Water Quality Status Report For Marine Waters, 2001

KING COUNTY

November 2002

TECHNICAL DOCUMENT AND RESEARCH CENTER
KING COUNTY DEPARTMENT OF
NATURAL RESOURCES AND PARKS

WATER QUALITY STATUS REPORT FOR MARINE WATERS, 2001

Prepared by the Marine & Sediment Assessment Group

King County Department of Natural Resources & Parks
Water and Land Resources Division
Science & Technical Support Unit
201 S. Jackson Street, Suite 600
Seattle, Washington 98104-3855

This information is available upon request in
Accessible formats for people with disabilities by calling
(206) 296-0600 (voice) or 1-800-833-6388 (TTY/TDD users only).

ACKNOWLEDGMENTS

The following individuals are acknowledged for their contributions to the monitoring efforts and production of this document.

King County Environmental Laboratory: John Blaine provided technical coordination for offshore sediment sampling. Judy Ochs provided technical coordination for water sampling and Kevin Li provided technical coordination for intertidal and benthic infauna sampling. Bob Kruger provided technical coordination for the Marine Outfall Siting Study (MOSS) project. Katherine Bourbonais provided laboratory coordination for the MOSS analytical work. The efforts of the field sampling crew and analytical laboratory were greatly appreciated.

Amanda Babson of the University of Washington provided the CTD transect Matlab plots in Section 4 and also conducted the post-processing of all CTD data. Gabriela Hannach, King County Science & Data Management Section, contributed written material for Section 4. Dan Smith, King County Marine & Sediment Assessment Group, contributed written material for Section 3.

Tony Petrillo of Blue Water Engineering conducted the sediment grab sampler position tracking study. Allan Fukuyama assisted with benthic fauna collection and organized species' identifications.

The time and efforts of the following reviewers were also appreciated: Betsy Cooper (Coordinator of King County's Wastewater Treatment Division's NPDES program), Jeff Stern (Wastewater Treatment Division), Jim Simmonds (Project Manager for the MOSS project), Scott Mickelson (King County Marine & Sediment Assessment Group), and Tim Determan (Washington State Dept. of Health). King County Environmental Laboratory: Dana Walker (Trace Organics), Kevin Li, Bob Kruger, and Judy Ochs (Environmental Services Section), Cheryl Kamera (Trace Metals), and Katherine Bourbonais (Laboratory Project Manager).

Scott Mickelson provided coordination for the MOSS field sampling effort. Kimberle Stark, Marine Monitoring Project Coordinator, organized production of this report.

EXECUTIVE SUMMARY

The King County Department of Natural Resources and Parks operates and maintains three wastewater treatment plants (West Point, South Plant, and Vashon Island) and two combined sewer overflow treatment plants (Alki and Carkeek) that discharge treated effluent into the Central Puget Sound Basin. King County has a marine monitoring program to confirm that these discharges are not degrading water quality within the vicinity of the treatment plants. The routine marine monitoring program has two components: point source monitoring focusing on areas near treatment plant discharges and ambient monitoring focusing on areas outside the immediate vicinity of treatment plant discharges. Monitoring areas outside the influence of point source discharges is necessary in order to assess background conditions in central Puget Sound.

King County is plans to build a new regional wastewater treatment plant that will discharge treated effluent through a marine outfall in northern King County or southern Snohomish County. An intensive marine monitoring program, the Marine Outfall Siting Study (MOSS), was initiated in late 1998 to support siting a suitable outfall location. The MOSS project continued throughout 2001 and data collected in 2001 are presented in this report.

In 2001, 6 offshore/nearshore and 5 beach water stations, 19 offshore/nearshore and 3 beach sediment stations, 4 shellfish stations, and 4 macroalgae stations were sampled for the point source program. For the ambient program, 6 offshore/nearshore and 15 beach water stations, 3 beach sediment stations, 6 shellfish stations, and 5 macroalgae stations were sampled. Water samples were analyzed for bacteria, nutrients, dissolved oxygen, chlorophyll, and physical parameters. Sediment samples were analyzed for organic compounds, metals, and conventional parameters. Six sediment samples around the South Plant wastewater treatment plant were also sampled for benthic fauna. Shellfish samples were analyzed for organics, metals, and bacteria. Macroalgae were analyzed for metals.

In 2001, 22 stations were sampled for the MOSS project. Six of these stations are also sampled for the ambient monitoring program and two for the point source monitoring program, however, additional parameters that are not part of the routine sampling program were included for the MOSS project. Ten offshore water stations were sampled for physical properties, nutrients, dissolved oxygen, chlorophyll, and bacteria for the MOSS project. Twelve beach stations were also sampled for the MOSS project in 2001. Beach waters were sampled for physical properties, nutrients, bacteria, and total and dissolved metals. In addition, organics (including polynuclear aromatic hydrocarbons, chlorinated and organophosphorus pesticides, polychlorinated biphenyls, and chlorinated herbicides) were sampled at three stations.

Water quality data were also collected for the MOSS project in a series of transects at five locations in the Central Basin. Each transect consisted of either five or six stations spaced equidistant across the length of the transect. Measurements were recorded monthly starting in 2000 and continued for six months in 2001. Data collected included physical properties, dissolved oxygen, and chlorophyll.

MONITORING RESULTS

Water

All offshore/nearshore stations met Washington State Class AA marine surface water standards for fecal coliform bacteria with the exception of three stations located in inner Elliott Bay. Levels at two of the three stations met the geometric mean standard of 14 colonies/100 milliliters but exceeded the peak standard of 43 colonies/100 ml. The other station exceeded both standards. The highest values for the Elliott Bay stations occurred during periods of high rainfall as these sites receive higher freshwater input than other stations due to their proximity to the Duwamish River. Fecal coliform bacteria in the water column near the County's treatment plant discharges were at low levels (usually less than 5 colonies/100 ml), if detected at all.

Fecal coliform counts at beaches are influenced by freshwater runoff from the surrounding watersheds. As a result, exceedences of Class AA marine water quality standards at some stations occurred during high rainfall months and at stations closer to freshwater sources. Ten beaches exceeded both the geometric mean and peak standards; four met the geometric mean but not the peak standard; and fourteen passed both standards. Beaches with the lowest bacteria counts were located near Boeing Creek, Seacrest Park and around the Duwamish Head area. Highest counts were at Brackett's Landing, Fauntleroy Cove, and the south side of Alki Point.

Enterococcus bacteria levels in the offshore/nearshore water column were either not detected or were low. Enterococcus bacteria counts at beach stations varied between stations and months and did not correlate with fecal coliform bacteria counts. *E. coli* was monitored at the MOSS stations only and showed the same pattern as enterococcus bacteria, in that *E. coli* was seldom detected in offshore waters and varied between stations and months. There was a clear correlation between *E. coli* and fecal coliform count but not enterococcus bacteria.

Temperature, salinity, and density values indicated a well-mixed water column throughout most of the year, although seasonal thermal stratification was evident in the summer. A time-lag of about one month was noted in the peak water temperatures between beach and offshore stations with temperatures peaking in June at offshore stations and in July for most beach stations. In 2001, all dissolved oxygen (DO) values were above 5.0 mg/L, which is an indicator level at which potential problems could occur.

Nutrients, such as ammonia and nitrate+nitrite, exhibited trends similar to previous years. Ammonia was highest in the summer and nitrate+nitrite was most abundant in winter when not being taken up by phytoplankton. All ammonia concentrations for beach and offshore stations, including those located near the treatment plant outfalls, were well below the Washington State ammonia criterion for marine surface waters.

Total and dissolved metals were analyzed at the MOSS beach stations and dissolved metals were analyzed at seven ambient and point source beach stations. For total metals, 12 of the 15 elements analyzed were detected in all samples. For dissolved metals, 10 of the 15 elements were detected in all samples. For copper, a constituent in marine boat paints as well as effluent and stormwater, the highest concentrations were found at stations with heavy boat traffic, such as near the Shilshole Bay Marina. Metal concentrations at all beach stations were below Washington State acute and chronic marine water quality criteria.

A total of 107 organic compounds were analyzed in beach waters from three MOSS sites: 64 semi-volatiles, 26 chlorinated pesticides/polychlorinated biphenyls (PCBs), 10 chlorinated herbicides, and 7 organophosphorus pesticides. Chlorinated pesticides, herbicides, PCBs, and organophosphorus pesticides were not detected in any of the samples. A total of 10 different semi-volatile organic compounds were detected in one or more samples at concentrations near the reporting limits. There are few Washington State water quality criteria for organic compounds and none of the compounds for which criteria exist were detected..

Sediment

Sediments from 13 stations around the South Plant and 6 stations around the Alki treatment plant outfalls were sampled between late October to early November 2001. Beach sediments were collected from six locations: three point source and three ambient.

Metals were analyzed in all sediments and many were either not detected (antimony, selenium, silver, and thallium) or seldom detected (cadmium). No concentrations exceeded Washington State Sediment Quality Standards (SQS) guidelines. For the outfall stations, a concentration gradient was not evident for either of the sites with respect to distance away from the outfall pipe.

Of the 98 organic compounds analyzed, 17 were detected in samples around the South Plant and Alki TP outfalls and 18 compounds were detected in beach sediments. Most of these compounds were polynuclear aromatic hydrocarbons (PAHs). Two PCB Aroclors were detected at two stations around the South Plant TP outfall (Aroclor 1254 and 1260). No organic compounds exceeded SQS criteria for either outfall or beach stations.

Biological monitoring (benthic community analysis) was conducted at six stations around the South Plant outfall in November 2001. Diversity indices and total species numbers were typical for sediments composed mostly of silt and clay, such as those around the South Plant outfall. Numerically dominant species found at all the stations are those species that are typically seen in other areas with similar sediment grain sizes and indicative of deep water silt/clay sediments. Diversity indices, species abundance, and dominant species present did not show a gradient with respect to distance away from the outfall pipe.

Shellfish

Shellfish (butter clams) tissues from four point source and two ambient stations were analyzed in July for metals and organic compounds. Thirteen of the 14 metals analyzed in 2001 were detected and concentrations varied only slightly between stations. There was no correlation between metal concentrations and lipid content. State and federal criteria do not exist for acceptable levels of metals in shellfish tissues, however, the Food and Drug Administration (FDA) has established an Action Level in fish and shellfish tissues of 1.0 mg/kg for mercury. When this value is exceeded, the food product cannot be commercially traded. Mercury concentrations in shellfish tissues were well below this Action Level. The FDA has also established guidance values termed "Levels of Concern" for shellfish for five metals: arsenic, cadmium, chromium, lead, and nickel. Shellfish tissue concentrations were below these Levels of Concern.

Of all the organic compounds analyzed, only benzoic acid and bis(2-ethylhexyl)phthalate were detected. Benzoic acid is a degradation product of metabolic processes and is always detected in shellfish samples. Quality control validation indicated the reported values of bis(2-ethylhexyl)phthalate are likely due to laboratory contamination. It is difficult to avoid laboratory contamination when processing shellfish samples as phthalates are a component in latex/nitrile gloves used in the laboratory.

Fecal coliform bacteria were analyzed in clams from six ambient stations and three point source stations monthly from May through September. Concentrations varied from station to station and from month to month. Generally, stations near Seahurst, West Point, Richmond Beach, and Normandy Park had the lowest values and the station at Carkeek Park had the highest values. The association between fecal coliform concentrations measured in shellfish and concentrations detected in water was examined and a consistent relationship was not evident. Enterococcus concentrations also varied from station to station and month to month and stations near Seahurst and West Point had consistently low values whereas Tramp Harbor had the highest values.

Macroalgae

Macroalgae (algae) samples were collected from eight beaches in 2001 (four point source and four ambient). Samples consisted entirely of the edible algae, *Ulva fenestrata* (known as sea lettuce), and were analyzed for 14 metals. Two metals (selenium and mercury) were not detected in any samples and two (beryllium and silver) were detected in one sample. The remaining 10 metals were detected in all samples. The southern West Point and Normandy Park stations had the highest concentrations of arsenic, chromium, copper, lead, nickel, and zinc and the Richmond Beach station had the lowest concentrations for most metals. Concentrations were similar to previous results with the exception of a higher copper value from the Normandy Park station.

CTD Transect Data

Conductivity, temperature, depth (CTD) transects were conducted monthly at five locations for the MOSS project between January and July. Data collected included physical properties, dissolved oxygen, and fluorescence (as an estimate of chlorophyll-*a*). Temperature, salinity, and density data indicated typical seasonal patterns, with the water column warming in June. Salinities near the surface of the Possession Sound transect were lower than other areas due to the freshwater input of the Snohomish River. Chlorophyll-*a* concentrations showed patterns similar to the northern ambient stations monitored. Dissolved oxygen concentrations were below 5.0 mg/L for the Possession Sound and Edmonds transects, although the majority of low values were recorded in Possession Sound which historically has low DO concentrations. All DO values for the other three transects were above 5.0 mg/L.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS ..... *iii*
EXECUTIVE SUMMARY ..... *v*
TABLE OF CONTENTS ..... *x*

SECTION:
1.0 INTRODUCTION 1-1

1.1 Overview 1-1

1.2 Sampling Area Characteristics 1-2

1.3 Sampling Area 1-3

1.4 Wastewater Collection and Treatment 1-3

2.0 WATER QUALITY MONITORING PROGRAMS 2-1

2.1 Point Source and Ambient Monitoring Programs 2-3
2.1.1 Marine Point Source Monitoring Program 2-3
2.1.2 Marine Ambient Monitoring Program 2-6

2.2 MOSS Sampling Program 2-6
2.2.1 MOSS Water Column 2-9
2.2.2 MOSS Beach Water Quality 2-11

2.3 Water Column Monitoring 2-11
2.3.1 Bacteria 2-12
2.3.2 Temperature and Salinity 2-12
2.3.3 Dissolved Oxygen 2-13
2.3.4 Transparency 2-13
2.3.5 Photosynthetically Active Radiation (PAR) 2-14
2.3.6 Nutrients 2-14
2.3.7 Chlorophyll and Pheopigments 2-15
2.3.8 pH 2-15
2.3.9 Water Column Sampling Methods 2-16

2.4 Sediment Monitoring 2-18
2.4.1 Total Solids 2-18
2.4.2 Total Volatile Solids 2-18
2.4.3 Grain Size Distribution 2-18
2.4.4 Total Organic Carbon 2-18
2.4.5 Total Sulfides 2-19

2.4.6 Sediment Sampling Methods 2-19

2.5 Benthic Fauna 2-22
2.5.1 Field and Identification Methods 2-22

2.6 Shellfish and Algae 2-23
2.6.1 Shellfish and Algae Sampling Methods 2-23

2.7 Regulatory Standards 2-25
2.7.1 Washington State Standards for Water 2-25
2.7.2 Washington State Standards for Fecal Coliform Bacteria 2-25
2.7.3 Washington State Standards for Sediment 2-28
2.7.4 Standards for Biota 2-30

3.0 SUMMARY OF 2001 MONITORING DATA 3-1

3.1 2001 Precipitation Data 3-1

3.2 Water Column Data Results 3-2
3.2.1 Water Column Bacteria 3-3
3.2.2 Water Temperature 3-13
3.2.3 Salinity and Density 3-13
3.2.4 Dissolved Oxygen 3-18
3.2.5 Transparency and Light Intensity 3-19
3.2.6 Nutrients 3-22
3.2.7 pH 3-29
3.2.8 Chlorophyll-*a* and Pheophytin 3-31
3.2.9 Metals in Beach Water 3-33
3.2.10 Organics in Beach Water 3-40

3.3 Sediment Chemistry Data Results 3-41
3.3.1 Sediment Conventionals 3-43
3.3.2 Sediment Metals 3-45
3.3.3 Sediment Organics 3-45
3.3.4 Benthic Community Results 3-48

3.4 Shellfish Data Results 3-54
3.4.1 Lipids 3-54
3.4.2 Metals 3-55
3.4.3 Organics 3-55
3.4.4 Bacteria 3-56

3.5 Macroalgae Data Results 3-59

4.0 CTD TRANSECT DATA 4-1

4.1 Temperature 4-1
4.2 Salinity 4-3
4.3 Density 4-3
4.4 Photosynthetically Active Radiation 4-4
4.5 Chlorophyll-*a* 4-4
4.6 Dissolved Oxygen 4-5
4.7 Turbidity 4-5
4.8 Summary of CTD Data 4-6

5.0 GLOSSARY 5.1

6.0 REFERENCES 6-1

APPENDICES:

A WATER COLUMN MONITORING DATA
B SEDIMENT MONITORING DATA
C SHELLFISH MONITORING DATA
D ALGAE MONITORING DATA
E BENTHIC FAUNA DATA
F SAMPLING STATION LOCATIONS

LIST OF FIGURES

1-1 King County Sampling Area in 2001 1-4
1-2 King County Wastewater Treatment Plant Locations 1-5
1-3 Monthly Flow from South & West Point TPs 1-6
2-1 Point Source Monitoring Station Locations 2-4
2-2 Ambient Monitoring Station Locations 2-7
2-3 MOSS Station Locations 2-10
2-4 Location of South Plant Outfall Sediment Grab Samples 2-20
3-1 Monthly Precipitation for 2001 3-2
3-2 Fecal Coliform Results: Comparison With Standards 3-4
3-3 Fecal Coliform Bacteria at Offshore/Nearshore Stations in 2001 3-7
3-4 Enterococcus Bacteria at Offshore /Nearshore Stations in 2001 3-8
3-5 *E.coli* Bacteria at MOSS Offshore Stations in 2001 3-8
3-6 Fecal Coliform Results for All Beach Stations 3-9
3-7 Fecal Coliform Results for Carkeek Park Stations 3-10
3-8 Enterococci Bacteria Counts at All Beach Stations & Frequency Detected 3-11
3-9 Enterococci & Fecal Coliform Bacteria Counts at Station LSVW01 3-11

3-10 *E. coli* Bacteria Counts at MOSS Beach Stations 3-12
3-11 Bacteria Counts at Station ITMUKILTSP..... 3-12
3-12 Water Temperature at Six Stations 2001 3-14
3-13 Water Temperature at Beach Stations 2001 3-15
3-14 Salinity at Six Stations in 2001 3-16
3-15 Density at Six Stations in 2001 3-17
3-16 Dissolved Oxygen Values at Offshore Stations, All Depths 3-19
3-17 Dissolved Oxygen at Six Stations in 2001 3-20
3-18 Dissolved Oxygen Values at MOSS Beach Stations..... 3-21
3-19 Ammonia Concentrations at Six Stations in 2001..... 3-23
3-20 Ammonia Concentrations at Beach Stations in 2001 3-24
3-21 Nitrate+Nitrite Concentrations at Six Stations in 2001 3-25
3-22 Nitrate+Nitrite Concentrations at Beach Stations 3-26
3-23 Silica Concentrations at Six Stations in 2001..... 3-28
3-24 Silica Concentrations at Beach Stations 3-29
3-25 Monthly pH Averages for MOSS Beach Stations 3-30
3-26 Chlorophyll-a Concentrations at Six Stations in 2001 3-32
3-27 Total Organic Carbon vs. Grain Size for All Station 3-44
3-28 Ammonia vs. TOC..... 3-44
3-29 Number of Organisms in the Major Taxa Groups..... 3-52
3-30 Percent Lipids in Butter Clams..... 3-54
3-31 Fecal Coliform Bacteria in Shellfish in 2001 3-57
3-32 Enterococcus Bacteria in Shellfish in 2001 3-57
3-33 Fecal Coliform & Enterococcus Bacteria Analyzed Concurrently 3-58
4-1 CTD Transect Station Locations 4-2
4-2 through 4-4 ..... CTD Temperature Data
4-5 through 4-7 ..... CTD Salinity Data
4-8 through 4-10 ..... CTD Density Data
4-11 through 4-13 ..... CTD PAR Data
4-14 through 4-16 ..... CTD Chlorophyll Data
4-17 through 4-19 ..... CTD Dissolved Oxygen Data
4-20 ..... CTD Turbidity Data

LIST OF TABLES

2-1 Summary of 2001 Marine Monitoring Programs 2-2
2-2 2001 Point Source Stations, Parameters, and Frequency Measured..... 2-5
2-3 2001 Ambient Stations, Parameters, and Frequency Measured 2-8
2-4 Laboratory Methods and Detection Limits for Water Samples..... 2-17
2-5 Laboratory Methods and Detection Limits for Sediment Parameters 2-21
2-6 Laboratory Methods and Detection Limits for Shellfish and Algae 2-24
2-7 Washington State Marine Surface Water Quality Standards..... 2-26
2-8 Fecal Coliform Bacteria Standards..... 2-27
2-9 Washington State Sediment Management Standards 2-29

3-1 2001 Ambient & MOSS Stations--Fecal Coliform Bacteria 3-5
3-2 2001 Point Source Monitoring--Fecal Coliform Bacteria 3-6
3-3 Summary of Fecal Coliform Bacteria at Offshore Stations in 2001 3-7
3-4 Nitrate+Nitrite Concentrations for Offshore Stations 3-26
3-5 MOSS Beach Station pH Values 3-30
3-6 Occurrence of Phytoplankton Bloom as Indicated by Chlorophyll 3-33
3-7 Total Metals Detected in Beach Water Samples 3-35
3-8 Total Metal average Concentrations by Station 3-36
3-9 Total Metal Average Concentrations by Month for Beach Stations 3-36
3-10 Dissolved Metals Detected in Beach Water Samples 3-37
3-11 Dissolved Metal Average Concentrations by Station 3-38
3-12 Dissolved Metal Average Concentrations by Month 3-38
3-13 Dissolved & Total Metal Average Concentrations by Station 3-39
3-14 Washington State Water Quality Criteria for Metals 3-40
3-15 Metals Summary 3-46
3-16 Organic Compounds Detected in Sediments 3-47
3-17 Summary of Benthic Indices & Sediment Physical Properties 3-51
3-18 Dominant Species at Each Sampling Station 3-53
3-19 FDA Levels of Concern for Shellfish Tissues 3-55
3-20 Metals Concentrations in Algae 3-60

November 2002

WATER QUALITY STATUS REPORT FOR MARINE WATERS, 2001

Prepared by the Marine & Sediment Assessment Group

King County Department of Natural Resources & Parks
Water and Land Resources Division
Science & Technical Support Unit
201 S. Jackson Street, Suite 600
Seattle, Washington 98104-3855

This information is available upon request in

Accessible formats for people with disabilities by calling
(206) 296-0600 (voice) or 1-800-833-6388 (TTY/TDD users only).

ACKNOWLEDGMENTS

The following individuals are acknowledged for their contributions to the monitoring efforts and production of this document.

King County Environmental Laboratory: John Blaine provided technical coordination for offshore sediment sampling. Judy Ochs provided technical coordination for water sampling and Kevin Li provided technical coordination for intertidal and benthic infauna sampling. Bob Kruger provided technical coordination for the Marine Outfall Siting Study (MOSS) project. Katherine Bourbonais provided laboratory coordination for the MOSS analytical work. The efforts of the field sampling crew and analytical laboratory were greatly appreciated.

Amanda Babson of the University of Washington provided the CTD transect Matlab plots in Section 4 and also conducted the post-processing of all CTD data. Gabriela Hannach, King County Science & Data Management Section, contributed written material for Section 4. Dan Smith, King County Marine & Sediment Assessment Group, contributed written material for Section 3.

Tony Petrillo of Blue Water Engineering conducted the sediment grab sampler position tracking study. Allan Fukuyama assisted with benthic fauna collection and organized species' identifications.

The time and efforts of the following reviewers were also appreciated: Betsy Cooper (Coordinator of King County's Wastewater Treatment Division's NPDES program), Jeff Stern (Wastewater Treatment Division), Jim Simmonds (Project Manager for the MOSS project), Scott Mickelson (King County Marine & Sediment Assessment Group), and Tim Determan (Washington State Dept. of Health). King County Environmental Laboratory: Dana Walker (Trace Organics), Kevin Li, Bob Kruger, and Judy Ochs (Environmental Services Section), Cheryl Kamera (Trace Metals), and Katherine Bourbonais (Laboratory Project Manager).

Scott Mickelson provided coordination for the MOSS field sampling effort. Kimberle Stark, Marine Monitoring Project Coordinator, organized production of this report.

EXECUTIVE SUMMARY

The King County Department of Natural Resources and Parks operates and maintains three wastewater treatment plants (West Point, South Plant, and Vashon Island) and two combined sewer overflow treatment plants (Alki and Carkeek) that discharge treated effluent into the Central Puget Sound Basin. King County has a marine monitoring program to confirm that these discharges are not degrading water quality within the vicinity of the treatment plants. The routine marine monitoring program has two components: point source monitoring focusing on areas near treatment plant discharges and ambient monitoring focusing on areas outside the immediate vicinity of treatment plant discharges. Monitoring areas outside the influence of point source discharges is necessary in order to assess background conditions in central Puget Sound.

King County is plans to build a new regional wastewater treatment plant that will discharge treated effluent through a marine outfall in northern King County or southern Snohomish County. An intensive marine monitoring program, the Marine Outfall Siting Study (MOSS), was initiated in late 1998 to support siting a suitable outfall location. The MOSS project continued throughout 2001 and data collected in 2001 are presented in this report.

In 2001, 6 offshore/nearshore and 5 beach water stations, 19 offshore/nearshore and 3 beach sediment stations, 4 shellfish stations, and 4 macroalgae stations were sampled for the point source program. For the ambient program, 6 offshore/nearshore and 15 beach water stations, 3 beach sediment stations, 6 shellfish stations, and 5 macroalgae stations were sampled. Water samples were analyzed for bacteria, nutrients, dissolved oxygen, chlorophyll, and physical parameters. Sediment samples were analyzed for organic compounds, metals, and conventional parameters. Six sediment samples around the South Plant wastewater treatment plant were also sampled for benthic fauna. Shellfish samples were analyzed for organics, metals, and bacteria. Macroalgae were analyzed for metals.

In 2001, 22 stations were sampled for the MOSS project. Six of these stations are also sampled for the ambient monitoring program and two for the point source monitoring program, however, additional parameters that are not part of the routine sampling program were included for the MOSS project. Ten offshore water stations were sampled for physical properties, nutrients, dissolved oxygen, chlorophyll, and bacteria for the MOSS project. Twelve beach stations were also sampled for the MOSS project in 2001. Beach waters were sampled for physical properties, nutrients, bacteria, and total and dissolved metals. In addition, organics (including polynuclear aromatic hydrocarbons, chlorinated and organophosphorus pesticides, polychlorinated biphenyls, and chlorinated herbicides) were sampled at three stations.

Water quality data were also collected for the MOSS project in a series of transects at five locations in the Central Basin. Each transect consisted of either five or six stations spaced equidistant across the length of the transect. Measurements were recorded monthly starting in 2000 and continued for six months in 2001. Data collected included physical properties, dissolved oxygen, and chlorophyll.

MONITORING RESULTS

Water

All offshore/nearshore stations met Washington State Class AA marine surface water standards for fecal coliform bacteria with the exception of three stations located in inner Elliott Bay. Levels at two of the three stations met the geometric mean standard of 14 colonies/100 milliliters but exceeded the peak standard of 43 colonies/100 ml. The other station exceeded both standards. The highest values for the Elliott Bay stations occurred during periods of high rainfall as these sites receive higher freshwater input than other stations due to their proximity to the Duwamish River. Fecal coliform bacteria in the water column near the County's treatment plant discharges were at low levels (usually less than 5 colonies/100 ml), if detected at all.

Fecal coliform counts at beaches are influenced by freshwater runoff from the surrounding watersheds. As a result, exceedences of Class AA marine water quality standards at some stations occurred during high rainfall months and at stations closer to freshwater sources. Ten beaches exceeded both the geometric mean and peak standards; four met the geometric mean but not the peak standard; and fourteen passed both standards. Beaches with the lowest bacteria counts were located near Boeing Creek, Seacrest Park and around the Duwamish Head area. Highest counts were at Brackett's Landing, Fauntleroy Cove, and the south side of Alki Point.

Enterococcus bacteria levels in the offshore/nearshore water column were either not detected or were low. Enterococcus bacteria counts at beach stations varied between stations and months and did not correlate with fecal coliform bacteria counts. *E. coli* was monitored at the MOSS stations only and showed the same pattern as enterococcus bacteria, in that *E. coli* was seldom detected in offshore waters and varied between stations and months. There was a clear correlation between *E. coli* and fecal coliform count but not enterococcus bacteria.

Temperature, salinity, and density values indicated a well-mixed water column throughout most of the year, although seasonal thermal stratification was evident in the summer. A time-lag of about one month was noted in the peak water temperatures between beach and offshore stations with temperatures peaking in June at offshore stations and in July for most beach stations. In 2001, all dissolved oxygen (DO) values were above 5.0 mg/L, which is an indicator level at which potential problems could occur.

Nutrients, such as ammonia and nitrate+nitrite, exhibited trends similar to previous years. Ammonia was highest in the summer and nitrate+nitrite was most abundant in winter when not being taken up by phytoplankton. All ammonia concentrations for beach and offshore stations, including those located near the treatment plant outfalls, were well below the Washington State ammonia criterion for marine surface waters.

Total and dissolved metals were analyzed at the MOSS beach stations and dissolved metals were analyzed at seven ambient and point source beach stations. For total metals, 12 of the 15 elements analyzed were detected in all samples. For dissolved metals, 10 of the 15 elements were detected in all samples. For copper, a constituent in marine boat paints as well as effluent and stormwater, the highest concentrations were found at stations with heavy boat traffic, such as near the Shilshole Bay Marina. Metal concentrations at all beach stations were below Washington State acute and chronic marine water quality criteria.

A total of 107 organic compounds were analyzed in beach waters from three MOSS sites: 64 semi-volatiles, 26 chlorinated pesticides/polychlorinated biphenyls (PCBs), 10 chlorinated herbicides, and 7 organophosphorus pesticides. Chlorinated pesticides, herbicides, PCBs, and organophosphorus pesticides were not detected in any of the samples. A total of 10 different semi-volatile organic compounds were detected in one or more samples at concentrations near the reporting limits. There are few Washington State water quality criteria for organic compounds and none of the compounds for which criteria exist were detected..

Sediment

Sediments from 13 stations around the South Plant and 6 stations around the Alki treatment plant outfalls were sampled between late October to early November 2001. Beach sediments were collected from six locations: three point source and three ambient.

Metals were analyzed in all sediments and many were either not detected (antimony, selenium, silver, and thallium) or seldom detected (cadmium). No concentrations exceeded Washington State Sediment Quality Standards (SQS) guidelines. For the outfall stations, a concentration gradient was not evident for either of the sites with respect to distance away from the outfall pipe.

Of the 98 organic compounds analyzed, 17 were detected in samples around the South Plant and Alki TP outfalls and 18 compounds were detected in beach sediments. Most of these compounds were polynuclear aromatic hydrocarbons (PAHs). Two PCB Aroclors were detected at two stations around the South Plant TP outfall (Aroclor 1254 and 1260). No organic compounds exceeded SQS criteria for either outfall or beach stations.

Biological monitoring (benthic community analysis) was conducted at six stations around the South Plant outfall in November 2001. Diversity indices and total species numbers were typical for sediments composed mostly of silt and clay, such as those around the South Plant outfall. Numerically dominant species found at all the stations are those species that are typically seen in other areas with similar sediment grain sizes and indicative of deep water silt/clay sediments. Diversity indices, species abundance, and dominant species present did not show a gradient with respect to distance away from the outfall pipe.

Shellfish

Shellfish (butter clams) tissues from four point source and two ambient stations were analyzed in July for metals and organic compounds. Thirteen of the 14 metals analyzed in 2001 were detected and concentrations varied only slightly between stations. There was no correlation between metal concentrations and lipid content. State and federal criteria do not exist for acceptable levels of metals in shellfish tissues, however, the Food and Drug Administration (FDA) has established an Action Level in fish and shellfish tissues of 1.0 mg/kg for mercury. When this value is exceeded, the food product cannot be commercially traded. Mercury concentrations in shellfish tissues were well below this Action Level. The FDA has also established guidance values termed "Levels of Concern" for shellfish for five metals: arsenic, cadmium, chromium, lead, and nickel. Shellfish tissue concentrations were below these Levels of Concern.

Of all the organic compounds analyzed, only benzoic acid and bis(2-ethylhexyl)phthalate were detected. Benzoic acid is a degradation product of metabolic processes and is always detected in shellfish samples. Quality control validation indicated the reported values of bis(2-ethylhexyl)phthalate are likely due to laboratory contamination. It is difficult to avoid laboratory contamination when processing shellfish samples as phthalates are a component in latex/nitrile gloves used in the laboratory.

Fecal coliform bacteria were analyzed in clams from six ambient stations and three point source stations monthly from May through September. Concentrations varied from station to station and from month to month. Generally, stations near Seahurst, West Point, Richmond Beach, and Normandy Park had the lowest values and the station at Carkeek Park had the highest values. The association between fecal coliform concentrations measured in shellfish and concentrations detected in water was examined and a consistent relationship was not evident. Enterococcus concentrations also varied from station to station and month to month and stations near Seahurst and West Point had consistently low values whereas Tramp Harbor had the highest values.

Macroalgae

Macroalgae (algae) samples were collected from eight beaches in 2001 (four point source and four ambient). Samples consisted entirely of the edible algae, *Ulva fenestrata* (known as sea lettuce), and were analyzed for 14 metals. Two metals (selenium and mercury) were not detected in any samples and two (beryllium and silver) were detected in one sample. The remaining 10 metals were detected in all samples. The southern West Point and Normandy Park stations had the highest concentrations of arsenic, chromium, copper, lead, nickel, and zinc and the Richmond Beach station had the lowest concentrations for most metals. Concentrations were similar to previous results with the exception of a higher copper value from the Normandy Park station.

CTD Transect Data

Conductivity, temperature, depth (CTD) transects were conducted monthly at five locations for the MOSS project between January and July. Data collected included physical properties, dissolved oxygen, and fluorescence (as an estimate of chlorophyll-*a*). Temperature, salinity, and density data indicated typical seasonal patterns, with the water column warming in June. Salinities near the surface of the Possession Sound transect were lower than other areas due to the freshwater input of the Snohomish River. Chlorophyll-*a* concentrations showed patterns similar to the northern ambient stations monitored. Dissolved oxygen concentrations were below 5.0 mg/L for the Possession Sound and Edmonds transects, although the majority of low values were recorded in Possession Sound which historically has low DO concentrations. All DO values for the other three transects were above 5.0 mg/L.

SECTION 1
Introduction

1.1 Overview

The King County Department of Natural Resources and Parks, and its predecessor METRO (Municipality of Metropolitan King County), has a long history of water quality monitoring and involvement with water quality improvements. As part of an intergovernmental effort to maintain and improve Puget Sound's water quality, the King County Wastewater Treatment Division provides regional sewage collection, treatment, and disposal systems which discharge wastewater to the Central Puget Sound Basin and waters flowing into the Sound. King County's Marine and Sediment Assessment Group supports a comprehensive, long-term marine monitoring program that assesses water quality in the Central Puget Sound Basin on behalf of and in coordination with the King County Wastewater Treatment Division.

The marine monitoring program is also part of an intergovernmental monitoring effort, the Puget Sound Ambient Monitoring Program, centering on Puget Sound marine waters with the County's program focusing on water quality mainly within King County boundaries. The Washington Department of Ecology (water and sediment quality), Washington Department of Fish & Wildlife (contaminants in fish tissues), and Washington Department of Health (shellfish growing areas and contaminants) also monitor water quality in Puget Sound. These agencies have stations throughout the Sound, including sites within King County. The main distinction among these agency monitoring programs is that the County has more stations within a concentrated area that are near wastewater treatment plant discharges. Although the other agencies have monitoring stations within King County, these stations do not overlap with the County's stations which allows a greater proportion of Puget Sound to be monitored.

The objectives of the King County marine monitoring program are to provide an understanding of water quality within King County and to assess water quality near the County's wastewater plant outfalls to confirm that discharges are not adversely affecting water quality. The County maintains a long-term dataset, with over 30 years of data collection at some sites. This dataset provides insight to natural variations and a basis against which water quality conditions near outfalls can be measured.

King County plans to build a new regional wastewater treatment plant in northern King County or southern Snohomish County. The treatment plant will discharge secondary treated effluent through a marine outfall also located in northern King County or in southern Snohomish County. An extensive marine monitoring program (the Marine Outfall Siting Study) was initiated in October 1998 to support siting of a suitable location for the marine outfall.

This report summarizes results of King County's National Pollutant Discharge Elimination System (NPDES) and ambient marine monitoring programs for 2001. In addition, Marine Outfall Siting Study (MOSS) water quality sampling results for 2001 are summarized. The report is intended to provide an overview of the sites monitored, parameters measured, matrices (e.g., water, sediment, and tissue) sampled, and a summary of analytical results.

1.2 Sampling Area Characteristics

Puget Sound is a fjord-like estuary that extends approximately 230 kilometers (km) in a north-south direction and is bordered by the Olympic mountains to the west and the Cascade mountain range to the east. The Sound consists of four major basins, including the Main (Admiralty Inlet and the Central Basin), Whidbey, Southern, and Hood Canal Basins. The average depth in Puget Sound is 106 meters (m). The Main Basin, with depths greater than 280 m, is shielded at the main entrance to the Sound by the Admiralty Inlet Sill which impedes the free exchange of deep waters. However, the Sound has near-oceanic salinity throughout the year, and is supplemented with cold, nutrient-rich, low-oxygenated deep water upwelled off the Washington coast during the late summer months. Water from the Pacific Ocean enters the Sound through Admiralty Inlet and Deception Pass. Puget Sound contains approximately 168 billion cubic meters of water, with an average tidal exchange of 3.7 to 4.3 m and an average water volume exchange of 8 billion cubic meters with each tidal cycle (King County, 1994). A mixed semi-diurnal tide, which is characterized by two unequal high tides and two unequal low tides occurring each day, dominates the tidal pattern within Puget Sound. These characteristics are conducive to maintaining overall favorable water quality conditions in Puget Sound.

Many complex factors influence water quality in Puget Sound, including water currents, physical, biological, chemical aspects, and human activities. Offshore water samples consistently indicate good water quality. However, nearshore sediments tend to accumulate contaminants from industrial and urban processes. Sediment carried in runoff from land plays a much greater role in Puget Sound's water quality than in most oceanic areas. Being surrounded by hills, lakes, and rivers in an urbanized area with substantial rainfall gives the Sound a multitude of complex sediment sources. The predominant sediment sources are from rivers and bluff erosion. The twelve largest rivers entering Puget Sound contribute approximately 1.8 million cubic meters of sediment annually. Their suspended load is highest during winter and early spring when heavy seasonal precipitation from storms erodes soil from the surrounding lowlands. Sediment sampling generally shows the highest levels of organic compounds in the nearshore areas of Elliott Bay, where urban runoff from storm drains, industrial sources, and nonpoint sources is the greatest.

Puget Sound waters were affected by recent El Niño wet-weather conditions in 1994-5 and again in 1997-1998. The most recent El Niño event was followed almost

immediately by a weak to moderate La Niña event that lasted through 1999. This resulted in a drier than normal year for 2000, however, essentially normal rainfall conditions were re-established in 2001.

1.3 Sampling Area

King County's NPDES and ambient marine water study region is located within the Central Basin extending southwest to Tramp Harbor and southeast to Normandy Park, west to Vashon Island, and north to Richmond Beach (Figure 1-1). Elliott Bay, a large urban embayment, is also located within the County's monitoring area.

The MOSS sampling region extends north from the southern portion of Admiralty Inlet to the west, around the southern tip of Whidbey Island to Possession Sound in the east. The southern boundary of the study area is the northern portion of Colvos Passage across to the main channel (see Figure 1-1). The MOSS locale includes areas in both King and Snohomish Counties.

1.4 Wastewater Collection and Treatment

Wastewater from homes, businesses, and industries within King County and southern Snohomish County is transported through pipelines that belong to local sewer agencies and then through King County's system of much larger pipelines (interceptors) to the County-operated treatment plants. At the plants, solids are separated from liquids. The liquids are then treated, disinfected, and discharged into Puget Sound marine waters. The solids are treated and the resulting rich organic material, known as biosolids, are recycled and used to enrich agricultural and forest soils.

The County provides wastewater treatment and disposal services to cities and local sewer and/or water districts with more than 200 million gallons of wastewater transported and treated each day. To accomplish this, King County currently operates and maintains three wastewater treatment plants, two combined sewer overflow (CSO) treatment plants, 37 pump stations, and approximately 391 kilometers of pipelines (Figure 1-2). The West Point Treatment Plant (TP), South Plant (formerly known as the Renton and East Division Reclamation Treatment Plant), and Vashon TP provide secondary wastewater treatment. The West Point TP also functions as a CSO treatment facility during rain-induced high flows between 300 and 440 million gallons per day (MGD). These incoming high flows to the plant receive primary treatment and are then blended with secondary-treated wastewater, which is awaiting discharge to the outfall. This blended effluent continues to meet all permit standards for secondary treatment. The Alki and Carkeek CSO Treatment Plants store combined wastewater and stormwater flow and later pump it to the West Point TP or provide the equivalent of primary treatment and disinfection before discharging it to Puget Sound.

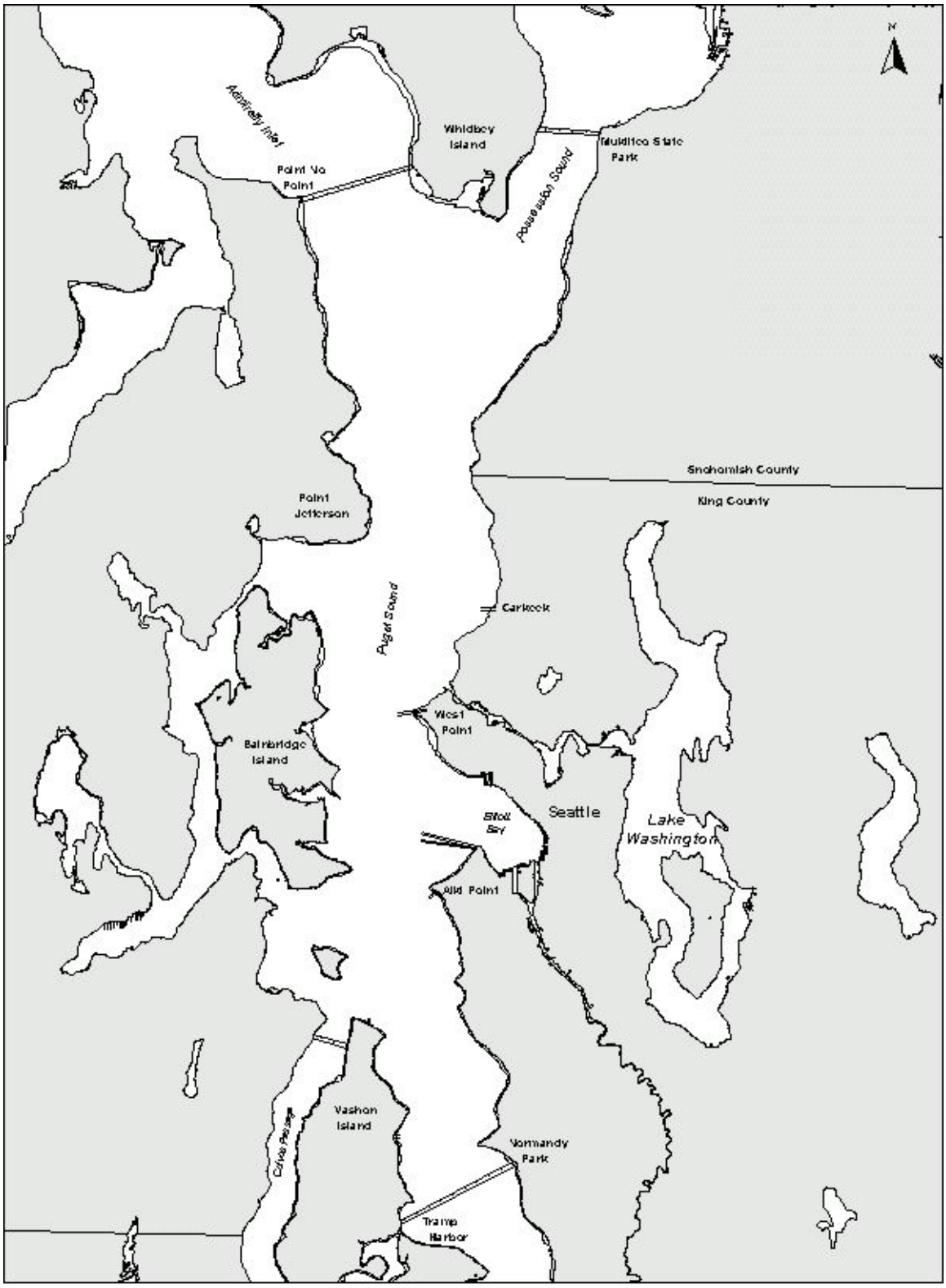


Figure 1-1. King County Sampling Area in 2001

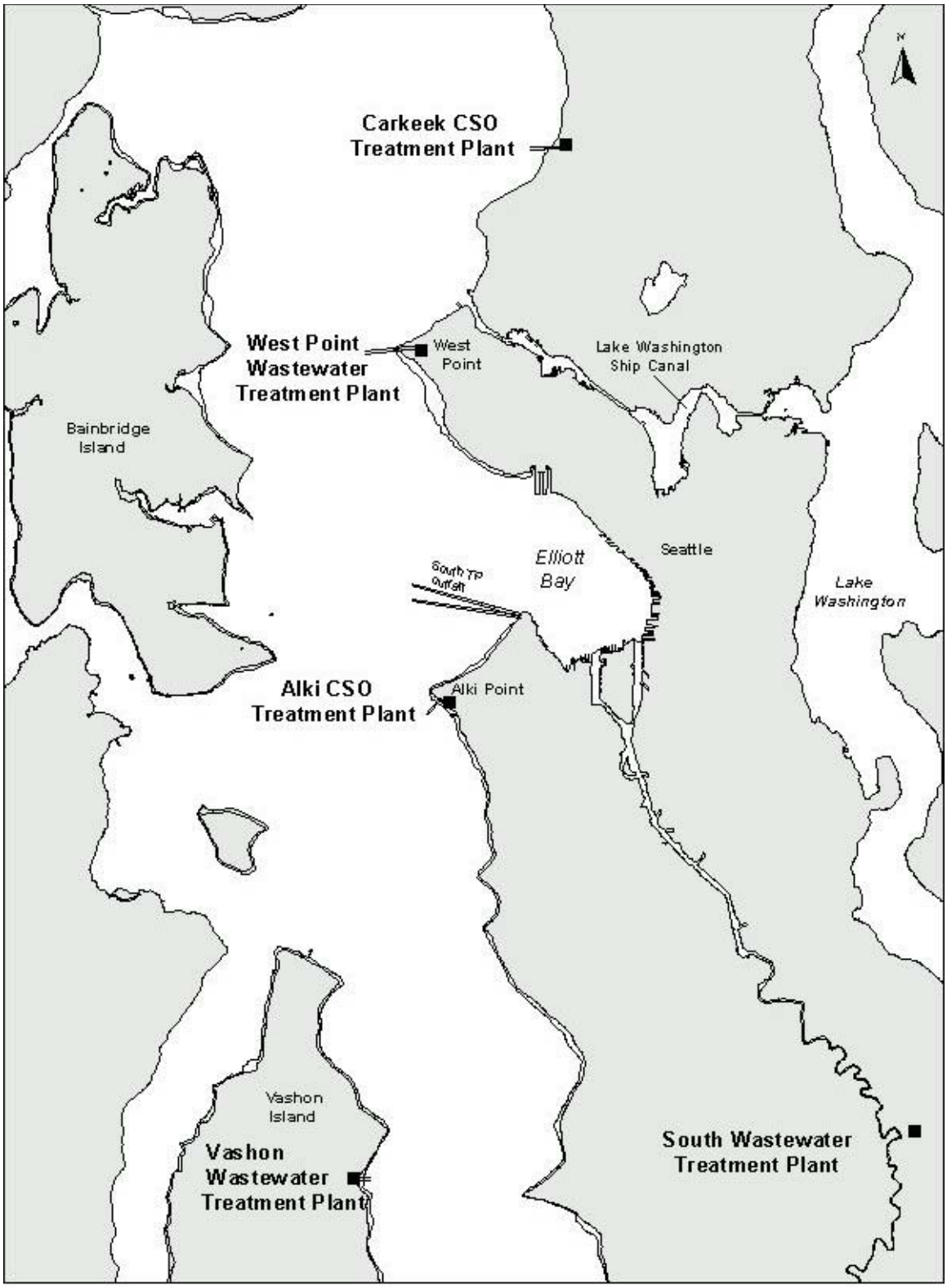


Figure 1-2. King County Wastewater Treatment Plant Locations

The West Point TP discharges the largest volume of effluent of the three secondary facilities. In 2001, the average daily discharge rates were 118.4, 69.5, and 0.10 MGD for the West Point, South, and Vashon TPs, respectively. Over the last ten years, wastewater discharge volumes have slightly increased at the two main treatment plants (West Point and South TPs) due to increased population growth within the County's service area (Figure 1-3). The slight decrease shown in 2000 and 2001 corresponds to low rainfall amounts, particularly for 2000 which had the lowest recorded rainfall amount (28.7 inches) since 1985. Discharges peak during times with high rainfall, with November and December having the highest average monthly discharge rates (see Section 3.1 for 2001 rainfall patterns).

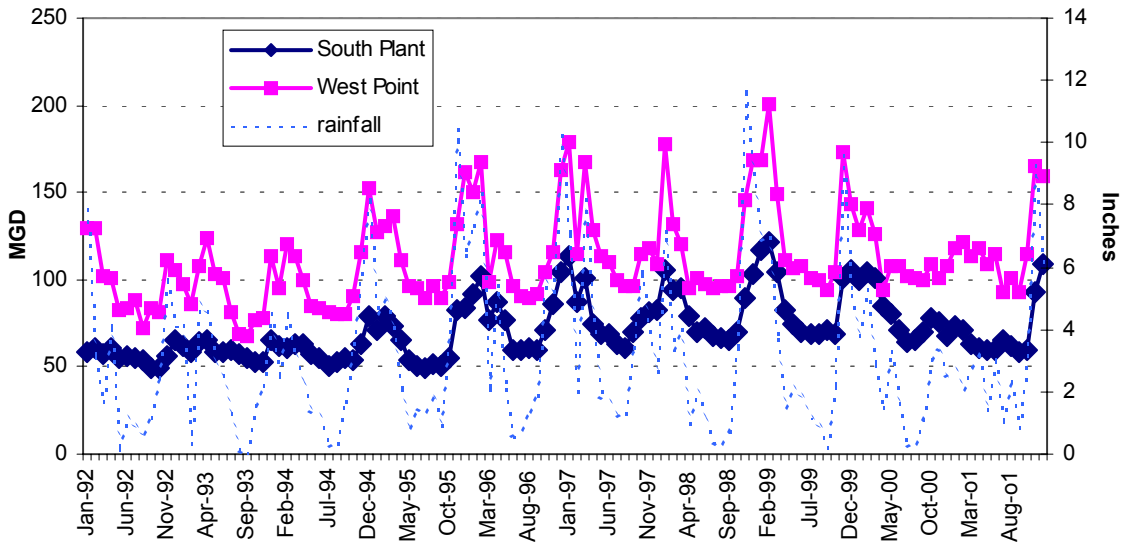


Figure 1-3. Monthly Flow from South and West Point TPs (MGD) and Monthly Rainfall (In.)

During 2001, the Alki CSO TP had a total of four discharge events, two in November and two in December. The average volume discharged per event was 11.4 MG. The Carkeek CSO TP had a total of five discharge events in 2001, one in August, three in November and one in December. The average discharge volume per event was 2.7 MG.

King County took over operation of the Vashon Wastewater TP in November 1999. The plant discharges effluent through a 1300 foot outfall pipe located on the east side of Vashon Island south of Point Beals. The County is currently in the process of upgrading the existing facility to handle greater peak wastewater flows. It is anticipated that the new treatment facilities, including a longer outfall pipe, will be constructed adjacent to the existing plant and will be operational by 2006.

The wastewater and CSO treatment plants discharge effluent directly into Puget Sound marine waters. The Clean Water Act states that all wastewater collection and treatment facilities that discharge effluent into surface waters are required to have a NPDES permit. In Washington, the Washington State Department of Ecology (Ecology) administers this program by delegation from the U.S. Environmental Protection Agency. NPDES permits set limits on the quality of wastewater that is discharged at each facility. The current NPDES permit for the West Point, Carkeek, and Alki TPs expired in 2000 but has been administratively extended until the new permit is re-issued. The current South Plant NPDES permit expired in mid 2002 and has also been administratively extended until the permit is re-issued. The current Vashon TP NPDES permit was issued in 2002.

SECTION 2
Water Quality Monitoring Programs

In 2001, the King County Department of Natural Resources and Parks (DNRP) operated three wastewater treatment plants and two CSO treatment plants with outfalls discharging directly into Puget Sound marine waters. The Clean Water Act states that all sewage treatment plants that discharge effluent from a point source into surface waters must have a National Pollutant Discharge Elimination System (NPDES) permit. In Washington, the Washington State Department of Ecology (DOE) administers the NPDES permit program by delegation from the U.S. Environmental Protection Agency (EPA).

King County's NPDES permits set limits on the quality of treated wastewater that is discharged through individual outfalls. In compliance with NPDES requirements and to verify that the facilities are meeting the goals of the Clean Water Act, King County has conducted an extensive point source monitoring program for over 20 years to assess the quality of each facility's effluent, the receiving water and sediments around each outfall, and nearby beaches.

Water quality may be affected by natural processes as well as by two types of pollution: point source and nonpoint source. Point source pollution is defined by its entry into the aquatic environment from a specific conveyance, such as an outfall pipe. Regulated pollution can be generated by a variety of industrial and municipal facilities, such as sewage treatment plants and manufacturing facilities. Nonpoint source pollution comes from any source that is not a point source and includes runoff or infiltration from streams, groundwater, storm water, etc. Land use, such as agricultural and urban usage, affects the quality of the runoff. King County's marine monitoring program is designed to assess potential effects from both types of pollution in both nearshore and offshore environments as well as assess ambient (background) conditions. The stations monitored by the marine program fall into one of two categories; ambient or point source. Within these categories, stations are classified as either beach (+3 m to -3 m mean lower low water), nearshore (-3 mean lower low water to 30 m), or offshore (bottom depth greater than 30 m).

Obtaining background data from areas in the receiving water that are not influenced by point sources is important in order to accurately evaluate the condition of the receiving water. King County has established an ambient monitoring program in the Central Puget Sound Basin, with stations well removed from the influence of King County treatment plant point source discharges. King County's goals for ambient monitoring are to better understand regional water quality and provide background data needed to identify trends that might indicate impacts from long-term cumulative pollution, or effects from King County outfalls.

Population growth in the greater Seattle area has necessitated planning for a new wastewater treatment plant to be located in northern King County or southern Snohomish County. This new treatment plant will include a marine outfall discharging secondary treated effluent to Puget Sound waters. Since 1998, King County has been conducting a marine outfall siting study (MOSS) as part of the planning process to assist with outfall siting and design and to assist with

evaluation of potential impacts to the marine environment. The MOSS sampling program consists of several components, including offshore water column profiling and nearshore/beach water quality monitoring. Sampling for this program started in December 1998 and will continue throughout 2002.

An overview of the County's point source, ambient, and MOSS monitoring programs for 2001 is provided in Table 2-1.

Table 2-1. Summary of 2001 Marine Monitoring Programs

			Number of Stations Sampled		
Location	**Matrix**	**Parameter**	***Ambient***	***Point Source***	***MOSS***
Beach	Water	Bacteria	15	5	12 [1]
		GWQP [2]	11	5	12 [1]
		Organics	--	--	3
		Metals	3	4	12 [1]
	Sediment	Organics	3	3	1 [3]
		Metals	3	3	1 [3]
		Conventionals [4]	3	3	1 [3]
	Shellfish	Organics	2	4	--
		Metals	2	4	--
		Bacteria	6	3	--
	Macroalgae	Metals	4	4	--
Nearshore	Water	Bacteria	2	1	--
		GWQP	2	1	--
Offshore	Water	Bacteria	4	5	10 [5]
		GWQP	4	5	10 [5]
	Sediment	Organics	--	19	--
		Metals	--	19	--
		Conventionals	--	19	--
		Benthic fauna	--	6	--

[1] Overlap with 3 ambient stations.
[2] GWQP = general water quality parameters. Includes temperaure, salinity, nutrients, dissolved oxygen.
[3] Overlap with 1 ambient station.
[4] Conventionals include total solids, total volatile solids, total sulfide, total organic carbon, and grain size.
[5] Overlap with 3 ambient and 2 point source stations.

2.1 Point Source and Ambient Monitoring Programs

The ambient and point source monitoring programs focus on marine water and the underlying sediments. Many marine pollutants are in particulate form. As these contaminated particles settle out of the water column, pollutant concentrations in the underlying sediments tend to increase. Most sources of contamination are found in nearshore areas where pollutants tend to accumulate in sediments close to these sources. Benthic organisms that live on or in contaminated sediments tend to accumulate these contaminants through contact or ingestion (bioaccumulation). Pollutants also tend to concentrate as they move from one trophic level to the next (biomagnification), as contaminated organisms become prey to animals higher up in the food web. Contaminated sediments can have an important impact on human and marine environmental health, especially in nearshore areas which are generally high contact areas for marine organisms and people.

Nutrients and pathogens which may cause water quality problems in marine waters are also typically seen in nearshore areas in the vicinity of contamination sources. While excess nutrients do not cause immediate harm to organisms living in the water column, excess nutrients can increase the amount of phytoplankton and algae which can deplete oxygen when it decays to levels incapable of sustaining aquatic organisms.

2.1.1 Marine Point Source Monitoring Program

King County collected offshore and nearshore water samples and offshore sediment samples for the 2001 point source monitoring program. In addition, beach water, sediment, shellfish tissues, and macroalgae samples were collected in areas adjacent to the treatment plant outfalls. A total of 30 sites were sampled in 2001. Point source stations include those that are required by the County's NPDES permit (e.g., offshore sediment sites near the South Treatment Plant outfall) and those that are not required but are in close proximity to point source discharges (e.g., beach stations near the West Point Treatment Plant). Station locations are shown in Figure 2-1 and station coordinates are provided in Appendix F.

Water samples were analyzed monthly for temperature, salinity, clarity, dissolved oxygen, nutrients, chlorophyll, and bacteria. Offshore sediment samples were collected in late October to November and analyzed for organic compounds, metals, conventional parameters (total organic carbon, total solids, total volatile solids, ammonia-nitrogen, total sulfides, oil and grease, and grain size). Benthic fauna analysis was also conducted for several of the South TP outfall stations. Beach sediments were collected in August and analyzed for organic compounds, metals, conventional parameters (total organic carbon, total solids, total volatile solids, and grain size). Shellfish tissues were analyzed for organic compounds, metals, and bacteria. Macroalgae samples were analyzed for metals. Shellfish and algae samples were collected in August and additional shellfish samples for bacterial analyses were collected monthly from May to September. A summary of parameters measured and the frequency for each station is provided in Table 2-2.

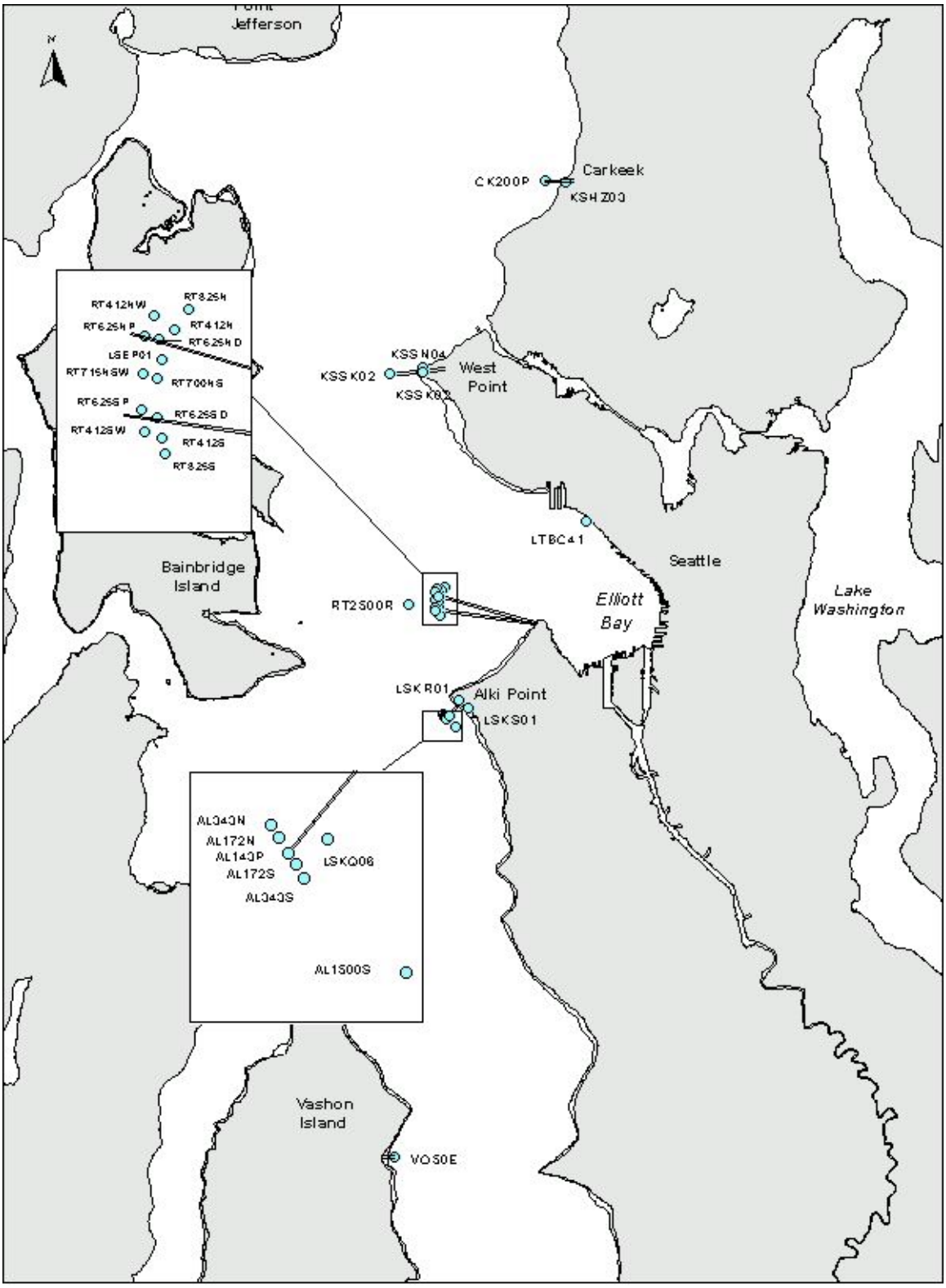


Figure 2-1. Point Source Monitoring Station Locations

Table 2-2. 2001 Point Source Stations, Parameters, and Frequency Measured

			SEDIMENT				WATER				SHELLFISH			ALGAE
STATION	LOCATION	OFFSHORE/ NEARSHORE/ BEACH	Organics	Metals	Conventionals	Benthic comm.	Bacteria	GWQP *	Organics	Metals **	Organics	Metals	Bacteria	Metals
KSHZ03	Carkeek	Beach	◆ 1	◆ 1	◆ 1		◆ 12	◆ 12		◆ 1	◆ 1	◆ 1	◆ 5	◆ 1
CK200P	Carkeek	Offshore					◆ 12	◆ 12						
KSSN04	West Point	Beach	◆ 1	◆ 1	◆ 1		◆ 12	◆ 12		◆ 1	◆ 1	◆ 1	◆ 5	◆ 1
KSSN05	West Point	Beach					◆ 12	◆ 12		◆ 1	◆ 1	◆ 1		◆ 1
KSSK02	West Point outfall	Offshore					◆ 12	◆ 12						
LTBC41	Denny Way	Nearshore					◆ 12	◆ 12						
LSEP01	South Plant outfall	Offshore					◆ 12	◆ 12						
RT2500R	South Plant outfall	Offshore	◆ 1	◆ 1	◆ 1	◆								
RT412N	South Plant outfall	Offshore	◆ 1	◆ 1	◆ 1									
RT412NW	South Plant outfall	Offshore	◆ 1	◆ 1	◆ 1	◆								
RT412S	South Plant outfall	Offshore	◆ 1	◆ 1	◆ 1									
RT412SW	South Plant outfall	Offshore	◆ 1	◆ 1	◆ 1	◆								
RT625ND	South Plant outfall	Offshore	◆ 1	◆ 1	◆ 1									
RT625NP	South Plant outfall	Offshore	◆ 1	◆ 1	◆ 1	◆								
RT625SD	South Plant outfall	Offshore	◆ 1	◆ 1	◆ 1									
RT625SP	South Plant outfall	Offshore	◆ 1	◆ 1	◆ 1	◆								
RT700NS	South Plant outfall	Offshore	◆ 1	◆ 1	◆ 1									
RT715NSW	South Plant outfall	Offshore	◆ 1	◆ 1	◆ 1	◆								
RT825N	South Plant outfall	Offshore	◆ 1	◆ 1	◆ 1									
RT825S	South Plant outfall	Offshore	◆ 1	◆ 1	◆ 1									
LSKR01	Alki Point	Beach	◆ 1	◆ 1	◆ 1		◆ 12	◆ 12		◆ 1	◆ 1	◆ 1	◆ 5	◆ 1
LSKS01	Alki	Beach					◆ 12	◆ 12						
LSKQ06	Alki outfall	Offshore					◆ 12	◆ 12						
AL343N	Alki outfall	Offshore	◆ 1	◆ 1	◆ 1									
AL172N	Alki outfall	Offshore	◆ 1	◆ 1	◆ 1									
AL143P	Alki outfall	Offshore	◆ 1	◆ 1	◆ 1									
AL172S	Alki outfall	Offshore	◆ 1	◆ 1	◆ 1									
AL343S	Alki outfall	Offshore	◆ 1	◆ 1	◆ 1									
AL1500S	Alki outfall	Offshore	◆ 1	◆ 1	◆ 1									
VO50E	Vashon I. Outfall	Offshore					◆ 12	◆ 12						

* GWQP = general water quality parameters. Includes nutrients, salinity, temperature, chlorophyll, dissolved oxygen, solids, transparency, photosynthetically active radiation for offshore/nearshore waters Includes nutrients, salinity, temperature for beach waters.

** Dissolved metals

Both Point source and MOSS program stations

Both fecal coliform and enterococcus bacteria were measured in water and shellfish tissues. Enterococcus has been proposed as an indicator of bacterial contamination in marine waters, therefore, both types of bacteria were analyzed in anticipation of possible changes in bacterial monitoring procedures. Although there are no regulatory standards for fecal coliform bacteria in shellfish tissues, samples were analyzed for informative purposes.

2.1.2 Marine Ambient Monitoring Program

The 2001 ambient monitoring program included collecting water samples at beach, nearshore, and offshore stations and sediments at beach stations (see Table 2-1). Water samples were collected from multiple depths at the offshore and nearshore stations and from a single depth at the beach stations. Shellfish and algae samples were also collected. A total of 15 beach stations and 6 offshore/nearshore stations were sampled in 2001. This program provides background information for comparison of data obtained from the King County point source monitoring program and contributes to a long-term dataset which enables trends to be evaluated regarding overall Puget Sound water quality.

Parameters measured for water samples included physical properties (water clarity, salinity, density, and temperature), and nutrient abundance (nitrogen and phosphorus compounds as well as silica). Dissolved oxygen, chlorophyll, and photosynthetically active radiation were also monitored at some sites. Bacteria was analyzed in all samples where water was collected. Organic compounds (e.g., polynulcear aromatic hydrocarbons, pesticides, and polychlorinated biphenyls), metals, and conventional parameters (total organic carbon, total solids, total volatile solids, and grain size) were monitored in beach sediments. Organic compounds and metals were monitored in shellfish tissues from two stations and only metals were monitored in macroalgae samples. Bacteria was also analyzed in shellfish tissues. Figure 2-2 shows ambient monitoring station locations and Table 2-3 provides a summary of parameters and frequency measured at each station. Station coordinates are provided in Appendix F. Samples at beach sites were collected in August for the annual shellfish, macroalgae, and sediment monitoring, as has been done in past years. At sites where shellfish tissues were analyzed for bacteria five times per year, the samples were collected monthly from May to September. Water samples that were collected for bacteria, physical parameters, and nutrient analyses were analyzed once monthly throughout the year.

2.2 MOSS Sampling Program

The MOSS program is being conducted to assist with siting and design of a new marine outfall. The sampling program includes four major study components: physical oceanography, submarine geophysics, water column profiling, and nearshore habitat and water quality. Data collected for the physical oceanography, submarine geophysics, and nearshore habitat components will be reported in separate documents. Data for water column profiling and beach water quality are provided in this report. Results for water column profiling and beach water quality samples collected in 1999 and 2000 were reported in the *Water Quality Status Report for Marine Waters, 1999 and 2000* (King County, 2001). Offshore and nearshore sediments were

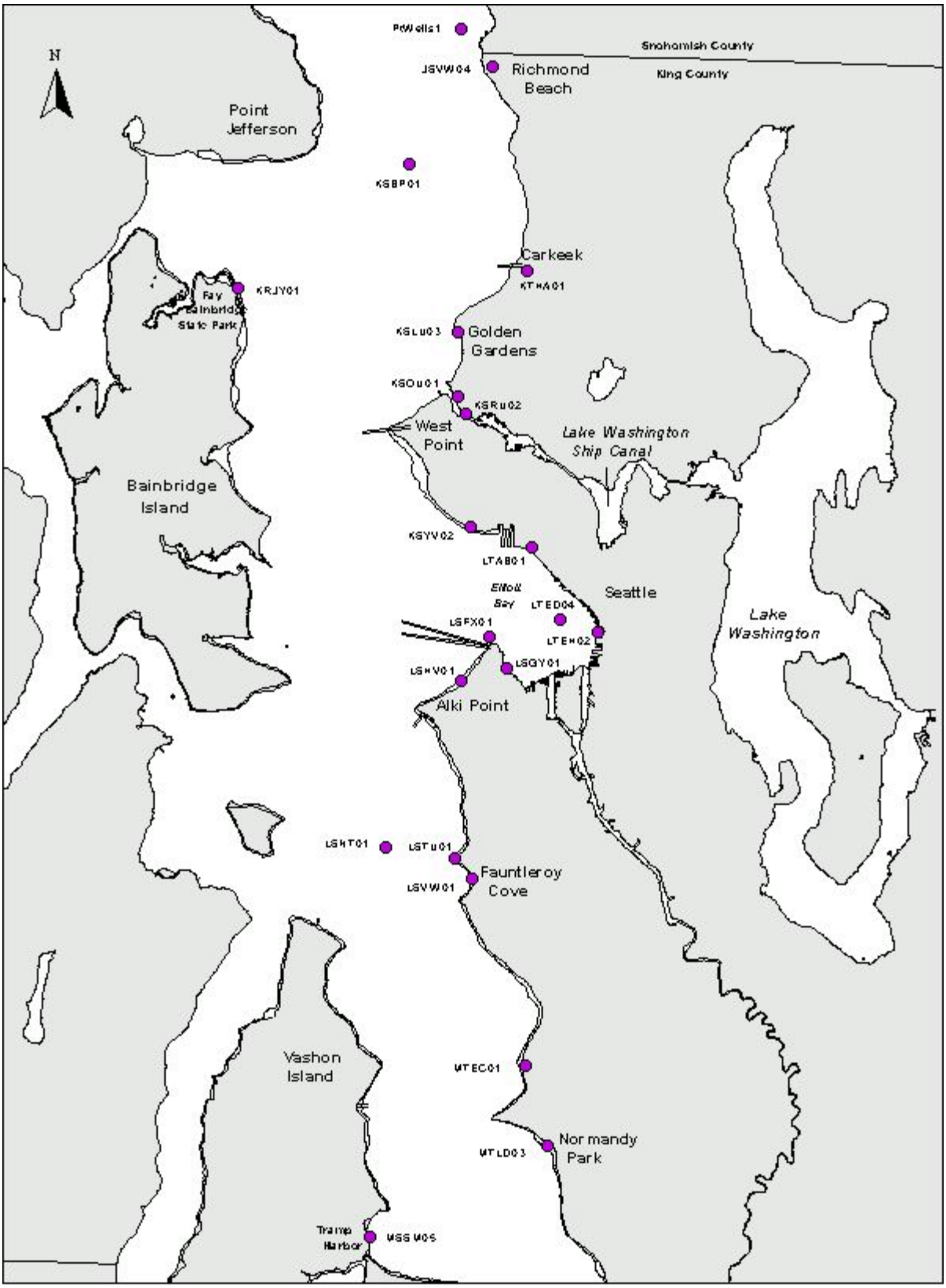


Figure 2-2. Ambient Monitoring Station Locations

Table 2-3. 2001 Ambient and MOSS Stations, Parameters, and Frequency Measured

(page 1 of 2)

			SEDIMENT			WATER				SHELLFISH			ALGAE
STATION	LOCATION	OFFSHORE/ NEARSHORE/ BEACH	Organics	Metals	Conventionals	Bacteria	GWQP *	Organics	Metals **	Organics	Metals	Bacteria	Metals
ITMUKILTSP	Mukilteo Pk.	Beach				◆ 10	◆ 10		◆ 4				
ADMIRALC14	Admiralty Inlet	Offshore				◆ 6	◆ 6						
POSSESSC14	Possession Sound	Offshore				◆ 6	◆ 6						
ITPICNICPT	Picnic Point	Beach				◆ 12	◆ 12		◆ 4				
ITMEADOWBP	Meadowdale Pk	Beach				◆ 12	◆ 12	◆ 2	◆ 6				
EDMDS-CTD4	Edmonds	Offshore				◆ 8	◆ 8						
EDMDS-CTD2	Edmonds	Offshore				◆ 8	◆ 8						
ITOCEANAVE	Ocean Avenue	Beach				◆ 12	◆ 12		◆ 4				
ITBRACKETT	Brackett's Landing	Beach				◆ 12	◆ 12		◆ 4				
ITEDWARDSPT	Edwards point	Beach				◆ 12	◆ 12	◆ 2	◆ 6				
PTWells1	Point Wells	Offshore				◆ 12	◆ 12						
JSVW04	Richmond Beach	Beach	◆ 1	◆ 1	◆ 1	◆ 12	◆ 12		◆ 5	◆ 1	◆ 1	◆ 5	◆ 1
ITBOEINGCR	Boeing Creek area	Beach				◆ 12	◆ 12		◆ 4				
KSBP01	Point Jefferson	Offshore				◆ 12	◆ 12						
ITCARKEEKP	Carkeek Park	Beach				◆ 12	◆ 12	◆ 2	◆ 6				
KTHA01	Piper's Creek	Creek				◆ 12	◆ 12						
KRJY01	Fay Bainbridge	Beach				◆ 6						◆ 5	
KSJX02	Blue Ridge	Beach				◆ 12	◆ 12		◆ 4				
KSLU03	Golden Gardens	Beach				◆ 12	◆ 12		◆ 5	◆ 1	◆ 1	◆ 5	◆ 1
KSQU01	Shilshole Bay	Beach				◆ 12	◆ 12		◆ 4				
KSRU02	LW Ship Canal	Nearshore				◆ 12	◆ 12						
KSYV02	Magnolia	Beach	◆ 1	◆ 1	◆ 1	◆ 12	◆ 12						◆ 1
LTAB01	inner Elliott Bay	Beach				◆ 12	◆ 12						
LTEH02	inner Elliott Bay	Nearshore				◆ 12	◆ 12						
LSGY01	Seacrest	Beach				◆ 12	◆ 12						
LSFX01	Duwamish Head	Beach				◆ 12	◆ 12						
LTED04	Elliott Bay	Offshore				◆ 12	◆ 12						
LSHV01	West Seattle	Beach				◆ 12	◆ 12						

Table 2-3. 2001 Ambient and MOSS Stations, Parameters, and Frequency Measured

(page 2 of 2)

STATION	LOCATION	OFFSHORE/ NEARSHORE/ BEACH	SEDIMENT			WATER				SHELLFISH			ALGAE
			Organics	Metals	Conventionals	Bacteria	GWQP *	Organics	Metals **	Organics	Metals	Bacteria	Metals
LSNT01	Dolphin Point	Offshore				◆ 12	◆ 12						
LSTU01	Lincoln Park	Beach				◆ 12	◆ 12						
LSVW01	Fauntleroy Cove	Beach				◆ 12	◆ 12						
COLVOSPASS	Colvos Passage	Offshore				◆ 1	◆ 1						
MTEC01	Seahurst Park	Beach				◆ 6						◆ 5	
MTLD03	Normandy Park	Beach	◆ 1	◆ 1	◆ 1	◆ 6			◆ 1	◆ 1	◆ 1	◆ 5	◆ 1
MSSM05	Tramp Harbor	Beach				◆ 6						◆ 5	

* GWQP = general water quality parameters. Includes nutrients, salinity, temperature, chlorophyll, dissolved oxygen, solids, transparency, photosynthetically active radiation for offshore/nearshore waters. Includes nutrients, salinity, temperature for beach waters. MOSS beach stations also include pH and dissolved oxygen.

** Total and dissolved metals with the exception of MTLD03 which was dissolved metals only.

MOSS stations

Ambient as well as MOSS program stations

collected in late 2001 and data results are provided in a separate report (King County, 2002). Water column profiling and beach water quality results for 2001 are provided in this report. MOSS station locations are shown in Figure 2-3.

2.2.1 MOSS Water Column

The water column profiling component was initiated in 1999 to evaluate physical, chemical, and bacterial characteristics of ambient receiving water in the Central Basin from southern Whidbey Island (including portions of Admiralty Inlet and Possession Sound) to northern Vashon Island. A total of 10 offshore stations (including 3 also sampled for the ambient program and 2 for the point source program) were sampled for physical properties (water clarity, salinity, density, and temperature), and nutrient abundance (nitrogen and phosphorus compounds as well as silica) (see Figure 2-3). Dissolved oxygen, chlorophyll, photosynthetically active radiation, and bacteria (fecal coliform, enterococcus, and *E. coli*) were also monitored.

In addition to the data collection listed above, *in situ* water quality data were collected in a series of transects at five locations in the study area (figure showing transect locations is provided in Section 4). These data were collected to provide information on the physical water quality

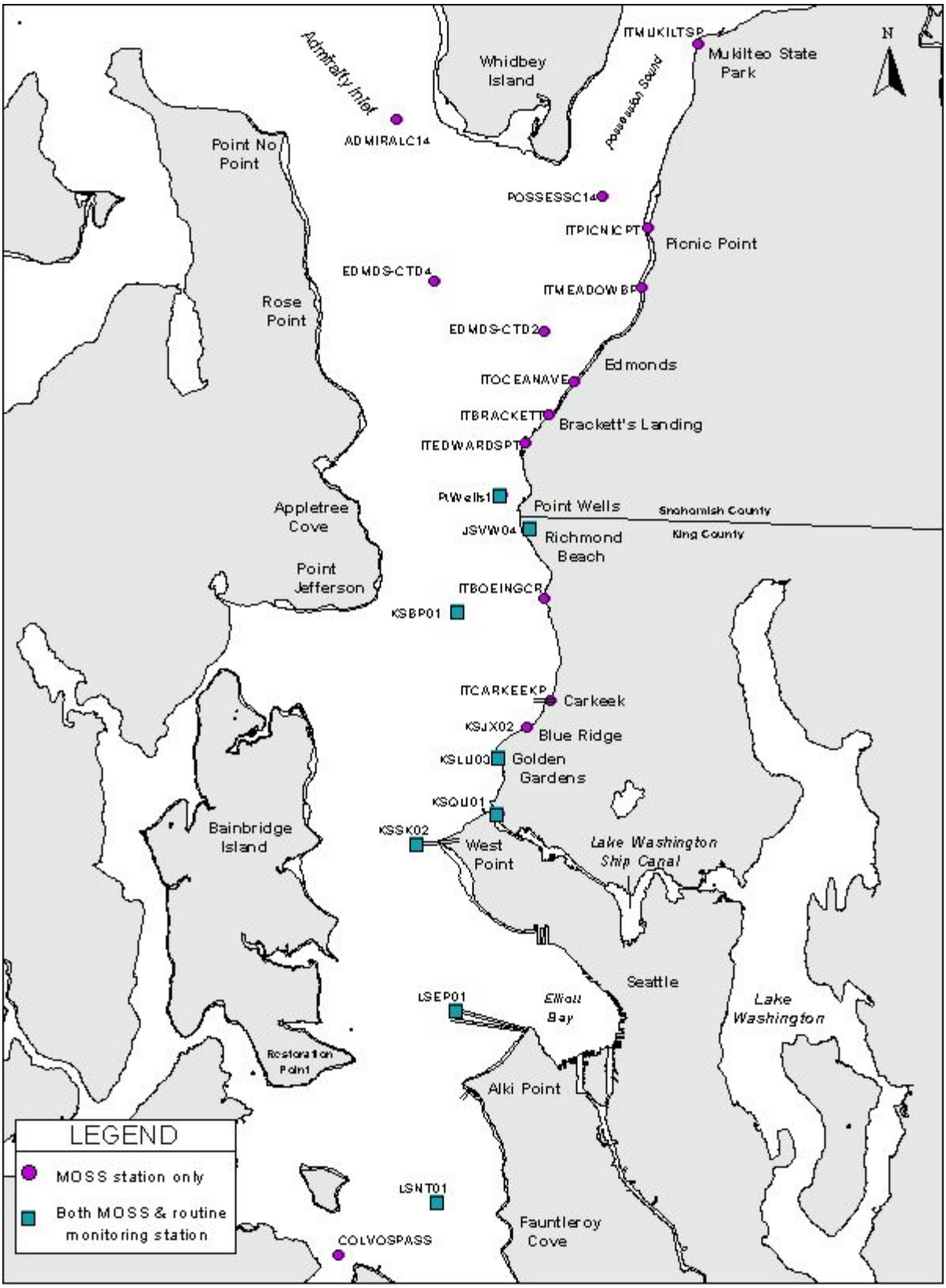


Figure 2-3. Moss Station Locations

properties of the central Puget Sound basin needed for modeling efforts. Each transect consisted of either five or six stations spaced equidistant across the length of the transect. Measurements were recorded monthly from the surface to a depth of approximately five meters above the bottom. Data collected included salinity, temperature, density, dissolved oxygen, turbidity, and fluorescence. Data collection began in 1999 for the Possession Sound and Point Wells transects and in 2000 for the West Point, Alki, and Edmonds transects. Transect sampling ended in July 2001.

