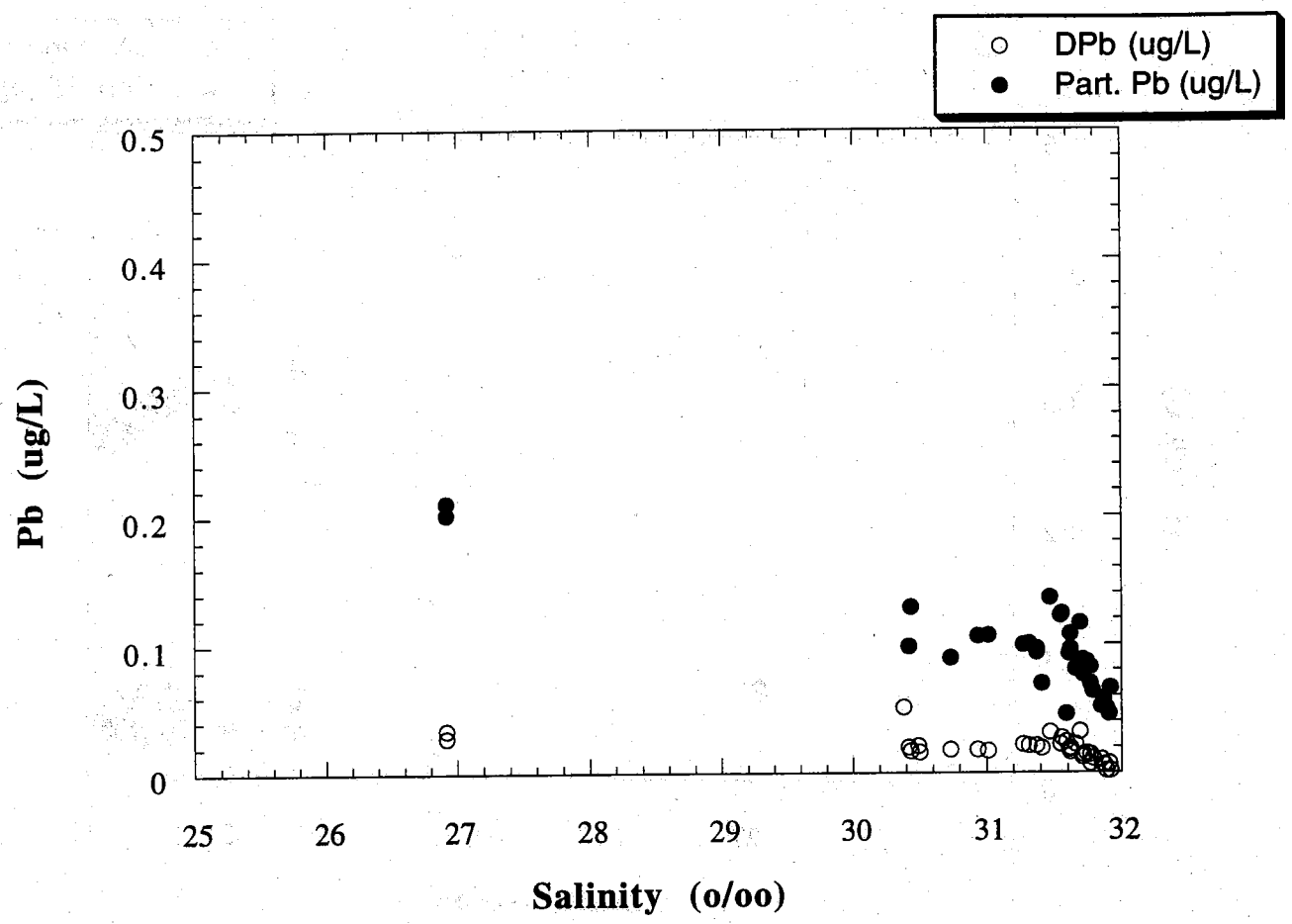
Cruise 2


DCu (ug/L)
Part. Cu (ug/L)
0.5
0.4
0.3
0.2
0.1
0
Cu (ug/L)
25
26
27
28
29
30
31
32
Salinity (o/oo)

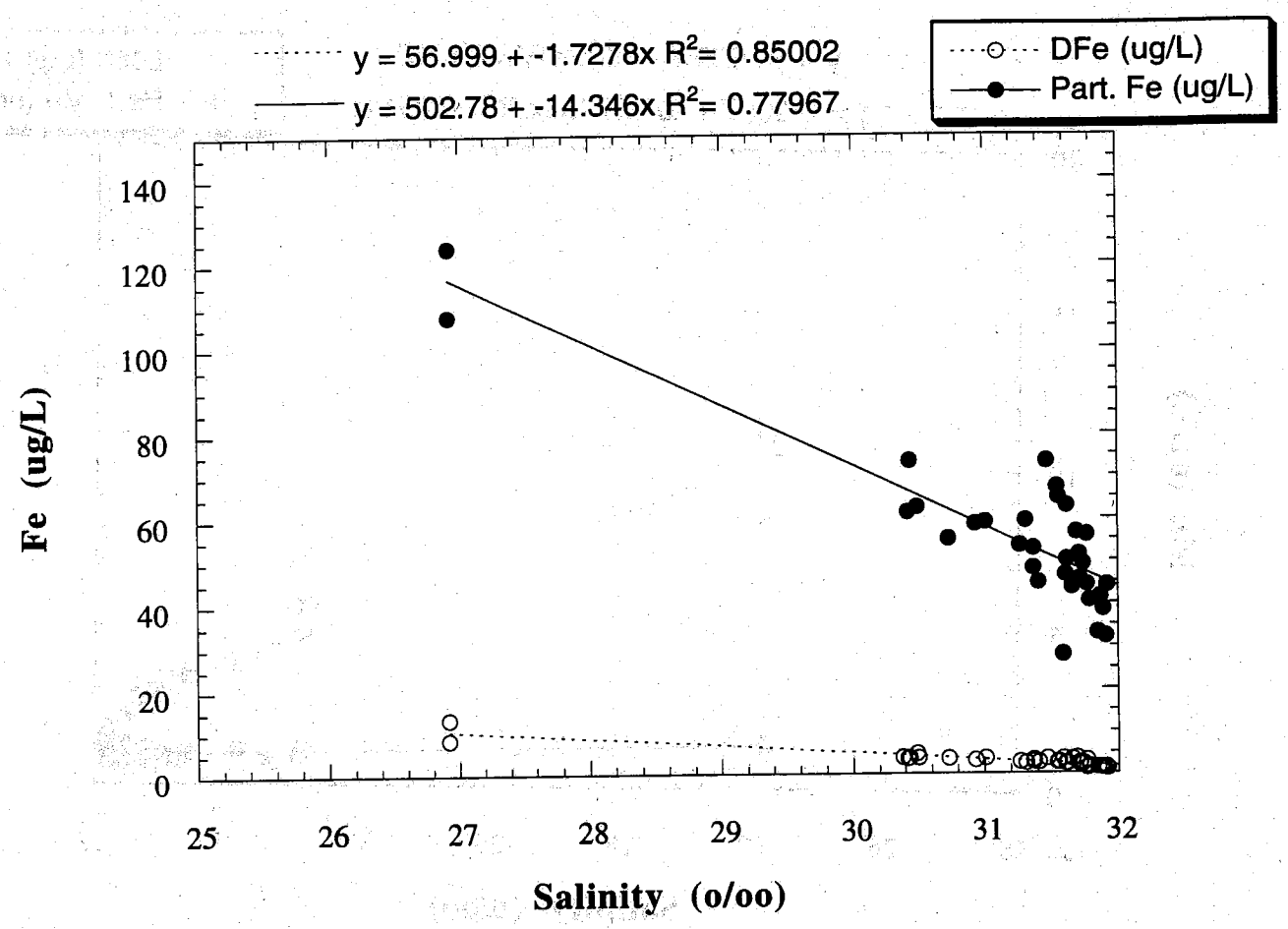
Cruise 2


DNi (ug/L)
Part. Ni (ug/L)
0.5
0.4
0.3
0.2
0.1
0
Ni (ug/L)
25
26
27
28
29
30
31
32
Salinity (o/oo)

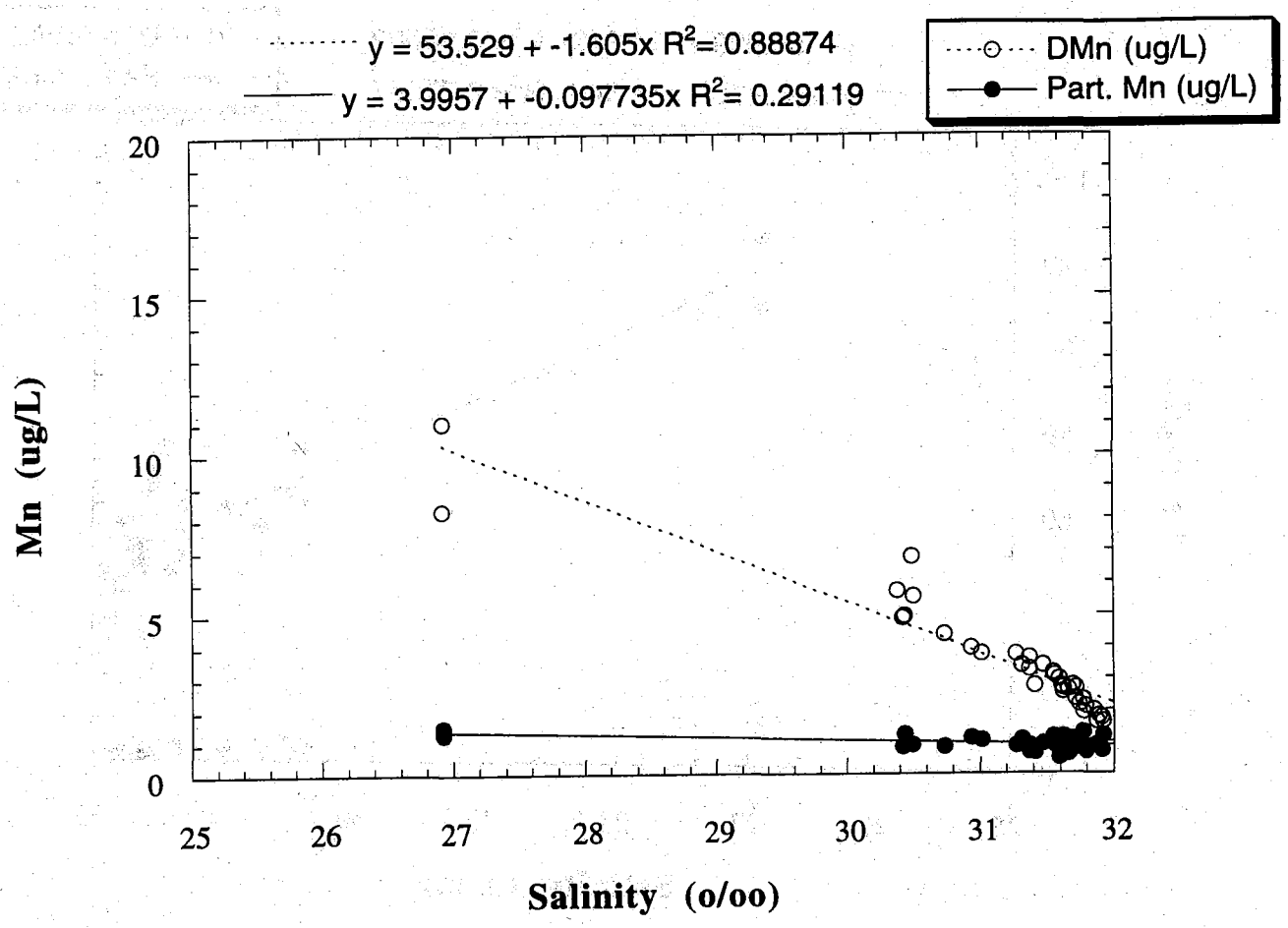
Cruise 2


DPb (ug/L)
Part. Pb (ug/L)
0.5
0.4
0.3
0.2
0.1
0
Pb (ug/L)
25
26
27
28
29
30
31
32
Salinity (o/oo)

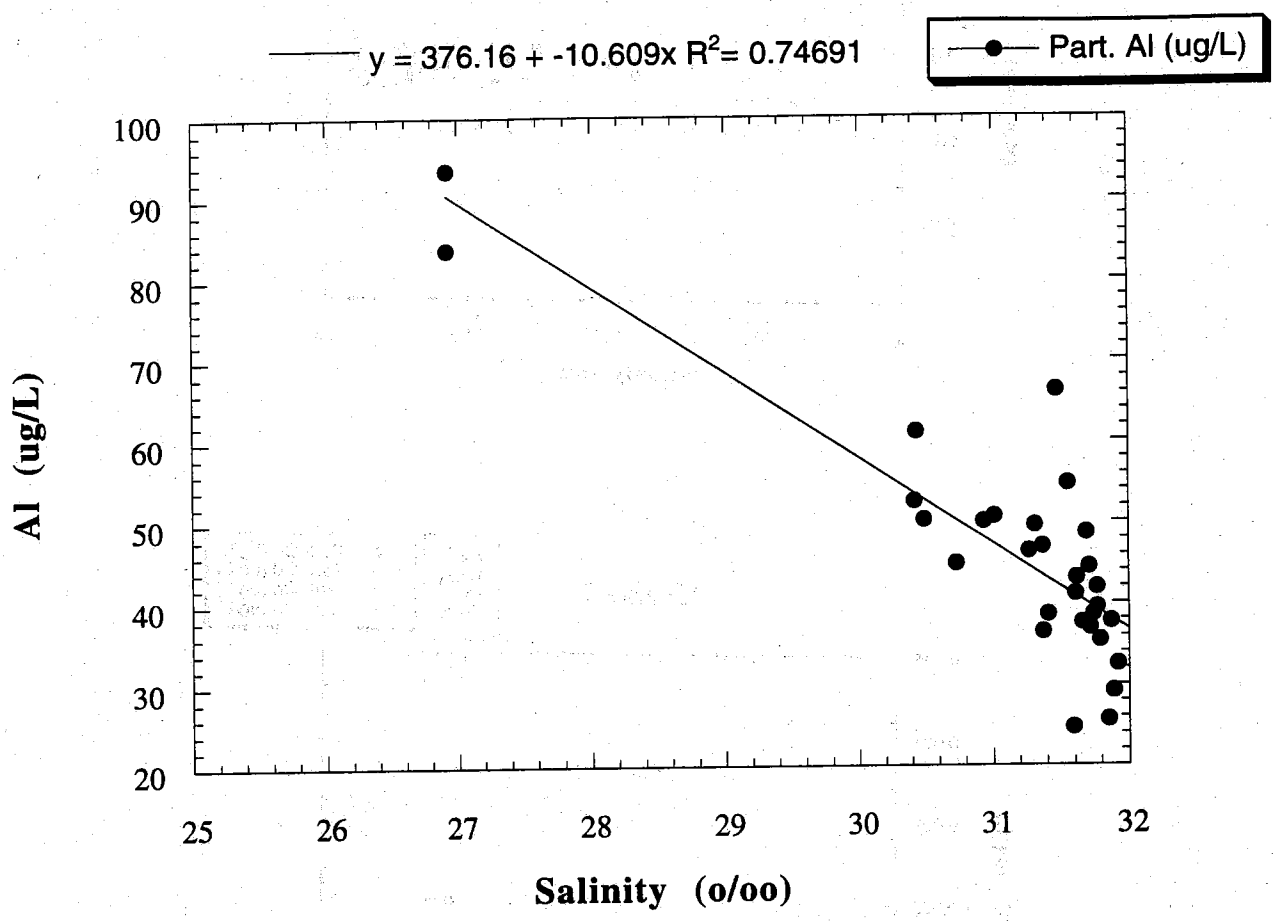
Cruise 2

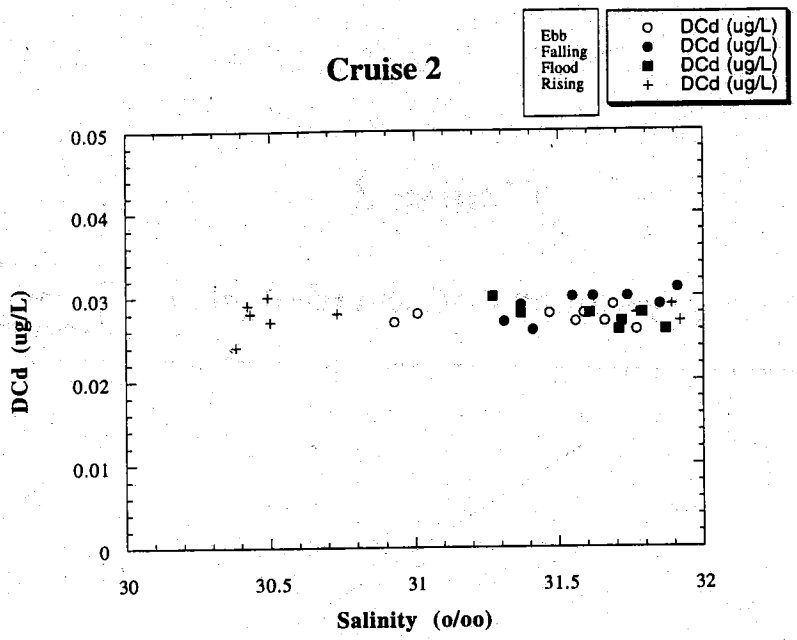

y = 56.999 + -1.7278x R2= 0.85002
y = 502.78 + -14.346x R2= 0.77967
DFe (ug/L)
Part. Fe (ug/L)
Fe (ug/L)
0
20
40
60
80
100
120
140
25
26
27
28
29
30
31
32
Salinity (o/oo)