2.2.2 MOSS Beach Water Quality

The beach monitoring component was initiated in March 2000 to evaluate physical, chemical, and bacterial characteristics of nearshore waters in the study area (see Figure 2-3). The station locations were selected to provide coverage of the entire MOSS study area and to assess water quality conditions in areas of particular interest for both ecological and human health risk assessments. Twelve beach stations were sampled in 2001 for the MOSS program, three which were also sampled as part of the ambient sampling program. Nine sites extending from Mukilteo State Park to Blue Ridge were sampled starting in 2000, with the exception of the Mukilteo State Park station which was added to the program beginning in March 2001. Beach waters were analyzed for physical properties (salinity and temperature), nutrient abundance (nitrogen, phosphorus compounds, and silica), pH, dissolved oxygen, and bacteria (fecal coliform, enterococcus, and *E. coli*). Dissolved oxygen and pH were parameters that were added to the program in January 2001. Total and dissolved metals were also analyzed at all 12 beach sites quarterly. Three sites, ITMEADOWSP, ITEDWARDSPT, and ITCARKEEKP, were sampled an additional two times for total and dissolved metals. These same three sites were also sampled twice for organic compounds (including chlorinated pesticides and herbicides, organophosphorus pesticides, polychlorinated biphenyls, and polynuclear aromatic hydrocarbons). As stated above, 3 of the 12 stations are also part of the marine ambient monitoring program (JSVW04, KSLU03, and KSQU01). Additional parameters, such as metals, *E. coli*, pH, and dissolved oxygen were included for the MOSS program that are not part of the routine sampling program. Bacteria samples from one station, KSJX02, were previously collected for the marine ambient monitoring program, but data collection from this station was discontinued in 1996. The beach sampling component ended in February 2002.

2.3 Water Column Monitoring

Water column monitoring at ambient and point source sites is an important component of the County's water quality monitoring programs and is structured to detect natural seasonal changes in the water column as well as identify changes from anthropogenic input. General water quality parameters including temperature, salinity, transparency, dissolved oxygen, chlorophyll-*a*, pheopigment, photosynthetically active radiation, ammonia, nitrate+nitrite, total phosphorus, silica, and total suspended solids, are monitored at multiple depths at multiple sites. Temperature, salinity, and bacteria are the only parameters measured at station KSRU02 located near the mouth of the Lake Washington Ship Canal. Bacteria are monitored at all water column monitoring sites.

2.3.1 Bacteria

Biologists and agencies responsible for protecting public health define water quality in terms of several variables, including the presence of bacteria. Fecal coliform bacteria are found in the feces of humans and other warm-blooded animals. These bacteria may enter the aquatic environment directly from humans and animals, from agricultural and storm runoff, and from wastewater. Although fecal coliform bacteria are usually not pathogenic, they may occur along with disease-causing bacteria so their presence indicates the potential for pathogens to be present. Generally, a high fecal coliform count suggests that there is a greater possibility for pathogens to be present. Fecal coliform bacteria are typically found in higher numbers than other pathogens and are easier and safer to test in the laboratory.

Regulatory standards have been established for acceptable levels of fecal coliform bacteria for various water uses, including recreation and fish and wildlife habitat. It should be noted that although fecal coliform bacteria are commonly used as an indicator for the presence of pathogens, there are limitations to the use of these data. There is no recognized numeric association between the number of fecal coliform bacteria and the number of pathogens measured in a sample. In addition, as the presence of viruses and naturally occurring toxic organisms (such as certain dinoflagellates) are not indicated by the presence of fecal coliforms, these organisms must be measured independently.

The Washington State Department of Ecology is currently considering proposing changes for marine surface water bacteriological criteria. The proposed changes incorporate the use of enterococci bacteria as an indicator of bacterial contamination in marine water along with the continued use of fecal coliform bacteria for shellfish protection standards. Enterococci bacteria are a subgroup of the fecal streptococci bacteria and like fecal coliform bacteria, are also found in the intestinal tract of warm-blooded mammals and birds. Specific regulatory changes for marine waters may include adopting an enterococcus geometric mean criterion of 35 colony forming units (cfu)/100 ml with no more than ten percent of the samples exceeding 104 cfu/100 ml. However, marine waters meeting the current geometric mean fecal coliform standard of 14 cfu/100 ml would be considered to be in compliance with the proposed enterococcus geometric mean standard. The state is proposing to keep the current fecal coliform bacterial standards to protect commercial and recreational shellfish harvesting.

Another species of fecal coliform bacteria found in the intestinal tract of humans and warm-blooded animals, *Escherichia coli* (*E. coli*), has also been used as an indicator for the presence of pathogens. Although *E. coli* is not routinely monitored for the County's marine monitoring program, it is being measured for the MOSS program and the results will be used to assist in the project's human-health risk assessment. Pathogenic strains of *E. coli* are rarely found in high numbers and the aquatic environment does not generally support their growth.

2.3.2 Temperature and Salinity

Water temperature is an important factor in an estuary. As water temperature rises, biological and chemical activity increases while the capacity of water to hold dissolved oxygen decreases.

Water temperature is dependent upon various factors, including depth, season, amount of tidal mixing, wind, storms, amount of freshwater input, and degree of stratification.

Both temperature and salinity influence water column stratification, although salinity is more important in determining stratification in estuaries. Estuaries usually exhibit changes in salinity as freshwater input increases or decreases. Salinity also fluctuates with tides, amount of input of high salinity water from deep Pacific oceanic water, amount of precipitation, and degree of water column mixing from winds. Generally, salinity increases with water depth unless the estuary is well-mixed.

2.3.3 Dissolved Oxygen

Dissolved oxygen is an important factor controlling the presence or absence of marine species. Aquatic plants and animals require a certain amount of oxygen dissolved in the water for respiration and basic metabolic processes. Waters that contain high amounts of dissolved oxygen are generally considered healthy ecosystems and are capable of sustaining various species of aquatic organisms.

Several factors influence dissolved oxygen concentrations. Seasonal climatic fluctuations can cause water temperature to rise in the spring and summer, reducing the capacity of water to hold dissolved oxygen. In winter, deep oceanic water from the Pacific Ocean containing naturally low levels of oxygen enters Puget Sound. Moreover, anthropogenic input of organic matter and phytoplankton decay may decrease levels of oxygen. Bacteria that utilize organic matter for food consume dissolved oxygen. Hypoxia results when the rate of oxygen consumption, mostly by bacteria decomposing organic material in the water column, exceeds the rate of oxygen production by photosynthesis and by replenishment at the air/water interface from the atmosphere. When the system is overloaded with organic material, oxygen consumption by bacteria may increase to the point where conditions can no longer support marine life (eutrophication), putting fish and other aquatic organisms at risk.

2.3.4 Transparency

Transparency, or water clarity, is measured to determine the depth to which enough light penetrates to support plant growth (euphotic zone). Several factors affect transparency including the amount of suspended silt and soil particles and the amount of phytoplankton and zooplankton in the water column. In addition to transparency, total suspended solids are also monitored. Freshwater input (particularly after storms) and wave action also affect transparency. Low transparency conditions which persist over an extended period of time can degrade the health of a water body as the decreased amount of light penetration reduces the area for aquatic plants and primary producers to grow. In addition, many marine organisms feed by filtering water and large amounts of suspended matter may obstruct their filter-feeding systems.

2.3.5 Photosynthetically Active Radiation (PAR)

Sunlight consists of a wide spectrum of wavelengths of which only a small proportion can be used for photosynthesis. This small range of light energy available for photosynthesis is in the 400 to 700 nanometer range. Photosynthetically active radiation (also referred to as light intensity) is measured at various depths throughout the water column to determine the amount of light energy available to phytoplankton, macrophytes, and some diatoms for photosynthesis. PAR is an important factor as phytoplankton and other plants can only inhabit those regions in the water column where enough light penetrates to support photosynthesis. Turbidity, waves, and time of year are factors which may affect PAR measurements.

2.3.6 Nutrients

The addition of nutrients, such as nitrogen and phosphorus, into marine waters can have a considerable effect on the water quality, particularly for nearshore habitats where nutrient input typically occurs and tends to be confined. Nutrients may enter marine waters from wastewater discharges, nonpoint runoff, and from riverine and oceanic sources. The greatest impact these nutrients may have is the sudden increase in aquatic plant growth.

The amount of light that penetrates the water column and the amount of nutrients in the water column affect phytoplankton growth. Nitrogen is the primary limiting nutrient that determines the growth of phytoplankton in marine waters (Valiela, 1984). Although nitrogen occurs naturally in the marine environment, abnormal increases from sources such as wastewater or fertilizers can cause increases in phytoplankton growth. An increase in phytoplankton biomass may cause a decline in dissolved oxygen as the phytoplankton cells respire and decay. This depression in dissolved oxygen levels can become critical in areas of reduced circulation. The marine waters within King County have not experienced any significant eutrophication problems, mainly due to the high degree of mixing in the Central Basin of Puget Sound (PSWQAT, 2000).

Nitrogen Compounds. Nitrate, nitrite, and ammonia are forms of inorganic nitrogen used by phytoplankton in the aquatic environment. Nitrates and nitrites are formed through the oxidation of ammonia by nitrifying bacteria. As noted above, nitrogen is usually the limiting nutrient in marine waters. Therefore, an increase in nitrogen compounds could lead to phytoplankton blooms. When blooms occur, water conditions (such as reduced water clarity and dissolved oxygen) may become unfavorable for aquatic organisms. Input of nitrogen compounds may originate from sources such as wastewater from municipal discharges and agricultural runoff.

Phosphorus. Phosphorus is an essential element for aquatic plants and a fundamental element in the metabolic process for both plants and animals. Total phosphorus includes both organic phosphorus and inorganic phosphate. Inorganic phosphates are rapidly taken up by algae and other aquatic plants, although phosphates are usually not the limiting nutrient in marine waters. However, large inputs could cause algal blooms which could lead to unfavorable conditions. Sources of phosphorus potentially entering the marine environment include wastewater from

municipal discharges, industrial wastes, nonpoint agricultural runoff, rivers and streams, and the Pacific Ocean.

Silica. Silica is a micronutrient needed by diatoms, radiolarians, some sponges and other siliceous organisms for skeletal growth. Silica can be used as an indicator of plankton blooms, along with chlorophyll-*a*, as silica concentrations will decrease in the photic zone from an increase in phytoplankton uptake. Sediments act as a sink for silica which may be regenerated by various physical and biological processes and reused by organisms on the seafloor and in overlying waters.

2.3.7 Chlorophyll and Pheopigments

Chlorophyll-*a* is a green pigment used by algae and green plants during the process of photosynthesis to convert light, carbon dioxide, and water to sugar. Chlorophyll-*a* concentration is the most direct indicator of phytoplankton biomass since all marine planktonic algae contain this photosynthetic pigment. However, chlorophyll-*a* concentrations are not an exact measurement of phytoplankton abundance. The ratio of phytoplankton biomass to chlorophyll varies with species, nutritional status, and environmental conditions. Pheopigments, such as pheophorbide-*a* and pheophytin-*a*, are degradation products of chlorophyll and are produced when phytoplankton cells are grazed upon by zooplankton. High concentrations of pheopigments relative to chlorophyll-*a* indicate a high level of grazing in an aquatic ecosystem. Several factors influence phytoplankton abundance, including amount of solar radiation, extent of grazing, water temperature, nutrient availability, and water column stratification.

2.3.8 pH

The pH scale is a unit of measure which describes the degree of acidity or alkalinity of a solution by measuring the amount of hydrogen ions. The letters pH stand for 'the power of hydrogen', whose chemical symbol is "H." It is measured on a scale of 0 to 14 with acids in a range from 0 up to 7, with the lower numbers being a stronger acid. Bases are in the range from 7 to 14, with the higher numbers being a stronger base. Seven is considered to be neutral--neither an acid nor a base and is the pH of distilled water. For water quality, pH is an important measurement as the toxicity of various chemicals may be affected by pH. For the MOSS project, pH was measured as it was necessary to have values for this parameter, along with salinity and temperature, in order to compare total ammonia data to the total ammonia criterion, which is pH, temperature, and salinity based. For offshore waters, a pH of 8.0, temperature of 15 ^{o}C, and salinity of 30 PSS are used to compare total ammonia data. The nearshore environment is more variable due to freshwater input and it is necessary to have discrete data to accurately compare ammonia data to applicable standards.

2.3.9 Water Column Sampling Methods

Field Methods. Offshore water column samples were collected in accordance with the *Recommended Guidelines for Sampling Marine Sediment, Water Column, and Tissues in Puget Sound* (PSEP, 1996) by the King County Environmental Services Section. A brief description is provided below.

Offshore water samples were collected from the *R/V Liberty*, a 42-foot (ft) boat, equipped with a hydraulic crane on the rear deck. Offshore water column profiles were sampled using a SeaBird Electronics SBE 25 SEALOGGER conductivity-temperature-depth (CTD) profiler. Parameters measured by the CTD included: temperature, salinity, density, dissolved oxygen, photosynthetically active radiation (PAR), and chlorophyll-*a* (measured by fluorescence). The CTD was lowered into the water using a hydraulic boom and allowed to equilibrate for 5 minutes at the surface before being lowered to a few meters from bottom depth. Five-liter Niskin bottles were mounted onto the CTD for collecting discrete water samples at predetermined depths for nutrients, total suspended solids, and bacteria. The CTD was electronically programmed to trip individual bottles at specific depths. All bottles were programmed to trip as the CTD ascended through the water column. The CTD was then brought on deck and discrete water samples were immediately drawn from the Niskin bottles and placed into appropriate sample containers. Dissolved oxygen samples were immediately preserved with powdered $MnSO_4$ (manganous sulfate) and AIA (alkali iodide azide), then stored in the dark. With the exception of dissolved oxygen bottles, sample containers were stored on ice until delivered to the King County Environmental Laboratory.

Transparency (water clarity) measurements were collected using an 12-inch diameter black-on-white Secchi disk. Secchi depths were recorded to the nearest 0.1 meter. As readings may vary depending upon environmental conditions (e.g., waves and glare) and the individual collecting the reading, all field crew were trained to collect measurements using the same procedure.

Intertidal (beach) water samples were collected by inverting sampling bottles just above the water surface, then sinking the bottle down to approximately 12-inches below the water surface. The bottles are not filled completely in order to allow room for mixing. Samples were collected from approximately knee-deep water when possible. At some sites where accessibility is difficult, such as LTAB01 located in inner Elliott Bay, samples were collected with a container lowered on a rope from a pier and then transferred into the sample container. Trace metal samples were collected using non-metallic equipment and employing the "clean hands/dirty hands" technique in accordance with EPA Method 1669 (EPA, 1995).

Laboratory Methods. With the exception of temperature, Secchi disk transparency, and CTD parameters which were measured in the field, all water column parameters were analyzed at the King County Environmental Laboratory. Laboratory methods and detection limits are provided in Table 2-4.

Fecal coliform and enterococcus bacteria were analyzed according to Standard Methods 9222D and 9230C, respectively (APHA, 1995). *E. coli* was analyzed according to King County Environmental Laboratory Standard Operating Procedure (SOP) 6.5.1.

All samples were analyzed within their respective hold times and quality assurance/quality control procedures included the use of blanks, duplicates, and spikes where appropriate. All data were reviewed by section supervisors prior to entry into the LIMS (Laboratory Information Management System) database.

Table 2-4. Laboratory Methods and Detection Limits for Water Samples

Parameter	Units[1]	MDL[2]	RDL[3]	Method
Salinity	pss	0.005	0.01	SM2520-B
Dissolved Oxygen	mg/L	0.5	1.0	SM4500-O-C
Chlorophyll-*a*	mg/m^3	0.01	0.02	EPA 445.0
Phaeophytin	mg/m^3	0.01	0.02	EPA 445.0
Ammonia-Nitrogen	mg/L	0.01	0.02	SM4500-NH3-H
Nitrite+Nitrate (NO_3+NO_2)	mg/L	0.02	0.04	SM4500-NO3-F
Total Phosphorous	mg/L	0.005	0.01	SM4500-P-B,E
Total Suspended Solids (TSS)	mg/L	0.5	1.0	SM2540-D
Silica	mg/L	0.05	0.1	SM4500-SI-D
Turbidity	FTU	0.5	1.0	SM2310-B
pH	pH units	--	--	SM4500-H-B
Fecal coliform	cfu/100 ml	--	--	SM9222-D
Enterococcus	cfu/100 ml	--	--	SM9230-C
E. coli	cfu/100 ml	--	--	Metro SOP 6.5.1
Metals, total & dissolved	µg/L	variable [4]	variable [4]	EPA 1640 (ICP-MS [5])
Mercury	µg/L	0.0001	0.0005	EPA 1631 (CVAFS)
Semi-volatile organics	µg/L	variable [4]	variable [4]	EPA 8270C
Chlorinated pesticides/PCBs	µg/L	variable [4]	variable [4]	EPA 608
Chlorinated herbicides	µg/L	variable [4]	variable [4]	EPA 8151 (mod.)
Organophosphorus pesticides	µg/L	variable [4]	variable [4]	EPA 8141A

[1] pss = practical salinity scale
mg/L = milligram per liter
µg/L = microgram per liter
mg/m^3 = milligram per meter cubed
cfu = colony forming unit
[2] MDL = method detection limit
[3] RDL = reported detection limit
[4] Detection limits vary with parameter analyzed. Detection limits for individual samples and analytes are provided in the Appendix A.
[5] Sample preparation was by reductive precipitation.

2.4 Sediment Monitoring

Sediment monitoring is a component of the County's ambient and point source monitoring programs as many pollutants (organics and trace metals) tend to be associated with particles that settle out onto bottom sediments. At sufficient concentrations, these compounds may be harmful to benthic organisms and may bioaccumulate. Conventional parameters (total solids, total volatile solids, grain size distribution, total organic carbon, and total sulfides) are also monitored as these parameters affect the bioavailability and/or toxicity of pollutants as well as influence the concentration of pollutants accumulated. A more detailed description of why sediment conventional parameters are measured is provided below.

2.4.1 Total Solids

Total solids are the inorganic and organic particles remaining after a sediment sample has been dried. This parameter is measured in order to convert chemical concentrations from a wet weight to a dry weight basis for reporting uniformity.

2.4.2 Total Volatile Solids

Volatile solids are primarily organic solids that burn in the presence of oxygen at a given temperature (usually 550 or 600 ^{o}C). The solids or ash remaining behind is comprised of the non-volatile or fixed solids. The volatile solid value is used as an estimate of organic matter in a sample.

2.4.3 Grain Size Distribution

This is a measure of the size range of particles contained in a given sample. Grain size is usually separated into four main categories: silt, clay, sand, and gravel. Grain size has an influence on chemical concentrations found in sediments and those sediments with a large proportion of small particles (silt and clay) tend to have higher chemical concentrations.

2.4.4 Total Organic Carbon

This is a measure of the total amount of particulate and nonparticulate organic carbon contained in a sample. In the same manner as grain size, total organic carbon also has an influence on chemical concentrations contained in sediments. The higher the organic carbon content, the higher some chemical concentrations tend to be. This is particularly true for organic compounds.

2.4.5 Total Sulfides

Sulfides are formed by the anaerobic breakdown of organic matter. Total sulfides represent the amount of all sulfide compounds in a given sample and are measured as they may be toxic to some benthic organisms at low concentrations and can create unaesthetic conditions for humans.

2.4.6 Sediment Sampling Methods

Field Methods. Offshore sediment samples at the Alki CSO TP outfall were collected by the King County Environmental Services Section from the *R/V Liberty*. Samples were collected with two stainless steel 0.1-m^2 modified van Veen grab samplers deployed in tandem. The sampler was decontaminated between sites by scrubbing with a brush to remove excess sediment, followed by an on-board rinsing and thorough *in-situ* rinsing. If sample acceptability criteria were met, the top two centimeters of sediment from a minimum of five subsamples were composited and homogenized before transference to the appropriate sample containers. Sediment samples were collected in accordance with the *Puget Sound Estuary Program (PSEP) Recommended Protocols* (PSEP, 1996) and the County's *Standard Protocol for Marine Sediments* (King County, 1997).

Offshore sediment samples at the South TP outfall were collected as described above with the following exceptions. King County contracted with Blue Water Engineering to monitor the position of the van Veen grab sampler as it contacted the bottom using an underwater acoustic navigation system. King County was interested in obtaining an exact location where the sampler landed on the bottom as opposed to where the boat was positioned above water. Blue Water Engineering used a Trimble Ag132 DGPS for surface navigation, ORE Trackpoint II Plus for acoustic navigation, a motion sensor for boat pitch and roll, and Coastal Oceanographics HYPACK positioning software. The position of the boat was determined using a DGPS and the heading was determined using a digital compass and displayed graphically real-time using a monitor. An acoustic transponder beacon was clamped to the winch wire seven feet above the van Veen sampler and activated prior to deployment. The transponder was clamped high enough above the sampler to avoid interference while sampling. After input of the offsets between the DGPS, the motion sensor and the hydrophone, the HYPACK software was able to calculate the position of the van Veen grab sampler in real-time along with the position of the boat. This enabled the van Veen grab sampler to be 'flown' just above the bottom until the coordinates of the station were reached and then the sampler was lowered. This allowed for accurate sampling of the stations so that the sampler landed 20 feet or less from the stations for most casts for the six stations where this procedure of flying the sampler was attempted. Figure 2-4 shows the exact locations for individual casts at each stations--up to six casts were necessary to obtain enough sediment for all analyses. A detailed description of the sampling methods using this navigational system is provided in *Subsurface Positional Tracking of a Van Veen Sampler in Deep Water Report* (Blue Water Engineering, 2002).

Intertidal (beach) samples were collected by hand-held stainless steel core tubes with a 2-inch diameter. Samples were collected at approximately the same tidal elevation at each beach, 6.5 feet above mean lower low water (MLLW), using a measuring staff, tide chart, and an optical level to sight the proper level on the measuring staff. If the appropriate tidal elevation fell in an

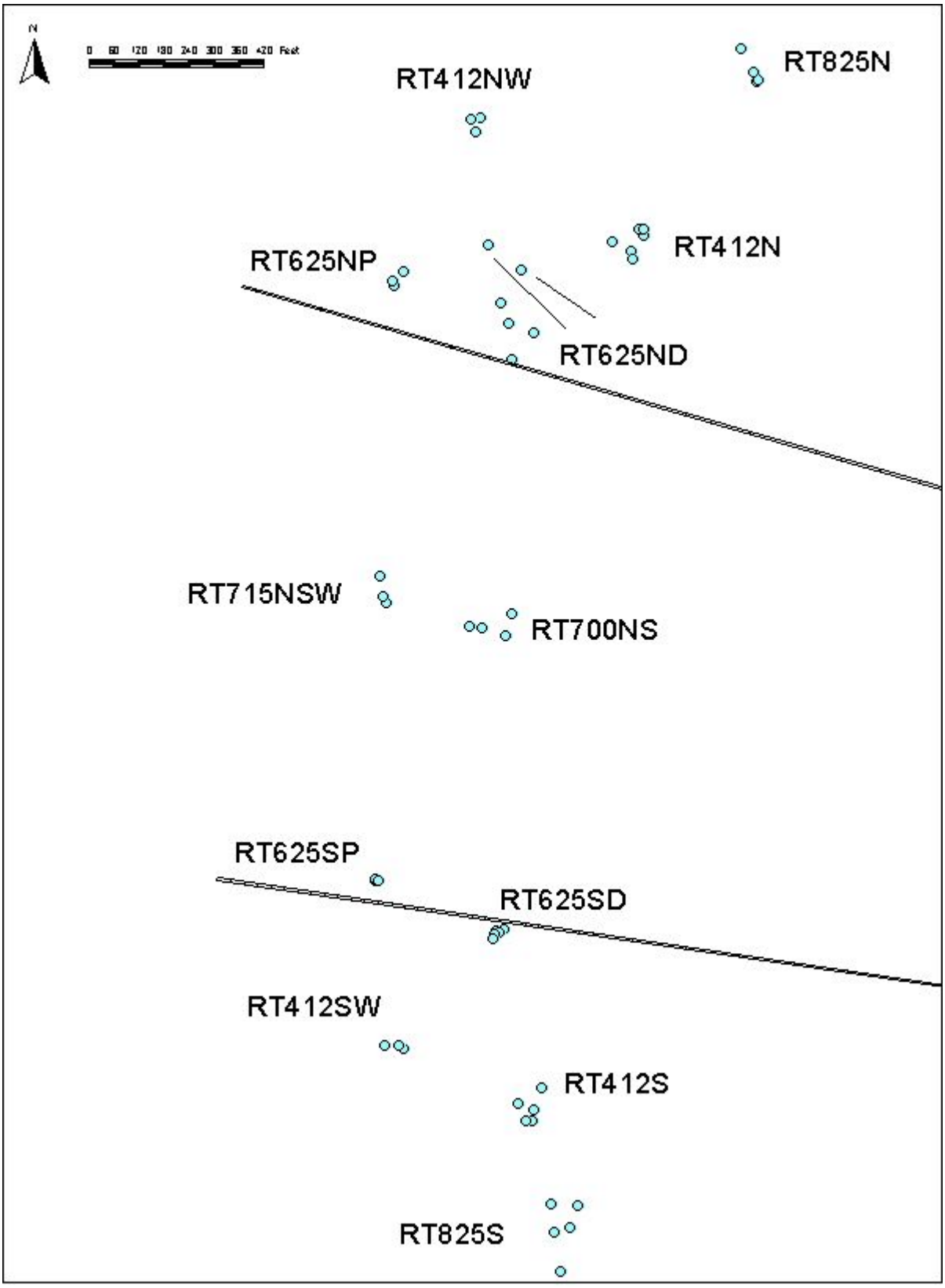


Figure 2-4. Location of South Plant Outfall Sediment Grab Samples

area with gravel, cobbles or boulders, then sediments without gravel/cobbles or other large objects closest to the area were sampled instead. Once the required sample amount was obtained, sediments were homogenized in a stainless steel bowl before being transferred to appropriate sample containers. All sampling equipment was pre-cleaned for use at a single site and not reused. All samples were stored on ice until submitted to the laboratory.

Laboratory Methods. The King County Environmental Laboratory analyzed all chemical parameters with the exception of particle size distribution and total sulfide. These two analyses were performed by a subcontracted laboratory. Methods and detection limits are provided in Table 2-5. All metals were analyzed using inductively coupled plasma (ICP) emission spectrometry with the exception of mercury. Mercury was analyzed by cold-vapor atomic absorption spectrophotometry (CVAA). Semivolatile organics were extracted with an organic solvent and then analyzed by gas chromatography/mass spectrometry (GC/MS). Pesticides and PCBs were extracted with organic solvents and then analyzed using a gas chromatograph equipped with an electron capture detector (ECD). All samples were analyzed within their respective hold times and quality assurance/quality control procedures included the use of blanks, duplicates, and surrogates and spikes when appropriate. All data were reviewed by section supervisors prior to entry into the LIMS database.

Specific quality assurance/quality control procedures for all offshore sediment analyses can be found in the *2001 NPDES Sediment Baseline Monitoring Plan for the Renton and Alki Outfalls-Sampling and Analysis Plan* (King County, 2001b).

Table 2-5. Laboratory Methods and Detection Limits for Sediment Parameters

Parameter	Units	MDL	Method
Total Solids	%	0.005	SM2540-G
Total Volatile Solids	%	0.005	SM2540-G
Total Oil & Grease	mg/kg	100	SM5520-B
Total Organic Carbon	mg/kg	5	SM5310-G
Total Sulfide	mg/kg	10	PSEP, 1986
Metals, total, ICP	mg/kg	variable[1]	EPA 3050/6010
Mercury, total, CVAA	mg/kg	0.019	EPA 7471
Semivolatile Organics	μg/kg	variable[1]	SW 846 8270
Pesticides/PCBs	μg/kg	variable[1]	SW 846 8081/8082
Organotins	μg/kg	0.3	Krone, 1988
Grain Size Distribution	%	0.1	PSEP, 1991

[1]Detection limits vary with parameter analyzed. Detection limits for individual samples and analytes are provided in Appendix B.

2.5 Benthic Fauna

Marine benthic communities are useful indicators of sediment quality as the organisms spend the majority of their lives in direct contact with sediments. Benthic organisms can accumulate harmful metal and organic pollutants by ingesting contaminated sediment, eating contaminated prey, or by adsorption from the overlying water, or sediment pore water. There is potential for contaminants to be passed up the food web to other organisms, since benthos are themselves food for fish and other animals.

Benthic communities can be investigated in many ways. Diversity indices, which are a reflection of the numbers and abundances of individuals within a community, are a common and useful method of assessing communities. Total abundance, or the total number of organisms, as well as total species abundance are also useful to describe benthic communities.

Benthic community analysis was conducted in 2001 as part of King County's NPDES monitoring for the South wastewater treatment plant. Samples were collected from six sites around the outfall. Sediment chemistry analysis was conducted concurrent with benthic sampling. Communities were investigated by calculating diversity indices, calculating total and species abundances, looking at populations of pollution tolerant and sensitive species, and by determining the proportion of individuals in major taxonomic groups. Spatial variation and correlation with physical conditions (sediment grain size, water currents) was also explored.

2.5.1 Field and Identification Methods

Samples were collected from the entire contents of a single 0.1 m^2 van Veen grab. Three replicates samples were collected at each station. After collection, samples were immediately sieved through a 1 millimeter screen and all material retained on the screen was preserved with 10% buffered formalin. Samples were later rinsed of formalin and stored in 70% alcohol. Preserved animals were sorted into the following major taxonomic groups: Polychaeta, Arthropoda, Mollusca, and miscellaneous (e.g., echinoderms, nemerteans, sipunculans). Samples were then sent to taxonomic experts for further identification.

All animals were identified to the lowest possible taxonomic level, usually species. Identifications were performed by Jeff Cordell (Crustacea), Kathy Welch (Polychaeta), Allan Fukuyama (Mollusca), Valerie Hironaka and Allan Fukuyama (Echinodermata and misc.), and Phil Lambert (Holothuroidea). Quality assurance identifications were performed by Kevin Li (Crustacea), Eugene Ruff (Polychaeta), Susan Weeks (Mollusca), and Scott McEuen (Echinodermata and misc.).

Following identification, the data set was reviewed and some species were eliminated as they represented incidental catches (e.g., nematodes), were pelagic species (e.g., copepods), or were colonial organisms that could not be accurately quantified (e.g., bryozoans and ascidians). It should be noted that colonial organisms were included in the tabulated data as either present or absent but eliminated from the calculation of diversity and abundance indices.

2.6 Shellfish and Algae

The uptake of contaminants by marine organisms occurs through ingestion of food and detrital particles, water exchange at feeding and respiratory surfaces, and adsorption of chemicals onto body surfaces. These contaminants may be stored in skeletal material, concretions, and soft tissues (Kennish, 1998). Biological monitoring is a component of the County's ambient and point source monitoring programs, as contaminants may be bioaccumulated by shellfish and algae.

Clam tissues are monitored for organic and metal contaminants and bacteria (fecal coliform and enterococcus). These measurements provide an indication of potential impacts to both shellfish and to humans that consume them. Chlorinated organic compounds (chlorine atoms attached to organic compounds) have been used in pesticides since the 1940s and tend to accumulate in tissue with higher lipid concentrations. Percent lipids in shellfish are also monitored as this parameter affects the concentration of organic pollutants accumulated.

Algae are monitored for metals as it is well documented that algae absorb metals directly from seawater (Phillips, 1994; Hou and Yan, 1998). Algae are used as a biomonitor to assess metal concentrations in intertidal areas.

2.6.1 Shellfish and Algae Sampling Methods

Field Methods. The King County Environmental Services Section collected shellfish samples. Butter clams (*Saxidomus giganteus*) from each sampling station were collected by hand digging with shovels in the vicinity of siphon holes. A tarp was placed next to the digging site and excavated sediment was placed on the tarp to minimize disturbance to other organisms. The sediment was replaced after clams of sufficient size were removed. After the required number of clams were obtained, they were placed in four-liter glass jars, with the exception noted below, and stored on ice until delivered to the laboratory. A minimum of five butter clams between 60 to 120 millimeters were collected at each station for analyses of metal and organic parameters and composited into a single sample. A minimum of 10 butter clams were collected for the monthly microbiological analyses, then composited into a single sample. Clams that were collected for microbiological analyses were placed in clean, sealable bags rather than glass jars. A minimum of 130 grams of tissue was necessary for analysis.

Algae samples were collected by the King County Environmental Services Section. Algae samples, composed entirely of *Ulva fenestrata*, were collected and placed in 250 ml acid-washed plastic specimen cups and consisted of only attached healthy algae (i.e., discolored or free-floating algae were not collected). The sampling strategy is to collect only the most prevalent edible algae wherever possible, and there was sufficient *Ulva fenestrata* at all the sampling stations to adhere to this strategy. After the required amount of algae were obtained, the containers were stored on ice until delivered to the laboratory.

Laboratory Methods. Shellfish samples were processed at the King County Environmental Laboratory in accordance with PSEP recommended protocols (PSEP, 1996). Before the clams

were opened, the shells were rinsed with deionized water to remove sand and other material adhering to the shells. Each clam was measured and the lengths recorded. Tissues from each clam were removed with ceramic blade scalpels, composited with their liquor, and then homogenized with a blender equipped with stainless steel blades. Samples were frozen until analyzed with the exception of the sample portion removed for bacterial analysis. The fecal coliform and enterococcus analyses were initiated immediately following processing.

Algae samples were processed at the King County Environmental Laboratory. Algae were rinsed with deionized water to remove sand and other material adhering to the blades. Sample portions obtained for each station were processed in a blender equipped with titanium blades. Samples were then frozen until analyzed.

The King County Environmental Laboratory analyzed all shellfish and algae parameters. Methods and detection limits are provided in Table 2-6. With the exception of mercury, all metals were analyzed using ICP and/or ICP-MS depending upon detection limit requirements. Mercury was analyzed by cold-vapor atomic absorption spectroscopy. Semi-volatile organics were extracted with an organic solvent and then analyzed by GC/MS. Pesticides and PCBs were extracted with organic solvents and then analyzed using a GC equipped with an ECD. Bacteria samples were processed within eight hours of sample collection and analyzed by multiple-tube fermentation technique.

All samples were analyzed within their respective hold times and quality assurance/quality control procedures included the use of blanks, duplicates, and surrogates and spikes when appropriate. All data were reviewed by section supervisors prior to entry into the LIMS database.

Table 2-6. Laboratory Methods and Detection Limits for Shellfish and Algae

Parameter	Units	MDL	Method
Total Solids	%	0.005	SM2540-G
Total Lipids	%	0.1	KCEL OR 07-01-001
Metals, total, ICP	mg/kg	variable[1]	EPA 3050/6010
Mercury, total, CVAA	mg/kg	0.004	EPA 7471
Semivolatile Organics	μg/kg	variable[1]	SW 846 8270
Pesticides/PCBs	μg/kg	variable[1]	SW 846 8081/8082
Fecal Coliform Bacteria	MPN/100g	20	SM9221-E
Enterococcus Bacteria	MPN/100g	20	SM9230-B

[1]Detection limits vary with parameter analyzed. Detection limits for individual samples and analytes are provided in Appendices C and D.

2.7 Regulatory Standards

Regulatory standards and guidelines for water quality have historically focused on those parameters that are of concern to human health. As a result, monitoring programs and criteria were concerned with bacteriological characteristics of surface waters. The focus of water quality guidelines has since expanded to include the health of aquatic organisms, resulting from the widespread use of pesticides, industrial and commercial uses of the Seattle waterfront, and the overall increase in concerns about water quality in Puget Sound. Washington State has implemented wildlife-based water quality standards along with previously existing human health-based standards for surface waters.

Current marine sediment standards are derived from the Apparent Effects Threshold (AET) method (EPA, 1988). This method compares measured chemistry values with associated biological effect data to arrive at empirically-derived chemical concentrations that predict when adverse biological effects should occur. Chemical concentrations below the standard values are predicted to have "no adverse effect". The criteria for marine sediments were developed primarily to protect benthic invertebrates with the assumption that such criteria would also be protective of other species.

The use of bacterial indicators and water quality criteria is necessary in order to evaluate data obtained from monitoring programs. Water quality management decisions can then be based upon these findings. In addition to their use as assessment tools, environmental quality guidelines provide a basis for the development of site-specific water quality objectives for environmental contaminants. These guidelines may also be used to identify the need for source controls to reduce the input of contaminants into marine waters.

The Clean Water Act requires the States to adopt federal water quality criteria or promulgate their own standards which afford equal or better protection to receiving waters.

2.7.1 Washington State Standards for Water

Washington State currently has marine surface water quality standards for conventional pollutants and for some toxics (WAC 173-201A). These standards were derived for the protection of a variety of uses, including human health and the propagation and protection of fish, shellfish, and wildlife. Water quality standards for marine surface waters include, including conventional and toxic pollutants (which includes both acute and chronic values) are provided in Tables 2-7 and 2-8.

2.7.2 Washington State Standards for Fecal Coliform Bacteria

Washington State divides surface water uses into five classes: AA, A, B, C, and Lake. Bacteria concentrations in samples taken from marine waters for both the ambient and point source monitoring programs are compared with the Class AA marine water standard and freshwater samples are compared to the Class AA freshwater standard (Table 2-8).

Table 2-7. Washington State Marine Surface Water Quality Standards

Contaminant	Marine Water Quality Standard		Contaminant	Marine Water Quality Standard	
Trace Metals (µg/L)	**Acute**	**Chronic**	**Semivolatile Organic Compounds (µg/L)**	**Acute**	**Chronic**
Arsenic[a]	69.0	36.0	Pentachlorophenol	13.0	7.9
Cadmium [a]	42.0	9.3	Total PCBs	10.0	0.030
Chromium VI[a]	1100.0	50.0			
Copper [a]	4.8	3.1			
Lead [a]	210.0	8.1			
Mercury	1.8[a]	0.025[b]			
Nickel [a]	74.0	8.2	**Other (µg/L)**		
Selenium[a]	290	71.0			
Silver [a]	1.9	---	Ammonia [c] (mg/L)	0.233	0.035
Zinc [a]	90.0	81.0	Chlorine (residual)	13.0	7.5
			Cyanide (weak dissoc.)	1.0	---
Pesticides (µg/L)					
Aldrin/Dieldrin	0.71	0.0019			
Chlordane	0.09	0.004			
Chloropyrifos	0.011	0.0056			
DDT (and metabolites)	0.13	0.001			
Endosulfan	0.034	0.0087			
Endrin	0.037	0.0023			
Heptachlor	0.053	0.0036			
Lindane	0.16	---			
Toxaphene	0.21	0.0002			

[a] Criteria are based on the dissolved fraction of the metal.
[b] Criterion is based on the total recoverable fraction of the metal.
[c] Criterion is based on un-ionized ammonia.
Source: WAC 173-201a, November 18, 1997.

The state fecal coliform standards are expressed as geometric mean values. The reason for this is due to the high variability in fecal coliform counts, as bacteria tend to clump and adhere to particulates in water as well as multiply exponentially. Transforming the data using natural logarithms can reduce this variability. This reduces the apparent differences between very high and very low numbers and also simplifies plotting the data by numerically compensating for the exponential growth rate of bacteria. Sample results obtained from King County's monitoring programs are expressed as a moving geometric mean to facilitate comparisons with state bacteria

Table 2-8. Fecal Coliform Bacteria Standards (colonies/100 ml)

Class	Moving Geometric Mean[a]	Peak[b]	Comments
AA: Freshwater Marine	50 14	100 43	Exceptional quality suitable for water supply (domestic, industrial, and agricultural), stock watering, fish and shellfish, recreation, and wildlife habitat.
A: Freshwater Marine	100 14	200 43	Can be used for the same purpose as Class AA, but differs in the allowed maximum temperature, minimum level of dissolved oxygen, and pH.
B: Freshwater Marine	200 100	400 200	Listed as "good"; it can be used for industrial and agricultural water supply and secondary contact recreation.
C: Both	200	400	Listed as "fair"; it can be used for industrial water supply, fish migration, secondary contact recreation, commerce, and navigation.

[a] Geometric mean of the 30 most recent samples.

[b] Not more than 10 percent of the 30 most recent samples may exceed this value.

Source: WAC 173-201a, 1997; NSSP, 1995.

standards. This value is obtained by taking the geometric mean value for the 30 most recent samples as directed by the National Shellfish Sanitation Program guidelines for systematic random sampling. As well as the moving geometric mean standard, no more than 10 percent of the samples used to obtain the moving geometric mean value may exceed a defined upper limit. For the Class AA marine water standard this value is 43 colonies/100 ml and 100 colonies/100 ml for the freshwater Class AA standard.

Fecal coliform levels below the method detection limit (MDL) are reported as <MDL. In order to calculate geometric means, any value reported as <MDL was assumed to be one. The moving geometric mean is calculated by taking the results of the 30 most recent samples and applying the formula shown below. When a new value is determined, it becomes part of the moving mean and the oldest value is dropped.

Computing Geometric Means.

Each geometric mean is calculated by taking the sum of the natural logarithms of the sample values, dividing that number by the number of samples, and then taking the inverse natural logarithm. The formula is given below,

$$\text{geometric mean} = \text{antilog}\ \frac{1}{n} \Sigma \log Y$$

*where **n** equals the number of fecal coliform observations and **Y** equals an individual observation (colonies/100 ml).*

2.7.3 Washington State Standards for Sediment

Chemicals may occur in sediment as part of the natural environment and from atmospheric deposition, however, sediment may become contaminated by industrial and municipal discharges and non-point sources. Sediment quality guidelines provide a means of assessing sediment quality which leads to informed management decisions regarding sediments and overlying waters.

In 1991, Ecology promulgated the Sediment Management Standards (SMS) which contain numeric criteria for specific organic and metal compounds (Table 2-9). The standards specify, based on the best available knowledge, the levels of sediment contaminants at which no adverse effects to marine organisms are expected. These standards are derived from the Puget Sound Apparent Effects Thresholds (AETs) for selected compounds, which are based on biological testing results (EPA, 1988). Concentrations of compounds that do not exceed the SMS values are not expected to have long-term adverse effects on marine biological resources.

The standards for ionizable organic compounds and metals are presented on a dry weight basis (the wet weight concentration divided by the decimal fraction of the total solids value) while the nonionizable organic compounds are organic carbon normalized (the dry weight concentration in µg/Kg divided by the dry weight total organic carbon content in mg/Kg multiplied by 1000).

The presence of contaminants in sediment does not necessarily indicate that the sediment is toxic to marine organisms. An important factor to the toxicity of contaminants is how much of a toxic compound is available for uptake directly into an organism or accumulated through the food chain. In general, organic compounds, which make up the largest class of chemicals of concern, tend to become associated with the organic matter contained in sediments. The nonpolar, nonionizable organic compounds (such as chlorinated hydrocarbons, aromatic hydrocarbons, and phthalates) have a tendency to adhere to organic matter in water and sediments whereas substances that form ions (such as salts, acids, bases, phenols, and metals) are soluble and therefore dissolve in water.

Organic matter in sediment is a food source for many benthic organisms (organisms that live on or near bottom sediments). Too little organic matter will not support these organisms and too much will reduce the number and/or diversity of organisms due to natural toxic effects associated with enhanced microbial activity. The organic carbon content of sediments has been shown to be related to the bioavailability and toxicity of some organic compounds to aquatic organisms (Di Toro et al., 1991). The toxicity of organic compounds in sediments appears to be more closely correlated to the concentration of organic carbon in the sediments rather than the dry weight concentration. Thus, a more accurate measure of contaminant toxicity can be assessed if the data are "normalized" for the total organic carbon (TOC) content. For this reason, the State standards for nonionizable organics are based upon concentrations that have been TOC normalized (Michelson, 1992). Organic carbon normalization is achieved by dividing the dry weight concentration by the dry weight TOC content. However, when TOC values are very low (e.g. <0.2 %) it is not appropriate to normalize contaminant values, as even background levels may exceed regulatory standards. When the TOC content is less that 0.2%, dry weight values are more appropriate to use than organic carbon normalized values.

Table 2-9. Washington State Sediment Standards

Contaminant	Sediment Quality Standard	Lowest Apparent Effects Threshold
Metals	mg/kg dry weight	
Arsenic	57	
Cadmium	5.1	
Chromium	260	
Copper	390	
Lead	450	
Mercury	0.41	
Silver	6.1	
Zinc	410	
Nonionizable Organic Compounds	mg/kg organic carbon	µg/kg dry weight
Total LPAHs [a]	370	5200
Naphthalene	99	2100
Acenapthylene	66	1300
Acenapthene	16	500
Flourene	23	540
Phenanthrene	100	1500
Anthracene	220	960
2-Methylnaphthalene	38	670
Total HPAHs [b]	960	12000
Fluoranthene	160	1700
Pyrene	1000	2600
Benzo(*a*)anthracene	110	1300
Chrysene	110	1400
Total Benzofluoranthenes	230	3200
Benzo(*a)* pyrene	99	1600
Indeno(1,2,3-*c,d*)pyrene	34	600
Dibenzo(*a,h*)anthracene	12	230
Benzo(*g,h,i*)perylene	31	670

Contaminant	Sediment Quality Standard	Lowest Apparent Effects Threshold
Nonionizable Organic Compounds	mg/kg organic carbon	µg/kg dry weight
1,2-Dichlorobenzene	2.3	35
1,4-Dichlorobenzene	3.1	110
1,2,4-Trichlorobenzene	0.81	31
Hexachlorobenzene	0.38	22
Dimethyl phthalate	53	71
Diethyl phthalate	61	200
Di-n-butyl phthalate	220	1400
Butyl benzyl phthalate	4.9	63
Bis (2-ethylhexyl) phthalate	47	1300
Di-n-octyl phthalate	58	6200
Dibenzofuran	15	540
Hexachlorobutadiene	3.9	11
N-Nitrosodiphenylamine	11	28
Total PCBs	12	130
Ionizable Organic Compounds	mg/kg dry weight	
Phenol	0.42	
2-Methylphenol	0.063	
4-Methylphenol	0.67	
2,4-Dimethylphenol	0.029	
Pentachlorophenol	0.36	
Benzyl alcohol	0.057	
Benzoic acid	0.65	

[a] Represents the sum of the following low molecular weight PAHs: Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, and Anthracene.

[b] Represents the sum of the following high molecular weight PAHs: Fluoranthene, Pyrene, Chrysene, Benz(*a*)anthracene, Benzo(*a*)pyrene, total Benzofluoranthenes, Indeno(1,2,3-*c,d*)pyrene, Dibenzo(*a,h*)anthracene, and Benzo(*g,h,i*)perylene.

Source: Ecology, 1995

2.7.4 Standards for Biota

In addition to contaminants found in water and sediment, several contaminants have the potential to accumulate in the tissues of aquatic biota, such as fish and shellfish. Bioaccumulation in biota may affect not only the species directly accumulating the contaminants, but humans and other species that consume the affected species. Numerical tissue-residue guidelines provide a basis for assessing the hazards that tissue-laden contaminants pose to human health and wildlife, and therefore, a basis for regulating contaminant inputs into the environment. Ecology does not currently have tissue-residue standards, however, heavy metal concentrations in shellfish samples were compared with EPA guidelines.

SECTION 3
Summary of 2001 Monitoring Data

This section summarizes data from the ambient, point source, and MOSS monitoring programs collected in 2001. A total of 65 stations were sampled in 2001: 21 ambient, 30 point source, and 14 MOSS stations. Data collected at eight stations that were sampled for the ambient and point source programs were also used for the MOSS project; therefore, data from a total of 22 stations were used for the MOSS program in 2001. All data for stations monitored are presented in Appendices A through F. Station locator maps are provided in Section 2, along with specific station information such as matrix, parameters, and frequency measured. Also included in this section is a summary of 2001 precipitation data as pollutants, particularly bacteria, may enter nearshore and offshore waters following rainstorms.

A summary of the results for specific parameters (e.g., salinity, bacteria, metals) and matrices (e.g., water, sediment, shellfish tissue) are provided. A discussion of the results for the ambient, point source, and MOSS samples are combined in order to facilitate the interpretation of the data. Each matrix is discussed separately.

3.1 2001 Precipitation Data

Monthly total precipitation data for 2001 were obtained from the National Climatic Data Center and are shown in Figure 3-1. The rainfall totals were measured at the Sea-Tac International Airport station (station # 24233). The data do not include snow or ice pellet accumulations as the 30-year average does not include these data.

Comparing the total precipitation data for 2001 to the 30-year (yr) average (36.88 inches), precipitation in 2001 returned to normal levels (37.56 inches) following the lower than normal rainfall total in 2000. However, from January through March rainfall totals were lower than the both the 5-yr and 30-yr averages and only the above average amount of rainfall in June, August, and November brought the annual totals up to normal levels (Figure 3-1). This dry period in typically rainy months began in November 2000 and continued through March 2001, resulting in the second driest wet season in the last 107 years and emergency drought conditions being declared in some parts of the state. May, July, and September were the driest months in 2001 (accounting for less than 1 % of the annual total combined) in contrast to November, which had 9.26 inches of rainfall (accounting for 25 % of the annual total).

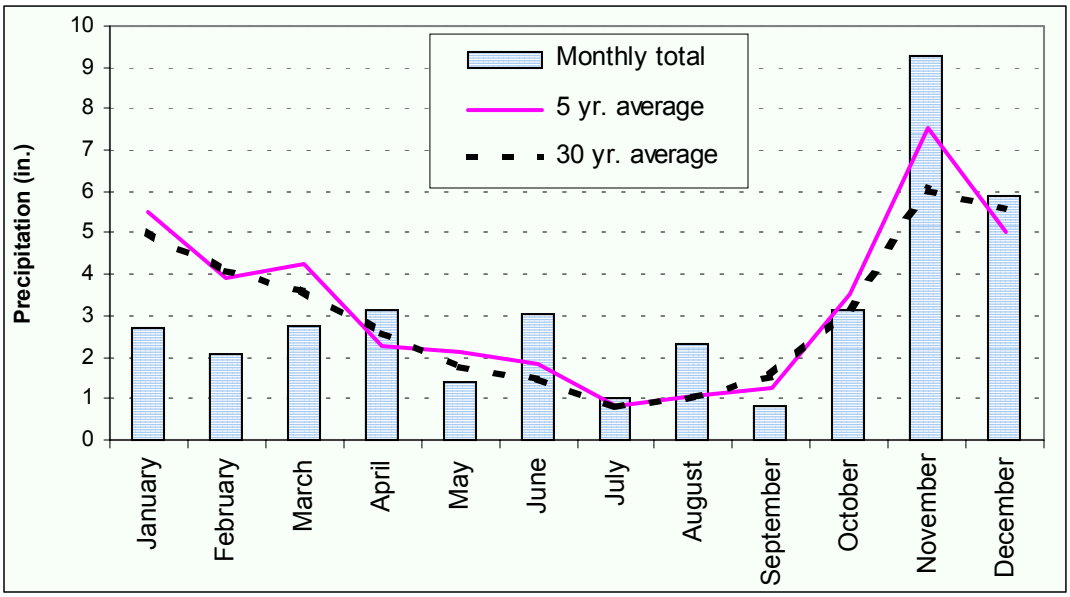


Figure 3-1. Monthly Precipitation for 2001

3.2 Water Column Data Results

Water column sampling is a large component of the County's water quality monitoring program and includes offshore, nearshore, and beach (intertidal) sites (see Figures 2-2 and 2-3). The monitoring program is structured to allow assessment of natural seasonal changes in the water column and also to identify anthropogenic inputs and influences.

Water quality parameters, including temperature, salinity, turbidity, dissolved oxygen, total suspended solids, Secchi disk transparency, light intensity, chlorophyll-*a*, pheophytin, photosynthetically active radiation, and nutrients (ammonia, nitrate+nitrite, silica, and total phosphorus) were measured at 17 offshore/nearshore stations in 2001. Temperature, salinity and nutrients were measured at 25 beach stations, 12 were MOSS sites, in 2001. Temperature, salinity and nutrients were also measured at the ambient and point source beach stations to obtain data to compare to MOSS beach stations. Dissolved metals were measured at 17 beach stations and total metals at 12 beach stations.

Bacteria (fecal coliform and enterococcus) were monitored at 29 beach stations and 17 offshore/nearshore stations in 2001. *E. coli* was also monitored at 10 offshore stations and at 12 beach stations in 2001. All water column data is provided in Appendix A.

3.2.1 Water Column Bacteria

Both fecal coliform and enterococcus bacteria were monitored at all water stations. *E. coli* was monitored at MOSS stations only. Data from the two freshwater stations (KTHA01 and KSRU02) are compared to freshwater bacteria standards and all other stations are compared to saltwater standards. Currently, Washington State marine Class AA fecal coliform standards for surface waters state that organism counts shall not exceed a geometric mean value of 14 colonies/100 ml and not more than 10 percent of the samples used to calculate the geometric mean may exceed 43 colonies/100 ml. Freshwater Class AA fecal coliform standards state that organism counts shall not exceed a geometric mean value of 50 colonies/100 ml and not more than 10 percent of the samples used for calculating the geometric mean may exceed 100 colonies/ 100 ml (WAC 173-201, 1997). King County uses results from the 30 most recent surface samples to obtain geometric mean values in accordance with guidelines from the National Shellfish Sanitation Program (NSSP, 1995). Surface samples are used as they tend to be the highest values and represents the area where most contact occurs with people and intertidal organisms. All marine waters within King County are classified as Class AA waters, with the exception of Elliott Bay which is classified as Class A. However, the Class A marine bacteria standards are the same as Class AA.

Offshore/Nearshore. All of the offshore/nearshore water column stations met Class AA fecal coliform water standards in 2001 with the exception of three stations located in inner Elliott Bay: LTEH02, LTBC41 and LTED04 (Figure 3-2; Tables 3-1 and 3-2). Fecal coliform counts at stations LTBC41 and LTED04 met the geometric mean but did not meet the peak standard, which is similar to results from previous years' sampling. For both these stations, 4 of the last 30 samples exceed 43 cfu/100 ml and exceedences of the peak standard occurred when rain fell prior to sampling. Station LTEH02 which is located along the Seattle waterfront exceeded both the geometric mean and the peak standards. For this station, 9 of the last 30 samples exceed 43 cfu/100 ml. These three stations receive higher freshwater input than other offshore/nearshore stations due to their proximity to the Duwamish River and runoff from storm drains in Elliott Bay.

Results from the MOSS stations, including the Admiralty Inlet and Possession Sound stations, were similar to other offshore stations, with low or no levels of fecal coliform bacteria detected. Fecal coliform bacteria in the water column near King County's treatment plant discharges were either not detected or present at low levels throughout most of the year. Figure 3-3 shows the concentrations of fecal coliform bacteria found at all offshore/nearshore stations in 2001, excluding the Lake Washington Ship Canal site, and Table 3-3 shows results by point source and ambient stations. For offshore stations, the highest concentrations are usually found at the surface. Starting in February 2000, only the surface depth was monitored at offshore/nearshore stations with the exception of all outfall stations (stations KSSK02, LSEP01, LSKQ06, CK200P, VO50E, and LTBC41). Depending upon the depth of the outfall sites, bacteria samples were collected from three to seven depths.

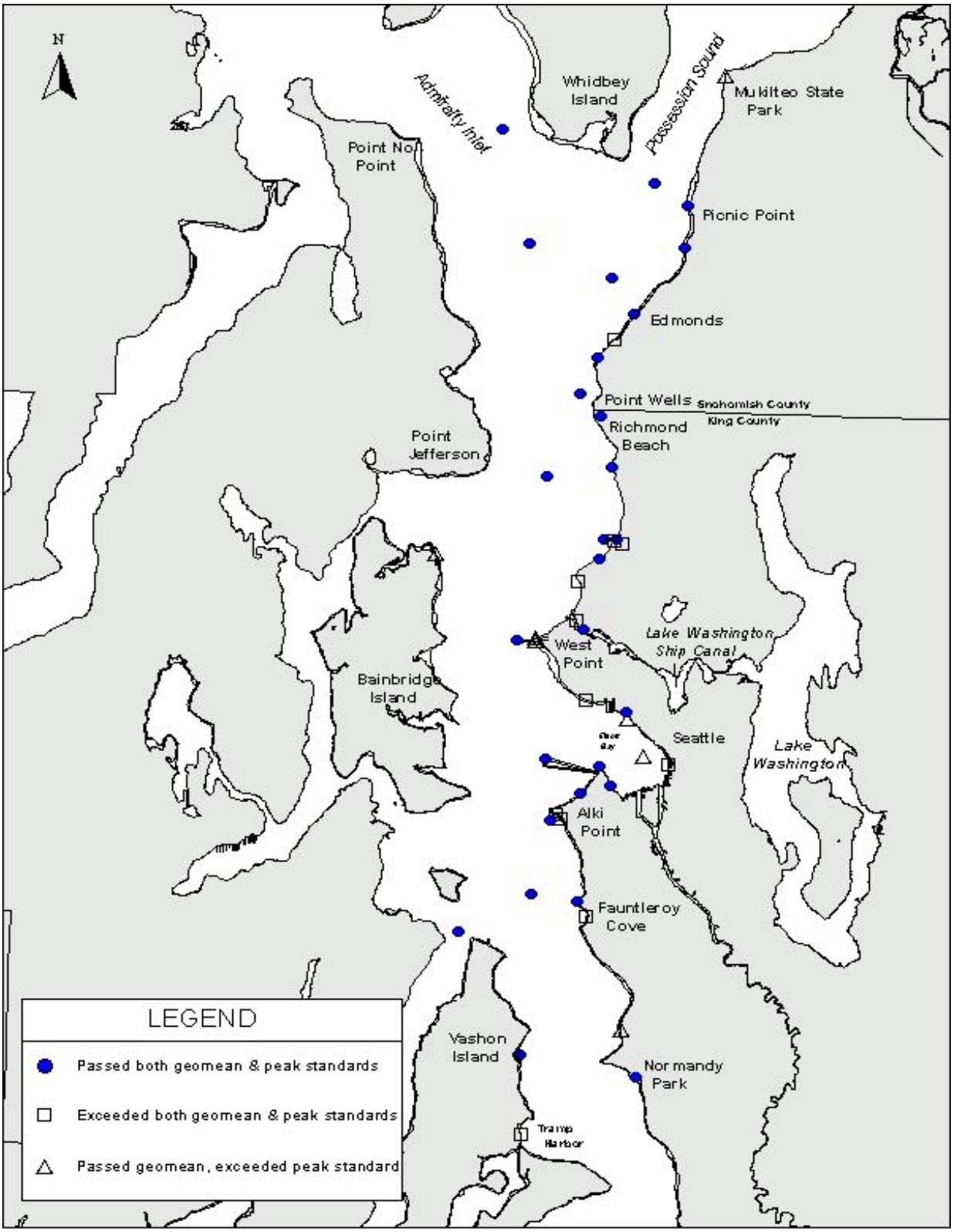


Figure 3-2. Fecal Coliform Results: Comparison With Standards

Table 3-1. 2001 Ambient & MOSS Stations--Fecal Coliform Bacteria

Station	Meets Class AA Marine Water Standards: Geometric mean (14 cfu/100 ml)	Meets Class AA Marine Water Standards: Peak [a] (43 cfu/100 ml)	Comments
Beach			
Stations north of Ship Canal			
JSVW04	Yes	Yes	3 of the last 30 samples are > 43 cfu/100 ml.
KSLU03	No	No	9 of the last 30 samples are > 43 cfu/100 ml.
KSQU01	No	No	7 of last 30 samples are > 43 cfu/100 ml. Near Ship Canal.
KRJY01	Yes	No	Sampled from May to October. 4 of last 30 samples >43 cfu/100 ml.
ITMUKILTSP [b]	No	Yes	Located at Mukilteo State Park. Only 10 samples.
ITPICNICPT [b]	Yes	Yes	Located at Picnic Point.
ITMEADOWBP [b]	Yes	Yes	Located at Meadowdale Beach Park.
ITOCEANAVE [b]	Yes	Yes	Located near Ocean Avenue-north of Brackett's Landing.
ITBRACKETT [b]	No	No	11 of 22 samples are > 43 cfu/100 ml.
ITEDWARDSPT [b]	Yes	Yes	Located at Edward's Point.
ITBOEINGCR [b]	Yes	Yes	Located near Boeing Creek.
ITCARKEEKP [b]	Yes	Yes	Located at Carkeek Park.
KTHA01 [c]	No	No	Freshwater Piper's Creek stn. 20 of last 30 samples >100 cfu/100ml.
KSJX02 [b]	Yes	Yes	Located near Blue Ridge.
Stations between Ship Canal and Alki Point			
KSYV02	No	No	7 of the last 30 samples are > 43 cfu/100 ml.
LTAB01	Yes	Yes	2 of the last 30 samples are > 43 cfu/100 ml.
LSGY01	Yes	Yes	Duwamish Head area
LSFX01	Yes	Yes	Seacrest Park area
LSHV01	Yes	Yes	Located north of Alki Point near Alki Drive.
Stations south of Alki Point			
LSVW01	No	No	18 of last 30 samples are >43 cfu/100 ml.
LSTU01	Yes	Yes	Near Lincloln Park.
MTEC01	Yes	No	Sampled May through October. 5 of last 30 samples >43 cfu/100ml.
MSSM05	No	No	Sampled May through October. 15 of last 30 samples >43 cfu/100ml.
MTLD03 [b]	Yes	Yes	Only 18 samples. 3 of 18 samples > 43 cfu/100 ml.
Offshore/Nearshore			
ADMIRALC14 [b]	Yes	Yes	Station is located in Admiralty Inlet.
POSSESSC14 [b]	Yes	Yes	Station is located in southern Possession Sound.
PtWells1 [b]	Yes	Yes	Station is located off Point Wells.
KSBP01	Yes	Yes	Station is between Carkeek Park and Jefferson Head.
KSRU02 [c]	Yes	Yes	Station is located in the Lake Washington Ship Canal.
LTEH02	No	No	Inner Elliott Bay stn. 9 of last 30 samples >43cfu/100ml.
LTED04	Yes	No	4 of the last 30 samples are > 43 cfu/100 ml.
LSNT01	Yes	Yes	Station is north of Vashon Island.
COLVOSPASS [b]	Yes	Yes	Station is located in northern Colvos Passage. Only sampled in Jan.
EDMDS-CTD2 [b]	Yes	Yes	Only 12 samples.
EDMDS-CTD4 [b]	Yes	Yes	Only 12 samples.

cfu = colony forming unit

[a] -- Not more than 10 percent of the 30 most recent samples may exceed this value.

[b] -- Geometric mean calculated with less than 30 samples.

[c] -- Station results are compared with Class AA freshwater standards which state the geometric mean value may not exceed 50 colonies/100ml and not more than 10 percent of the most 30 recent samples may exceed 100 colonies/100 ml.

Table 3-2. 2001 Point Source Monitoring--Fecal Coliform Bacteria

Station	Meets Class AA Marine Water Standards: Geometric mean (14 cfu/100 ml)	Meets Class AA Marine Water Standards: Peak [a] (43 cfu/100 ml)	Comments
Beach			
Carkeek Park			
KSHZ03	No	No	9 of last 30 samples are > 43 cfu/100 ml. Near mouth of Piper's Creek.
West Point			
KSSN04	Yes	No	North of West Point lighthouse. 5 of last 30 >43 cfu/100ml.
KSSN05	Yes	No	5 of last 30 samples are > 43 cfu/100 ml.
Alki			
LSKR01	No	No	8 of last 30 samples are > 43 cfu/100 ml.
LSKS01	No	No	17 of last 30 samples are > 43 cfu/100 ml.
Offshore/Nearshore			
Carkeek Park			
CK200P	Yes	Yes	Station near end of outfall pipe.
West Point			
KSSK02	Yes	Yes	Station near end of outfall pipe.
Denny Way			
LTBC41	Yes	No	4 of last 30 samples >43 cfu/100 ml.
Alki			
LSKQ06	Yes	Yes	Station is off the Alki TP outfall.
Vashon Island			
VO50E [c]	Yes	Yes	Station at end of Vashon Island TP outfall. Only 11 samples.
Outer Elliott Bay			
LSEP01	Yes	Yes	Station near end of north outfall pipe for South Plant.

cfu = colony forming unit

[a] -- Not more than 10 percent of the 30 most recent samples may exceed this value.

[b] -- Station results are compared with Class AA freshwater standards which state the geometric mean value may not exceed 50 colonies/100ml and not more than 10 percent of the most 30 recent samples may exceed 100 colonies/100 ml.

[c] -- Geometric mean calculated with less than 30 samples.

Enterococci bacteria were not detected in most of the samples analyzed for offshore/nearshore waters and 91 % of all samples were below 5 cfu/100 ml. Figure 3-4 shows enterococci counts for offshore/nearshore waters in 2001. As was seen with fecal coliform counts, the stations in Elliott Bay had higher values and were more frequently detected than other stations.

Escherichia coli (*E. coli*) samples were analyzed in surface waters for the MOSS stations. As with enterococcus and fecal coliform bacteria, *E. coli* was not detected in the majority of samples analyzed (78 % of all samples analyzed had no detectable levels) and there was no value above 20 cfu/100 ml. The ambient station off Point Jefferson, KSBP01, had the highest detected value in December. December tended to have detected values at most stations, and over an inch and half of rain fell prior to sampling. Figure 3-5 shows 2001 *E. coli* results for the MOSS offshore stations.

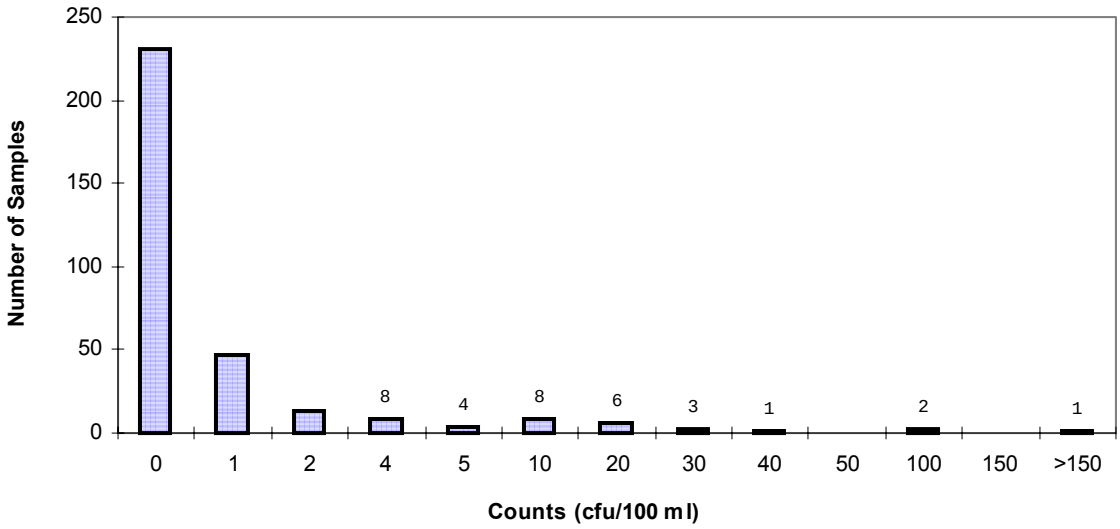


Figure 3-3. Fecal Coliform Bacteria at Offshore/Nearshore Stations in 2001

Table 3-3. Summary of Fecal Coliform Bacteria at Offshore/Nearshore Stations in 2001

	Range (cfu/100ml)			Station with	Rainfall amt. 3 days
	All Stations	Point Source	Ambient/MOSS	Highest Value	prior to sampling (in.)
January	0 - 5	0 - 5	0 - 2	LTBC41	0.08
February	0 - 9	0 - 4	0 - 9	LTED04	0.07
March	0 - 1	0 - 1	0 - 1	several	0.01
April	0 - 4	0 - 1	0 - 4	LTED04	0.47
May	0 - 2	0 - 2	0 - 1	LTBC41	0
June	0 - 2	0 - 1	0 - 2	LTED04	0
July	0 - 6	0 - 6	0 - 1	LTBC41	0.01
August	0 - 15	0 - 15	0 - 13	LTBC41	2.00
September	0 - 190	0 - 190	0 - 1	LTBC41	0
October	0 - 7	0 - 7	0 - 2	LTBC41	0.40
November	0 - 70	0 - 5	0 - 70	LTED04	0.80
December	0 - 70	0 - 3	0 - 70	LTED04	1.73

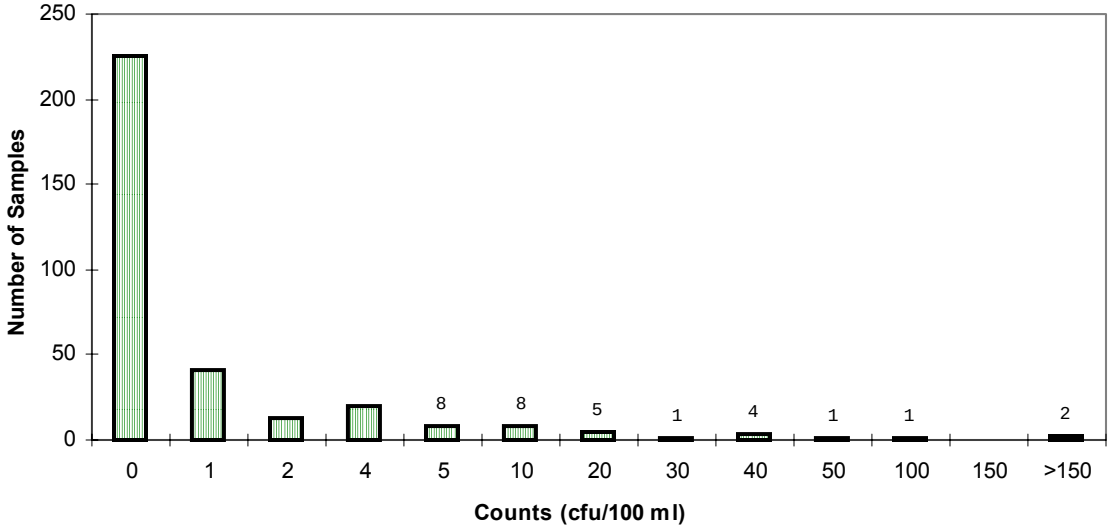


Figure 3-4. Enterococcus Bacteria at Offshore/Nearshore Stations in 2001

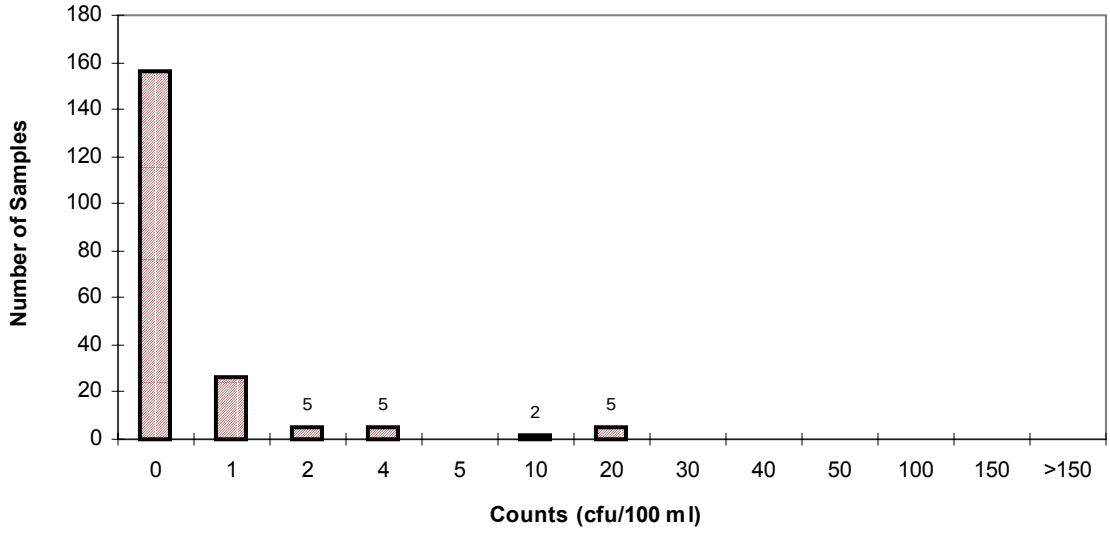


Figure 3-5. *E. coli* Bacteria at MOSS Offshore Stations in 2001

Beaches. Fecal coliform concentrations in water samples from beaches are influenced by freshwater runoff and by waterfowl congregating in these areas. As a result, the number of stations exceeding the Class AA marine surface water standards increased during high rainfall months and at stations close to streams and other freshwater sources (see Figure 3-2). Stations that are in areas with restricted water movement tend to retain freshwater for a longer period of time. As a result, inhibited water mixing causes these stations to exceed standards more frequently than stations with good tidal mixing. Stations near the mouth of the Lake Washington Ship Canal (KSQU01), Carkeek Park (KSHZ03), in Piper's Creek (KTHA01), Fauntleroy Cove (LSVW01), Tramp Harbor (MSSM05), and Golden Gardens (KSLU03) have consistently failed fecal coliform standards for the last several years. Sampling at one of the MOSS beach stations at Brackett's Landing (ITBRACKETT) began in 2000 and had a total of 22 samples collected (usually 30 samples are used to calculate the geometric mean). This station failed both the geometric mean and the peak standards and 11 of the 22 samples collected (50 %) were over 43 cfu/100 mls.

Stations with the lowest fecal coliform counts were located near Seacrest Park, Duwamish Head, the north side of Alki Point, Seahurst Park, Fay Bainbridge State Park, and Lincoln Park. Bacteria levels at these stations have consistently been low over the past several years. All the MOSS beach stations met both the geometric mean and peak standards, with the exception of the Brackett's Landing station, which failed both standards, and the Mukilteo State Park (ITMUKILTSP) station which failed the geometric mean standard (see Table 3-1). The geometric means for the MOSS stations were calculated with less than 30 samples. Only 10 samples were collected at the Mukilteo State Park station and a single fecal coliform result of 1,500 cfu/100ml in May caused this station to fail both standards. All other results from this station ranged from 5 to 40 cfu/100 ml. Geometric means from all MOSS stations ranged between 4 and 11 cfu/100ml, with the exception of the Mukilteo State Park station (21 cfu/100 ml) and the Brackett's Landing station (47 cfu/100 ml). Figure 3-6 shows the range of values for all beach stations and the frequency detected.

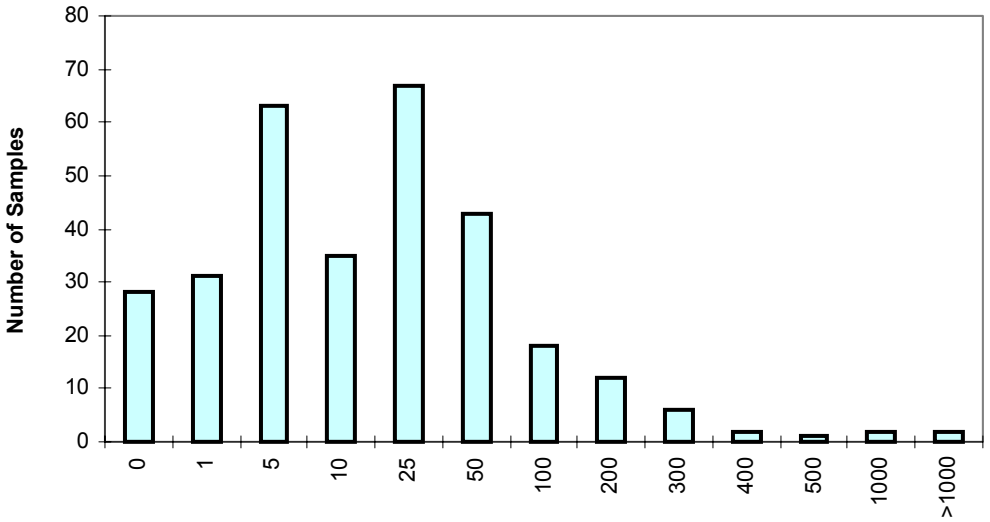


Figure 3-6. Fecal Coliform Results for All Beach Stations (cfu/100 ml)

There are two stations that have been sampled for several years in the Carkeek Park area. One station, KSHZ03, is located at the beach close to the outflow of Piper's Creek, and the other station is located in Piper's Creek itself (KTHA01), upstream of the Carkeek CSO treatment plant facility. Fecal coliform bacteria at these two stations have consistently failed standards for the past several years. Additional sampling at Carkeek Park began for the MOSS project in 2000 and a beach station was placed outside the freshwater influence of Piper's Creek. Bacteria levels at this station (ITCARKEEKP) are consistently low and pass standards, indicating the bacteria at station KSHZ03 is likely due to bacteria from Piper's Creek. Figure 3-7 shows fecal coliform levels for these three stations.

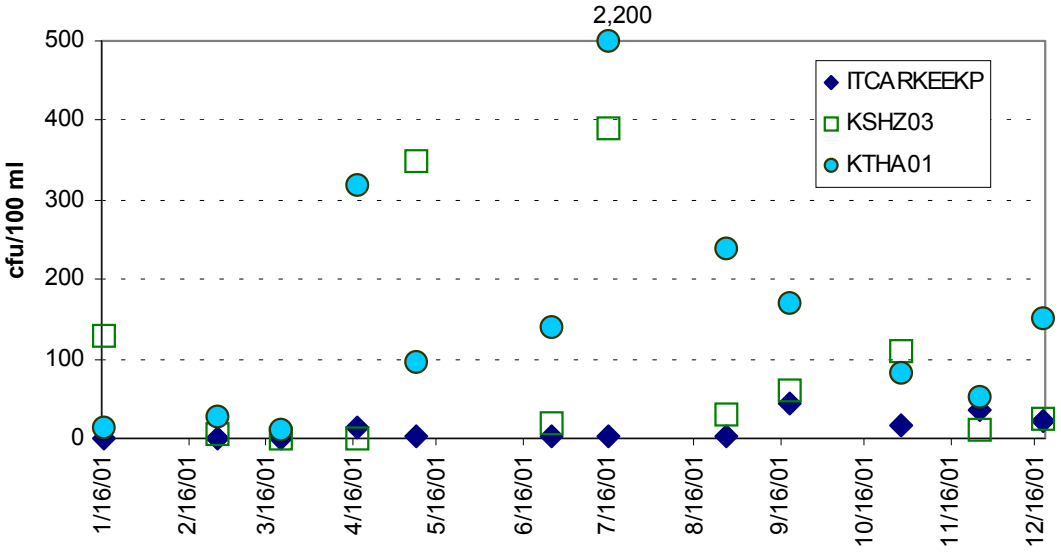


Figure 3-7. Fecal Coliform Results for Carkeek Park Stations (cfu/100 ml)

Enterococci counts at beach stations varied from station to station and from month to month. Values were generally higher in the rainy months, but did not consistently correlate with rainfall. Throughout the year, enterococci counts were lowest at the ITCARKEEKP, ITOCEANAVE, LSGY01, and ITMEADOWBP stations. Counts were highest at the following stations: LSVW01, LTEH02, ITBRACKETT, KSLU03, and KSYV02. Figure 3-8 shows the range of enterococci bacteria detected at beach stations and frequency detected. As noted in the past, enterococcus bacteria counts did not generally show a correspondence with fecal coliform levels. Fecal coliform and enterococcus bacteria results from samples collected concurrently at station LSVW01 are shown in Figure 3-9 and are typical of results at other stations.