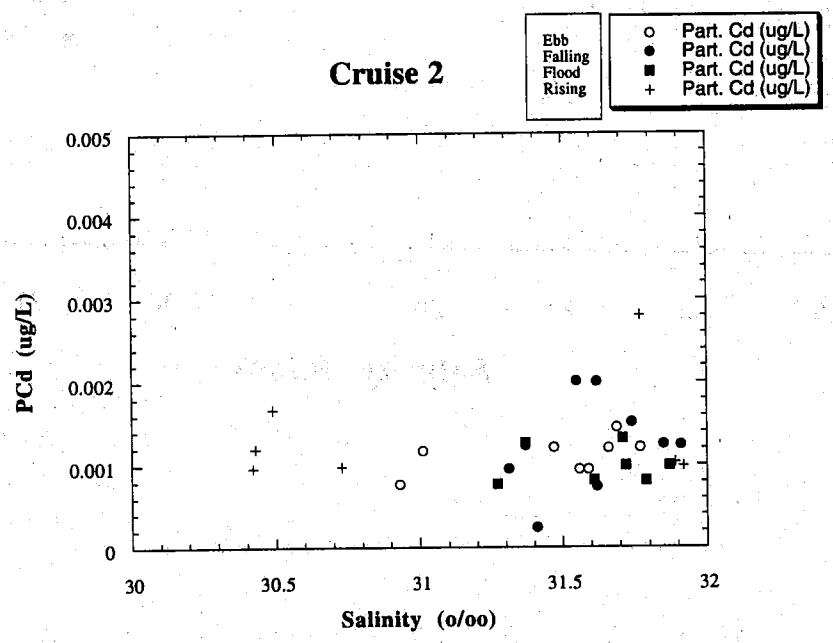
Cruise 2

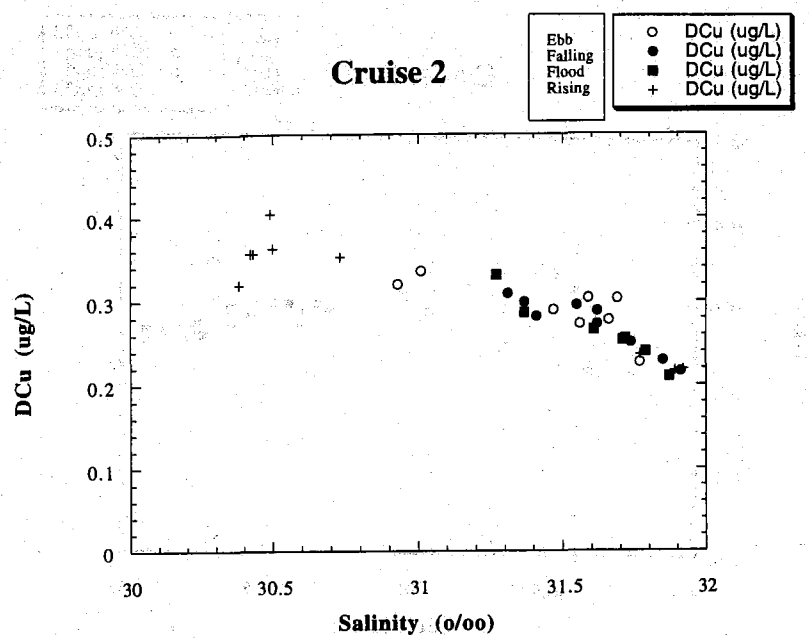

y = 53.529 + -1.605x R²= 0.88874
y = 3.9957 + -0.097735x R²= 0.29119
DMn (ug/L)
Part. Mn (ug/L)
Mn (ug/L)
20
15
10
5
0
25
26
27
28
29
30
31
32
Salinity (o/oo)

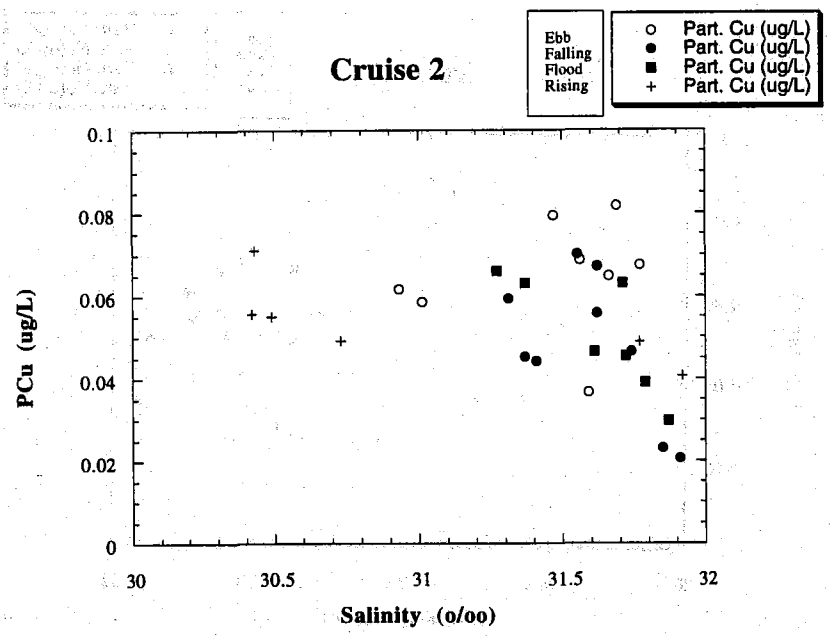
Cruise 2

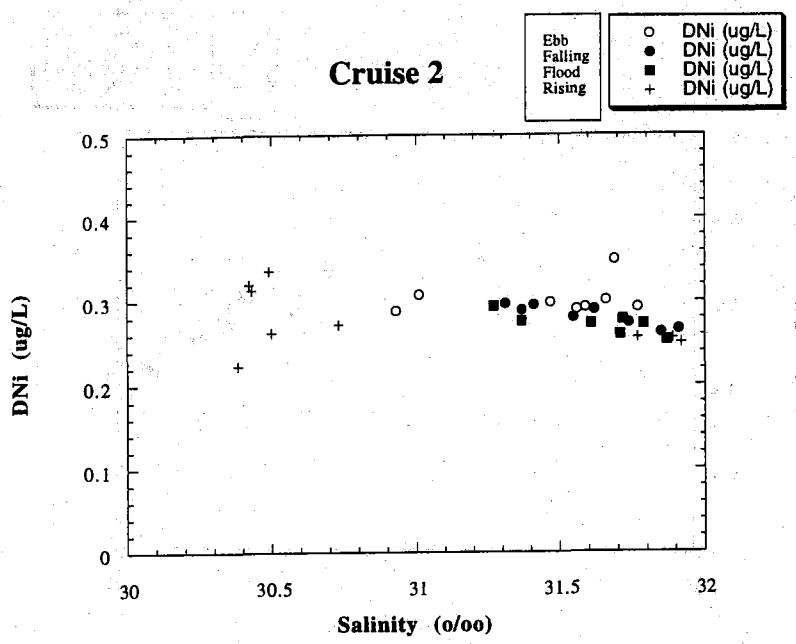

y = 376.16 + -10.609x R²= 0.74691
Part. Al (ug/L)
100
90
80
70
60
50
40
30
20
Al (ug/L)
25
26
27
28
29
30
31
32
Salinity (o/oo)

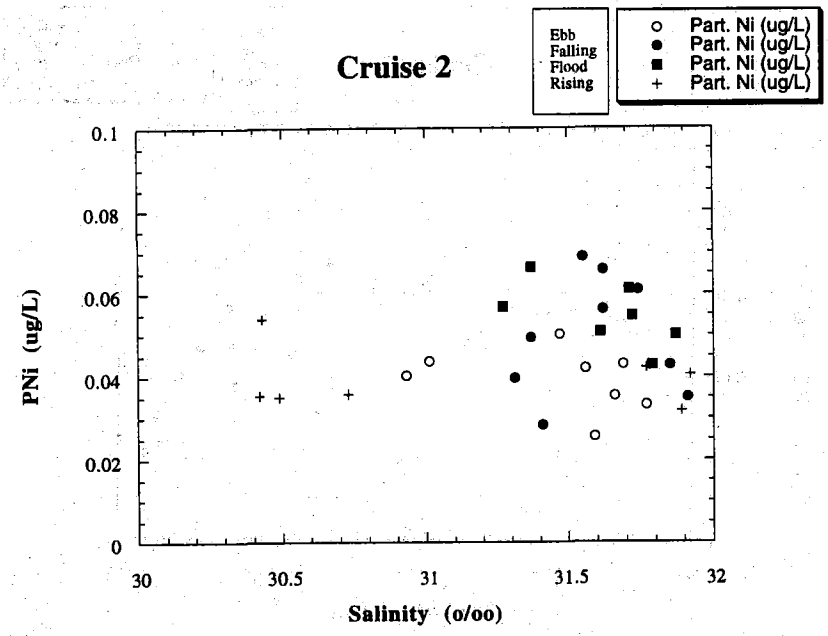

Cruise 2
Ebb
Falling
Flood
Rising
DCd (ug/L)
DCd (ug/L)
DCd (ug/L)
DCd (ug/L)
0.05
0.04
0.03
0.02
0.01
0
DCd (ug/L)
30
30.5
31
31.5
32
Salinity (o/oo)

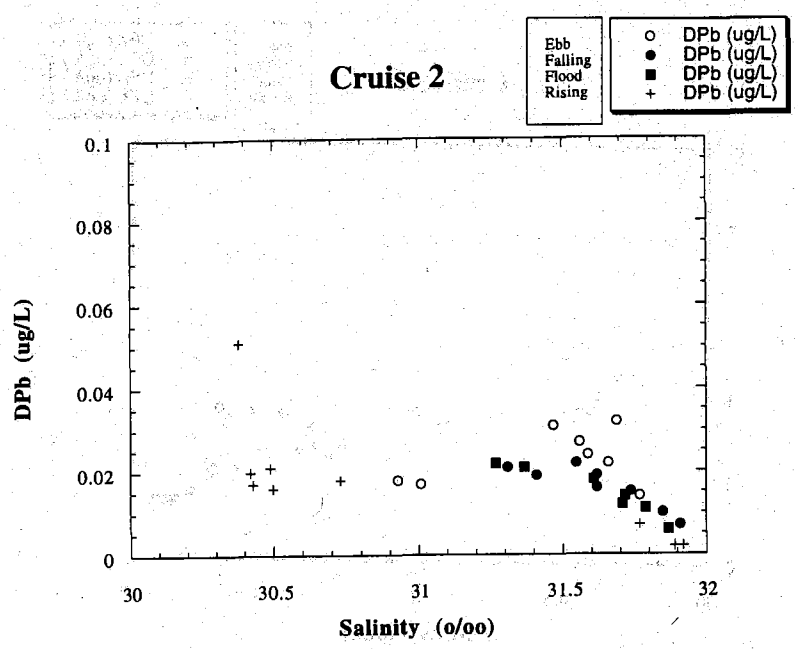

Cruise 2
Ebb
Falling
Flood
Rising
Part. Cd (ug/L)
Part. Cd (ug/L)
Part. Cd (ug/L)
Part. Cd (ug/L)
0.005
0.004
0.003
0.002
0.001
0
PCd (ug/L)
30
30.5
31
31.5
32
Salinity (o/oo)

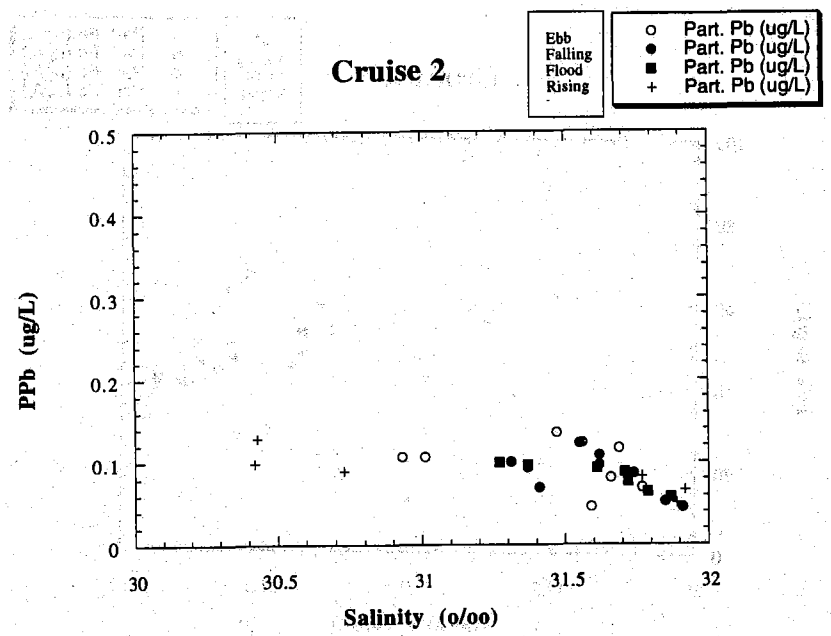

Cruise 2
Ebb
Falling
Flood
Rising
DCu (ug/L)
DCu (ug/L)
DCu (ug/L)
DCu (ug/L)
DCu (ug/L)
0.5
0.4
0.3
0.2
0.1
0
30
30.5
31
31.5
32
Salinity (o/oo)

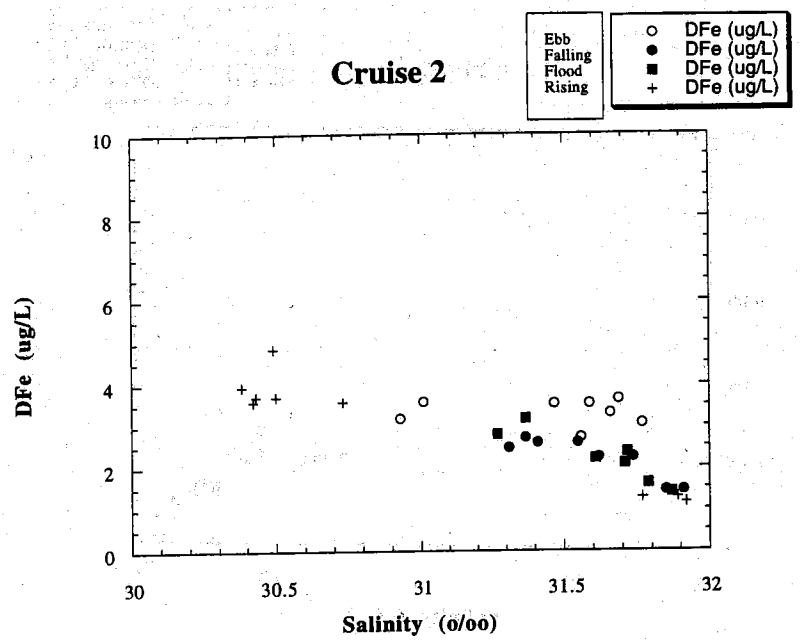

Cruise 2
Ebb
Falling
Flood
Rising
Part. Cu (ug/L)
Part. Cu (ug/L)
Part. Cu (ug/L)
Part. Cu (ug/L)
PCu (ug/L)
0.1
0.08
0.06
0.04
0.02
0
30
30.5
31
31.5
32
Salinity (o/oo)

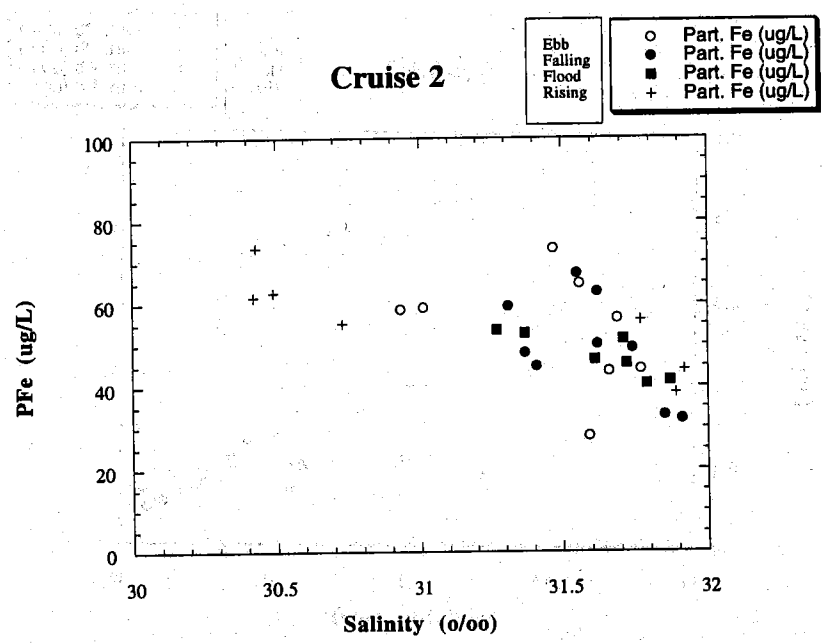

Cruise 2
Ebb
Falling
Flood
Rising
DNi (ug/L)
DNi (ug/L)
DNi (ug/L)
DNi (ug/L)
0.5
0.4
0.3
0.2
0.1
0
DNi (ug/L)
30
30.5
31
31.5
32
Salinity (o/oo)

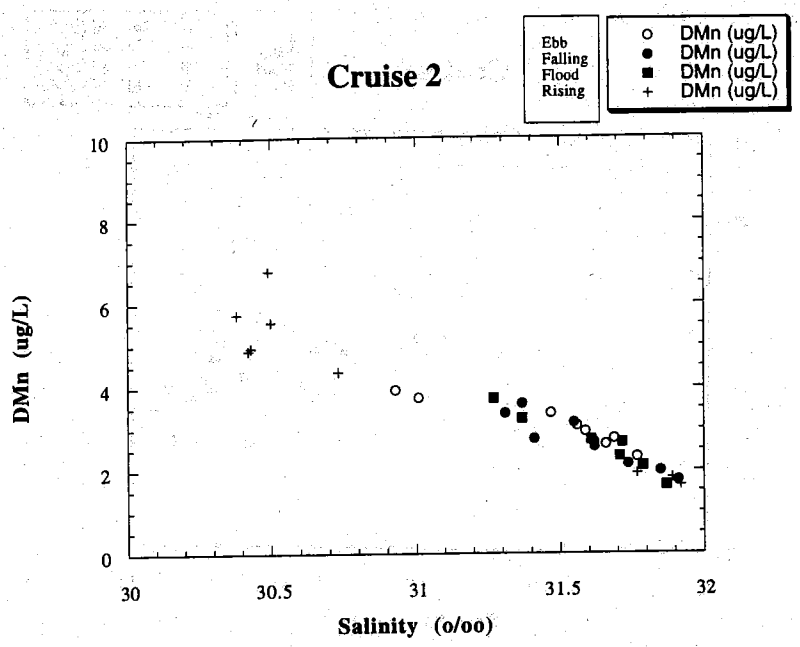

Cruise 2
Ebb
Falling
Flood
Rising
Part. Ni (ug/L)
Part. Ni (ug/L)
Part. Ni (ug/L)
Part. Ni (ug/L)
0.1
0.08
0.06
0.04
0.02
0
PNi (ug/L)
30
30.5
31
31.5
32
Salinity (o/oo)

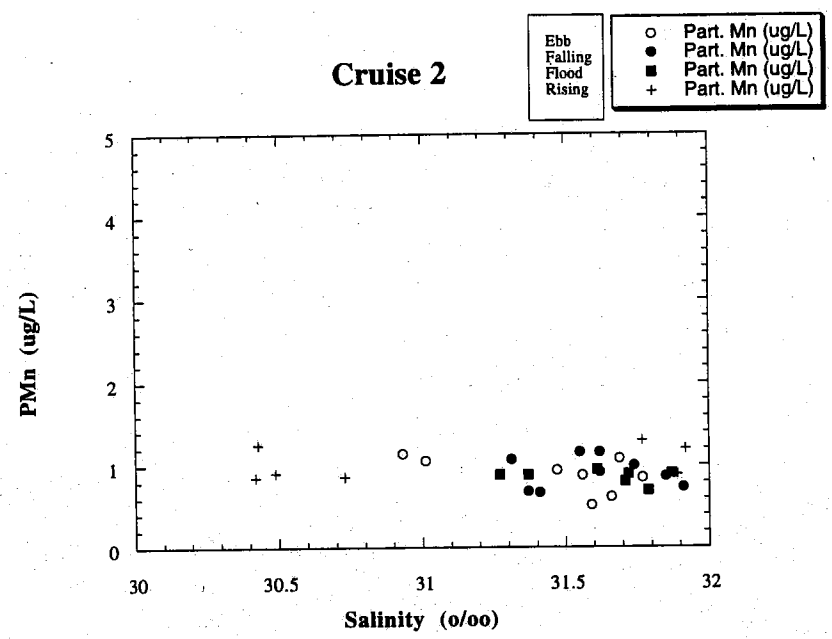

Cruise 2
Ebb
Falling
Flood
Rising
DPb (ug/L)
DPb (ug/L)
DPb (ug/L)
DPb (ug/L)
0.1
0.08
0.06
0.04
0.02
0
DPb (ug/L)
30
30.5
31
31.5
32
Salinity (o/oo)

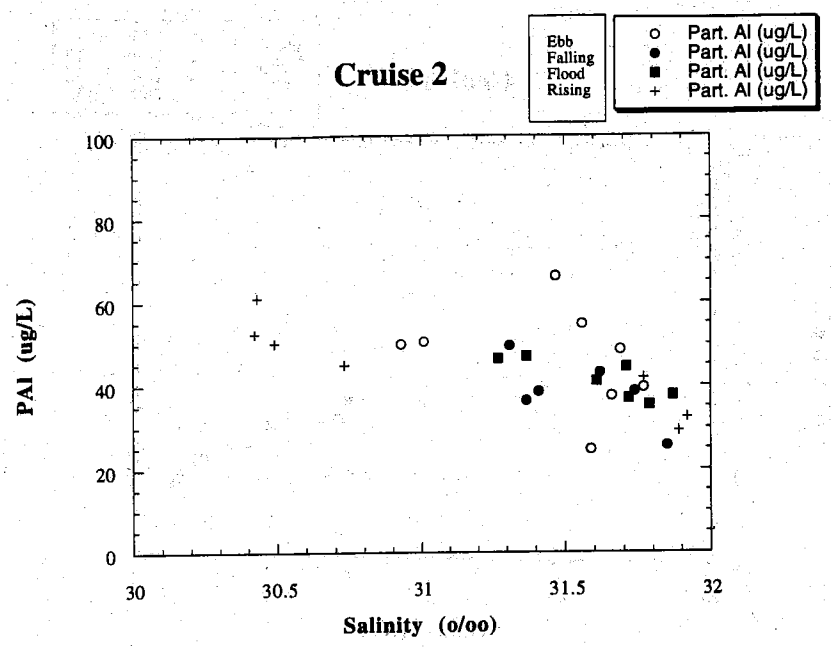

Cruise 2
Ebb
Falling
Flood
Rising
Part. Pb (ug/L)
Part. Pb (ug/L)
Part. Pb (ug/L)
Part. Pb (ug/L)
0.5
0.4
0.3
0.2
0.1
0
PPb (ug/L)
30
30.5
31
31.5
32
Salinity (o/oo)


Cruise 2
Ebb
Falling
Flood
Rising
DFe (ug/L)
DFe (ug/L)
DFe (ug/L)
DFe (ug/L)
DFe (ug/L)
10
8
6
4
2
0
30
30.5
31
31.5
32
Salinity (o/oo)


Cruise 2
Ebb
Falling
Flood
Rising
Part. Fe (ug/L)
Part. Fe (ug/L)
Part. Fe (ug/L)
Part. Fe (ug/L)
PFe (ug/L)
100
80
60
40
20
0
30
30.5
31
31.5
32
Salinity (o/oo)


Cruise 2
Ebb
Falling
Flood
Rising
DMn (ug/L)
DMn (ug/L)
DMn (ug/L)
DMn (ug/L)
DMn (ug/L)
10
8
6
4
2
0
30
30.5
31
31.5
32
Salinity (o/oo)

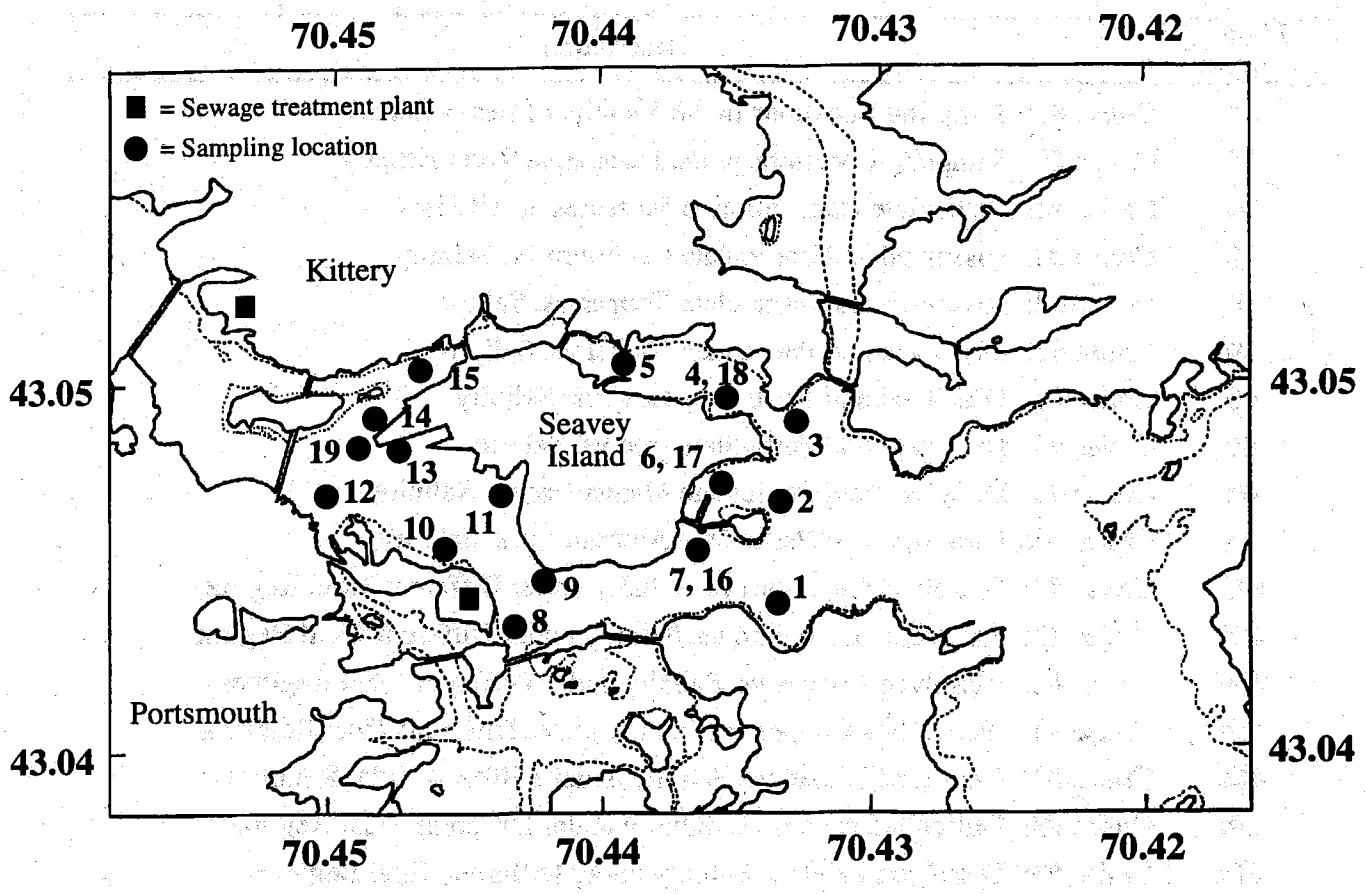

Cruise 2
Ebb
Falling
Flood
Rising
Part. Mn (ug/L)
Part. Mn (ug/L)
Part. Mn (ug/L)
Part. Mn (ug/L)
PMn (ug/L)
5
4
3
2
1
0
30
30.5
31
31.5
32
Salinity (o/oo)


Cruise 2
Ebb
Falling
Flood
Rising
Part. Al (ug/L)
Part. Al (ug/L)
Part. Al (ug/L)
Part. Al (ug/L)
PAl (ug/L)
100
80
60
40
20
0
30
30.5
31
31.5
32
Salinity (o/oo)

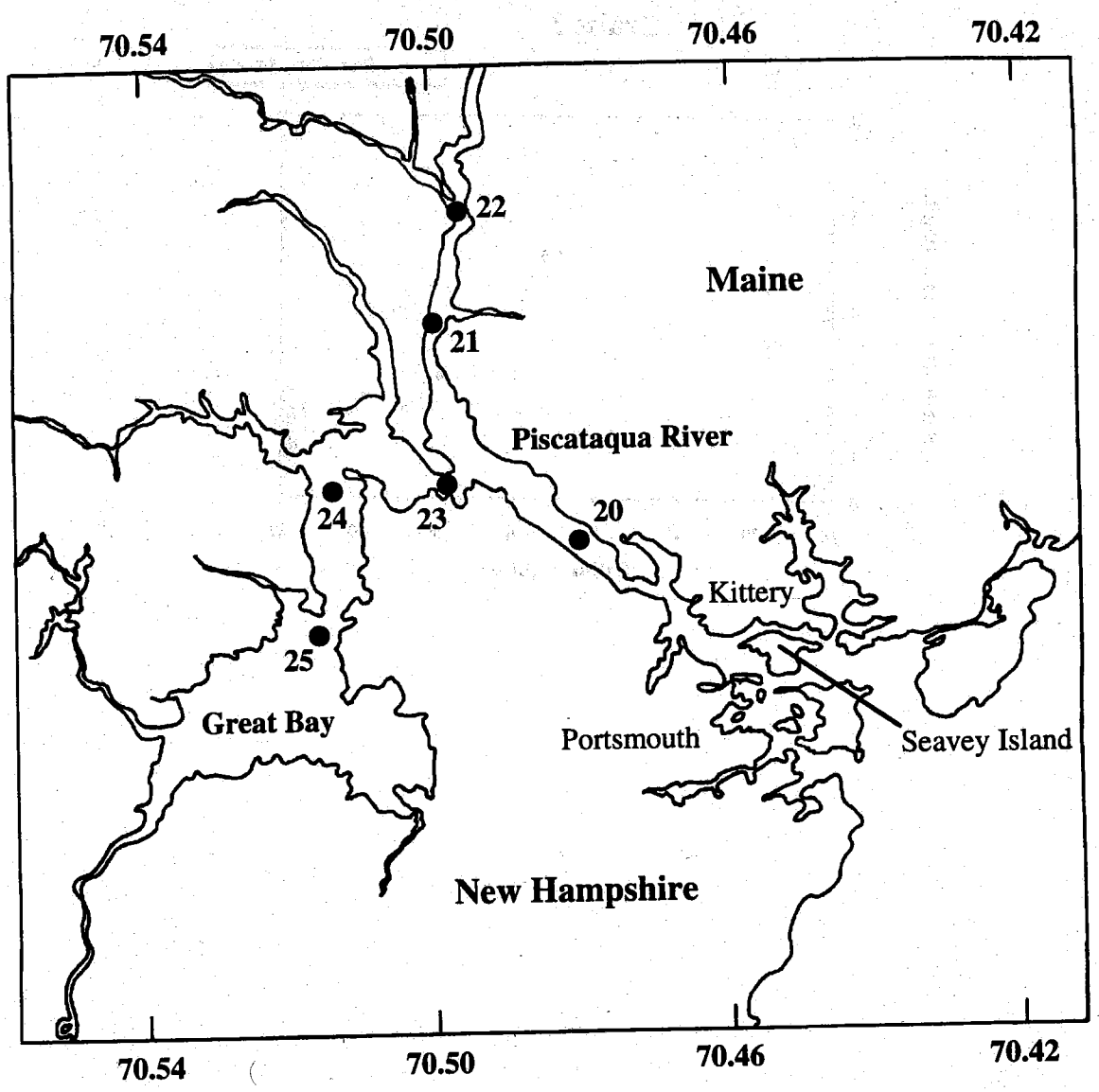
List of Figures for Cruise 3

Figure Number	Description
34	Cruise #3: Sampling Locations in the Vicinity of Seavy Island
35	Cruise #3: Sampling Locations in the Piscataqua River Estuary
36	Cruise #3: Particulate Concentration Measures at All Sites
37	Cruise #3: Dissolved and Particulate Cadmium vs. Salinity
38	Cruise #3: Dissolved and Particulate Copper vs. Salinity
39	Cruise #3: Dissolved and Particulate Nickel vs. Salinity
40	Cruise #3: Dissolved and Particulate Lead vs. Salinity
41	Cruise #3: Dissolved and Particulate Iron vs. Salinity
42	Cruise #3: Dissolved and Particulate Manganese vs. Salinity
43	Cruise #3: Dissolved and Particulate Aluminum vs. Salinity
44a	Cruise #3: Dissolved Cadmium vs. Salinity under Different Tidal Regimes
44b	Cruise #3: Particulate Cadmium vs. Salinity under Different Tidal Regimes
45a	Cruise #3: Dissolved Copper vs. Salinity under Different Tidal Regimes
45b	Cruise #3: Particulate Copper vs. Salinity under Different Tidal Regimes
46a	Cruise #3: Dissolved Nickel vs. Salinity under Different Tidal Regimes
46b	Cruise #3: Particulate Nickel vs. Salinity under Different Tidal Regimes
47a	Cruise #3: Dissolved Lead vs. Salinity under Different Tidal Regimes
47b	Cruise #3: Particulate Lead vs. Salinity under Different Tidal Regimes
48a	Cruise #3: Dissolved Iron vs. Salinity under Different Tidal Regimes
48b	Cruise #3: Particulate Iron vs. Salinity under Different Tidal Regimes
49a	Cruise #3: Dissolved Manganese vs. Salinity under Different Tidal Regimes
49b	Cruise #3: Particulate Manganese vs. Salinity under Different Tidal Regimes
50	Cruise #3: Particulate Aluminum vs. Salinity under Different Tidal Regimes