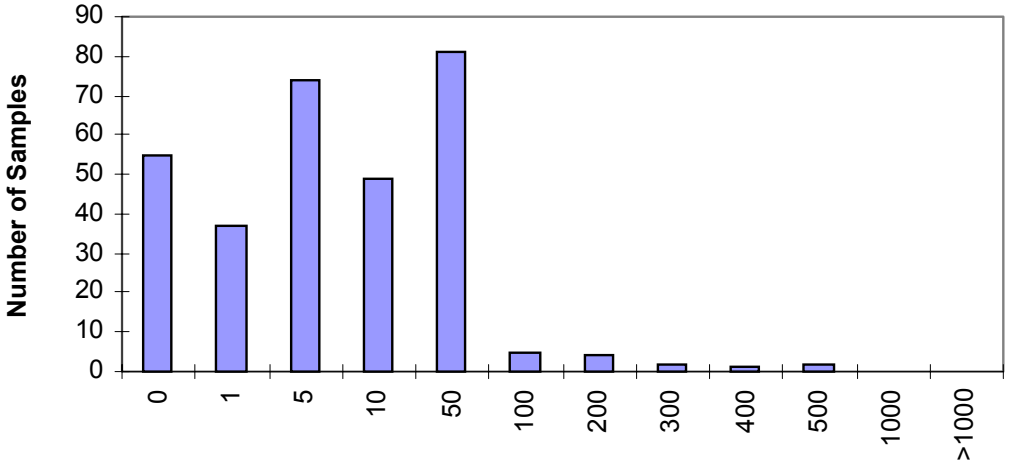


Figure 3-8. Enterococci Bacteria Counts at All Beach Stations and Frequency Detected (cfu/100 ml)

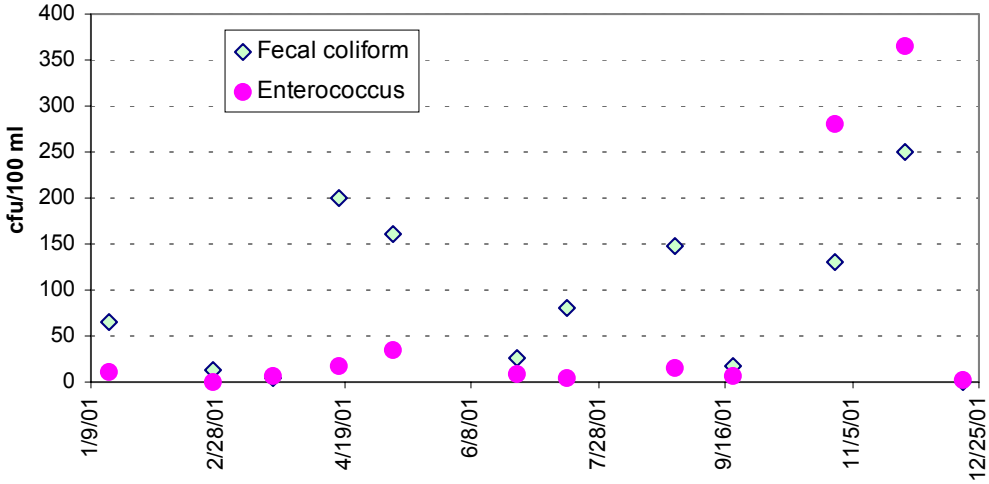


Figure 3-9. Enterococci and Fecal Coliform Bacteria Counts at Station LSVW01 Sampled Concurrently (cfu/100 ml)

Escherichia coli (*E. coli*) was sampled for the MOSS project at 12 beaches. As seen with the other bacteria monitored, values varied between stations and from month to month. Figure 3-10 shows the range of values and frequency detected for all the sites. The highest single count of 1,400 cfu/100 ml was found in waters at Edwards Point in January. Based upon a yearly average, the Mukilteo State Park and Edwards Point stations had the highest counts averaging 133 and 127 cfu/100 ml, respectively, and Meadowdale Beach Park had the lowest average count

(6 cfu/100 ml). For all stations combined, the median *E. coli* value was 10 cfu/100 ml and 50 % of all samples were 10 cfu/100 ml or less. Just over 67 % of all values were 20 cfu/100 ml or less and only a small portion (0.06 %) of all values were over 100 cfu/100 ml.

While fecal coliform and enterococcus bacteria counts do not appear to be correlated, *E. coli* and fecal coliform bacteria show a similarity when sampled concurrently. When fecal coliform counts are elevated, *E. coli* counts are also elevated whereas enterococcus values may be quite low. Both *E. coli* and fecal coliform bacteria are members of the same bacterial group (coliforms) while enterococcus is a member of the fecal streptococcus group. Figure 3-11 shows the relationship between *E. coli* and fecal coliform measurements.

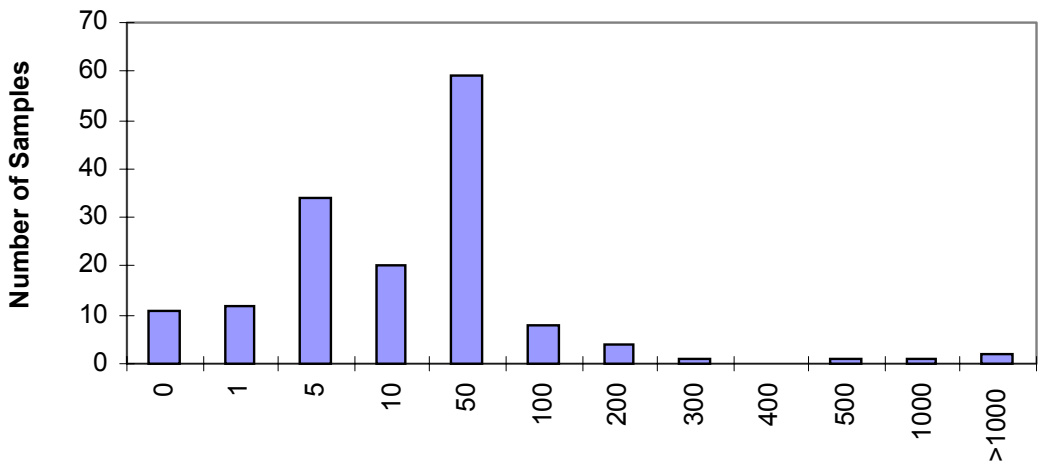


Figure 3-10. *E. coli* Bacteria Counts at MOSS Beach Stations and Frequency Detected (cfu/100 ml)

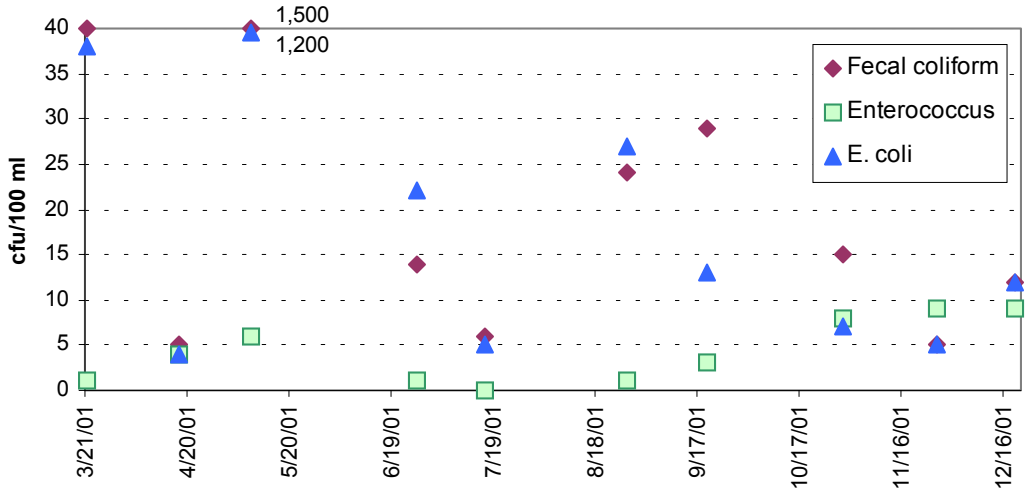


Figure 3-11. Bacteria Counts at Station ITMUKILTSP (cfu/100 ml)

3.2.2 Water Temperature

Temperature profiles were created from measurements taken at varying depths in the water column. Measurements were taken at depths ranging from one meter below the surface up to 205 meters, depending on the sampling station. At offshore stations, temperatures ranged from 7.8 to 14.1 °C, with higher temperatures occurring at shallower depths during the summer season. The mean temperature throughout the entire year for all depths was 10.1 °C. Temperature variations during the winter and early spring months were slight, particularly at deeper depths. Surface temperatures varied more than other depths sampled due to weather influences such as air temperature, cloud cover, wind, and solar radiation. The water column exhibited seasonal thermal stratification in May that continued through June and then started to decrease in July. By August, the water column was once again well mixed. Figures 3-12 shows temperature profiles at six selected stations that are representative of the patterns seen at other stations sampled. The graphs show a well-mixed water column throughout much of the year and at deeper depths even when seasonal stratification is present.

Temperatures at beach stations ranged from 6.6 to 23 °C. However, the 23 °C measurement taken at Normandy park (MTLD03) in July, is unusual. Excluding this data point, the maximum measured temperature is 16.6 °C. As shown, in Figure 3-13, this 10 degree temperature range 6.6 to 16.6 °C reflects the variation in recorded temperatures across all beach locations. As expected, seasonal variation in temperatures is apparent with the minimums occurring in January and December, and warming in the summer to the maximums in July to September. A time-lag of approximately one month was noted in peak temperatures between the beach and offshore stations with temperatures peaking in June for offshore stations and July for most beach stations.

3.2.3 Salinity and Density

Salinity measurements on the Practical Salinity Scale (PSS) were collected throughout the water column at each station. Generally, measurements were taken at depths ranging from 1 to 205 m depending on the depth of the station. Salinities from up to seven discrete depths are provided in Appendix A and a summary is described below. At offshore stations, with the exception of station KSRU02, salinities ranged from 18.4 (Station LTAB01) to 30.5 (station KSSN04) PSS. Station KSRU02 is located in the Lake Washington Ship Canal west of the Ballard Locks. Thus, this location is influenced by the operation of the Ballard Locks and freshwater flows from Lake Washington. Salinities at this site ranged from 2.1 to 24.4 PSS and varied dependent upon the tidal cycle when sampling occurred and operation of the Ballard Locks.

Overall, salinities varied due to seasonal influences, as shown in the salinity profiles in Figure 3-14. Results from 2001, parallel those of previous years (1999, 2000). Salinities were lowest in surface water layers when freshwater inputs were highest. The two inner Elliott Bay stations (LTBC41 and LTED04) had lower salinities at the surface throughout the year, which is attributed the freshwater flow from the Duwamish River. The lowest salinities 24.7 to 26 PSS

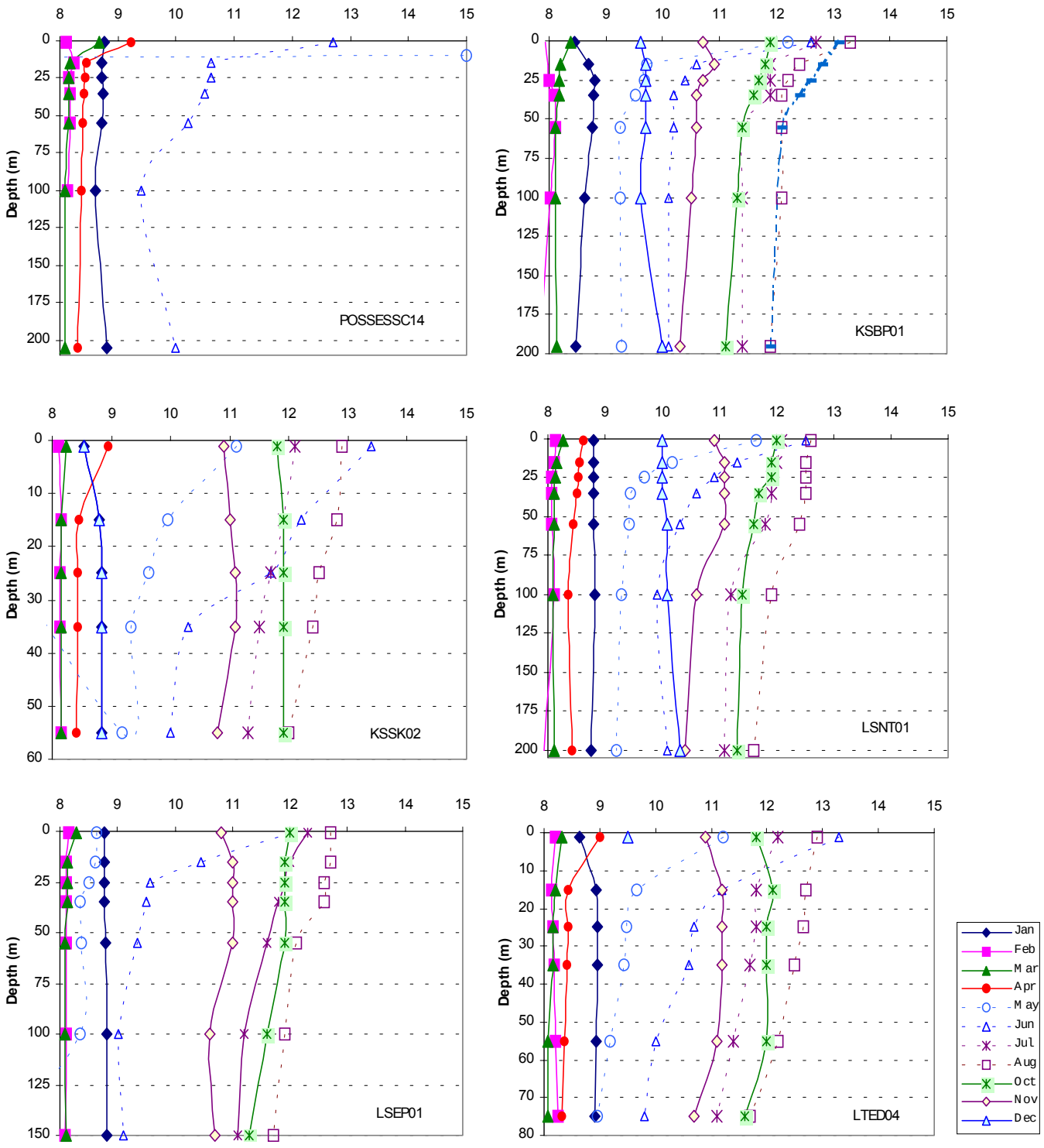


Figure 3-12. Water Temperature (°C) at Six Stations in 2001

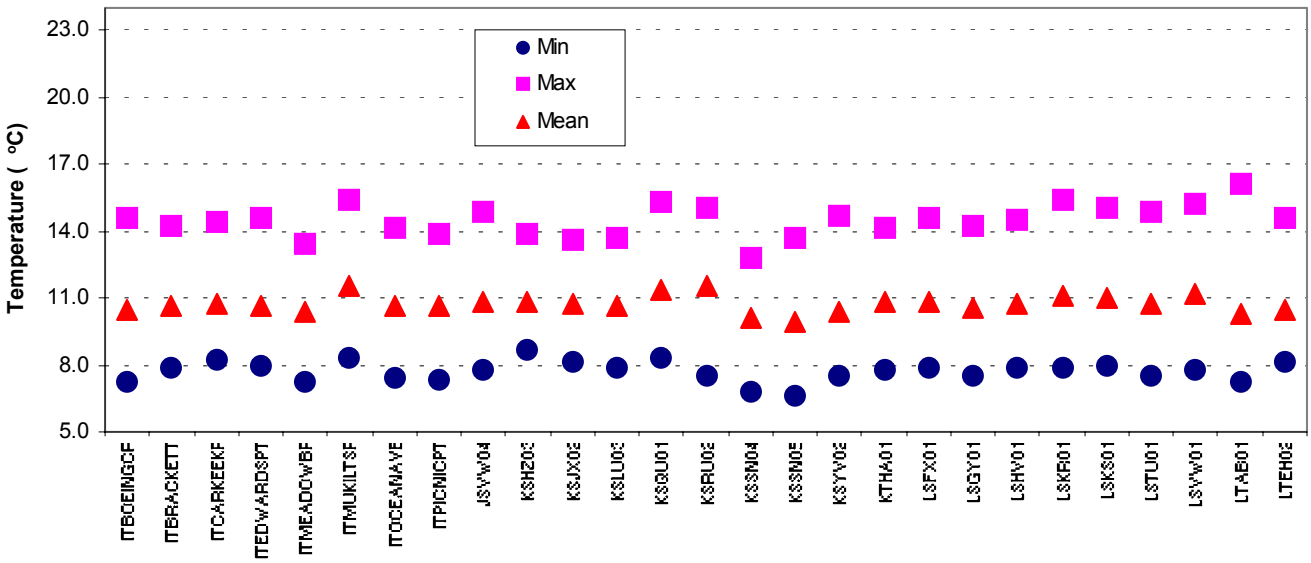


Figure 3-13. Water Temperature at Beach Stations in 2001

were in the surface layer of the Admiralty Inlet and Possession Sound stations. (ADMIRALC14 and POSSESSC14). These relatively lower salinities may be attributed to freshwater flow from the Skagit, Stillaguamish, and Snohomish Rivers in Possession Sound. Apart from the surface layer, there was little variability in salinities over the depth profile from 15 to 205 meters, indicating a well-mixed water column. Generally, salinities were highest from September to December which may attributed to an increased input of saltier deep oceanic water from upwelling on the outer coast during late summer and a decrease in freshwater input from rivers and runoff.

Salinities at beach stations ranged from 18.35 to 30.70 (mean = 28.28) PSS in 2001. Salinities were lower at stations that were near a freshwater source, such as the Lake Washington Ship Canal and Possession Sound. The influence of riverine input to Possession Sound was particularly evident at the northern stations. Stations ITMUKILTSP (Mukilteo State Park) and ITPICNICPT (Picnic Point) had lower salinities during the rainy months and the Mukilteo station exhibited a year-round freshwater influence. There was no notable difference between stations from north to south other than proximity to a freshwater source.

Water density is a function of both temperature and salinity, with density tending to increase with higher salinity and lower temperature. Density variations within the water column affects vertical mixing, and therefore has the potential to affect the concentration of substances dissolved in the water column at differing depths. Figures 3-15 show the density profiles of six

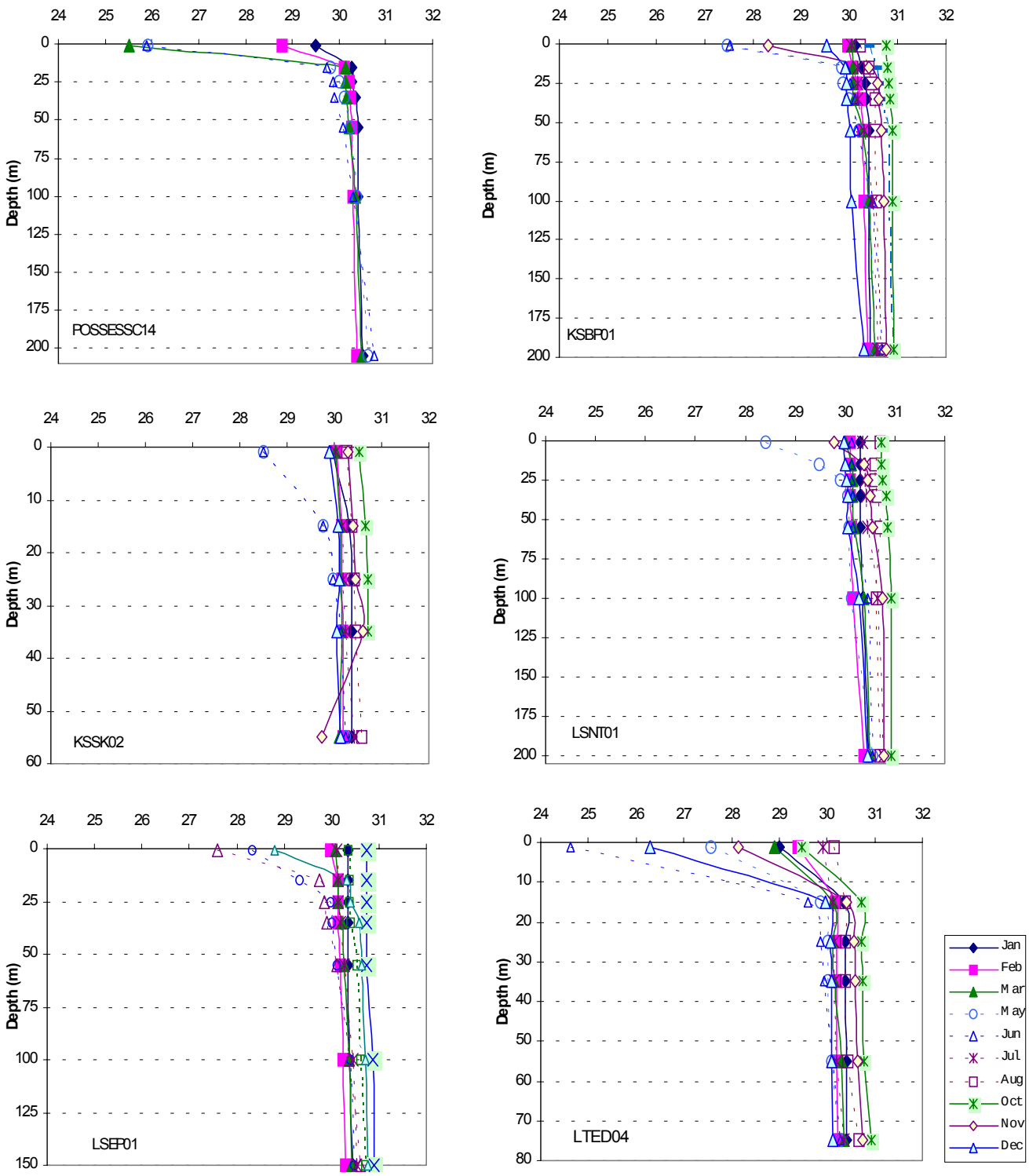


Figure 3-14. Salinity (PSS) at Six Stations in 2001

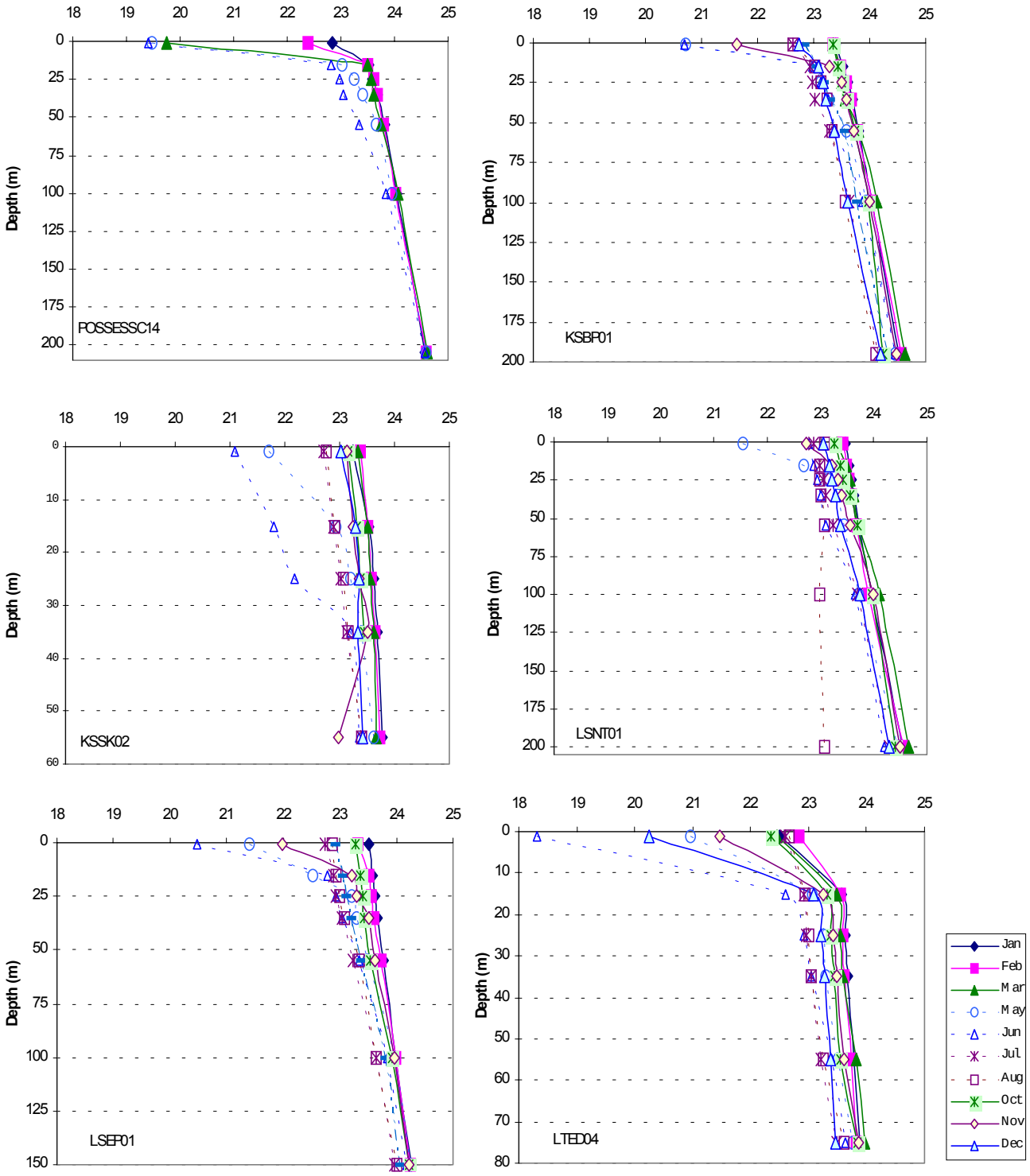


Figure 3-15. Density (sigma-t) at Six Stations in 2001

offshore stations that are representative of the other stations sampled. At depths greater than 25 m, there was relatively little variation in density with the exception of sites KSSK02 and LSNT01. Stations in Possession Sound and Admiralty Inlet showed lower densities in the months with relatively high freshwater flows in area rivers, particularly in May and June.

3.2.4 Dissolved Oxygen

Dissolved oxygen was measured throughout the water column depending upon the depth of the station. Dissolved oxygen values from up to seven discrete water depths ranging from 1 to 205 m are provided in Appendix A and are discussed below. Concentrations at all offshore stations and depths sampled in 2001 ranged from 5.1 to 14.1 mg/L, with a mean of 7.8 mg/L. These values are similar to results from previous years' sampling. As shown in Figure 3-16, concentrations generally declined with depth up to approximately 50 meters, but remained relatively constant at greater depths. For surface values at offshore stations, the mean concentration was 8.7 mg/L, compared with a mean of 6.95 mg/L at a depth of 200 meters.

Between late July and December, most measurements were below 7.0 mg/L at all depths and stations. The remainder of the year showed average measurements between 8 and 9 mg/L. This seasonal variation is reflected in Figure 3-17, which appears to show a bimodal distribution of dissolved oxygen concentrations. Dissolved oxygen concentrations below 7.0 mg/L naturally occur in the late summer and fall as a result of a seasonal influx of deep oceanic water, which has lower concentrations of dissolved oxygen. Both the lowest and highest reported concentrations occurred at station LTED04 in inner Elliot Bay, with a minimum of 5.1 mg/L at the surface layer, and a maximum of 14.1 mg/L at the deepest depth sampled (75 m). This site showed relatively high variability with a standard deviation of 1.7, and a mean of 7.6 mg/L. Ecology uses 5.0 mg/L as an indicator of problems associated with low dissolved oxygen that might occur (Ecology, 1998). None of the measurements taken in 2001 were below this level.

Dissolved oxygen was measured at nine of the MOSS beach stations from April to December. Values ranged from 1.8 to 14.1 mg/L with a mean of 8.9 mg/L. In July, with the exception of the Boeing Creek (ITBOEINGCR) and Carkeek Park (ITCARKEEKP) stations, all dissolved oxygen values were below 3.1 mg/L and a low of 1.8 mg/L was recorded for that month at the Brackett's Landing station (ITBRACKETT). It is possible that the presence of macroalgae caused a decrease in oxygen due to decay of some plants and a canopy effect from heavy growth in July. Nutrients were also the lowest in July at beach stations which suggests heavy algae growth. The higher dissolved oxygen levels at the ITBOEINGCR and ITCARKEEKP stations in July may be due to freshwater mixing at these sites (indicated by comparably high silica levels) and also minimal amounts of algae compared to most of the other sites. Figure 3-18 shows dissolved oxygen concentrations for the beach stations.

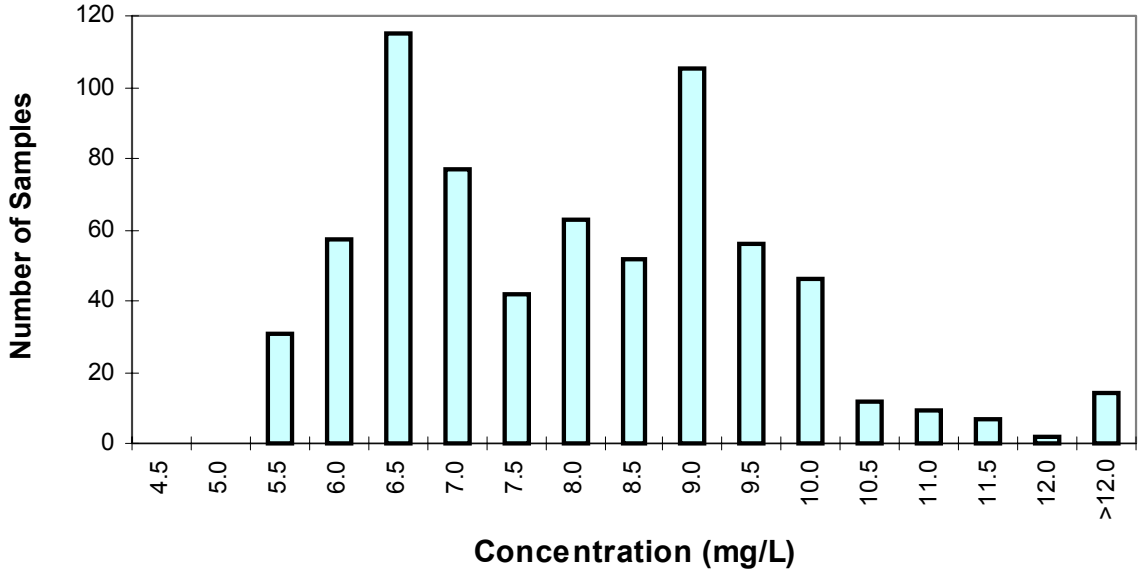


Figure 3-16. Dissolved Oxygen Values at Offshore Stations, All Depths

3.2.5 Transparency and Light Intensity

Secchi disk transparency measurements provide an indication of water clarity; the higher the value, the clearer the water. Secchi disk values ranged from 1.5 to 14 m for all offshore stations in 2001. There was no difference in transparency between ambient and point source stations. The lowest values were observed during months with phytoplankton blooms, such as May. Secchi values were higher in the fall and winter months and at stations that are located in the central portion of the Main Basin, such as KSBP01 and LSNT01, compared to stations that are closer to shore. Although the Possession Sound station was only sampled from January through June, this site had the lowest observed transparencies throughout the six month period. The Admiralty Inlet stations also had low transparencies. Both of these stations are more affected by freshwater input from the Skagit and Snohomish Rivers, as well as wind and waves, than other stations sampled.

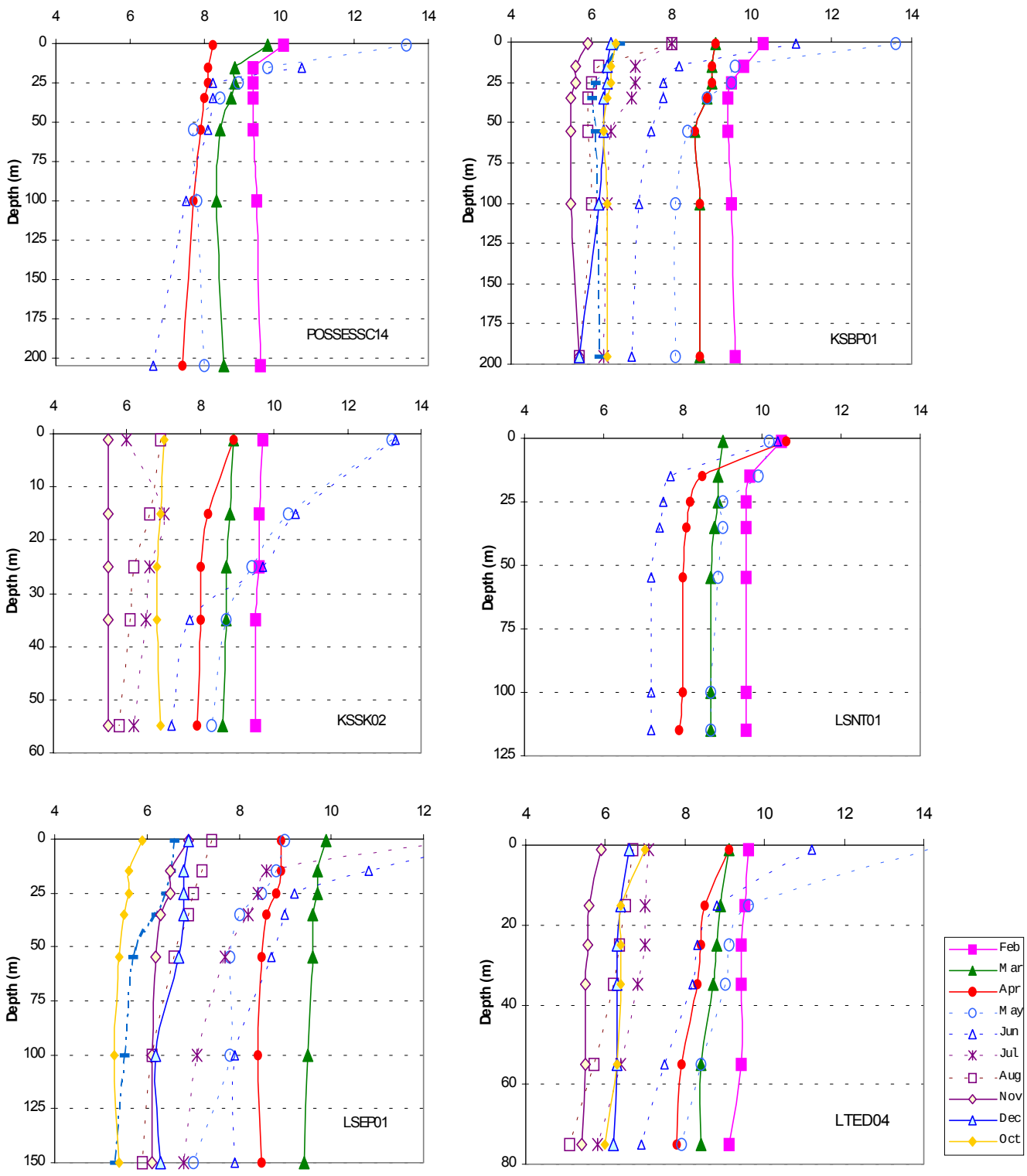


Figure 3-17. Dissolved Oxygen (mg/L) at Six Stations in 2001

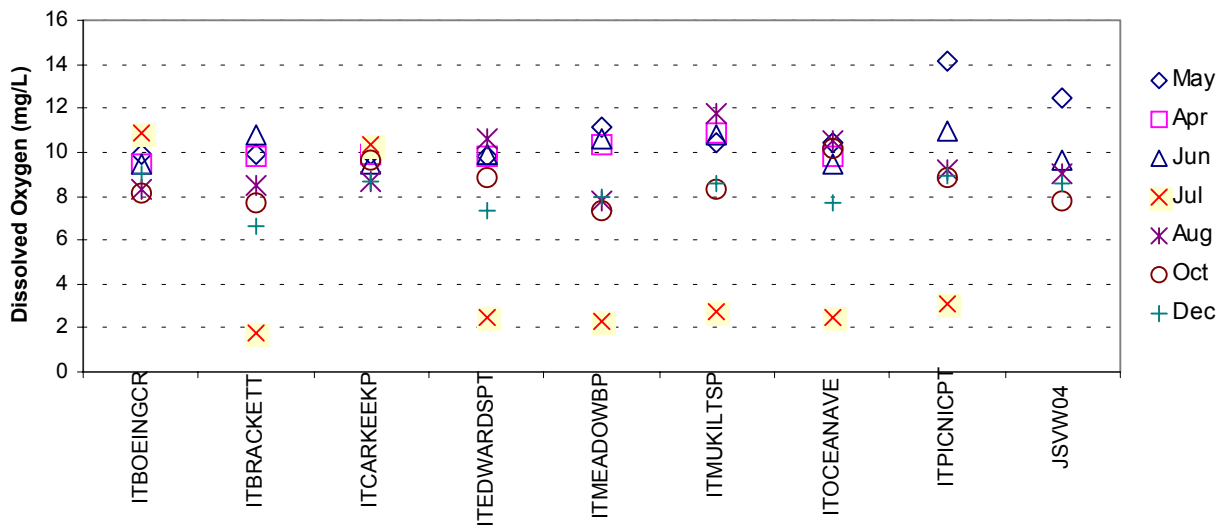


Figure 3-18. Dissolved Oxygen Values at MOSS Beach Stations

Turbidity

Turbidity is also a measure of water clarity but differs from Secchi disk measurement in that it is an expression of the water's optical property that causes light to be scattered and absorbed. Both suspended and dissolved solids (including detritus, plankton, and particulates), wind, and waves can affect the water's optical properties resulting in high turbidity values. The lower the value, the clearer the water. In 2001, turbidity values ranged from less than 0.5 to 6 FTU. The highest turbidity values were seen both at the surface and bottom depths at each station. December and January had the highest turbidity values which is similar to past years' results. Due to problems with the instrument and the need to utilize space on the CTD for other sensors, there were few turbidity measurements collected in 2001.

Photosynthetically Active Radiation

Photosynthetically active radiation (PAR), also expressed as light intensity, is a measure of the amount of light which is available to macrophytes and phytoplankton for photosynthesis. Only wavelengths that plants use for photosynthesis (from 400 to 700 nanometers) are measured for this parameter. Light intensity values for offshore stations ranged from 0 to 100 % of the surface light available. As would be expected, the greatest amount of light was available at and near the surface for all stations. The light levels drop rapidly with depth and indicate that less than one percent of light is available at 35 m for any given month. For all stations combined throughout the year, 62% of light is available at the 1 m depth and only 2% at the 15 m depth.

3.2.6 Nutrients

Nitrogen compounds

Nitrogen is ubiquitous in the marine environment and occurs in several chemical forms. These include inorganic forms such as ammonia, nitrate, and nitrite, with nitrate being predominant. The analytical method used by King County does not differentiate between nitrite and nitrate, therefore, these are reported as a single value as nitrate + nitrite. Nitrite concentrations in the water column are naturally very low and the contribution nitrite to the total values is usually minimal. Discussion of the nitrogen compounds is provided below.

Ammonia. Ammonia concentrations at all offshore stations ranged from less than the MDL of 0.01 mg/L to 0.28 mg/L. The maximum concentration was detected at the West Point TP outfall station (KSSK02). The mean concentration for all stations and depths was 0.024 mg/L, using the conservative strategy of considering all data reported as less than the MDL as actual concentrations of 0.01 mg/L. Therefore, this mean could be an overestimate and the true mean somewhat less than this value. Higher concentrations tended to occur at deeper depths, which reflects the decay of organic nitrogen from phytoplankton occurring in the summer months. The highest ammonia concentrations corresponded to high phytoplankton concentrations. Figure 3-19 shows ammonia profiles for six stations that are reflective of the patterns seen at other stations. Results for 2001 are similar to those reported in 1999 and 2000 (King County, 2001). Only 8 of 790 measurements for ammonia were above 0.1 mg/L. Seven of the eight values, ranging from 0.11 to 0.28 mg/L, were measured at the West Point TP outfall station and the eighth was measured at the South TP outfall station. The highest ammonia values detected at station KSSK02 were all noted for the deepest depth sampled (55 m) and the one value over 0.1 mg/L at the South TP station (LSEP01) was also noted at the deepest depth sampled (150 m). The highest values for both outfall stations were detected in June. For station LSEP01 in June, all depths monitored with the exception of the deepest depth had ammonia levels below 0.04 mg/L. For station KSSK02 in June, the 1 to 25 m depths had ammonia concentrations 0.01 mg/L or below.

Washington State ammonia criteria for marine surface waters are based upon un-ionized ammonia. However, for total ammonia which is measured by King County, the State uses U.S. EPA's criteria concentrations which are based upon total ammonia. These total ammonia criteria are based on temperature, salinity, and pH of the water. Using a temperature of 15 ^{o}C, a salinity of 30 PSS, and a pH of 8.0, all ammonia concentrations measured for offshore stations were well below the 1.6 mg/L chronic criterion. The highest measured concentration was almost six times lower than the criterion.

Ammonia concentrations at beach stations ranged from less than the MDL (0.01 mg/L) to 0.24 mg/L at KSJX02. The mean concentration for all stations, assuming, 0.01 mg/L for values reported less than the MDL, was 0.025 mg/L. The highest reported concentrations were 0.24 (KSJX02) and 0.18 mg/L (LTAB01). Excluding these two sites, all other concentrations were below 0.08 mg/L. Figure 3-20 shows the ranges of concentrations measured at beach stations in

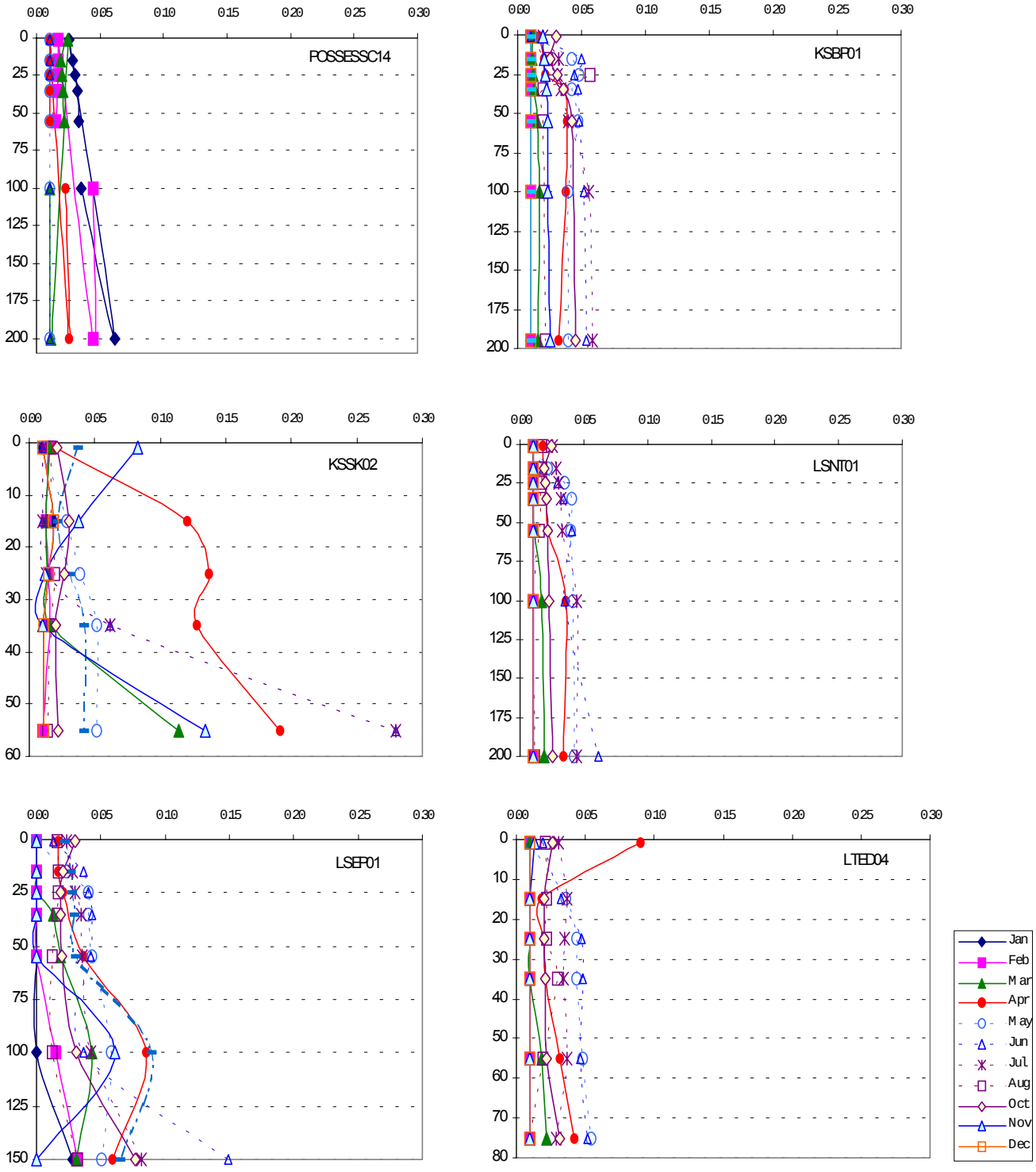


Figure 3-19. Ammonia (mg/L) Concentrations at Six Stations in 2001

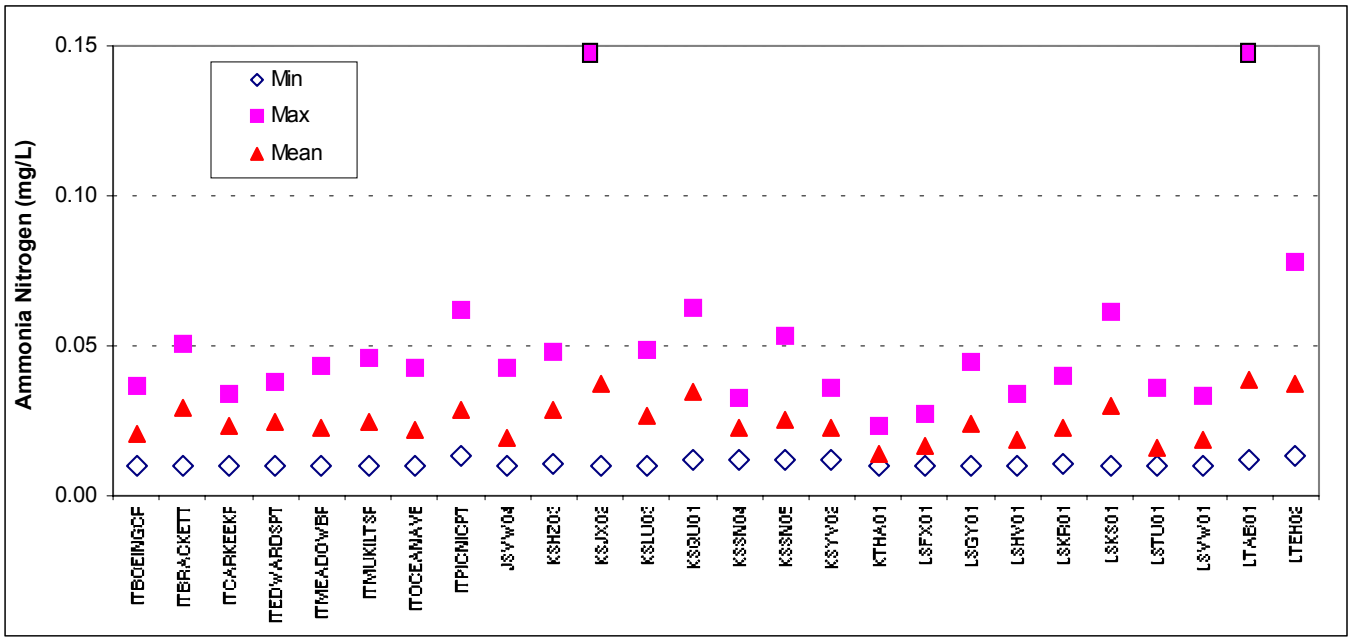


Figure 3-20. Ammonia Concentrations at Beach Stations in 2001

2001. The highest concentrations at beach stations generally occurred in summer and autumn months and lowest concentrations in the winter months, similar to what was observed at offshore stations. Using a temperature of 15 ^{o}C, a salinity of 30 PSS, and a pH of 8.0 (the mean pH at beach stations as discussed below in the pH section), all ammonia concentrations measured for beach stations were well below the 1.6 mg/L chronic criterion.

Nitrate + Nitrite. At offshore locations nitrate + nitrite concentrations ranged from less than the method detection limit of 0.02 mg/L to 0.44 mg/L. The highest concentration was measured in the surface layer at station LTBC41, a nearshore station along the Seattle waterfront. The median and mean concentrations for all stations and depths combined was 0.32 and 0.31 mg/L, respectively. Concentrations were generally highest in the winter months when nitrogen fixing by phytoplankton is lowest and freshwater flows are highest. Additionally, concentrations tend be lower in the shallower depths (1-25 m), where most of the photosynthesis occurs and the nitrate+nitrite is being taken up by phytoplankton (Table 3-4). Results for 2001 are comparable to data collected in 1999 and 2000. Results for six stations that are representative of the other stations sampled are shown in Figure 3-21.

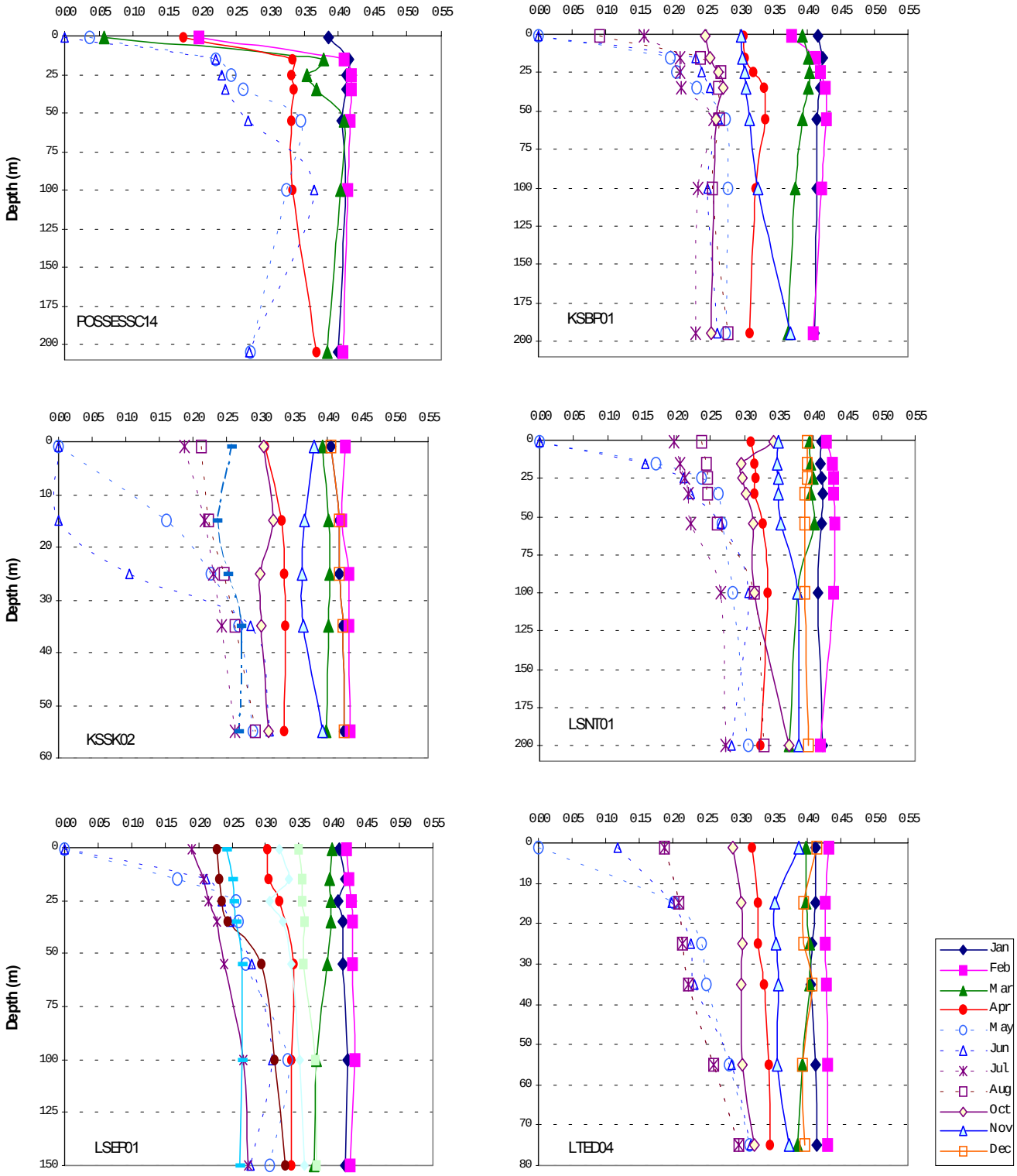


Figure 3-21. Nitrate+Nitrite (mg/L) Concentrations at Six Stations in 2001

Table 3-4. Nitrate+Nitrite Concentrations for Offshore Stations

	Nitrate+Nitrite (mg/L)		
	1 m	25 m	100 m
January	0.41	0.41	0.41
February	0.38	0.42	0.42
March	0.34	0.39	0.39
April	0.28	0.32	0.33
May	0.05	0.24	0.29
June	0.05	0.22	0.30
July	0.16	0.20	0.25
August	0.16	0.24	0.29
September	0.25	0.26	--
October	0.30	0.30	0.32
November	0.36	0.36	0.38
December	0.40	0.40	0.39

Nitrate+nitrite at beach stations ranged from less than the method detection limit of 0.02 to 2.1 mg/L. The highest values occurred at the freshwater Piper's Creek station KTHA01. Every value from this station exceeded 1.0 mg/L. Excluding this freshwater site, the maximum concentration was 0.50 mg/L (detected at station KSHZ03 in February) and the median and mean concentrations were 0.29 and 0.27 mg/L, respectively. Concentrations were similar between all stations, excluding the freshwater station where nutrients are in higher concentrations. Overall, the pattern seen at beach stations was similar to that of the offshore stations with the highest values observed in the winter and lower concentrations in the summer months when phytoplankton and algae growth is highest. Figure 3-22 shows concentrations for all beach stations combined.

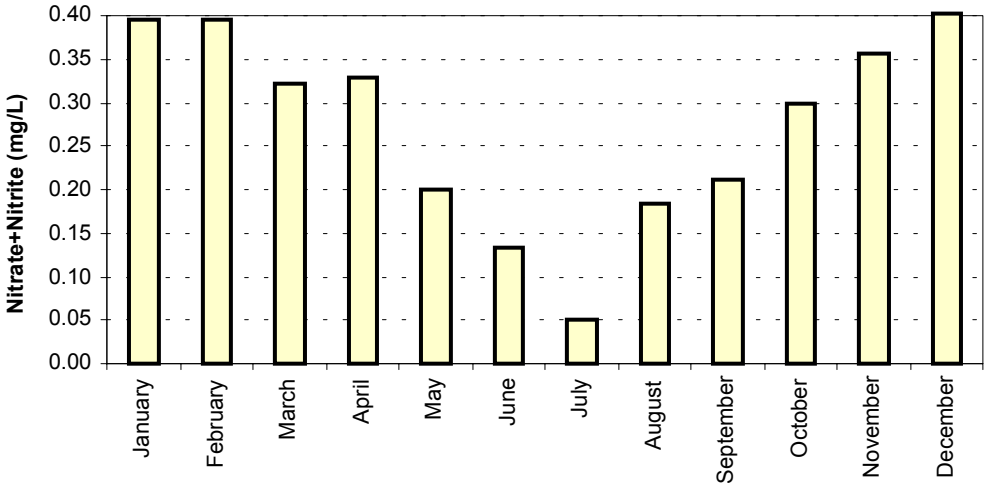


Figure 3-22. Nitrate+Nitrite Concentrations at Beach Stations

Total Phosphorus

Phosphorus is found as dissolved inorganic, dissolved organic, and particulate phosphorus in saltwater. Generally, particulate phosphorus is the most abundant of the three forms. There are several forms of inorganic phosphorus found in the marine environment with the most abundant form being orthophosphate. Total phosphorus, which includes all forms of inorganic and organic phosphorus, is measured by King County.

Phosphorus concentrations at all offshore stations (all depths combined) ranged from less than the method detection limit of 0.005 mg/L to 0.15 mg/L, with a mean concentration of 0.07 mg/L. These results are comparable to previous years and a mean of 0.07 mg/L for offshore stations has been obtained for the past five years. The highest concentration (0.15 mg/L) was measured at a depth of 35 m at the Admiralty Inlet station, ADMIRALC14, in May. Concentrations ranged from 0.04 to 0.06 mg/L for all other depths at this station in May. Overall, there was little variability in phosphorus concentrations by depth, with mean concentrations ranging between 0.05 and 0.08 mg/L. A seasonal trend was apparent with highest concentrations in the winter months and lowest concentrations occurring near the surface during the summer months, when photosynthesis is actively occurring. This same pattern of lower concentrations at depths from 1 to 35 m in summer months was also observed for other nutrients, such as nitrate+nitrite.

Total phosphorus at the beach stations ranged from 0.03 to 0.46 mg/L, with an overall mean of 0.08 mg/L. Variability was greater at beach stations than for offshore stations, possibly due to freshwater input at beach stations. The highest values were measured at the Brackett's Landing (ITBRACKETT) and Carkeek Park (ITCARKEEKP) stations in May. The highest average annual concentration of 0.11 mg/L, was obtained at three stations: ITBRACKETT, ITCARKEEKP, and KSSN05 (southern West Point station). The same seasonal trend observed at the offshore stations also occurred at the beach locations.

Silica

Silica concentrations at all offshore stations ranged from 0.24 to 5.0 mg/L, with a mean of 2.7 mg/L. This result is similar to previous years' results. Concentrations tended to be lower at the surface layer during the summer months as diatoms use silica for skeletal growth and these organisms are most abundant at the surface. Silica depth profiles are shown in Figure 3-23 for six selected stations that are representative of the pattern seen at other stations. Overall, lowest concentrations were observed in summer months, when phytoplankton abundance is high and the highest concentrations occurred during winter months when uptake by phytoplankton is low and freshwater inputs are relatively high. Stations that are near a freshwater source such as the inner Elliott Bay, Possession Sound, and Carkeek Park stations had higher silica concentrations, particularly during high rainfall months when silica can enter marine waters through particulates from freshwater runoff.

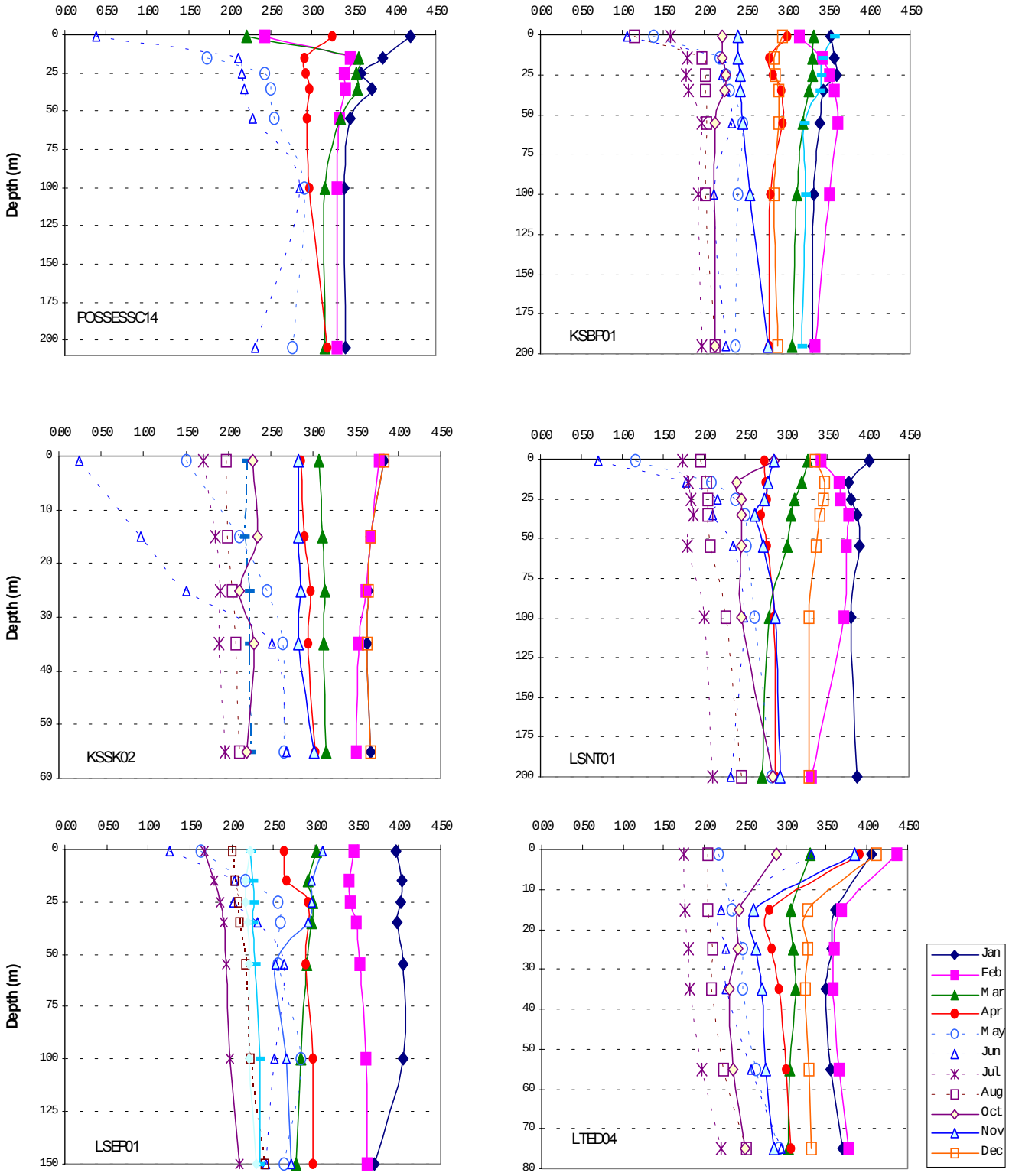


Figure 3-23. Silica (mg/L) Concentrations for Six Stations in 2001

Silica concentrations at beach stations were slightly higher than those at offshore stations, which is consistent with previous years' results. Values ranged from 0.61 mg/L to 39.8 mg/L, with a mean of 4.3 mg/L. These results reflect the influence of freshwater runoff that transports particulate bound silica to the beach areas. The highest concentration of 39.8 mg/L was reported for the freshwater station KTHA01, in Piper's Creek. Excluding this station, the next highest value was 7.4 mg/L, reported at KSHZ03 (Carkeek Park) near the mouth of Piper's Creek. Station ITCARKEEKP which is located outside the influence of Piper's Creek but near Carkeek Park had silica concentrations lower than the station at the mouth of Piper's Creek indicating the silica at KSHZ03 is due to particulates from Piper's Creek. The ITBOEINGCR and inner Elliott Bay stations also had higher average annual silica concentrations compared to stations away from a freshwater source. Figure 3-24 shows concentrations for all beach stations in 2001.

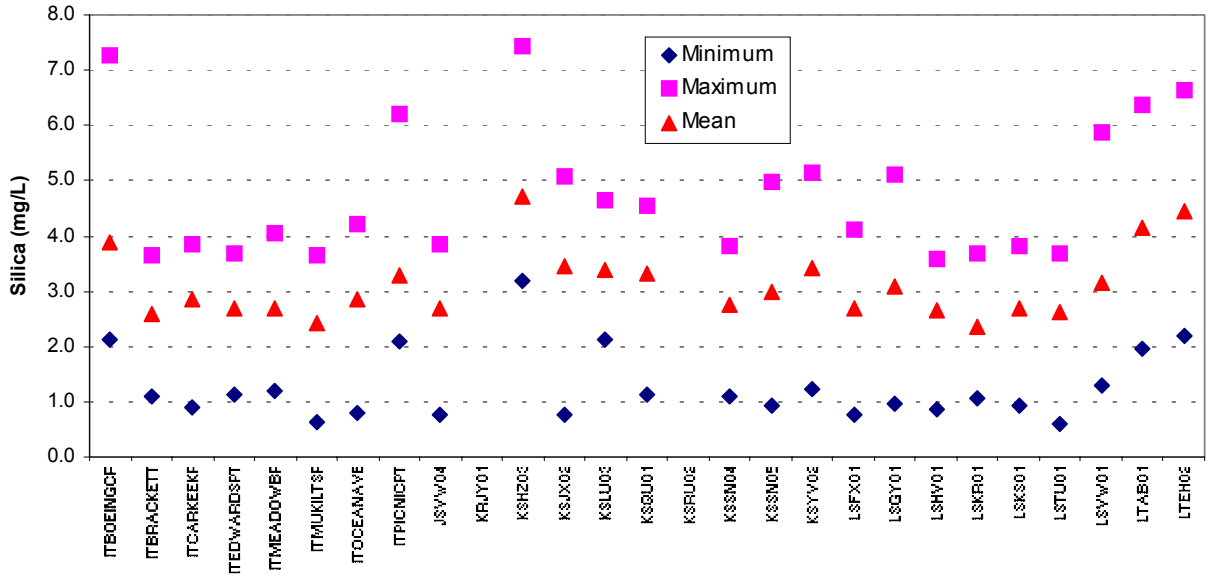


Figure 3-24. Silica Concentrations at Beach Stations

3.2.7 pH

The pH at MOSS beach stations was measured to assess the variability for this parameter in beach waters. This parameter was also measured to obtain data to use in the calculation needed to compare ammonia data to the criterion, which is salinity, temperature, and pH-based. The pH of offshore waters varies very little, therefore, pH is not routinely monitored for offshore waters. However, there was no data to assess pH variability of beach waters.

A total of 10 stations were monitored monthly April through December. For all stations combined, the pH ranged from 7.7 to 8.4 with a mean of 8.0. Table 3-5 provides a summary for results at all stations. There was some variability between stations and month sampled, as is shown in Figure 3-25. ITPICNICPT and ITEDWARDSP had the greatest difference between the minimum and maximum pHs, with a difference of 0.64 and 0.59, respectively.

Table 3-5. MOSS Beach Station pH Values

Station	Minimum	Maximum	Mean
ITBOEINGCR	7.79	8.22	7.93
ITBRACKETT	7.75	8.16	7.93
ITCARKEEKP	7.79	8.17	7.96
ITEDWARDSP	7.8	8.39	8.00
ITMEADOWBP	7.75	8.14	7.93
ITMUKILTSP	7.71	8.22	7.97
ITOCEANAVE	7.77	8.2	8.02
ITPICNICPT	7.79	8.43	7.98
JSVW04	7.76	8.21	7.93
KSLU03	7.74	8.02	7.87

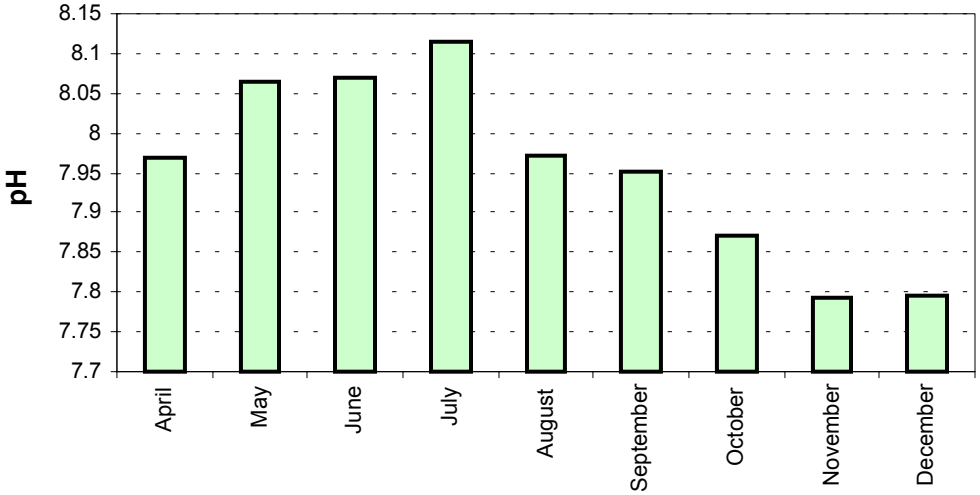


Figure 3-25. Monthly pH Averages for MOSS Beach Stations

3.2.8 Chlorophyll-*a* and Pheophytin

Chlorophyll-*a* and pheophytin (a degradation product of chlorophyll) measurements were collected from depths between 1 and 35 m at all offshore stations. Chlorophyll-*a* and pheophytin were not measured at beach stations.

In 2001, chlorophyll-*a* concentrations at all stations ranged from 0.09 to 36.7 µg/L, with an overall mean of 4.1 µg/L. The maximum measurement was recorded at the 1 m depth in March at the Possession Sound station (POSSESSC14). Chlorophyll-*a* levels were highest at the surface and decreased with depth. This decrease with depth corresponds to the decreased light availability at the deeper depths (an average of only 2% of the surface light is available at 15 m). Chlorophyll-*a* concentrations were lowest from November to January and highest between May and August. Chlorophyll-*a* concentrations for six stations are shown in Figure 3-26 and are representative of the pattern seen at other stations sampled.

Although maximum chlorophyll concentrations vary from year to year, phytoplankton blooms (indicated by high chlorophyll levels) exhibit seasonal trends with blooms usually occurring in April or May and June or July of each year. In 2001, blooms followed this trend and were evident in May and June at all stations sampled and again in July at the central and southern stations. The northern (Admiralty Inlet, Possession Sound, and south of Whidbey Island (EDMDS-CTD4), stations exhibited a large bloom in February that was not seen at the other stations in the Central Basin. In March, stations in Possession Sound and south of Whidbey Island continued to exhibit a large bloom in addition to the station off Edmonds (EDMDS-CTD2). However, the bloom was diminishing at the Admiralty Inlet station in March. Another large bloom occurred in August from the waters off Edmonds to the waters off West Point. The early bloom at the northern stations was also seen in 2000 but the late in the year October bloom that was noted at the Admiralty Inlet station in 1999 was not evident in either 2000 or 2001. Table 3-6 shows the pattern of when blooms were evident at the offshore stations throughout the Central Basin. The trend of early in the year blooms at the northern stations and the later spring/summer blooms at the more southern stations is apparent.

Pheophytin concentrations ranged from less than the method detection limit (0.02 µg/L) to 4.5 µg/L, with a mean of 0.6 µg/L. Pheophytin followed the same pattern as chlorophyll with low levels in the winter months, however, the time of year when the highest values were measured were different. In February and March when a bloom was occurring at the northern stations, pheophytin levels remained low. Pheophytin levels did not become elevated until May, and they remained high through June until they started to decrease in July. Levels were high again in August, particularly at the five stations exhibiting a large August bloom.

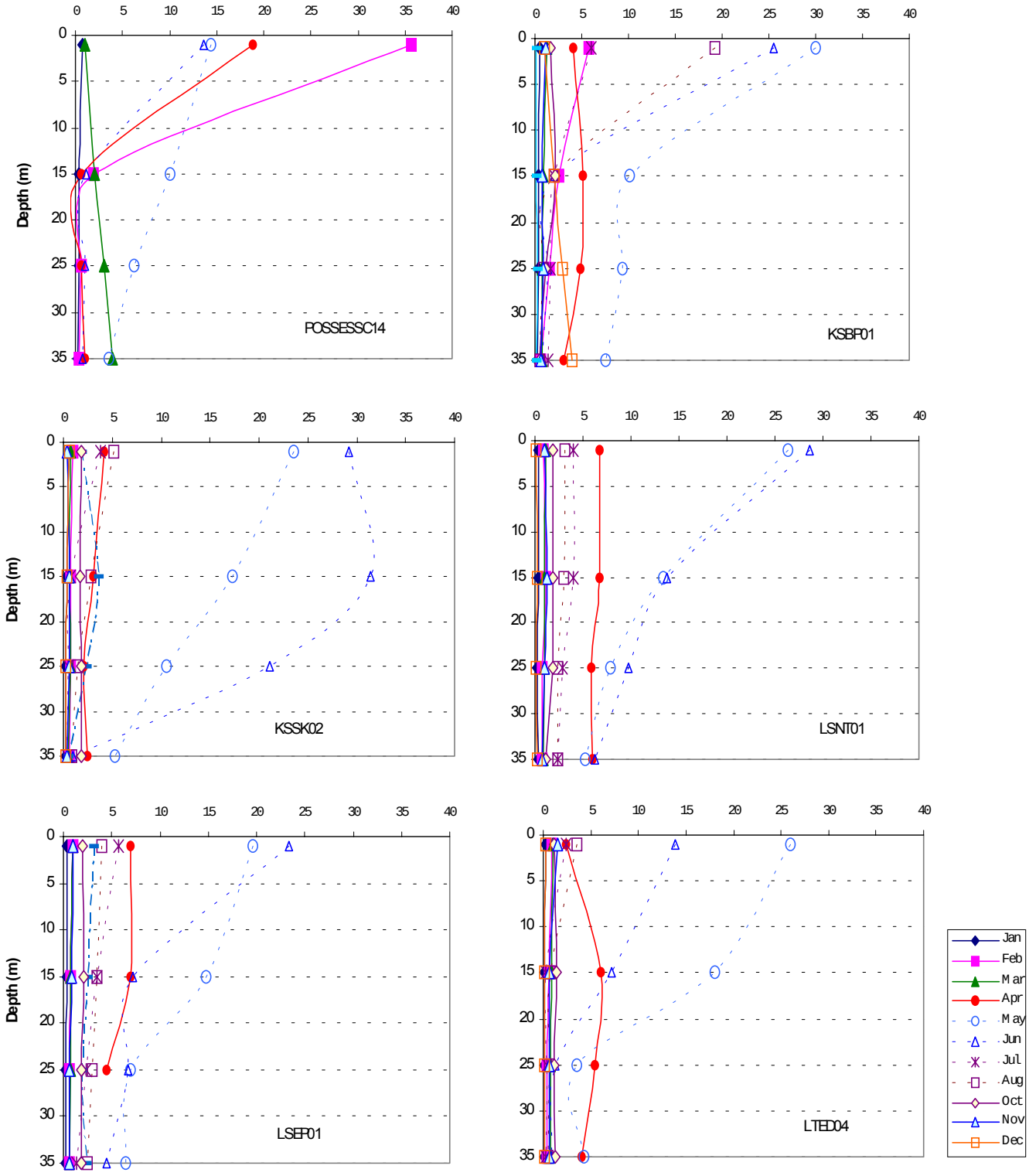


Figure 3-26. Chlorophyll-*a* (µg/L) Concentrations at Six Stations in 2001

Table 3-6. Occurrence of Phytoplankton Blooms as Indicated by Chlorophyll Levels

January	February	March	April	May	June	July	August	September	October	November	December
	AdmiralC14	AdmiralC14	**AdmiralC14**	AdmiralC14	**AdmiralC14**	Edmds-CTD2	**Edmds-CTD4**				
	PossessC14	**PossessC14**	**PossessC14**	**PossessC14**	**PossessC14**	KSBP01	**Edmds-CTD2**				
	Edmds-CTD4	**Edmds-CTD4**	Edmds-CTD4	**Edmds-CTD4**	**Edmds-CTD4**	LTBC41	**PtWells1**				
	KSBP01	**Edmds-CTD2**	LSEP01	**Edmds-CTD2**	**PtWells1**	**LTED04**	**KSBP01**				
			LSNT01	**PtWells1**	**KSBP01**	LSEP01	CK200P				
			LSKQ06	**KSBP01**	**CK200P**	LSKQ06	KSSK02				
			VO50E	**CK200P**	**KSSK02**	**VO50E**					
				KSSK02	LTBC41						
				LTBC41	LTED04						
				LTED04	**LSEP01**						
				LSEP01	LSKQ06						
				LSKQ06	**LSNT01**						
				LSNT01	**VO50E**						
				VO50E							

Stations with chlorophyll concentrations over 5.0 µg/L at the 1 meter depth are included.
Stations with chlorophyll concentrations over 10.0 µg/L at the 1 meter depth are in bold.

3.2.9 Metals in Beach Water

Between 1999 and 2000, monthly water column samples were collected from eight MOSS offshore stations for metals analysis. Results showed little variability between stations and months, therefore, no offshore samples were collected in 2001 (King County, 2001). Beach sampling at MOSS stations for metals analysis began in 2000 and continued through 2001. For 2001, samples were collected from a total of 17 beach stations for metals analysis. Twelve were MOSS stations and five additional stations were sampled for the ambient and point source programs. Samples were collected quarterly at the MOSS stations in March, June, September, and December and analyzed for both dissolved and total metals. Three MOSS stations (Carkeek Park, Edwards Point, and Meadowdale Beach Park) were also sampled in January and February in order to obtain a complete two-year monthly data set at these sites. Samples were collected once for dissolved metals analysis between July 31 and August 1 at the ambient and point source stations.

The stations sampled were:

- Boeing Creek (ITBOEINGCR)--MOSS
- Brackett's Landing, (ITBRACKETT)--MOSS
- Carkeek Park (ITCARKEEKP)--MOSS
- Edwards Point (ITEDWARDSPT)--MOSS
- Meadowdale Beach Park (ITMEADOWBP)--MOSS
- Mukilteo State Park (ITMUKILTSP)--MOSS
- Ocean Avenue (ITOCEANAVE)--MOSS
- Picnic Point (ITPICNICPT)--MOSS
- Richmond Beach (JSVW04)--MOSS/Ambient
- Carkeek Park (KSHZ03)--Point source
- Blue Ridge Beach (KSJX02)--MOSS
- Golden Gardens beach (KSLU03)--MOSS/Ambient
- Shilshole Bay (KSQU01)--MOSS/Ambient
- West Point north beach (KSSN04)--Point source
- West Point south beach (KSSN05)--Point source
- Alki Point (LSKR01)--Point source
- Normandy Park (MTLD03)--Ambient

All MOSS samples were analyzed for the dissolved (<0.45 microns) and total fractions of following 15 elements: antimony, arsenic, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, nickel, selenium, silver, thallium, vanadium and zinc. The ambient and point source samples were analyzed for the same metals listed above with the exception of mercury and vanadium. Analysis of all elements except mercury was performed by the King County Environmental Laboratory. Mercury analysis was performed by Frontier Geosciences of Seattle, Washington.

Beach Total Metals

Reportable concentrations of 12 of the 15 elements (antimony, arsenic, cadmium, chromium, cobalt, lead, mercury, copper, nickel, vanadium, thallium and zinc) were detected in every sample. Selenium and silver were never detected, and beryllium was detected in three samples. Thallium concentrations were below the reporting limit, indicating that while thallium concentrations were high enough to be detected, the concentrations could not be reliably quantified. Similarly, many of the beryllium, mercury and lead concentrations were below the reporting limit but above the method detection limit.