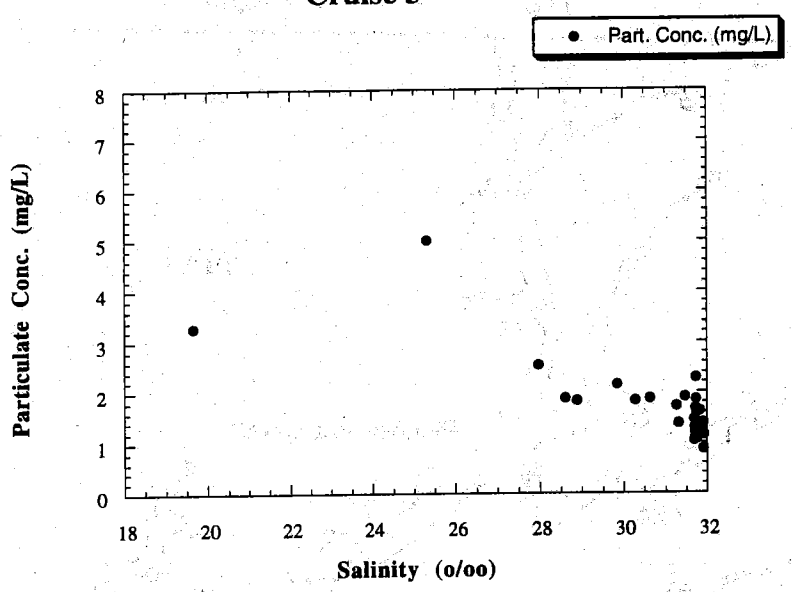
Cruise 3
Water column sampling locations in the vicinity of Seavey Island



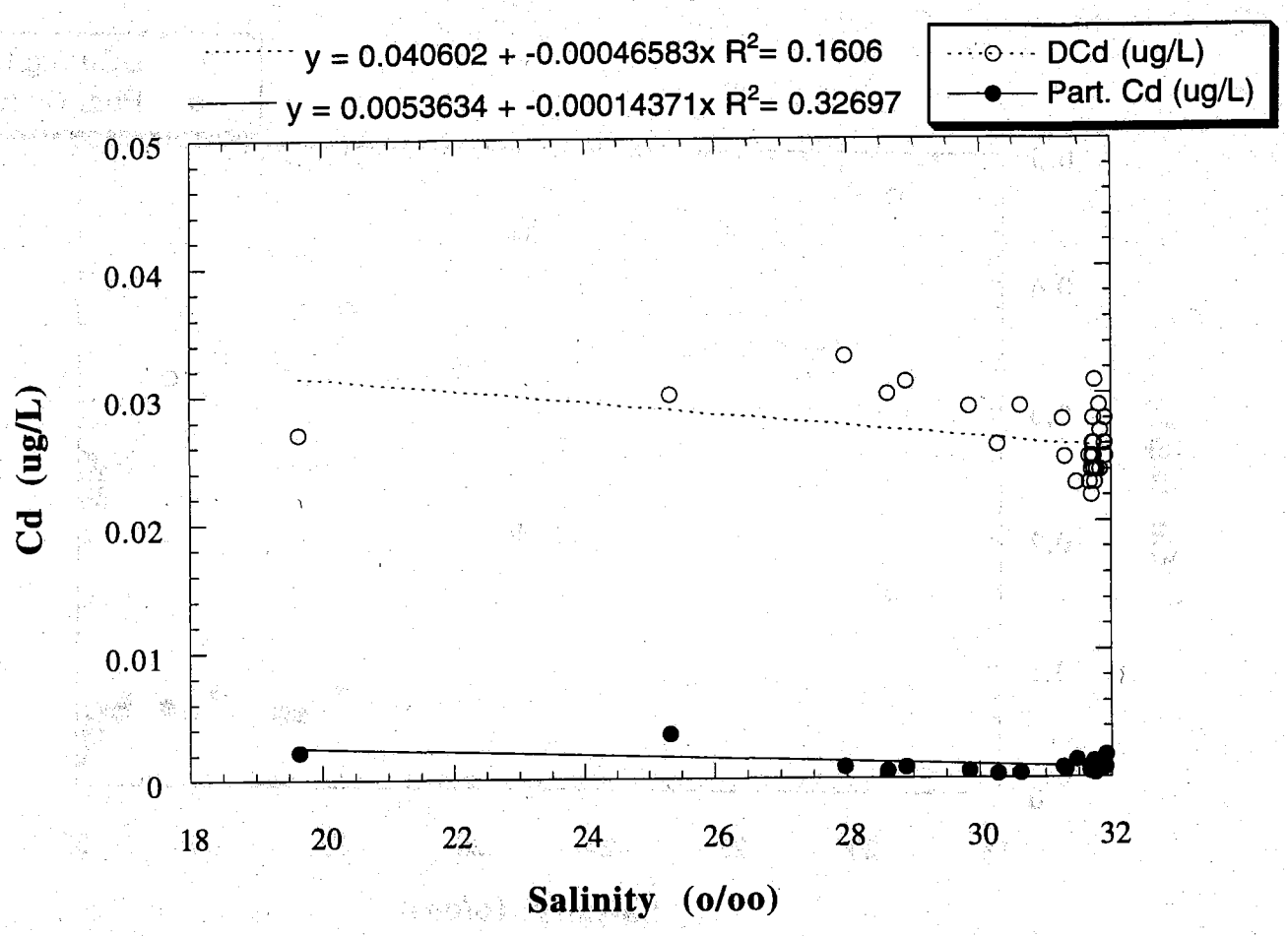
Cruise 3
Piscataqua River Estuary
Water Sampling Locations



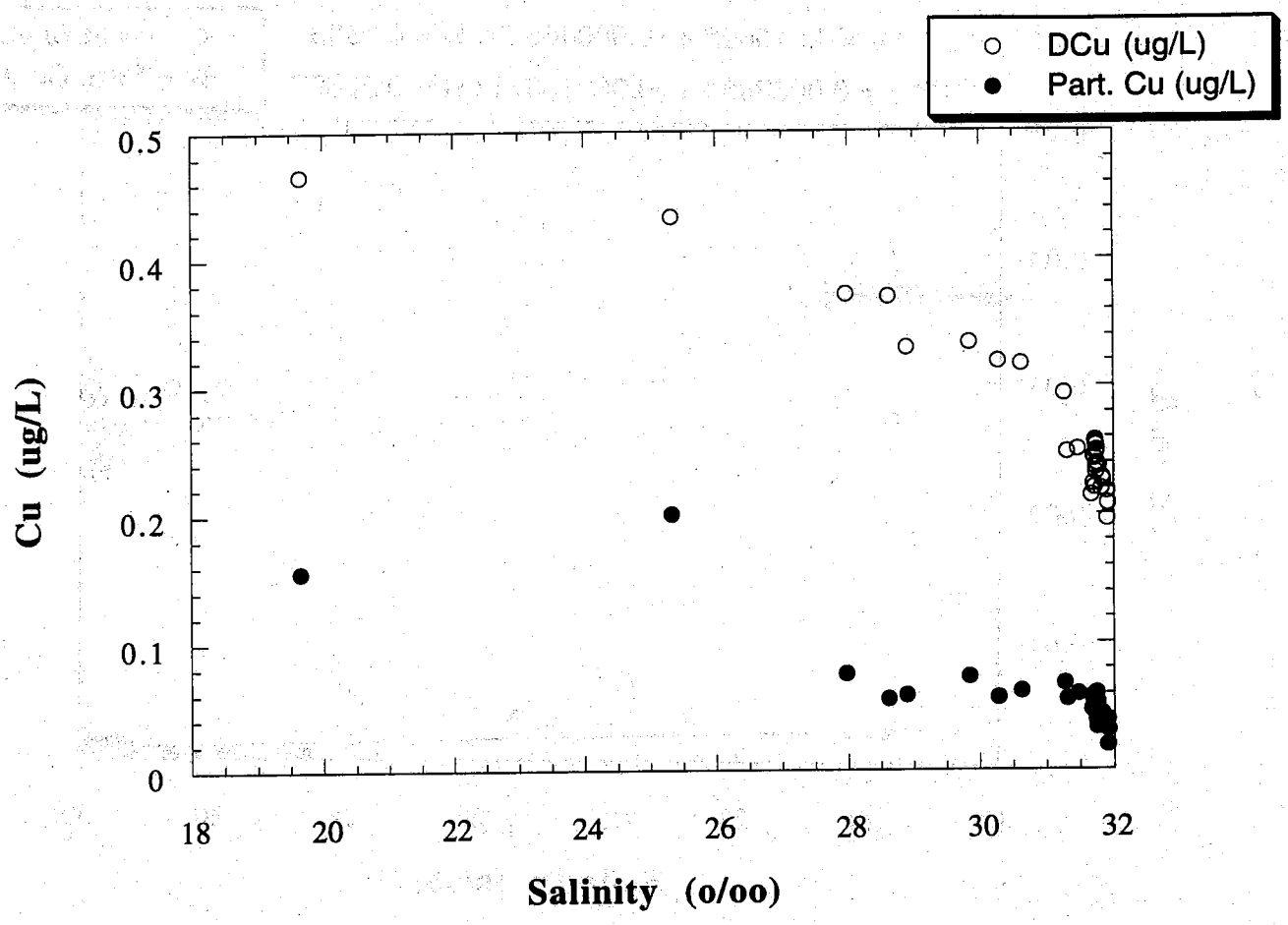
Cruise 3


Part. Conc. (mg/L)
Particulate Conc. (mg/L)
0
1
2
3
4
5
6
7
8
18
20
22
24
26
28
30
32
Salinity (o/oo)

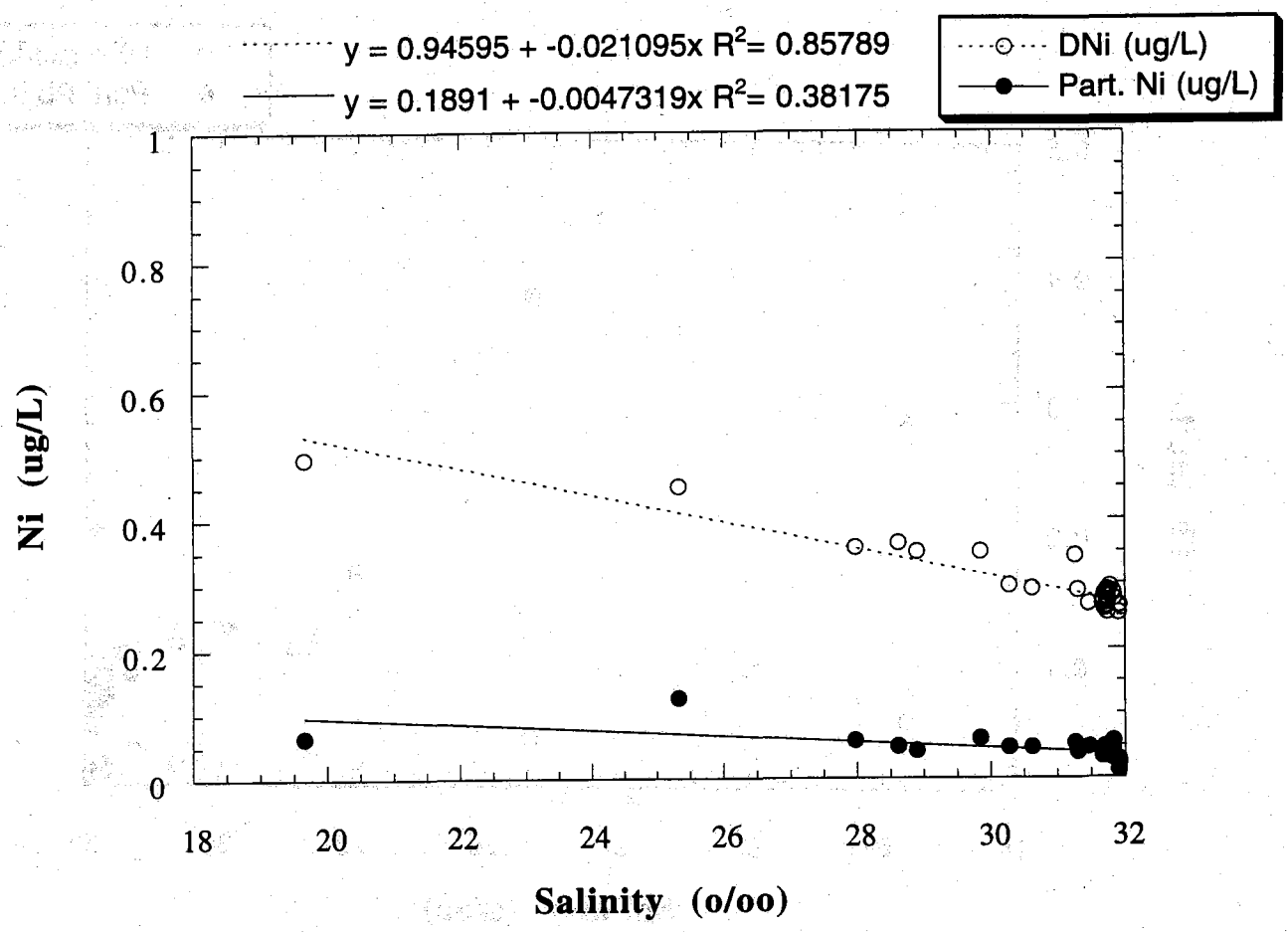
Cruise 3


y = 0.040602 + -0.00046583x R2= 0.1606
y = 0.0053634 + -0.00014371x R2= 0.32697
DCd (ug/L)
Part. Cd (ug/L)
0.05
0.04
0.03
0.02
0.01
0
Cd (ug/L)
18
20
22
24
26
28
30
32
Salinity (o/oo)

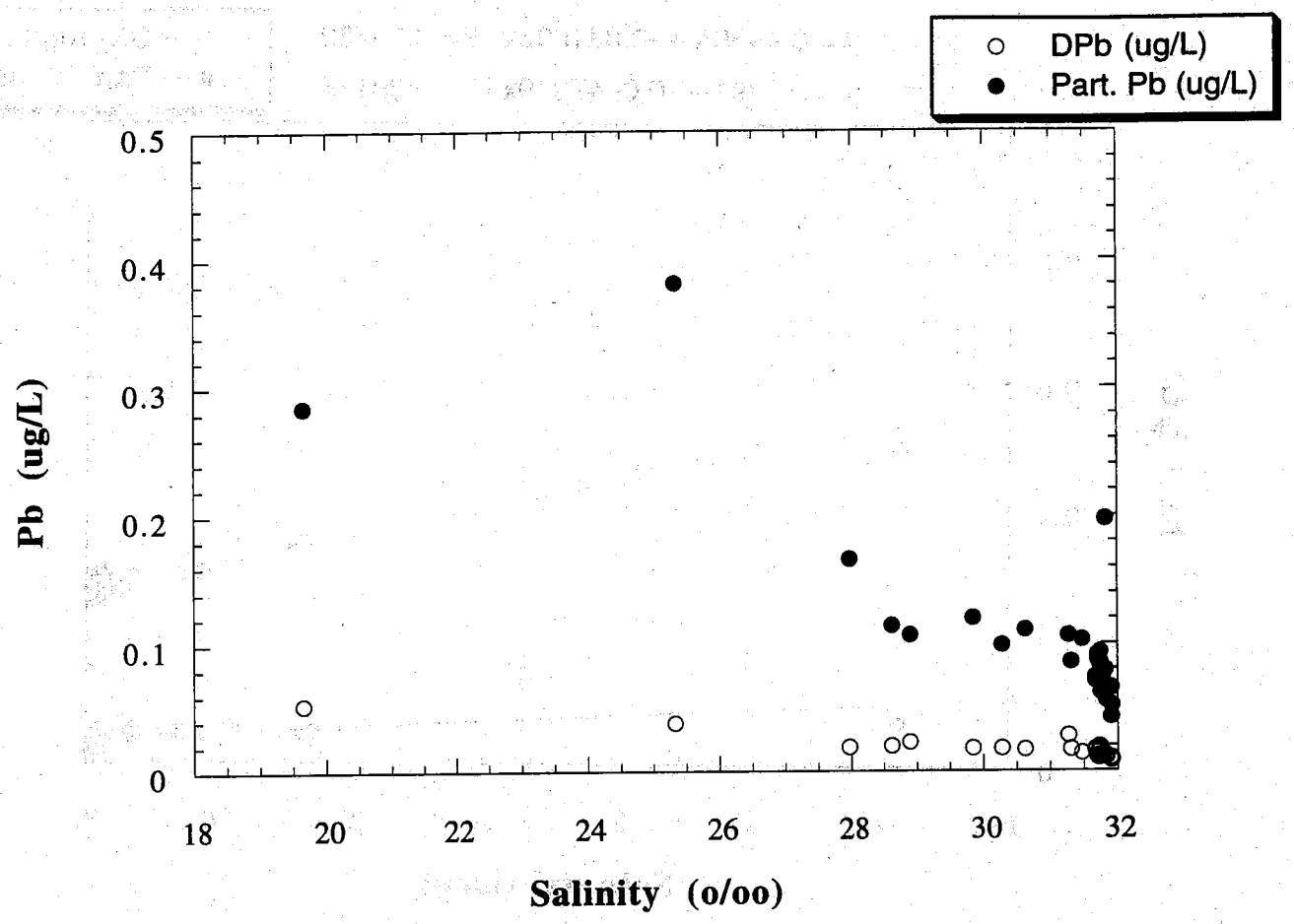
Cruise 3


DCu (ug/L)
Part. Cu (ug/L)
0.5
0.4
0.3
0.2
0.1
0
Cu (ug/L)
18
20
22
24
26
28
30
32
Salinity (o/oo)

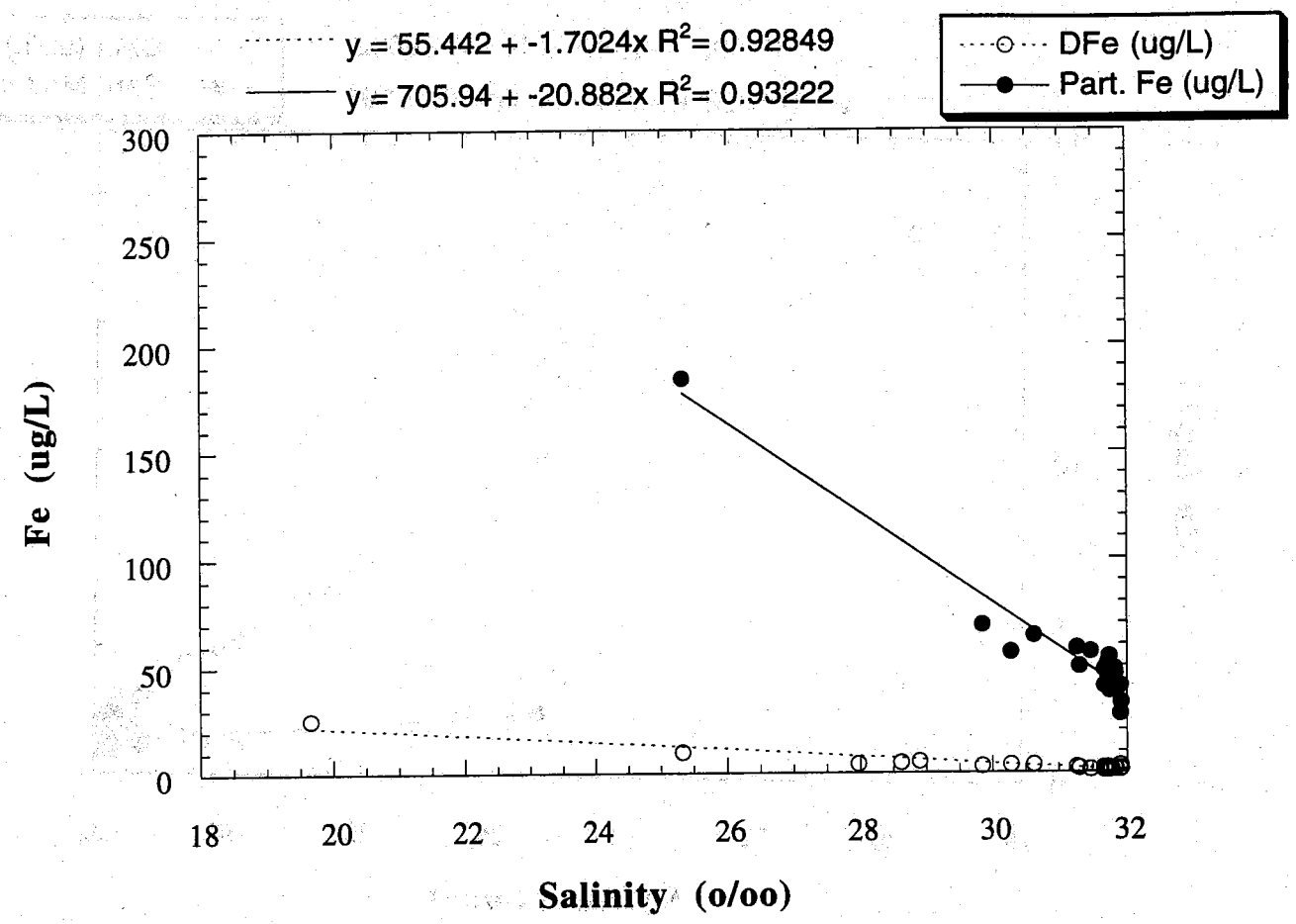
Cruise 3


y = 0.94595 + -0.021095x R2= 0.85789
y = 0.1891 + -0.0047319x R2= 0.38175
DNi (ug/L)
Part. Ni (ug/L)
Ni (ug/L)
1
0.8
0.6
0.4
0.2
0
18
20
22
24
26
28
30
32
Salinity (o/oo)

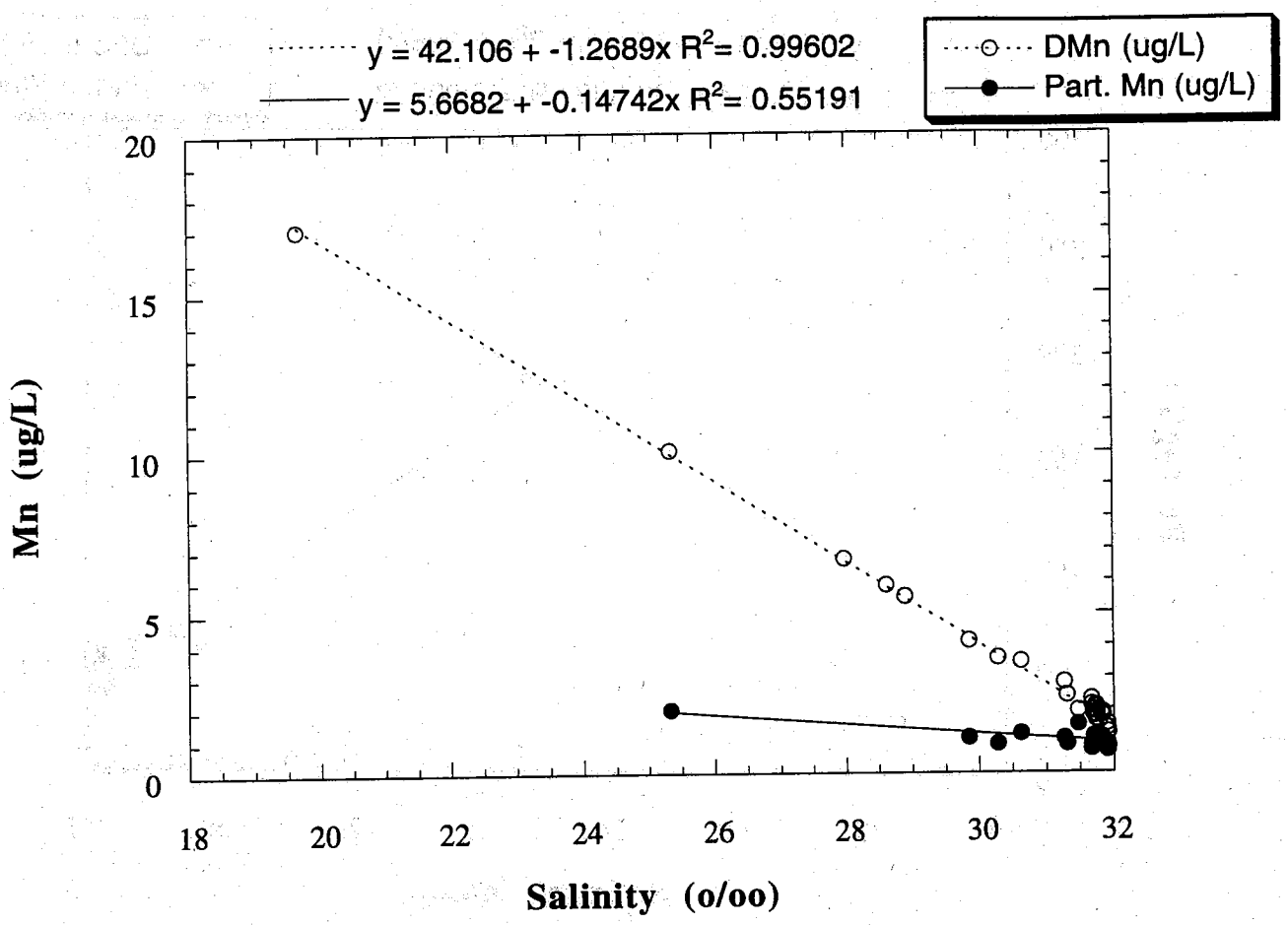
Cruise 3


DPb (ug/L)
Part. Pb (ug/L)
0.5
0.4
0.3
0.2
0.1
0
Pb (ug/L)
18
20
22
24
26
28
30
32
Salinity (o/oo)

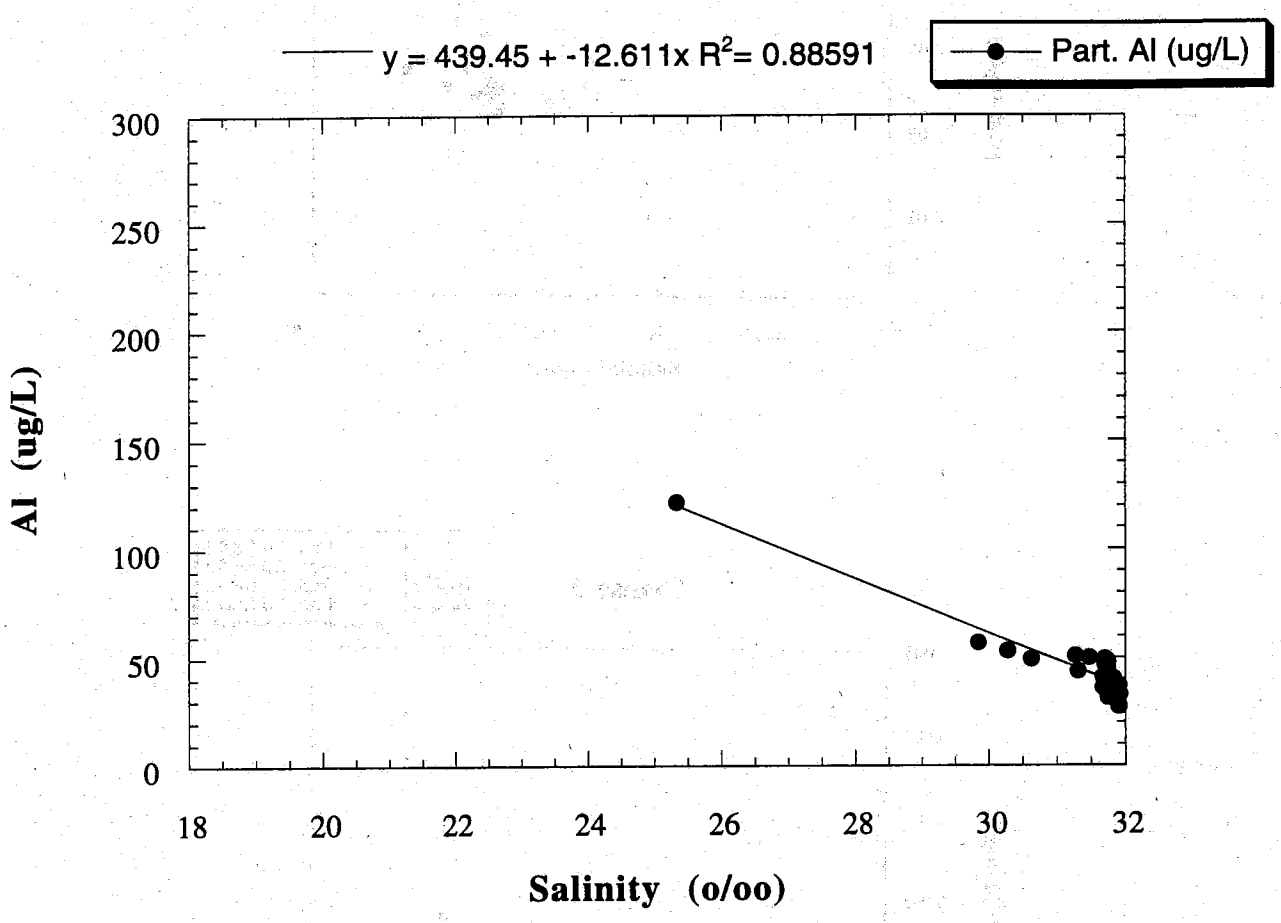
Cruise 3

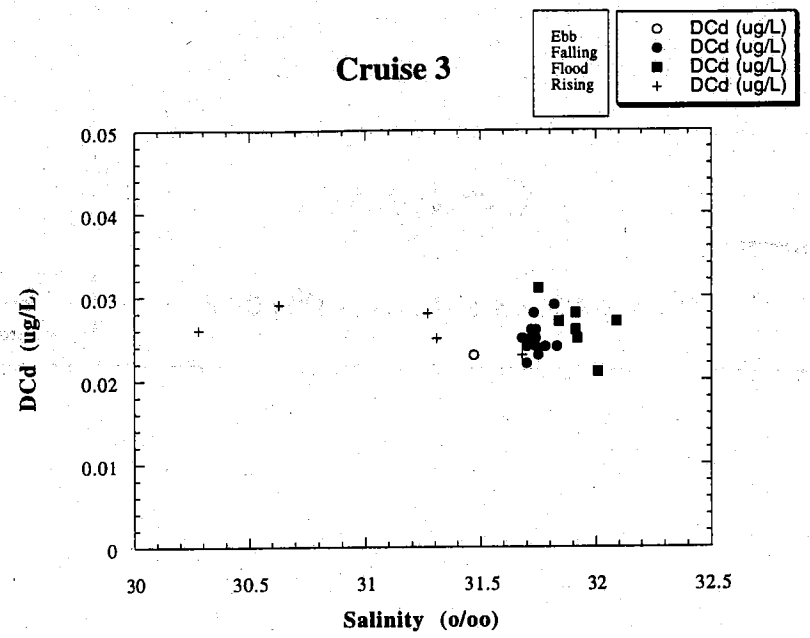

y = 55.442 + -1.7024x R²= 0.92849
y = 705.94 + -20.882x R²= 0.93222
DFe (ug/L)
Part. Fe (ug/L)
Fe (ug/L)
300
250
200
150
100
50
0
18
20
22
24
26
28
30
32
Salinity (o/oo)

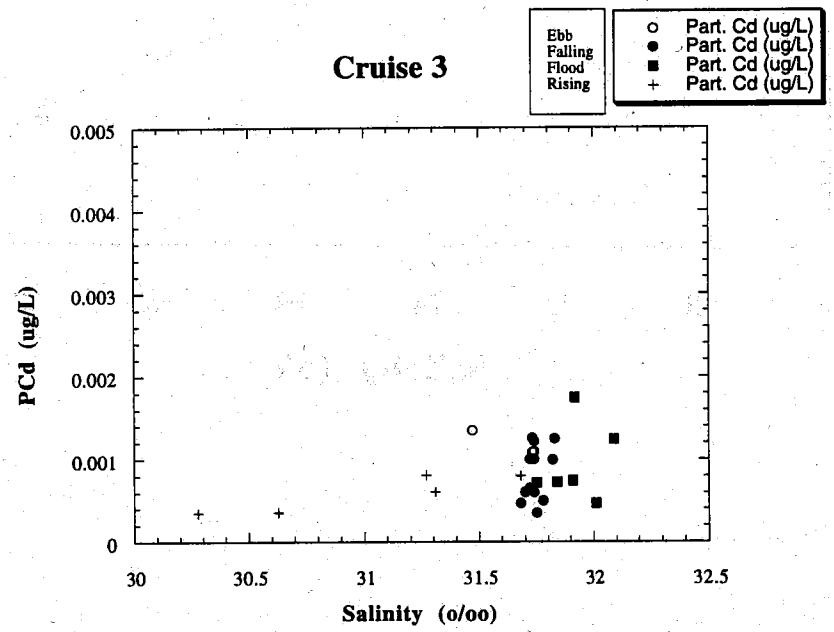
Cruise 3

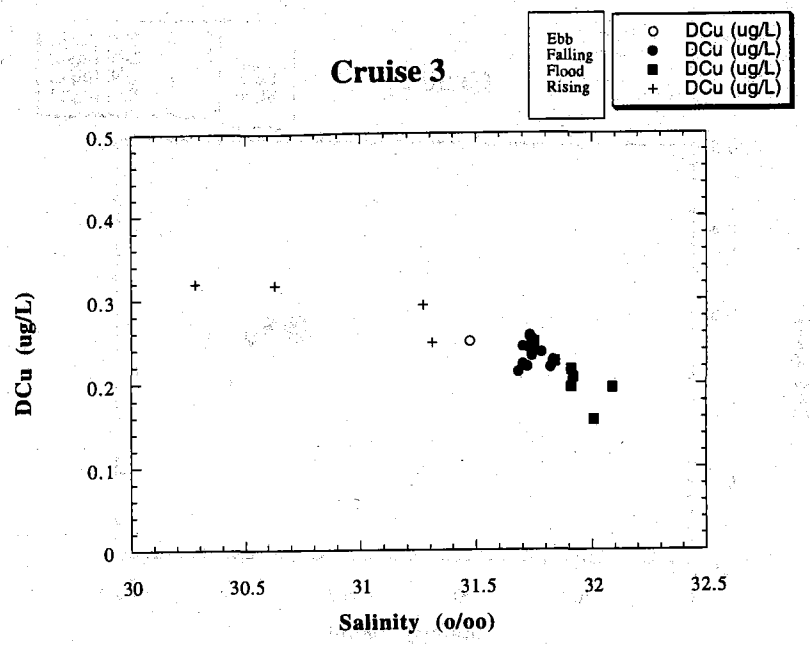

y = 42.106 + -1.2689x R²= 0.99602
y = 5.6682 + -0.14742x R²= 0.55191
DMn (ug/L)
Part. Mn (ug/L)
Mn (ug/L)
Salinity (o/oo)
0
5
10
15
20
18
20
22
24
26
28
30
32