Descriptive statistics and frequency of detection of metal concentrations are presented in Table 3-7 Complete data results are presented in Appendix A. Concentrations for most metals varied little between stations. The range of arsenic values was slight, with the exception of the significantly lower value at the station located at the mouth of the Lake Washington Ship Canal. This station, which is influenced by freshwater, also had lower slightly lower concentrations of

Table 3-7. Total Metals Detected in Beach Water Samples--Frequency of Detection and Minimum, Maximum, and Median Concentrations (µg/L)

Metal	FOD %	Minimum	Maximum	Mean	Median	N
Antimony	100	0.018	0.12	0.069	0.070	53
Arsenic	100	0.68	1.54	1.06	1.05	53
Beryllium	8	0.039	0.029	0.013	0.015	40
Cadmium	100	0.0286	0.1180	0.0635	0.0644	53
Chromium	100	0.13	4.57	0.515	0.262	53
Cobalt	100	0.020	0.972	0.145	0.066	29
Copper	100	0.391	4.170	0.917	0.575	53
Lead	100	0.022	2.37	0.224	0.076	53
Mercury	100	0.00024	0.00466	0.00092	0.00057	53
Nickel	100	0.378	5.29	0.867	0.575	53
Thallium	100	0.006	0.020	0.010	0.010	41
Vanadium	100	0.891	4.96	1.662	1.420	41
Zinc	100	0.470	9.68	1.676	1.030	53

FOD = Frequency of detection
N= Number of samples

cadmium, chromium, and nickel. Table 3-8 provides a summary of the mean metal concentrations detected at each site. If a value was below the reporting limit but above the MDL, the value was included in the mean. Lead, nickel, and zinc varied the most with the highest concentration for these metals detected at station KSJX02. The highest copper concentrations were detected at the three stations on the north side of the Lake Washington Ship Canal: KSQU01 at the mouth of the Canal, KSLU03 close to the Shilshole Bay Marina, and KSJX02 north of the Shilshole Bay Marina. Copper is a constituent is many boat paints as an anti-fouling agent, therefore, it is not unexpected that the highest values were detected in areas with high boat traffic.

There was little variation in metal concentrations with respect to the months sampled, although there are only three data points each for January and February. The only difference variation observed was in March when higher chromium, copper, lead, and zinc concentrations were detected compared to the other months sampled. Table 3-9 provides a summary of mean concentrations by month.

Table 3-8. Total Metal Average Concentrations (µg/L) by Station

	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
ITBOEINGCR	1.13	0.064	0.562	0.720	0.1166	0.00077	0.962	1.215
ITBRACKETT	1.05	0.068	0.344	0.701	0.4493	0.00080	0.636	1.456
ITCARKEEKP	1.11	0.068	0.804	0.944	0.1646	0.00114	1.379	1.679
ITEDWARDSPT	1.06	0.065	0.352	0.629	0.0893	0.00061	0.652	1.217
ITMEADOWBP	1.03	0.066	0.269	0.454	0.0493	0.00076	0.572	0.795
ITMUKILTSP	1.00	0.061	0.330	0.610	0.0704	0.00066	0.662	0.965
ITOCEANAVE	1.12	0.075	0.747	0.912	0.3874	0.00181	1.010	2.041
ITPICNICPT	1.01	0.060	0.427	0.613	0.1120	0.00078	0.798	1.033
JSVW04	1.09	0.064	0.609	0.880	0.5930	0.00109	0.942	1.748
KSJX02	1.23	0.077	1.697	1.764	0.8371	0.00176	2.169	3.816
KSLU03	1.02	0.056	0.250	1.663	0.0881	0.00067	0.532	2.938
KSQU01	0.85	0.038	0.148	1.682	0.0658	0.00052	0.414	2.410

Table 3-9. Total Metal Average Concentrations (µg/L) by Month for Beach Stations

	N	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc
January	3	1.057	0.069	0.214	0.414	0.0371	0.00061	0.519	0.757
February	3	1.157	0.069	0.777	0.982	0.1561	0.00182	1.458	1.817
March	12	1.123	0.075	1.001	1.314	0.5176	0.00160	1.392	2.720
June	11	0.982	0.058	0.307	0.817	0.1625	0.00057	0.588	1.363
September	12	1.023	0.061	0.332	0.864	0.1556	0.00058	0.661	1.278
December	12	1.065	0.056	0.414	0.773	0.1179	0.00075	0.742	1.510

N = number of samples

Beach Dissolved Metals

Reportable dissolved concentrations of 10 of the 15 metals (antimony, arsenic, cadmium, chromium, cobalt, copper, nickel, thallium, vanadium, and zinc) were detected in every sample. Chromium and thallium levels were below the reporting limit in all samples. Lead and mercury were infrequently detected while beryllium, selenium and silver were never detected.

Quality control results indicated that some samples were affected by blank contamination. This occurred for antimony and zinc. Zinc was particularly problematic as it is difficult to overcome trace amounts of contamination during sample preparation for analysis of dissolved zinc at such low detection limits. As 92 % of the samples were affected by method blank contamination, all results flagged with a "B" qualifier for these two analyses are considered undetected. Frequency of detection and descriptive statistics for the dissolved metals are presented in Table 3-10.

For the dissolved metals with detectable concentrations, there was little variation between stations and months sampled. Table 3-11 shows the mean concentrations for metals detected at beach stations and Table 3-12 shows mean concentrations by month. As stated above, lead was seldom detected. Lead was only detected above reporting limits in three samples from two stations, ITBRACKETT and JSVW04, but was detected above the MDL but below the reporting limit in all samples from these stations. As seen with total copper concentrations, stations near areas with heavy boat traffic, KSQU01 and KSLU03, had higher concentrations of dissolved copper than other stations sampled. Table 3-13 shows the relationship between dissolved and total concentrations for four metals. The amount of dissolved metals compared to the total concentration is similar for arsenic and cadmium, but the total fractions are higher for chromium and copper compared to dissolved values. This suggests that most of the arsenic and cadmium in beach waters is in the dissolved form whereas chromium and copper have a higher proportion of metals attached to particulates. Due to the fact that samples are collected in separate containers for total and dissolved metals analyses and that the values in Table 3-13 are averages, it is possible for the dissolved value to be higher than the total value.

Table 3-10. Dissolved Metals Detected in Beach Water Samples--Frequency of Detection and Minimum, Maximum, and Median Concentrations (µg/L)

Metal	FOD %	Minimum	Maximum	Mean	Median	N
Antimony	85	0.054	0.11	0.08	0.07	51
Arsenic	100	0.75	1.2	1.0	1.1	60
Beryllium	0	--	--	--	--	60
Cadmium	100	0.030	0.086	0.061	0.062	60
Chromium	100	0.077	0.20	0.12	0.11	60
Cobalt	78.3	0.012	0.08	0.025	0.021	47
Copper	100	0.29	1.9	0.57	0.40	60
Lead	30	0.0074	0.051	0.019	0.012	18
Mercury	83.3	0.0001	0.0008	0.0003	0.0002	50
Nickel	100	0.32	0.55	0.41	0.41	60
Selenium	0	--	--	--	--	60
Silver	0	--	--	--	--	60
Thallium	80	0.0062	0.011	0.009	0.010	48
Vanadium	68.3	0.89	1.5	1.3	1.4	41
Zinc	8.3	0.59	3.9	1.8	0.85	5

N = number of samples

Table 3-11. Dissolved Metal Average Concentrations (µg/L) by Station

	Arsenic	Cadmium	Chromium	Copper	Nickel
ITBOEINGCR	1.103	0.0639	0.1340	0.3841	0.441
ITBRACKETT	1.046	0.0637	0.1143	0.3968	0.400
ITCARKEEKP	1.104	0.0662	0.1102	0.3911	0.416
ITEDWARDSPT	1.082	0.0648	0.1182	0.4080	0.397
ITMEADOWBP	1.072	0.0667	0.1183	0.3530	0.421
ITMUKILTSP	0.993	0.0578	0.1175	0.5993	0.456
ITOCEANAVE	1.027	0.0646	0.1155	0.3656	0.391
ITPICNICPT	1.013	0.0568	0.1200	0.3963	0.427
JSVW04	1.005	0.0645	0.0982	0.4148	0.365
KSHZ03	1.200	0.0499	0.1800	0.4530	0.415
KSJX02	1.059	0.0606	0.1147	0.4337	0.417
KSLU03	0.987	0.0586	0.1260	1.3730	0.417
KSQU01	0.904	0.0407	0.1053	1.5080	0.421
KSSN04	1.050	0.0609	0.0770	0.3890	0.412
KSSN05	1.230	0.0638	0.0970	0.6580	0.545
LSKR01	1.040	0.0511	0.0980	0.3980	0.344
MTLD03	1.070	0.0625	0.1065	0.3705	0.375

Table 3-12. Dissolved Metal Average Concentrations (µg/L) by Month

	N	Arsenic	Cadmium	Chromium	Copper	Mercury	Nickel
January	3	1.014	0.068	0.100	0.301	0.00020	0.398
February	3	1.157	0.072	0.113	0.363	0.00042	0.461
March	12	1.038	0.067	0.124	0.526	0.00033	0.423
June	12	0.975	0.058	0.136	0.703	0.00021	0.417
August	7	1.089	0.059	0.107	0.576	--	0.404
September	12	1.061	0.061	0.108	0.583	0.00015	0.376
December	12	1.046	0.055	0.105	0.580	0.00030	0.435

Note: Mercury was not analyzed in August

Table 3-13. Dissolved and Total Metal Average Concentrations (µg/L) by Station

	Arsenic		Cadmium		Chromium		Copper	
	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total
ITBOEINGCR	1.103	1.133	0.0639	0.0639	0.1340	0.5623	0.3841	0.7203
ITBRACKETT	1.046	1.053	0.0637	0.0677	0.1143	0.3435	0.3968	0.7008
ITCARKEEKP	1.104	1.114	0.0662	0.0676	0.1102	0.8039	0.3911	0.9441
ITEDWARDSPT	1.082	1.055	0.0648	0.0649	0.1182	0.3523	0.4080	0.6293
ITMEADOWBP	1.072	1.033	0.0667	0.0658	0.1183	0.2690	0.3530	0.4543
ITMUKILTSP	0.993	0.997	0.0578	0.0611	0.1175	0.3295	0.5993	0.6103
ITOCEANAVE	1.027	1.123	0.0646	0.0754	0.1155	0.7473	0.3656	0.9124
ITPICNICPT	1.013	1.011	0.0568	0.0600	0.1200	0.4270	0.3963	0.6130
JSVW04	1.005	1.085	0.0645	0.0645	0.0982	0.6090	0.4148	0.8798
KSJX02	1.059	1.230	0.0606	0.0774	0.1147	1.6970	0.4337	1.7637
KSLU03	0.987	1.021	0.0586	0.0560	0.1260	0.2498	1.3730	1.6625
KSQU01	0.904	0.848	0.0407	0.0377	0.1053	0.1475	1.5080	1.6823

Statistical Analysis of Beach Water Metals Data

A preliminary evaluation of the beach metals data indicates the data are not normally distributed and there are large variations in individual metal concentrations. An analysis of spatial and temporal metals concentrations at beach stations will be conducted in 2003 and reported in a separate document.

Beach Metals Data Compared to Washington State Water Quality Criteria

Table 3-14 shows acute and chronic water quality criteria for nine metals: arsenic, cadmium, copper, lead, mercury, nickel, selenium, silver, and zinc. No criteria currently exists for other metals analyzed. For most of the nine metals, the criteria are compared to dissolved metals. The exception to this are the mercury chronic criterion and selenium, for which the criteria are based upon the total fraction. The zinc criterion listed in Table 3-14 is based upon the total fraction due to quality control failures during analysis for the dissolved fraction. A correction factor was applied to the dissolved criterion to obtain the total criterion. All metal concentrations were well below the associated acute and chronic water quality criteria.

Table 3-14. Washington State Water Quality Criteria for Metals

Metal	Criterion Dissolved or Total Fraction Based	Marine Water Criteria (µg/L) Acute	Chronic
Arsenic	Dissolved	69	36
Cadmium	Dissolved	42	9.3
Copper	Dissolved	4.8	3.1
Lead	Dissolved	210	8.1
Mercury	Dissolved (acute) / Total (chronic)	1.8	0.025
Nickel	Dissolved	74	8.2
Selenium	Total	290	71
Silver	Dissolved	1.9	--
Zinc	Total	95	86

3.2.10 Organics in Beach Water

Beach water samples were collected in January and February from three stations: Meadowdale Beach Park (ITMEADOWBP), Edwards Point (ITEDWARDSPT), and Carkeek Park (ITCARKEEKP). Analysis for organic compounds at these three sites began in 2000 and continued through February 2001 in order to obtain a year-long data set. All samples were analyzed for semi-volatile organics, chlorinated pesticides and polychlorinated biphenyls (PCBs), and organophosphorus pesticides. A total of 107 organic compounds were analyzed: 64 semivolatiles, 26 chlorinated pesticides/PCBs, 10 chlorinated herbicides, and 7 organophosphorus pesticides. Complete data results for 2001 are provided in Appendix A and 2000 results are provided in *1999/2000 Water Quality Status Report for Marine Waters* (King County, 2001).

Chlorinated pesticides, herbicides, PCBs, and organophosphorus pesticides were not detected in any of the samples. A total of 10 different semi-volatile organic compounds were detected in one or more samples. As with metals' analysis in beach waters, data validation determined there were four semi-volatile organic compounds with positive results that were impacted by probable laboratory contamination. These compounds were all in the phthalate group: benzyl butyl phthalate, bis(2-ethylhexyl)phthalate, diethyl phthalate, and di-n-butyl phthalate. For this report, data flagged with a “B” were considered undetected.

Phthalates

Only those beach water samples for which the phthalate concentration was five times greater than the concentration detected in the method blank have been considered to have reportable phthalate concentrations. As a result of method blank contamination, there were no reportable concentrations of benzyl butyl phthalate, diethyl phthalate, or di-n-butyl phthalate. However, there were two reportable detections of bis(2-ethylhexyl)phthalate that ranged from 2.09 to 11.5 µg/L. The higher of the two values was detected at Meadowdale Beach Park in January and the other in water at Edwards Point in January.

Polynuclear Aromatic Hydrocarbons

There were five polynuclear aromatic hydrocarbons (PAHs) detected in one or more samples: fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene. Fluoranthene and pyrene were detected just above the method detection limit and below the reporting limit in the water sample from Edwards Point in January. These compounds were not detected in any of the other samples. Fluorene was also only detected in the Edwards Point January sample, but the concentration of 0.023 µg/L was above the reporting limit. Naphthalene was detected just above the method detection limit and below the reporting limit in the water samples from Edwards Point in January and Meadowdale Beach Park in February. Phenanthrene was detected in all six samples just above the method detection limit and below the reporting limit ranging from 0.005 to 0.009 µg/L.

Miscellaneous Organic Compounds

Caffeine was the only other organic compound detected and was found above the method detection limit but below the reporting limit in three of the six samples at Edwards Point, Carkeek Park, and Meadowdale Beach Park in January. Concentrations ranged from 0.009 to 0.011 µg/L.

3.3 Sediment Chemistry Data Results

Marine sediment was collected from offshore and beach stations as part of the ambient and point source monitoring programs (see Figures 2-1 and 2-2). Point source stations are located near treatment plant outfall pipes and combined sewer overflow (CSO) outfall pipes. Outfall stations are positioned at varying distances from the pipe to assess potential impacts from the outfall.

Sediment samples were analyzed for conventional parameters including total solids, total volatile solids, total sulfide, ammonia nitrogen, oil and grease, total organic carbon (TOC) and grain size distribution. Sediments were also analyzed for metals and organic compounds including pesticides, PCBs, PAHs, and semivolatile organics.

Metals and ionizable organics data are presented on a dry weight basis. Non-ionizable organics data are presented on a dry weight basis when sediment TOC is less than 0.5% dry weight. Non-ionizable organics are presented normalized to organic carbon when sediment TOC is greater than 0.5% dry weight. All sediment data are provided in Appendix B.

Point source sediment samples were collected from 13 stations around the South TP outfall and from 6 stations near the Alki CSO outfall in 2001. These stations were also sampled in 1999 as these two sites are sampled bi-annually. In years when sediments at the South TP and Alki CSO plants are not sampled, West Point TP and Carkeek CSO outfall sediments are sampled. Six beach stations (three point source, three ambient) were also sampled in 2001. The point source beach stations are located as close as possible to the offshore treatment plant outfalls.

The South TP and Alki CSO sampling stations are positioned along transects that run perpendicular to the outfall diffuser pipes. The stations are arrayed roughly north to south, in alignment with the bathymetric contour line and the net current flow. The intent of this configuration is to determine if a chemical or biological gradient exists around the outfalls.

South TP stations are positioned along two transects, one at the end of the diffuser pipe, the other at the diffuser's mid point. A comparison station is located 2500 feet to the west. The current configuration has existed since the 1999 sampling event, prior to which, samples were collected from only a single transect. As more data is collected from the newer stations, more inferences can be made about temporal and spatial trends. The Alki CSO stations are arrayed along a single transect perpendicular to the end of the diffuser pipe in the direction of the net current. A comparison station is located 1500 feet to the south.

A study was conducted during the 2001 South TP sediment sampling event using an acoustic tracking system mounted above the van Veen grab sampler to determine the actual location of the sampler relative to the targeted sample location. Results of the study found discrepancies between the targeted coordinates and the actual location sampled of up to 234 feet (ft) with an average difference of 139 ft (Blue Water Engineering, 2002). After completion of six stations, an attempt was made to 'fly' the van Veen sampler to the remaining seven station target coordinates using real-time data plotted on a navigation screen utilizing the acoustic tracking system to assist. Using this approach, it was possible for the sampler to land within 20 ft or less of the targeted coordinates.

For previous sampling events where this acoustic tracking technology was not used, the exact location where sediments were collected cannot be determined as results from the tracking study indicated the sampler may have deviated from station locations by as much as 240 ft. Therefore, assessing if a concentration gradient is present around the outfall based upon existing data is not possible due to the amount of sampling error. The only certainty in terms of sample locations for previous sampling events is that an area around the outfall was sampled.

3.3.1 Sediment Conventionals

The physical structure of the sediments influences the results of the conventional analyses. Grain size composition of the South TP outfall sediments were dominated by fine particles and consequently, TOC values were higher at this site. Beach sediments are composed mainly of sand and have very low TOC values. TOC levels affect other conventional parameters, including ammonia and sulfides.

TOC was measured in all sediment samples. Values for offshore sediments ranged from 2,284 to 23,131 mg/Kg dry weight. The highest values for offshore sediments were detected at South TP outfall stations, the lowest at Alki CSO stations. TOC values for beach sediments ranged from below the method detection limit (520 mg/Kg) to 2,190 mg/Kg dry weight. Beach sediments were composed mainly of sand and gravel (>94 %). As stated above, sandy sediments typically have lower TOC values than sediments containing a high proportion of silt and clay. Figure 3-27 shows the relationship between TOC and grain size distribution.

Total sulfides were analyzed since they may be toxic to benthic organisms, either directly or through their effect on the bioavailability of metals. Total sulfides were detected in 13 samples collected from the South TP outfall stations at concentrations ranging from 12 to 92 mg/Kg wet weight. Sulfides were also detected at a single Alki CSO station at 2.2 mg/Kg wet weight. South TP outfall sediments have a higher proportion of fine-grained sediments and TOC which may explain why sulfides are consistently detected. Total sulfides were not analyzed at beach stations.

Total oil and grease analysis includes compounds such as animal fats, vegetable oils, soaps, and greases. This analysis was performed on samples collected from both offshore and beach stations in 2001. Alki CSO samples had the highest levels with values ranging from 495 to 549 mg/Kg wet weight. Beach stations had the next highest levels with values ranging from 130 to 170 mg/Kg wet weight. Only four South TP stations had total oil and grease values above the detection limit (100 mg/Kg wet weight). Four samples had values just above the detection limit of 100 mg/Kg wet weight. Values ranged from 100 to 120 mg/Kg wet weight.

Ammonia-nitrogen was analyzed in samples collected from the offshore stations. Values ranged from 1.37 to 7.23 mg/Kg wet weight. There did not appear to be a gradient or any consistent differences among the outfall stations with respect to distance from the outfall pipe. Ammonia values correlated more strongly with TOC rather than with location around the outfall (Figure 3-28). These results are consistent with previous years', which also found ammonia to be correlated to TOC and grain size.

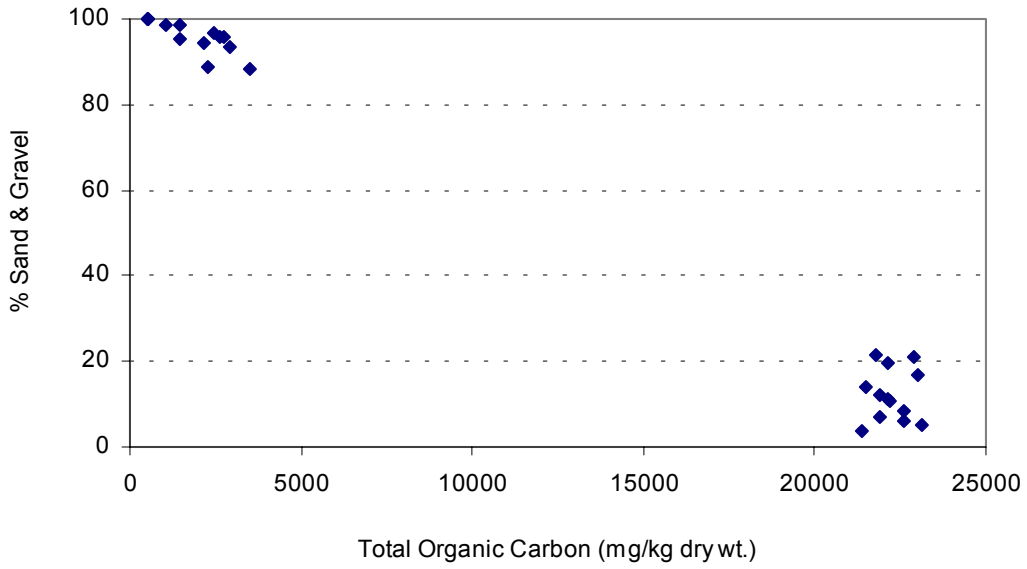


Figure 3-27. Total Organic Carbon vs. Grain Size for All Stations

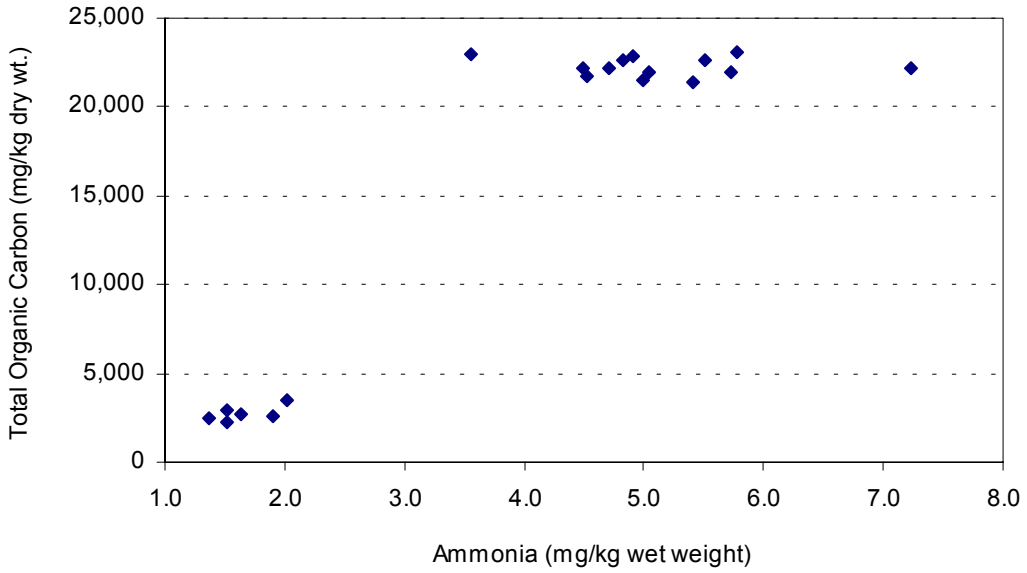


Figure 3-28. Ammonia vs. TOC

3.3.2 Sediment Metals

Sixteen metals were analyzed in offshore sediments and 14 were analyzed in beach sediments. Antimony and thallium were not analyzed in beach sediments. Results from metals analyses in 2001 were similar to previous years'. Concentrations of those metals for which a Washington State SQS value exists; arsenic, cadmium, chromium, copper, lead, mercury, silver, and zinc, were all below the respective criteria. Antimony, selenium, silver, and thallium were not detected in any samples and cadmium was detected in only a single sample.

Earth metals, including iron, manganese, and aluminum, and metals commonly used in manufacturing, such as copper and zinc, were the most frequently detected.

The highest concentrations of most metals were detected in samples collected from the South TP stations. This may be due to the differences in sediments between the South TP and the Alki CSO and beach stations. Several metals including arsenic, chromium, copper, lead, nickel, and zinc have a strong association with fine-grained sediments, which characterize the South TP (King County, 1998).

Mercury was detected in all the South TP samples and all but one of the Alki CSO sediment samples at concentrations well below the SQS of 0.41 mg/kg dry weight. Mercury results from previous sampling events at the South TP sediments were similar to 2001 results; however, mercury was rarely detected in Alki CSO sediments prior to 2001. Detectable mercury levels in the Alki CSO sediments were just above the detection limit of 0.03 mg/Kg dry weight in all but one of the six samples, with the exception of one value of 0.09 mg/Kg dry weight. Mercury can enter the marine environment from boat paints, plastics, electrical equipment, atmospheric deposition, municipal treatment plant effluent and creosote. There was no concentration gradient observed with respect to distance from the outfall pipes for either Alki CSO or South TP sediments. Alki CSO and beach station sediments were predominately sand and gravel and metal concentrations were typically lower. A summary of the metals results is presented in Table 3-15, which reports all values on a dry weight basis.

3.3.3 Sediment Organics

Semivolatile organics, chlorinated pesticides and PCBs were analyzed in 19 offshore and 6 beach sediment samples. Additionally, organotin compounds were analyzed in samples collected from the treatment plant outfall stations. Sediment organics data are presented in Appendix B.

Organics data are compared with either Washington State Sediment Quality Standards (SQS), which are organic carbon based for certain compounds, or Lowest Apparent Effect Threshold (LAET) criteria which are dry weight based. Beach sediments had low organic carbon and it is not appropriate to organic carbon normalize the data to assess compliance with regulatory standards that are organic carbon based. For sediments containing less than 0.5% organic carbon, dry weight values are more appropriate and data are compared with the regulatory

Table 3-15. Sediment Metals Summary

	Range (mg/Kg dry wt.)		Detection Frequency		Station with Highest Value	
	Beach	Offshore	Beach	Offshore	Beach	Offshore
Aluminum	4,961-7,642	5,504-23,088	6/6	19/19	JSVW04	RT825N
Antimony	NA	<5.3	NA	ND	NA	ND
Arsenic	<3.3	<8.8-11.7	ND	8/19	ND	RT625ND
Beryllium	0.106-0.154	0.127-0.596	6/6	19/19	JSVW04	RT825N
Cadmium	<0.20-0.163	<0.53	1/6	ND	JSVW04	ND
Chromium	13.9-18.5	16.5-50.2	6/6	19/19	JSVW04	RT825N
Copper	4.3-9.91	5.4-47.7	6/6	19/19	JSVW04	RT825N
Iron	7,604-12,076	9,838-30,971	6/6	19/19	JSVW04	RT625NP
Lead	2.4-9.21	5.54-30.9	6/6	19/19	JSVW04	RT625ND
Manganese	102-190	250-695	6/6	19/19	JSVW04	RT825N
Mercury	<0.03-0.03	0.24	2/6	18/19	KSSN04	RT625ND
Nickel	13-27.4	19.5-43.5	6/6	19/19	KSHZ03	RT825N
Selenium	<3.3	<8.8	ND	ND	ND	ND
Silver	<0.26	<0.7	ND	ND	ND	ND
Thallium	NA	<35	NA	ND	NA	ND
Zinc	18.4-36.2	23.6-108	6/6	19/19	KSYV02	RT825N

NA = Not analyzed
ND = Not detected

standards that are based upon LAETs. For sediments with organic carbon content greater than 0.5%, such as the South TP outfall sediments, results are compared to the organic carbon based SQS criteria.

Eighty-seven organic compounds were analyzed in 2001. Seventeen compounds were detected in South TP outfall and Alki CSO samples and 18 compounds were detected in beach samples. No compounds exceeded regulatory standards. Table 3-16 shows the detection frequency of organic compounds.

Compounds detected at the South TP outfall stations were primarily PAHs. PAHs are a constituent of petroleum products and coal-tar related manufacturing products and are combustion byproducts. Creosote, a compound commonly used on pilings as a wood preservative to deter marine boring organisms, is comprised of up to 80% PAHs (Hutton and Samis, 2000). Several PAHs including pyrene, fluoranthene, benzo(a)pyrene, benzo(a)anthrancene, chrysene, and phenanthrene were detected at most or all South TP outfall stations. These results are similar to past sampling events for sediments in the vicinity of the South TP outfall.

Table 3-16. Organic Compounds Detected in Sediments

Compound	Range (µg/kg dry wt.)	Detection Fequency	Station with Highest Value
Offshore			
Aroclor 1254	<4.6-20	2/19	RT412SW
Aroclor 1260	<4.6-9.2	1/19	RT412SW
Anthracene	<14-15	1/19	AL172N
Benzo(A)Anthracene	5.4-55	19/19	RT625SD
Benzo(A)Pyrene	<4.1-83	18/19	RT412NW
Benzo(B)Fluoranthene	<4.1-60	17/19	RT825S
Benzo(K)Fluoranthene	<4.1-48	17/19	RT825S
Benzoic Acid	196-553	19/19	RT412N
Benzyl Butyl Phthalate	<8.2-42	16/19	RT625NP
Bis(2-Ethylhexyl)Phthalate	<9.4-990	16/19	RT625SD
Chrysene	<5.4-67	18/19	RT412NW
Di-N-Butyl Phthalate	13-56	19/19	RT412SW
Fluoranthene	<11-102	16/19	RT825S
Indeno(1,2,3-Cd)Pyrene	<14-57	13/19	RT412S
Phenanthrene	<5-50	17/19	RT825S
Phenol	<30-144	10/19	RT412N
Pyrene	15-129	19/19	2 Stations
Beach			
Acenaphthene	<9.1-10	1/6	KSSN04
Acenaphthylene	<20-35	1/6	KSSN04
Anthracene	<5.2-45	2/6	KSSN04
Benzo(A)Anthracene	<2.6-173	3/6	KSSN04
Benzo(A)Pyrene	<3.9-188	3/6	KSSN04
Benzo(B)Fluoranthene	<3.9-145	3/6	KSSN04
Benzo(G,H,I)Perylene	<10-143	1/6	KSSN04
Benzo(K)Fluoranthene	<3.9-55	2/6	KSSN04
Benzoic Acid	53-222	6/6	LSKR01
Bis(2-Ethylhexyl)Phthalate	16-31	6/6	LSKR01
Chrysene	<5.2-153	3/6	KSSN04
Di-N-Butyl Phthalate	<6.5-16	3/6	MTLD03
Dibenzo(A,H)Anthracene	<9.1-23	1/6	KSSN04
Fluoranthene	<10-535	2/6	KSSN04
Indeno(1,2,3-Cd)Pyrene	<12-140	1/6	KSSN04
Phenanthrene	<5.2-150	2/6	KSSN04
Phenol	<9.4-45	5/6	LSKR01
Pyrene	<5.2-446	2/6	KSSN04

Station RT2500R, located beyond the immediate influence of the outfall, typically had the lowest concentrations among the compounds that were detected at the South TP outfall sediments. There were no other apparent spatial patterns.

PAHs were also the most commonly detected organic compounds in Alki CSO and beach sediments. Many of the same PAHs detected in the South TP outfall sediments were also

detected in Alki CSO outfall and beach sediments, although at lower concentrations. For beach sediments, PAHs were detected most frequently at the northern West Point and Magnolia stations. The fewest number of PAHs were detected at the Normandy Park and northern Alki Point stations.

PCBs were used widely as insulating material until their use was banned. However, due to their chemical structure PCBs are persistent in sediments. Two PCB Aroclors were detected in the South TP outfall sediments, Aroclor 1254 and Aroclor 1260. Aroclor 1254 was detected at two stations (RT412SW and RT625ND) and Aroclor 1260 was detected at station RT412SW. Values for both Aroclors are well below the SQS criterion for total PCBs. PCBs were not detected in any of the Alki CSO outfall or beach sediment samples. Pesticides were not detected in any sediment samples.

Bis(2-ethylhexyl)phthalate was detected at all beach stations and most offshore stations. Phthalates are used in a wide variety of plastics manufacturing applications and are a common field sampling and laboratory contaminant. Benzoic acid was also detected at all stations. Benzoic acid is used as a food preservative and an anti-fungal agent; however, it is also a degradation product of metabolic processes produced by marine organisms.

Tributyltin (TBT), has been used extensively as an anti-fouling agent in boat paints since it is extremely effective for stopping marine organisms from attaching to boat hulls, particularly barnacles and algae. TBT, however, is also toxic to nontarget marine organisms and its use on leisure craft was banned in 1998, although it is still in use for commercial vessels. TBT is measured in treatment plant outfall sediments, but not in beach sediments.

TBT was detected in all South TP outfall samples but none of the Alki CSO outfall sediment samples. This is likely due to the difference between the grain sizes for the two sites and that fact that organotins have an affinity for fine-grained sediments with high amounts of TOC (Clarkson, 1991). The end of the pipe (the western) transect stations at the South TP outfall had higher TBT concentrations than the mid-diffuser stations (eastern transect). There is currently no SQS or guideline for TBT in sediments.

3.3.4 Benthic Community Results

Marine benthic communities are useful indicators of sediment quality since they integrate the effects of physical and chemical sediment properties, as well as water quality conditions. Benthic organisms spend their lives in contact with sediment, water at the sediment/water interface, and interstitial or pore water. The potential for chemical contaminants within these three matrices to be consumed or absorbed by benthic organisms could lead to unhealthy organisms, stressed communities, and possibly to the bioaccumulation/biomagnification of these contaminants through higher levels in the food web. Benthic community monitoring was conducted for the South Treatment Plant outfall in 2001 at five stations placed in a transect at various distances around the outfall. A sixth, reference station was located approximately 2,500 feet from the end of the twin outfall diffusers. Three replicate benthic community samples were collected at each sampling station in conjunction with a single sediment chemistry sample.

There are various methods and techniques used to analyze benthic community data. The two primary ways to characterize benthic communities are measuring the functional characteristics of the community (i.e., trophic indices and food web studies) and by examining the structural characteristics of the community (i.e., diversity, richness and abundance measures). Structural measures are typically evaluated for permitting purposes, therefore, King County analyzes and characterizes benthic communities at its wastewater treatment plant outfalls using the metrics listed below. All of the calculated metrics are based on an average of results from the three replicates samples collected at each station.

- Shannon-Wiener Diversity Index
- Pielou's Evenness Measure
- Swartz's Dominance Index
- Species Abundances and Richness
- Percent of Total Organisms
- Numerically Dominant Species
- Biomass

The results for each of these metrics are summarized in the following sections. Calculated values for Shannon-Wiener, Pielou's, Swartz's, abundance, richness, and biomass measures are shown below.

Shannon-Wiener Diversity Index

The Shannon-Wiener index is one of the most widely used diversity indices due to its ease of calculation and its relative independence of sample size. This index uses the total number of species in a sample as well as the abundance of single species to determine diversity. High diversity values are seen in areas with many different species and low environmental stress, while low values are seen in areas with few species and high environmental stress. Shannon-Wiener diversity values were calculated using the following equation:

$$H' = -\sum_{i=1}^{S} P_i \log_2 P_i$$

Where H' = Shannon-Wiener index
P_i = Proportion of total sample represented by species *i*
S = The number of taxa to which individuals have been allocated

Average Shannon-Wiener diversity values for the South Treatment Plant outfall benthic samples ranged from 4.20 at the south diffuser sampling station (RT625SD) to 4.65 at the north diffuser sampling station (RT625ND). The Shannon-Wiener value calculated for the reference station (RT2500R) was 4.31. Shannon-Wiener values from the 1999 South Treatment Plant outfall monitoring event ranged from 3.12 to 3.98.

Pielou's Evenness Measure

Pielou's Evenness Measure is a measure of diversity that is commonly used in conjunction with the Shannon-Wiener index. Evenness was calculated using the following equation:

$$J = H' / \log_2 S$$

Where J = Evenness
H′ = Shannon-Wiener index
S = The number of taxa to which individuals have been allocated

Evenness values close to 1.0 represent a sample composed of several different species while low evenness values indicate a sample composed of only a few dominant species. Average evenness values ranged from 0.80 at the south diffuser station and the reference station to 0.86 at the sampling station located south of the south diffuser (RT412S). Evenness values from the 1999 monitoring event ranged from 0.59 to 0.68.

Swartz's Dominance Index

Swartz's Dominance Index is another diversity index that measures the minimum number of species whose abundance makes up 75% of the total sample abundance. Low values indicate a sample with little diversity while high values indicate a sample composed of many species. Average Swartz's index values ranged from 11 at the sampling station located north of the north diffuser (Station RT412N) to 15 at the north diffuser station. The Swartz's index value for the reference station was 12. Swartz's index values from the 1999 monitoring event ranged from 4.33 to 7.67.

Species Abundance and Richness Measures

The average total abundance (the total number of organisms) ranged from 120 at station RT412N to 255 at the reference station. Abundance values from the 1999 monitoring event ranged from 486 to 633. The higher abundances in 1999 were mainly due to higher numbers of five organisms: *Ampharete acutifrons, Pectinaria californiensis, Euphilomedes producta, Axinopsida serricata,* and *Macoma carlottensis*. The average total richness (total number of species) ranged from 34 at station RT412N to 46 at the north diffuser station. Richness values from the 1999 monitoring event ranged from 41 to 47.

Table 3-17 summarizes the benthic indices discussed above as well as biomass measurements, along with physical properties of the sediment from which the benthic organisms were collected. The number of organisms in each major taxa group is shown in Figure 3-29.

Table 3-17. Summary of Benthic Indices and Sediment Physical Properties South Treatment Plant Outfall – 2001 Monitoring Event

Benthic Index (Average of 3 Replicates)	RT625ND	RT625SD	RT700NS	RT412N	RT412S	RT2500R
Total Richness (# of species/0.1 m2)	**46**	**39**	**44**	**34**	**42**	**42**
Annelida Richness	23	14	20	18	23	20
Crustacea Richness	12	14	12	7	9	11
Mollusca Richness	9	6	7	5	7	6
Miscellaneous Taxa Richness	2	5	5	4	3	5
Total Abundance (# of individuals/0.1 m2)	**225**	**176**	**199**	**120**	**155**	**255**
Annelida Abundance	76	49	54	45	72	71
Crustacea Abundance	74	56	114	54	56	99
Mollusca Abundance	71	63	25	13	22	77
Miscellaneous Abundance	4	8	6	8	5	8
Total Biomass (g/0.1 m2)	**101**	**142**	**102**	**153**	**68**	**106**
Annelida Biomass	4.5	5.5	4.2	11.3	5.3	5.2
Crustacea Biomass	0.15	0.18	0.15	0.09	0.11	0.14
Mollusca Biomass	1.2	0.35	0.28	23	0.84	0.56
Miscellaneous Biomass	95	136	97	119	62	100
Shannon-Wiener Diversity Index	**4.65**	**4.2**	**4.45**	**4.3**	**4.64**	**4.31**
Pielou's Evenness Index	**0.84**	**0.8**	**0.81**	**0.85**	**0.86**	**0.8**
Swartz's Dominance Index	**15**	**14**	**12**	**11**	**13**	**12**
Physical Properties (wet weight except for carbon)						
Percent Solids	30	31.3	30.3	31.3	32.3	30.1
Percent Clay	31.4	30.5	33	33.4	29.6	31
Percent Silt	52	48.2	53.1	55.6	48.9	56.9
Percent Sand	16.3	19.6	13.6	10.8	20.3	12
Percent Gravel	0.3	1.6	0.3	<0.1	1.3	<0.1
Total Organic Carbon (mg/Kg dry weight)	23,000	22,900	21,500	22,200	21,800	21,900
Percent Total Organic Carbon (dry weight)	2.3	2.3	2.2	2.2	2.2	2.2
Station Depth (m)	193	192	194	192	193	194

Numerically Dominant Species

Table 3-18 shows the five numerically most dominant species at each sampling station. *Euphilomedes producta*, a tiny ostracod was numerically either the most dominant or second-most dominant species at all six sampling stations. Other species found at multiple stations in a numerically dominant role were: *Macoma carlottensis*, a small clam (four stations); *Pectinaria californiensis*, a polychaete worm (three stations); and *Eudorellopsis integra*, a cumacean (three stations). All of the numerically dominant species are well-documented and wide-spread in Puget Sound. *M. carlottensis*, in particular, is typically found in deep, depositional areas at which the dominant grain size fraction is clay/silt. Clays and silts comprised between 78 and 86% of the grain size distribution at all six stations (see Table 3-17).

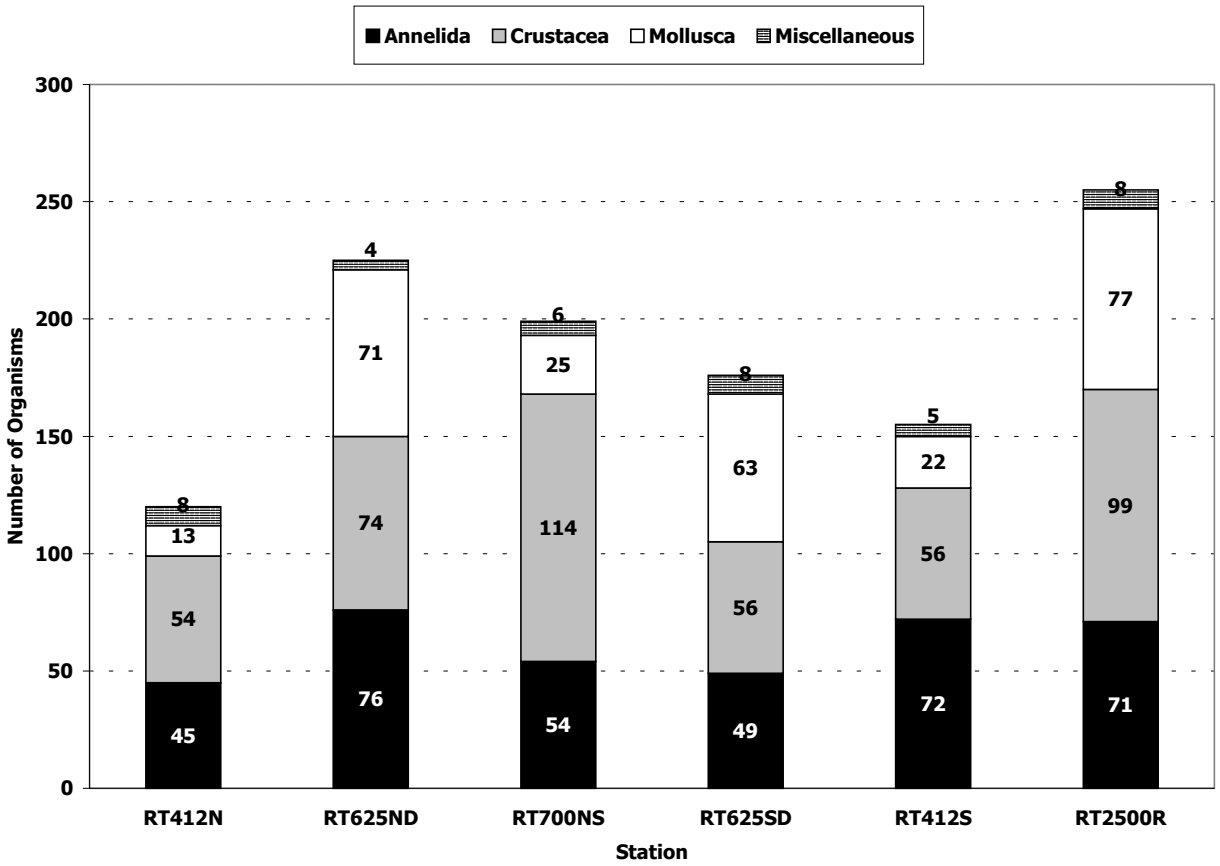


Figure 3-29. Number of Organisms in the Major Taxa Groups South Treatment Plant Outfall – 2001 Monitoring Event

Indicator Species

Indicator species are those organisms that are considered as an indicator of disturbed or organically enriched sediments. They may also be species that consistently dominant the benthic community in a given area. The benthic community at the South Plant TP outfall has consistently been dominated by *Euphilomedes producta, Eudorellopsis integra, Axinopsida serricata, Pectinaria californiensis*, and *Macoma carlottensis* in 1997, 1999, and again in 2001. *Macoma carlottensis* and *Pectinaria californiensis* are two species that are indicative of deep water silt/clay dominated sediments as are the echinoderms *Molpadia intermedia* and *Brisaster latifrons.* *Molpadia intermedia* and *Brisaster latifrons* have only been found at the deep water South TP outfall stations during King County sampling events at the treatment plant outfalls. Both *Molpadia intermedia* and *Brisaster latifrons* have also typically been found in other deep water areas of the Sound (Long et al., 1999, 2000). Although a dominant species in the South

Table 3-18. Dominant Species at Each Sampling Station South Treatment Plant Outfall – 2001 Monitoring Event

Station	Dominant Species	Taxonomic Group	Average # of Individuals	Percent of Total Abundance
RT412N	*Euphilomedes producta*	Crustacea	20	17.1
	Eudorella pacifica	Crustacea	10	8.4
	Harpiniopsis fulgens	Crustacea	10	8.4
	Pectinaria californiensis	Annelida	9	7.8
	Heterophoxus affinis	Crustacea	9	7.3
RT625ND	*Macoma carlottensis*	Mollusca	37	16.3
	Euphilomedes producta	Crustacea	25	11
	Axinopsida serricata	Mollusca	13	5.8
	Eudorellopsis integra	Crustacea	12	5.3
	Paraphoxus communis	Crustacea	11	4.9
RT700NS	*Euphilomedes producta*	Crustacea	37	18.7
	Eudorellopsis integra	Crustacea	24	11.8
	Eudorella pacifica	Crustacea	18	8.8
	Macoma carlottensis	Mollusca	11	5.3
	Paraphoxus communis	Crustacea	10	5
RT625SD	*Macoma carlottensis*	Mollusca	51	28.8
	Euphilomedes producta	Crustacea	12	7
	Spiophanes berkeleyorum	Annelida	11	6.3
	Protomedeia prudens	Crustacea	9	5.3
	Onuphis iridescens	Annelida	8	4.4
RT412S	*Dipolydora caullery*	Annelida	19	12.3
	Euphilomedes producta	Crustacea	18	11.6
	Pectinaria californiensis	Annelida	14	8.8
	Eudorellopsis integra	Crustacea	14	8.8
	Levinsenia oculata	Annelida	10	6.5
RT2500R	*Euphilomedes producta*	Crustacea	44	17.3
	Macoma carlottensis	Mollusca	37	14.4
	Axinopsida serricata	Mollusca	24	9.5
	Pectinaria californiensis	Annelida	19	7.5
	Heterophoxus affinis	Crustacea	15	5.9

Plant outfall sediments, *Axinopsida serricata* is also the dominant species in many different substrate types and areas of the Sound. The polychaete *Capitella capitata* is an opportunistic organism widely considered to be indicative of disturbed and organically enriched sediments. Although small numbers of this species have been found during past sampling events at the South TP outfall, none were found in 2001. *Capitella capitata* has been found in several areas of the Sound typically in deep, silty sediments during benthic surveys by others (Ebbesmeyer et al., 1998; Tetra Tech, 1990) and it is likely that small numbers of this species are typical for the area. Ophiurids, brittle stars, are considered to be pollution sensitive. Small numbers of this sensitive species were found at four stations in 2001 and have also been found during past sampling events.

3.4 Shellfish Data Results

Shellfish tissue samples were collected from beaches as a part of the ambient and point source monitoring programs. Samples consisted exclusively of butter clam, *Saxidomus giganteus,* whole tissues. Prior to 1998, samples consisted of the most prevalent species at a particular beach. The change to butter clams was initiated in order to facilitate comparisons between stations and to assist in assessing temporal trends for future monitoring. Only general comparisons between data collected prior to 1998 and recent results can be made.

Shellfish were collected in July 2001 and analyzed for semivolatile organics, pesticides, PCBs, lipids, and metals. Shellfish were collected at four point source stations, KSHZ03 (Carkeek), KSSN04 and KSSN05 (West Point), LSKR01 (Alki Point), and at two ambient stations, JSVW04 (Richmond Beach), and MTLD03 (Normandy Park). Shellfish from the above six stations and four additional stations, MTEC01 (Seahurst Park), KSLU03 (Golden Gardens), MSSM05 (Tramp Harbor) and KRJY01 (Fay Bainbridge State Park) were collected once monthly from May to September and analyzed for fecal coliform and enterococcus bacteria.

Results are provided in Appendix C and are presented on a wet weight basis unless otherwise noted. Dry weight values for metals are also provided in Appendix C.

3.4.1 Lipids

Shellfish tissue samples were analyzed for lipid content. The amount of lipids affects the accumulation of certain organic compounds. Lipids ranged from 0.41 to 0.69 percent in 2001, which is similar to previous years' results (Figure 3-30).

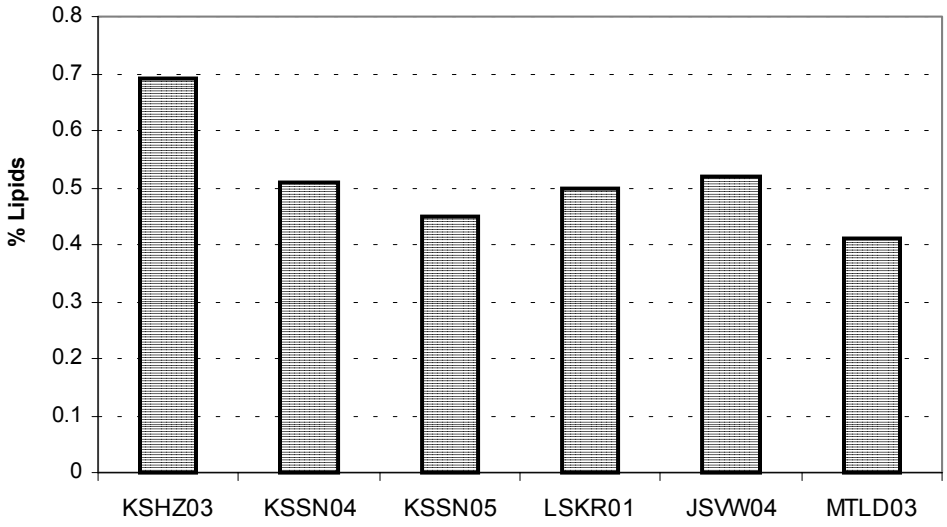


Figure 3-30. Percent Lipids in Butter Clams

3.4.2 Metals

State criteria do not exist for acceptable levels of metals in shellfish tissues. The U.S. Food and Drug Administration (FDA), however, has established guidance values termed Levels of Concern for mollusks for five metals: arsenic, cadmium, chromium, lead, and nickel. These guidance values are risk-based and differ for children and adults. For comparative purposes, the lower of the two values was chosen. Table 3-19 shows the Levels of Concern for the five metals (FDA 1993a, b, c, d, e). The FDA has established an Action Level in fish and shellfish tissues of 1.0 mg/kg for mercury (FDA, 1995). Food products that exceed the Action Level cannot be commercially traded, an important distinction from Levels of Concern.

Table 3-19. FDA Levels of Concern for Shellfish Tissues

	mg/Kg wet weight
	Level of Concern
Arsenic	55
Cadmium	3
Chromium	11
Lead	0.8
Nickel	80
	Action Level
Mercury	1

Fourteen metals were analyzed in shellfish tissue in 2001. No results exceeded any of the Levels of Concern or the Action Level for mercury. Beryllium was not detected in any sample. Arsenic, cadmium, chromium, lead, mercury, nickel, selenium, and zinc concentrations varied only slightly between stations and were similar to values detected previously. Copper and silver were higher in shellfish collected at station JSVW04 in 2001 (23.3 and 8.33 mg/Kg dry weight, respectively) compared to the next highest values of 11.6 and 4.98 mg/Kg dry weight. In 1999, copper was also higher in shellfish collected at JSVW04. Silver concentrations in 1999, however, were not higher at this station.

3.4.3 Organics

The same six stations that were monitored for metals were also monitored for organics. Of all the compounds analyzed, only two were detected: benzoic acid and bis(2-ethylhexyl)phthalate. Benzoic acid was detected in all samples at concentrations ranging from 1,150 to 3,100 µg/Kg wet weight. Benzoic acid is used as a food preservative and an anti-fungal agent, however, it is also a degradation product produced by metabolic processes and has always been detected in shellfish samples.

Bis(2-ethylhexyl)phthalate was detected in every sample except for LSKR01 at concentrations ranging from 95.5 to 441 µg/Kg wet weight. Low levels of bis(2-ethylhexyl)phthalate were detected in the quality control spike blanks indicating the reported values for the shellfish are likely due to laboratory contamination. The clams were exposed to phthalates contained in laboratory equipment when they were collected, shucked, and then placed in a blender for processing.

A study was conducted by the Trace Organics section at the King County Environmental Laboratory in June 2002 to determine sources of phthalates that might be imparted during tissue preparation, homogenization, and analysis. Various materials, such as a several types of laboratory gloves, pipette bulbs, clips, and foil, were tested for phthalate content. The study indicated that the primary contaminant was bis(2-ethylhexyl) phthalate and the two greatest sources of contamination were a specific type of pipette bulb and the powder-free latex laboratory gloves commonly used by the Trace Metals section (Walker, 2002). The purple nitrile gloves that are commonly used in the laboratory only had moderate levels of phthalate contamination and the lowest levels were found in a type of blue nitrile glove that the trace organics section commonly uses. Prior to this study, the powder-free latex gloves were commonly used during tissue homogenization, but now the current practice is to use the blue nitrile gloves to eliminate as much phthalate contamination as possible. However, it is not possible to eliminate all background levels of phthalates in the laboratory due to their association with so many different types of plastic products that are in common use.

3.4.4 Bacteria

Fecal coliform and enterococcus bacteria were analyzed in shellfish tissues collected from six ambient stations and three point source stations from May through September in 2001. Shellfish bacteria results are reported in Appendix C.

Fecal coliform counts varied between stations and months. During the five month sampling period, counts at all monitoring stations ranged from 20 to 24,000 MPN/100g (most probable number per 100 grams), with the highest count detected at Carkeek Park (KSHZ03) in July. Despite the high fecal coliform count in July, the Carkeek Park station had low counts for the other months monitored. The Tramp Harbor station (MSSM05) had a fecal coliform count of 3,300 MPN/100g in July and the other seven stations had values less than 490 MPN/100 g in July.

West Point (KSSN04), Seahurst Park (MTEC01), Richmond Beach (JSVW04), and Normandy Park (MTLD03) tended to have the lowest bacteria counts throughout the sampling period (Figure 3-31). Although some stations had consistently lower fecal coliform counts than other stations, there were no statistically significant differences detected.

Enterococcus bacteria concentrations ranged from 50 to 13,000 MPN/100g in 2001 and also varied between stations and from month to month (Figure 3-32). The highest enterococci counts

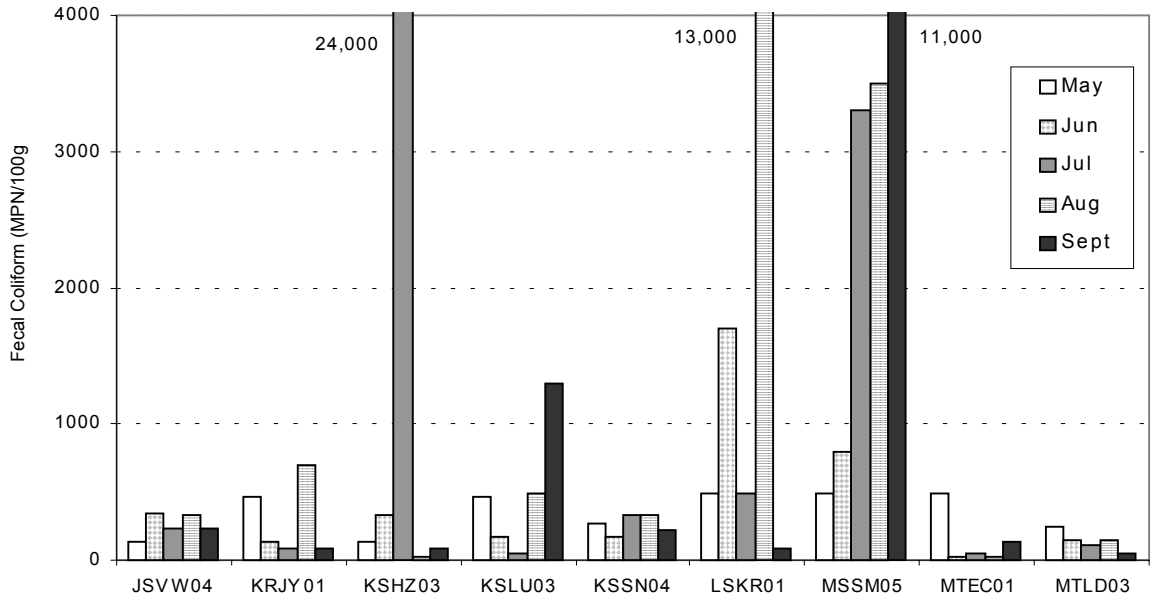


Figure 3-31. Fecal Coliform Bacteria in Shellfish in 2001

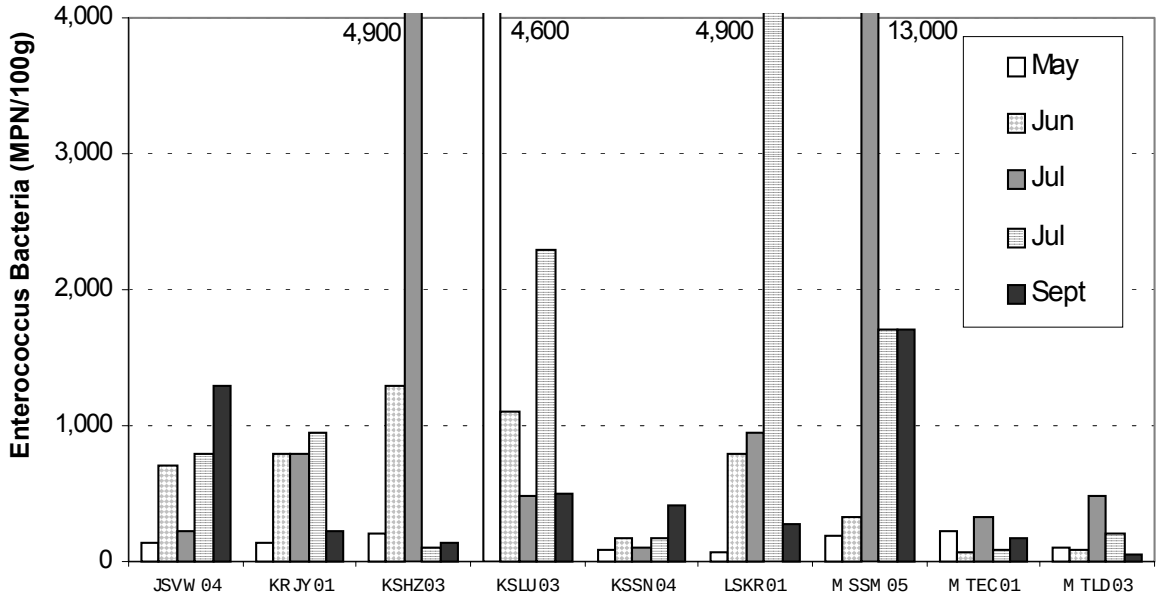


Figure 3-32. Enterococcus Bacteria in Shellfish in 2001

were detected at Tramp Harbor (MSSM05) in July. West Point (KSSN04) and Seahurst Park (MTEC01) had the lowest counts throughout the sampling period. Although some stations had consistently lower enterococci counts than other stations, there were no statistically significant differences detected.

The relationship between fecal coliform and enterococcus bacteria in shellfish was evaluated. A slight pattern that has not been noted for previous sampling events was evident. Generally, when fecal coliform counts were elevated (above 3,000 MPN/100g) enterococcus counts were also elevated but there were instances when enterococcus counts were above 2,000 MPN/100g and fecal coliform counts were below 500 MPN/100g (Figure 3-33). Fecal coliform bacteria counts were not consistently higher than enterococci counts. For enterococcus bacteria, approximately 58% of all counts were higher than fecal coliform values. There also did not appear to be a consistent relationship between fecal coliform bacteria measured in shellfish and the values measured in corresponding water samples.

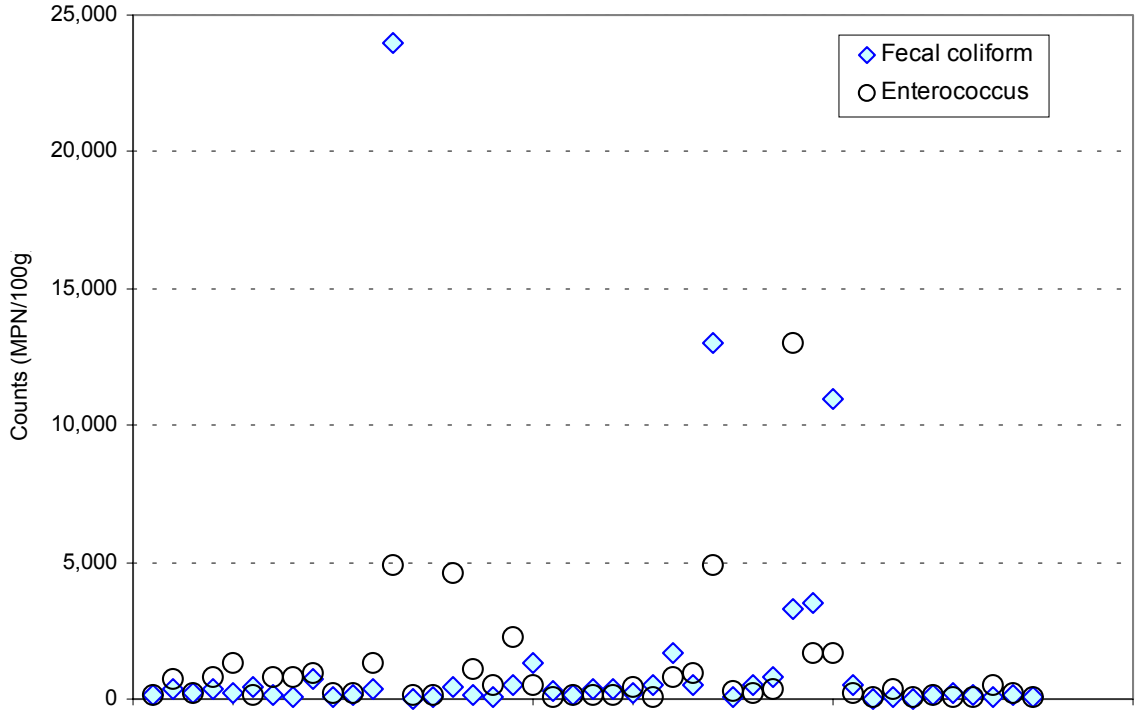


Figure 3-33. Fecal Coliform and Enterococcus Bacteria Analyzed Concurrently

3.5 Macroalgae Data Results

Macroalgae (algae) samples were collected from four point source and four ambient beaches in 2001. Samples consisted entirely of the most prevalent edible algae *Ulva fenestrata,* known as sea lettuce, and were analyzed for 14 metals. Organics were not analyzed in macroalgae tissues. All macroalgae data discussed below are presented on a dry weight basis and are provided in Appendix D.

The point source stations KSSN04 and KSSN05 were located on the north and south side of West Point, respectively, KSHZ03 at Carkeek Park and LSKR01 at Alki Point. Ambient stations were located near Richmond Beach (JSVW04), Normandy Park (MTLD03), Golden Gardens (KSLU03), and Magnolia (KSYV02). Stations were sampled between July 31 and August 2, 2001.

Selenium and mercury were not detected in macroalgae samples, which is similar to results from previous years' sampling. Beryllium and silver were detected in a single sample, at station KSSN05, at levels only slightly above the detection limit. Lead, copper and zinc were detected in all samples, at levels ranging from 0.140 to 1.93 mg/Kg, 3.23 to 24.2 mg/Kg and 6.45 to 20.45 mg/Kg, respectively. Aluminum, arsenic, cadmium, chromium, iron, manganese, and nickel were also detected in all samples. A summary of metals detected in algae from beach stations for the past several years is shown in Table 3-20.

Arsenic and zinc concentrations were similar between stations, however, the other metals varied between stations. The southern West Point and Normandy Park stations had the highest concentrations of arsenic, chromium, copper, lead, nickel, and zinc. The Richmond Beach station had the lowest concentrations for most metals. Concentrations were similar to previous results with the exception of a higher copper value 53.0 mg/Kg from station MTLD03 than was detected in either 1999 or 2000 (9.24 and 18.3 mg/Kg, respectively) (King County, 2001).

Table 3-20. Metal Concentrations in Algae (mg/Kg dry weight)

Point Source Stations

Parameter	KSSN05				KSSN04				LSKR01				KSHZ03		
mg/Kg dry wt.	2001	2000	1999	1998	2001	2000	1999	1998	2001	2000	1999	1998	2001	2000	1999
Arsenic	6.56	4.57	4.39	4.04	5.32	5.95	4.63	2.68	4.95	5.09	4.27	4.25	3.85	5.83	5.53
Cadmium	0.262	0.222	0.24	0.13	0.425	0.300	<0.16	0.35	0.557	0.295	0.29	0.55	0.292	0.69	0.34
Chromium	6.62	4.57	4.71	8.57	2.10	3.18	1.49	8.39	0.87	1.37	0.71	1.16	1.60	2.99	2.77
Copper	29.4	24.2	8.46	6.07	33.2	17.0	8.11	7.00	7.5	22.1	3.23	2.49	10.6	17.5	7.19
Lead	1.51	0.727	<1.3	<1.1	0.834	0.859	<1.6	2.74	0.140	0.307	<2.3	<1.7	0.829	1.25	1.81
Nickel	9.17	6.10	6.24	10.7	2.96	3.92	3.79	30.2	2.20	2.70	2.14	2.38	2.01	4.51	4.42
Zinc	18.9	13.4	18.7	19.5	15.8	14.2	16.7	193	9.9	19.6	9.62	9.06	11.4	14.3	14.1

Ambient Stations

Parameter	JSVWO4				KSYV02				MTLD03			KSLU03		
mg/Kg dry wt.	2001	2000	1999	1998	2001	2000	1999	1998	2001	2000	1999	2001	2000	1999
Arsenic	3.75	4.49	5.56	4.04	6.12	5.46	4.52	7.95	4.73	3.86	<7.2	4.04	5.79	4.5
Cadmium	0.212	0.458	0.34	0.27	0.201	0.098	<0.16	<0.16	0.661	0.603	<0.42	0.274	0.371	0.4
Chromium	0.90	1.66	1.63	9.35	1.34	3.06	1.93	2.68	5.20	3.12	2.19	0.93	2.74	2.11
Copper	7.6	14.0	4.51	6.93	30.9	5.46	13.8	10.7	53.0	18.3	9.24	13.6	14.9	9.5
Lead	0.604	1.11	<1.8	2.67	0.625	0.956	1.97	2.05	1.93	0.805	<4.2	0.287	0.938	<1.6
Nickel	3.03	2.44	4.15	10.6	2.35	3.51	2.55	10.9	5.61	3.6	<2.9	1.71	3.93	3.17
Zinc	9.0	7.21	11.5	16.4	18.5	9.23	17.6	76.7	14.7	9.02	19.2	10.5	11.4	20.4

SECTION 4
CTD Transect Data

Conductivity, temperature, and depth (CTD) transects were conducted monthly between February and July, 2001 at 5 locations in Puget Sound for the MOSS project (Figure 4-1): Possession Sound, Edmonds, Point Wells, West Point and Alki. Data collected by CTD casts included depth (m), temperature (^{o}C), salinity (PSS), photosynthetically active radiation (µmol/m^{2}s), chlorophyll-*a* (mg/m^3), and dissolved oxygen (mg/L). Density (sigma-t) was calculated monthly from measurements of temperature and salinity. Turbidity (FTU) was measured once in July. The data are presented as vertical profiles in Figures 4-2 to 4-20. Each graph represents a cross-sectional view of the water column as viewed to the north. The horizontal axis represents distance from the western shoreline and the terminus of the horizontal axis represents the eastern shoreline of Puget Sound.

4.1 Temperature

The vertical temperature structure in 2001 exhibited typical seasonal patterns (Figures 4-2 to 4-4). The water column was essentially isothermal (i.e., the temperature was uniform throughout) from February through May, with mean temperatures ranging from 8.0 to 8.3 ^{o}C. Thermal stratification started to develop in May, becoming progressively marked in June and July. Surface waters increased to temperatures above 13 or 14 ^{o}C at all locations in July, the last month sampled. The month of August typically exhibits the highest water temperatures with continued stratification of the water column (data not available for 2001).

Temperature profiles at the entrance to Possession Sound in northern Puget Sound indicated well developed thermal stratification in July with warmer temperatures than the previous two years. As in 1999 and 2000, the temperatures recorded in the Possession Sound surface water were the highest temperatures among the five locations sampled. These higher temperatures are a result of solar heating and less dynamic waters in Possession Sound.

Slightly warmer surface waters on the eastern shoreline (mainland) than on the western shoreline were observed in Possession Sound as well as in Alki transects. This east-west difference in thermal structure may be a result of a difference in flow across the basin. Colder oceanic water may be entering the Sound along the western side and warmer sound water exiting the Sound along the eastern shore (Ebbesmeyer et al., 2001).

Temperature profiles along the Point Wells and Edmonds transects indicated the presence of warmer surface waters along the western shoreline (Kitsap Peninsula) in June and July, differing from Possession Sound and Alki, and differing somewhat from the thermal patterns observed in 1999 and 2000. The West Point transect exhibited a flat thermal structure in July, in agreement with observations from previous years.

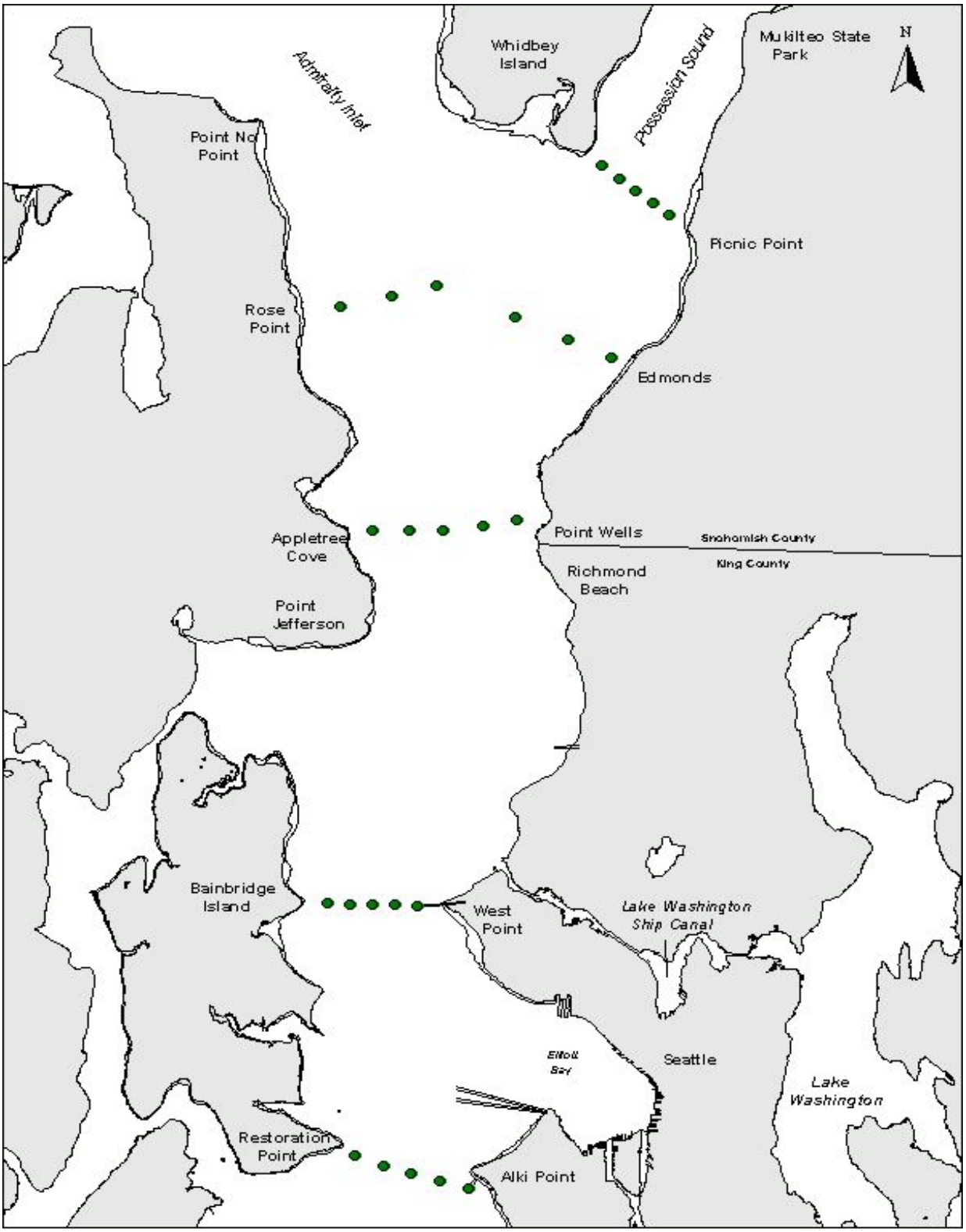


Figure 4-1. CTD Transect Station Locations

4.2 Salinity

Salinity along the Puget Sound transects ranged from 24.3 to 30.7 PSS during the months sampled (February – July) (Figures 4-5 to 4-7).

Salinity stratification of the water column occurs when a layer of low salinity surface water persists on top of higher salinity oceanic water. This type of stratification is typically strongest in late spring and early summer as a result of runoff from snowmelt and is readily apparent at all locations profiled in 2001. A second peak in stratification may occur in late fall or winter as a result of local precipitation.

As in previous years, Possession Sound salinity profiles during 2001 were characterized by a persistent lens of low salinity surface water. This low salinity water represents the freshwater input of the Snohomish River located at the northern reaches of Possession Sound. Beneath the lens of low salinity water the salinity structure remained flat, i.e., without marked east-west variations, as is characteristic of salt wedge type estuarine systems. The lowest salinity encountered during 2001 was recorded at this location in April (24.3 PSS).

Salinity stratification along the Point Wells and Edmonds transects exhibited a pattern similar to the one seen in the temperature profiles. In March, the halocline (the layer of water with a rapid change in salinity) was somewhat deeper along the eastern shoreline (mainland), indicating influx of more saline ocean water on the western side of the basin and outflow of less saline Puget Sound water along the eastern shore. This pattern was found to persist throughout the summer in 1999 and 2000. In 2001, however, the salinity pattern was reversed in the following months, giving way to a marked deepening of low salinity waters along the western shoreline (Kitsap Peninsula) in June and July.

The West Point and Alki transects were only slightly stratified in spring and summer, with a deeper layer of low salinity water on the eastern shoreline.

4.3 Density

Density profiles are a function of both salinity and temperature, salinity having a greater impact on density than temperature. As such, the vertical structure of the density will closely mimic the salinity and temperature profiles discussed above. Density profiles are shown in Figures 4-8 to 4-10.

The density profiles in Possession Sound were generally flat with a slight deepening of low density waters towards the eastern shoreline in July. The cooler, denser water at depth is indicative of oceanic water flowing up into Possession Sound with the warmer, fresher water flowing out at the surface while moving towards the east.

The density profile along the Point Wells and Edmonds transects exhibited a slope downward to the west, which was also seen in the temperature and salinity profiles. This pattern is somewhat different to profiles from previous years and is not explained by the accepted Puget Sound circulation pattern whereby water flows out along the eastern shore while denser oceanic water flows in along the western shore. Only the Alki transects exhibited density profiles consistent with this circulation pattern.

4.4 Photosynthetically Active Radiation

Photosynthetically active radiation (PAR) is a measure of the amount of light (number of photons) available for photosynthesis and is a key factor for the growth of phytoplankton. PAR levels in the marine environment are highly variable, depending on season, weather conditions, and depth. Because local weather conditions or the occasional passing of a cloud can dramatically alter measured PAR values, the data presented are discussed only in a general manner (Figures 4-11 to 4-13).

Surface light levels during the winter months were 2-10 times lower than summer surface levels. Since light attenuates relatively quickly as it passes through the water column, data were only collected to a depth of 30 meters. Although less light is available in the winter months, light penetration is typically highest during these months due to the absence of phytoplankton cells (i.e. the water is clearer) and lowest during the spring and summer when phytoplankton absorb a significant portion of the light penetrating the water.

4.5 Chlorophyll-*a*

Chlorophyll-*a* is the primary pigment present in all photosynthetic cells. The concentration of chlorophyll-*a* (as indicated by the measure of fluorescence) in a water sample is commonly used as a measure of the density of phytoplankton in that sample.

Chlorophyll-*a* reached the highest concentrations along all transects during the summer months; concentrations were low both during the winter and at depths greater than 50 m during all seasons (Figures 4-14 to 4-16). This pattern in primary production is typical in Puget Sound and of temperate nearshore areas.

The Possession Sound, Point Wells, West Point and Edmonds profiles all indicate one distinct bloom (>30 mg/m^3) in May with decreasing population densities in June. Two distinct blooms - in May and July - were observed the two previous years in Possession Sound and Point Wells. It is likely that a second peak developed later in the summer of 2001. Possession Sound and Point Wells had the densest blooms, with chlorophyll-*a* concentrations >60 mg/m^3. Both the Point Wells and the Edmonds blooms extended down to greater depth on the western shoreline (Kitsap Peninsula), suggesting that phytoplankton growth is stimulated by the input of nutrient rich in-flowing oceanic water.

The chlorophyll-*a* distribution along the Edmonds transect indicates very high chlorophyll-*a* levels along the shorelines and very low levels towards the center of the transect. This pattern has been observed in previous years and suggests the presence of upwelling at this location. It appears as though there was an instrument malfunction during sampling of the Alki transect in April that was not evident for the other transects sampled.

4.6 Dissolved Oxygen

The Washington State Department of Ecology considers a dissolved oxygen (DO) concentration below 5.0 mg/L to be an indicator of depressed water quality (Ecology, 1998). Depressed DO concentrations can result from the natural cycles of primary production or can be induced by the anthropogenic introduction of nutrients to the system. DO concentrations typically start decreasing at depth in early summer as dead organic matter produced from surface blooms travels through the water column and settles at the bottom, reaching minimum values during late fall and early winter. Since CTD profiling during 2001 was limited to the months of February through July it did not include the time of year when DO is known to reach critically low values (Figsures 4-17 to 4-19).

Possession Sound, Point Wells, West Point and Edmonds DO profiles mirrored chlorophyll-*a* profiles, with summer surface bloom areas exhibiting higher DO concentrations as a result of photosynthetic oxygen evolution by phytoplankton.

Dissolved oxygen concentrations at or slightly below 5.0 mg/L were observed in Possession Sound and Edmonds in July. Possession Sound historically has low DO concentrations due to the limited circulation and high riverine input of organic matter.

4.7 Turbidity

Changes in water column turbidity can be explained by the presence of suspended inorganic particulate material and floating, planktonic organisms. Turbidity is usually greatest during the winter months when there is high precipitation runoff. Increased turbidity during spring and summer is associated with snowmelt runoff carrying particulates and increased primary production in surface waters. Turbidity measurements in 2001 were limited to the month of July (Figure 4-20) and thus did not include the times of year when turbidity is known to reach maximum values.

In July turbidity was low at all five locations. Evident in all transects is an increase in turbidity along the bottom, resulting from trapping and suspension of benthic particulate material. This layer was thickest in Possession Sound.

4.8 Summary of CTD Data

CTD data for 2001 were collected from February to July only. This timeframe is adequate to assess key seasonal changes occurring during spring and early summer related to increases in temperature, light intensity and daylength, yet it precludes assessment of processes that occur later in the year, such as low DO due to the decay of organic matter or increased turbidity from runoff.

The 2001 CTD transects were only partially consistent with the suspected circulation pattern of the Puget Sound Central Basin and Possession Sound. Oceanic water entering the system along the western edge of Admiralty Inlet is expected to decrease the depth of the isoclines along the western edge of the transects. In other words, the top layer of warmer, low salinity water in which algal blooms develop in spring and summer would be thinner on the west side than on the east side. This pattern was observed for the southernmost, Alki transect only, whereas an inverse pattern was evident for Edmonds and Point Wells. The transect at the entrance to Possession Sound was generally consistent with previous years, but indicates a concentration of surface water along the eastern instead of the western shoreline.