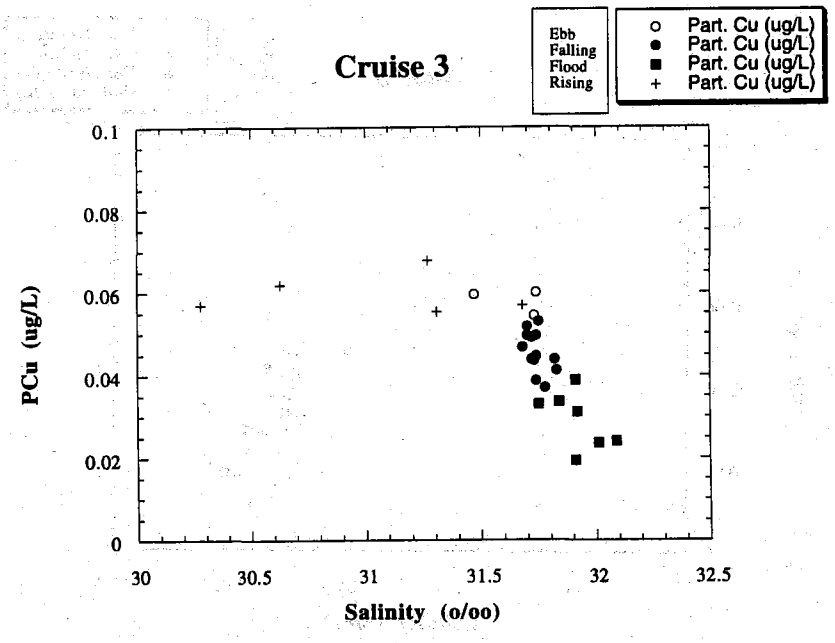
Cruise 3

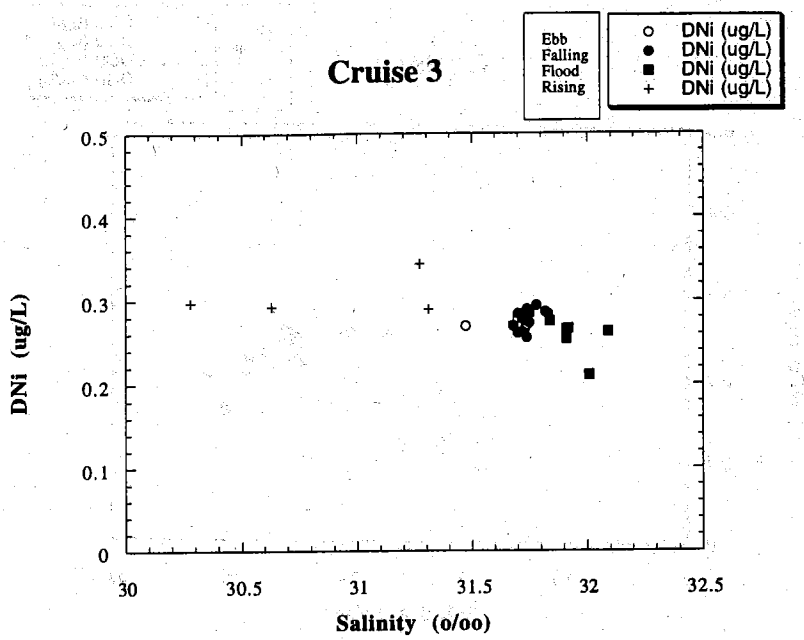

y = 439.45 + -12.611x R2= 0.88591
Part. Al (ug/L)
300
250
200
150
100
50
0
Al (ug/L)
18
20
22
24
26
28
30
32
Salinity (o/oo)

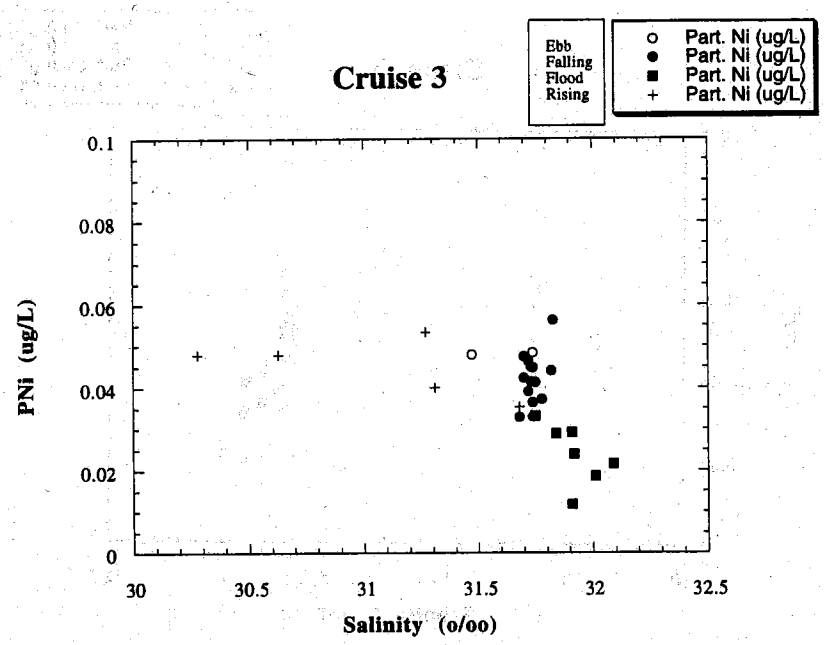

Cruise 3
Ebb
Falling
Flood
Rising
DCd (ug/L)
DCd (ug/L)
DCd (ug/L)
DCd (ug/L)
DCd (ug/L)
0.05
0.04
0.03
0.02
0.01
0
30
30.5
31
31.5
32
32.5
Salinity (o/oo)

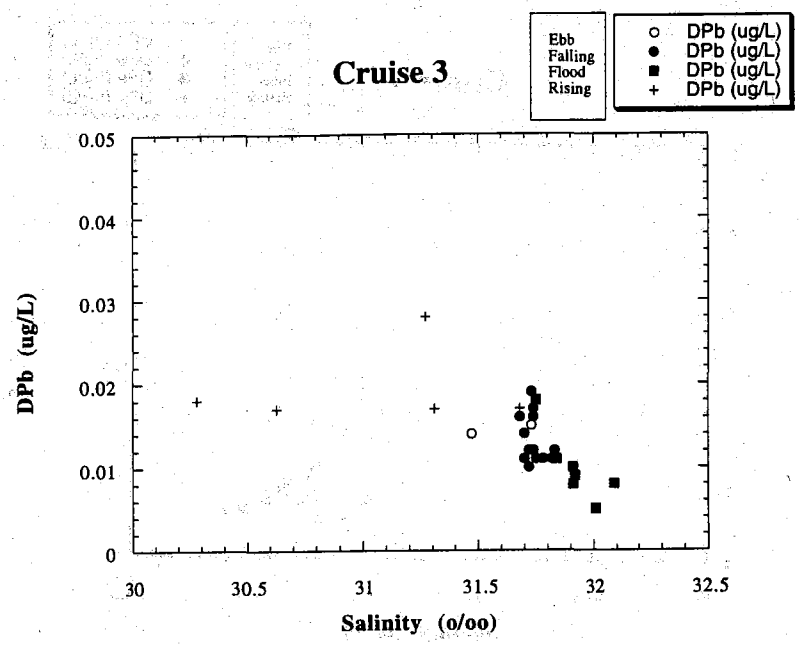

Cruise 3
Ebb
Falling
Flood
Rising
Part. Cd (ug/L)
Part. Cd (ug/L)
Part. Cd (ug/L)
Part. Cd (ug/L)
PCd (ug/L)
0.005
0.004
0.003
0.002
0.001
0
30
30.5
31
31.5
32
32.5
Salinity (o/oo)

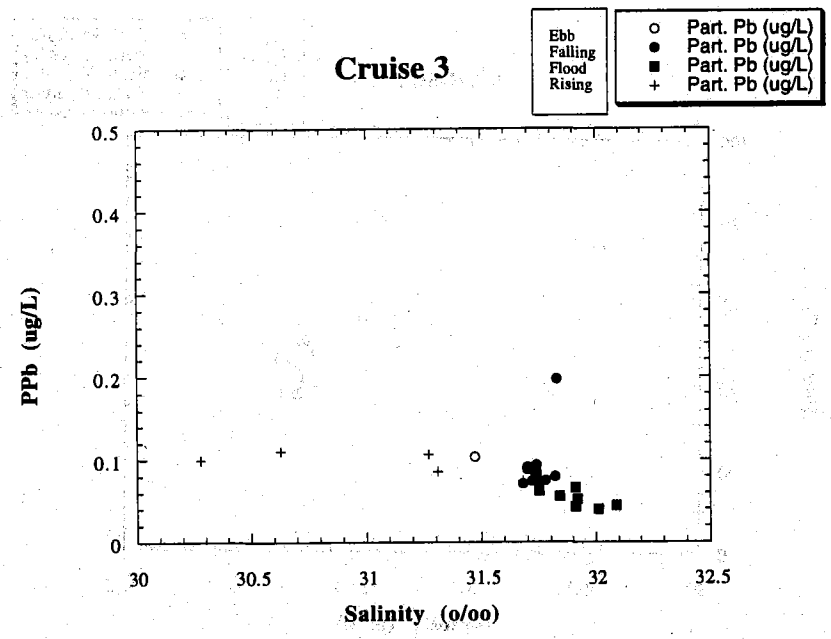

Cruise 3
Ebb
Falling
Flood
Rising
DCu (ug/L)
DCu (ug/L)
DCu (ug/L)
DCu (ug/L)
DCu (ug/L)
0.5
0.4
0.3
0.2
0.1
0
30
30.5
31
31.5
32
32.5
Salinity (o/oo)

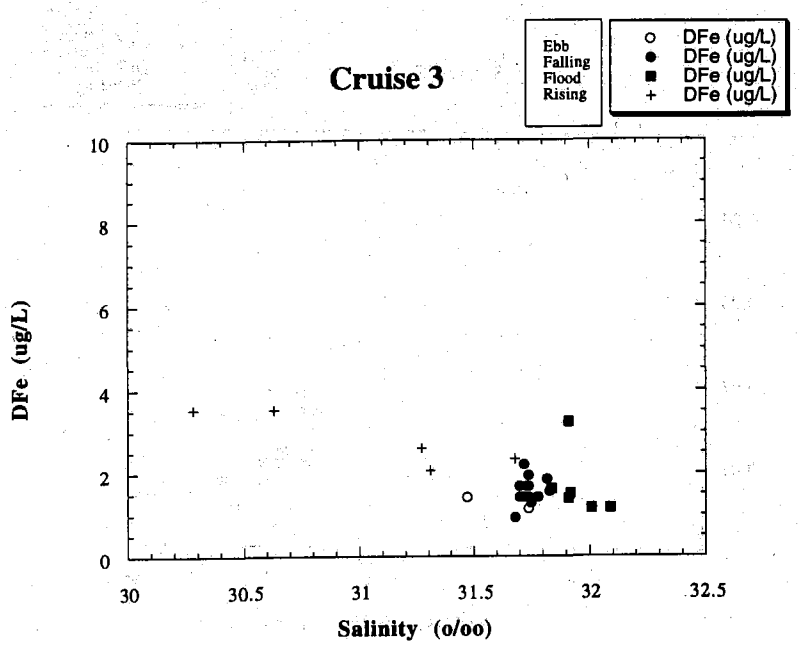

Cruise 3
Ebb
Falling
Flood
Rising
Part. Cu (ug/L)
Part. Cu (ug/L)
Part. Cu (ug/L)
Part. Cu (ug/L)
PCu (ug/L)
0.1
0.08
0.06
0.04
0.02
0
30
30.5
31
31.5
32
32.5
Salinity (o/oo)

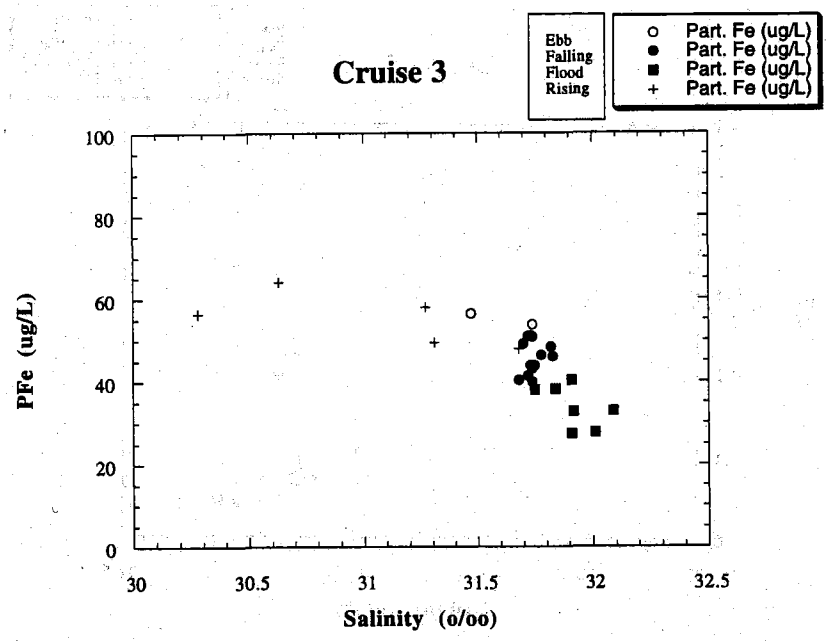

Cruise 3
Ebb
Falling
Flood
Rising
DNi (ug/L)
DNi (ug/L)
DNi (ug/L)
DNi (ug/L)
DNi (ug/L)
0.5
0.4
0.3
0.2
0.1
0
30
30.5
31
31.5
32
32.5
Salinity (o/oo)

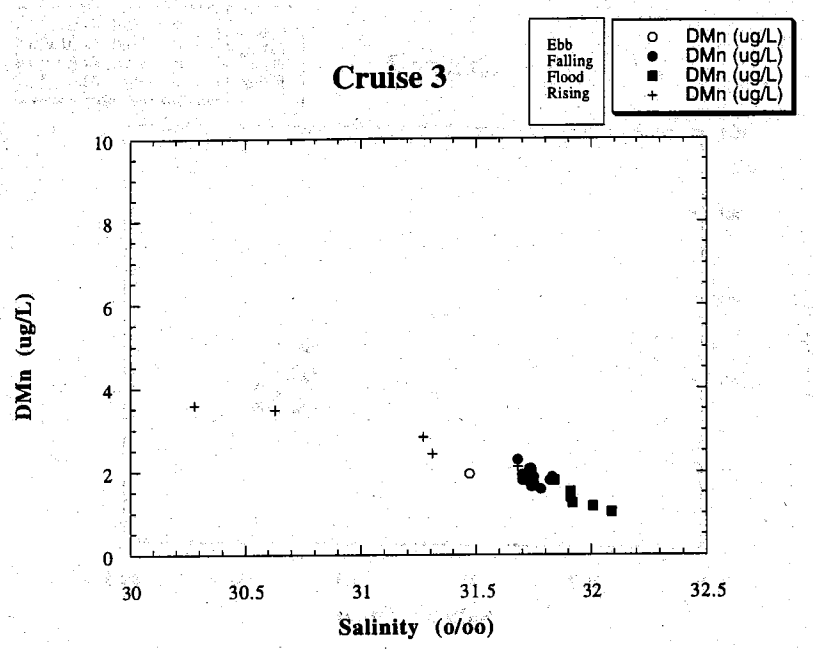

Cruise 3
Ebb
Falling
Flood
Rising
Part. Ni (ug/L)
Part. Ni (ug/L)
Part. Ni (ug/L)
Part. Ni (ug/L)
PNi (ug/L)
0.1
0.08
0.06
0.04
0.02
0
30
30.5
31
31.5
32
32.5
Salinity (o/oo)

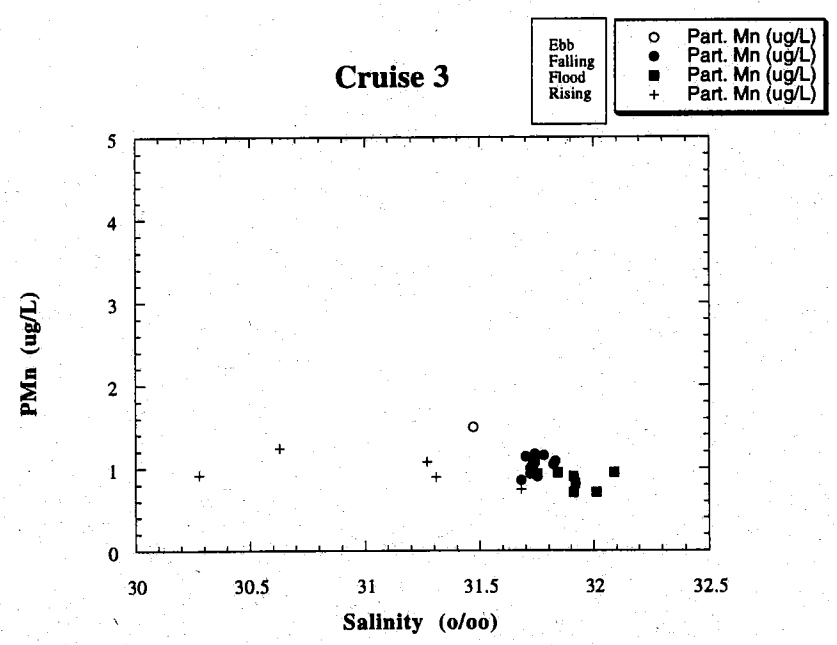

Cruise 3
Ebb
Falling
Flood
Rising
DPb (ug/L)
DPb (ug/L)
DPb (ug/L)
DPb (ug/L)
DPb (ug/L)
0.05
0.04
0.03
0.02
0.01
0
30
30.5
31
31.5
32
32.5
Salinity (o/oo)

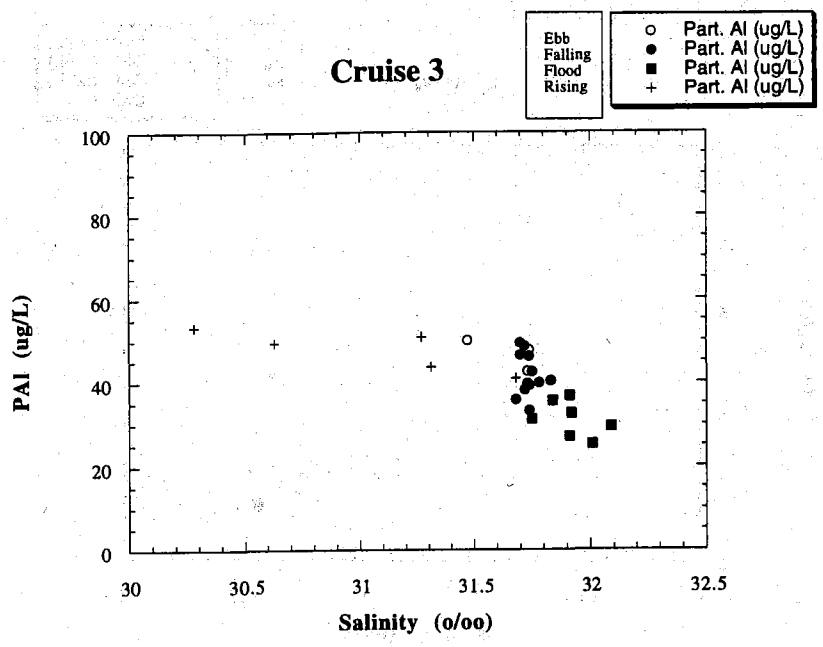

Cruise 3
Ebb
Falling
Flood
Rising
Part. Pb (ug/L)
Part. Pb (ug/L)
Part. Pb (ug/L)
Part. Pb (ug/L)
PPb (ug/L)
0.5
0.4
0.3
0.2
0.1
0
30
30.5
31
31.5
32
32.5
Salinity (o/oo)


Cruise 3
Ebb
Falling
Flood
Rising
DFe (ug/L)
DFe (ug/L)
DFe (ug/L)
DFe (ug/L)
DFe (ug/L)
Salinity (o/oo)
0
2
4
6
8
10
30
30.5
31
31.5
32
32.5


Cruise 3
Ebb
Falling
Flood
Rising
Part. Fe (ug/L)
Part. Fe (ug/L)
Part. Fe (ug/L)
Part. Fe (ug/L)
PFe (ug/L)
Salinity (o/oo)
0
20
40
60
80
100
30
30.5
31
31.5
32
32.5


Cruise 3
Ebb
Falling
Flood
Rising
DMn (ug/L)
DMn (ug/L)
DMn (ug/L)
DMn (ug/L)
DMn (ug/L)
10
8
6
4
2
0
30
30.5
31
31.5
32
32.5
Salinity (o/oo)

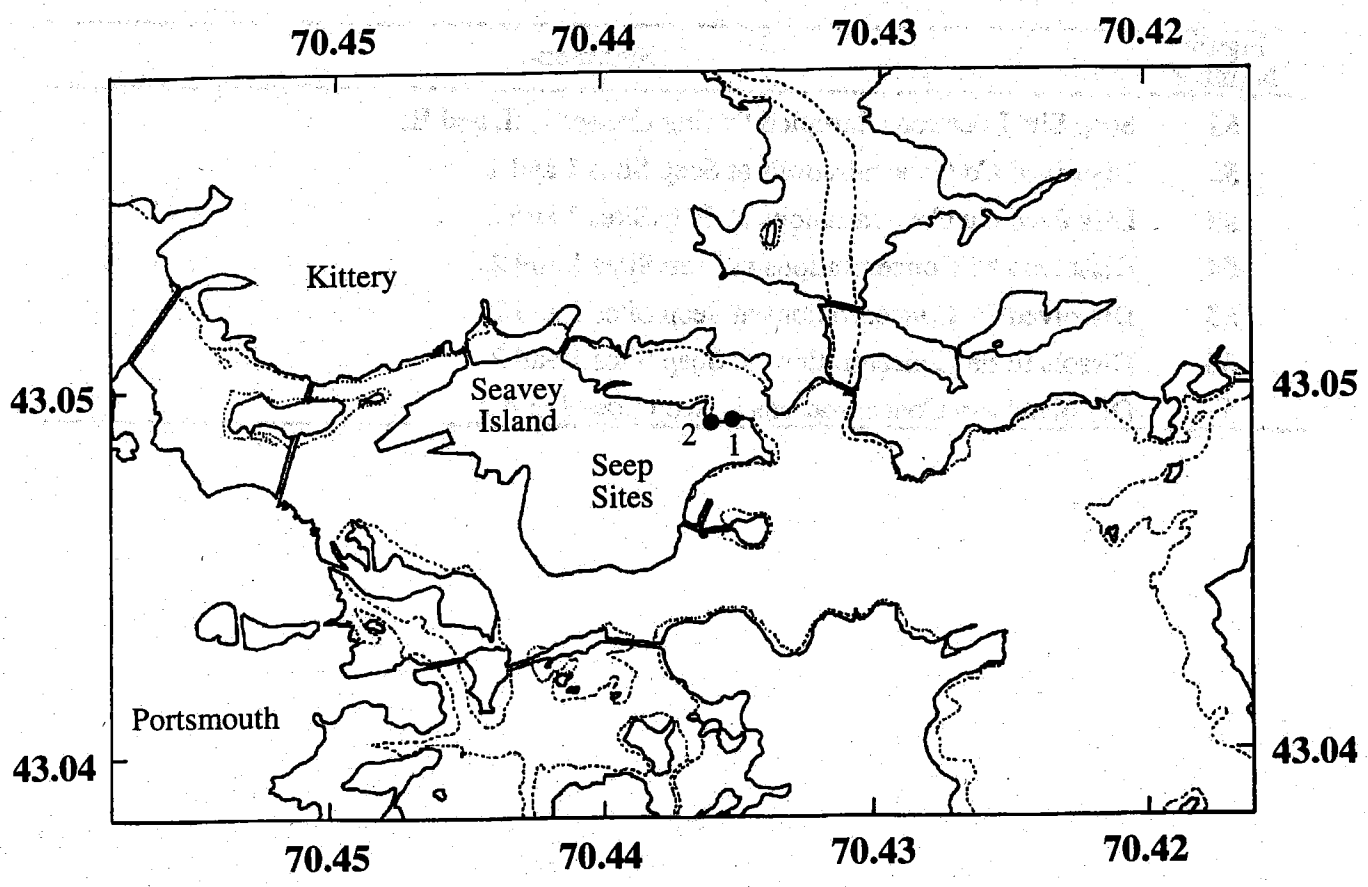

Cruise 3
Ebb
Falling
Flood
Rising
Part. Mn (ug/L)
Part. Mn (ug/L)
Part. Mn (ug/L)
Part. Mn (ug/L)
PMn (ug/L)
5
4
3
2
1
0
30
30.5
31
31.5
32
32.5
Salinity (o/oo)

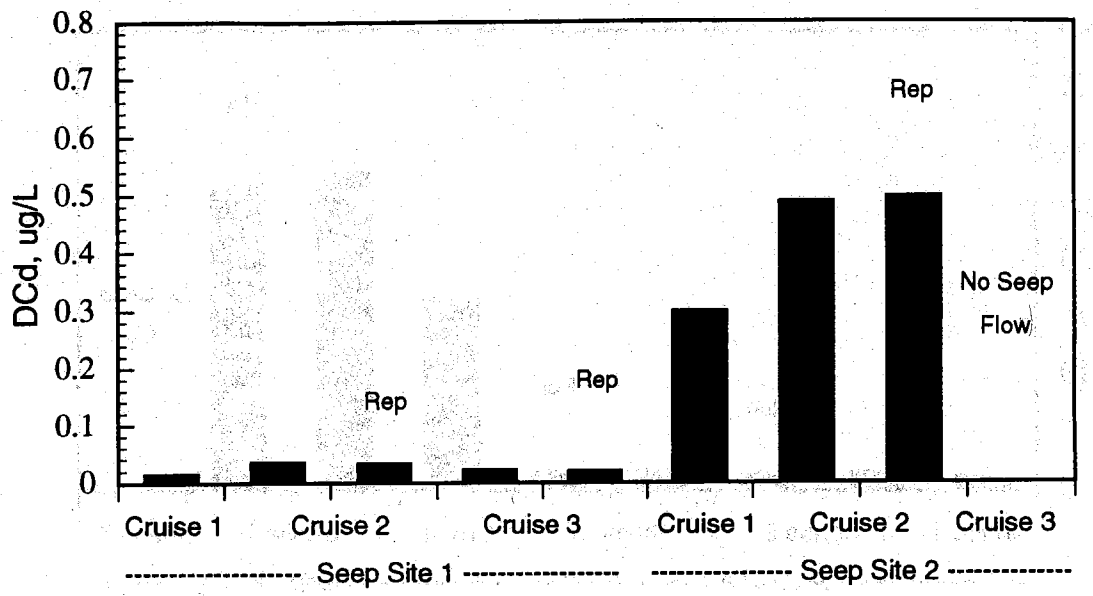

Cruise 3
Ebb
Falling
Flood
Rising
Part. Al (ug/L)
Part. Al (ug/L)
Part. Al (ug/L)
Part. Al (ug/L)
PAl (ug/L)
100
80
60
40
20
0
30
30.5
31
31.5
32
32.5
Salinity (o/oo)

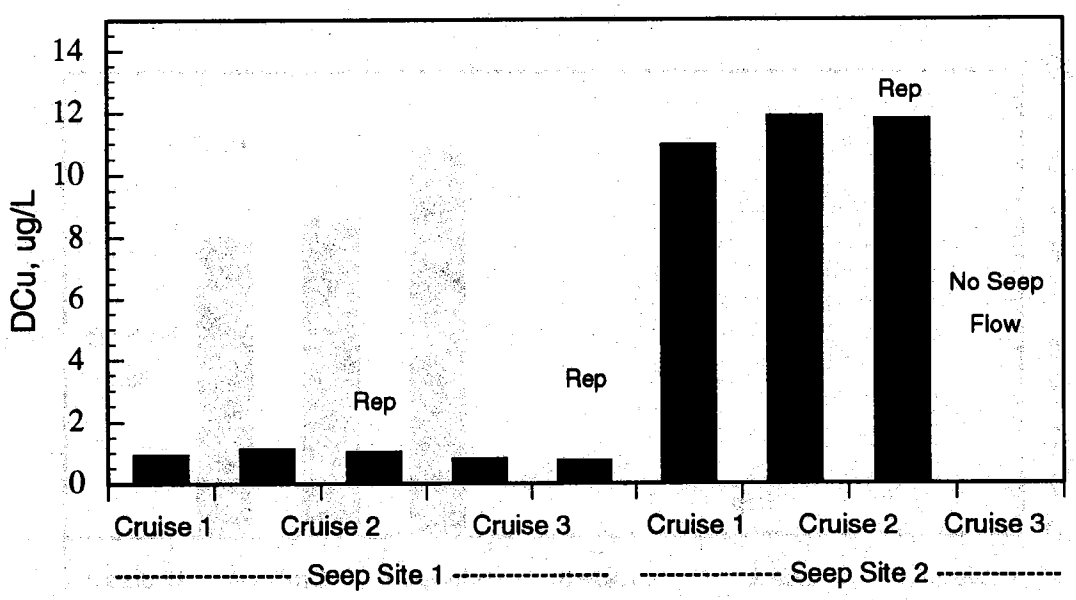
List of Figures for Seeps

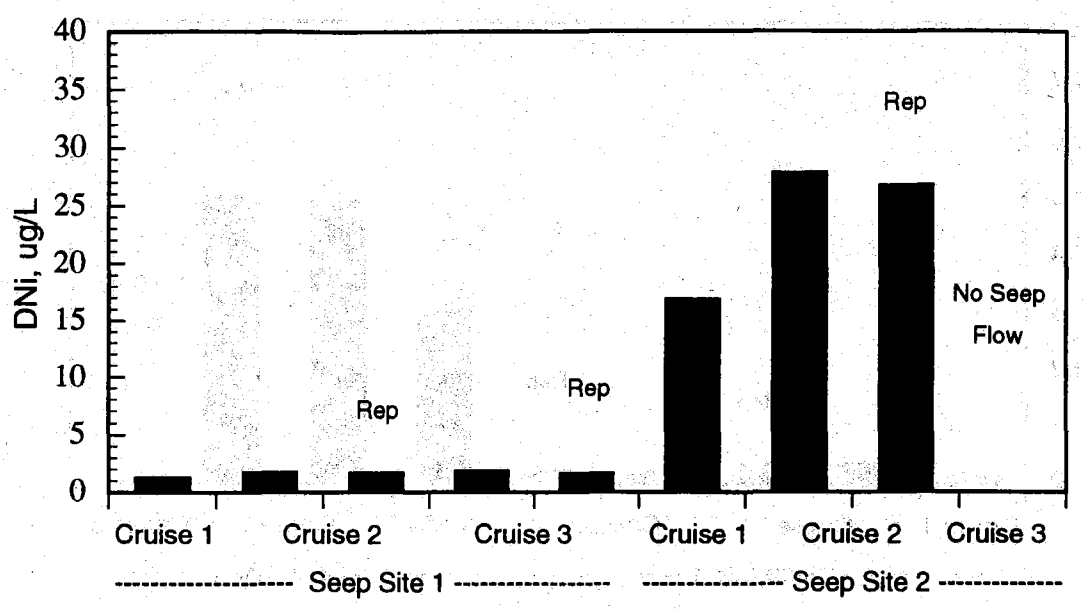
Figure Number	Description
51	Seep Site Locations Sampled During Cruises I, II, and III
52	Dissolved Cd Concentrations at Seep Sites 1 and 2
53	Dissolved Cu Concentrations at Seep Sites 1 and 2
54	Dissolved Ni Concentrations at Seep Sites 1 and 2
55	Dissolved Pb Concentrations at Seep Sites 1 and 2
56	Dissolved Fe Concentrations at Seep Sites 1 and 2
57	Dissolved Mn Concentrations at Seep Sites 1 and 2