Two measures of biological activity, chlorophyll-*a* and dissolved oxygen, exhibited patterns typical of the Puget Sound region. Primary productivity, measured as changes in chlorophyll-*a* and DO in surface waters, peaked in May and was followed by a decrease in DO at depth. Unlike the previous two years, a second peak had not yet developed by July of 2001.

Figure 4-2. Pt. Wells (top 6 plots) and Possession Sound (bottom 6 plots)
Temperature (° C) 2001

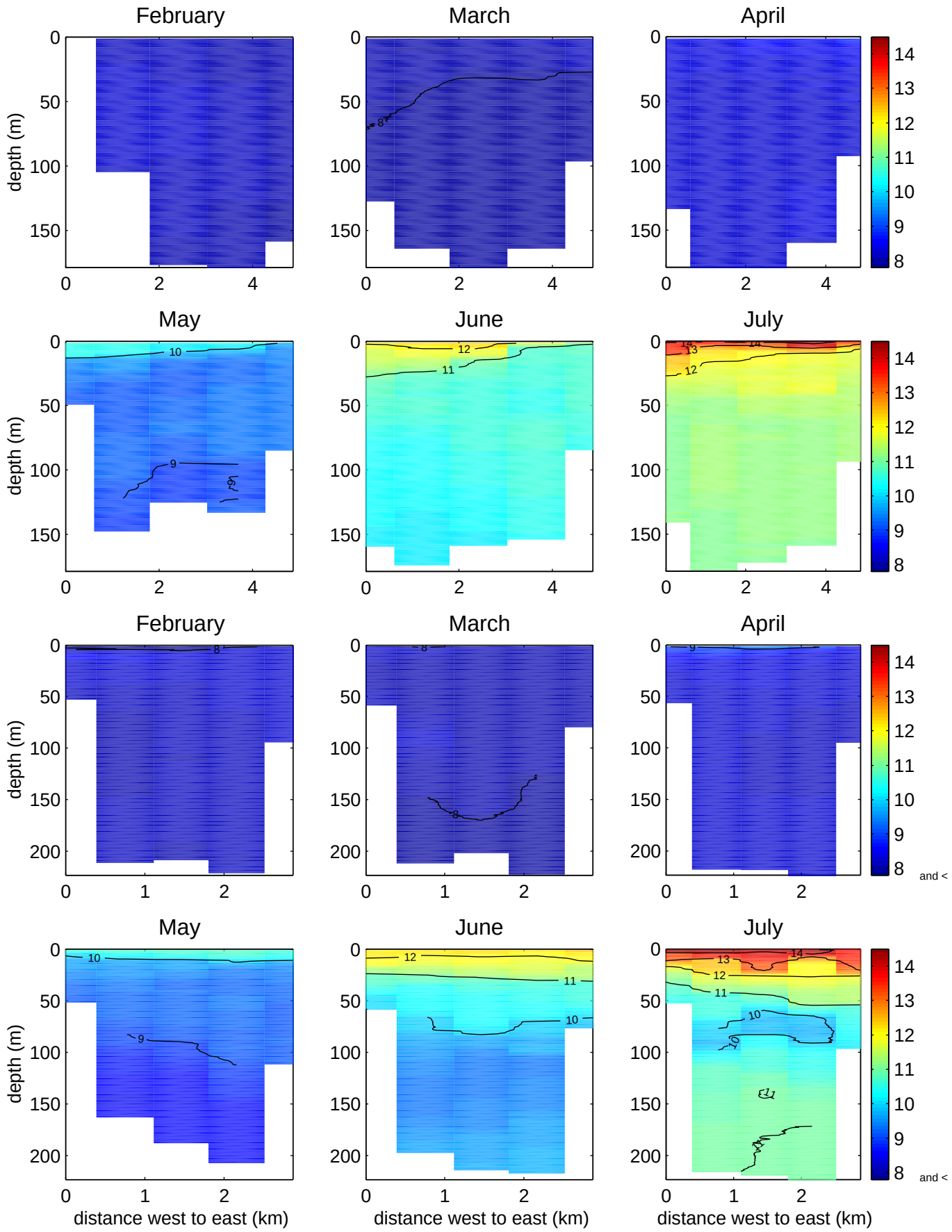


Figure 4−3. West Point (top 6 plots) and Alki (bottom 5 plots) Temperature (° C) 2001

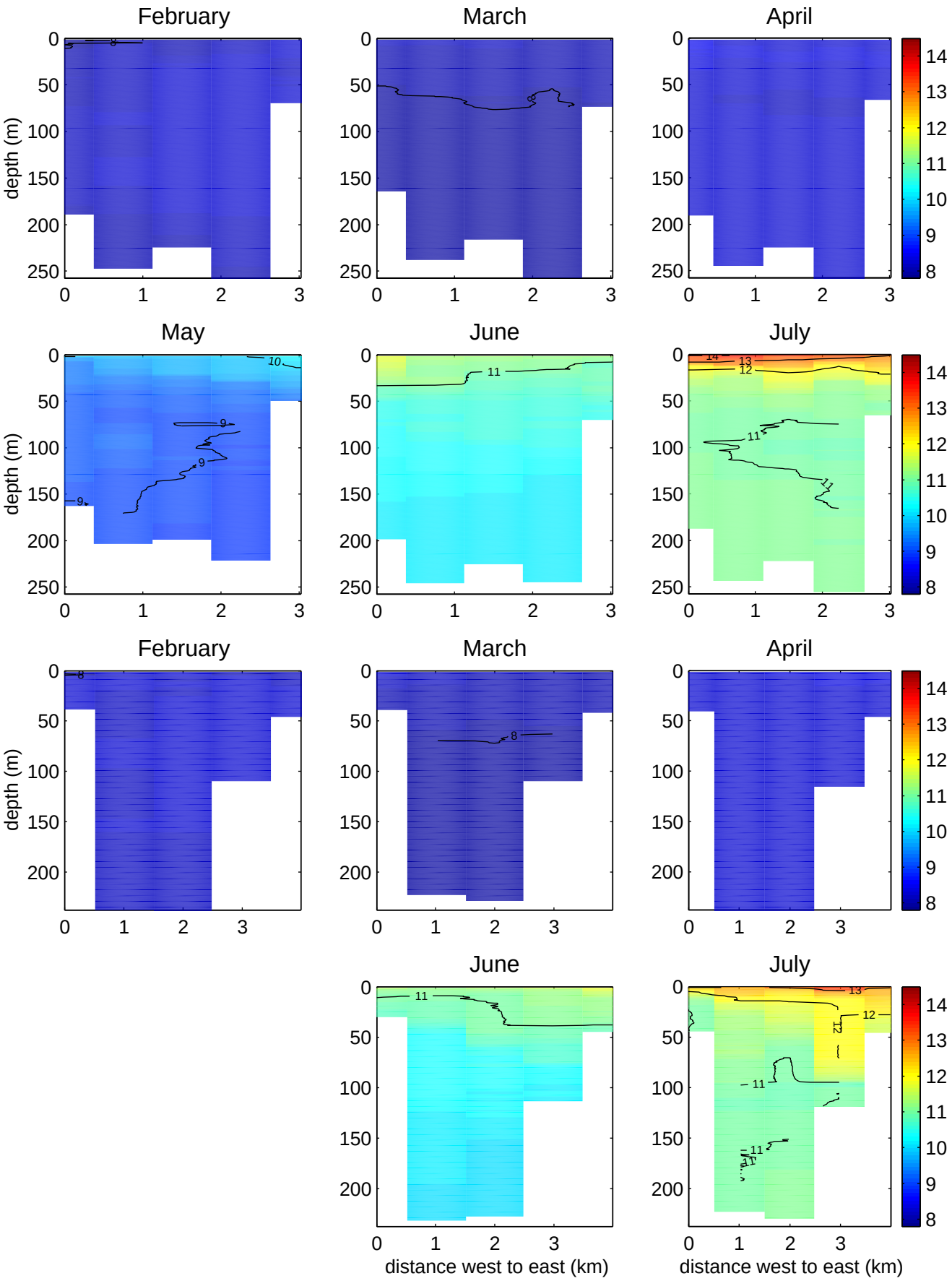


Figure 4-4. EdmondsTemperature (° C) 2001

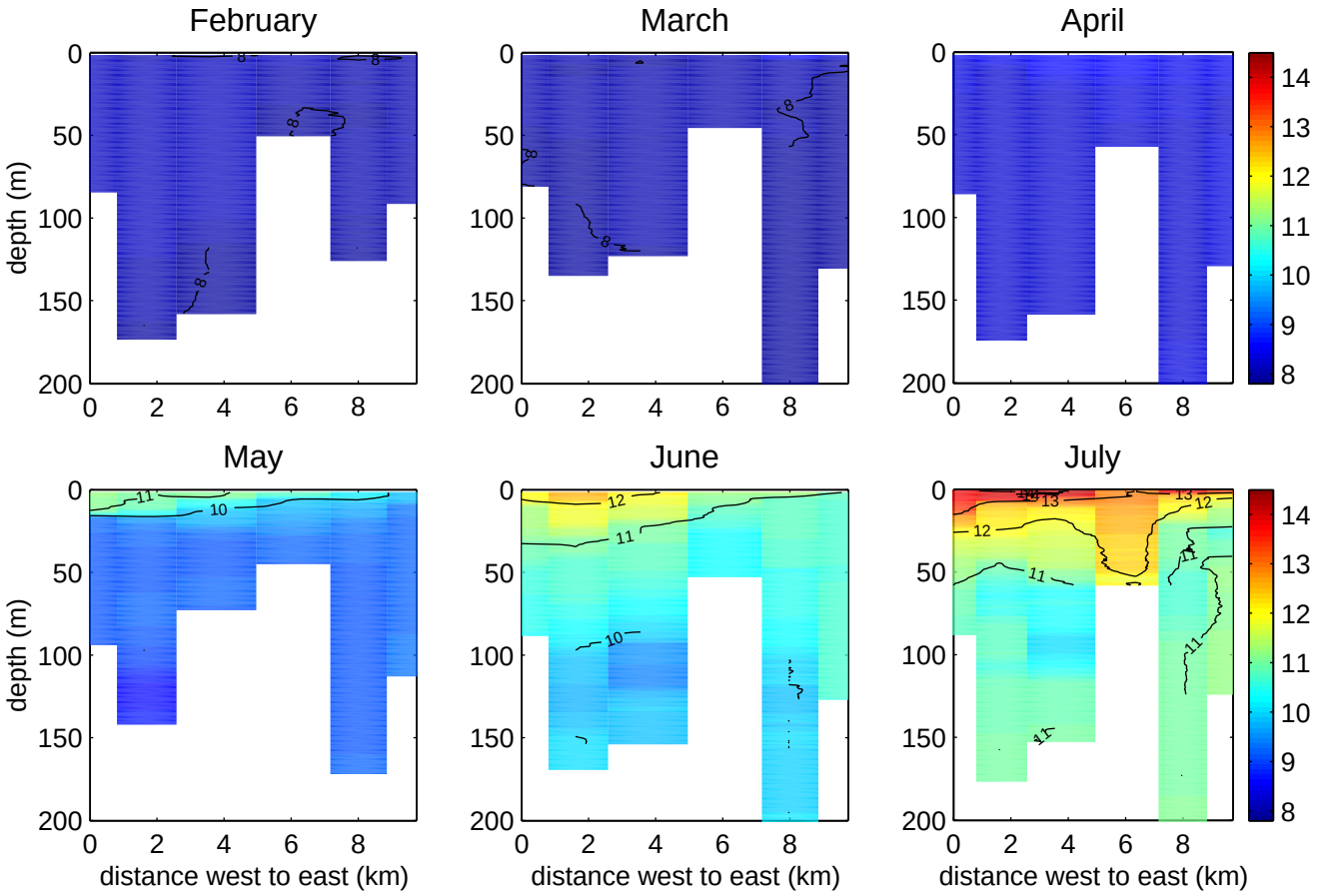


Figure 4-5. Pt. Wells (top 6 plots) and Possession Sound (bottom 6 plots) Salinity (PSS) 2001

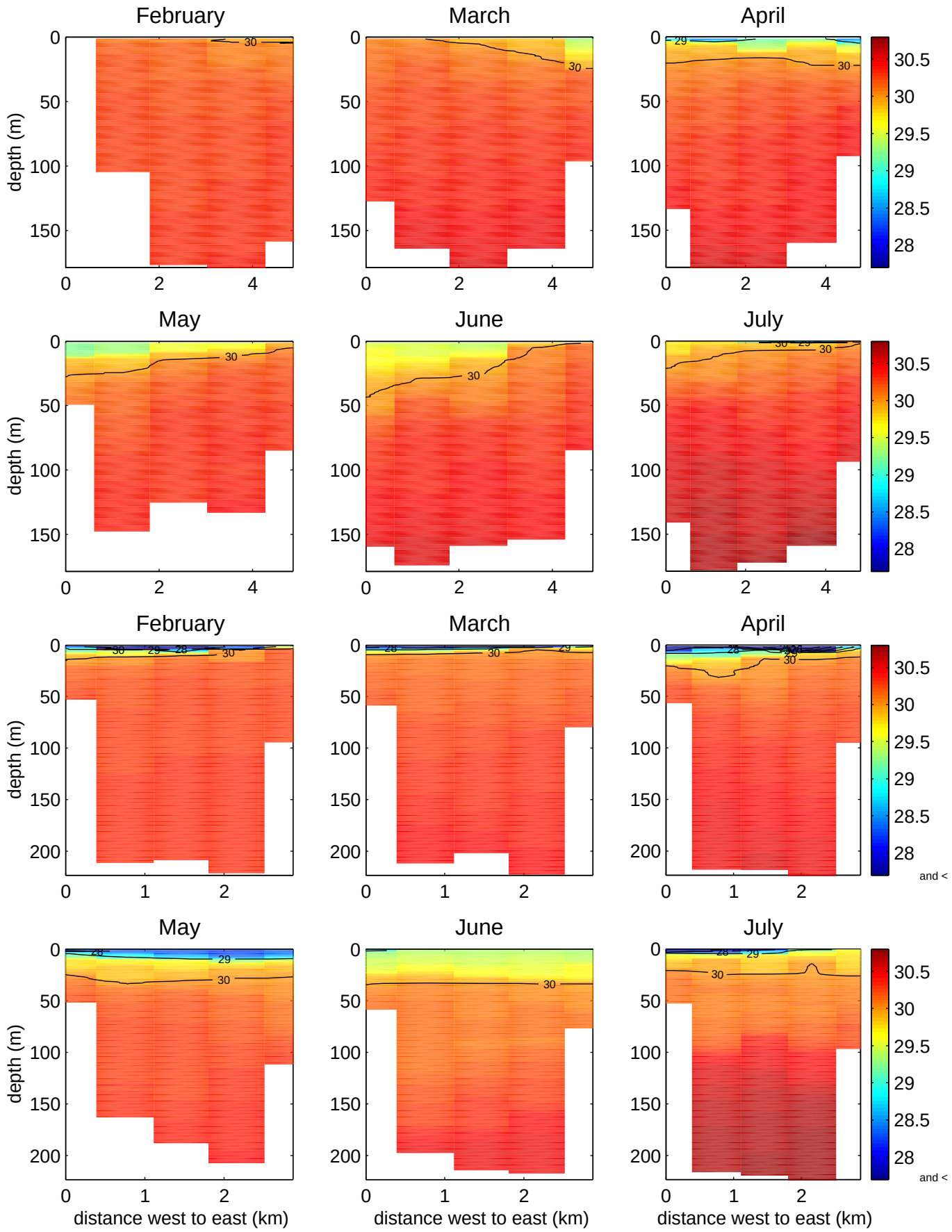


Figure 4-6. West Point (top 6 plots) and Alki (bottom 5 plots) Salinity (PSS) 2001

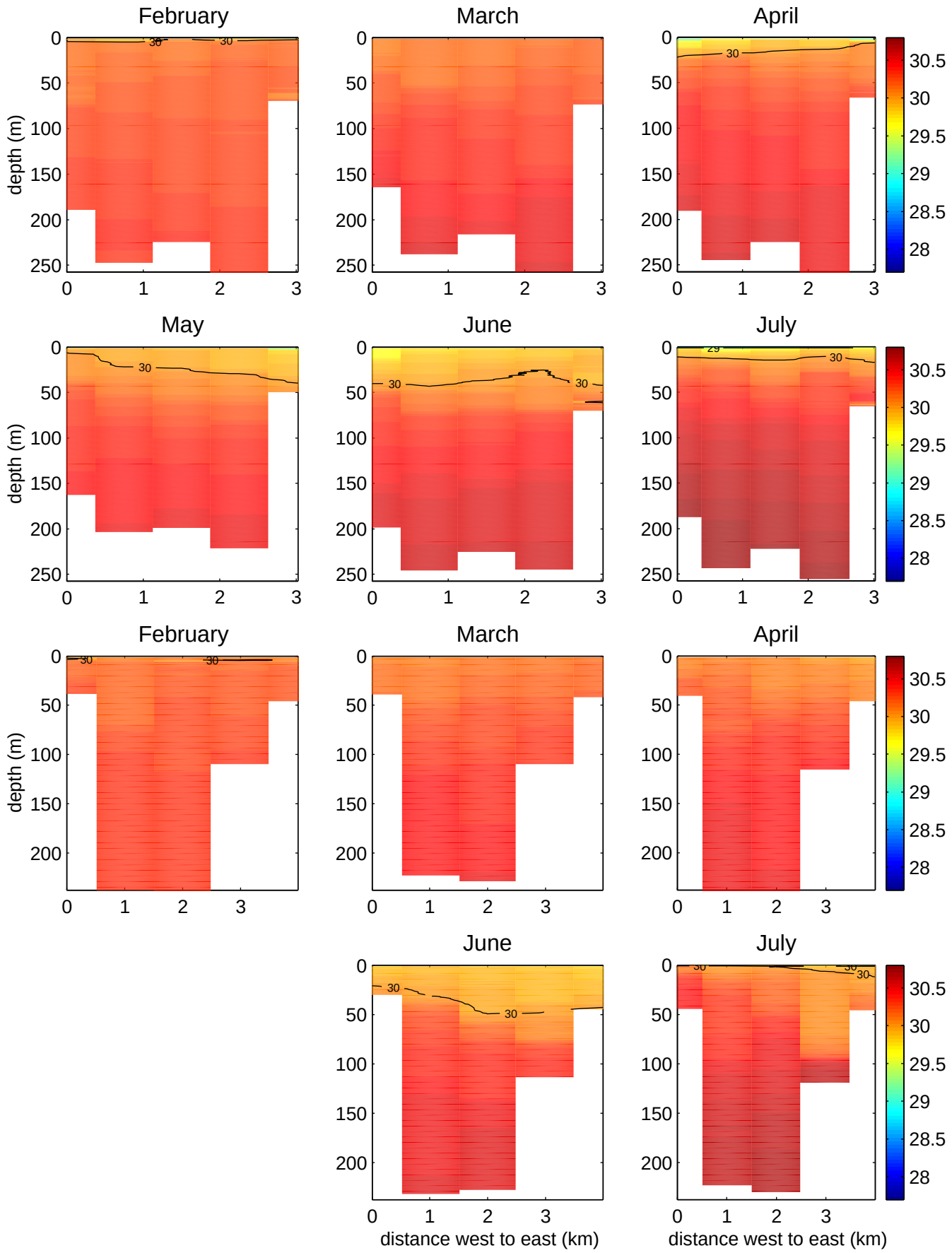


Figure 4-7. Edmonds Salinity (PSS) 2001

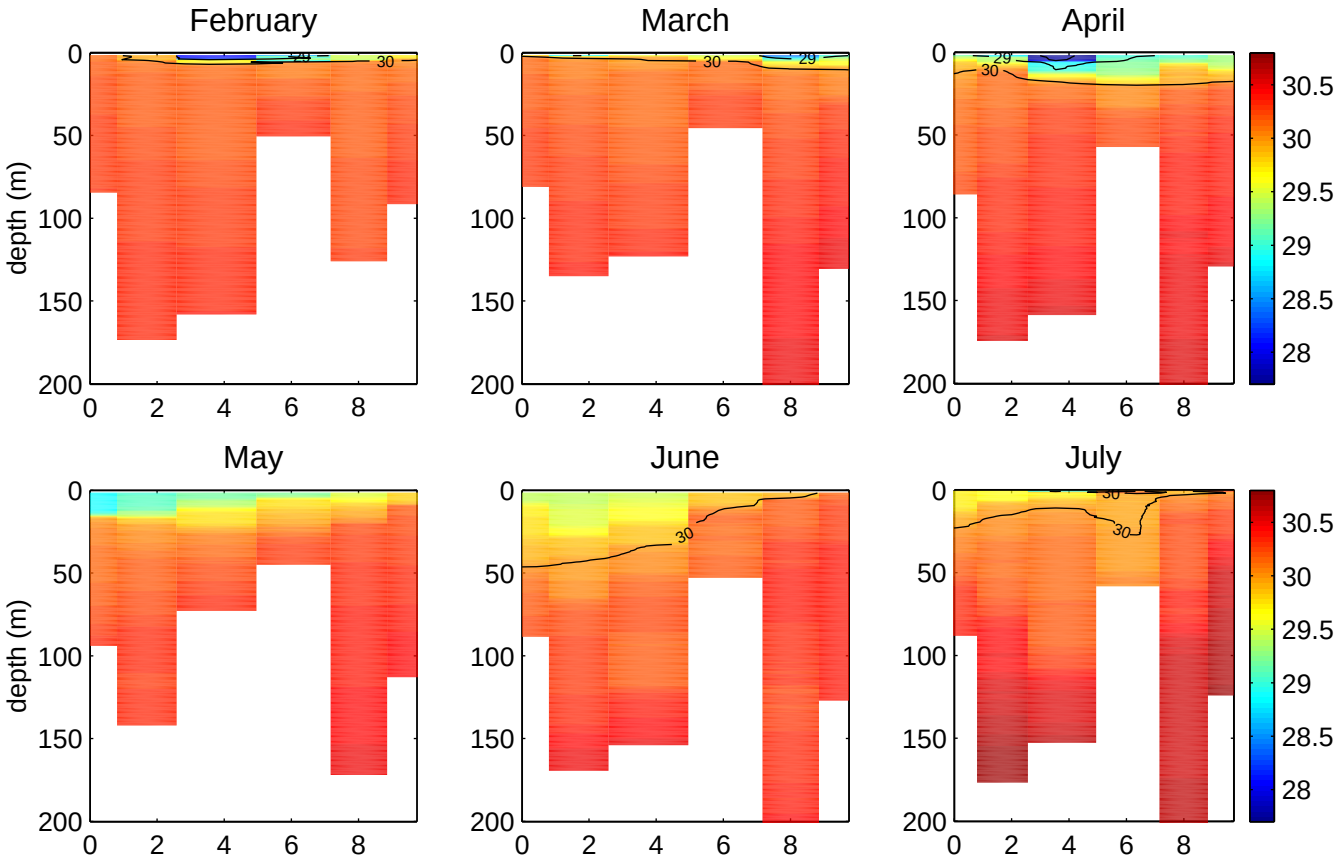


Figure 4-8. Point Wells (top 6 plots) and Possession Sound (bottom 6 plots)
Density (sigma−t) 2001

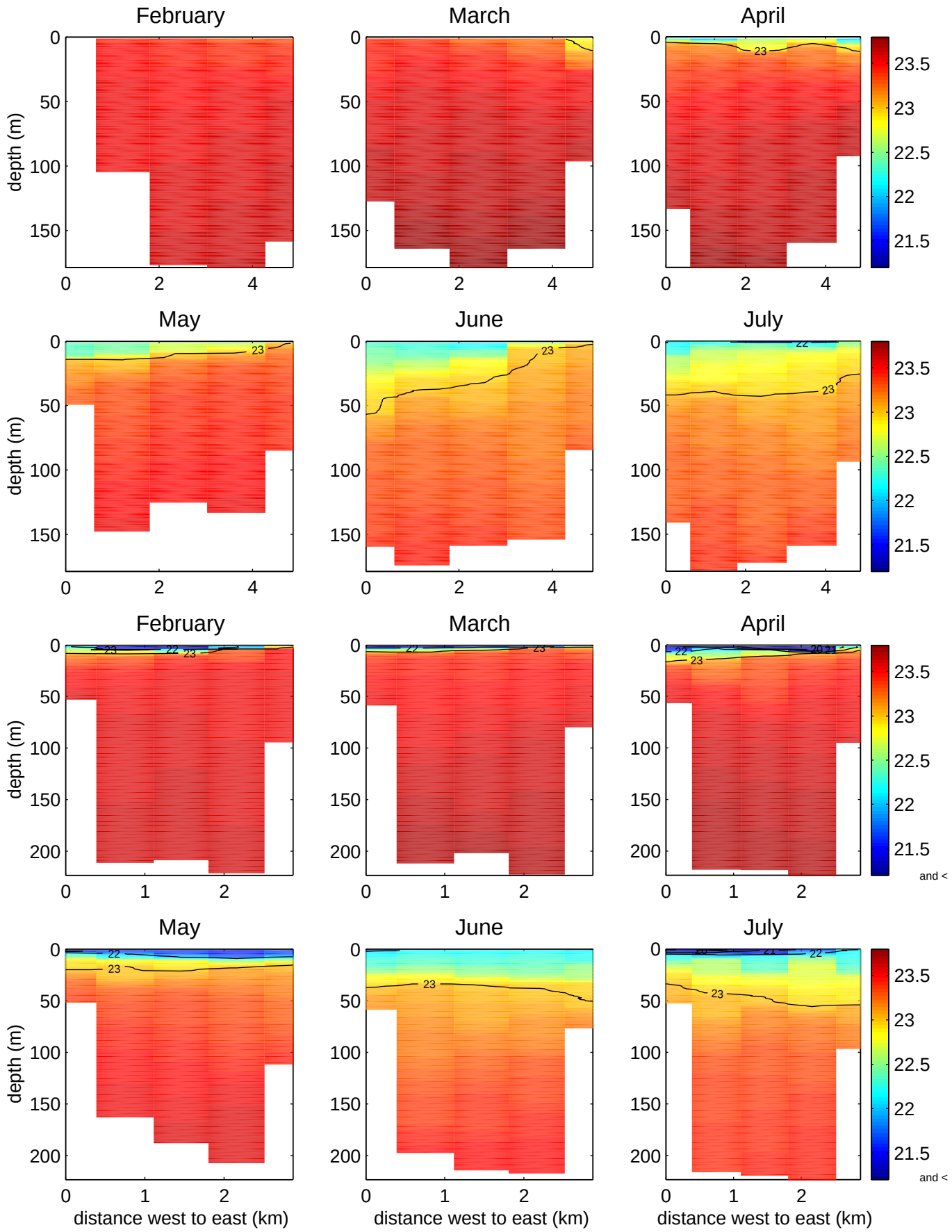


Figure 4-9. West Point (top 6 plots) and Alki (bottom 5 plots) Density (sigma−t) 2001

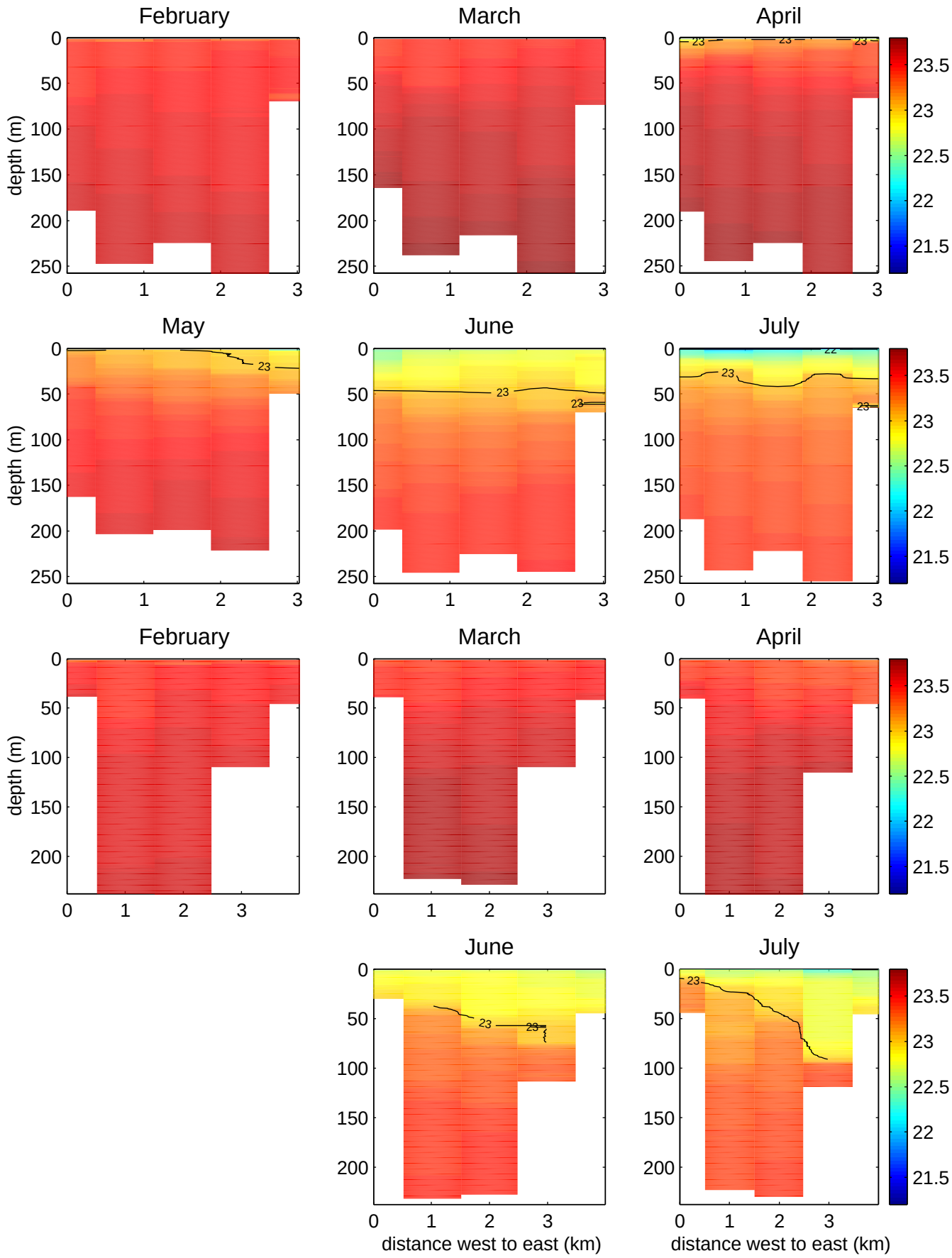


Figure 4-10. Edmonds Density (sigma−t) 2001

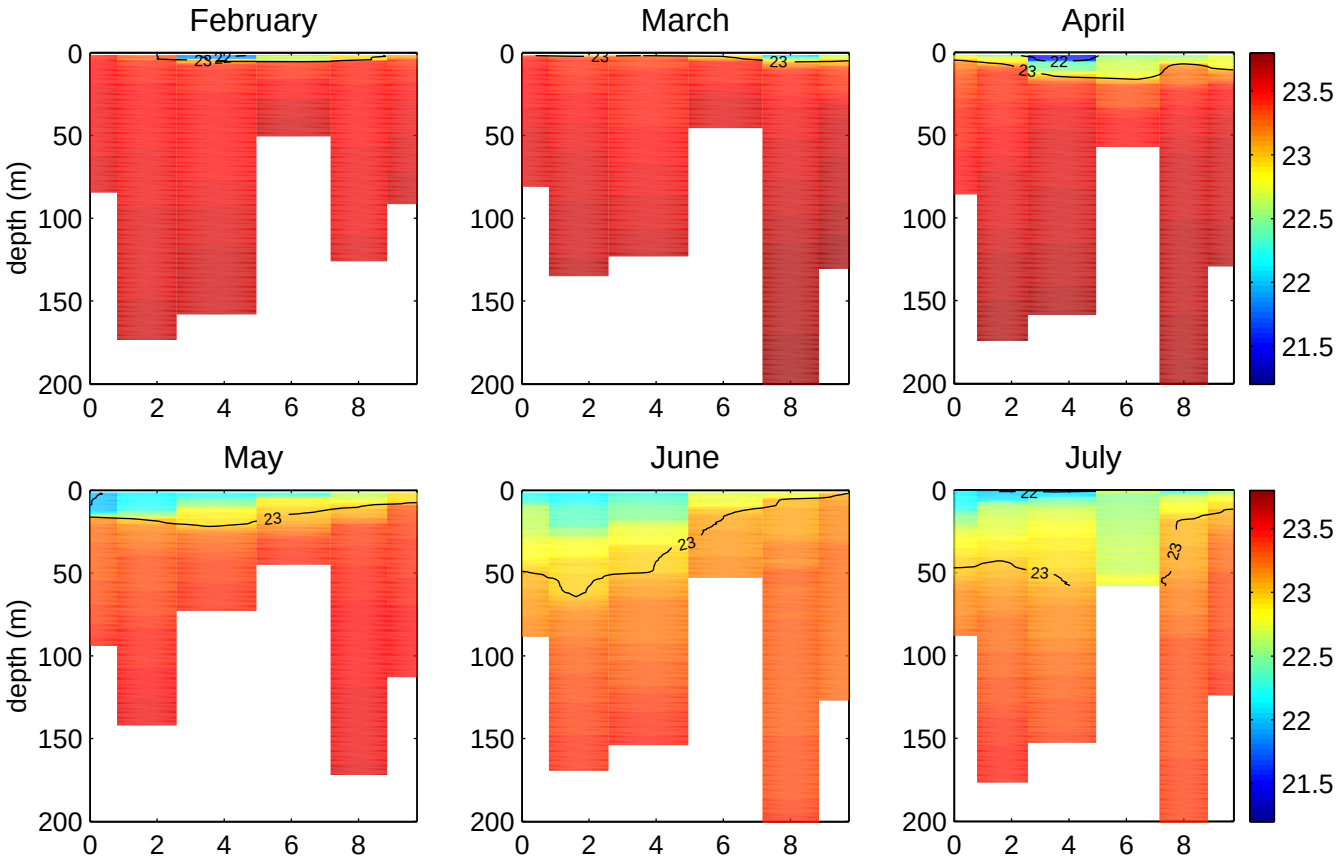


Figure 4-11. Pt. Wells (top 6 plots) and Possession Sound (bottom 6 plots) PAR (umol/m^{2}s) 2001

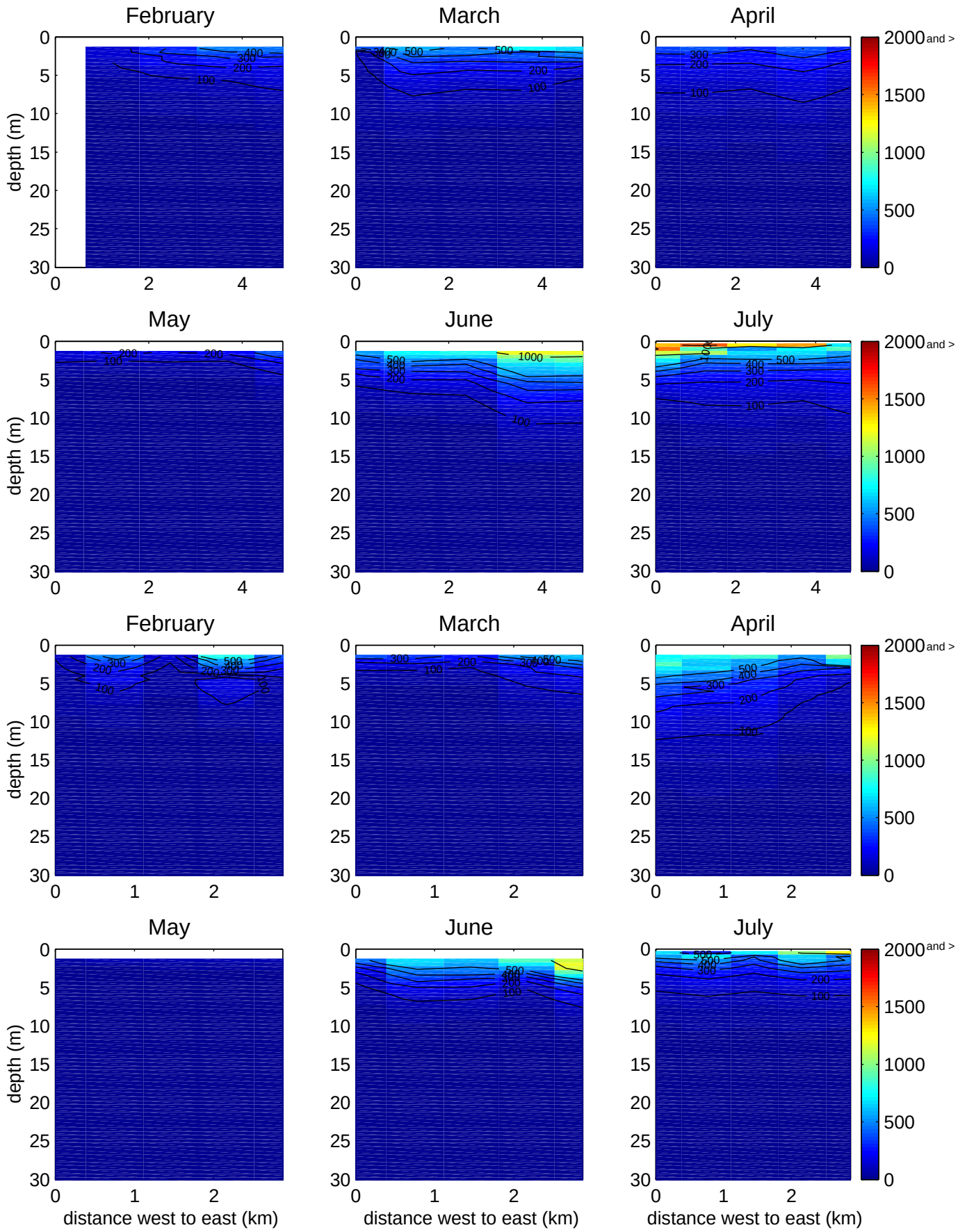


Figure 4-12. West Point (top 6 plots) and Alki (bottom 5 plots) PAR (umol/m^{2}s) 2001

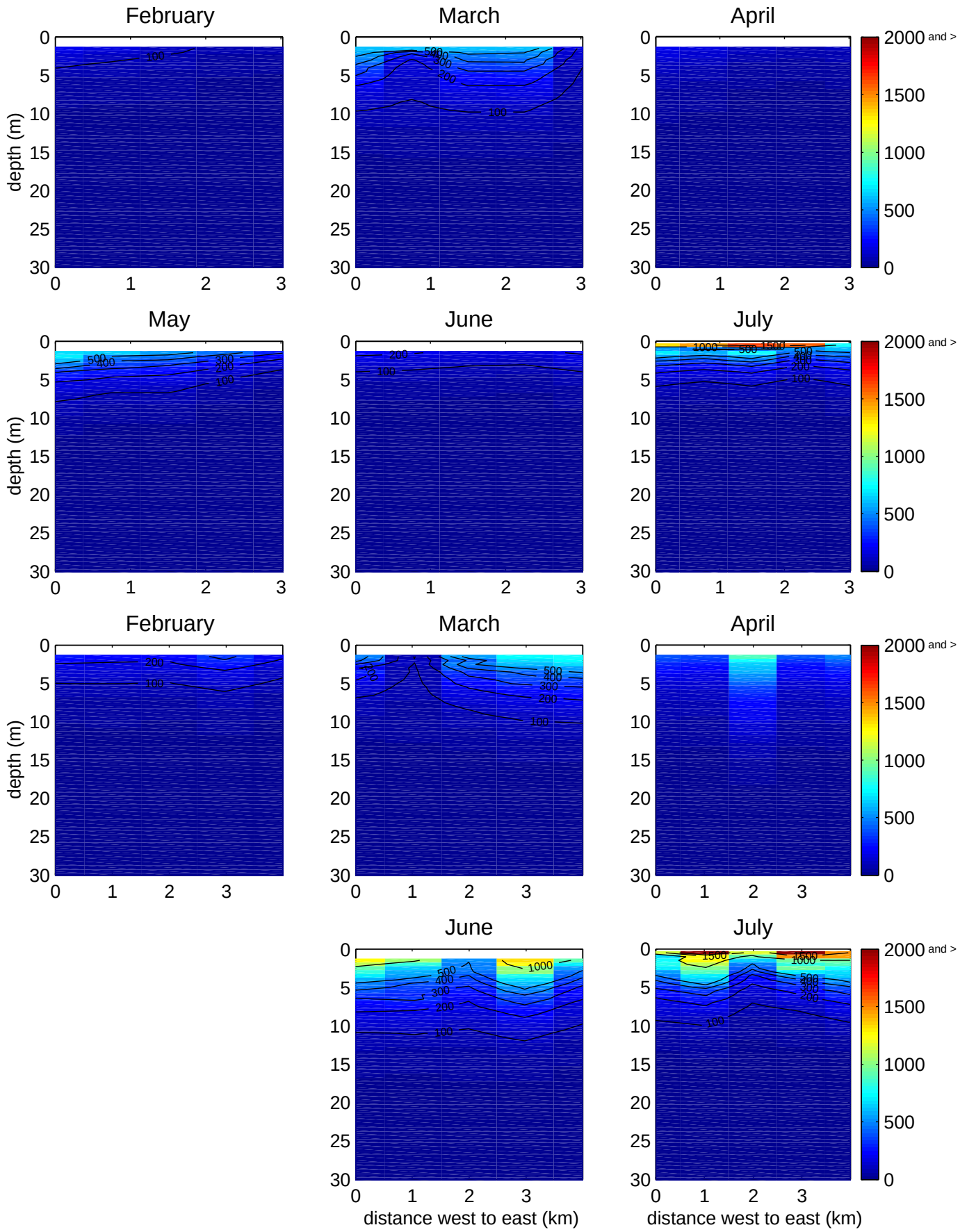


Figure 4-13. Edmonds PAR (umol/m^{2}s) 2001

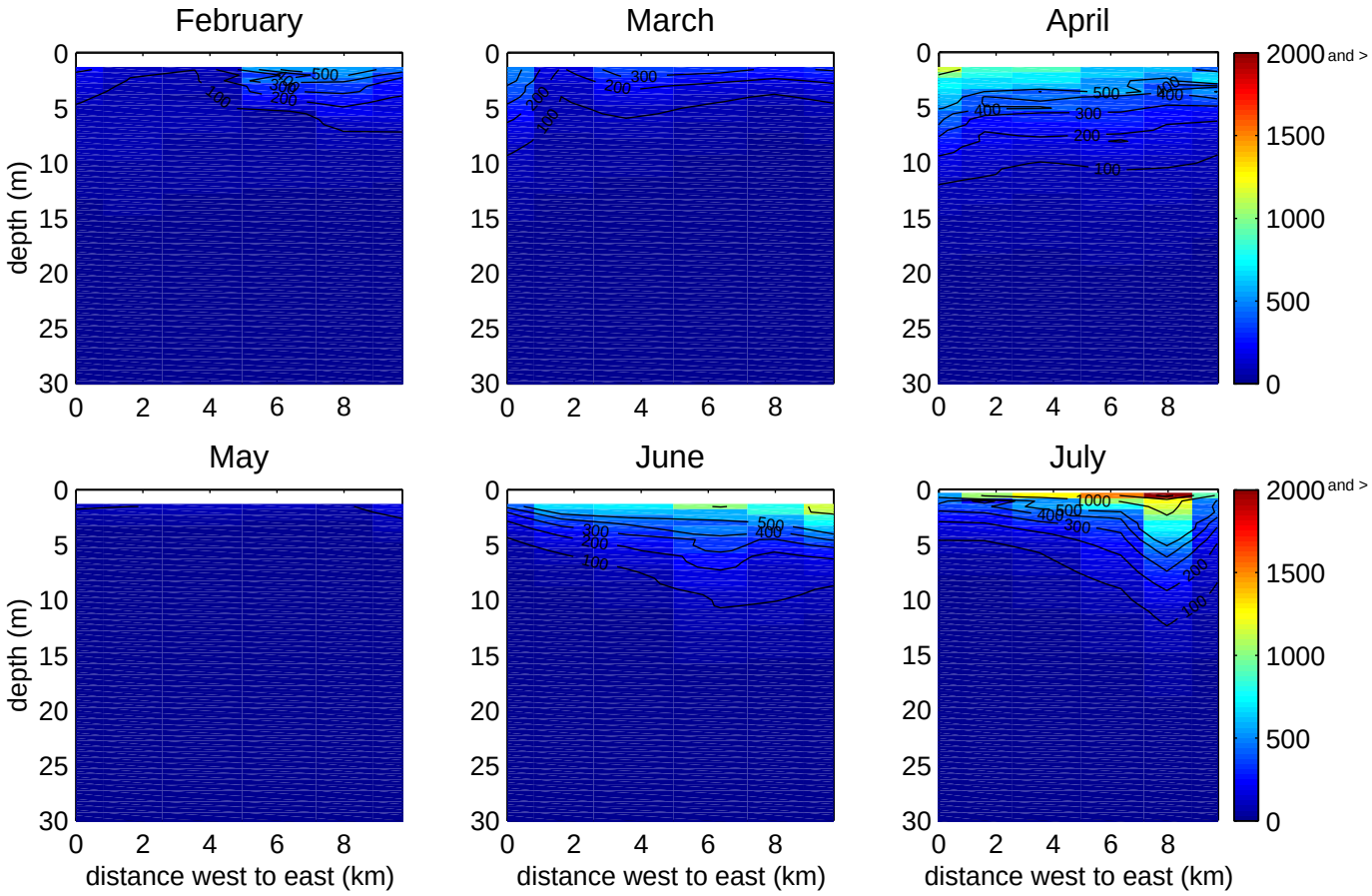


Figure 4-14. Point Wells (top 6 plots) and Possession Sound (bottom 6 plots) Chlorophyll−a (mg/m^3) 2001

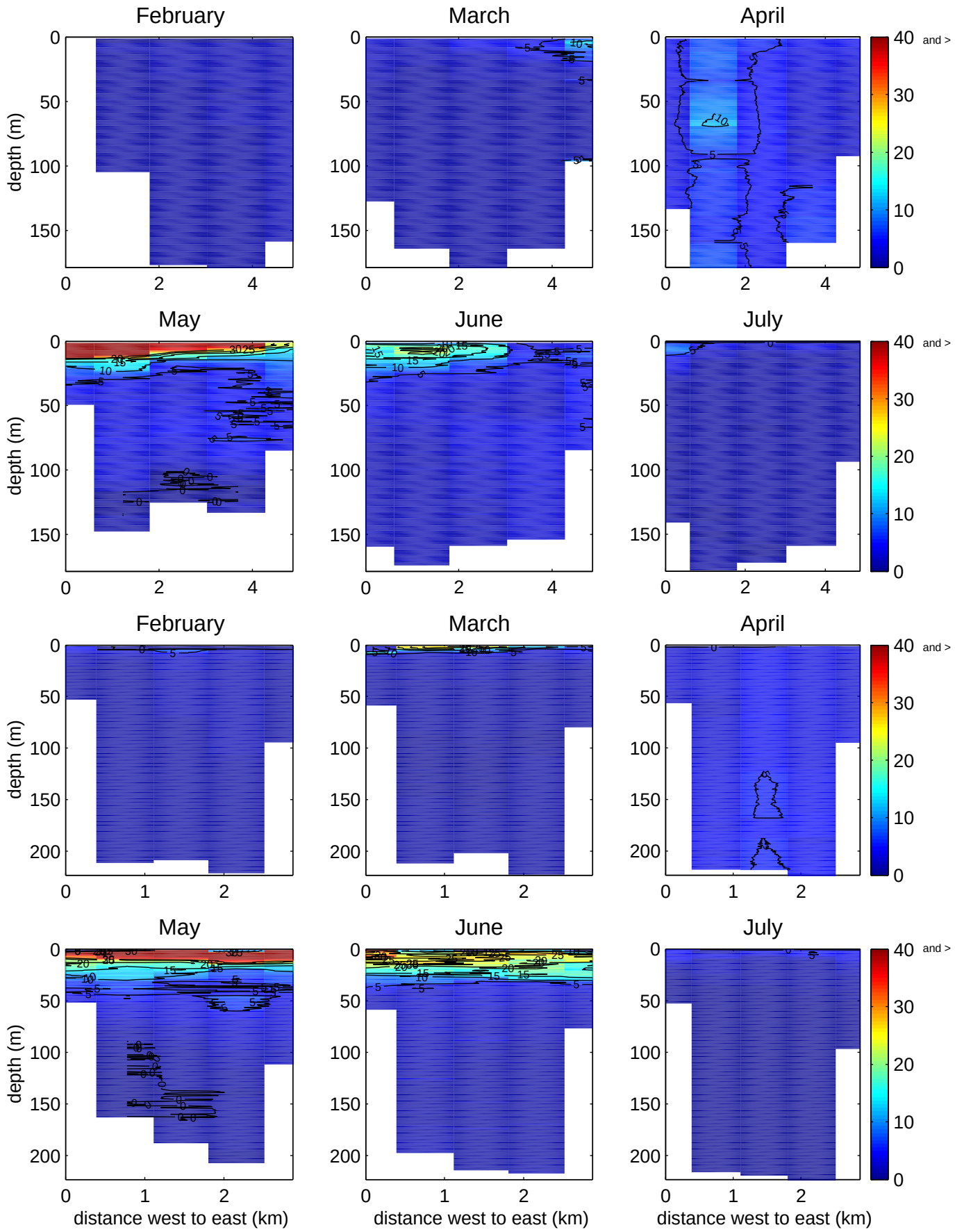


Figure 4-15. West Point (top 5 plots) and Alki (bottom 5 plots) Chlorophyll−a (mg/m^3) 2001

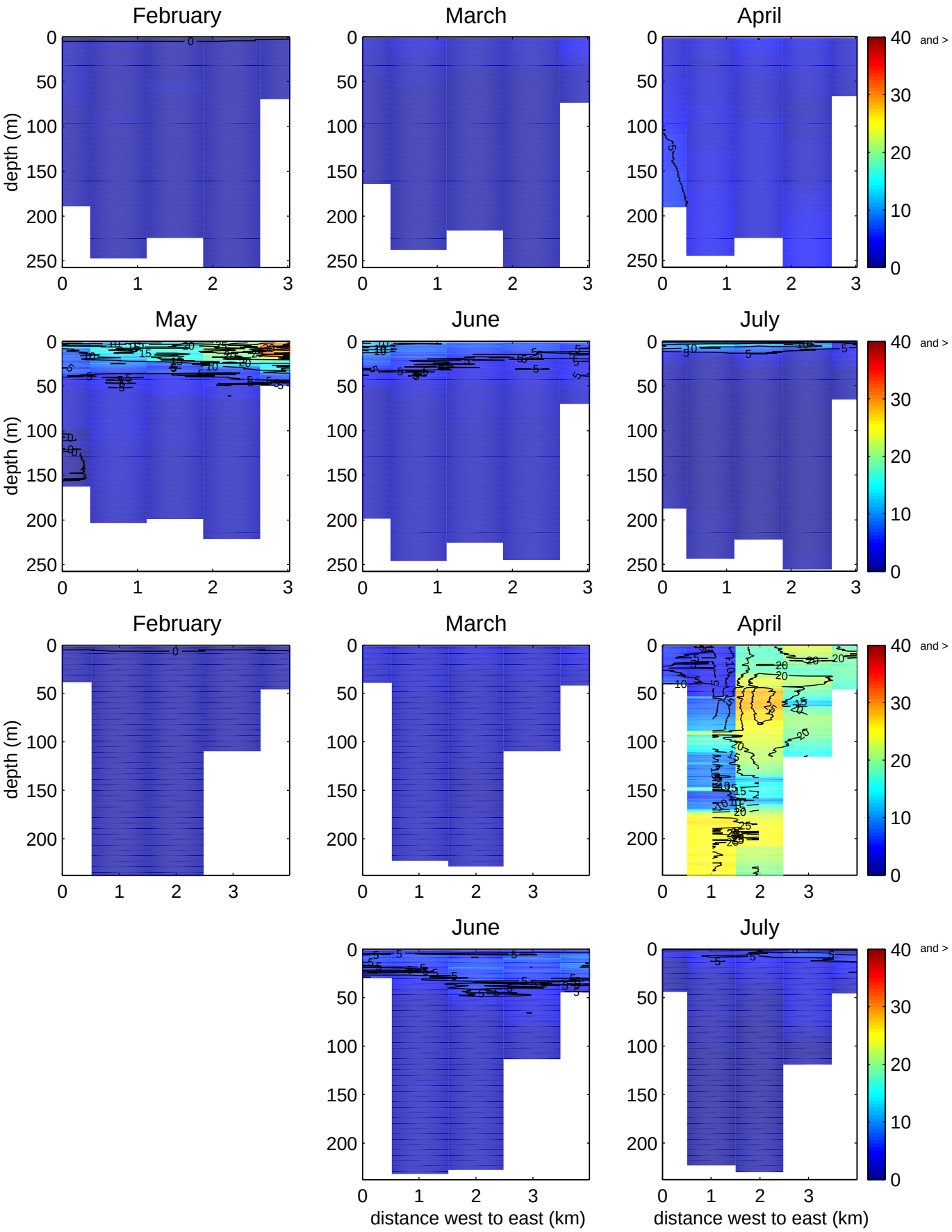


Figure 4-16. Edmonds Chlorophyll−a (mg/m^3) 2001

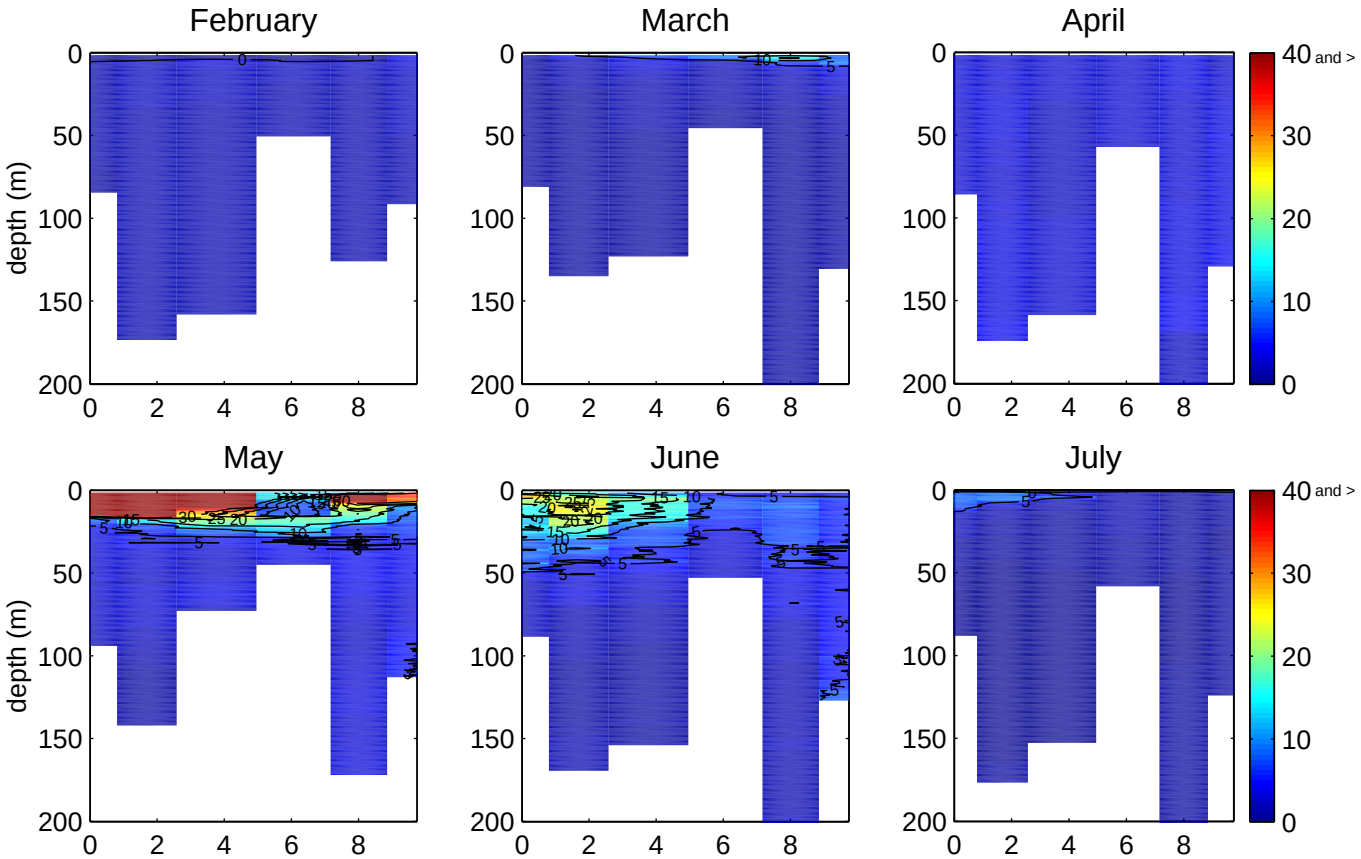


Figure 4-17. Point Wells (top 6 plots) and Possession Sound (bottom 6 plots)
Dissolved Oxygen (mg/L) 2001

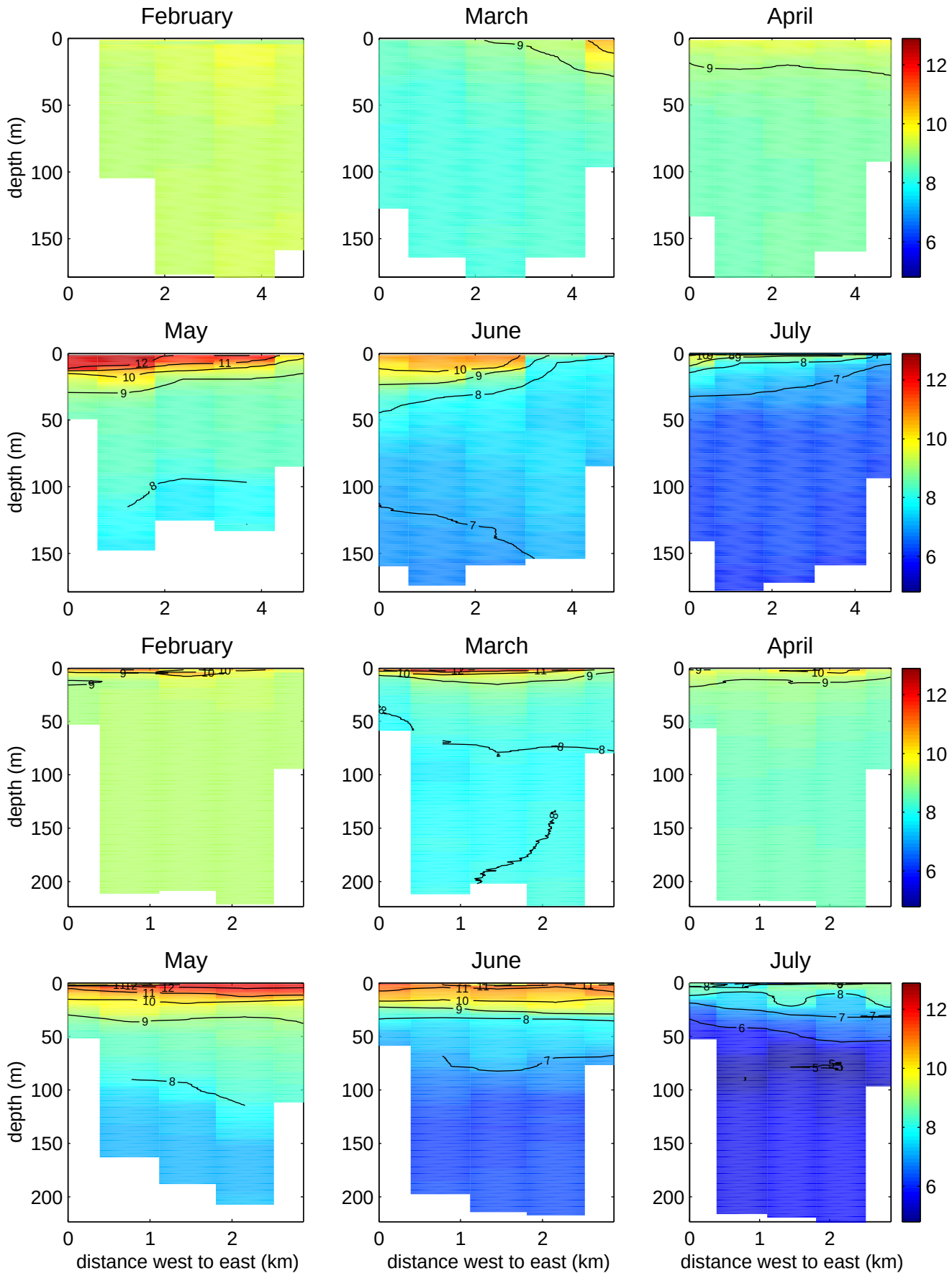


Figure 4-18. West Point (top 6 plots) and Alki (bottom 5 plots) Dissolved Oxygen (mg/L) 2001

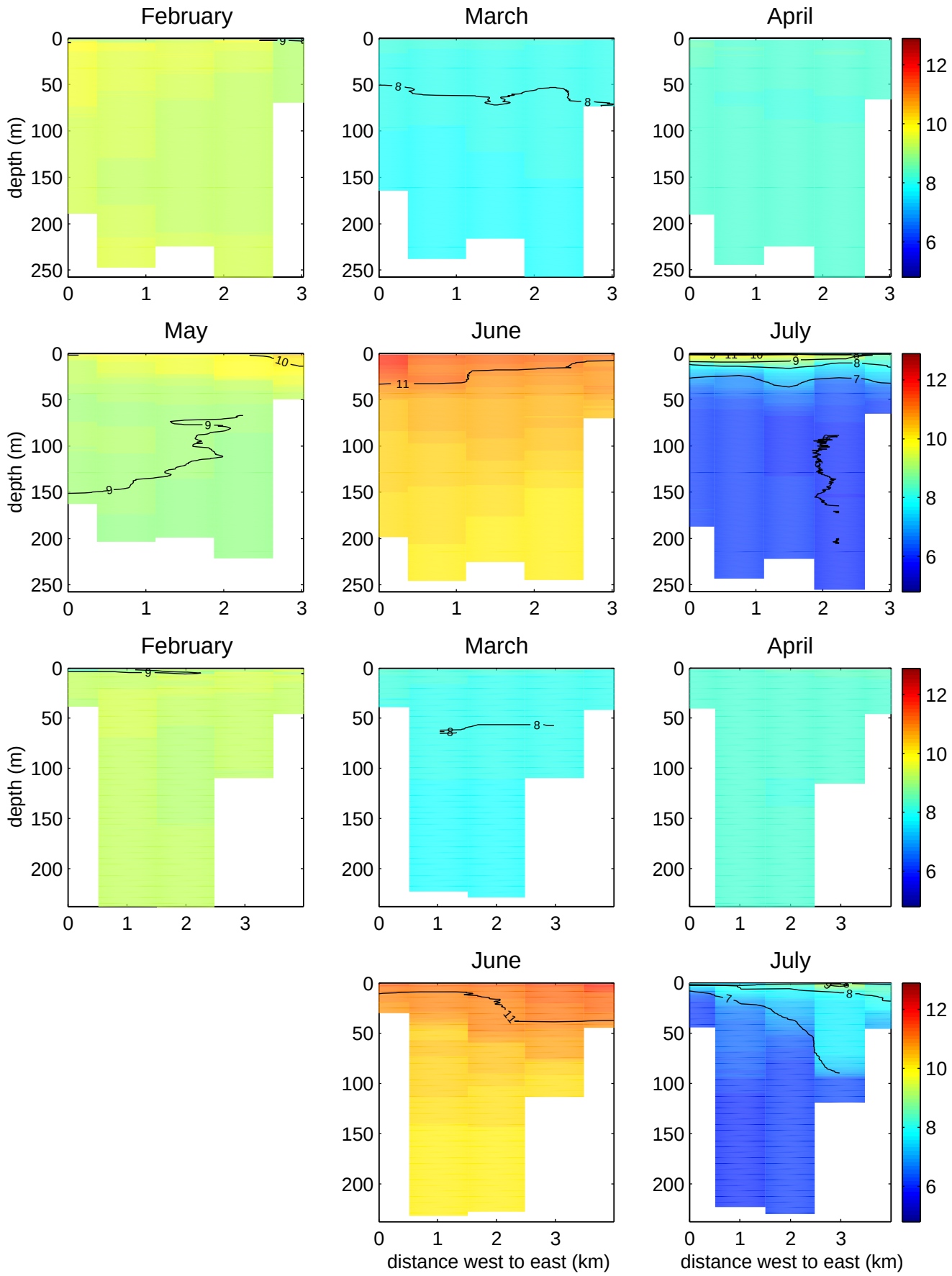


Figure 4-19. Edmonds Dissolved Oxygen (mg/L) 2001

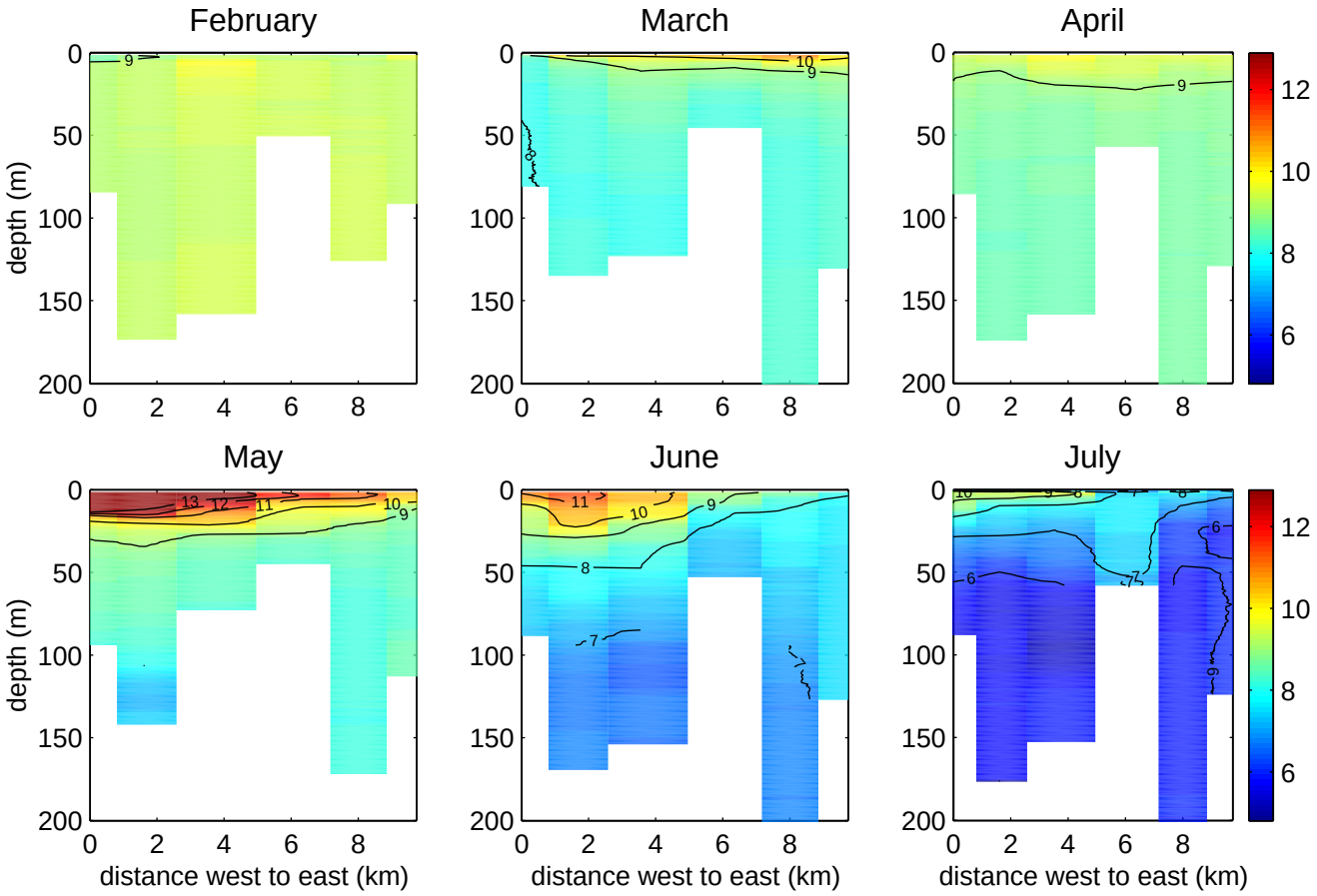
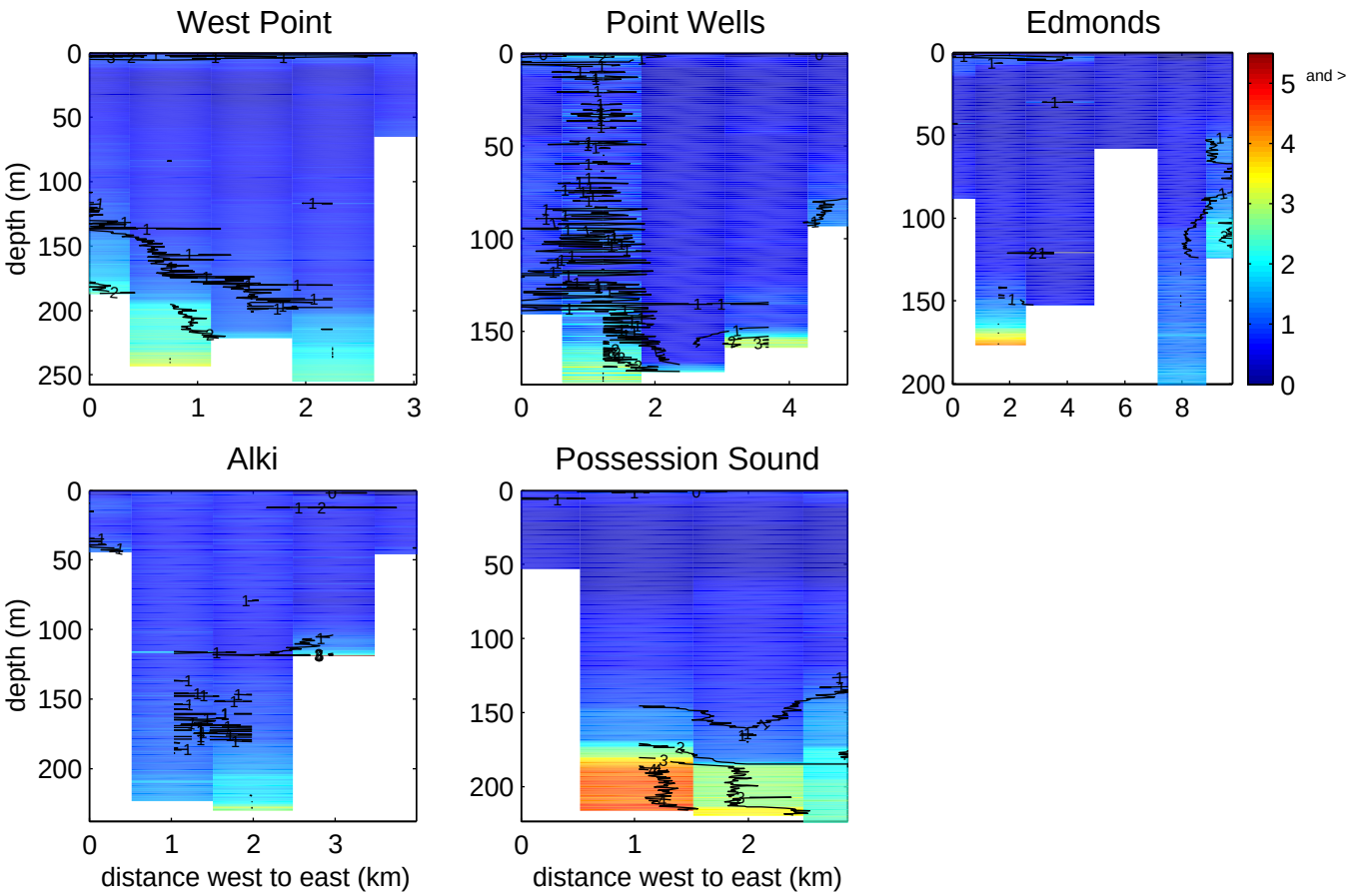


Figure 4-20. July Tubidity (FTU) 2001



SECTION 5
Glossary

Algae: Plants that grow in surface waters in relative proportion to the amount of light, nutrients, and attachment sites available. Algae are food for fish and other aquatic organisms.

Alkalinity: A measure primarily of the carbonate or carbon dioxide related compounds in water. The lower the alkalinity, the less capacity the water has to absorb acids without becoming more acidic.

Ammonium: A nitrogen-containing substance commonly excreted by animals and used by macroalgae for growth.

Anthropogenic: Caused by humans.

Benthos: The communities of aquatic life that dwell in or on the bottom sediments of a waterbody. The benthos may comprise the following: burrowing organisms such as clams, creeping animals such as snails, and sessile animals such as sponges.

Bioaccumulation: The enrichment of a chemical in an organism caused by either passive adsorption from seawater, active uptake, or ingestion, followed by retention in tissues or hard parts.

Bioaccumulative substance: Substances that increase in concentration in living organisms as they inhale or filter contaminated air or water or ingest contaminated food or water.

Biochemical Oxygen Demand (BOD): Refers to the amount of dissolved oxygen required to meet the metabolic needs of microorganisms in water, wastewater, and effluents.

Biosolids: The organic solids separated from raw wastewater or produced by the wastewater treatment process. Contain large amounts of organic matter.

cfu: Colony forming unit. A unit of measure used for describing the amount of bacteria contained in a given water volume.

Chlorophyll: Green pigments in plants, including algae, that play an important part in the chemical reactions of photosynthesis. A measurement of chlorophyll-*a*, one type of pigment, is commonly used as an indicator of the algae content of water.

Clean Water Act: Formerly known as the Federal Water Pollution Control Act.

Cleanup Screening Levels (CSL): CLSs are the criteria in the State sediment quality standards used to determine whether an area should be designated as a cleanup site.

Combined sewers: A sewer system that carries both sanitary sewage and stormwater runoff.

Combined sewer overflow (CSO): An overflow of combined wastewater and stormwater. CSOs occur when stormwater from heavy rains exceed the capacity of the wastewater collection system.

Detection limit: The lowest concentration level in a sample that can be determined to be statistically different from a blank sample.

Dissolved oxygen (DO): The oxygen that is freely available in water. Certain amounts are necessary for life processes of aquatic animals. The oxygen is supplied by the photosynthesis of plants and by aeration. Oxygen is consumed by animals, plants, and bacteria that decompose dead organic matter and some chemicals.

Effluent: Treated/untreated water or wastewater flowing out of a treatment facility, sewer, or industrial outfall. Generally refers to discharges into surface waters.

Enterococcus: Any *Streptococcus* bacteria that inhabit the intestines of warm-blooded animals. In the intestines, *Enterococci* are normal and do not cause disease. They can be pathogenic if they enter tissues, the bloodstream, or the urinary tract.

Estuary: A coastal area where fresh water mixes with salt water. It is usually in a semi-enclosed body with a source of fresh water, such as a river or stream. Estuaries provide shelter and food for marine organisms, birds, and other wildlife.

Euphotic zone: The layer of water that receives sufficient light to support photosynthesis.

Eutrophication: The progressive enrichment of confined bodies of water (such as an estuary) due to the addition of large amounts of inorganic nutrients. Excessive nutrient inputs allow large phytoplankton blooms, which use up oxygen in the underlying waters when they decompose. This deficit can kill nearby aquatic life.

Fecal coliform: Bacteria from the intestines of warm-blooded animals. Most fecal coliform bacteria are not harmful (pathogenic). They are measured or counted as an indicator of the possible presence of harmful bacteria.

Geometric mean: A calculated mean or average that is appropriate for data sets containing a few values that are very high relative to the other values. To reduce the bias introduced to an arithmetic mean (average) by these very high numbers, the natural logarithms of the data are averaged. The antilog of this average is the geometric mean.

Habitat: The physical and chemical environment that enables an aquatic organism to successfully complete its life cycle. The habitat includes food, shelter, and other factors, such as oxygen and physical characteristics.

Halocline: A layer of water which has a high rate of salinity change in the vertical dimension.

Influent: Water, wastewater, or other liquid flowing into a treatment facility.

Intertidal: The area of a beach that is exposed during low tide and covered during high tide.

Invertebrates: Animals lacking a backbone.

Macroalgae: Plants that float in the water or attach to larger plants, rocks, and other substrates. They are a normal component of aquatic ecosystems. Excessive numbers can make the water appear cloudy or colored.

Mean: Same as average. The sum of a list of values divided by the number of items on the list.

Median: The midpoint in a set of values that have been arranged in order.

Method detection limit (MDL): The minimum concentration of a substance that can be measured and reported with 99 percent confidence that the concentration is greater than zero.

mgd: A unit of measure equal to million gallons per day.

mg/L: Milligrams per liter. Used in describing the amount of a substance in a given volume of liquid. Equal to parts per million (ppm).

µg/L: Micrograms per liter. Equal to parts per billion (ppb).

Monitor: The systematic and repeated measurement of conditions in order to track changes and assess the data gathered.

mpn: Most probable number. A unit of measure used for describing the amount of bacteria contained in a solid matrix, such as shellfish tissue.

National Pollutant Discharge Elimination System (NPDES): NPDES comes from Section 402 of the Clean Water Act. It prohibits the discharge of pollutants into navigable waters of the united States unless a special permit is issued by the EPA, a state, or tribal government.

Nearshore: Areas near the beach or shoreline influenced by light and wave action that may or may not be exposed at low tide.

Nitrate, nitrite: Two forms of nitrogen compounds that algae may use for growth. High concentrations may lead to algal blooms and undesirable effects.

Nonpoint source: An input of pollutants into a water body from unidentifiable sources, such as agriculture, the atmosphere, stormwater or groundwater runoff.

Nutrient: An inorganic or organic compound essential for growth of organisms.

Organic: Refers to living organisms and to the chemistry of compounds containing carbon.

Outfall: Discrete location where quantities of water and/or waste are discharged into lakes, streams, or oceans, generally through a pipe.

Pathogen: A microorganism that can cause disease in other microorganisms, humans, animals, or plants. Pathogens can be present in point and nonpoint source discharges.

Parameter: One of a set of properties whose values determine the characteristics of a waterbody. Examples include dissolved oxygen, temperature, and salinity.

Phytoplankton: Free-floating, single-celled, microscopic plants that live in water (also called unicellular algae).

Plankton: Organisms that drift passively or are weak swimmers, mostly phytoplankton, protozoa, larval animals, and small filter-feeding zooplankton. Are generally found in the surface layers of a waterbody.

Point source: An input of pollutants into a waterbody from discrete sources, such as municipal or industrial outfalls.

Polychaeta: A class of annelid worms that includes most of the marine segmented worms.

Primary treatment: The first stage of wastewater treatment involving removal of debris and solids by screening and settling.

Pycnocline: A layer of water which has a high rate of density change in the vertical dimension.

Raw sewage: Untreated wastewater.

Reported detection limit (RDL): The level below which the laboratory does not report numerical values.

Salinity: A measure of the amount of dissolved solids in seawater. It is usually calculated from conductivity, refractive index, or chlorinity.

Secchi disk: A black and white painted disk that is used to measure the clarity of water. The disk is lowered into the water until it is not visible. The Secchi disk reading is half the distance between that depth and the depth at which the disk can be seen again.

Secondary treatment: The stage following primary treatment and which bacteria are used to consume organic wastes. Wastewater is then disinfected and discharged through an outfall.

Sediment Quality Standards (SQS): Standards established by the Washington State Department of Ecology for selected organic compounds and metals in sediments (Chapter 173-204 WAC). These standards are derived from the Puget Sound Apparent Effects Thresholds for selected chemicals.

Sill: A submarine ridge partially separating bodies of water, such as fjords, from one another or from the open ocean.

Standard: An established limit for a substance in water or sediment or a physical property of the water or sediment.

Subtidal sediments: Sediments below the lowest reach of the low tide.

Thermocline: A layer of water in which a rapid change in temperature can be measured in the vertical dimension.

Total suspended solids (TSS): Particles, both mineral (clay and sand) and organic (macroalgae and small pieces of decomposed plant and animal material), that are suspended in water.