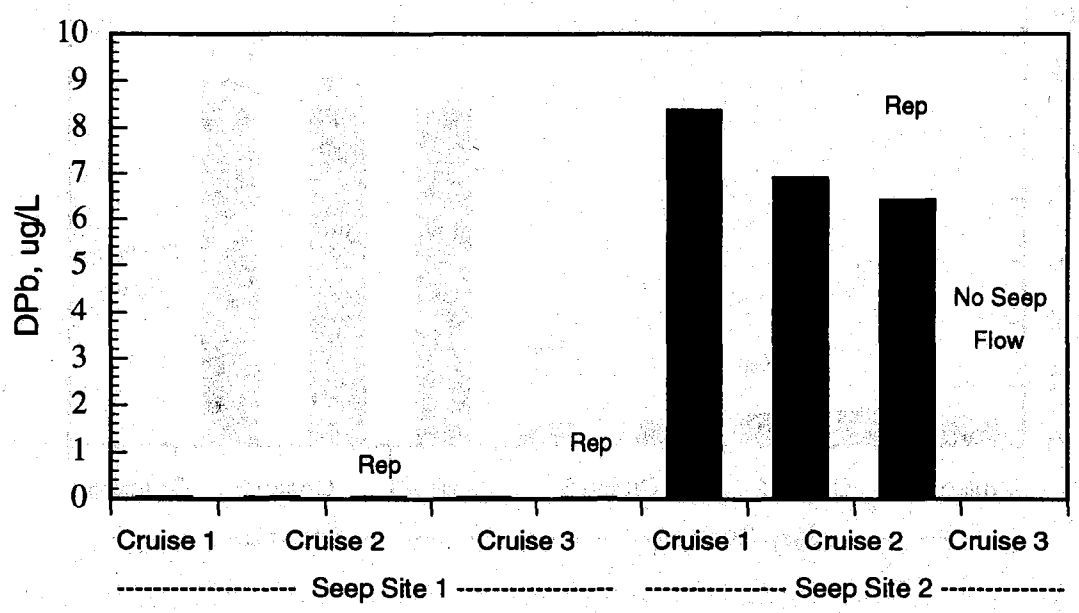
Cruises 1, 2, and 3
Seep sampling locations on
Seavey Island

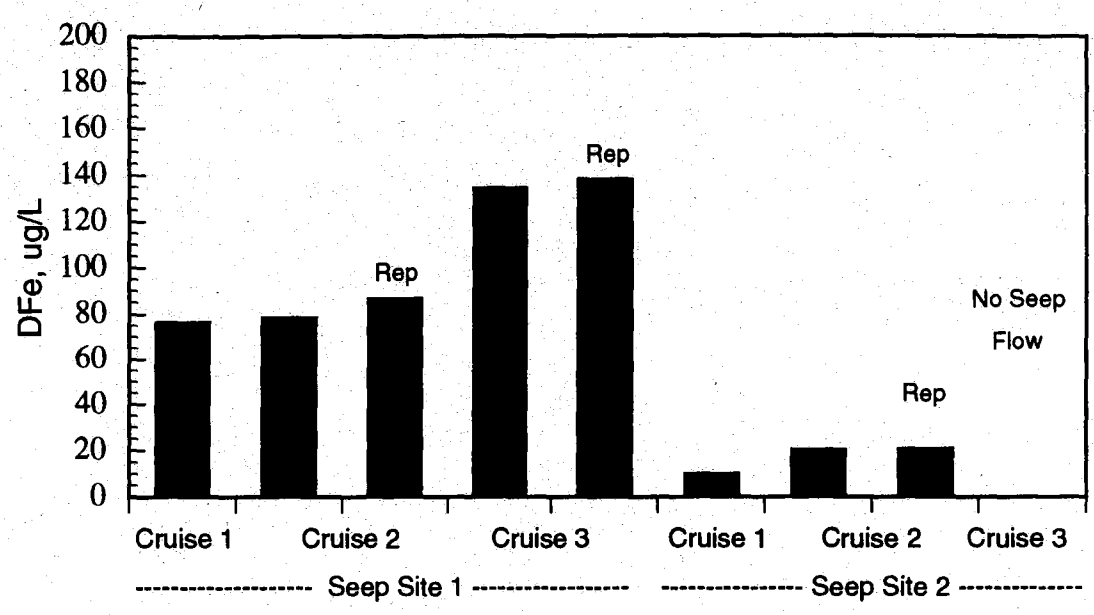


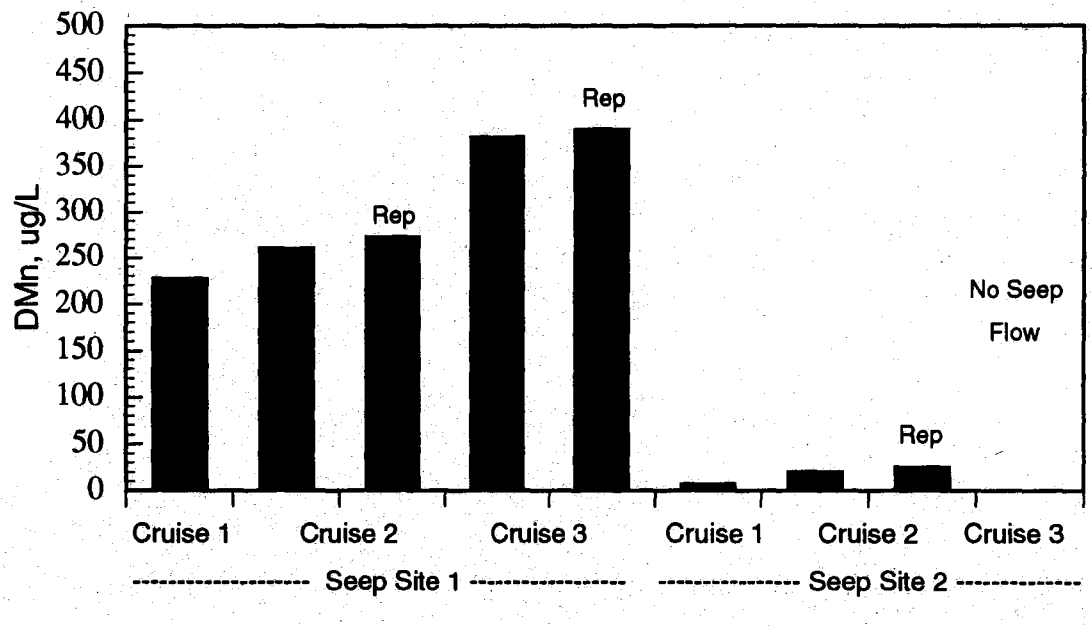

DCd, ug/L
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Rep
Rep
Rep
No Seep
Flow
Cruise 1
Cruise 2
Cruise 3
Cruise 1
Cruise 2
Cruise 3
Seep Site 1
Seep Site 2


DCu, ug/L
14
12
10
8
6
4
2
0
Rep
Rep
Rep
No Seep
Flow
Cruise 1
Cruise 2
Cruise 3
Cruise 1
Cruise 2
Cruise 3
Seep Site 1
Seep Site 2


DNi, ug/L
40
35
30
25
20
15
10
5
0
Rep
Rep
Rep
No Seep
Flow
Cruise 1
Cruise 2
Cruise 3
Cruise 1
Cruise 2
Cruise 3
Seep Site 1
Seep Site 2


DPb, ug/L
10
9
8
7
6
5
4
3
2
1
0
Rep
Rep
Rep
No Seep
Flow
Cruise 1
Cruise 2
Cruise 3
Cruise 1
Cruise 2
Cruise 3
Seep Site 1
Seep Site 2


DFe, ug/L
200
180
160
140
120
100
80
60
40
20
0
Rep
Rep
Rep
No Seep
Flow
Cruise 1
Cruise 2
Cruise 3
Cruise 1
Cruise 2
Cruise 3
Seep Site 1
Seep Site 2


DMn, ug/L
500
450
400
350
300
250
200
150
100
50
0
Rep
Rep
Rep
No Seep
Flow
Cruise 1
Cruise 2
Cruise 3
Cruise 1
Cruise 2
Cruise 3
Seep Site 1
Seep Site 2

APPENDIX A

Particulate concentrations of Cd, Cu, Ni, and Pb in a set of samples collected from a dosing experiment conducted by Science Applications International Corporation (SAIC).

Seawater samples were collected from dosing tanks maintained by SAIC personnel, and they were brought back to our laboratory for trace metal analysis. Subsequent to their collection, particulate metal samples were prepared and analyzed as described in our Standard Operating Procedures (attached). The particulate concentrations of Cd, Cu, Ni, and Pb found for each of the dosing tanks sampled are reported in the table that follows. Particulate Pb data were provided to SAIC, for incorporation into a report submitted to NCCOSC (Nacci et al., 1994).

References:

Nacci, D., S. Cayula, G. Tracey, T. Gleason, J. Serbst, and W. Munns, Jr., 1994. Title: An assessment of exposure response data from the estuarine ecological risk assessment case study for Portsmouth Naval Shipyard. Prepared for: Naval Command, Control and Ocean Surveillance Center (NCCOSC), Research, Development, Test and Evaluation Division, San Diego, CA 92152. Contract No. N66001-94-M-1081

Appendix A. Table 1. Particulate Cd, Cu, Ni, and Pb concentrations in samples from a dosing experiment conducted by SAIC, Inc.

Elutriate Sample No.	Sample Desc.	Sample Type	Sample Salinity, o/oo	Particulate Weight, mg	Rinse Adjusted Volume, ml	Particulate Concentration mg/L	PCd ug/g	PCu ug/g	PNi ug/g	PPb ug/g
113159	Header	elutriate	31.4	0	357.2	0.00	BD	BD	BD	BD
113161	T3	elutriate	31.4	6.43	234.3	27.45	0.34	88.3	33.5	13161
113162	T4	elutriate	31.4	6.74	214.9	31.37	0.46	87.7	37.1	13287
113163	T19	elutriate	31.4	4.49	217.8	20.62	0.16	95.2	37.4	11426
113165	T6	elutriate	31.4	4.39	241.3	18.20	0.13	77.5	38.9	281
113166	T29	elutriate	31.4	7.59	221.1	34.33	0.11	NA	33.0	304
113167	T13	elutriate	31.4	4.39	216.9	20.24	1.16	85.3	38.3	139
113168	T18	elutriate	31.4	4.03	232.0	17.37	1.15	94.1	39.2	95
113169	T12	elutriate	31.4	5.32	215.0	24.75	0.27	82.2	35.0	17769
113170	T31	elutriate	31.4	6.75	233.7	28.88	0.11	75.5	33.9	16259

BD refers to Below Detection

NA refers to Not analyzed

APPENDIX B

Marine Tissue and Sediment Trace Metal Method Detection Limits by Instrumental Neutron Activation

Mussel samples that were deployed in studies of metal uptake at locations within the Piscataqua River Estuary were analyzed by instrumental neutron activation analysis. Samples were prepared and analyzed following the methods detailed in our SOP (Appendix A). A Method Detection Limit Study was performed for both marine tissue and sediment samples using neutron activation, and the results are presented in Table 1, Appendix X).

For samples analyzed by the neutron activation technique, it should be noted at the outset that the "short activation" technique did not work because of the high salt content associated with the mussel tissue. Sodium and chloride were present to such an extent, that even with a very short activation scheme, the samples were literally too hot to handle safely. Thus, the short activation elements are not reported for the deployed mussel tissue samples (Table 2, Appendix X). Concentrations of metal reported for mussel tissue (Table 2) are for longer lived isotopes, which were counted after a sufficient cool down time.

Appendix B. Table 1. Trace element method detection limits for tissues and sediments analyzed by instrumental neutron activation

	Aluminum	Manganese	Vanadium	Copper	Cadmium	Arsenic	Iron	Chromium	Cobalt	Zinc
NIST Oyster Tissue 1566a	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g
1566a-1	194	12.6	5.2	61	3.5	16.0	516	1.1	0.52	799
1566a-2	196	10.8	4.8	56	3.3	14.1	530	1.0	0.53	791
1566a-3	198	13.1	5.1	74	4.7	15.5				
1566a-4	195	11.9	5.3	73	4.4	14.2	489	1.1	0.54	749
1566a-5	187	15.8	5.1	59	4.2	19.2	546	1.3	0.58	788
1566a-6	212	11.3	5.2	74	3.4	13.3	512	0.9	0.47	755
1566a-7	184	11.5	5.0	69	4.2	16.5	514	1.1	0.56	778
1566a-8	225	13.2	5.9	80	3.3	16.6	517	1.2	0.53	745
1566a-9	198	16.1	5.3	60	3.2	11.4	546	1.2	0.53	785
Observed Average, ug/g	199	12.9	5.2	67	3.8	15.2	518	1.1	0.53	774
Observed Std Dev	13	1.9	0.3	8	0.6	2.3	19	0.1	0.03	21
NIST Certified 1566a Avg.	202.5	12.3	4.68	66.3	4.15	14.0	539	1.43	0.57	830
NIST 1566a Std Dev	12.5	1.5	0.15	4.3	0.38	1.2	15	0.46	0.11	57
% Recovery of 1566a	98	105	111	102	92	109	96	77	93	93
Tissue MDL	36	5.5	0.9	25	1.7	6.5	57	0.4	0.10	63
Tissue LOQ	126	19.0	3.0	85	5.7	22.5	190	1.2	0.32	210

Appendix B. Table 1. Trace element method detection limits for tissues and sediments analyzed by instrumental neutron activation

	Aluminum	Manganese	Vanadium	Copper	Cadmium	Arsenic	Iron	Chromium	Cobalt	Zinc
NIST Oyster Tissue 1566a	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g	ug/g
CRC Sediment MESS-1										
MESS-1-1	43300	497	73	BD	BD	10.70	31800	66	12.3	214
MESS-1-2	47800	495	67	BD	BD	10.20	31500	76	12.2	201
MESS-1-3	46500	515	74	BD	BD	11.00	30200	63	11.7	198
MESS-1-4	45600	488	65	BD	BD	11.70	31000	67	11.9	191
MESS-1-5	47300	509	71	BD	BD	10.90	31400	71	11.8	189
MESS-1-6	54900	576	78	BD	BD	9.40	29800	73	11.6	199
MESS-1-7	45900	488	66	BD	BD	11.40	33500	84	12.8	202
MESS-1-8	51300	543	66	BD						
Observed Average, ug/g	47329	510	71	BD	BD	10.76	31314	72	12.0	199
Observed Std Dev	3640	31	5	BD	BD	0.77	1203	7	0.4	8
CRC Certified MESS-1 Avg.	58000	513	72.4	25.1	0.59	10.6	31000	71	10.8	191
CRC MESS-1 Std Dev		25	5.3	3.8	0.10	1.2		11	1.9	17
% Recovery of MESS-1	82	99	97			101	101	101	112	104
Sediment MDL	10912	93	14			2.41	3782	22	1.3	26
Sediment LOQ	36399	309	48			7.68	12034	70	4.2	82
Note BD Refers to Below Detection										

Appendix B. Table 2. Metal concentrations of tissue samples collected from the Piscataqua River Estuary

Sample Location	Sample ID	Ratio Dry/Wet Wt.	As, ug/g Dry Wt.	Cd, ug/g Dry Wt.	Fe, ug/g Dry Wt.	Cr, ug/g Dry Wt.	Zn, ug/g Dry Wt.	Se, ug/g Dry Wt.
Pepperel Cove 1	113050	0.081	13.8	BD	574	2.6	90	1.6
Pepperel Cove 2	113051	0.066	17.0	BD	664	2.7	97	1.8
Pepperel Cove 3	113052	0.072	21.7	BD	538	3.4	97	1.8
Pepperel Cove 4	113053	0.064	17.7	BD	440	1.2	60	1.2
Back Channel 1	113054	0.094	25.0	BD	590	2.7	94	1.5
Back Channel 2	113055	0.097	22.7	BD	477	1.9	79	1.7
Back Channel 3	113056	0.104	22.3	BD	414	2.2	95	1.7
Clark Outer 1	113057	0.086	33.4	BD	462	2.2	85	1.5
Clark Outer 2	113058	0.088	22.9	BD	407	1.9	61	1.2
Clark Outer 3	113059	0.092	23.5	BD	445	2.7	107	1.6
Clark Outer 4	113060	0.102	16.0	BD	619	3.0	92	1.6
Clark Middle 1	113061	0.087	27.8	BD	652	2.2	80	1.4
Clark Middle 2	113062	0.082	25.3	BD	603	2.7	86	1.5
Clark Middle 3	113063	0.105	22.0	BD	515	3.3	80	1.4
Clark Middle 1	113064	0.099	41.0	BD	565	2.3	97	1.4
Clark Inner 1	113065	0.092	1770.0	1780	621	3.1	104	1.4
Clark Inner 2	113066	0.095	1670.0	1640	519	2.5	92	1.7
Clark Inner 3	113067	0.096	51.5	BD	494	2.0	85	1.3
Clark Day 0 shucked	113068	0.129	BD	BD	478	2.3	93	1.3
Brave Boat Day 0 shucked	113069	0.115	25.5	BD	536	2.1	69	1.2
Clark Day 0 whole	113070	0.096	16.2	BD	713	2.2	104	1.4
Brave Boat Day 0 whole (Rep 1)	113071	0.077	30.9	BD	1260	3.2	47	0.9
Brave Boat Day 0 whole (Rep 2)	113071	0.075	34.1	BD	611	2.8	82	1.6
Brave Boat Day 0 whole (Rep 3)	113071	0.075	35.9	BD	492	2.9	82	1.6