Transparency: A measure of water clarity, often measured by using a Secchi disk.

Turbidity: Lack of water clarity caused by suspension of minute particles, usually algae, silt, clay, or dissolved materials.

Upwelling: The process by which deep, cold, nutrient-laden water is brought to the surface, usually by wind divergence of equatorial currents or coastal winds which push water away from the coast.

Washington Administrative Code (WAC): The regulations adopted by various Washington State agencies through the rule-making process.

Wastewater: Flow of liquids and solids within a sewerage system.

Water column: The area of water contained between the surface and the bottom of a waterbody.

Zooplankton: Small animals that drift passively or weakly swim in the water.

SECTION 6
References

APHA (American Public Health Association), American Water Works Association, Water Environment Federation. 1992. *Standard Methods for the Examination of Water and Wastewater, 18th Edition*.

Blue Water Engineering. 2002. *Subsurface Positional Tracking of a Van Veen Sampler in Deep Water*. Prepared for King County Environmental Laboratory. Seattle, WA.

Clarkson, T. W. 1991. *Inorganic and Organometal Pesticides. In: Handbook of Pesticide Toxicology.* Hayes, W. J. and Laws, E. R., Eds. Academic Press, New York, NY, 1991.10-161.

DiToro, D.M., C.S. Zarba, D.J. Hansen, W.J. Berry, R.C. Swartz, C.E. Cowan, S.P. Pavlou, H,E. Allen, N.A. Thomas, and P.R. Paquin. 1991. *Technical Basis for Establishing Sediment Quality Criteria for Nonionic Organic Chemicals Using Equilibrium Partitioning.* Environmental Toxicology and Chemistry, 10:1541-1583.

Ebbesmeyer, C.C., G.A. Cannon, B.J. Nairn, M. Kawase, and W.P. Fox, 2001. *Puget Sound Physical Oceanography Related to the Triple Junction Region*. Interim Report for King County Department of Natural Resources, September 2001.

Ebbesmeyer, C.C., R.A. Harman, and R.J. Stewart. 1998. *Possible Impacts of Tidal Refluxing on Southern Puget Sound Benthos.* Puget Sound Research Conference 1998 Proceedings. Puget Sound Water Quality Action Team, Olympia, WA.

EPA (U.S. Environmental Protection Agency). 1988. *Sediment Quality Values Refinement, 1988 Update and Evaluation of Puget Sound AETs. Volume I.* Prepared by the Puget Sound Estuary Program.

EPA. 1995. *Method 1669: Sampling Ambient Water for Trace Metals at EPA Water Quality Criteria Levels.* EPA-R-95-034 (April 1995 Draft). Office of Water. Washington D.C.

FDA (U.S. Food & Drug Administration). 1993a. *Guidance Document for Arsenic in Shellfish*. Center for Food Safety and Applied Nutrition, Food and Drug Administration, Washington, D.C.

FDA. 1993b. *Guidance Document for Cadmium in Shellfish*. Center for Food Safety and Applied Nutrition, Food and Drug Administration, Washington, D.C.

FDA. 1993c. *Guidance Document for Chromium in Shellfish*. Center for Food Safety and Applied Nutrition, Food and Drug Administration, Washington, D.C.

FDA. 1993d. *Guidance Document for Lead in Shellfish*. Center for Food Safety and Applied Nutrition, Food and Drug Administration, Washington, D.C.

FDA. 1993e. *Guidance Document for Nickel in Shellfish*. Center for Food Safety and Applied Nutrition, Food and Drug Administration, Washington, D.C.

FDA. 1995. *Action Levels for Poisonous or Deleterious Substances in Human Food and Animal Feed*. Center for Food Safety and Applied Nutrition, Food and Drug Administration, Washington, D.C.

Hou, X. and X. Yan. 1998. *Study on the Concentration and Seasonal Variation of Inorganic Elements in 35 Species of Marine Algae*. Sci. Total Environ. 222(141-156).

Kennish, M.J. 1998. *Pollution Impacts on Marine Biotic Communities*. CRC Press, Boca Raton, Florida.

King County Dept. of Natural Resources (King County). 2002. *Sediment Chemistry and Benthic Infauna: Basline Sediment Characterization Study for the Brightwater Marine Outfall.* King County Dept. of Nat. Resources. Seattle, WA.

King County. 2001. *Water Quality Status Report for Marine Waters, 1999 and 2000*. King County Dept. of Nat. Resources. Seattle, WA.

King County. 2001b. *2001 NPDES Sediment Monitoring Plan for the South Plant, Vashon Island, and Alki CSO TP Outfalls: Sampling and Analysis Plan*. Seattle, WA

King County. 1998. *1998 NPDES Sediment Baseline Monitoring Plan for the West Point Outfall: Sampling and Analysis Plan*. Prepared for the Washington Department of Ecology.

King County. 1997. *Standard Protocols for Marine Sediments*. King County Environmental Laboratory.

King County. 1994. *Water Quality Status Report for Marine Waters-King County Area 1993*. Seattle, WA.

Krone, C.A., D.W. Brown, D.G. Burrows, R.G. Bogar, S.L. Chan, and U. Varanasi. 1989. *A Method for Analysis on Butyltin Species and the Measurement of Butyltins in Sediment and English Sole Livers from Puget Sound*. Marine Environmental Research 27: 1-18.

Long, E.R., J. Hameedi, A. Robertson, M. Dutch, S. Aasen, K. Welch, S. Magoon, R.S. Carr, T. Johnson, J. Biedenbach, K.J. Scott, C. Mueller, and J. Anderson. 2000. Sediment Quality in

Puget Sound Year 2--Central Puget Sound. Publication No. 00-03-055. Washington Dept. of Ecology, Olympia, WA.

Long, E.R., J. Hameedi, A. Robertson, M. Dutch, S. Aasen, C. Ricci, K. Welch, W. Kammin, R.S. Carr, T. Johnson, J. Biedenbach, K.J. Scott, C. Mueller, and J. Anderson. 1999. Sediment Quality in Puget Sound Year 1--Northern Puget Sound. Publication No. 99-347. Washington Dept. of Ecology, Olympia, WA.

Michelsen, Teresa C. 1992. *Organic Carbon Normalization of Sediment Data.* Technical Information Memorandum. Olympia, WA: Washington State Department of Ecology, Sediment Management Unit. p8.

NOAA. 2001. *Local Climatological Data: 2001 Annual Summary With Comparative Data*. NOAA, National Climatic Data Center. Asheville, NC.

NSSP (National Shellfish Sanitation Program). 1995. *National Shellfish Sanitation Program Manual of Operations, Part I, Sanitation of Shellfish Growing Areas*. U.S. Department of Health and Human Services, Public Health Service, Food and Drug Administration.

Phillips, D.J.H. 1994. *Macrophytes as Biomonitors of Trace Metals*. In: *Biomonitoring of Coastal Waters and Estuaries* (K.J.M Kramer, ed.), pp. 85-103. CRC Press, Boca Raton, FL.

PSEP (Puget Sound Estuary Program). 1991. *Recommended Guidelines for Measuring Conventional Marine Water-Column Variables in Puget Sound*. Prepared for U.S. EPA and Puget Sound Water Quality Authority.

PSEP. 1996. *Recommended Guidelines for Sampling Marine Sediment, Water Column, and Tissue in Puget Sound*. Prepared for U.S. Environmental Protection Agency, Region 10, Office of Puget Sound, Seattle, WA and Puget Sound Water Quality Authority, Olympia, WA.

PSWQAT (Puget Sound Water Quality Action Team). 2000. *2000 Puget Sound Update: Seventh Annual Report of the Puget Sound Ambient Monitoring Program.* Puget Sound Water Quality Action Team. Olympia, WA.

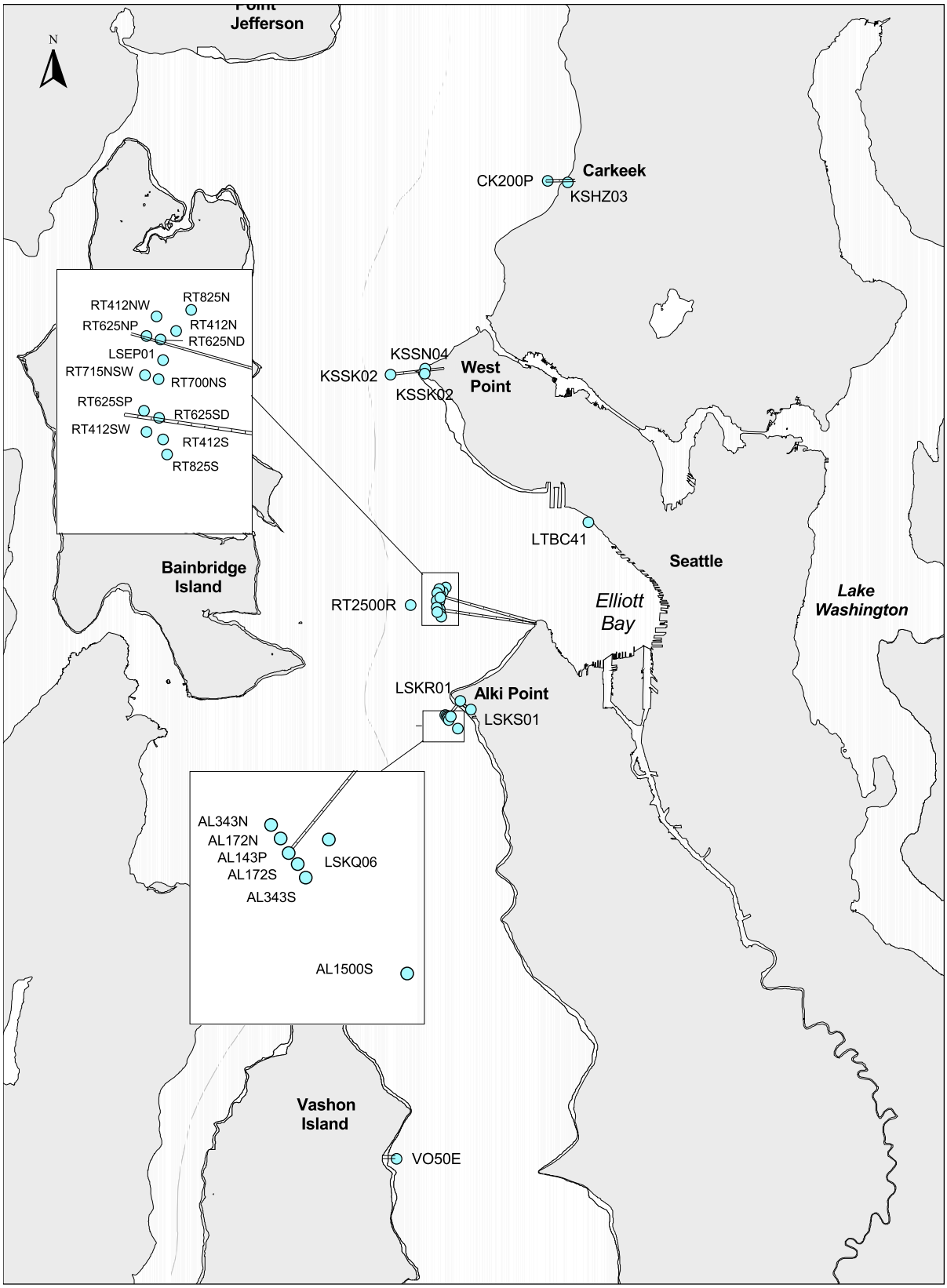
Tetra Tech, Inc. 1990. *Puget Sound Ambient Monitoring Program 1989: Marine Sediment Monitoring*. Prepared by Tetra Tech, Inc. for Washington Dept. of Ecology. Tetra Tech, Inc., Bellevue, WA.

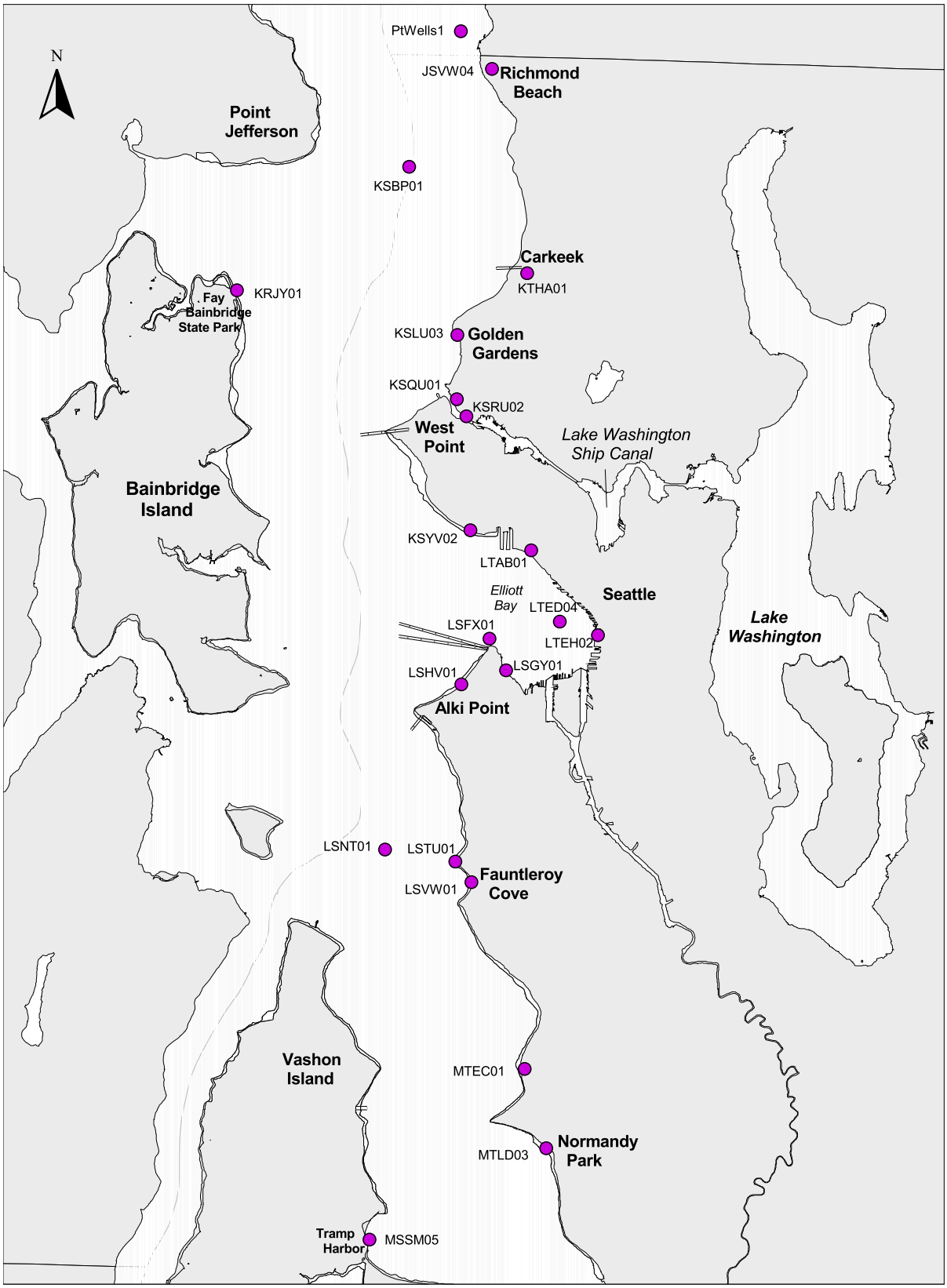
Valiela, I. 1984. *Marine Ecological Processes*. Springer-Verlag, New York.

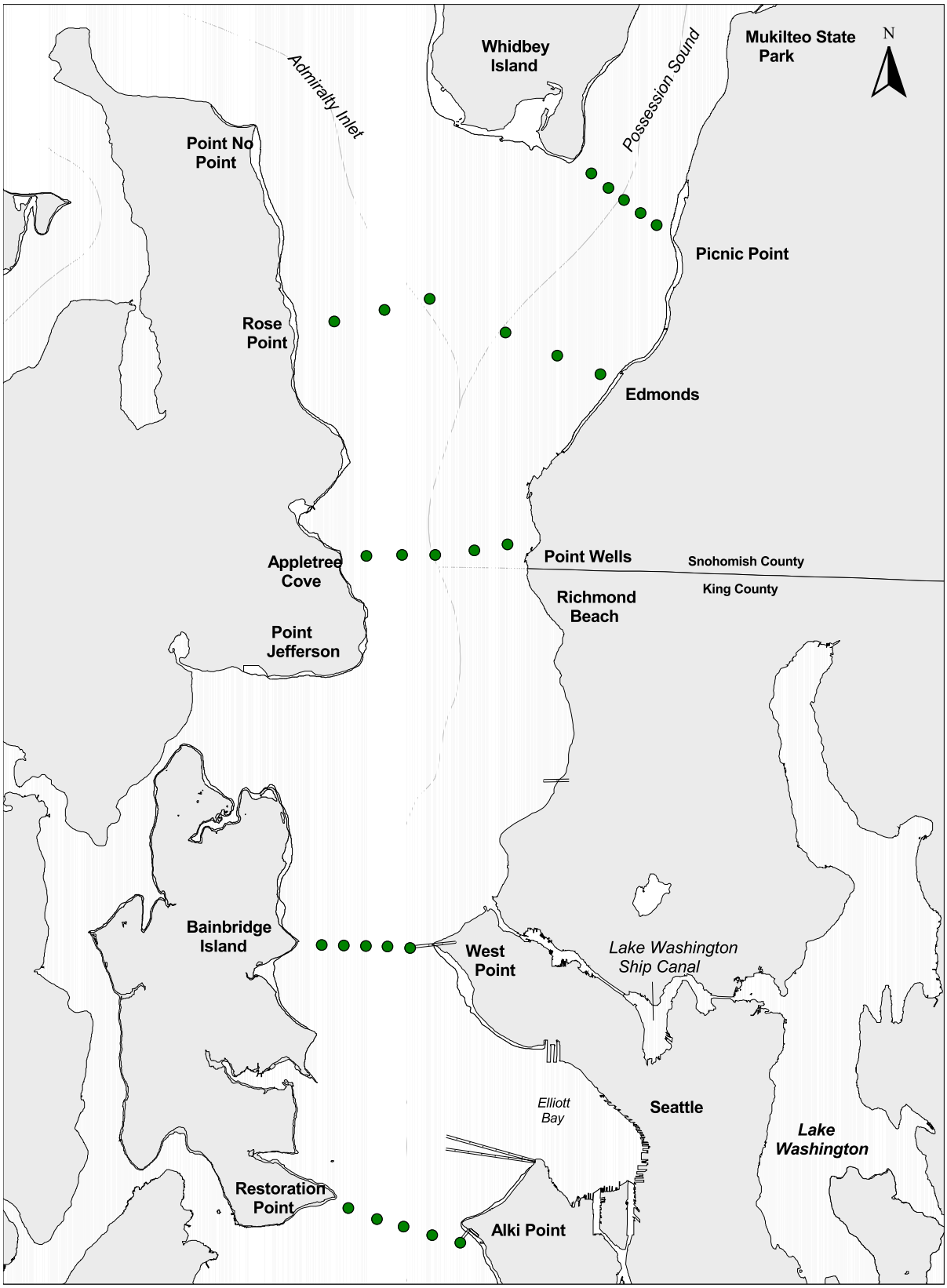
Walker, D. 2002. Personal communication from Dana Walker at King County Environmental Laboratory to Kimberle Stark on October 16, 2002.

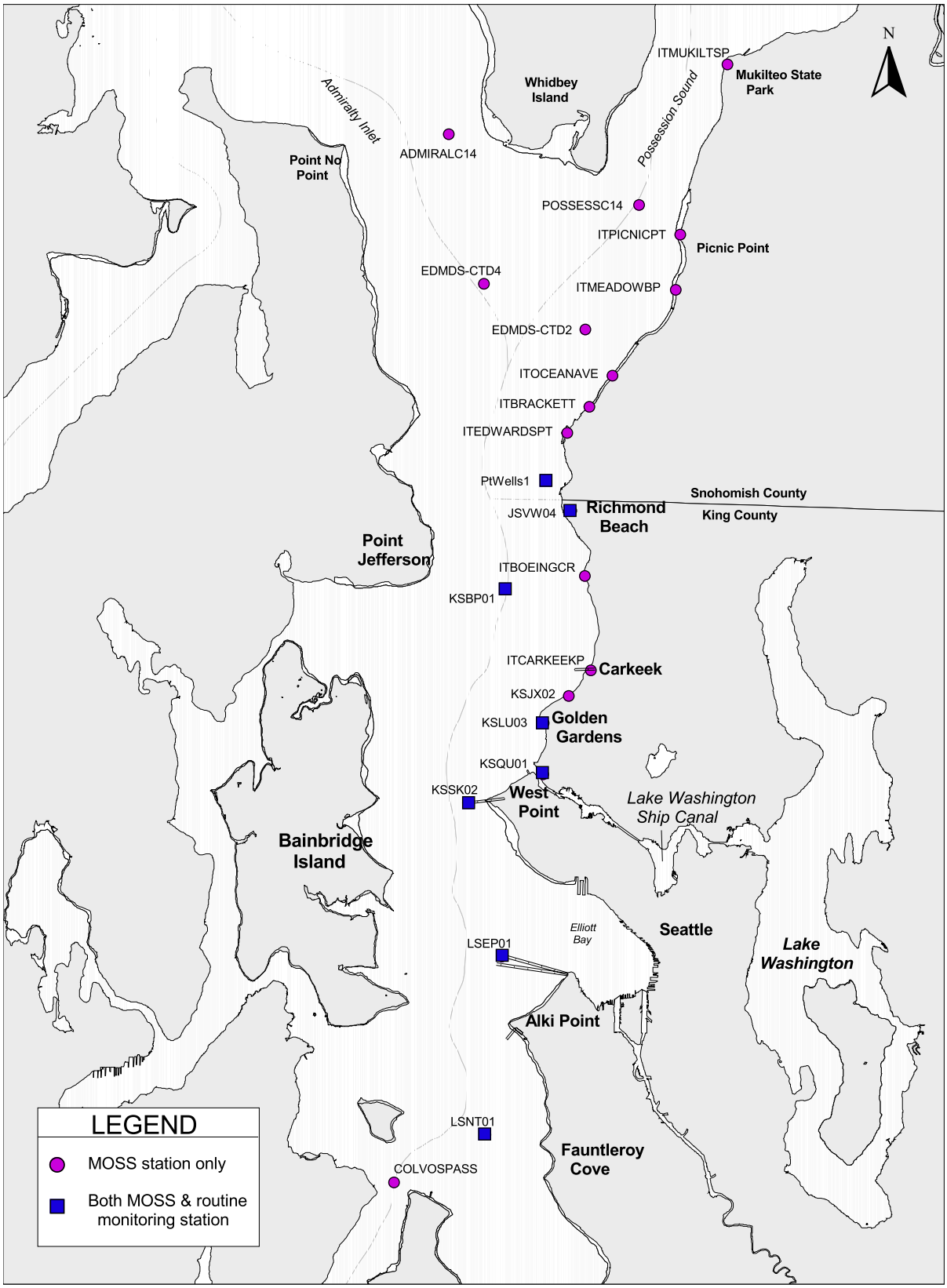
Washington Administrative Code (WAC). 1997. Chapter 173-201A. November 18, 1997. Olympia, WA

Washington Dept. of Ecology. *Sediment Management Standards*. *Chapter 173-204.* Olympia, WA: Washington State Department of Ecology.


Point Jefferson
N
CK200P
Carkeek
KSHZ03
RT412NW
RT825N
RT625NP
RT412N
RT625ND
LSEP01
RT715NSW
RT700NS
RT625SP
RT625SD
RT412SW
RT412S
RT825S
KSSN04
KSSK02
West Point
KSSK02
LTBC41
Seattle
Bainbridge Island
RT2500R
Elliott Bay
Lake Washington
LSKR01
Alki Point
LSKS01
AL343N
AL172N
AL143P
AL172S
AL343S
LSKQ06
AL1500S
Vashon Island
VO50E


N
PtWells1
JSVW04
Richmond Beach
Point Jefferson
KSBP01
Carkeek
KTHA01
KRJY01
Fay Bainbridge State Park
KSLU03
Golden Gardens
KSQU01
KSRU02
West Point
Lake Washington Ship Canal
Bainbridge Island
KSYV02
LTAB01
Elliott Bay
LTED04
Seattle
LSFX01
LTEH02
Lake Washington
LSGY01
LSHV01
Alki Point
LSNT01
LSTU01
LSVW01
Fauntleroy Cove
Vashon Island
MTEC01
MTLD03
Normandy Park
Tramp Harbor
MSSM05


Whidbey Island
Mukilteo State Park
N
Admiralty Inlet
Possession Sound
Point No Point
Picnic Point
Rose Point
Edmonds
Appletree Cove
Point Wells
Snohomish County
King County
Richmond Beach
Point Jefferson
Bainbridge Island
West Point
Lake Washington Ship Canal
Elliott Bay
Seattle
Lake Washington
Restoration Point
Alki Point


N
ITMUKILTSP
Mukilteo State Park
Whidbey Island
Admiralty Inlet
Possession Sound
ADMIRALC14
Point No Point
POSSESSC14
ITPICNICPT
Picnic Point
EDMDS-CTD4
ITMEADOWBP
EDMDS-CTD2
ITOCEANAVE
ITBRACKETT
ITEDWARDSPT
PtWells1
Snohomish County
King County
JSVW04
Richmond Beach
Point Jefferson
ITBOEINGCR
KSBP01
ITCARKEEKP
Carkeek
KSJX02
KSLU03
Golden Gardens
KSQU01
KSSK02
West Point
Lake Washington Ship Canal
Bainbridge Island
Elliott Bay
Seattle
LSEP01
Lake Washington
Alki Point
LSNT01
Fauntleroy Cove
COLVOSPASS
LEGEND
MOSS station only
Both MOSS & routine monitoring station

APPENDIX A

WATER COLUMN MONITORING DATA

A-1 2001 Offshore point source general water quality parameters
A-2 2001 Offshore ambient general water quality parameters
A-3 2001 Beach point source general water quality parameters
A-4 2001 Beach ambient/MOSS general water quality parameters
A-5 2001 Offshore point source bacteria
A-6 2001 Offshore ambient bacteria
A-7 2001 Beach point source bacteria
A-8 2001 Beach ambient bacteria
A-9 2001 Beach dissolved metals
A-10 2001 Beach total metals
A-11 2001 Beach semi-volatile organics
A-12 2001 Beach chlorinated pesticides
A-13 2001 Beach chlorinated herbicides
A-14 2001 Beach organophosphorus pesticides

Table A-1 Offshore Point Source Water Column Monitoring
General Water Quality Paramters (page 1 of 12)

Station	Date	Depth (m)	Temperature ^{0}C	Salinity (pss)	Density (Sigma-t)	Secchi Transparency (m)	Turbidity FTU	Light Intensity (PAR) % of Surface	Dissolved Oxygen (mg/L)
CK200P	17-Jan-01	1	8.7	30.297	23.49	7.5	0.7	62	--
		15	8.8	30.345	23.57	--	0.8	3	--
		25	8.8	30.375	23.64	--	0.9	1	--
		35	8.8	30.385	23.69	--	0.9	0	--
		55	8.8	30.399	23.79	--	1.0	0	--
	20-Feb-01	1	8.2	30.184	23.47	8	--	52	9.4
		15	8.2	30.246	23.58	--	--	3	9.2
		25	8.2	30.255	23.64	--	--	0	9.2
		35	8.2	30.257	23.68	--	--	0	9.2
		55	8.2	30.266	23.78	--	--	0	9.2
	21-Mar-01	1	8.1	30.051	23.37	10	--	100	8.8
		15	8.1	30.186	23.54	--	--	4	8.6
		25	8.1	30.212	23.61	--	--	1	8.6
		35	8.1	30.256	23.69	--	--	0	8.5
		55	8.1	30.277	23.80	--	--	0	8.5
	22-May-01	1	11.0	29.211	22.28	3	--	--	12.8
		15	9.9	29.792	22.98	--	--	--	9.9
		25	9.5	30.022	23.27	--	--	--	9.0
		35	9.3	30.164	23.45	--	--	--	8.5
		55	9.2	30.222	23.59	--	--	--	8.4
	18-Jun-01	1	13.0	27.639	20.70	2.8	--	0	11.3
		15	10.9	29.763	22.78	--	--	0	8.7
		25	10.6	29.934	23.01	--	--	0	8.3
		35	10.2	30.153	23.30	--	--	0	7.7
		55	10.1	30.280	23.51	--	--	0	7.5
	23-Jul-01	1	--	--	--	9	--	--	--
		15	--	--	--	--	--	--	--
		25	--	--	--	--	--	--	--
		35	--	--	--	--	--	--	--
		55	--	--	--	--	--	--	--
	20-Aug-01	1	13.1	30.283	22.73	6.3	--	82	7.4
		15	12.9	30.317	22.85	--	--	2	7.1
		25	12.5	30.392	23.02	--	--	0	6.4
		35	12.4	30.438	23.13	--	--	0	6.3
		55	12.3	30.464	23.25	--	--	0	6.2
	24-Sep-01	1	12.9	30.489	22.92	8.5	<0.5	47	5.7
		15	12.7	30.571	23.09	--	<0.5	3	6.2
		25	12.6	30.599	23.17	--	<0.5	1	6.2
		35	12.6	30.600	23.22	--	<0.5	0	6.2
		55	12.5	30.646	23.37	--	0.6	0	6.1
	23-Oct-01	1	11.8	30.409	23.07	--	0.5	38	7.0
		15	11.9	30.739	23.38	--	0.6	2	6.5
		25	11.9	30.756	23.44	--	0.6	0	6.4
		35	11.7	30.836	23.57	--	0.7	0	6.1
		55	11.5	30.902	23.75	--	1.0	0	6.1
	19-Nov-01	1	10.6	28.496	21.79	7	1.0	83	6.1
		15	11.0	30.295	23.18	--	0.6	2	5.7
		25	11.0	30.526	23.40	--	0.5	0	5.7
		35	11.0	30.547	23.46	--	0.5	0	5.6
		55	10.9	30.673	23.68	--	0.7	0	5.6
	17-Dec-01	1	9.6	28.397	21.88	7.8	1.1	100	6.8
		15	9.9	29.891	23.06	--	0.9	1	6.4
		25	9.9	29.995	23.17	--	0.8	0	6.3
		35	10.0	30.038	23.24	--	0.8	0	6.3
		55	10.0	30.104	23.38	--	0.8	0	6.3
KSSK02	17-Jan-01	1	8.5	29.964	23.25	7	0.7	75	--
		15	8.8	30.304	23.54	--	0.8	4	--
		25	8.8	30.362	23.63	--	0.9	1	--
		35	8.8	30.376	23.68	--	0.9	0	--
		55	8.8	30.380	23.78	--	0.9	0	--

Table A-1 Offshore Point Source Water Column Monitoring
General Water Quality Paramters (page 2 of 12)

Station	Date	Depth (m)	TSS (mg/L)	Chlorophyll-*a* (mg/m3)	Phaeophytin (mg/m3)	Silica (mg/L)	NH4-N (mg/L)	NO2+NO3 (mg/L)	Phosphorus (total) (mg/L)
CK200P	17-Jan-01	1	0.8	0.43	0.15	3.67	<0.01	0.41	0.078
		15	1.8	0.27	0.13	3.65	<0.01	0.41	<0.005
		25	1.0	0.23	0.13	3.62	<0.01	0.41	0.076
		35	1.3	0.25	0.15	3.62	<0.01	0.42	0.078
		55	1.7	--	--	3.58	<0.01	0.42	0.077
	20-Feb-01	1	1.3	0.94	0.23	3.75	<0.01	0.43	0.078
		15	2.2	0.57	0.19	3.8	0.01	0.44	0.077
		25	1.8	0.37	0.19	3.73	<0.01	0.44	0.079
		35	2.4	0.31	0.21	3.74	<0.01	0.43	0.079
		55	3.0	--	--	3.7	<0.01	0.43	0.079
	21-Mar-01	1	2.0	1.0	0.29	3.5	0.01	0.38	0.074
		15	1.2	0.52	0.21	3.47	0.01	0.40	0.075
		25	2.1	0.49	0.23	3.47	0.02	0.38	0.076
		35	0.7	0.44	0.22	3.41	0.02	0.36	0.077
		55	2.3	--	--	3.38	0.02	0.39	0.076
	22-May-01	1	4.5	30.4	1.3	1.51	<0.01	<0.02	0.040
		15	2.8	16	0.85	2.99	0.04	0.24	0.051
		25	2.6	6.8	0.28	3.45	0.06	0.34	0.064
		35	2.1	2.9	0.97	3.46	0.06	0.37	0.061
		55	2.4	--	--	3.59	0.06	0.39	0.064
	18-Jun-01	1	3.8	28	3.12	0.862	<0.01	<0.02	0.042
		15	0.6	4.83	0.927	2.01	0.04	0.22	0.057
		25	0.5	1.74	0.971	2.08	0.05	0.24	0.058
		35	0.5	0.397	0.809	2.25	0.06	0.26	0.060
		55	0.7	--	--	2.24	0.05	0.28	0.062
	23-Jul-01	1	0.7	2.1	1.17	1.58	0.03	0.16	0.054
		15	2.2	3.58	1.03	1.49	0.03	0.15	0.050
		25	1.8	4.24	0.864	1.55	0.03	0.15	0.053
		35	1.6	4.01	0.868	1.52	0.03	0.15	0.052
		55	1.6	--	--	1.52	0.03	0.15	0.051
	20-Aug-01	1	1.2	8.88	1.92	1.41	0.02	0.15	0.056
		15	1.5	4.59	4.1	1.67	0.03	0.18	0.062
		25	1.4	4.83	2.71	1.77	0.02	0.20	0.063
		35	1.3	2.38	1.59	1.95	0.02	0.24	0.064
		55	1.0	--	--	2.02	0.02	0.25	0.061
	24-Sep-01	1	0.8	1.02	0.302	1.99	0.03	0.26	0.068
		15	0.8	0.52	0.426	1.99	0.04	0.27	0.068
		25	0.7	0.499	0.735	2.00	0.04	0.28	0.071
		35	<1.0	0.365	0.317	1.99	0.04	0.27	0.066
		55	0.7	--	--	1.99	0.04	0.28	0.071
	23-Oct-01	1	1.0	1.01	0.396	2.42	0.03	0.30	0.076
		15	1.7	0.71	0.485	2.3	0.03	0.30	0.074
		25	1.1	0.793	0.575	2.11	0.03	0.30	0.075
		35	1.8	0.493	0.522	2.22	0.03	0.31	0.074
		55	1.5	--	--	2.33	0.03	0.31	0.078
	19-Nov-01	1	3.4	0.887	0.249	2.75	0.01	0.34	0.071
		15	1.2	0.434	0.255	2.67	<0.01	0.36	0.074
		25	1.1	0.342	0.214	2.53	<0.01	0.36	0.075
		35	0.9	0.357	0.291	2.52	<0.01	0.36	0.078
		55	1.2	--	--	2.55	<0.01	0.37	0.074
	17-Dec-01	1	2.5	0.226	0.175	3.45	<0.01	0.39	0.076
		15	1.9	0.163	0.156	3.27	<0.01	0.40	0.089
		25	2.0	0.144	0.118	3.28	<0.01	0.40	0.082
		35	2.4	0.0934	0.126	3.3	<0.01	0.40	0.082
		55	1.3	--	--	3.26	<0.01	0.39	0.082
KSSK02	17-Jan-01	1	0.6	0.57	0.13	3.83	<0.01	0.405	0.077
		15	2.2	0.33	0.15	3.68	0.018	0.417	0.078
		25	2.8	0.29	0.15	3.65	0.015	0.417	0.079
		35	1.3	0.3	0.15	3.64	0.011	0.423	0.082
		55	1.1	--	--	3.68	0.011	0.425	0.080

Table A-1 Offshore Point Source Water Column Monitoring
General Water Quality Paramters (page 3 of 12)

Station	Date	Depth (m)	Temperature ^{0}C	Salinity (pss)	Density (Sigma-t)	Secchi Transparency (m)	Turbidity FTU	Light Intensity (PAR) % of Surface	Dissolved Oxygen (mg/L)
KSSK02	21-Feb-01	1	8.1	30.052	23.38	9	--	100	9.6
(cont.)		15	8.1	30.148	23.52	--	--	4	9.5
		25	8.1	30.154	23.57	--	--	1	9.5
		35	8.1	30.188	23.65	--	--	0	9.5
		55	8.1	30.196	23.74	--	--	0	9.5
	20-Mar-01	1	8.2	30.016	23.33	10.8	--	59	8.8
		15	8.2	30.137	23.50	--	--	4	8.7
		25	8.2	30.144	23.55	--	--	1	8.7
		35	8.1	30.171	23.62	--	--	0	8.6
		55	8.1	30.109	23.66	--	--	0	8.6
	17-Apr-01	1	8.9	--	--	7	0.4	34	8.9
		15	8.5	--	--	--	0.9	2	8.2
		25	8.4	--	--	--	1.0	0	8.0
		35	8.4	--	--	--	1.0	0	8.0
		55	8.4	--	--	--	1.1	0	7.9
	22-May-01	1	11.1	28.512	21.71	3	--	61	13.2
		15	9.9	29.766	22.94	--	--	0	10.4
		25	9.6	29.969	23.20	--	--	0	9.3
		35	9.3	30.131	23.41	--	--	0	8.7
		55	9.2	30.245	23.62	--	--	0	8.3
	19-Jun-01	1	13.4	28.219	21.08	2.4	--	0	13.2
		15	12.2	28.781	21.8	--	--	0	10.6
		25	11.7	29.099	22.17	--	--	0	9.7
		35	10.3	30.055	23.21	--	--	0	7.7
		55	10.0	30.077	23.35	--	--	0	7.2
	24-Jul-01	1	12.1	30.024	22.71	8.5	--	--	6.0
		15	11.9	30.146	22.90	--	--	--	7.0
		25	11.7	30.188	23.02	--	--	--	6.6
		35	11.5	30.247	23.14	--	--	--	6.5
		55	11.3	30.422	23.41	--	--	--	6.2
	22-Aug-01	1	12.9	30.269	22.75	7	--	60	6.9
		15	12.8	30.370	22.92	--	--	3	6.6
		25	12.5	30.432	23.07	--	--	1	6.2
		35	12.4	30.451	23.15	--	--	0	6.1
		55	12.0	30.589	23.41	--	--	0	5.8
	24-Sep-01	1	--	--	--	--	--	--	--
		15	--	--	--	8.8	--	--	--
		25	--	--	--	--	--	--	--
		35	--	--	--	--	--	--	--
		55	--	--	--	--	--	--	--
	23-Oct-01	1	11.8	30.530	23.16	10	0.6	73	7.0
		15	11.9	30.666	23.32	--	0.7	2	6.9
		25	11.9	30.702	23.39	--	0.7	0	6.8
		35	11.9	30.724	23.44	--	0.6	0	6.8
	19-Nov-01	1	10.9	30.288	23.13	6.8	1.2	82	5.5
		15	11.0	30.392	23.25	--	0.8	2	5.5
		25	11.1	30.457	23.35	--	0.7	0	5.5
		35	11.1	30.596	23.50	--	0.6	0	5.5
		55	10.8	29.748	22.98	--	1.9	0	5.5
	17-Dec-01	1	8.5	29.902	23.03	7	0.7	75	6.4
		15	8.8	30.084	23.29	--	0.8	4	6.3
		25	8.8	30.100	23.36	--	0.9	1	6.3
		35	8.8	30.046	23.33	--	0.9	0	6.4
		55	8.8	30.124	23.42	--	0.9	0	6.4
LSEP01	17-Jan-01	1	8.8	30.339	23.51	too dark	0.8	0.1411*	--
		15	8.8	30.338	23.57	--	0.8	0.06431*	--
		25	8.8	30.341	23.62	--	0.8	0.06872*	--
		35	8.8	30.345	23.67	--	0.8	0.05462*	--
		55	8.8	30.350	23.76	--	0.8	0.05555*	--
		100	8.8	30.383	23.99	--	0.9	0.06368*	--
		150	8.8	30.442	24.26	--	1.5	0.05678*	--

Table A-1 Offshore Point Source Water Column Monitoring
General Water Quality Paramters (page 4 of 12)

Station	Date	Depth (m)	TSS (mg/L)	Chlorophyll-*a* (mg/m3)	Phaeophytin (mg/m3)	Silica (mg/L)	NH4-N (mg/L)	NO2+NO3 (mg/L)	Phosphorus (total) (mg/L)
	21-Feb-01	1	1.3	0.95	0.28	3.77	0.02	0.43	0.072
		15	1.7	0.71	0.24	3.68	0.01	0.42	0.074
		25	1.4	0.7	0.26	3.62	0.02	0.43	0.078
		35	1.4	0.57	0.2	3.54	0.02	0.43	0.076
		55	1.2	--	--	3.51	0.01	0.43	0.075
	20-Mar-01	1	2.5	0.75	0.16	3.07	0.02	0.39	0.076
		15	2.4	0.58	0.15	3.11	0.01	0.40	0.076
		25	2.4	0.68	0.16	3.14	0.01	0.40	0.074
		35	1.3	0.55	0.18	3.13	0.02	0.40	0.076
		55	3.1	--	--	3.15	0.11	0.40	0.084
	17-Apr-01	1	3.5	4.2	<0.02	2.85	0.02	0.31	0.081
		15	2.0	3.1	<0.02	2.89	0.12	0.33	0.084
		25	2.4	2.1	0.29	2.97	0.14	0.34	0.067
		35	1.6	2.5	0.3	2.94	0.13	0.34	0.081
		55	1.0	--	--	3.03	0.19	0.34	0.092
	22-May-01	1	4.3	23.6	1.5	1.5	<0.01	<0.02	0.029
		15	2.2	17.3	1.9	2.13	0.03	0.16	0.050
		25	2.8	10.5	0.9	2.46	0.04	0.23	0.058
		35	2.4	5.3	0.24	2.64	0.05	0.27	0.065
		55	2.0	--	--	2.65	0.05	0.29	0.067
	19-Jun-01	1	8.6	29.2	2.88	0.236	<0.01	<0.02	0.030
		15	3.7	31.4	2.84	0.963	<0.01	<0.02	0.037
		25	3.6	21.1	2.15	1.51	0.01	0.11	0.044
		35	2.1	1	1.05	2.51	0.06	0.29	0.059
		55	1.0	--	--	2.69	0.28	0.32	0.084
	24-Jul-01	1	1.9	3.76	0.213	1.7	0.03	0.19	0.064
		15	2.2	0.786	0.874	1.85	0.03	0.22	0.065
		25	1.8	0.492	1.15	1.9	0.04	0.23	0.066
		35	0.9	0.357	1.17	1.89	0.04	0.24	0.067
		55	1.1	--	--	1.96	0.05	0.26	0.069
	22-Aug-01	1	1.4	5.12	0.258	1.97	0.02	0.21	0.065
		15	0.7	2.84	0.311	1.99	0.02	0.22	0.065
		25	1.3	1.48	0.975	2.05	0.02	0.25	0.069
		35	1.1	0.845	0.992	2.08	0.02	0.26	0.070
		55	1.2	--	--	2.13	0.01	0.29	0.072
	24-Sep-01	1	0.6	1.8	0.445	2.22	0.04	0.26	0.071
		15	1.2	3.56	0.255	2.18	0.02	0.24	0.068
		25	1.1	2.38	0.432	2.24	0.03	0.25	0.069
		35	1.9	0.537	0.488	2.24	0.04	0.27	0.070
		55	1.5	--	--	2.25	0.04	0.27	0.069
	23-Oct-01	1	0.5	1.85	0.285	2.28	0.02	0.31	0.067
		15	1.3	1.67	0.4	2.34	0.03	0.32	0.071
		25	2.1	1.84	0.396	2.13	0.03	0.30	0.072
		35	1.9	1.85	0.371	2.3	0.02	0.30	0.071
	19-Nov-01	1	3.1	0.414	0.296	2.83	0.08	0.38	0.091
		15	2.4	0.555	0.256	2.83	0.04	0.37	0.084
		25	1.9	0.669	0.18	2.85	0.01	0.36	0.079
		35	1.0	0.406	0.307	2.83	<0.01	0.36	0.077
		55	4.1	--	--	3.01	0.13	0.39	0.096
	17-Dec-01	1	0.6	0.57	0.13	3.83	<0.01	0.41	0.077
		15	2.2	0.33	0.15	3.68	0.02	0.42	0.078
		25	2.8	0.29	0.15	3.65	0.02	0.42	0.079
		35	1.3	0.3	0.15	3.64	0.01	0.42	0.082
		55	1.1	--	--	3.68	0.01	0.43	0.080
LSEP01	17-Jan-01	1	2.1	0.33	0.12	3.96	<0.01	0.41	0.081
		15	1.6	0.43	0.15	4.04	<0.01	0.42	0.078
		25	2.3	0.31	0.13	4.03	<0.01	0.41	0.079
		35	1.8	0.29	0.16	3.98	<0.01	0.42	0.078
		55	2.9	--	--	4.06	<0.01	0.42	0.077
		100	2.2	--	--	4.05	<0.01	0.42	0.081
		150	2.9	--	--	3.71	0.03	0.42	0.081

Table A-1 Offshore Point Source Water Column Monitoring
General Water Quality Paramters (page 5 of 12)

Station	Date	Depth (m)	Temperature ^{0}C	Salinity (pss)	Density (Sigma-t)	Secchi Transparency (m)	Turbidity FTU	Light Intensity (PAR) % of Surface	Dissolved Oxygen (mg/L)
LSEP01	21-Feb-01	1	8.2	29.987	23.32	9	--	48	9.9
(cont.)		15	8.1	30.135	23.51	--	--	5	9.6
		25	8.1	30.138	23.56	--	--	1	9.6
		35	8.1	30.146	23.61	--	--	0	9.6
		55	8.1	30.187	23.73	--	--	0	9.5
		100	8.1	30.238	23.98	--	--	0	9.4
		150	8.1	30.289	24.25	--	--	0	9.4
	20-Mar-01	1	8.3	30.084	23.38	13.9	--	90	8.9
		15	8.1	30.134	23.50	--	--	6	8.8
		25	8.1	30.146	23.56	--	--	1	8.8
		35	8.1	30.208	23.65	--	--	0	8.6
		55	8.1	30.271	23.80	--	--	0	8.5
		100	8.1	30.384	24.09	--	--	0	8.4
		150	8.1	30.419	24.35	--	--	0	8.5
	17-Apr-01	1	8.6	--	--	9.5	0.5	59	9.0
		15	8.6	--	--	--	0.6	2	8.8
		25	8.5	--	--	--	0.5	0	8.5
		35	8.4				0.5	0	8.3
		55	8.4	--	--	--	0.7	0	8.0
		100	8.4	--	--	--	1.4	0	7.8
		150	8.4	--	--	--	1.3	0	7.8
	22-May-01	1	12.0	28.325	21.41	2.5	--	33	13.6
		15	10.5	29.328	22.52	--	--	0	10.8
		25	9.6	29.972	23.21	--	--	0	9.2
		35	9.5	30.009	23.29	--	--	0	8.9
		55	9.4	30.111	23.49	--	--	0	8.7
		100	9.0	30.397	23.97	--	--	0	7.9
		150	9.1	30.477	24.24	--	--	0	7.9
	19-Jun-01	1	14.0	27.590	20.48	2.5	--	0	12.6
		15	10.9	29.754	22.78	--	--	0	8.6
		25	10.7	29.841	22.93	--	--	0	8.4
		35	10.6	29.892	23.03	--	--	0	8.2
		55	10.2	30.106	23.35	--	--	0	7.7
		100	9.8	30.379	23.83	--	--	0	7.1
		150	10.1	30.606	24.19	--	--	0	6.8
	24-Jul-01	1	12.3	30.100	22.73	8	--	--	7.4
		15	12.0	30.140	22.88	--	--	--	7.2
		25	11.9	30.147	22.94	--	--	--	7.0
		35	11.8	30.186	23.05	--	--	--	6.9
		55	11.6	30.258	23.23	--	--	--	6.6
		100	11.2	30.441	23.64	--	--	--	6.1
		150	11.1	30.536	23.97	--	--	--	5.9
	22-Aug-01	1	12.7	30.358	22.86	9.5	--	73	6.6
		15	12.7	30.376	22.94	--	--	3	6.5
		25	12.6	30.383	23.00	--	--	1	6.4
		35	12.6	30.413	23.08	--	--	0	6.2
		55	12.1	30.524	23.34	--	--	0	5.7
		100	11.9	30.611	23.64	--	--	0	5.5
		150	11.7	30.722	24.00	--	--	0	5.3
	24-Sep-01	1	13.2	30.533	22.90	9.7	<0.5	--	6.9
		15	12.8	30.559	23.05	--	<0.5	--	6.5
		25	12.8	30.562	23.11	--	<0.5	--	6.5
		35	12.7	30.585	23.19	--	<0.5	--	6.3
		55	12.5	30.641	23.36	--	<0.5	--	6.2
		100	11.9	30.813	23.80	--	1.4	--	6.1
		150	11.9	30.838	24.05	--	1.9	--	6.1

Table A-1 Offshore Point Source Water Column Monitoring
General Water Quality Paramters (page 6 of 12)

Station	Date	Depth (m)	TSS (mg/L)	Chlorophyll-*a* (mg/m3)	Phaeophytin (mg/m3)	Silica (mg/L)	NH4-N (mg/L)	NO2+NO3 (mg/L)	Phosphorus (total) (mg/L)
LSEP01	21-Feb-01	1	2.0	0.98	0.23	3.46	<0.01	0.42	0.077
(cont.)		15	2.5	0.69	0.22	3.4	<0.01	0.43	0.075
		25	2.3	0.65	0.21	3.42	<0.01	0.43	0.076
		35	1.8	0.61	0.19	3.49	<0.01	0.43	0.073
		55	3.4	--	--	3.54	<0.01	0.43	0.080
		100	1.3	--	--	3.61	0.02	0.43	0.078
		150	2.2	--	--	3.62	0.03	0.43	0.081
	20-Mar-01	1	2.0	0.95	0.18	3.01	<0.01	0.40	0.074
		15	2.2	0.74	0.15	2.91	<0.01	0.40	0.075
		25	1.9	0.71	0.17	2.97	<0.01	0.40	0.074
		35	1.7	0.56	0.11	2.95	0.01	0.40	0.076
		55	2.0	--	--	2.9	0.02	0.39	0.074
		100	3.5	--	--	2.82	0.04	0.38	0.076
		150	2.7	--	--	2.77	0.03	0.37	0.073
	17-Apr-01	1	2.0	6.9	0.058	2.63	0.02	0.30	0.065
		15	2.2	6.9	<0.02	2.65	0.02	0.30	0.066
		25	1.7	4.5	<0.02	2.91	0.02	0.32	0.066
		35	2.1	4.60	<0.02	2.81	0.0224	0.326	0.0656
		55	3.7	--	--	2.88	0.04	0.34	0.070
		100	3.2	--	--	2.97	0.09	0.34	0.073
		150	3.2	--	--	2.97	0.06	0.34	0.072
	22-May-01	1	3.7	19.6	0.73	1.63	<0.01	<0.02	0.028
		15	2.9	14.8	1.5	2.17	0.02	0.17	0.051
		25	1.9	7	0.85	2.56	0.04	0.26	0.059
		35	2.8	6.5	0.2	2.58	0.04	0.26	0.061
		55	4.6	--	--	2.56	0.04	0.27	0.062
		100	2.2	--	--	2.83	0.06	0.33	0.068
		150	4.2	--	--	2.62	0.05	0.31	0.069
	19-Jun-01	1	5.7	23.3	1.85	1.25	0.01	<0.02	0.033
		15	1.7	7.18	0.848	2.04	0.04	0.21	0.056
		25	1.4	6.68	0.499	2.02	0.04	0.23	0.056
		35	2.8	4.45	0.599	2.31	0.04	0.25	0.055
		55	1.8	--	--	2.62	0.04	0.28	0.059
		100	1.0	--	--	2.51	0.04	0.31	0.059
		150	3.1	--	--	2.41	0.15	0.28	0.069
	24-Jul-01	1	1.0	5.73	0.739	1.68	0.02	0.19	0.063
		15	1.1	3.54	0.209	1.79	0.03	0.21	0.065
		25	0.7	2.4	0.722	1.86	0.03	0.22	0.064
		35	1.5	1.38	0.561	1.91	0.03	0.23	0.067
		55	1.4	--	--	1.93	0.04	0.24	0.066
		100	0.9	--	--	1.97	0.04	0.27	0.068
		150	2.4	--	--	2.09	0.08	0.27	0.073
	22-Aug-01	1	1.0	3.99	0.314	2.01	0.02	0.23	0.065
		15	1.3	3.43	0.673	2.04	0.02	0.23	0.066
		25	1.5	2.96	0.151	2.07	0.02	0.24	0.065
		35	0.6	2.44	0.408	2.09	0.02	0.24	0.069
		55	1.3	--	--	2.16	0.01	0.29	0.069
		100	1.4	--	--	2.22	0.01	0.31	0.070
		150	1.3	--	--	2.39	0.03	0.33	0.072
	24-Sep-01	1	2.2	3.13	0.37	2.22	0.02	0.24	0.067
		15	1.2	2.51	0.396	2.25	0.03	0.25	0.067
		25	0.9	1.92	0.406	2.27	0.03	0.25	0.070
		35	0.8	2.3	0.477	2.25	0.03	0.26	0.069
		55	0.6	--	--	2.28	0.03	0.27	0.068
		100	2.1	--	--	2.34	0.09	0.27	0.070
		150	2.1	--	--	2.33	0.07	0.26	0.070

Table A-1 Offshore Point Source Water Column Monitoring
General Water Quality Paramters (page 7 of 12)

Station	Date	Depth (m)	Temperature ^{0}C	Salinity (pss)	Density (Sigma-t)	Secchi Transparency (m)	Turbidity FTU	Light Intensity (PAR) % of Surface	Dissolved Oxygen (mg/L)
LSEP01	23-Oct-01	1	12.0	30.729	23.28	11	<0.5	77	6.8
(cont.)		15	11.9	30.730	23.36	--	0.5	3	6.8
		25	11.9	30.731	23.40	--	0.6	0	6.8
		35	11.9	30.731	23.43	--	0.6	0	6.8
		55	11.9	30.734	23.54	--	0.6	0	6.7
		100	11.6	30.880	23.92	--	0.8	0	6.2
		150	11.3	30.899	24.22	--	1.7	0	6.3
	19-Nov-01	1	10.8	28.789	21.99	5.5	0.9	81	5.9
		15	11.0	30.328	23.20	--	0.6	3	5.6
		25	11.0	30.395	23.30	--	0.7	1	5.6
		35	11.0	30.580	23.50	--	0.8	0	5.4
		55	11.0	30.628	23.63	--	0.8	0	5.4
		100	10.6	30.702	23.96	--	1.2	0	5.3
		150	10.7	30.777	24.23	--	0.9	0	5.3
LSKQ06	17-Jan-01	1	8.8	30.340	23.51	too dark	0.8	0.1486*	--
		15	8.8	30.354	23.58	--	0.9	0.04697*	--
		25	8.8	30.387	23.65	--	1.1	0.04847*	--
		35	8.8	30.386	23.70	--	1.2	0.04535*	--
	21-Feb-01	1	8.1	30.124	23.44	10.5	--	59	9.8
		15	8.1	30.126	23.50	--	--	3	9.8
		25	8.1	30.127	23.55	--	--	1	9.8
		35	8.1	30.139	23.60	--	--	0	9.7
	20-Mar-01	1	8.3	29.978	23.29	14	--	100	9.1
		15	8.1	30.112	23.48	--	--	3	8.8
		25	8.1	30.121	23.54	--	--	1	8.8
		35	8.1	30.124	23.59	--	--	0	8.8
	17-Apr-01	1	8.8	--	--	9	0.6	70	9.1
		15	8.7	--	--	--	0.5	3	9.0
		25	8.7	--	--	--	0.4	0	9.1
		35	8.7	--	--	--	0.5	0	9.0
	22-May-01	1	11.5	28.680	21.78	2.7	--	100	12.7
		15	10.0	29.637	22.83	--	--	0	10.3
		25	9.9	29.771	23.01	--	--	0	10.0
		35	9.8	29.785	23.06	--	--	0	9.9
	19-Jun-01	1	12.7	29.996	22.67	2.5	--	0	6.4
		15	11.4	30.169	22.94	--	--	0	6.9
		25	11.0	30.185	23.00	--	--	0	6.9
		35	10.8	30.251	23.13	--	--	0	6.7
	24-Jul-01	1	12.2	28.665	21.56	7	--	--	10.9
		15	11.8	29.514	22.51	--	--	--	9.4
		25	11.8	29.727	22.79	--	--	--	8.7
		35	11.6	29.815	22.93	--	--	--	8.5
	22-Aug-01	1	12.8	30.346	22.84	8	--	67	6.7
		15	12.7	30.381	22.95	--	--	3	6.5
		25	12.5	30.427	23.06	--	--	1	6.3
		35	12.4	30.465	23.15	--	--	0	6.2
	24-Sep-01	1	13.0	30.483	22.89	9.8	<0.5	100	5.8
		15	12.9	30.547	23.03	--	<0.5	5	6.6
		25	12.9	30.558	23.09	--	<0.5	1	6.5
		35	12.7	30.592	23.20	--	0.5	0	6.3
	23-Oct-01	1	12.0	30.702	23.26	11	<0.5	78	6.9
		15	11.9	30.704	23.33	--	0.7	3	6.8
		25	11.9	30.723	23.39	--	0.7	0	6.7
		35	11.9	30.755	23.49	--	0.8	0	6.7
	19-Nov-01	1	10.9	29.761	22.72	6	0.8	87	5.7
		15	11.1	30.524	23.34	--	0.7	4	5.6
		25	11.1	30.543	23.40	--	0.9	1	5.6
		35	11.1	30.564	23.47	--	0.8	0	5.6
	17-Dec-01	1	9.9	29.924	23.02	8	1.0	24	6.6
		15	9.9	29.927	23.08	--	1.0	1	6.6
		25	9.9	29.927	23.13	--	0.9	0	6.6
		35	9.9	29.931	23.17	--	1.0	0	6.6

Table A-1 Offshore Point Source Water Column Monitoring
General Water Quality Paramters (page 8 of 12)

Station	Date	Depth (m)	TSS (mg/L)	Chlorophyll-*a* (mg/m3)	Phaeophytin (mg/m3)	Silica (mg/L)	NH4-N (mg/L)	NO2+NO3 (mg/L)	Phosphorus (total) (mg/L)
LSEP01	23-Oct-01	1	1.1	1.98	0.301	2.22	0.03	0.32	0.069
(cont.)		15	1.6	2.09	0.38	2.17	0.02	0.34	0.070
		25	2.0	1.88	0.453	2.17	0.02	0.31	0.068
		35	0.8	1.87	0.465	2.19	0.02	0.33	0.072
		55	1.4	--	--	2.21	0.02	0.34	0.072
		100	1.2	--	--	2.2	0.03	0.35	0.069
		150	2.6	--	--	2.29	0.08	0.36	0.074
	19-Nov-01	1	2.1	1.02	0.204	3.09	<0.01	0.35	0.072
		15	1.1	0.861	0.16	2.96	<0.01	0.36	0.076
		25	1.3	0.674	0.207	2.95	<0.01	0.36	0.075
		35	2.5	0.584	0.206	2.92	<0.01	0.36	0.076
		55	12.6	--	--	2.53	<0.01	0.36	0.077
		100	1.7	--	--	2.66	0.06	0.37	0.085
		150	1.9	--	--	2.71	<0.01	0.38	0.080
LSKQ06	17-Jan-01	1	1.1	0.3	0.1	3.67	<0.01	0.40	0.079
		15	1.3	0.29	0.14	3.63	<0.01	0.41	0.079
		25	2.4	0.22	0.14	3.6	<0.01	0.40	0.078
		35	2.4	0.26	0.18	3.58	<0.01	0.41	0.075
	21-Feb-01	1	2.7	0.98	0.24	3.69	<0.01	0.42	0.077
		15	1.6	0.77	0.23	3.78	<0.01	0.43	0.093
		25	2.8	0.86	0.26	3.78	<0.01	0.43	0.079
		35	2.1	0.77	0.18	3.87	<0.01	0.43	0.089
	20-Mar-01	1	2.9	0.9	0.22	3.18	0.01	0.40	0.076
		15	1.7	1.1	0.17	3.17	<0.01	0.40	0.078
		25	3.0	0.77	0.18	3.22	<0.01	0.40	0.076
		35	1.4	0.91	0.21	3.26	<0.01	0.40	0.072
	17-Apr-01	1	2.0	5.7	<0.02	2.7	0.02	0.30	0.064
		15	2.8	6.1	0.055	2.71	0.02	0.31	0.061
		25	1.7	5.1	<0.02	2.75	0.02	0.30	0.064
		35	2.5	5	<0.02	2.79	0.02	0.31	0.064
	22-May-01	1	3.6	24.7	1.3	1.35	<0.01	<0.02	0.035
		15	2.9	12.3	1.4	2.11	0.02	0.18	0.053
		25	3.5	9.2	0.58	2.24	0.03	0.20	0.055
		35	2.1	9.8	0.87	2.26	0.03	0.20	0.055
	19-Jun-01	1	3.3	21	2.21	1.52	0.01	0.10	0.048
		15	2.3	13.2	1.26	1.94	0.02	0.17	0.051
		25	1.2	6.43	0.331	2.29	0.04	0.22	0.055
		35	1.0	5.15	0.472	2.24	0.04	0.22	0.056
	24-Jul-01	1	2.4	8.19	0.801	1.47	0.02	0.16	0.054
		15	0.7	1.47	0.589	1.84	0.03	0.22	0.059
		25	1.1	1.46	0.591	1.87	0.03	0.22	0.061
		35	2.3	1.24	0.74	1.9	0.04	0.24	0.066
	22-Aug-01	1	1.8	4.57	0.0761	2.06	0.02	0.22	0.067
		15	1.4	3.54	0.143	2.02	0.02	0.23	0.064
		25	1.2	2.38	0.591	2	0.02	0.24	0.074
		35	1.4	2.93	0.641	2.02	0.02	0.27	0.066
	24-Sep-01	1	1.3	3.67	0.342	2.17	0.03	0.25	0.070
		15	0.8	4.21	0.304	2.2	0.03	0.26	0.068
		25	0.8	3.53	0.342	2.23	0.03	0.26	0.067
		35	1.1	1.77	0.329	2.31	0.03	0.27	0.071
	23-Oct-01	1	2.5	2.18	0.247	2.39	0.02	0.30	0.072
		15	1.3	2.33	0.511	2.35	0.02	0.29	0.074
		25	1.8	2.23	0.532	2.37	0.02	0.29	0.074
		35	1.3	2.22	0.553	2.38	0.02	0.30	0.073
	19-Nov-01	1	1.7	1.07	0.188	2.89	<0.01	0.36	0.072
		15	1.8	0.727	0.145	2.87	<0.01	0.36	0.073
		25	1.4	0.798	0.238	2.85	<0.01	0.36	0.075
		35	2.6	0.751	0.274	2.84	<0.01	0.36	0.076
	17-Dec-01	1	2.6	0.193	0.153	3.38	<0.01	0.40	0.083
		15	2.9	0.199	0.157	3.28	<0.01	0.39	0.084
		25	2.8	0.237	0.17	3.17	<0.01	0.39	0.081

Table A-1 Offshore Point Source Water Column Monitoring
General Water Quality Paramters (page 9 of 12)

Station	Date	Depth (m)	Temperature ^{0}C	Salinity (pss)	Density (Sigma-t)	Secchi Transparency (m)	Turbidity FTU	Light Intensity (PAR) % of Surface	Dissolved Oxygen (mg/L)
LTBC41	17-Jan-01	1	8.5	30.600	23.76	9	0.8	71	--
		15	8.9	30.342	23.56	--	0.7	3	--
		25	8.9	30.358	23.61	--	0.8	1	--
	21-Feb-01	1	8.3	29.669	23.06	8.5	--	100	9.6
		15	8.2	30.192	23.53	--	--	3	9.3
		25	8.2	30.216	23.62	--	--	0	9.3
	20-Mar-01	1	8.2	29.630	23.03	14	--	39	9.0
		15	8.2	30.117	23.48	--	--	3	8.9
		25	8.2	30.136	23.53	--	--	1	8.8
	17-Apr-01	1	8.5			7	0.5	8	8.8
		15	8.5			--	0.5	5	8.8
		25	8.4			--	1.2	0	8.3
	22-May-01	1	10.7	28.753	21.97	4	--	86	12.3
		15	9.6	29.897	23.10	--	--	0	9.4
		25	9.5	29.991	23.26	--	--	0	9.1
	19-Jun-01	1	14.1	27.185	20.14	2.8	--	0	12.4
		15	11.1	29.643	22.66	--	--	0	8.9
		25	10.8	29.800	22.87	--	--	0	8.5
	24-Jul-01	1	12.5	29.676	22.37	7.5	--	--	6.6
		15	11.8	30.082	22.87	--	--	--	7.1
		25	11.7	30.098	22.94	--	--	--	6.9
	22-Aug-01	1	13.3	29.523	22.10	--	--	74	7.1
		15	12.6	30.356	22.94	--	--	3	6.4
		25	12.6	30.375	23.00	--	--	1	6.4
	24-Sep-01	1	13.4	29.942	22.41	8	<0.5	--	6.2
		15	12.8	30.559	23.06	--	<0.5	--	6.4
		25	12.7	30.586	23.15	--	0.8	--	6.2
	23-Oct-01	1	11.6	29.238	22.19	8.5	<0.5	82	7.6
		15	12.0	30.702	23.33	--	<0.5	2	6.8
		25	12.0	30.497	1023.216		0.58	0	6.5
	19-Nov-01	1	10.9	29.006	22.13	2.2	1.1	76	5.9
		15	11.2	30.503	23.30	--	<0.5	2	5.7
		25	11.2	30.603	23.42	--	<0.5	0	5.6
	17-Dec-01	1	10.0	29.624	22.78	2.6	1.0	6	6.5
		15	10.0	29.969	23.12	--	0.8	0	6.5
		25	10.0	29.996	23.16	--	0.8	0	6.6
VO50E	21-Feb-01	1	8.3	30.135	23.42	10	--	26	9.9
		5	8.2	30.145	23.46	--	--	13	9.8
		10	8.2	30.146	23.50	--	--	4	9.8
	20-Mar-01	1	8.2	29.975	23.31	14	--	88	9.2
		5	8.2	30.000	23.35	--	--	37	9.1
		10	8.2	30.047	23.41	--	--	9	9.1
	17-Apr-01	1	8.6	--	--	10.5	0.2	100	9.0
		5	8.6	--	--	--	0.4	97	8.9
		10	8.5	--	--	--	0.6	39	8.7
	22-May-01	1	10.7	29.524	22.56	2.9	--	64	11.8
		5	10.4	29.604	22.70	--	--	9	11.1
		10	10.2	29.668	22.80	--	--	1	10.9
	19-Jun-01	1	13.0	29.905	22.56	2.6	--	0	6.7
		5	12.4	30.112	22.79	--	--	0	7.5
		10	12.0	30.122	22.83	--	--	0	7.5
	24-Jul-01	1	12.4	30.342	22.83	6.5	--	--	6.7
		5	12.2	30.381	22.90	--	--	--	6.6
		10	12.1	30.394	22.94	--	--	--	6.5
	22-Aug-01	1	12.8	30.452	22.84	7	--	69	5.7
		5	12.7	30.454	22.84	--	--	23	5.8
		10	12.6	30.462	22.85	--	--	8	5.8
	23-Oct-01	1	12.0	30.718	23.28	13	0.6	50	7.1
		5	11.9	30.739	23.32	--	<0.5	17	7.0
		10	11.9	30.746	23.36	--	<0.5	5	7.0

Table A-1 Offshore Point Source Water Column Monitoring

General Water Quality Paramters (page 10 of 12)

Station	Date	Depth (m)	TSS (mg/L)	Chlorophyll-*a* (mg/m3)	Phaeophytin (mg/m3)	Silica (mg/L)	NH4-N (mg/L)	NO2+NO3 (mg/L)	Phosphorus (total) (mg/L)
LTBC41	17-Jan-01	1	1.4	0.38	0.066	4.2	0.01	0.41	0.077
		15	2.2	0.34	0.12	3.58	<0.01	0.41	0.076
		25	2.3	0.29	0.12	3.58	<0.01	0.41	0.078
	21-Feb-01	1	3.2	1.1	0.25	3.77	<0.01	0.43	0.098
		15	0.9	0.51	0.22	3.66	<0.01	0.43	0.090
		25	2.2	0.43	0.16	3.7	<0.01	0.42	0.081
	20-Mar-01	1	2.4	1.1	0.2	3.31	<0.01	0.40	0.074
		15	2.1	0.84	0.21	3.05	<0.01	0.40	0.073
		25	2.9	0.81	0.17	3.05	<0.01	0.40	0.076
	17-Apr-01	1	2.8	5.9	<0.02	2.92	0.02	0.32	0.065
		15	3.8	6.8	<0.03	2.82	0.02	0.32	0.065
		25	1.4	5.9	<0.04	2.81	0.02	0.33	0.069
	22-May-01	1	4.2	15.5	0.33	2.06	0.01	0.06	0.033
		15	1.9	9.7	0.82	2.42	0.04	0.22	0.057
		25	1.7	2.3	0.64	2.51	0.05	0.25	0.061
	19-Jun-01	1	2.4	21.7	1.96	2.02	0.01	<0.02	0.039
		15	1.0	4.65	0.681	2.39	0.04	0.21	0.051
		25	0.7	2.55	0.834	2.5	0.06	0.22	0.057
	24-Jul-01	1	4.0	6.35	0.708	1.63	0.02	0.16	0.055
		15	1.8	0.953	0.53	1.74	0.04	0.20	0.059
		25	1.6	0.395	0.576	1.78	0.04	0.21	0.060
	22-Aug-01	1	0.9	4.41	0.0855	2.12	0.02	0.20	0.063
		15	1.6	1.01	0.326	2	0.02	0.23	0.062
		25	1.3	0.764	0.47	2.07	0.02	0.24	0.064
	24-Sep-01	1	1.2	2.94	0.307	2.32	0.03	0.25	0.069
		15	1.3	2.13	0.379	1.95	0.03	0.26	0.071
		25	1.2	0.791	0.393	2	0.03	0.27	0.072
	23-Oct-01	1	1.8	1.26	0.26	2.88	0.02	0.29	0.069
		15	1.3	1.88	0.407	2.39	0.02	0.29	0.072
		25	1.1	1.53	0.319	2.43	0.02	0.298	0.0791
	19-Nov-01	1	1.6	1.06	0.231	3.17	0.02	0.37	0.079
		15	0.9	0.671	0.142	2.63	<0.01	0.35	0.077
		25	0.7	0.723	0.16	2.56	<0.01	0.35	0.074
	17-Dec-01	1	4.3	0.192	0.203	5.04	0.02	0.44	0.081
		15	1.2	0.224	0.188	4.77	0.01	0.44	0.082
		25	1.3	0.173	0.162	3.27	<0.01	0.39	0.083
VO50E	21-Feb-01	1	1.2	1	0.15	3.8	<0.01	0.42	0.083
		5	1.6	0.76	0.21	3.67	<0.01	0.42	0.080
		10	1.5	0.83	0.22	3.66	<0.01	0.42	0.080
	20-Mar-01	1	2.1	1.2	0.36	3.29	0.01	0.39	0.075
		5	2.9	1.4	0.3	3.33	<0.01	0.40	0.076
		10	3.2	1.1	0.27	3.24	<0.01	0.40	0.077
	17-Apr-01	1	2.4	5.6	<0.02	2.82	0.02	0.31	0.064
		5	2.4	5.4	0.31	2.85	0.02	0.31	0.072
		10	3.2	5.6	<0.02	2.87	0.02	0.31	0.064
	22-May-01	1	3.7	29.5	1	1.8	0.01	0.07	0.044
		5	3.5	26.3	1.2	1.92	0.02	0.11	0.045
		10	2.5	21.3	1.2	1.99	0.02	0.13	0.048
	19-Jun-01	1	4.8	30.4	1.22	2.13	0.04	0.21	0.054
		5	3.0	25.4	2.54	1.24	0.02	0.03	0.043
		10	2.4	19.5	2.56	1.64	0.02	0.10	0.047
	24-Jul-01	1	3.8	11.1	1.16	1.33	0.02	0.13	0.051
		5	1.0	6.53	0.811	1.59	0.03	0.18	0.055
		10	1.9	6.24	1.16	1.64	0.03	0.18	0.063
	22-Aug-01	1	0.7	4.14	0.513	1.84	0.02	0.21	0.066
		5	1.1	3.81	0.456	1.88	0.02	0.22	0.063
		10	1.4	3.41	0.445	1.91	0.02	0.23	0.066
	23-Oct-01	1	1.8	2.4	0.437	2.33	0.02	0.29	0.079
		5	1.6	2.29	0.384	2.35	0.02	0.30	0.073
		10	1.8	2.98	0.136	2.36	0.02	0.29	0.069

Table A-1 Offshore Point Source Water Column Monitoring
General Water Quality Paramters (page 11 of 12)

Station	Date	Depth (m)	Temperature ^{0}C	Salinity (pss)	Density (Sigma-t)	Secchi Transparency (m)	Turbidity FTU	Light Intensity (PAR) % of Surface	Dissolved Oxygen (mg/L)
VO50E	19-Nov-01	1	11.1	30.441	23.22	7.8	0.6	100	5.7
(cont.)		5	11.1	30.453	23.25	--	0.6	36	5.7
		10	11.1	30.453	23.26	--	0.6	26	5.7
	17-Dec-01	1	9.8	29.852	22.98	7.6	0.9	32	6.6
		5	9.8	29.874	23.02	--	0.9	8	6.6
		10	9.8	29.899	23.05	--	1.0	2	6.6

* Surface PAR below MDL, subsurface PAR value reported.

Table A-1 Offshore Point Source Water Column Monitoring

General Water Quality Paramters (page 12 of 12)

Station	Date	Depth (m)	TSS (mg/L)	Chlorophyll-*a* (mg/m3)	Phaeophytin (mg/m3)	Silica (mg/L)	NH4-N (mg/L)	NO2+NO3 (mg/L)	Phosphorus (total) (mg/L)
VO50E	19-Nov-01	1	1.2	1.05	0.238	2.84	<0.01	0.35	0.073
(cont.)		5	1.3	1.3	0.174	2.79	<0.01	0.35	0.074
		10	2.1	1.23	0.209	2.83	<0.01	0.35	0.074
	17-Dec-01	1	2.1	0.29	0.156	3.15	<0.01	0.40	0.078
		5	1.7	0.288	0.188	3.42	<0.01	0.40	0.082
		10	2.2	0.248	0.185	3.3	<0.01	0.39	0.082

Table A-2 Offshore Ambient Water Column Monitoring
General Water Quality Paramters (page 1 of 22)

Station	Date	Depth (m)	Temperature ^{0}C	Salinity (pss)	Density (Sigma-t)	Secchi Transparency (m)	Turbidity FTU	Light Intensity (PAR) % of Surface	Dissolved Oxygen (mg/L)
ADMIRALC14	17-Jan-01	1	8.0	28.123	21.89	7.5	0.7	65	--
		15	8.2	29.329	22.86	--	0.7	3	--
		25	8.5	29.781	23.23	--	0.8	0	--
		35	8.5	30.251	23.64	--	1.0	0	--
		55	8.4	30.271	23.75	--	1.0	0	--
		100	8.3	30.452	24.12	--	1.4	0	--
		115	8.3	30.502	24.23	--	1.5	0	--
	20-Feb-01	1	7.9	29.336	22.84	7	--	80	10.4
		15	8.0	30.098	23.49	--	--	1	9.6
		25	8.0	30.149	23.57	--	--	0	9.6
		35	8.0	30.161	23.63	--	--	0	9.5
		55	8.1	30.190	23.74	--	--	0	9.5
		100	8.0	30.276	24.03	--	--	0	9.5
		115	8.0	30.293	24.11	--	--	0	9.5
	21-Mar-01	1	8.4	29.963	23.26	11	--	74	8.9
		15	8.2	30.037	23.41	--	--	3	8.9
		25	8.2	30.079	23.50	--	--	0	8.8
		35	8.2	30.170	23.62	--	--	0	8.7
		55	8.2	30.221	23.75	--	--	0	8.7
		100	8.2	30.279	24.00	--	--	0	8.7
		115	8.1	30.299	24.09	--	--	0	8.7
	16-Apr-01	1	10.0	--	--	2.8	0.3	70	10.6
		15	8.8	--	--	--	0.7	0	8.5
		25	8.5	--	--	--	0.5	0	8.2
		35	8.4	--	--	--	0.5	0	8.1
		55	8.5	--	--	--	0.5	0	8.0
		100	8.5	--	--	--	0.6	0	8.0
		115	8.5	--	--	--	0.8	0	7.9
	22-May-01	1	11.1	28.119	21.41	3.6	--	33	10.2
		15	10.7	28.730	22.02	--	--	0	9.9
		25	9.8	30.028	23.22	--	--	0	9.0
		35	9.8	30.057	23.29	--	--	0	9.0
		55	9.7	30.133	23.45	--	--	0	8.9
		100	9.6	30.278	23.78	--	--	0	8.7
		115	9.6	30.291	23.86	--	--	0	8.7
	18-Jun-01	1	12.7	26.269	19.70	2.7	--	0	10.4
		15	10.3	30.105	23.15	--	--	0	7.7
		25	10.3	30.210	23.28	--	--	0	7.5
		35	10.2	30.331	23.43	--	--	0	7.4
		55	10.2	30.529	23.68	--	--	0	7.2
		100	10.2	30.573	23.92	--	--	0	7.2
		115	10.2	30.602	24.01	--	--	0	7.2
COLVOSPASS	17-Jan-01	1	8.8	30.281	23.46	too dark	0.7	0.1312*	--
		15	8.8	30.291	23.53	--	0.9	0.04777*	--
		25	8.8	30.293	23.58	--	0.9	0.04742*	--
		35	8.8	30.296	23.63	--	0.8	0.05024*	--
		55	8.8	30.298	23.72	--	0.8	0.0577*	--
		100	8.8	30.318	23.92	--	1.1	0.05684*	--

* Surface PAR below MDL. Subsurface PAR value reported

Table A-2 Offshore Ambient Water Column Monitoring
General Water Quality Paramters (page 2 of 22)

Station	Date	Depth (m)	TSS (mg/L)	Chlorophyll-*a* (mg/m3)	Phaeophytin (mg/m3)	Silica (mg/L)	NH4-N (mg/L)	NO2+NO3 (mg/L)	Phosphorus (total) (mg/L)
ADMIRALC14	17-Jan-01	1	1.3	0.89	0.23	3.75	0.01	0.38	0.082
		15	0.6	0.64	0.21	3.65	<0.01	0.40	0.085
		25	2.0	0.46	0.18	3.69	<0.01	0.39	0.079
		35	1.3	0.37	0.22	3.59	<0.01	0.40	0.085
		55	2.6	--	--	3.62	<0.01	0.38	0.083
		100	2.1	--	--	3.36	<0.01	0.41	0.084
		115	2.4	--	--	3.18	<0.01	0.41	0.084
	20-Feb-01	1	3.5	18.1	1	2.8	<0.01	0.30	0.069
		15	3.1	3.2	0.15	3.43	<0.01	0.40	0.075
		25	2.7	2.3	0.27	3.61	<0.01	0.41	0.075
		35	3.5	2.1	0.32	3.59	<0.01	0.41	0.076
		55	2.8	--	--	3.58	<0.01	0.41	0.076
		100	2.2	--	--	3.48	<0.01	0.41	0.073
		115	3.6	--	--	3.27	<0.01	0.40	0.077
	21-Mar-01	1	2.9	5	<0.02	3.08	0.01	0.36	0.073
		15	2.4	3.1	0.021	3.22	0.01	0.38	0.075
		25	2.2	1.9	0.31	3.29	0.01	0.40	0.074
		35	2.2	1.2	0.22	3.33	0.01	0.40	0.076
		55	0.7	--	--	3.33	0.01	0.40	0.073
		100	2.8	--	--	3.29	0.01	0.40	0.074
		115	2.4	--	--	3.27	0.01	0.39	0.074
	16-Apr-01	1	3.4	19	0.59	3.15	<0.01	0.20	0.059
		15	1.6	4.1	<0.02	2.97	0.02	0.30	0.063
		25	1.3	1.5	0.37	3.05	0.03	0.32	0.067
		35	1.2	1	0.34	2.99	0.03	0.33	0.067
		55	2.2	--	--	2.97	0.03	0.32	0.068
		100	1.9	--	--	2.91	0.03	0.32	0.064
		115	2.3	--	--	2.92	0.03	0.32	0.065
	22-May-01	1	4.0	7.6	2.2	1.83	0.02	0.13	0.044
		15	3.5	7	1.8	1.93	0.03	0.16	0.050
		25	3.8	5.7	2.4	2.05	0.03	0.21	0.056
		35	3.3	6.3	2.2	2.07	0.04	0.21	0.152
		55	4.1	--	--	2.07	0.04	0.22	0.061
		100	4.6	--	--	2.01	0.04	0.22	0.059
		115	3.9	--	2.52	2.34	0.04	0.25	0.056
	18-Jun-01	1	4.5	21	1.99	0.85	<0.01	<0.02	0.036
		15	0.5	0.732	0.88	2.11	0.05	0.25	0.061
		25	0.6	0.521	0.93	2.14	0.05	0.25	0.064
		35	1.4	0.508	1.05	2.11	0.05	0.25	0.062
		55	0.8	--	--	2.17	0.05	0.26	0.062
		100	0.7	--	--	2.15	0.05	0.26	0.062
		115	0.7	--	--	2.12	0.05	0.26	0.060
COLVOSPASS	17-Jan-01	1	2.0	0.3	0.11	3.77	<0.01	0.41	0.078
		15	1.9	0.35	0.16	3.67	<0.01	0.41	0.076
		25	1.8	0.29	0.14	3.68	<0.01	0.41	0.078
		35	2.3	0.38	0.16	3.65	<0.01	0.41	0.081
		55	3.0	--	--	3.64	<0.01	0.41	0.079
		100	2.4	--	--	3.64	<0.01	0.41	0.078

Table A-2 Offshore Ambient Water Column Monitoring
General Water Quality Paramters (page 3 of 22)

Station	Date	Depth (m)	Temperature ^{0}C	Salinity (pss)	Density (Sigma-t)	Secchi Transparency (m)	Turbidity FTU	Light Intensity (PAR) % of Surface	Dissolved Oxygen (mg/L)
EDMDS-CTD2	17-Jan-01	1	8.5	29.920	23.23	10	0.6	71	--
		15	8.6	30.102	23.42	--	0.6	4	--
		25	8.5	30.252	23.59	--	0.8	1	--
		35	8.5	30.300	23.67	--	0.8	0	--
		55	8.7	30.400	23.81	--	0.7	0	--
		100	8.7	30.417	24.03	--	0.8	0	--
		130	8.7	30.453	24.20	--	0.8	0	--
	21-Mar-01	1	8.5	28.481	22.09	3.8	--	99	9.1
		15	8.2	30.140	23.50	--	--	2	8.7
		25	8.1	30.209	23.61	--	--	0	8.6
		35	8.1	30.232	23.67	--	--	0	8.6
		55	8.1	30.247	23.78	--	--	0	8.6
		100	8.1	30.388	24.09	--	--	0	8.6
		130	8.1	30.435	24.27	--	--	0	8.7
	16-Apr-01	1	8.7	--	--	9	0.1	100	8.5
		15	8.4	--	--	--	0.5	6	8.3
		25	8.4	--	--	--	0.5	1	8.0
		35	8.4	--	--	--	0.6	0	8.0
		55	8.4	--	--	--	0.6	0	7.9
		100	8.4	--	--	--	0.4	0	7.7
		130	8.4	--	--	--	0.5	0	7.7
	22-May-01	1	11.7	27.424	20.77	2.9	--	90	12.5
		15	9.9	29.627	22.85	--	--	0	10.0
		25	9.5	30.063	23.29	--	--	0	8.8
		35	9.4	30.136	23.41	--	--	0	8.6
		55	9.3	30.243	23.60	--	--	0	8.3
		100	9.2	30.374	23.93	--	--	0	7.9
		130	9.2	30.487	24.14	--	--	0	8.0
	18-Jun-01	1	11.1	28.162	21.36	--	--	--	8.7
		15	10.6	29.959	22.99	--	--	--	8.2
		25	10.4	30.039	23.13	--	--	--	8.0
		35	10.3	30.083	23.23	--	--	--	7.8
		55	10.1	30.249	23.48	--	--	--	7.4
		100	10.1	30.386	23.79	--	--	--	7.3
		130	10.1	30.494	24.01	--	--	--	7.1
	23-Jul-01	1	13.3	28.963	21.67	9	--	100	8.0
		15	12.1	30.099	22.83	--	--	3	7.3
		25	12.0	30.127	22.92	--	--	0	7.2
		35	11.7	30.199	23.07	--	--	0	6.8
		55	11.6	30.363	23.31	--	--	0	6.5
		100	11.5	30.558	23.68	--	--	0	6.4
		130	11.4	30.636	23.90	--	--	0	6.3
	20-Aug-01	1	13.7	29.764	22.22	4.2	--	74	8.7
		15	13.2	30.253	22.75	--	--	0	7.9
		25	13.0	30.303	22.87	--	--	0	7.5
		35	12.9	30.325	22.95	--	--	0	7.3
		55	12.3	30.525	23.30	--	--	0	6.4
		100	11.9	30.679	23.71	--	--	0	5.7
		130	11.7	30.730	23.92	--	--	0	5.5

Table A-2 Offshore Ambient Water Column Monitoring
General Water Quality Paramters (page 4 of 22)

Station	Date	Depth (m)	TSS (mg/L)	Chlorophyll-*a* (mg/m3)	Phaeophytin (mg/m3)	Silica (mg/L)	NH4-N (mg/L)	NO2+NO3 (mg/L)	Phosphorus (total) (mg/L)
EDMDS-CTD2	17-Jan-01	1	2.0	0.71	0.17	3.63	<0.01	0.42	0.085
		15	1.5	0.48	0.16	3.66	<0.01	0.40	0.086
		25	2.1	0.43	0.23	3.39	<0.01	0.41	0.080
		35	1.5	0.27	0.12	3.34	<0.01	0.41	0.083
		55	2.4	--	--	3.3	<0.01	0.42	0.083
		100	3.0	--	--	3.34	<0.01	0.41	0.084
		130	1.7	--	--	3.48	<0.01	0.40	0.085
	21-Mar-01	1	3.7	15.9	0.14	2.76	0.01	0.26	0.066
		15	2.1	0.5	0.22	3.15	0.01	0.40	0.076
		25	2.3	0.41	0.15	3.07	0.01	0.40	0.076
		35	0.8	0.51	0.17	3.11	0.01	0.40	0.081
		55	2.2	--	--	3.18	0.01	0.40	0.077
		100	2.5	--	--	3.06	0.02	0.38	0.079
		130	1.7	--	--	3.02	0.02	0.37	0.075
	16-Apr-01	1	1.7	2.6	0.2	2.91	0.03	0.32	0.065
		15	3.2	5.1	<0.02	2.81	0.02	0.32	0.066
		25	3.4	3.5	<0.02	2.96	0.03	0.33	0.069
		35	3.8	2.3	0.19	2.96	0.03	0.34	0.071
		55	2.8	--	--	2.98	0.04	0.34	0.070
		100	2.2	--	--	2.98	0.03	0.34	0.069
		130	1.4	--	--	2.93	0.03	0.33	0.068
	22-May-01	1	4.8	20	3.3	0.903	0.01	<0.02	0.033
		15	2.7	13.9	1.5	2.03	0.02	0.17	0.054
		25	1.8	4	0.76	2.37	0.05	0.25	0.059
		35	2.4	3.3	0.83	2.47	0.05	0.26	0.063
		55	2.2	--	--	2.56	0.05	0.28	0.064
		100	2.3	--	--	3.06	0.03	0.36	0.064
		130	1.9	--	--	3.22	0.04	0.39	0.062
	18-Jun-01	1	1	3.76	1.125	2.02	0.04	0.20	0.06
		15	0.6	0.84	1.15	2.3	0.06	0.24	0.06
		25	<0.5	0.327	0.626	2.28	0.06	0.25	0.058
		35	<0.5	0.207	0.542	2.17	0.05	0.25	0.066
		55	<0.5	--	--	2.14	0.05	0.26	0.061
		100	0.7	--	--	2.14	0.05	0.26	0.062
		130	0.5	--	--	2.21	0.05	0.27	0.063
	23-Jul-01	1	2.5	5.47	0.98	1.01	0.02	0.09	0.042
		15	2.0	0.951	1.41	1.71	0.04	0.18	0.056
		25	1.0	0.801	1.9	1.75	0.04	0.19	0.058
		35	1.2	0.317	1.17	1.85	0.04	0.22	0.059
		55	1.9	--	--	1.86	0.05	0.22	0.058
		100	1.4	--	--	1.93	0.05	0.23	0.056
		130	2.6	--	--	2.02	0.05	0.23	0.059
	20-Aug-01	1	3.5	18.9	2.34	0.964	<0.01	0.07	0.042
		15	2.5	17.3	3.58	1.17	0.01	0.12	0.049
		25	2.4	14.7	2.28	1.31	0.01	0.15	0.050
		35	1.7	13.3	2.18	1.39	0.01	0.16	0.050
		55	1.6	--	--	1.8	0.02	0.23	0.055
		100	1.2	--	--	2.12	0.02	0.28	0.057
		130	1.6	--	--	2.23	0.01	0.30	0.060

Table A-2 Offshore Ambient Water Column Monitoring
General Water Quality Paramters (page 5 of 22)

Station	Date	Depth (m)	Temperature ^{0}C	Salinity (pss)	Density (Sigma-t)	Secchi Transparency (m)	Turbidity FTU	Light Intensity (PAR) % of Surface	Dissolved Oxygen (mg/L)
EDMDS-CTD4	17-Jan-01	1	8.4	29.542	22.94	8	0.6	81	--
		15	8.5	29.960	23.32	--	0.8	3	--
		25	8.5	30.162	23.52	--	0.9	1	--
		35	8.5	30.280	23.66	--	1.1	0	--
		50	8.5	30.346	23.78	--	1.2	0	--
	20-Feb-01	1	8.1	28.465	22.14	5	--	72	11.6
		15	7.9	30.032	23.45	--	--	1	9.9
		25	8.0	30.149	23.59	--	--	0	9.7
		35	8.0	30.228	23.68	--	--	0	9.6
		50	8.0	30.234	23.76	--	--	0	9.6
	21-Mar-01	1	8.9	26.911	20.81	3.2	--	64	10.2
		15	8.2	30.045	23.42	--	--	0	9.0
		25	8.2	30.065	23.48	--	--	0	9.0
		35	8.2	30.147	23.59	--	--	0	8.8
		50	8.2	30.173	23.69	--	--	0	8.8
	16-Apr-01	1	--	--	--	4.7	--	--	--
		15	8.5	--	--	--	0.3	4	8.2
		25	8.4	--	--	--	0.5	1	7.9
		35	8.4	--	--	--	0.5	0	7.9
		50	8.4	--	--	--	0.6	0	7.9
	22-May-01	1	10.5	29.224	22.37	4.5	--	100	10.2
		15	9.8	29.781	22.98	--	--	0	9.2
		25	9.5	30.112	23.33	--	--	0	8.7
		35	9.5	30.110	23.38	--	--	0	8.7
		50	9.5	30.146	23.47	--	--	0	8.7
	18-Jun-01	1	12.9	25.863	19.34	3	--	0	11.1
		15	11.5	28.450	21.66	--	--	0	9.1
		25	10.5	29.905	23.01	--	--	0	7.9
		35	10.3	30.118	23.25	--	--	0	7.7
		50	10.2	30.222	23.41	--	--	0	7.6
	23-Jul-01	1	13.2	29.187	21.85	7.5	--	98	8.4
		15	12.1	30.091	22.83	--	--	2	7.3
		25	11.9	30.354	23.11	--	--	0	6.8
		35	11.7	30.476	23.29	--	--	0	6.6
		50	11.5	30.506	23.42	--	--	0	6.4
	20-Aug-01	1	13.7	29.561	22.05	4.3	--	68	7.8
		15	13.4	30.161	22.64	--	--	0	8.0
		25	12.0	30.661	23.34	--	--	0	6.0
		35	12.0	30.660	23.38	--	--	0	6.0
		50	11.8	30.704	23.51	--	--	0	5.7

Table A-2 Offshore Ambient Water Column Monitoring
General Water Quality Paramters (page 6 of 22)

Station	Date	Depth (m)	TSS (mg/L)	Chlorophyll-*a* (mg/m3)	Phaeophytin (mg/m3)	Silica (mg/L)	NH4-N (mg/L)	NO2+NO3 (mg/L)	Phosphorus (total) (mg/L)
EDMDS-CTD4	17-Jan-01	1	<0.5	0.79	0.21	3.62	<0.01	0.41	0.083
		15	1.7	0.3	0.13	3.27	<0.01	0.41	0.083
		25	2.0	0.19	0.1	3.2	<0.01	0.41	0.084
		35	3.2	0.33	0.17	3.31	<0.01	0.41	0.087
		50	1.6	--	--	3.25	<0.01	0.41	0.083
	20-Feb-01	1	4.6	20.7	0.31	2.63	<0.01	0.26	0.063
		15	2.4	6.8	0.25	3.3	<0.01	0.38	0.076
		25	2.2	2.6	0.28	3.43	<0.01	0.41	0.077
		35	2.0	1.1	0.22	3.28	<0.01	0.41	0.075
		50	2.4	--	--	3.58	<0.01	0.42	0.078
	21-Mar-01	1	5.8	33.6	<0.02	2.11	0.01	0.13	0.062
		15	2.0	1.7	0.22	3.02	0.02	0.37	0.076
		25	2.1	1.4	0.41	3.13	0.01	0.39	0.080
		35	0.7	0.6	0.25	3.17	0.01	0.39	0.079
		50	2.1	--	--	3.22	0.01	0.39	0.076
	16-Apr-01	1	3.4	7.9	0.34	3.37	0.01	0.20	0.052
		15	1.5	1	0.37	2.9	0.03	0.32	0.064
		25	2.7	0.98	0.21	2.98	0.04	0.33	0.068
		35	2.5	0.91	0.079	2.99	0.04	0.33	0.067
		50	2.7	--	--	2.97	0.04	0.33	0.069
	22-May-01	1	2.9	11	1.6	2.59	0.02	0.20	0.048
		15	3.1	7	1.7	2.82	0.03	0.28	0.055
		25	2.1	5	0.99	2.78	0.05	0.30	0.060
		35	3.3	5	1.1	2.83	0.04	0.30	0.060
		50	1.8	--	--	2.86	0.05	0.30	0.063
	18-Jun-01	1	5.5	16.3	2.08	0.745	<0.01	<0.02	0.033
		15	1.6	7.58	1.83	1.64	0.02	0.15	0.051
		25	0.9	1.4	1.03	2.08	0.05	0.24	0.060
		35	1.2	1.08	1.37	2.12	0.05	0.25	0.061
		50	1.5	--	--	2.14	0.05	0.25	0.060
	23-Jul-01	1	8.3	4.89	1.62	1.31	0.02	0.12	0.049
		15	4.2	0.951	2.83	1.69	0.04	0.19	0.052
		25	2.1	0.982	1.19	1.72	0.05	0.21	0.060
		35	2.4	0.482	0.967	1.8	0.05	0.22	0.055
		50	1.6	--	--	1.9	0.06	0.23	0.064
	20-Aug-01	1	2.4	17	2.57	0.954	<0.01	0.07	0.043
		15	3.2	17.4	3.07	1.09	0.01	0.10	0.048
		25	1.2	1.79	1.16	2.04	0.03	0.26	0.056
		35	1.0	1.92	1.32	2.04	0.02	0.26	0.058
		50	1.6	--	--	2.18	0.02	0.28	0.060

Table A-2 Offshore Ambient Water Column Monitoring
General Water Quality Paramters (page 7 of 22)

Station	Date	Depth (m)	Temperature ^{0}C	Salinity (pss)	Density (Sigma-t)	Secchi Transparency (m)	Turbidity FTU	Light Intensity (PAR) % of Surface	Dissolved Oxygen (mg/L)
KSBP01	17-Jan-01	1	8.5	30.126	23.39	8	0.7	68	--
		15	8.7	30.242	23.51	--	0.7	4	--
		25	8.8	30.322	23.60	--	0.8	1	--
		35	8.8	30.366	23.69	--	0.8	0	--
		55	8.8	30.394	23.80	--	0.9	0	--
		100	8.6	30.410	24.04	--	1.0	0	--
		195	8.5	30.431	24.51	--	1.2	0	--
	20-Feb-01	1	7.9	29.969	23.34	10	--	100	10.2
		15	8.0	30.069	23.47	--	--	3	9.7
		25	8.0	30.150	23.58	--	--	0	9.5
		35	8.1	30.235	23.68	--	--	0	9.4
		55	8.1	30.268	23.79	--	--	0	9.3
		100	8.0	30.308	24.04	--	--	0	9.4
		195	7.8	30.377	24.56	--	--	0	9.5
	21-Mar-01	1	8.4	30.056	23.35	12.8	--	62	9.1
		15	8.2	30.074	23.45	--	--	5	8.9
		25	8.2	30.080	23.50	--	--	1	8.9
		35	8.2	30.099	23.56	--	--	0	8.8
		55	8.1	30.288	23.81	--	--	0	8.6
		100	8.1	30.418	24.12	--	--	0	8.6
		195	8.1	30.527	24.64	--	--	0	8.7
	16-Apr-01	1	--	--	--	10	--	--	--
		15	8.6	--	--	--	0.5	4	8.7
		25	8.4	--	--	--	0.5	1	8.3
		35	8.4	--	--	--	0.6	0	8.0
		55	8.3	--	--	--	0.6	0	8.0
		100	8.4	--	--	--	0.7	0	7.9
		195	8.4	--	--	--	1.3	0	7.9
	22-May-01	1	12.2	27.475	20.72	2.5	--	100	13.6
		15	9.7	29.840	23.04	--	--	0	9.6
		25	9.7	29.876	23.12	--	--	0	9.5
		35	9.5	30.002	23.29	--	--	0	8.9
		55	9.2	30.209	23.58	--	--	0	8.4
		100	9.2	30.412	23.94	--	--	0	8.1
		195	9.3	30.522	24.46	--	--	0	8.1
	18-Jun-01	1	12.6	27.521	20.69	2.7	--	0	11.1
		15	10.6	29.935	22.98	--	--	0	8.2
		25	10.4	30.022	23.12	--	--	0	7.8
		35	10.2	30.112	23.26	--	--	0	7.8
		55	10.2	30.148	23.39	--	--	0	7.5
		100	10.1	30.492	23.86	--	--	0	7.2
		195	10.1	30.685	24.45	--	--	0	7.0
	23-Jul-01	1	12.7	30.053	22.62	8	--	100	8.0
		15	11.9	30.178	22.93	--	--	2	7.1
		25	11.9	30.169	22.97	--	--	0	7.1
		35	11.9	30.179	23.03	--	--	0	7.0
		55	11.4	30.299	23.29	--	--	0	6.5
		100	11.4	30.471	23.63	--	--	0	6.4
		195	11.4	30.587	24.15	--	--	0	6.3

Table A-2 Offshore Ambient Water Column Monitoring
General Water Quality Paramters (page 8 of 22)

Station	Date	Depth (m)	TSS (mg/L)	Chlorophyll-*a* (mg/m3)	Phaeophytin (mg/m3)	Silica (mg/L)	NH4-N (mg/L)	NO2+NO3 (mg/L)	Phosphorus (total) (mg/L)
KSBP01	17-Jan-01	1	1.5	0.51	0.14	3.53	<0.01	0.42	0.083
		15	2.2	0.43	0.15	3.58	<0.01	0.42	0.086
		25	1.3	0.33	0.14	3.61	<0.01	0.42	0.087
		35	1.3	0.29	0.13	3.44	<0.01	0.42	0.084
		55	2.0	--	--	3.4	<0.01	0.41	0.089
		100	1.9	--	--	3.33	<0.01	0.42	0.085
		195	1.4	--	--	3.32	<0.01	0.41	0.085
	20-Feb-01	1	3.4	5.8	0.48	3.15	<0.01	0.38	0.073
		15	1.8	2.6	0.23	3.43	<0.01	0.41	0.077
		25	2.8	1.6	0.29	3.52	<0.01	0.42	0.080
		35	1.9	0.62	0.2	3.57	<0.01	0.43	0.078
		55	2.3	--	--	3.62	<0.01	0.43	0.078
		100	2.2	--	--	3.52	<0.01	0.42	0.078
		195	1.7	--	--	3.34	<0.01	0.41	0.076
	21-Mar-01	1	0.7	1.3	0.18	3.33	0.01	0.39	0.075
		15	2.4	0.84	0.2	3.31	0.01	0.40	0.074
		25	2.2	0.72	0.21	3.32	0.01	0.40	0.075
		35	0.6	0.73	0.2	3.27	0.01	0.40	0.078
		55	2.5	--	--	3.2	0.02	0.39	0.077
		100	2.6	--	--	3.12	0.02	0.38	0.070
		195	1.7	--	--	3.07	0.02	0.37	0.070
	16-Apr-01	1	2.0	4.1	<0.02	3	0.02	0.31	0.066
		15	1.9	5.1	<0.02	2.78	0.02	0.31	0.066
		25	2.4	4.9	<0.02	2.83	0.02	0.32	0.065
		35	2.8	3.1	0.33	2.93	0.04	0.34	0.071
		55	1.5	--	--	2.94	0.04	0.34	0.072
		100	1.9	--	--	2.8	0.04	0.32	0.069
		195	2.7	--	--	2.79	0.03	0.32	0.072
	22-May-01	1	4.4	30	1.2	1.38	0.01	<0.02	0.038
		15	2.6	10.1	1	2.19	0.04	0.20	0.056
		25	2.5	9.3	1.1	2.25	0.05	0.21	0.058
		35	3.4	7.6	0.85	2.3	0.04	0.24	0.063
		55	1.6	--	--	2.46	0.05	0.28	0.065
		100	2.0	--	--	2.41	0.04	0.28	0.065
		195	2.4	--	--	2.38	0.04	0.28	0.064
	18-Jun-01	1	4.0	25.5	2.87	1.06	<0.01	<0.02	0.041
		15	0.5	2.08	1.12	2.21	0.05	0.23	0.064
		25	<0.5	1.43	1.41	2.21	0.04	0.24	0.064
		35	1.6	0.812	0.695	2.26	0.05	0.26	0.065
		55	0.7	--	--	2.33	0.05	0.27	0.064
		100	0.6	--	--	2.11	0.05	0.25	0.061
		195	1.6	--	--	2.26	0.05	0.27	0.064
	23-Jul-01	1	3.1	6.08	1.25	1.58	0.02	0.16	0.052
		15	1.2	2.01	1.07	1.79	0.03	0.21	0.058
		25	1.0	1.67	1.06	1.78	0.03	0.21	0.056
		35	1.3	1.39	1.04	1.81	0.03	0.21	0.056
		55	1.0	--	--	1.96	0.04	0.26	0.068
		100	1.2	--	--	1.92	0.06	0.24	0.060
		195	1.8	--	--	1.97	0.06	0.23	0.060

Table A-2 Offshore Ambient Water Column Monitoring
General Water Quality Paramters (page 9 of 22)

Station	Date	Depth (m)	Temperature ^{0}C	Salinity (pss)	Density (Sigma-t)	Secchi Transparency (m)	Turbidity FTU	Light Intensity (PAR) % of Surface	Dissolved Oxygen (mg/L)
KSBP01	20-Aug-01	1	13.3	30.218	22.63	4.5	--	100	8.0
(Con't)		15	12.4	30.413	23.02	--	--	1	6.1
		25	12.2	30.457	23.13	--	--	0	6.0
		35	12.1	30.521	23.24	--	--	0	5.9
		55	12.1	30.524	23.33	--	--	0	5.9
		100	12.1	30.570	23.58	--	--	0	6.0
		195	11.9	30.651	24.10	--	--	0	5.7
	24-Sep-01	1	13.1	30.408	22.82	10	<0.5	100	6.7
		15	12.8	30.558	23.05	--	<0.5	5	6.4
		25	12.6	30.610	23.18	--	<0.5	1	6.1
		35	12.4	30.648	23.29	--	<0.5	0	6.0
		55	12.1	30.779	23.54	--	0.6	0	6.1
		100	12.3	30.805	23.77	--	0.6	0	6.1
		195	11.9	30.896	24.31	--	1.3	0	6.2
	23-Oct-01	1	11.9	30.774	23.34	13	0.6	50	6.6
		15	11.8	30.801	23.44	--	0.6	2	6.5
		25	11.7	30.817	23.51	--	0.6	0	6.5
		35	11.6	30.842	23.59	--	0.6	0	6.4
		55	11.4	30.883	23.75	--	0.6	0	6.3
		100	11.3	30.903	23.98	--	0.6	0	6.4
		195	11.1	30.923	24.24	--	1.3	0	6.4
	19-Nov-01	1	10.7	28.312	21.62	5.5	1.2	74	5.8
		15	10.9	30.412	23.28	--	0.5	3	5.6
		25	10.7	30.584	23.51	--	0.6	1	5.6
		35	10.6	30.620	23.59	--	0.6	0	5.5
		55	10.6	30.658	23.71	--	0.7	0	5.5
		100	10.5	30.720	23.99	--	0.7	0	5.5
		195	10.3	30.755	24.48	--	0.9	0	5.7
	17-Dec-01	1	9.6	29.518	22.74	8.1	1.0	47	6.5
		15	9.7	29.910	23.10	--	0.9	1	6.4
		25	9.7	29.939	23.17	--	1.0	0	6.4
		35	9.7	29.943	23.22	--	1.0	0	6.3
		55	9.7	30.022	23.37	--	0.9	0	6.3
		100	9.6	30.052	23.62	--	1.1	0	6.2
		195	10.0	30.314	24.19	--	1.8	0	5.7
LSNT01	17-Jan-01	1	8.8	30.298	23.48	too dark	0.9	0.04443*	--
		15	8.8	30.294	23.54	--	1.0	0.06145*	--
		25	8.8	30.298	23.59	--	1.0	0.06501*	--
		35	8.8	30.303	23.64	--	1.0	0.05563*	--
		55	8.8	30.305	23.73	--	1.0	0.05619*	--
		100	8.8	30.349	23.97	--	1.0	0.05953*	--
		200	8.8	30.491	24.54	--	2.3	0.05972*	--
	21-Feb-01	1	8.1	30.111	23.42	10.5	--	57	9.7
		15	8.1	30.111	23.49	--	--	3	9.7
		25	8.1	30.115	23.54	--	--	0	9.7
		35	8.1	30.114	23.59	--	--	0	9.8
		55	8.1	30.119	23.68	--	--	0	9.7
		100	8.1	30.144	23.90	--	--	0	9.6
		200	7.9	30.368	24.56	--	--	0	9.5

* Surface PAR below MDL. Subsurface PAR value reported

Table A-2 Offshore Ambient Water Column Monitoring
General Water Quality Paramters (page 10 of 22)

Station	Date	Depth (m)	TSS (mg/L)	Chlorophyll-*a* (mg/m3)	Phaeophytin (mg/m3)	Silica (mg/L)	NH4-N (mg/L)	NO2+NO3 (mg/L)	Phosphorus (total) (mg/L)
KSBP01	20-Aug-01	1	3.3	19.2	2.69	1.15	<0.01	0.09	0.050
(Con't)		15	0.8	2.09	2.28	1.96	0.02	0.24	0.061
		25	1.0	0.903	1.91	2.01	0.06	0.27	0.060
		35	1.3	0.533	1.48	2.01	0.02	0.27	0.058
		55	1.2	--	--	2.03	0.02	0.27	0.056
		100	0.5	--	--	2.01	0.02	0.26	0.064
		195	2.2	--	--	2.12	0.02	0.28	0.062
	24-Sep-01	1	1.4	1.62	0.398	2.21	0.03	0.25	0.064
		15	1.3	2.12	0.98	2.21	0.03	0.26	0.067
		25	1.5	1.14	0.87	2.26	0.03	0.27	0.070
		35	1.6	0.461	0.977	2.24	0.04	0.28	0.072
		55	1.7	--	--	2.12	0.04	0.26	0.067
		100	1.8	--	--	2.14	0.02	0.26	0.063
		195	1.7	--	--	2.12	0.05	0.26	0.072
	23-Oct-01	1	1.5	1.13	0.529	2.41	0.02	0.30	0.068
		15	0.7	0.805	0.525	2.41	0.02	0.30	0.064
		25	1.9	0.848	0.54	2.44	0.02	0.31	0.069
		35	3.7	0.641	0.388	2.44	0.02	0.31	0.062
		55	1.1	--	--	2.46	0.02	0.32	0.068
		100	1.2	--	--	2.55	0.02	0.33	0.066
		195	<1	--	--	2.77	0.03	0.38	0.069
	19-Nov-01	1	2.5	0.525	0.225	2.94	<0.01	0.34	0.077
		15	2.1	0.322	0.258	2.84	<0.01	0.35	0.077
		25	1.1	0.306	0.235	2.86	<0.01	0.36	0.077
		35	1.9	0.294	0.301	2.9	<0.01	0.38	0.079
		55	1.2	--	--	2.9	<0.01	0.37	0.077
		100	2.0	--	--	2.85	<0.01	0.38	0.077
		195	1.9	--	--	2.89	<0.01	0.38	0.073
	17-Dec-01	1	1.4	0.183	0.151	3.58	<0.01	0.41	0.083
		15	1.2	0.168	0.194	3.43	<0.01	0.40	0.081
		25	1.2	0.233	0.206	3.42	<0.01	0.39	0.080
		35	<0.5	0.19	0.208	3.4	<0.01	0.39	0.083
		55	4.0	--	--	3.21	<0.01	0.39	0.080
		100	1.5	--	--	3.22	<0.01	0.39	0.077
		195	2.4	--	--	3.18	<0.01	0.39	0.082
LSNT01	17-Jan-01	1	2.5	0.34	0.17	4.02	<0.01	0.41	0.076
		15	2.8	0.35	0.17	3.76	<0.01	0.41	0.079
		25	2.3	0.28	0.19	3.79	<0.01	0.41	0.079
		35	2.7	0.35	0.18	3.87	<0.01	0.41	0.080
		55	2.1	--	--	3.9	<0.01	0.41	0.081
		100	2.5	--	--	3.8	<0.01	0.41	0.080
		200	4.2	--	--	3.87	<0.01	0.42	0.079
	21-Feb-01	1	2.1	0.93	0.18	3.43	<0.01	0.42	0.076
		15	2.4	1.1	0.21	3.64	<0.01	0.43	0.072
		25	2.4	0.81	0.21	3.66	<0.01	0.43	0.074
		35	1.5	0.8	0.27	3.76	<0.01	0.43	0.075
		55	2.3	--	--	3.74	<0.01	0.43	0.076
		100	1.4	--	--	3.71	<0.01	0.43	0.075
		200	4.6	--	--	3.31	<0.01	0.41	0.079

Table A-2 Offshore Ambient Water Column Monitoring
General Water Quality Paramters (page 11 of 22)

Station	Date	Depth (m)	Temperature ^{0}C	Salinity (pss)	Density (Sigma-t)	Secchi Transparency (m)	Turbidity FTU	Light Intensity (PAR) % of Surface	Dissolved Oxygen (mg/L)
LSNT01	20-Mar-01	1	8.3	29.994	23.31	12	--	64	9.0
(Con't)		15	8.1	30.136	23.50	--	--	5	8.7
		25	8.1	30.146	23.56	--	--	1	8.7
		35	8.1	30.163	23.62	--	--	0	8.6
		55	8.1	30.189	23.73	--	--	0	8.6
		100	8.1	30.391	24.10	--	--	0	8.5
		200	8.1	30.511	24.65	--	--	0	8.6
	17-Apr-01	1	8.6	--	--	9.5	0.4	100	8.9
		15	8.6	--	--	--	0.6	4	8.8
		25	8.5	--	--	--	0.6	1	8.7
		35	8.5	--	--	--	0.7	0	8.6
		55	8.4	--	--	--	0.6	0	8.4
		100	8.4	--	--	--	1.1	0	7.9
		200	8.4	--	--	--	2.9	0	7.9
	22-May-01	1	11.6	28.414	21.55	2.7	--	38	13.6
		15	10.2	29.481	22.68	--	--	0	10.4
		25	9.7	29.901	23.14	--	--	0	9.3
		35	9.4	30.054	23.34	--	--	0	8.9
		55	9.4	30.075	23.45	--	--	0	8.9
		100	9.3	30.137	23.72	--	--	0	8.6
		200	9.2	30.549	24.46	--	--	0	8.0
	19-Jun-01	1	12.5	30.127	22.79	2.5	--	0	7.4
		15	11.3	30.126	22.87		--	0	7.2
		25	10.9	30.137	22.94	--	--	0	7.1
		35	10.6	30.148	23.00	--	--	0	7.0
		55	10.3	30.156	23.11	--	--	0	6.9
		100	9.9	30.462	23.66	--	--	0	6.1
		200	10.1	30.563	24.21	--	--	0	6.0
	24-Jul-01	1	12.1	30.364	22.88	9.5	--	--	6.4
		15	12.0	30.397	22.98	--	--	--	6.2
		25	11.9	30.415	23.05	--	--	--	6.2
		35	11.9	30.420	23.10	--	--	--	6.2
		55	11.8	30.454	23.24	--	--	--	6.0
		100	11.2	30.659	23.69	--	--	--	5.4
		200	11.1	30.790	24.29	--	--	--	5.2
	22-Aug-01	1	12.6	30.713	23.08	8.5	--	66	5.0
		15	12.5	30.614	22.98	--	--	3	5.4
		25	12.5	30.615	22.98	--	--	1	5.3
		35	12.5	30.661	23.02	--	--	0	5.1
		55	12.4	30.712	23.07	--	--	0	5.1
		100	11.9	30.636	23.00	--	--	0	5.2
		200	11.6	30.713	23.07	--	--	0	5.1
	23-Oct-01	1	12.0	30.719	23.27	10	<0.5	84	6.9
		15	11.9	30.737	23.37	--	0.6	2	6.7
		25	11.9	30.753	23.43	--	0.7	0	6.6
		35	11.7	30.817	23.55	--	0.8	0	6.4
		55	11.6	30.866	23.70	--	0.8	0	6.3
		100	11.4	30.920	23.98	--	0.7	0	6.3
		200	11.3	30.940	24.41	--	1.3	0	6.4

Table A-2 Offshore Ambient Water Column Monitoring
General Water Quality Paramters (page 12 of 22)

Station	Date	Depth (m)	TSS (mg/L)	Chlorophyll-*a* (mg/m3)	Phaeophytin (mg/m3)	Silica (mg/L)	NH4-N (mg/L)	NO2+NO3 (mg/L)	Phosphorus (total) (mg/L)
LSNT01	20-Mar-01	1	<1	1.1	0.22	3.26	<0.01	0.40	0.073
(Con't)		15	1.2	0.97	0.18	3.19	<0.01	0.40	0.073
		25	2.9	0.94	0.15	3.11	<0.01	0.40	0.075
		35	2.0	0.84	0.12	3.06	<0.01	0.40	0.075
		55	2.1	--	--	3.02	0.01	0.40	0.073
		100	2.5	--	--	2.8	0.02	0.38	0.072
		200	4.3	--	--	2.7	0.02	0.37	0.072
	17-Apr-01	1	2.0	6.8	<0.02	2.73	0.02	0.31	0.064
		15	2.9	6.8	0.15	2.75	0.02	0.31	0.065
		25	1.9	5.9	0.26	2.76	0.02	0.32	0.066
		35	2.2	6	0.077	2.69	0.02	0.31	0.065
		55	2.5	--	--	2.76	0.02	0.33	0.065
		100	2.8	--	--	2.85	0.04	0.33	0.068
		200	5.2	--	--	2.87	0.03	0.32	0.069
	22-May-01	1	4.8	26.4	2.5	1.16	<0.01	<0.02	0.031
		15	3.0	13.4	1.2	2.09	0.02	0.17	0.050
		25	2.0	7.9	1.1	2.38	0.03	0.24	0.057
		35	1.5	5.3	0.36	2.5	0.04	0.26	0.063
		55	2.7	--	--	2.52	0.04	0.27	0.058
		100	2.4	--	--	2.62	0.04	0.28	0.065
		200	4.3	--	--	2.83	0.04	0.31	0.069
	19-Jun-01	1	4.1	28.6	2.78	0.71	<0.01	<0.02	0.037
		15	2.5	13.7	1.18	1.78	0.02	0.16	0.050
		25	3.6	9.76	0.684	2.16	0.03	0.21	0.058
		35	1.8	6.26	0.685	2.11	0.03	0.22	0.063
		55	0.9	--	--	2.36	0.04	0.27	0.057
		100	0.8	--	--	2.48	0.03	0.31	0.061
		200	1.7	--	--	2.32	0.06	0.28	0.060
	24-Jul-01	1	1.7	3.99	0.129	1.74	0.03	0.20	0.060
		15	0.8	4	0.385	1.81	0.03	0.21	0.062
		25	2.4	2.91	0.299	1.84	0.03	0.21	0.064
		35	1.9	2.39	0.484	1.87	0.03	0.22	0.065
		55	1.6	--	--	1.8	0.03	0.22	0.065
		100	0.8	--	--	2	0.04	0.27	0.070
		200	1.4	--	--	2.1	0.04	0.27	0.072
	22-Aug-01	1	0.9	3.14	0.138	1.96	0.02	0.24	0.065
		15	0.8	3.05	0.351	2.03	0.02	0.24	0.067
		25	0.8	2.37	0.64	2.04	0.02	0.25	0.070
		35	0.6	2.33	0.566	2.05	0.02	0.25	0.068
		55	1.0	--	--	2.07	0.02	0.26	0.068
		100	2.0	--	--	2.27	<0.01	0.31	0.075
		200	1.4	--	--	2.46	0.01	0.33	0.076
	23-Oct-01	1	0.9	1.93	0.349	2.86	0.03	0.34	0.071
		15	1.5	1.84	0.404	2.39	0.02	0.30	0.072
		25	2.0	1.83	0.447	2.45	0.02	0.30	0.072
		35	2.0	1.16	0.407	2.45	0.02	0.30	0.070
		55	1.3	--	--	2.46	0.02	0.31	0.071
		100	1.4	--	--	2.45	0.02	0.32	0.069
		200	1.9	--	--	2.84	0.03	0.37	0.071

Table A-2 Offshore Ambient Water Column Monitoring
General Water Quality Paramters (page 13 of 22)

Station	Date	Depth (m)	Temperature ^{0}C	Salinity (pss)	Density (Sigma-t)	Secchi Transparency (m)	Turbidity FTU	Light Intensity (PAR) % of Surface	Dissolved Oxygen (mg/L)
LSNT01	19-Nov-01	1	10.9	29.786	22.74	6.8	0.7	85	5.9
(Con't)		15	11.1	30.376	23.23	--	0.7	3	5.6
		25	11.1	30.460	23.33	--	0.7	0	5.6
		35	11.1	30.498	23.41	--	0.7	0	5.5
		55	11.1	30.549	23.55	--	0.8	0	5.4
		100	10.6	30.753	24.00	--	1.0	0	5.3
		200	10.4	30.767	24.49	--	2.2	0	5.4
	17-Dec-01	1	10.0	29.983	23.06	7.8	0.9	15	6.4
		15	10.0	30.013	23.16	--	0.9	0	6.3
		25	10.0	30.024	23.22	--	0.9	0	6.2
		35	10.0	30.055	23.29	--	1.0	0	6.1
		55	10.1	30.065	23.38	--	1.0	0	6.1
		100	10.1	30.271	23.73	--	1.2	0	5.8
		200	10.3	30.451	24.29	--	3.2	0	5.5
LTED04	17-Jan-01	1	8.6	29.009	22.49	--	0.9	69	--
		15	8.9	30.354	23.56	--	0.8	3	--
		25	8.9	30.379	23.63	--	0.7	1	--
		35	9.0	30.388	23.68	--	0.7	0	--
		55	8.9	30.406	23.79	--	3.3	0	--
		75	8.9	30.419	23.89	--	6.0	0	--
	21-Feb-01	1	8.2	29.383	22.84	8	--	67	9.6
		15	8.1	30.181	23.54	--	--	2	9.4
		25	8.2	30.195	23.59	--	--	0	9.4
		35	8.2	30.198	23.62	--	--	0	9.4
		55	8.2	30.214	23.74	--	--	0	9.3
		75	8.2	30.229	23.83	--	--	0	9.0
	20-Mar-01	1	8.3	28.907	22.45	11.1	--	87	9.0
		15	8.2	30.111	23.48	--	--	5	8.8
		25	8.2	30.136	23.55	--	--	1	8.7
		35	8.2	30.147	23.60	--	--	0	8.6
		55	8.1	30.313	23.83	--	--	0	8.3
		75	8.1	30.354	23.96	--	--	0	8.3
	17-Apr-01	1	9.0	--	--	8.5	0.6	27	9.1
		15	8.4	--	--	--	0.5	1	8.5
		25	8.4	--	--	--	0.44	0	8.4
		35	8.4	--	--	--	0.5	0	8.4
		55	8.4	--	--	--	1.3	0	7.9
		75	8.3	--	--	--	1.4	0	7.8
	22-May-01	1	11.2	27.582	20.97	4	--	72	14.1
		15	9.7	29.857	23.06	--	--	0	9.6
		25	9.5	30.008	23.25	--	--	0	9.1
		35	9.4	30.032	23.30	--	--	0	9.0
		55	9.2	30.098	23.50	--	--	0	8.4
		75	9.0	30.280	23.77	--	--	0	7.9
	19-Jun-01	1	13.3	24.622	18.31	4	--	0	11.2
		15	11.2	29.607	22.61	--	--	0	8.8
		25	10.7	29.857	22.92	--	--	0	8.4
		35	10.6	29.935	23.06	--	--	0	8.2
		55	10.0	30.115	23.40	--	--	0	7.5
		75	9.8	30.277	23.64	--	--	0	6.9

Table A-2 Offshore Ambient Water Column Monitoring
General Water Quality Paramters (page 14 of 22)

Station	Date	Depth (m)	TSS (mg/L)	Chlorophyll-*a* (mg/m3)	Phaeophytin (mg/m3)	Silica (mg/L)	NH4-N (mg/L)	NO2+NO3 (mg/L)	Phosphorus (total) (mg/L)
LSNT01	19-Nov-01	1	1.2	1.02	0.185	2.86	<0.01	0.35	0.075
(Con't)		15	0.9	1.29	0.215	2.78	<0.01	0.35	0.078
		25	1.3	1.05	0.176	2.74	0.01	0.35	0.081
		35	0.9	0.787	0.2	2.62	<0.01	0.35	0.080
		55	1.9	--	--	2.72	<0.01	0.35	0.077
		100	2.7	--	--	2.87	<0.01	0.38	0.077
		200	3.3	--	--	2.92	<0.01	0.38	0.080
	17-Dec-01	1	1.4	0.168	0.149	3.35	<0.01	0.39	0.083
		15	1.1	0.189	0.163	3.47	<0.01	0.39	0.084
		25	0.9	0.178	0.158	3.46	<0.01	0.39	0.083
		35	1.6	0.188	0.181	3.41	<0.01	0.39	0.083
		55	2.1	--	--	3.37	<0.01	0.39	0.082
		100	2.6	--	--	3.28	<0.01	0.39	0.082
		200	2.4	--	--	3.28	<0.01	0.39	0.083
LTED04	17-Jan-01	1	2.3	0.28	0.092	4.06	<0.01	0.41	0.075
		15	2.6	0.18	0.082	3.61	<0.01	0.41	0.078
		25	1.9	0.18	0.095	3.57	<0.01	0.41	0.086
		35	1.9	0.13	0.078	3.50	<0.01	0.41	0.082
		55	5.1	--	--	3.56	<0.01	0.41	0.085
		75	8.7	--	--	3.70	<0.01	0.42	0.087
	21-Feb-01	1	2.0	0.88	0.24	4.36	0.01	0.43	0.086
		15	1.2	0.62	0.17	3.69	<0.01	0.43	0.077
		25	1.6	0.42	0.21	3.60	<0.01	0.43	0.080
		35	1.1	0.37	0.16	3.58	0.01	0.43	0.079
		55	2.9	--	--	3.65	<0.01	0.43	0.080
		75	17.3	--	--	3.78	0.01	0.43	0.089
	20-Mar-01	1	3.0	1	0.16	3.30	<0.01	0.40	0.073
		15	2.1	0.85	0.17	3.07	<0.01	0.40	0.076
		25	2.7	0.75	0.2	3.10	<0.01	0.40	0.078
		35	3.3	0.79	0.21	3.12	<0.01	0.40	0.075
		55	4.5	--	--	3.05	0.02	0.39	0.076
		75	3.6	--	--	3.03	0.02	0.39	0.074
	17-Apr-01	1	2.2	2.4	0.083	3.91	0.09	0.32	0.062
		15	3.0	6	<0.02	2.80	0.02	0.33	0.068
		25	2.4	5.45	<0.02	2.82	0.02	0.33	0.066
		35	2.5	4	<0.02	2.91	0.02	0.34	0.069
		55	2.7	--	--	3.00	0.03	0.34	0.073
		75	2.9	--	--	3.07	0.04	0.34	0.072
	22-May-01	1	4.4	26	1.1	2.18	0.01	<0.02	0.034
		15	2.8	18.1	0.78	2.34	0.04	0.20	0.059
		25	2.5	3.5	0.66	2.47	0.04	0.24	0.059
		35	1.8	4.3	0.28	2.47	0.04	0.25	0.060
		55	1.6	--	--	2.63	0.05	0.28	0.067
		75	2.9	--	--	2.92	0.05	0.32	0.074
	19-Jun-01	1	3.8	13.9	3.05	3.32	0.02	0.12	0.048
		15	1.2	7.13	1.35	2.21	0.03	0.20	0.051
		25	0.7	1.22	0.910	2.27	0.05	0.23	0.055
		35	<0.5	0.874	0.848	2.27	0.05	0.23	0.058
		55	0.5	--	--	2.58	0.05	0.29	0.065
		75	1.6	--	--	2.94	0.05	0.32	0.069

Table A-2 Offshore Ambient Water Column Monitoring
General Water Quality Paramters (page 15 of 22)

Station	Date	Depth (m)	Temperature ^{0}C	Salinity (pss)	Density (Sigma-t)	Secchi Transparency (m)	Turbidity FTU	Light Intensity (PAR) % of Surface	Dissolved Oxygen (mg/L)
LTED04	24-Jul-01	1	12.2	29.914	22.61	9	--	--	7.1
(Con't)		15	11.8	30.121	22.91	--	--	--	7.0
		25	11.8	30.138	22.96	--	--	--	7.0
		35	11.7	30.153	23.04	--	--	--	6.8
		55	11.4	30.201	23.22	--	--	--	6.4
		75	11.1	30.355	23.49	--	--	--	5.8
	22-Aug-01	1	12.9	30.157	22.67	11	--	75	6.7
		15	12.7	30.381	22.94	--	--	3	6.5
		25	12.7	30.387	23.00	--	--	0	6.4
		35	12.5	30.381	23.05	--	--	0	6.2
		55	12.2	30.439	23.26	--	--	0	5.7
		75	11.7	30.662	23.61	--	--	0	5.1
	23-Oct-01	1	11.8	29.482	22.34	11	0.7	47	7.0
		15	12.1	30.711	23.32	--	<0.5	2	6.4
		25	12.0	30.736	23.39	--	<0.5	0	6.4
		35	12.0	30.745	23.44	--	<0.5	0	6.4
		55	12.0	30.763	23.55	--	0.9	0	6.3
		75	11.6	30.929	23.85	--	1.4	0	6.0
	19-Nov-01	1	10.9	28.132	21.46	5	1.1	80	5.9
		15	11.2	30.422	23.25	--	<0.5	2	5.6
		25	11.2	30.576	23.42	--	<0.5	0	5.6
		35	11.2	30.598	23.48	--	<0.5	0	5.5
		55	11.1	30.657	23.62	--	0.6	0	5.5
		75	10.7	30.757	23.87	--	1.5	0	5.4
	17-Dec-01	1	9.5	26.299	20.25	3.1	3.2	34	6.6
		15	10.0	29.966	23.09	--	0.9	0	6.4
		25	10.1	30.070	23.21	--	0.8	0	6.3
		35	10.1	30.088	23.27	--	0.8	0	6.3
		55	10.1	30.106	23.38	--	0.7	0	6.3
		75	10.1	30.119	23.47	--	0.7	0	6.2
POSSESSC14	17-Jan-01	1	8.8	29.489	22.85	no data	0.7	60	--
		15	8.7	30.266	23.53	--	0.7	3	--
		25	8.7	30.284	23.59	--	0.7	1	--
		35	8.7	30.355	23.68	--	0.7	0	--
		55	8.7	30.393	23.81	--	0.7	0	--
		100	8.6	30.418	24.05	--	0.9	0	--
		205	8.8	30.522	24.58	--	1.7	0	--
	20-Feb-01	1	8.1	28.781	22.39	3.5	--	40	10.0
		15	8.2	30.126	23.49	--	--	0	9.3
		25	8.2	30.210	23.61	--	--	0	9.3
		35	8.2	30.245	23.68	--	--	0	9.3
		55	8.2	30.265	23.79	--	--	0	9.3
		100	8.1	30.297	24.02	--	--	0	9.3
		205	7.9	30.382	24.60	--	--	0	9.4

Table A-2 Offshore Ambient Water Column Monitoring
General Water Quality Paramters (page 16 of 22)

Station	Date	Depth (m)	TSS (mg/L)	Chlorophyll-*a* (mg/m3)	Phaeophytin (mg/m3)	Silica (mg/L)	NH4-N (mg/L)	NO2+NO3 (mg/L)	Phosphorus (total) (mg/L)
LTED04	24-Jul-01	1	1.9	2.43	0.632	1.74	0.03	0.19	0.055
(Con't)		15	2.5	0.242	0.471	1.76	0.04	0.21	0.056
		25	1.0	0.359	0.465	1.80	0.04	0.22	0.058
		35	3.1	0.290	0.630	1.82	0.03	0.22	0.058
		55	0.8	--	--	1.97	0.04	0.26	0.063
		75	2.3	--	--	2.2	0.03	0.30	0.070
	22-Aug-01	1	0.9	3.53	0.0858	2.05	0.02	0.21	0.062
		15	0.7	0.811	0.454	2.05	0.02	0.23	0.060
		25	0.65	0.628	0.503	2.10	0.02	0.23	0.062
		35	0.8	0.469	0.437	2.09	0.03	0.24	0.060
		55	0.9	--	--	2.24	0.02	0.28	0.067
		75	2.2	--	--	2.52	<0.01	0.34	0.072
	23-Oct-01	1	1.4	1.09	0.268	2.88	0.03	0.29	0.073
		15	1.5	1.45	0.208	2.43	0.02	0.30	0.073
		25	0.95	1.18	0.278	2.42	0.02	0.30	0.075
		35	2.1	1.25	0.297	2.31	0.02	0.30	0.073
		55	1.1	--	--	2.36	0.02	0.30	0.078
		75	1.8	--	--	2.50	0.03	0.32	0.074
	19-Nov-01	1	2.0	1.5	0.200	3.85	0.01	0.39	0.075
		15	1.3	0.657	0.155	2.61	<0.01	0.35	0.074
		25	1.75	0.6215	0.174	2.64	<0.01	0.35	0.075
		35	2.4	0.665	0.207	2.71	<0.01	0.36	0.072
		55	2.0	--	--	2.75	<0.01	0.36	0.076
		75	2.9	--	--	2.86	<0.01	0.37	0.075
	17-Dec-01	1	2.6	0.238	0.203	4.12	<0.01	0.42	0.083
		15	1.5	0.187	0.138	3.27	<0.01	0.39	0.080
		25	1.6	0.1505	0.115	3.27	<0.01	0.39	0.083
		35	2.0	0.158	0.144	3.24	<0.01	0.41	0.080
		55	2.2	--	--	3.29	<0.01	0.39	0.082
		75	2.1	--	--	3.31	<0.01	0.40	0.084
POSSESSC14	17-Jan-01	1	2.6	0.79	0.17	4.2	0.01	0.39	0.084
		15	1.1	0.43	0.15	3.86	<0.01	0.42	0.087
		25	2.2	0.35	0.13	3.6	<0.01	0.41	0.085
		35	2.4	0.29	0.14	3.73	<0.01	0.41	0.086
		55	2.1	--	--	3.46	<0.01	0.41	0.088
		100	2.7	--	--	3.39	<0.01	0.41	0.086
		205	2.5	--	--	3.4	<0.01	0.40	0.088
	20-Feb-01	1	6.8	35.7	<0.02	2.43	<0.01	0.20	0.067
		15	2.6	1.9	0.37	3.46	<0.01	0.41	0.077
		25	1.5	0.6	0.26	3.39	<0.01	0.42	0.077
		35	1.5	0.39	0.12	3.4	<0.01	0.42	0.078
		55	1.7	--	--	3.33	<0.01	0.42	0.079
		100	2.5	--	--	3.3	<0.01	0.41	0.078
		205	3.4	--	--	3.3	<0.01	0.41	0.078

Table A-2 Offshore Ambient Water Column Monitoring
General Water Quality Paramters (page 17 of 22)

Station	Date	Depth (m)	Temperature ^{0}C	Salinity (pss)	Density (Sigma-t)	Secchi Transparency (m)	Turbidity FTU	Light Intensity (PAR) % of Surface	Dissolved Oxygen (mg/L)
POSSESSC14	21-Mar-01	1	8.7	25.526	19.76	1.5	--	100	9.6
(Con't)		15	8.2	30.129	23.49	--	--	1	8.8
		25	8.2	30.151	23.56	--	--	0	8.7
		35	8.1	30.160	23.61	--	--	0	8.6
		55	8.1	30.218	23.75	--	--	0	8.3
		100	8.1	30.356	24.07	--	--	0	8.2
		205	8.1	30.483	24.62	--	--	0	8.4
	16-Apr-01	1	9.2	--	--	3.6	0.0	100	8.2
		15	8.5	--	--	--	0.3	2	8.1
		25	8.4	--	--	--	0.3	0	8.1
		35	8.4	--	--	--	0.4	0	8.0
		55	8.4	--	--	--	0.4	0	7.9
		100	8.4	--	--	--	0.4	0	7.7
		205	8.3	--	--	--	1.3	0	7.4
	22-May-01	1	12.5	25.921	19.47	2.6	--	100	13.3
		15	9.7	29.817	23.02	--	--	0	9.7
		25	9.5	30.018	23.26	--	--	0	8.9
		35	9.4	30.126	23.41	--	--	0	8.4
		55	9.0	30.259	23.66	--	--	0	7.6
		100	9.1	30.382	23.95	--	--	0	7.8
		205	9.3	30.618	24.58	--	--	0	8.0
	18-Jun-01	1	12.7	25.893	19.41	2.2	--	0	10.6
		15	10.6	29.749	22.82	--	--	0	8.2
		25	10.6	29.870	22.97	--	--	0	8.2
		35	10.5	29.903	23.05	--	--	0	8.1
		55	10.2	30.099	23.34	--	--	0	7.5
		100	9.4	30.305	23.83	--	--	0	6.6
		205	10.0	30.756	24.56	--	--	0	6.9
PTWELLS1	17-Jan-01	1	8.5	30.202	23.44	7.5	0.6	66	--
		15	8.7	30.268	23.54	--	0.7	3	--
		25	8.7	30.281	23.59	--	0.7	1	--
		35	8.8	30.327	23.66	--	0.7	0	--
		55	8.7	30.335	23.76	--	0.8	0	--
		100	8.8	30.427	24.03	--	1.0	0	--
		130	8.8	30.442	24.18	--	1.5	0	--
	20-Feb-01	1	8.1	30.171	23.49	11	--	15	9.4
		15	8.1	30.172	23.49	--	--	2	9.4
		25	8.1	30.210	23.59	--	--	0	9.3
		35	8.1	30.214	23.63	--	--	0	9.3
		55	8.1	30.213	23.68	--	--	0	9.3
		100	8.1	30.227	23.78	--	--	0	9.3
		130	8.0	30.333	24.15	--	--	0	9.3
	21-Mar-01	1	8.2	30.167	23.46	10.8	--	100	8.8
		15	8.1	30.190	23.55	--	--	6	8.7
		25	8.1	30.233	23.63	--	--	1	8.7
		35	8.1	30.252	23.69	--	--	0	8.6
		55	8.1	30.259	23.79	--	--	0	8.6
		100	8.1	30.407	24.11	--	--	0	8.5
		130	8.1	30.532	24.35	--	--	0	8.5

Table A-2 Offshore Ambient Water Column Monitoring
General Water Quality Paramters (page 18 of 22)

Station	Date	Depth (m)	TSS (mg/L)	Chlorophyll-*a* (mg/m3)	Phaeophytin (mg/m3)	Silica (mg/L)	NH4-N (mg/L)	NO2+NO3 (mg/L)	Phosphorus (total) (mg/L)
POSSESSC14	21-Mar-01	1	6.2	36.7	<0.02	2.21	<0.01	0.06	0.047
(Con't)		15	0.5	0.67	0.67	3.57	0.01	0.38	0.072
		25	0.6	0.57	0.43	3.54	0.01	0.35	0.077
		35	0.6	0.54	0.29	3.55	0.01	0.37	0.076
		55	1.0	--	--	3.35	<0.01	0.41	0.076
		100	1.1	--	--	3.15	<0.01	0.40	0.079
		205	3.3	--	--	3.15	0.02	0.38	0.073
	16-Apr-01	1	2.5	18.8	0.11	3.25	<0.01	0.17	0.059
		15	1.1	0.69	0.19	2.91	0.04	0.33	0.067
		25	3.3	0.66	0.21	2.92	0.04	0.33	0.069
		35	2.8	1	0.4	2.96	0.04	0.33	0.068
		55	2.5	--	--	2.94	0.04	0.33	0.069
		100	2.5	--	--	2.96	0.03	0.33	0.072
		205	3.0	--	--	3.18	0.02	0.37	0.074
	22-May-01	1	3.6	14.4	2	1.73	0.01	0.04	0.036
		15	2.3	10.1	1.1	2.43	0.04	0.22	0.061
		25	2.3	6.2	1.3	2.5	0.05	0.24	0.062
		35	2.4	3.6	0.93	2.54	0.05	0.26	0.064
		55	2.0	--	--	2.91	0.02	0.35	0.069
		100	2.1	--	--	2.76	0.02	0.32	0.065
		205	3.1	--	--	2.45	0.04	0.27	0.065
	18-Jun-01	1	4.3	13.6	1.05	0.384	<0.01	<0.02	0.026
		15	<0.5	1.14	0.707	2.1	0.05	0.22	0.057
		25	<0.5	0.994	0.934	2.15	0.05	0.23	0.057
		35	<0.5	0.787	0.656	2.18	0.05	0.24	0.061
		55	<0.5	--	--	2.28	0.04	0.27	0.060
		100	0.5	--	--	2.85	0.01	0.37	0.074
		205	1.8	--	--	2.31	0.05	0.27	0.065
PTWELLS1	17-Jan-01	1	1.4	0.79	0.155	3.59	<0.01	0.41	0.082
		15	2.0	0.49	0.17	3.57	<0.01	0.41	0.080
		25	1.1	0.41	0.15	3.60	<0.01	0.42	0.080
		35	1.7	0.31	0.13	3.54	<0.01	0.42	0.081
		55	2.6	--	--	3.45	<0.01	0.41	0.081
		100	2.9	--	--	3.51	<0.01	0.40	0.079
		130	2.4	--	--	3.72	<0.01	0.41	0.083
		1	2.7	1	0.21	3.55	<0.01	0.42	0.077
		15	4.0	0.73	0.2	3.52	<0.01	0.42	0.077
		25	2.9	0.71	0.2	3.54	<0.01	0.42	0.079
		35	1.9	0.65	0.25	3.64	<0.01	0.42	0.076
		55	3.1	--	--	3.69	<0.01	0.42	0.075
		100	3.2	--	--	3.68	<0.01	0.42	0.078
		130	2.8	--	--	3.51	<0.01	0.41	0.076
		1	3.5	0.65	0.16	3.48	0.01	0.36	0.073
		15	0.8	0.56	0.21	3.56	0.01	0.37	0.075
		25	<0.5	0.49	0.21	3.52	0.01	0.36	0.073
		35	1.5	0.5	0.2	3.50	0.01	0.38	0.076
		55	1.8	--	--	3.52	0.01	0.38	0.076
		100	0.8	--	--	3.35	0.02	0.36	0.072
		130	3.7	--	--	3.32	0.02	0.34	0.074

Table A-2 Offshore Ambient Water Column Monitoring
General Water Quality Paramters (page 19 of 22)

Station	Date	Depth (m)	Temperature ^{0}C	Salinity (pss)	Density (Sigma-t)	Secchi Transparency (m)	Turbidity FTU	Light Intensity (PAR) % of Surface	Dissolved Oxygen (mg/L)
PTWELLS1	16-Apr-01	1	8.8	--	--	11.7	0.0	83	8.9
(Con't)		15	8.6	--	--	--	0.4	5	8.5
		25	8.5	--	--	--	0.5	1	8.3
		35	8.4	--	--	--	0.5	0	8.0
		55	8.4	--	--	--	0.6	0	7.9
		100	8.4	--	--	--	0.8	0	7.8
		130	8.4	--	--	--	1.0	0	7.7
	22-May-01	1	11.5	28.096	21.32	2.9	--	100	12.9
		15	10.1	29.479	22.70	--	--	0	10.8
		25	9.9	29.631	22.89	--	--	0	10.2
		35	9.7	29.862	23.15	--	--	0	9.2
		55	9.3	30.152	23.52	--	--	0	8.5
		100	9.2	30.365	23.91	--	--	0	8.1
		130	9.2	30.415	24.09	--	--	0	8.1
	18-Jun-01	1	12.7	28.300	21.26	3.3	--	0	10.6
		15	11.0	29.778	22.78	--	--	0	8.8
		25	10.5	29.967	23.05	--	--	0	8.2
		35	10.3	30.083	23.23	--	--	0	7.9
		55	10.1	30.233	23.46	--	--	0	7.6
		100	10.0	30.414	23.82	--	--	0	7.2
		130	10.0	30.463	23.99	--	--	0	7.2
	23-Jul-01	1	12.7	29.993	22.57	12	--	58	7.7
		15	12.0	30.113	22.87	--	--	4	7.1
		25	11.6	30.213	23.05	--	--	1	6.7
		35	11.6	30.225	23.11	--	--	0	6.7
		55	11.5	30.432	23.38	--	--	0	6.4
		100	11.3	30.553	23.71	--	--	0	6.2
		130	11.2	30.607	23.91	--	--	0	6.0
	20-Aug-01	1	13.5	30.228	22.60	3	--	58	8.7
		15	13.0	30.305	22.82	--	--	0	7.3
		25	12.7	30.357	22.97	--	--	0	6.6
		35	12.6	30.398	23.07	--	--	0	6.5
		55	12.2	30.576	23.37	--	--	0	6.1
		100	11.8	30.722	23.76	--	--	0	5.5
		130	11.7	30.783	23.96	--	--	0	5.4
	24-Sep-01	1	12.6	30.598	23.06	9.4	<0.5	61	6.3
		15	12.5	30.621	23.16	--	<0.5	3	6.2
		25	12.5	30.641	23.23	--	<0.5	1	6.2
		35	12.5	30.650	23.28	--	<0.5	0	6.2
		55	12.2	30.733	23.48	--	0.8	0	6.1
		100	12.0	30.839	23.82	--	1.6	0	6.0
		130	11.9	30.880	24.00	--	1.8	0	6.1
	23-Oct-01	1	11.8	30.537	23.18	No data	0.7	42	7.1
		15	11.9	30.664	23.31	--	0.5	1	6.7
		25	11.9	30.688	23.37	--	0.6	0	6.7
		35	11.9	30.686	23.42	--	0.5	0	6.7
		55	11.8	30.723	23.55	--	0.6	0	6.5
		100	11.3	30.923	24.00	--	1.0	0	6.3
		130	11.2	30.954	24.19	--	2.2	0	6.3

Table A-2 Offshore Ambient Water Column Monitoring
General Water Quality Paramters (page 20 of 22)

Station	Date	Depth (m)	TSS (mg/L)	Chlorophyll-*a* (mg/m3)	Phaeophytin (mg/m3)	Silica (mg/L)	NH4-N (mg/L)	NO2+NO3 (mg/L)	Phosphorus (total) (mg/L)
PTWELLS1	16-Apr-01	1	<1	3.9	<0.02	2.83	0.02	0.31	0.066
(Con't)		15	3.6	4.1	<0.02	2.85	0.03	0.32	0.066
		25	2.0	4.5	<0.02	2.85	0.03	0.33	0.067
		35	1.9	3.3	<0.02	2.9	0.03	0.34	0.070
		55	2.8	--	--	2.97	0.04	0.34	0.067
		100	1.9	--	--	2.93	0.04	0.33	0.069
		130	2.3	--	--	2.88	0.04	0.33	0.068
	22-May-01	1	2.7	19.1	1.8	1.42	<0.01	<0.02	0.035
		15	2.8	18.3	1.9	2.06	0.02	0.14	0.050
		25	2.7	15.3	0.63	2.22	0.03	0.17	0.054
		35	2.2	9.4	1	2.46	0.04	0.22	0.058
		55	3.6	--	--	2.63	0.05	0.27	0.063
		100	2.2	--	--	2.72	0.05	0.29	0.065
		130	2.9	--	--	2.65	0.04	0.30	0.066
	18-Jun-01	1	2.5	21.3	1.82	1.22	<0.01	0.05	0.040
		15	1.6	5.24	0.656	2.16	0.04	0.21	0.056
		25	0.8	1.73	1.22	2.32	0.06	0.24	0.063
		35	0.6	0.843	1.06	2.33	0.06	0.25	0.061
		55	0.8	--	--	2.26	0.05	0.26	0.060
		100	1.0	--	--	2.42	0.05	0.28	0.061
		130	1.1	--	--	2.29	0.05	0.27	0.062
	23-Jul-01	1	0.6	0.562	1.04	1.6	0.05	0.16	0.051
		15	0.7	0.728	2.56	1.84	0.03	0.21	0.056
		25	1.4	0.305	1.15	1.85	0.04	0.23	0.060
		35	1.7	0.333	1.28	1.88	0.04	0.23	0.057
		55	1.8	--	--	1.84	0.05	0.23	0.057
		100	2.7	--	--	1.97	0.06	0.24	0.069
		130	3.7	--	--	2.06	0.06	0.25	0.064
	20-Aug-01	1	3.2	27.8	4.53	0.804	0.01	0.04	0.050
		15	1.1	5.73	3.4	1.42	0.03	0.16	0.051
		25	0.9	3.45	3.43	1.68	0.03	0.20	0.056
		35	1.0	2.56	3.64	1.75	0.03	0.22	0.056
		55	1.6	--	--	1.87	0.02	0.25	0.055
		100	1.8	--	--	2.17	0.02	0.30	0.062
		130	2.2	--	--	2.27	0.02	0.30	0.064
	24-Sep-01	1	0.9	0.837	0.449	2.16	0.04	0.26	0.065
		15	1.3	0.688	0.578	2.15	0.04	0.26	0.064
		25	1.5	0.602	0.579	2.16	0.04	0.27	0.067
		35	1.1	0.511	0.54	2.19	0.04	0.27	0.065
		55	1.8	--	--	2.18	0.04	0.27	0.066
		100	2.3	--	--	2.2	0.05	0.26	0.067
		130	2.6	--	--	2.26	0.05	0.26	0.068
	23-Oct-01	1	1.8	1.27	0.631	2.37	0.03	0.30	0.066
		15	0.8	1.06	0.393	2.43	0.02	0.31	0.065
		25	2.1	0.862	0.449	2.39	0.02	0.30	0.066
		35	1.4	0.824	0.346	2.43	0.02	0.30	0.069
		55	1.3	--	--	2.43	0.02	0.30	0.072
		100	2.4	--	--	2.43	0.02	0.32	0.069
		130	2.9	--	--	2.51	0.02	0.32	0.072

Table A-2 Offshore Ambient Water Column Monitoring
General Water Quality Paramters (page 21 of 22)

Station	Date	Depth (m)	Temperature ^{0}C	Salinity (pss)	Density (Sigma-t)	Secchi Transparency (m)	Turbidity FTU	Light Intensity (PAR) % of Surface	Dissolved Oxygen (mg/L)
PTWELLS1	19-Nov-01	1	10.8	29.350	22.42	6.5	0.9	66	5.8
(Con't)		15	11.0	30.550	23.38	--	<0.5	3	5.6
		25	11.0	30.619	23.48	--	0.5	1	5.5
		35	11.0	30.633	23.54	--	0.5	0	5.5
		55	10.9	30.670	23.68	--	0.6	0	5.5
		100	10.6	30.726	23.97	--	1.1	0	5.5
		130	10.4	30.760	24.17	--	2.0	0	5.5
	17-Dec-01	1	9.6	29.206	22.51	8	1.2	44	6.7
		15	9.7	29.530	22.80	--	0.9	1	6.5
		25	9.8	29.893	23.12	--	0.9	0	6.4
	17-Dec-01	35	9.7	29.926	23.20	--	0.9	0	6.3
		55	9.7	30.101	23.44	--	1.0	0	6.0
		100	9.8	30.190	23.69	--	1.6	0	5.8
		130	10.0	30.339	23.91	--	2.6	0	5.7

Table A-2 Offshore Ambient Water Column Monitoring
General Water Quality Paramters (page 22 of 22)

Station	Date	Depth (m)	TSS (mg/L)	Chlorophyll-*a* (mg/m3)	Phaeophytin (mg/m3)	Silica (mg/L)	NH4-N (mg/L)	NO2+NO3 (mg/L)	Phosphorus (total) (mg/L)
PTWELLS1	19-Nov-01	1	2.2	0.521	0.262	2.91	<0.01	0.35	0.072
(Con't)		15	1.9	0.277	0.272	2.7	<0.01	0.36	0.076
		25	1.5	0.317	0.247	2.7	<0.01	0.36	0.077
		35	2.6	0.254	0.254	2.77	<0.01	0.37	0.074
		55	2.2	--	--	2.79	<0.01	0.37	0.076
		100	2.3	--	--	2.65	<0.01	0.37	0.079
		130	3.9	--	--	2.8	<0.01	0.37	0.079
	17-Dec-01	1	1.2	0.227	0.164	2.98	<0.01	0.39	0.081
		15	2.0	0.189	0.156	3.32	<0.01	0.40	0.081
		25	2.5	0.182	0.187	3.31	<0.01	0.40	0.081
	17-Dec-01	35	2.0	0.21	0.195	3.29	<0.01	0.40	0.080
		55	2.1	--	--	3.28	<0.01	0.39	0.079
		100	2.1	--	--	3.25	<0.01	0.39	0.083
		130	3.2	--	--	3.29	<0.01	0.39	0.084

Table A-3 2001 Point Source Beach Monitoring
General Water Quality Parameters (page 1 of 2)

Station	Date	Temperature ^{0}C	Dissolved Oxygen (mg/L)	TSS (mg/L)	Silica (mg/L)	NH_4-N (mg/L)	NO_2+NO_3 (mg/L)	Phosphorus (total) (mg/L)	pH	Salinity (pss)
KSSN04	16-Jan-01	6.8	--	--	3.63	0.02	0.40	0.082	--	30.374
(West Point)	26-Feb-01	7.5	--	--	3.8	0.01	0.42	0.082	--	29.845
	22-Mar-01	9.2	--	--	3.06	0.01	0.34	0.100	--	29.089
	17-Apr-01	9.0	--	--	2.97	0.03	0.35	0.063	--	29.476
	8-May-01	10.0	--	--	2.69	0.02	0.23	0.078	--	28.524
	26-Jun-01	11.6	--	--	1.68	0.02	0.11	0.093	--	29.29
	16-Jul-01	12.6	--	--	1.1	0.03	0.08	0.051	--	29.797
	27-Aug-01	12.8	--	--	2.09	0.03	0.26	0.066	--	30.412
	19-Sep-01	12.6	--	--	1.97	0.03	0.23	0.070	--	30.391
	29-Oct-01	11.6	--	--	2.57	0.03	0.30	0.083	--	30.036
	26-Nov-01	8.8	--	--	3.6	0.02	0.36	0.101	--	25.384
	19-Dec-01	9.0	--	--	3.83	<0.01	0.40	0.083	--	28.01
KSSN05	16-Jan-01	7.4	--	--	3.76	0.01	0.38	0.083	--	30.06
(West Point)	26-Feb-01	6.6	--	--	3.33	0.02	0.35	0.109	--	29.982
	22-Mar-01	8.8	--	--	2.91	0.02	0.31	0.082	--	29.905
	17-Apr-01	9.3	--	--	2.87	0.02	0.32	0.061	--	28.699
	8-May-01	9.8	--	--	2.8	0.03	0.20	0.114	--	28.182
	26-Jun-01	11.7	--	--	1.66	0.03	0.12	0.067	--	29.674
	16-Jul-01	12.4	--	--	0.929	0.03	0.02	0.088	--	29.291
	27-Aug-01	13.7	--	--	1.95	0.03	0.19	0.121	--	30.156
	19-Sep-01	13.2	--	--	1.77	0.04	0.18	0.106	--	30.204
	29-Oct-01	10.1	--	--	4.4	0.03	0.29	0.074	--	24.35
	26-Nov-01	8.0	--	--	4.98	0.05	0.42	0.311	--	23.918
	19-Dec-01	8.3	--	--	4.5	0.01	0.42	0.087	--	25.621
LSKR01	16-Jan-01	7.9	--	--	3.69	0.01	0.39	0.088	--	30.312
(Alki Point)	26-Feb-01	9.1	--	--	2.88	0.01	0.28	0.080	--	30.15
	22-Mar-01	10.7	--	--	2.16	0.02	0.28	0.075	--	30.134
	17-Apr-01	10.4	--	--	1.68	0.02	0.17	0.064	--	29.872
	8-May-01	9.7	--	--	2.08	0.02	0.14	0.079	--	29.695
	26-Jun-01	12.1	--	--	1.57	0.04	0.11	0.054	--	29.797
	16-Jul-01	14.7	--	--	1.05	0.04	<0.02	0.079	--	29.157
	27-Aug-01	15.4	--	--	1.96	0.03	0.06	0.067	--	30.322
	19-Sep-01	13.5	--	--	2.17	0.03	0.20	0.077	--	30.498
	29-Oct-01	11.5	--	--	2.51	0.02	0.28	0.082	--	30.705
	26-Nov-01	9.1	--	--	3.19	0.02	0.35	0.080	--	28.085
	19-Dec-01	9.1	--	--	3.27	0.01	0.40	0.091	--	29.68
LSKS01	16-Jan-01	8.0	--	--	3.81	0.01	0.41	0.088	--	30.272
(Alki)	26-Feb-01	9.1	--	--	3.23	0.02	0.35	0.077	--	30.139
	22-Mar-01	10.2	--	--	2.54	0.02	0.29	0.069	--	30.198
	17-Apr-01	10.6	--	--	3.68	0.04	0.26	0.073	--	28.702
	8-May-01	9.9	--	--	2.25	0.03	0.19	0.055	--	29.796
	26-Jun-01	11.9	--	--	1.68	0.06	0.11	0.057	--	29.782
	16-Jul-01	14.6	--	--	0.943	0.02	<0.02	0.053	--	28.911
	27-Aug-01	15.0	--	--	2.01	0.03	0.12	0.066	--	30.191
	19-Sep-01	13.7	--	--	2.4	0.05	0.21	0.105	--	30.422
	29-Oct-01	11.3	--	--	3.18	0.04	0.35	0.084	--	30.218
	26-Nov-01	8.7	--	--	3.31	0.03	0.36	0.080	--	27.809
	19-Dec-01	9.0	--	--	3.39	0.01	0.42	0.099	--	29.525

Table A-3 2001 Point Source Beach Monitoring
General Water Quality Parameters (page 2 of 2)

Station	Date	Temperature ^0C	Dissolved Oxygen (mg/L)	TSS (mg/L)	Silica (mg/L)	NH_4-N (mg/L)	NO_2+NO_3 (mg/L)	Phosphorus (total) (mg/L)	pH	Salinity (pss)
KSHZ03	16-Jan-01	8.7	--	6.1	4.82	0.01	0.44	0.082	--	29.014
(Carkeek	26-Feb-01	8.7	--	14	5.61	0.02	0.50	0.085	--	25.919
Park)	21-Mar-01	9.7	--	--	4.21	0.02	0.37	0.097	--	29.163
	17-Apr-01	9.7	10.1	--	3.22	0.03	0.33	0.069	7.92	29.01
	8-May-01	10.5	12.2	--	7.42	0.03	0.40	0.073	8.02	28.146
	26-Jun-01	11.8	--	--	5.4	0.02	0.21	0.064	--	27.162
	16-Jul-01	13.9	--	--	3.93	0.03	0.21	0.098	--	24.61
	27-Aug-01	13.8	7.92	--	3.9	0.03	0.21	0.110	7.85	28.494
	19-Sep-01	13.3	--	--	6.88	0.05	0.39	0.087	--	27.502
	2-Oct-01	--	--	--	--	0.03	--	--	--	--
	3-Oct-01	--	--	--	--	0.03	--	--	--	--
	4-Oct-01	--	--	--	--	0.04	--	--	--	--
	29-Oct-01	11.4	--	--	3.18	0.03	0.31	0.072	--	27.973
	26-Nov-01	8.9	--	--	3.88	0.03	0.31	0.075	--	21.608
	19-Dec-01	9.4	--	--	4.02	<0.01	0.40	0.077	--	25.768

Table A-4 2001 Ambient/MOSS Beach Monitoring
General Water Quality Parameters (page 1 of 7)

Station	Date	Temperature ^{0}C	Dissolved Oxygen (mg/L)	TSS (mg/L)	Silica (mg/L)	NH_4-N (mg/L)	NO_2+NO_3 (mg/L)	Phosphorus (total) (mg/L)	pH	Salinity (pss)
ITBOEINGCR	16-Jan-01	7.2	--	3.5	7.27	0.01	0.46	0.079	--	23.878
(Boeing Creek)	26-Feb-01	8.3	--	3.7	4.11	0.01	0.42	0.073	--	29.636
	21-Mar-01	8.4	--	--	3.6	0.01	0.35	0.077	--	29.85
	17-Apr-01	9.7	10.1	--	3.03	0.03	0.36	0.072	7.92	29.038
	8-May-01	9.9	10.9	--	4.59	0.03	0.27	0.091	7.94	28.041
	26-Jun-01	11.6	4.5	--	2.63	0.04	0.17	0.055	7.99	29.213
	16-Jul-01	14.6	9.2	--	2.14	<0.01	0.06	0.056	8.22	28.222
	27-Aug-01	14.2	8.1	--	4.87	0.03	0.31	0.066	7.91	27.375
	19-Sep-01	13.2	8.1	--	2.2	0.03	0.21	0.066	7.97	29.26
	2-Oct-01	--	--	--	--	--	--	--	--	--
	29-Oct-01	11.5	8.1	--	4.14	0.03	0.34	0.078	7.79	28.711
	26-Nov-01	8.9	9.7	--	4.34	0.02	0.36	0.073	7.81	22.585
	19-Dec-01	8.6	7.1	--	3.59	0.01	0.42	0.100	7.81	28.17
ITBRACKETT	16-Jan-01	7.9	--	3.4	3.62	0.05	0.39	0.087	--	30.277
(Brackett's	26-Feb-01	8.0	--	2.4	3.65	0.03	0.42	0.080	--	30.099
Landing)	21-Mar-01	8.8	--	--	3.18	0.02	0.32	0.109	--	29.209
	17-Apr-01	9.8	8.9	--	3.04	0.04	0.36	0.064	7.92	29.481
	8-May-01	10.4	11.3	--	2.4	0.02	0.13	0.464	8.01	29.074
	26-Jun-01	12.2	4.2	--	1.36	0.03	0.07	0.054	8.16	29.64
	16-Jul-01	13.5	--	--	1.09	0.05	0.05	0.052	8.1	29.565
	27-Aug-01	13.8	8.3	--	2.03	0.02	0.21	0.081	7.93	30.292
	19-Sep-01	14.2	9	--	1.75	0.04	0.17	0.067	7.95	30.508
	29-Oct-01	10.7	8.3	--	2.41	0.03	0.29	0.074	7.78	28.827
	26-Nov-01	9.0	8	--	3.25	0.02	0.34	0.076	7.75	26.574
	19-Dec-01	9.2	7.9	--	3.23	<0.01	0.39	0.084	7.78	29.409
ITCARKEEKP	16-Jan-01	8.2	--	2.4	3.76	0.01	0.38	0.080	--	30.229
(Carkeek Park)	26-Feb-01	8.8	--	29.3	3.86	0.03	0.40	0.112	--	29.764
	21-Mar-01	8.5	--	--	3.79	0.02	0.35	0.118	--	29.681
	17-Apr-01	9.9	10	--	3.55	0.03	0.39	0.072	7.91	28.026
	8-May-01	10.0	10.8	--	2.59	0.03	0.22	0.389	7.95	28.9615
	26-Jun-01	11.9	--	--	1.79	0.03	0.19	0.061	7.96	29.6105
	16-Jul-01	14.4	10.3	--	0.9075	0.03	<0.02	0.083	8.17	29.286
	27-Aug-01	14.0	9.1	--	2.11	0.02	0.16	0.063	8.03	29.518
	19-Sep-01	13.3	8.8	--	1.72	0.02	0.16	0.065	7.99	30.374
	29-Oct-01	11.6	10.8	--	2.85	0.02	0.25	0.080	8	28.476
	26-Nov-01	9.3	9.3	--	3.53	0.02	0.30	0.076	7.82	22.356
	19-Dec-01	9.2	7.3	--	3.67	<0.01	0.39	0.075	7.79	25.739
ITEDWARDSPT	16-Jan-01	8.1	--	2.7	3.7	<0.01	0.39	0.083	--	30.285
(Edward's Point)	26-Feb-01	8.0	--	3.9	3.45	0.02	0.40	0.080	--	30.088
	21-Mar-01	9.0	--	--	3.62	0.03	0.34	0.079	--	29.238
	17-Apr-01	10.0	9.4	--	2.62	0.02	0.32	0.080	7.99	29.097
	8-May-01	10.0	10.8	--	2.98	0.04	0.22	0.107	7.98	28.943
	26-Jun-01	12.0	3.9	--	1.51	0.04	0.09	0.057	8.07	29.652
	27-Aug-01	14.4	11.2	--	2.24	0.02	0.09	0.076	8.07	29.733
	19-Sep-01	14.6	16.1	--	1.94	0.03	0.12	0.066	8.1	30.254
	29-Oct-01	11.2	8.8	--	2.42	0.03	0.28	0.122	8.39	30.09
	26-Nov-01	8.2	8.1	--	3.56	0.03	0.35	0.084	7.83	29.45
	19-Dec-01	8.9	8.4	--	3.3	<0.01	0.39	0.083	7.8	24.891
	16-Jul-01	13.3	--	--	1.12	0.02	0.03	0.048	7.8	29.071

Table A-4 2001 Ambient/MOSS Beach Monitoring
General Water Quality Parameters (page 2 of 7)

Station	Date	Temperature ^{0}C	Dissolved Oxygen (mg/L)	TSS (mg/L)	Silica (mg/L)	NH_4-N (mg/L)	NO_2+NO_3 (mg/L)	Phosphorus (total) (mg/L)	pH	Salinity (pss)
ITMEADOWBP	16-Jan-01	7.9	--	3.6	4.06	<0.01	0.41	0.081	--	29.689
(Meadowdate	26-Feb-01	7.2	--	<1	3.58	0.01	0.41	0.079	--	30.042
Beach Park)	21-Mar-01	8.7	--	--	3.28	0.03	0.32	0.071	--	29.645
	17-Apr-01	10.4	8.4	--	2.72	<0.01	0.25	0.078	8.03	28.941
	8-May-01	10.2	11.9	--	2.72	0.02	0.20	0.061	8.05	29.126
	26-Jun-01	12.1	4.5	--	1.75	0.04	0.13	0.056	8.04	29.491
	16-Jul-01	13.4	--	--	1.18	0.02	0.07	0.045	8.14	29.822
	27-Aug-01	13.1	7.6	--	2.03	0.03	0.23	0.058	7.86	30.364
	19-Sep-01	12.9	7.7	--	1.9	0.04	0.22	0.071	7.9	30.468
	29-Oct-01	11.0	8.6	--	2.33	0.03	0.31	0.072	7.75	29.887
	26-Nov-01	9.2	8	--	3.26	0.02	0.34	0.072	7.79	25.916
	19-Dec-01	8.9	8.2	--	3.42	<0.01	0.42	0.083	7.78	28.553
ITMUKILTSP	21-Mar-01	8.3	--	--	2.73	0.02	0.17	0.052	7.95	24.099
(Mukiltilo	17-Apr-01	10.3	8.8	--	3.31	0.03	0.21	0.057	8.04	26.892
State Park)	8-May-01	10.9	11.3	--	2.81	0.03	0.13	0.054	8	24.711
	26-Jun-01	14.4	5.2	--	1.03	0.02	0.03	0.041	8.2	26.102
	16-Jul-01	15.4	--	--	0.643	0.01	<0.02	0.032	8.22	26.338
	27-Aug-01	15.0	10.2	--	1.77	0.02	0.04	0.048	8.13	26.921
	19-Sep-01	13.1	7.2	--	1.74	0.03	0.19	0.057	7.84	29.186
	29-Oct-01	10.4	9.2	--	3.26	0.05	0.31	0.067	7.71	21.642
	26-Nov-01	8.9	7.7	--	3.65	0.03	0.28	0.062	7.82	21.103
	19-Dec-01	8.6	8.1	--	3.35	<0.01	0.40	0.077	7.79	26.334
ITOCEANAVE	16-Jan-01	8.1	--	2.2	3.7	0.01	0.40	0.079	--	30.155
(Ocean Avenue)	26-Feb-01	7.4	--	3.3	3.7	0.02	0.41	0.081	--	29.8115
	21-Mar-01	9.1	--	--	3.02	<0.01	0.27	0.221	--	28.459
	17-Apr-01	9.8	9.1	--	3.32	0.02	0.34	0.062	8.04	28.692
	8-May-01	10.9	11.8	--	2.29	0.01	0.10	0.173	8.15	28.677
	26-Jun-01	12.1	4.3	--	1.71	0.03	0.10	0.061	8.02	29.371
	16-Jul-01	13.6	--	--	0.804	0.03	0.02	0.045	8.2	29.758
	27-Aug-01	14.1	10.1	--	3.19	0.02	0.17	0.090	8.09	28.965
	19-Sep-01	13.6	10.8	--	1.89	0.03	0.13	0.068	8.11	30.14
	29-Oct-01	11.0	10.1	--	2.99	0.04	0.26	0.080	7.98	29.133
	26-Nov-01	9.3	8.5	--	4.23	0.02	0.42	0.076	7.77	25.701
	19-Dec-01	9.2	7.9	--	3.24	<0.01	0.40	0.094	7.79	29.488
ITPICNICPT	16-Jan-01	7.5	--	15.4	4.04	0.01	0.39	0.089	--	28.979
(Picinc Point)	26-Feb-01	7.3	--	6.2	3.09	0.02	0.36	0.082	--	29.891
	21-Mar-01	8.3	--	--	2.67	0.04	0.19	0.052	--	26.127
	17-Apr-01	10.1	8.6	--	3.74	0.02	0.36	0.071	8.01	26.460
	8-May-01	12.3	--	--	2.08	0.02	0.03	0.065	8.43	27.335
	26-Jun-01	13.8	5.6	--	2.33	0.04	0.06	0.062	8.21	26.398
	16-Jul-01	13.9	--	--	2.26	0.02	0.10	0.056	8.07	29.729
	27-Aug-01	13.7	8.8	--	2.27	0.03	0.15	0.067	7.91	28.193
	19-Sep-01	13.0	7.6	--	6.21	0.06	0.39	0.078	7.84	28.365
	29-Oct-01	10.6	9.3	--	3.59	0.04	0.34	0.074	7.8	23.600
	26-Nov-01	9.0	8.3	--	3.27	0.02	0.35	0.080	7.8	25.422
	19-Dec-01	8.2	8.8	--	3.78	0.01	0.48	0.097	7.79	27.459

Table A-4 2001 Ambient/MOSS Beach Monitoring
General Water Quality Parameters (page 3 of 7)

Station	Date	Temperature ^{0}C	Dissolved Oxygen (mg/L)	TSS (mg/L)	Silica (mg/L)	NH_4-N (mg/L)	NO_2+NO_3 (mg/L)	Phosphorus (total) (mg/L)	pH	Salinity (pss)
JSVW04	16-Jan-01	7.8	--	5	3.47	<0.01	0.37	0.078	--	30.142
(Richmond	26-Feb-01	8.2	--	2.6	3.78	<0.01	0.41	0.077	--	29.407
Beach)	21-Mar-01	8.2	--	--	3.84	0.02	0.35	0.074	--	29.662
	17-Apr-01	9.5	10.2	--	2.88	0.02	0.33	0.074	7.93	29.291
	8-May-01	10.3	12.3	--	2.22	0.01	0.11	0.193	8.21	28.889
	26-Jun-01	11.8	--	--	1.6	0.03	0.11	0.053	8.02	29.576
	16-Jul-01	14.9	--	--	0.751	<0.01	<0.02	0.100	--	29.215
	27-Aug-01	14.4	8.9	--	1.93	0.02	0.16	0.074	8.02	30.322
	19-Sep-01	14.5	--	--	2.05	0.04	0.14	0.077	--	29.781
	29-Oct-01	11.5	7.8	--	2.74	0.03	0.29	0.083	7.76	29.989
	26-Nov-01	9.8	9.7	--	3.55	0.02	0.35	0.100	7.79	24.452
	19-Dec-01	9.2	7.2	--	3.39	<0.01	0.41	0.085	7.81	29.058
KRJY01	21-May-01	14.5	--	--	--	--	--	--	--	--
(Fay Bainbridge	25-Jun-01	13.0	--	--	--	--	--	--	--	--
State Park)	20-Aug-01	15.8	--	--	--	--	--	--	--	--
	17-Sep-01	13.8	--	--	--	--	--	--	--	--
KSYV02	16-Jan-01	7.8	--	--	3.96	0.02	0.39	0.086	--	29.723
(Magnolia)	26-Feb-01	7.5	--	--	4.11	0.01	0.41	0.077	--	29.000
	22-Mar-01	9.0	--	--	3.1	0.02	0.30	0.070	--	28.808
	17-Apr-01	9.7	--	--	3.76	0.04	0.35	0.058	--	27.003
	8-May-01	10.1	--	--	4.54	0.03	0.22	0.063	--	24.290
	26-Jun-01	12.0	--	--	1.83	0.02	0.05	0.084	--	29.309
	16-Jul-01	12.8	--	--	1.22	0.02	0.03	0.065	--	29.109
	27-Aug-01	14.7	--	--	2.24	0.03	0.12	0.135	--	29.735
	19-Sep-01	13.5	--	--	1.86	0.02	0.13	0.142	--	29.842
	29-Oct-01	10.5	--	--	4.39	0.03	0.29	0.067	--	24.665
	26-Nov-01	8.7	--	--	5.16	0.02	0.41	0.081	--	22.942
	19-Dec-01	8.5	--	--	4.72	0.02	0.42	0.081	--	24.766
KTHA01	16-Jan-01	7.8	--	--	33.3	0.02	1.52	0.076	--	--
(Piper's Creek)	26-Feb-01	7.9	--	--	32.2	0.01	1.60	0.065	--	--
	21-Mar-01	10.2	--	--	39.8	<0.01	1.34	0.075	--	--
	17-Apr-01	11.1	--	--	31.2	0.01	1.35	0.069	--	--
	8-May-01	10.9	--	--	35.7	<0.01	1.32	0.148	--	--
	26-Jun-01	12.2	--	--	36.8	0.02	1.43	0.100	--	--
	16-Jul-01	13.9	--	--	22.4	0.02	1.16	0.137	--	--
	27-Aug-01	14.1	--	--	34.4	0.01	1.30	0.109	--	--
	19-Sep-01	13.1	--	--	34.5	<0.01	1.34	0.112	--	--
	29-Oct-01	10.6	--	--	31.5	0.01	1.35	0.075	--	--
	26-Nov-01	9.5	--	--	29.7	0.02	1.63	0.100	--	--
	19-Dec-01	8.5	--	--	31.2	0.02	2.13	0.097	--	--

Table A-4 2001 Ambient/MOSS Beach Monitoring
General Water Quality Parameters (page 4 of 7)

Station	Date	Temperature ^{0}C	Dissolved Oxygen (mg/L)	TSS (mg/L)	Silica (mg/L)	NH_4-N (mg/L)	NO_2+NO_3 (mg/L)	Phosphorus (total) (mg/L)	pH	Salinity (pss)
LSFX01	16-Jan-01	8.3	--	--	3.57	0.01	0.37	0.071	--	30.308
(Duwamish	26-Feb-01	7.9	--	--	4.12	0.01	0.40	0.085	--	29.000
Head)	22-Mar-01	10.3	--	--	3.22	0.01	0.31	0.081	--	29.030
	17-Apr-01	9.3	--	--	2.78	0.02	0.25	0.056	--	29.242
	8-May-01	9.8	--	--	2.8	0.02	0.22	0.060	--	28.328
	26-Jun-01	11.7	--	--	1.71	0.02	0.13	0.056	--	29.675
	16-Jul-01	14.6	--	--	0.759	0.01	<0.02	0.064	--	29.337
	27-Aug-01	14.6	--	--	1.79	0.02	0.13	0.069	--	30.228
	19-Sep-01	13.2	--	--	2.07	0.03	0.24	0.073	--	30.481
	29-Oct-01	11.6	--	--	2.8	0.02	0.29	0.079	--	29.667
	26-Nov-01	9.4	--	--	3.28	0.01	0.35	0.078	--	27.704
	19-Dec-01	9.2	--	--	3.19	<0.01	0.39	0.084	--	29.862
LSGY01	16-Jan-01	8.6	--	--	3.68	<0.01	0.40	0.089	--	30.101
(Seacrest)	26-Feb-01	7.5	--	--	5.12	0.02	0.42	0.078	--	26.816
	22-Mar-01	9.7	--	--	3.38	0.01	0.39	0.079	--	29.404
	17-Apr-01	9.0	--	--	3.25	0.02	0.35	0.064	--	29.068
	8-May-01	10.1	--	--	3.46	0.03	0.25	0.057	--	26.268
	26-Jun-01	12.3	--	--	2.28	0.04	0.18	0.060	--	28.623
	16-Jul-01	13.3	--	--	0.962	0.03	0.04	0.044	--	29.559
	27-Aug-01	14.2	--	--	2.01	0.03	0.22	0.065	--	30.123
	19-Sep-01	13.1	--	--	2.19	0.04	0.23	0.067	--	29.978
	29-Oct-01	11.6	--	--	2.86	0.03	0.31	0.075	--	29.549
	26-Nov-01	8.7	--	--	3.42	0.02	0.36	0.074	--	27.293
	19-Dec-01	8.9	--	--	4.45	<0.01	0.41	0.084	--	26.073
LSHV01	16-Jan-01	8.1	--	--	3.6	0.01	0.39	0.083	--	30.322
(West Seattle)	26-Feb-01	7.9	--	--	3.55	0.02	0.38	0.083	--	30.049
	22-Mar-01	9.5	--	--	3.37	0.01	0.35	0.071	--	29.237
	17-Apr-01	9.6	--	--	3.07	0.02	0.31	0.069	--	29.928
	8-May-01	10.0	--	--	2.57	0.03	0.19	0.072	--	28.770
	26-Jun-01	11.3	--	--	1.77	0.03	0.16	0.057	--	29.722
	16-Jul-01	13.9	--	--	0.871	<0.01	<0.02	0.063	--	29.653
	27-Aug-01	14.5	--	--	1.93	0.02	0.22	0.064	--	30.348
	19-Sep-01	13.1	--	--	2.12	0.03	0.23	0.068	--	30.514
	29-Oct-01	11.6	--	--	2.6	0.02	0.31	0.075	--	30.238
	26-Nov-01	9.2	--	--	3.15	0.02	0.36	0.078	--	28.401
	19-Dec-01	9.6	--	--	3.24	<0.01	0.40	0.085	--	29.952
LSTU01	16-Jan-01	8.6	--	--	3.7	<0.01	0.40	0.078	--	30.372
(Lincoln Park)	26-Feb-01	7.5	--	--	3.66	<0.01	0.40	0.109	--	30.138
	22-Mar-01	9.1	--	--	3.04	0.01	0.33	0.073	--	30.160
	17-Apr-01	9.5	--	--	2.95	0.02	0.28	0.062	--	29.930
	8-May-01	10.0	--	--	2.54	0.01	0.22	0.316	--	29.445
	26-Jun-01	11.5	--	--	1.85	0.04	0.19	0.063	--	29.913
	16-Jul-01	14.9	--	--	0.606	0.01	<0.02	0.042	--	29.088
	27-Aug-01	13.2	--	--	1.91	0.03	0.20	0.061	--	30.364
	19-Sep-01	13.6	--	--	2.17	0.02	0.20	0.068	--	30.528
	29-Oct-01	11.7	--	--	2.47	0.02	0.28	0.077	--	30.686
	26-Nov-01	9.1	--	--	3.2	0.01	0.35	0.077	--	28.664
	19-Dec-01	9.7	--	--	3.28	<0.01	0.40	0.087	--	29.749

Table A-4 2001 Ambient/MOSS Beach Monitoring
General Water Quality Parameters (page 5 of 7)

Station	Date	Temperature ^{0}C	Dissolved Oxygen (mg/L)	TSS (mg/L)	Silica (mg/L)	NH_4-N (mg/L)	NO_2+NO_3 (mg/L)	Phosphorus (total) (mg/L)	pH	Salinity (pss)
LSVW01	16-Jan-01	8.6	--	--	3.88	<0.01	0.39	0.079	--	30.202
(Fauntleroy	26-Feb-01	7.8	--	--	3.85	<0.01	0.42	0.102	--	29.999
Cove)	22-Mar-01	10.9	--	--	2.87	0.02	0.33	0.077	--	30.001
	17-Apr-01	9.4	--	--	5.86	0.02	0.37	0.067	--	28.309
	8-May-01	10.7	--	--	2.4	0.03	0.16	0.087	--	29.545
	26-Jun-01	12.5	--	--	2	0.03	0.20	0.069	--	29.819
	16-Jul-01	15.2	--	--	1.3	0.03	<0.02	0.072	--	28.551
	27-Aug-01	15.1	--	--	2.02	0.02	0.13	0.069	--	30.235
	19-Sep-01	13.3	--	--	2.32	0.03	0.23	0.065	--	30.259
	29-Oct-01	11.6	--	--	3.1	0.01	0.33	0.077	--	29.715
	26-Nov-01	9.6	--	--	4.8	<0.01	0.39	0.080	--	27.813
	19-Dec-01	9.6	--	--	3.37	<0.01	0.41	0.086	--	29.647
LTAB01	16-Jan-01	7.2	--	--	5.81	0.02	0.40	0.074	--	25.652
(Inner Elliot Bay)	26-Feb-01	7.5	--	--	3.68	0.01	0.40	0.079	--	29.817
	22-Mar-01	8.9	--	--	3.99	0.02	0.36	0.074	--	27.715
	17-Apr-01	9.1	--	--	4.45	0.19	0.41	0.058	--	25.771
	8-May-01	9.8	--	--	6.37	0.03	0.24	0.052	--	18.353
	26-Jun-01	12.1	--	--	2.23	0.04	0.16	0.053	--	28.435
	16-Jul-01	12.8	--	--	1.95	0.02	0.08	0.044	--	27.432
	27-Aug-01	16.1	--	--	2.97	0.04	0.23	0.066	--	27.830
	19-Sep-01	13.3	--	--	2.19	0.04	0.22	0.065	--	29.688
	29-Oct-01	9.8	--	--	5.27	0.03	0.29	0.070	--	21.536
	26-Nov-01	9.2	--	--	5.43	0.01	0.40	0.079	--	21.683
	19-Dec-01	7.8	--	--	5.59	0.01	0.44	0.081	--	21.765
LTEH02	16-Jan-01	8.3	--	--	4.51	0.02	0.40	0.082	--	28.591
(Inner Elliot Bay)	26-Feb-01	8.1	--	--	4.42	0.02	0.41	0.080	--	28.381
	22-Mar-01	9.1	--	--	6.65	0.03	0.43	0.065	--	19.591
	17-Apr-01	9.3	--	--	5.68	0.04	0.42	0.058	--	22.374
	8-May-01	9.9	--	--	4.82	0.04	0.25	0.059	--	22.516
	26-Jun-01	12.4	--	--	3.49	0.06	0.18	0.057	--	25.913
	16-Jul-01	12.7	--	--	2.62	0.08	0.17	0.056	--	26.893
	27-Aug-01	14.6	--	--	3.11	0.05	0.24	0.067	--	27.602
	19-Sep-01	13.1	--	--	2.18	0.05	0.23	0.067	--	29.994
	29-Oct-01	10.4	--	--	5.04	0.03	0.29	0.068	--	21.809
	26-Nov-01	8.8	--	--	6.21	0.02	0.43	0.079	--	18.985
	19-Dec-01	8.8	--	--	4.74	0.01	0.42	0.086	--	24.758
MSSM05	22-May-01	13.0	--	--	--	--	--	--	--	--
(Tramp Harbor)	25-Jun-01	15.0	--	--	--	--	--	--	--	--
	24-Jul-01	15.0	--	--	--	--	--	--	--	--
	20-Aug-01	14.9	--	--	--	--	--	--	--	--
	22-Oct-01	12.0	--	--	--	--	--	--	--	--

Table A-4 2001 Ambient/MOSS Beach Monitoring
General Water Quality Parameters (page 6 of 7)

Station	Date	Temperature ^{0}C	Dissolved Oxygen (mg/L)	TSS (mg/L)	Silica (mg/L)	NH_4-N (mg/L)	NO_2+NO_3 (mg/L)	Phosphorus (total) (mg/L)	pH	Salinity (pss)
MTEC01	22-May-01	14.5	--	--	--	--	--	--	--	--
(Seahurst Park)	25-Jun-01	16.6	--	--	--	--	--	--	--	--
	23-Jul-01	--	--	--	--	--	--	--	--	--
	20-Aug-01	--	--	--	--	--	--	--	--	--
	17-Sep-01	13.7	--	--	--	--	--	--	--	--
	22-Oct-01	11.7	--	--	--	--	--	--	--	--
MTLD03	21-May-01	14.5	--	--	--	--	--	--	--	--
(Normandy	26-Jun-01	15.0	--	--	--	--	--	--	--	--
Park)	24-Jul-01	23.0	--	--	--	--	--	--	--	--
	22-Aug-01	14.0	--	--	--	--	--	--	--	--
	17-Sep-01	13.7	--	--	--	--	--	--	--	--
	22-Oct-01	11.4	--	--	--	--	--	--	--	--
KSJX02	16-Jan-01	8.1	--	3.9	4.08	<0.01	0.41	0.080	--	--
(Blue Ridge)	26-Feb-01	9.0	--	25.7	3.65	0.02	0.38	0.103	--	--
	21-Mar-01	9.8	--	--	3.78	0.01	0.38	0.099	--	--
	17-Apr-01	10.6	9.2	--	3.72	0.03	0.44	0.067	--	--
	8-May-01	10.0	11	--	2.62	0.03	0.23	0.063	--	--
	16-Jul-01	13.6	12.3	--	0.748	0.01	0.02	0.058	--	--
	27-Aug-01	13.4	7.8	--	4.34	0.03	0.37	0.073	--	--
	19-Sep-01	13.0	6.8	--	2.52	0.02	0.29	0.066	--	--
	29-Oct-01	11.6	8.2	--	3.71	0.02	0.37	0.075	--	--
	26-Nov-01	9.4	9	--	5.08	0.02	0.42	0.069	--	--
	19-Dec-01	9.2	8.4	--	3.81	<0.01	0.39	0.078	--	--
KSLU03	16-Jan-01	7.9	--	1.8	4.58	0.02	0.40	0.060	--	24.965
(Golden	26-Feb-01	8.5	--	3.4	3.56	0.01	0.41	0.079	--	30.060
Gardens)	21-Mar-01	10.4	--	--	3.39	0.01	0.36	0.089	--	30.150
	17-Apr-01	10.4	9.5	--	3.79	0.03	0.39	0.059	7.95	27.322
	8-May-01	10.0	11	--	2.65	0.03	0.25	0.066	7.97	28.543
	26-Jun-01	12.8	--	--	2.85	0.05	0.21	0.051	8.02	25.610
	16-Jul-01	13.5	--	--	2.31	0.02	0.07	0.061	--	28.143
	27-Aug-01	13.7	8.6	--	2.96	0.03	0.22	0.078	7.89	29.372
	19-Sep-01	--	6.8	--	2.12	0.04	0.23	0.061	7.87	25.568
	29-Oct-01	11.7	8	--	3.45	0.04	0.29	0.064	7.74	23.548
	26-Nov-01	9.6	9.5	--	4.38	0.02	0.32	0.063	7.74	18.373
	19-Dec-01	9.0	8.4	--	4.66	0.02	0.36	0.065	7.81	18.864

Table A-4 2001 Ambient/MOSS Beach Monitoring
General Water Quality Parameters (page 7 of 7)

Station	Date	Temperature ^{0}C	Dissolved Oxygen (mg/L)	TSS (mg/L)	Silica (mg/L)	NH_4-N (mg/L)	NO_2+NO_3 (mg/L)	Phosphorus (total) (mg/L)	pH	Salinity (pss)
KSQU01	16-Jan-01	8.5	--	2	4.43	0.02	0.34	0.062	--	--
(Shilshole Bay)	26-Feb-01	8.3	--	2.1	4.29	0.02	0.34	0.060	--	--
	21-Mar-01	8.9	--	--	4.38	0.02	0.29	0.054	--	--
	17-Apr-01	9.4	10.4	--	4	0.03	0.31	0.044	--	--
	8-May-01	11.3	11.3	--	3.47	0.05	0.21	0.080	--	--
	26-Jun-01	13.0	--	--	2.25	0.05	0.11	0.066	--	--
	16-Jul-01	15.3	--	--	1.14	0.06	0.05	0.040	--	--
	27-Aug-01	14.9	5.7	--	2.16	0.06	0.19	0.060	--	--
	19-Sep-01	15.0	7	--	1.85	0.05	0.14	0.043	--	--
	29-Oct-01	12.1	8.3	--	3.13	0.04	0.24	0.056	--	--
	26-Nov-01	10.4	9.6	--	4.04	0.02	0.23	0.048	--	--
	19-Dec-01	9.0	10.2	--	4.54	0.01	0.29	0.054	--	--
KSRU02	17-Jan-01	7.8	--	--	--	--	--	--	--	18.355
(LW Ship Canal)	20-Feb-01	7.5	--	--	--	--	--	--	--	17.518
	21-Mar-01	--	--	--	--	--	--	--	--	19.391
	16-Apr-01	9.2	--	--	--	--	--	--	--	17.342
	22-May-01	--	--	--	--	--	--	--	--	18.298
	18-Jun-01	13.9	--	--	--	--	--	--	--	19.968
	23-Jul-01	14.8	--	--	--	--	--	--	--	22.355
	20-Aug-01	14.6	--	--	--	--	--	--	--	24.407
	24-Sep-01	15	--	--	--	--	--	--	--	20.006
	23-Oct-01	12.5	--	--	--	--	--	--	--	20.830
	19-Nov-01	11.2	--	--	--	--	--	--	--	13.339
	17-Dec-01	8.6	--	--	--	--	--	--	--	2.120

Table A-5 2001 Offshore Point Source Water Column Monitoring Bacteria (page 1 of 6)

Station	Date	Depth	Fecal Coliform (cfu/100 ml)	*Esherichia coli* (cfu/100 ml)	*Enterococcus* (cfu/100 ml)	Moving Geometric Mean*
CK200P	17-Jan-01	1	0	--	1	2
	20-Feb-01	1	0	--	0	2
	21-Mar-01	1	0	--	2	2
		15	1	--	0	
		25	0	--	0	
		35	2	--	0	
		55	0	--	0	
	16-Apr-01	1	0	--	1	2
		10	0	--	0	
	22-May-01	1	0	--	0	2
		15	0	--	0	
		25	0	--	0	
		35	0	--	0	
		55	0	--	0	
	18-Jun-01	1	0	--	0	2
		15	0	--	0	
		25	0	--	0	
		35	0	--	0	
		55	0	--	0	
	23-Jul-01	1	0	--	1	2
		15	0	--	0	
		25	0	--	0	
		35	0	--	0	
		55	0	--	0	
	20-Aug-01	1	0	--	0	1
		15	0	--	0	
		25	0	--	1	
		35	0	--	0	
		55	0	--	0	
	24-Sep-01	1	0	--	0	1
		15	0	--	0	
		25	0	--	0	
		35	0	--	0	
		55	0	--	0	
	23-Oct-01	1	0	--	1	1
		15	0	--	1	
		25	1	--	1	
		35	0	--	0	
		55	0	--	0	
	19-Nov-01	1	6	--	9	1
		15	1	--	2	
		25	2	--	4	
		35	0	--	2	
		55	3	--	5	

* The moving geometric mean value is for fecal coliform only

Table A-5 2001 Offshore Ambient Water Column Monitoring Bacteria (page 2 of 6)

Station	Date	Depth	Fecal Coliform (cfu/100 ml)	*Esherichia coli* (cfu/100 ml)	*Enterococcus* (cfu/100 ml)	Moving Geometric Mean*
	17-Dec-01	1	82	--	34	1
		15	9	--	13	
		25	6	--	6	
		35	11	--	0	
		55	2	--	1	
KSSK02	17-Jan-01	1	3	4	4	2
		15	1	0	1	
		25	0	0	1	
		35	0	0	1	
		55	0	0	1	
	21-Feb-01	1	0	0	0	2
		15	0	1	1	
		25	0	0	0	
		35	0	0	1	
		55	0	0	1	
	20-Mar-01	1	0	0	0	2
		15	0	0	0	
		25	0	0	0	
		35	0	0	0	
		55	0	0	0	
	17-Apr-01	1	0	0	0	2
		15	1	0	3	
		25	0	0	1	
		35	0	1	3	
		55	0	0	4	
	22-May-01	1	0	0	0	2
		15	0	1	1	
		25	0	0	0	
		35	0	0	0	
		55	0	0	0	
	19-Jun-01	1	0	0	0	2
		15	0	0	0	
		25	0	0	0	
		35	0	0	0	
		55	1	0	1	
	24-Jul-01	1	1	1	0	2
		15	0	0	0	
		25	0	0	0	
		35	0	0	0	
		55	0	0	0	
	22-Aug-01	1	1	0	0	2
		15	0	0	0	
		25	0	0	1	
		35	0	0	0	

* The moving geometric mean value is for fecal coliform only

Table A-5 2001 Offshore Ambient Water Column Monitoring Bacteria (page 3 of 6)

Station	Date	Depth	Fecal Coliform (cfu/100 ml)	*Esherichia coli* (cfu/100 ml)	*Enterococcus* (cfu/100 ml)	Moving Geometric Mean*
KSSK02 (Con't)		55	0	0	0	
	24-Sep-01	1	0	0	0	2
		15	0	0	0	
		25	0	0	0	
		35	0	0	0	
		55	0	0	0	
	23-Oct-01	1	1	1	1	2
		15	0	0	0	
		25	0	1	1	
		35	1	0	0	
	19-Nov-01	1	1	7	21	2
		15	1	4	9	
		25	0	0	5	
		35	1	2	1	
		55	2	4	34	
	17-Dec-01	15	21	18	4	
		40	24	12	5	
		50	16	15	8	
		55	10	9	9	
LSEP01	17-Jan-01	1	0	1	0	1
		15	0	1	0	
		25	1	1	0	
		35	1	1	0	
		55	0	0	0	
		100	1	1	0	
		150	0	1	1	
	21-Feb-01	1	0	0	0	1
		15	0	1	1	
		25	0	0	0	
		35	0	0	1	
		55	1	0	0	
		100	0	0	0	
		150	0	0	0	
	20-Mar-01	1	0	0	0	1
		15	0	0	0	
		25	0	0	0	
		35	2	0	0	
		55	0	0	0	
		100	0	1	0	
		150	0	0	0	

* The moving geometric mean value is for fecal coliform only

Table A-5 2001 Offshore Ambient Water Column Monitoring Bacteria (page 4 of 6)

Station	Date	Depth	Fecal Coliform (cfu/100 ml)	*Esherichia coli* (cfu/100 ml)	*Enterococcus* (cfu/100 ml)	Moving Geometric Mean*
LSEP01 (Con't)	17-Apr-01	1	0	0	0	1
		15	3	1	2	
		25	0	0	0	
		35	0	0	0	
		55	<2	0	0	
		100	0	0	0	
		150	0	0	0	
	22-May-01	1	0	0	0	1
		15	0	0	0	
		25	0	0	0	
		35	0	0	0	
		55	0	0	0	
	22-May-01	100	0	0	0	
		150	0	0	0	
	19-Jun-01	1	0	0	0	1
		15	0	0	0	
		25	0	0	0	
		35	0	0	0	
		55	0	0	0	
		100	0	0	0	
		150	1	0	0	
	24-Jul-01	1	0	0	0	1
		15	0	0	0	
		25	1	0	0	
		35	0	0	0	
		55	0	0	0	
		100	0	0	0	
		150	0	0	0	
	22-Aug-01	1	0	0	0	1
		15	1	0	1	
		25	1	0	0	
		35	0	1	0	
		55	0	0	0	
		100	0	0	0	
		150	0	1	0	
	24-Sep-01	1	0	0	0	1
		15	0	0	0	
		25	0	0	0	
		35	0	0	0	
		55	0	0	0	
		100	0	0	0	
		150	0	0	0	

* The moving geometric mean value is for fecal coliform only

Table A-5 2001 Offshore Ambient Water Column Monitoring Bacteria (page 5 of 6)

Station	Date	Depth	Fecal Coliform (cfu/100 ml)	*Esherichia coli* (cfu/100 ml)	*Enterococcus* (cfu/100 ml)	Moving Geometric Mean*
LSEP01 (Con't)	23-Oct-01	1	0	0	0	1
		15	0	0	0	
		25	0	0	0	
		35	0	0	0	
		55	0	0	0	
		100	0	0	0	
		150	1	0	0	
	19-Nov-01	1	2	2	5	1
		15	0	0	0	
		25	0	1	2	
		35	0	1	3	
		55	0	0	0	
		100	0	0	0	
		150	0	1	1	
LTBC41	17-Jan-01	1	5	--	4	8
		15	0	--	1	
		30	1	--	2	
	21-Feb-01	1	4	--	5	8
		15	7	--	8	
		30	1	--	1	
	20-Mar-01	1	0	--	2	8
		15	1	--	0	
		30	0	--	0	
	17-Apr-01	1	0	--	1	8
		15	1	--	4	
		30	0	--	0	
	22-May-01	1	2	--	0	7
		15	0	--	0	
		30	0	--	0	
	19-Jun-01	1	0	--		7
		15	1	--	7	
		30	1	--	3	
	24-Jul-01	1	6	--	3	6
		15	1	--	0	
		30	0	--	1	
	22-Aug-01	1	15	--	36	6
		15	1	--	1	
		30	0	--	0	
	24-Sep-01	1	190	--	3	6
		15	5	--	0	
		30	0	--	0	
	23-Oct-01	1	7	--	5	6
		15	0	--	0	
		30	0	--	1	

* The moving geometric mean value is for fecal coliform only

Table A-5 2001 Offshore Ambient Water Column Monitoring Bacteria (page 6 of 6)

Station	Date	Depth	Fecal Coliform (cfu/100 ml)	*Esherichia coli* (cfu/100 ml)	*Enterococcus* (cfu/100 ml)	Moving Geometric Mean*
LTBC41 (Con't)	19-Nov-01	1	--	--		6
		15	12	--	31	
		30	5	--	3	
	17-Dec-01	1	--	--	160	5
		15	--	--	190	
		30	25	--	11	
VO50E	21-Feb-01	1	0	--	0	--
	20-Mar-01	1	0	--	0	--
	17-Apr-01	1	0	--	0	--
		5	0	--	1	
	22-May-01	1	0	--	0	--
		5	0	--	0	
	19-Jun-01	1	0	--	0	--
		5	0	--	0	
	24-Jul-01	1	0	--	0	--
		5	0	--	0	
	22-Aug-01	1	0	--	2	--
		5	0	--	0	
	24-Sep-01	1	0	--	0	--
		1	0	--	0	--
	23-Oct-01	1	0	--	0	--
		5	0	--	0	
		10	1	--	0	
	19-Nov-01	1	2	--	2	--
		5	1	--	3	
		10	3	--	2	
	17-Dec-01	1	3	--	2	1
		5	0	--	6	
		10	1	--	1	
LSKQ06	17-Jan-01	1	0	--	0	1
	21-Feb-01	1	0	--	0	1
	20-Mar-01	1	1	--	0	1
	17-Apr-01	1	0	--	0	1
	22-May-01	1	0	--	0	1
	19-Jun-01	1	0	--	0	1
	24-Jul-01	1	1	--	0	1
	22-Aug-01	1	0	--	1	1
	24-Sep-01	1	0	--	0	1
	23-Oct-01	1	0	--	0	1
	19-Nov-01	1	5	--	5	1
	17-Dec-01	1	3	--	3	1

* The moving geometric mean value is for fecal coliform only

For stations with less than 30 data points, the geometric mean is given for the most recent sample only

Table A-6 2001 Offshore Ambient Water Column Monitoring Bacteria (page 1 of 2)

Station	Date	Depth	Fecal Coliform (cfu/100 ml)	*Esherichia coli* (cfu/100 ml)	*Enterococcus* (cfu/100 ml)	Moving Geometric Mean*
ADMIRALC14	17-Jan-01	1	0	1	1	--
	20-Feb-01	1	1	0	0	--
	21-Mar-01	1	0	0	0	--
	16-Apr-01	1	0	0	0	--
	22-May-01	1	0	0	0	--
	18-Jun-01	1	0	0	0	1
COLVOSPASS	17-Jan-01	1	0	1	0	1
EDMDS-CTD2	17-Jan-01	1	1	2	0	--
	20-Feb-01	1	2	0	0	--
	21-Mar-01	1	0	0	0	--
	16-Apr-01	1	0	0	0	--
	22-May-01	1	0	0	0	--
	18-Jun-01	1	0	0	0	--
	23-Jul-01	1	0	0	0	--
	20-Aug-01	1	0	0	0	2
EDMDS-CTD4	17-Jan-01	1	0	1	1	--
	20-Feb-01	1	0	0	0	--
	21-Mar-01	1	0	0	0	--
	16-Apr-01	1	0	0	0	--
	22-May-01	1	1	0	0	--
	18-Jun-01	1	1	0	0	--
	23-Jul-01	1	0	0	0	--
	20-Aug-01	1	0	0	0	1
POSSESSC14	17-Jan-01	1	0	0	0	--
	20-Feb-01	1	0	0	0	--
	21-Mar-01	1	0	0	0	--
	16-Apr-01	1	0	0	0	--
	22-May-01	1	0	0	0	--
	18-Jun-01	1	0	0	0	2
PTWELLS1	17-Jan-01	1	1	0	0	--
	20-Feb-01	5	0	0	1	--
	21-Mar-01	1	0	0	0	--
	16-Apr-01	1	0	0	0	--
	22-May-01	1	0	0	0	--
	18-Jun-01	1	0	0	0	--

* The moving geometric mean value is for fecal coliform only

For stations with less than 30 data points, the geometric mean is given for the most recent sample only

Table A-6 2001 Offshore Ambient Water Column Monitoring Bacteria (page 2 of 2)

Station	Date	Depth	Fecal Coliform (cfu/100 ml)	*Esherichia coli* (cfu/100 ml)	*Enterococcus* (cfu/100 ml)	Moving Geometric Mean*
PTWELLS1	23-Jul-01	1	0	0	0	2
(Con't)	20-Aug-01	1	0	0	0	1
	24-Sep-01	1	0	0	1	2
	23-Oct-01	1	0	2	0	2
	19-Nov-01	1		0	4	2
	17-Dec-01	1	19	18	12	2
KSBP01	17-Jan-01	1	1	1	0	1
	20-Feb-01	1	2	1	0	1
	21-Mar-01	1	0	0	0	1
	16-Apr-01	1	0	0	0	1
	22-May-01	1	0	0	0	1
	18-Jun-01	1	0	0	0	1
	23-Jul-01	1	0	0	0	1
	20-Aug-01	1	0	0	0	1
	24-Sep-01	1	0	0	0	1
	23-Oct-01	1	0	0	0	1
	19-Nov-01	1		2	1	1
	17-Dec-01	1	31	20	14	1
LSNT01	17-Jan-01	1	1	1	0	1
	21-Feb-01	1	0	0	0	1
	20-Mar-01	1	0	0	0	1
	17-Apr-01	1	0	0	0	1
	22-May-01	1	--	0	0	1
	19-Jun-01	1	0	0	0	1
	24-Jul-01	1	0	0	0	1
	22-Aug-01	1	0	0	0	1
	24-Sep-01	1	0	0	0	1
	23-Oct-01	1	0	0	0	1
	19-Nov-01	1	0	3	0	1
	17-Dec-01	5	1	3	4	1
LTED04	17-Jan-01	1	2	--	4	4
	21-Feb-01	1	9	--	3	5
	20-Mar-01	1	1	--	3	5
	17-Apr-01	1	4	--	2	5
	22-May-01	1	1	--	0	5
	19-Jun-01	1	2	--	2	4
	24-Jul-01	1	1	--	0	3
	22-Aug-01	1	13	--	11	4
	24-Sep-01	1	1	--	0	3
	23-Oct-01	1	2	--	5	3
	19-Nov-01	1	70	--	45	4
	17-Dec-01	1	--	--	79	4

* The moving geometric mean value is for fecal coliform only

For stations with less than 30 data points, the geometric mean is given for the most recent sample only

Table A-7 2001 Point Source Beach Monitoring
Bacteria (page 1 of 2)

Station	Date	Fecal Coliform (cfu/100 ml)	*Esherichia coli* (cfu/100 ml)	*Enterococcus* (cfu/100 ml)	Moving Geometric Mean*
KSHZ03	16-Jan-01	130	140	4	19
	26-Feb-01	5	5	20	19
	21-Mar-01	1	1	2	18
	17-Apr-01	0	0	0	18
	8-May-01	350	280	140	19
	26-Jun-01	20	18	19	18
	16-Jul-01	390	460	410	18
	27-Aug-01	30	25	8	17
	19-Sep-01	61	64	33	17
	29-Oct-01	110	98	43	17
	26-Nov-01	10	13	9	17
	19-Dec-01	26	23	12	17
KSSN04	16-Jan-01	1	--	1	7
	26-Feb-01	95	--	4	8
	22-Mar-01	3	--	6	8
	17-Apr-01	3	--	2	8
	8-May-01	37	--	19	8
	26-Jun-01	29	--	16	8
	16-Jul-01	1	--	1	7
	27-Aug-01	0	--	0	7
	19-Sep-01	13	--	16	7
	29-Oct-01	180	--	3	8
	26-Nov-01	12	--	5	8
	19-Dec-01	30	--	22	9
KSSN05	16-Jan-01	11	--	8	12
	26-Feb-01	170	--	1	13
	22-Mar-01	1	--	0	12
	17-Apr-01	14	--	13	12
	8-May-01	6	--	1	10
	26-Jun-01	1	--	0	9
	16-Jul-01	33	--	10	9
	27-Aug-01	4	--	0	8
	19-Sep-01	54	--	80	8
	29-Oct-01	14	--	24	9
	26-Nov-01	68	--	70	10
	19-Dec-01	40	--	22	11

* The moving geometric mean value is for fecal coliform only

Table A-7 2001 Point Source Beach Monitoring
Bacteria (page 2 of 2)

Station	Date	Fecal Coliform (cfu/100 ml)	*Esherichia coli* (cfu/100 ml)	*Enterococcus* (cfu/100 ml)	Moving Geometric Mean*
LSKR01	16-Jan-01	28	--	20	12
	26-Feb-01	35	--	8	13
	22-Mar-01	2	--	4	11
	17-Apr-01	14	--	62	12
	8-May-01	14	--	20	12
	26-Jun-01	21	--	5	13
	16-Jul-01	220	--	46	14
	27-Aug-01	19	--	29	14
	19-Sep-01	11	--	6	15
	29-Oct-01	29	--	13	15
	26-Nov-01	4	--	17	15
	19-Dec-01	15	--	4	15
LSKS01	16-Jan-01	56	--	14	54
	26-Feb-01	2	--	2	47
	22-Mar-01	1	--	0	42
	17-Apr-01	275	--	300	47
	8-May-01	4	--	2	43
	26-Jun-01	18	--	2	43
	16-Jul-01	470	--	21	39
	27-Aug-01	250	--	41	42
	19-Sep-01	240	--	6	41
	29-Oct-01	85	--	18	43
	26-Nov-01	26	--	6	43
	19-Dec-01	22	--	27	43

* The moving geometric mean value is for fecal coliform only

Table A-8 2001 Ambient Beach Monitoring
Bacteria (page 1 of 9)

Station	Date	Fecal Coliform (cfu/100 ml)	*Esherichia coli* (cfu/100 ml)	*Enterococcus* (cfu/100 ml)	Moving Geometric Mean*
ITBOEINGCR	16-Jan-01	8	18	0	--
	26-Feb-01	0	2	0	--
	21-Mar-01	0	2	0	--
	17-Apr-01	1	3	1	--
	8-May-01	11	5	6	--
	26-Jun-01	2	4	2	--
	16-Jul-01	99	150	120	--
	27-Aug-01	5	7	3	--
	19-Sep-01	15	7	5	--
	2-Oct-01	0		0	--
	29-Oct-01	3	7	11	--
	26-Nov-01	18	10	4	--
	19-Dec-01	29	30	26	4
ITBRACKETT	16-Jan-01	7	6	11	--
	26-Feb-01	3	1	1	--
	21-Mar-01	23	23	3	--
	17-Apr-01	730	610	5	--
	8-May-01	31	62	35	--
	26-Jun-01	32	40	24	--
	16-Jul-01	150	180	13	--
	27-Aug-01	48	54	22	--
	19-Sep-01	44	46	18	--
	29-Oct-01	11	8	7	--
	26-Nov-01	35	14	12	--
	19-Dec-01	21	6	25	47
ITCARKEEKP	16-Jan-01	0	1	0	--
	26-Feb-01	1	1	0	--
	21-Mar-01	0	1	0	--
	17-Apr-01	14	13	5	--
	8-May-01	2	3	2	--
	26-Jun-01	3	2	1	--
	16-Jul-01	3	2	2	--
	27-Aug-01	4	3	3	--
	19-Sep-01	43	45	7	--
	29-Oct-01	17	24	20	--
	26-Nov-01	35	33	13	--
	19-Dec-01	26	26	12	5

* The moving geometric mean value is for fecal coliform only

** Units are MPN/100 ml

For stations with less than 30 data points, the geometric mean is given for the most recent sample only

Table A-8 2001 Ambient Beach Monitoring
Bacteria (page 2 of 9)

Station	Date	Fecal Coliform (cfu/100 ml)	*Esherichia coli* (cfu/100 ml)	*Enterococcus* (cfu/100 ml)	Moving Geometric Mean*
ITEDWARDSPT	16-Jan-01	1600	1400	16	--
	26-Feb-01	4	9	12	--
	21-Mar-01	2	3	1	--
	17-Apr-01	1	1	1	--
	8-May-01	4	3	11	--
	26-Jun-01	4	5	10	--
	16-Jul-01	3	2	2	--
	27-Aug-01	11	27	21	--
	19-Sep-01	6	12	2	--
	29-Oct-01	22	24	38	--
	26-Nov-01	10	6	4	--
	19-Dec-01	16	31	10	8
ITMEADOWBP	16-Jan-01	3	4	4	--
	26-Feb-01	3	7	5	--
	21-Mar-01	4	1	1	--
	17-Apr-01	13	15	17	--
	8-May-01	1	5	3	--
	26-Jun-01	1	0	4	--
	16-Jul-01	8	3	0	--
	27-Aug-01	0	0	8	--
	19-Sep-01	1	2	0	--
	29-Oct-01	1	1	0	--
	26-Nov-01	20	16	3	--
	19-Dec-01	18	15	5	4

* The moving geometric mean value is for fecal coliform only

** Units are MPN/100 ml

For stations with less than 30 data points, the geometric mean is given for the most recent sample only

Table A-8 2001 Ambient Beach Monitoring Bacteria (page 3 of 9)

Station	Date	Fecal Coliform (cfu/100 ml)	*Esherichia coli* (cfu/100 ml)	*Enterococcus* (cfu/100 ml)	Moving Geometric Mean*
ITOCEANAVE	16-Jan-01	5	5	3	--
	26-Feb-01	43	11	2	--
	21-Mar-01	8	7	0	--
	17-Apr-01	11	12	2	--
	8-May-01	2	3	3	--
	26-Jun-01	4	4	6	--
	16-Jul-01	6	4	1	--
	27-Aug-01	29	25	9	--
	19-Sep-01	7	5	1	--
	29-Oct-01	3	0	2	--
	26-Nov-01	--	--	8	--
	19-Dec-01	12	10	8	7
ITPICNICPT	16-Jan-01	25	26	10	--
	26-Feb-01	44	33	4	--
	21-Mar-01	5	3	5	--
	17-Apr-01	13	15	14	--
	8-May-01	0	0	1	--
	26-Jun-01	9	12	0	--
	16-Jul-01	0	1	2	--
	27-Aug-01	8	2	6	--
	19-Sep-01	18	14	11	--
	29-Oct-01	15	15	5	--
	26-Nov-01	3	6	5	--
	19-Dec-01	20	16	200	11
JSVW04	16-Jan-01	15	12	8	8
	26-Feb-01	24	24	35	9
	21-Mar-01	3	6	1	8
	17-Apr-01	7	5	8	8
	8-May-01	9	8	9	8
	26-Jun-01	1	1	1	8
	16-Jul-01	6	8	1	8
	27-Aug-01	2	4	1	7
	19-Sep-01	15	34	0	8
	29-Oct-01	2	1	2	8
	26-Nov-01	15	19	6	7
	19-Dec-01	22	22	16	7

* The moving geometric mean value is for fecal coliform only

** Units are MPN/100 ml

For stations with less than 30 data points, the geometric mean is given for the most recent sample only

Table A-8 2001 Ambient Beach Monitoring
Bacteria (page 4 of 9)

Station	Date	Fecal Coliform (cfu/100 ml)	*Esherichia coli* (cfu/100 ml)	*Enterococcus* (cfu/100 ml)	Moving Geometric Mean*
KRJY01**	21-May-01	<2	--	<2	8
	25-Jun-01	<2	--	2	8
	24-Jul-01	8	--	<2	8
	20-Aug-01	2	--	<2	7
	17-Sep-01	<2	--	<2	7
	22-Oct-01	33	--	11	8
KSJX02	16-Jan-01	6	7	9	--
	26-Feb-01	0	0	0	--
	21-Mar-01	1	4	1	--
	17-Apr-01	2	4	13	--
	8-May-01	4	1	3	--
	16-Jul-01	37	28	8	--
	27-Aug-01	22	17	13	--
	29-Oct-01	10	6	4	--
	26-Nov-01	57	35	33	--
	19-Dec-01	28	15	--	8
KSLU03	16-Jan-01	24	29	9	21
	26-Feb-01	1	0	4	18
	21-Mar-01	1	0	3	17
	17-Apr-01	1	<1	9	16
	8-May-01	0	0	0	13
	26-Jun-01	43	38	11	13
	16-Jul-01	94	110	6	14
	27-Aug-01	34	16	15	14
	19-Sep-01	35	46	34	16
	29-Oct-01	22	42	6	15
	26-Nov-01	100	75	31	18
	19-Dec-01	57	56	26	18

* The moving geometric mean value is for fecal coliform only

** Units are MPN/100 ml

For stations with less than 30 data points, the geometric mean is given for the most recent sample only

Table A-8 2001 Ambient Beach Monitoring Bacteria (page 5 of 9)

Station	Date	Fecal Coliform (cfu/100 ml)	*Esherichia coli* (cfu/100 ml)	*Enterococcus* (cfu/100 ml)	Moving Geometric Mean*
KSQU01	16-Jan-01	38	30	4	26
	26-Feb-01	9	5	4	25
	21-Mar-01	2	0	0	23
	17-Apr-01	31	26	16	24
	8-May-01	10	19	8	23
	26-Jun-01	14	10	3	22
	16-Jul-01	22	24	20	22
	27-Aug-01	53	39	16	22
	19-Sep-01	37	23	3	22
	29-Oct-01	11	17	18	23
	26-Nov-01	24	19	0	22
	19-Dec-01	86	98	37	22
KSYV02	16-Jan-01	19	--	14	19
	26-Feb-01	6	--	5	16
	22-Mar-01	2	--	1	14
	17-Apr-01	3	--	2	14
	8-May-01	14	--	3	14
	26-Jun-01	4	--	6	13
	16-Jul-01	14	--	6	13
	27-Aug-01	71	--	18	14
	19-Sep-01	24	--	34	15
	29-Oct-01	16	--	19	15
	26-Nov-01	18	--	20	16
	19-Dec-01	36	--	41	16
KTHA01	16-Jan-01	14	20	11	172
	26-Feb-01	28	25	24	155
	21-Mar-01	11	11	29	141
	17-Apr-01	320	150	170	147
	8-May-01	95	80	33	152
	26-Jun-01	140	140	190	147
	16-Jul-01	2200	2100	1100	153
	27-Aug-01	240	290	320	149
	19-Sep-01	170	200	180	151
	29-Oct-01	83	100	130	156
	26-Nov-01	51	36	310	150
	19-Dec-01	150	130	190	150

* The moving geometric mean value is for fecal coliform only

** Units are MPN/100 ml

For stations with less than 30 data points, the geometric mean is given for the most recent sample only

Table A-8 2001 Ambient Beach Monitoring Bacteria (page 6 of 9)

Station	Date	Fecal Coliform (cfu/100 ml)	*Esherichia coli* (cfu/100 ml)	*Enterococcus* (cfu/100 ml)	Moving Geometric Mean*
LSFX01	16-Jan-01	9	--	2	4
	26-Feb-01	0	--	0	4
	22-Mar-01	1	--	0	3
	17-Apr-01	0	--	1	3
	8-May-01	2	--	0	3
	26-Jun-01	0	--	3	3
	16-Jul-01	1	--	1	3
	27-Aug-01	8	--	4	3
	19-Sep-01	29	--	14	3
	29-Oct-01	1000	--	450	4
	26-Nov-01	3	--	4	4
	19-Dec-01	4	--	11	4
LSGY01	16-Jan-01	2	--	1	5
	26-Feb-01	2	--	0	5
	22-Mar-01	0	--	0	5
	17-Apr-01	1	--	1	5
	8-May-01	0	--	1	4
	26-Jun-01	0	--	1	4
	16-Jul-01	5	--	0	4
	27-Aug-01	1	--	0	4
	19-Sep-01	2	--	2	3
	29-Oct-01	6	--	20	4
	26-Nov-01	1	--	1	4
	19-Dec-01	11	--	13	4
LSVW01	16-Jan-01	65	--	11	52
	26-Feb-01	14	--	0	53
	22-Mar-01	5	--	7	49
	17-Apr-01	200	--	18	51
	8-May-01	160	--	35	53
	26-Jun-01	26	--	8	51
	16-Jul-01	80	--	13	51
	27-Aug-01	148	--	16	53
	19-Sep-01	18	--	6	56
	29-Oct-01	130	--	280	57
	26-Nov-01	250	--	365	58
	19-Dec-01	1	--	2	52

* The moving geometric mean value is for fecal coliform only

** Units are MPN/100 ml

For stations with less than 30 data points, the geometric mean is given for the most recent sample only

Table A-8 2001 Ambient Beach Monitoring
Bacteria (page 7 of 9)

Station	Date	Fecal Coliform (cfu/100 ml)	*Esherichia coli* (cfu/100 ml)	*Enterococcus* (cfu/100 ml)	Moving Geometric Mean*
LTAB01	16-Jan-01	28	--	6	11
	26-Feb-01	4	--	1	10
	22-Mar-01	0	--	0	10
	17-Apr-01	6	--	4	10
	8-May-01	7	--	9	9
	26-Jun-01	6	--	2	8
	16-Jul-01	180	--	48	9
	27-Aug-01	2	--	1	8
	19-Sep-01	24	--	1	8
	29-Oct-01	29	--	20	8
	26-Nov-01	10	--	13	9
	19-Dec-01	37	--	44	9
LTEH02	16-Jan-01	26	--	10	21
	26-Feb-01	31	--	4	20
	22-Mar-01	18	--	5	21
	17-Apr-01	29	--	17	22
	8-May-01	36	--	11	22
	26-Jun-01	19	--	4	21
	16-Jul-01	1100	--	450	23
	27-Aug-01	90	--	10	24
	19-Sep-01	6	--	4	22
	29-Oct-01	46	--	44	24
	26-Nov-01	46	--	27	26
	19-Dec-01	82	--	110	27
MSSM05**	22-May-01	49	--	5	48
	25-Jun-01	22	--	<2	45
	24-Jul-01	170	--	7	47
	20-Aug-01	110	--	<2	54
	16-Sep-01	33	--	<2	52
	22-Oct-01	5	--	6	53
MTEC01**	22-May-01	<2	--	<2	6
	25-Jun-01	70	--	<2	6
	23-Jul-01	<2	--	<2	5
	20-Aug-01	<2	--	<2	5
	17-Sep-01	4	--	<2	5
	22-Oct-01	33	--	5	6

* The moving geometric mean value is for fecal coliform only

** Units are MPN/100 ml

For stations with less than 30 data points, the geometric mean is given for the most recent sample only

Table A-8 2001 Ambient Beach Monitoring Bacteria (page 8 of 9)

Station	Date	Fecal Coliform (cfu/100 ml)	*Esherichia coli* (cfu/100 ml)	*Enterococcus* (cfu/100 ml)	Moving Geometric Mean*
KSRU02	17-Jan-01	35	--	5	30
	20-Feb-01	47	--	12	32
	21-Mar-01	41	--	5	32
	16-Apr-01	58	--	3	33
	22-May-01	40	--	5	33
	18-Jun-01	18	--	3	32
	23-Jul-01	12	--	2	30
	20-Aug-01	9	--	4	29
	24-Sep-01	27	--	3	29
	23-Oct-01	23	--	11	29
	19-Nov-01	43	--	35	30
	17-Dec-01	--	--	150	31
LTED04	17-Jan-01	2	--	4	4
	21-Feb-01	9	--	3	5
	20-Mar-01	1	--	3	5
	17-Apr-01	4	--	2	5
	22-May-01	1	--	0	5
	19-Jun-01	2	--	2	4
	24-Jul-01	1	--	0	3
	22-Aug-01	13	--	11	4
	24-Sep-01	1	--	0	3
	23-Oct-01	2	--	5	3
	19-Nov-01	70	--	45	4
	17-Dec-01		--	79	4
LSHV01	16-Jan-01	5	--	17	4
	26-Feb-01	1	--	0	4
	22-Mar-01	0	--	0	4
	17-Apr-01	0	--	1	4
	8-May-01	17	--	2	4
	26-Jun-01	4	--	2	4
	16-Jul-01	8	--	6	4
	27-Aug-01	0	--	0	4
	19-Sep-01	6	--	6	4
	29-Oct-01	240	--	84	4
	26-Nov-01	7	--	4	4
	19-Dec-01	3	--	1	4
LSTU01	16-Jan-01	2	--	0	4
	26-Feb-01	1	--	1	3
	22-Mar-01	23	--	29	4
	17-Apr-01	1	--	0	3
	8-May-01	4	--	2	4
	26-Jun-01	1	--	0	4
	16-Jul-01	1	--	140	4
	27-Aug-01	4	--	0	4

* The moving geometric mean value is for fecal coliform only

** Units are MPN/100 ml

For stations with less than 30 data points, the geometric mean is given for the most recent sample only

Table A-8 2001 Ambient Beach Monitoring
Bacteria (page 9 of 9)

Station	Date	Fecal Coliform (cfu/100 ml)	*Esherichia coli* (cfu/100 ml)	*Enterococcus* (cfu/100 ml)	Moving Geometric Mean*
LSTU01	19-Sep-01	5	--	1	4
(con't)	29-Oct-01	44	--	16	4
	26-Nov-01	8	--	6	4
	19-Dec-01	1	--	0	4
MTLD03**	21-May-01	5	--	2	--
	26-Jun-01	17	--		--
	24-Jul-01	13	--	5	--
	22-Aug-01	2	--		--
	17-Sep-01	6	--	2	--
	22-Oct-01	21	--	2	10
ITMUKILTSP	21-Mar-01	40	38	1	--
	17-Apr-01	5	4	4	--
	8-May-01	1500	1200	6	--
	26-Jun-01	14	22	1	--
	16-Jul-01	6	5	0	--
	27-Aug-01	24	27	1	--
	19-Sep-01	29	13	3	--
	29-Oct-01	15	7	8	--
	26-Nov-01	5	5	9	--
	19-Dec-01	10	10	9	21

* The moving geometric mean value is for fecal coliform only

** Units are MPN/100 ml

For stations with less than 30 data points, the geometric mean is given for the most recent sample only

Table A-9 2001 Beach Water Column Monitoring
Dissolved Metals (mg/L) (page 1 of 6)

		Antimony		Arsenic		Beryllium		Cadmium		Chromium	
Station	Date	Qual	Value	Qual	Value	Qual	Value	Qual	Value	Qual	Value
ITBOEINGCR	21-Mar-01	<RDL	0.000058		0.00111	<MDL	0.000015		0.0000699	<RDL	0.00013
	26-Jun-01	B	0.0000558		0.00107	--	--		0.0000591	<RDL	0.0002
	19-Sep-01		0.000082		0.00113	<MDL	0.000015		0.0000644	<RDL	0.00011
	19-Dec-01		0.00007265		0.0011	--	--		0.0000621	<RDL	0.000096
ITBRACKETT	21-Mar-01		0.0000777		0.00105	<MDL	0.000015		0.0000694	<RDL	0.00012
	26-Jun-01	B	0.000102		0.00104	--	--		0.0000609	<RDL	0.00013
	19-Sep-01		0.000112		0.000924	<MDL	0.000015		0.0000618	<RDL	0.000097
	19-Dec-01		0.0000723		0.00117	--	--		0.0000626	<RDL	0.00011
ITCARKEEKP	16-Jan-01	<RDL	0.000059		0.00102	<MDL	0.000015		0.0000692	<RDL	0.000091
	26-Feb-01	RDL	0.000069		0.00124	<MDL	0.000015		0.0000715	<RDL	0.00011
	21-Mar-01	<RDL	0.000059		0.00119	<MDL	0.000015		0.0000721	<RDL	0.00011
	26-Jun-01	B	0.00008955		0.001013	--	--		0.00006305	<RDL	0.00013
	19-Sep-01		0.0000874		0.0011	<MDL	0.000015		0.0000641	<RDL	0.00011
	19-Dec-01		0.0000715		0.00106	--	--		0.0000572	<RDL	0.00011
ITEDWARDSPT	16-Jan-01	<RDL	0.000059		0.00104	<MDL	0.000015		0.0000656	<RDL	0.000089
	26-Feb-01	<RDL	0.000067		0.00111	<MDL	0.000015		0.0000713	<RDL	0.00011
	21-Mar-01	<RDL	0.00006		0.00108	<MDL	0.000015		0.0000681	<RDL	0.00014
	26-Jun-01	B	0.0000925		0.00105	--	--		0.000062	<RDL	0.00014
	19-Sep-01		0.0000847		0.00107	<MDL	0.000015		0.0000595	<RDL	0.0001
	19-Dec-01		0.0000772		0.00114	--	--		0.0000624	<RDL	0.00013
ITMEADOWBP	16-Jan-01	<RDL	0.000054		0.000981	<MDL	0.000015		0.0000681	<RDL	0.00012
	26-Feb-01		0.0000723		0.00112	<MDL	0.000015		0.0000732	<RDL	0.00012
	21-Mar-01	<RDL	0.000064		0.00108	<MDL	0.000015		0.0000679	<RDL	0.00013
	26-Jun-01	B	0.0000915		0.00104	--	--		0.0000629	<RDL	0.00013
	19-Sep-01		0.0000912		0.00113	<MDL	0.000015		0.000068	<RDL	0.00011
	19-Dec-01		0.0000685		0.00108	--	--		0.0000603	<RDL	0.0001
ITMUKILTSP	21-Mar-01	<RDL	0.000061		0.000881	<MDL	0.000015		0.0000522	<RDL	0.00013
	26-Jun-01	B	0.0001		0.000969	--	--		0.0000553	<RDL	0.00012
	19-Sep-01		0.0000973		0.00106	<MDL	0.000015		0.0000634	<RDL	0.00011
	19-Dec-01		0.0000693		0.00106	--	--		0.0000603	<RDL	0.00011
ITOCEANAVE	21-Mar-01	<RDL	0.0000615		0.00104	<MDL	0.000015		0.0000699	<RDL	0.00013
	26-Jun-01	B	0.00009		0.00105	--	--		0.0000642	<RDL	0.00013
	19-Sep-01		0.0000878		0.0009575	<MDL	0.000015		0.0000621	<RDL	0.00011
	19-Dec-01		0.0000702		0.00106	--	--		0.0000623	<RDL	0.000092
ITPICNICPT	21-Mar-01	<RDL	0.000067		0.000951	<MDL	0.000015		0.0000602	<RDL	0.00013
	26-Jun-01	B	0.0000859		0.00101	--	--		0.0000527	<RDL	0.00014
	19-Sep-01		0.0000904		0.00108	<MDL	0.000015		0.00006	<RDL	0.00011
	19-Dec-01		0.0000701		0.00101	--	--		0.0000544	<RDL	0.0001

< MDL Result below method detection limit

< RDL Result above method detection limit but below reportable detection limit

B Method blank above MDL. The analyte concentration in the sample may include laboratory contamination

Table A-9 2001 Beach Water Column Monitoring
Dissolved Metals (mg/L) (page 2 of 6)

		Cobalt		Copper		Lead		Mercury		Nickel	
Station	Date	Qual	Value	Qual	Value	Qual	Value	Qual	Value	Qual	Value
ITBOEINGCR	21-Mar-01	<RDL	0.000016		0.000397	<MDL	0.0000069	<RDL	0.00000029		0.000409
	26-Jun-01	<RDL	0.000019		0.000375	<MDL	0.000007	<RDL	0.00000016		0.000445
	19-Sep-01		0.0000225		0.00033	<MDL	0.000007	<RDL	0.0000001		0.0004
	19-Dec-01	--	--		0.0004345	<MDL	0.000007	<RDL	0.000000385		0.000508
ITBRACKETT	21-Mar-01	<RDL	0.000024		0.000422		0.0000444	<RDL	0.00000028		0.000415
	26-Jun-01	<RDL	0.000017		0.000408	<RDL	0.00001	<RDL	0.00000016		0.000392
	19-Sep-01		0.0000249		0.00035	<RDL	0.00002	<RDL	0.00000022		0.000365
	19-Dec-01	--	--		0.000407	<RDL	0.0000096	<RDL	0.00000027		0.000427
ITCARKEEKP	16-Jan-01	--	--		0.000285	<MDL	0.0000069	<MDL			0.000382
	26-Feb-01		0.0000278		0.000377	<MDL	0.0000069	<RDL	0.00000032		0.000471
	21-Mar-01		0.0000285		0.000389	<MDL	0.000007	<RDL	0.00000023		0.000452
	26-Jun-01	<RDL	0.0000185		0.0003915	<MDL	0.000007	<RDL	0.0000002		0.000423
	19-Sep-01		0.0000259		0.00035	<MDL	0.000007	<RDL	0.0000001		0.000369
	19-Dec-01	--	--		0.000554	<MDL	0.000007	<RDL	0.0000003		0.000401
ITEDWARDSPT	16-Jan-01	<RDL	0.000012		0.000294	<MDL	0.000007	<MDL			0.000386
	26-Feb-01	<RDL	0.000016		0.000375	<MDL	0.000007	<RDL	0.00000034		0.000417
	21-Mar-01	<RDL	0.000017		0.000611	<MDL	0.000007	<RDL	0.00000021		0.000406
	26-Jun-01	<RDL	0.000019		0.000385	<MDL	0.000007	<RDL	0.00000019		0.000397
	19-Sep-01		0.0000257		0.000383	<MDL	0.0000069	<RDL	0.00000017		0.000349
	19-Dec-01	--	--		0.0004	<MDL	0.0000069	<RDL	0.00000028		0.000427
ITMEADOWBP	16-Jan-01	<RDL	0.000016		0.000325	<MDL	0.0000069	<RDL	0.0000002		0.000426
	26-Feb-01	<RDL	0.000013	H	0.000338	<MDL	0.0000069		0.000000589		0.000496
	21-Mar-01	<RDL	0.000017		0.000394	<RDL	0.0000089	<RDL	0.00000021		0.000398
	26-Jun-01	<RDL	0.000018		0.000376	<MDL	0.000007	<RDL	0.0000002		0.000412
	19-Sep-01	<RDL	0.000019		0.00032	<MDL	0.000007	<RDL	0.00000012		0.000371
	19-Dec-01	--	--		0.000365	<MDL	0.0000069	<RDL	0.00000027		0.000425
ITMUKILTSP	21-Mar-01		0.0000437		0.000488	<MDL	0.000007	<RDL	0.00000035		0.000473
	26-Jun-01		0.0000364		0.00108	<MDL	0.000007	<RDL	0.00000029		0.000462
	19-Sep-01		0.0000305		0.000424	<MDL	0.000007	<RDL	0.00000011		0.000396
	19-Dec-01	--	--		0.000405	<RDL	0.0000087	<RDL	0.00000032		0.000494
ITOCEANAVE	21-Mar-01	<RDL	0.0000235		0.0004205	<MDL	0.00000695	<RDL	0.00000024		0.0004065
	26-Jun-01	<RDL	0.000018		0.00039	<MDL	0.000007	<RDL	0.00000022		0.0004
	19-Sep-01	<RDL	0.00002065		0.0003	<MDL	0.000007	<RDL	0.000000175		0.0003535
	19-Dec-01	--	--		0.000352	<MDL	0.000007	<RDL	0.00000035		0.000404
ITPICNICPT	21-Mar-01		0.0000307		0.000441	<MDL	0.0000069	<RDL	0.00000026		0.000414
	26-Jun-01		0.0000351		0.000425	<MDL	0.000007	<RDL	0.00000019		0.000444
	19-Sep-01		0.0000211		0.000307	<MDL	0.000007	<MDL			0.000355
	19-Dec-01	--	--		0.000412	<MDL	0.000007	<RDL	0.00000034		0.000496

< MDL Result below method detection limit

< RDL Result above method detection limit but below reportable detection limit

B Method blank above MDL. The analyte concentration in the sample may include laboratory contamination

H Sample handling criteria were not met in some manner prior to analysis.

Table A-9 2001 Beach Water Column Monitoring
Dissolved Metals (mg/L) (page 3 of 6)

		Selenium		Silver		Thallium		Vanadium		Zinc	
Station	Date	Qual	Value	Qual	Value	Qual	Value	Qual	Value	Qual	Value
ITBOEINGCR	21-Mar-01	<MDL	0.00015	<MDL	0.000059	<RDL	0.0000094		0.00133	B	0.000836
	26-Jun-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.0000093		0.00137	<RDL,B	0.00063
	19-Sep-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.00001		0.0014	B	0.000902
	19-Dec-01	<MDL	0.00015	<MDL	0.0000835	--	--	--	--	<RDL,B	0.000768
ITBRACKETT	21-Mar-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.00001		0.00137	B	0.00104
	26-Jun-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.00001		0.00143	<RDL,B	0.00064
	19-Sep-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.0000096		0.00145	<RDL,B	0.00063
	19-Dec-01	<MDL	0.00015	<MDL	0.000083	--	--	--	--	B	0.00082
ITCARKEEKP	16-Jan-01	<MDL	0.00015	<MDL	0.000059	<RDL	0.0000097		0.00132	<RDL	0.00059
	26-Feb-01	<MDL	0.00015	<MDL	0.000059	<RDL	0.00001		0.00129	B	0.000759
	21-Mar-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.0000089		0.00135	B	0.00097
	26-Jun-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.000011		0.001435	<RDL,B	0.000785
	19-Sep-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.0000099		0.00137	<RDL,B	0.00059
	19-Dec-01	<MDL	0.00015	<MDL	0.000084	--	--	--	--	B	0.00132
ITEDWARDSPT	16-Jan-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.0000095		0.00126		0.000851
	26-Feb-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.00001		0.00133	B	0.00102
	21-Mar-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.0000096		0.00132	B	0.00209
	26-Jun-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.000011		0.00145	<RDL,B	0.00059
	19-Sep-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.0000099		0.00137	<RDL,B	0.00055
	19-Dec-01	<MDL	0.00015	<MDL	0.000083	--	--	--	--	B	0.000798
ITMEADOWBP	16-Jan-01	<MDL	0.00015	<MDL	0.000059	<RDL	0.0000094		0.00131	<RDL	0.00059
	26-Feb-01	<MDL	0.00015	<MDL	0.000059	<RDL	0.00001		0.00131	B	0.0013
	21-Mar-01	<MDL	0.00015	<MDL	0.000059	<RDL	0.0000099		0.00132	B	0.000757
	26-Jun-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.000011		0.00145	<RDL,B	0.00053
	19-Sep-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.000011		0.0014	<RDL,B	0.00053
	19-Dec-01	<MDL	0.00015	<MDL	0.000083	--	--	--	--	B	0.000784
ITMUKILTSP	21-Mar-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.0000072		0.000992	<RDL,B	0.00063
	26-Jun-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.0000095		0.00125	B	0.000801
	19-Sep-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.0000095		0.00131	B	0.000914
	19-Dec-01	<MDL	0.00015	<MDL	0.000084	--	--	--	--	B	0.000806
ITOCEANAVE	21-Mar-01	<MDL	0.00015	<MDL	0.0000595	<RDL	0.00000995		0.001425	B	0.000769
	26-Jun-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.000011		0.00143	<RDL,B	0.00061
	19-Sep-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.00000985		0.001425	<RDL,B	0.00055
	19-Dec-01	<MDL	0.00015	<MDL	0.000084	--	--	--	--	<RDL,B	0.00073
ITPICNICPT	21-Mar-01	<MDL	0.00015	<MDL	0.000059	<RDL	0.0000086		0.00115	B	0.000767
	26-Jun-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.0000093		0.00137	<RDL,B	0.00068
	19-Sep-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.0000094		0.00134	<RDL,B	0.00063
	19-Dec-01	<MDL	0.00015	<MDL	0.000084	--	--	--	--	B	0.000842

< MDL Result below method detection limit

< RDL Result above method detection limit but below reportable detection limit

B Method blank above MDL. The analyte concentration in the sample may include laboratory contamination

Table A-9 2001 Beach Water Column Monitoring
Dissolved Metals (mg/L) (page 4 of 6)

		Antimony		Arsenic		Beryllium		Cadmium		Chromium	
Station	**Date**	**Qual**	**Value**	**Qual**	**Value**	**Qual**	**Value**	**Qual**	**Value**	**Qual**	**Value**
JSVW04	21-Mar-01		0.0000697		0.00108	<MDL	0.000015		0.0000864	<RDL	0.00011
	26-Jun-01		0.000072		0.000749	--	--		0.0000506	<RDL	0.000093
	31-Jul-01		0.0000879		0.000956	<MDL	0.000015		0.0000572	<RDL	0.000078
	19-Sep-01		0.0000945		0.00111	<MDL	0.000015		0.0000657	<RDL	0.00011
	19-Dec-01		0.0000654		0.00113	--	--		0.0000628	<RDL	0.0001
KSHZ03	31-Jul-01		0.0000561		0.0012	<MDL	0.000015		0.0000499	<RDL	0.00018
KSJX02	21-Mar-01	<RDL	0.00006		0.00105	<MDL	0.000015		0.0000664	<RDL	0.00013
	19-Sep-01		0.0000825		0.00113	<MDL	0.000015		0.0000647	<RDL	0.00012
	19-Dec-01		0.0000645		0.000996	--	--		0.0000508	<RDL	0.000094
KSLU03	21-Mar-01	<RDL	0.000058		0.00109	<MDL	0.000015		0.0000733	<RDL	0.00013
	26-Jun-01		0.0000779		0.000834	--	--		0.0000596	<RDL	0.00016
	2-Aug-01		0.0000884		0.00108	<MDL	0.000015		0.0000644	<RDL	0.00011
	19-Sep-01		0.0000888		0.00106	<MDL	0.000015		0.0000587	<RDL	0.00012
	19-Dec-01		0.0000542		0.00087	--	--		0.0000368	<RDL	0.00011
KSQU01	21-Mar-01	<RDL	0.000068		0.000848	<MDL	0.000015		0.0000474	<RDL	0.000099
	26-Jun-01	B	0.0000861		0.000905	--	--		0.000043	<RDL	0.00012
	19-Sep-01		0.000103		0.000983	<MDL	0.000015		0.0000421	<RDL	0.000092
	19-Dec-01		0.0000612		0.000879	--	--		0.0000301	<RDL	0.00011
KSSN04	1-Aug-01		0.0000879		0.00105	<MDL	0.000015		0.0000609	<RDL	0.000077
KSSN05	1-Aug-01		0.0000918		0.00123	<MDL	0.000015		0.0000638	<RDL	0.000097
LSKR01	1-Aug-01		0.000104		0.00104	<MDL	0.000015		0.0000511	<RDL	0.000098
MTLD03	1-Aug-01		0.0001005		0.00107	<MDL	0.000015		0.0000625	<RDL	0.0001065

< MDL Result below method detection limit

< RDL Result above method detection limit but below reportable detection limit

B Method blank above MDL. The analyte concentration in the sample may include laboratory contamination

Table A-9 2001 Beach Water Column Monitoring
Dissolved Metals (mg/L) (page 5 of 6)

		Cobalt		Copper		Lead		Mercury		Nickel	
Station	**Date**	**Qual**	**Value**	**Qual**	**Value**	**Qual**	**Value**	**Qual**	**Value**	**Qual**	**Value**
JSVW04	21-Mar-01	<RDL	0.000018		0.00053		0.0000487	<RDL	0.0000002		0.000415
	26-Jun-01	<RDL	0.000016		0.000324		0.0000511	<RDL	0.00000021		0.000319
	31-Jul-01		0.000032		0.000452	<RDL	0.000032	--	--		0.000318
	19-Sep-01		0.0000267		0.00035	<RDL	0.000013	<RDL	0.00000013		0.000379
	19-Dec-01	--	--		0.000418	<RDL	0.0000074	<RDL	0.00000031		0.000392
KSHZ03	31-Jul-01		0.000038		0.000453	<RDL	0.000014	--	--		0.000415
KSJX02	21-Mar-01		0.0000325		0.00042	<RDL	0.0000074	<RDL	0.00000019		0.00047
	19-Sep-01	<RDL	0.000018		0.000318	<MDL	0.000007	<RDL	0.00000011		0.000388
	19-Dec-01	--	--		0.000563	<MDL	0.0000069	<RDL	0.00000033		0.000394
KSLU03	21-Mar-01	<RDL	0.000016		0.000315	<MDL	0.000007		0.000000808		0.000393
	26-Jun-01		0.0000201		0.00182	<MDL	0.000007	<RDL	0.00000027		0.000462
	2-Aug-01		0.0000243		0.00131	<MDL	0.000007	--	--		0.000421
	19-Sep-01	<RDL	0.000019		0.00164	<MDL	0.000007	<RDL	0.0000003		0.000406
	19-Dec-01	--	--		0.00178	<MDL	0.000007	<RDL	0.00000026		0.000402
KSQU01	21-Mar-01	<RDL	0.000013		0.00148	<MDL	0.0000069		0.000000699		0.00042
	26-Jun-01	<RDL	0.000016		0.00176	<RDL	0.000016	<RDL	0.00000026		0.000431
	19-Sep-01	<RDL	0.000017		0.00192	<MDL	0.0000069	<RDL	0.00000013		0.000383
	19-Dec-01	--	--		0.000872	<MDL	0.0000069	<RDL	0.00000024		0.00045
KSSN04	1-Aug-01		0.0000566		0.000389	<RDL	0.000013	--	--		0.000412
KSSN05	1-Aug-01		0.0000846		0.000658	<RDL	0.0000084	--	--		0.000545
LSKR01	1-Aug-01		0.0000294		0.000398	<RDL	0.00001	--	--		0.000344
MTLD03	1-Aug-01		0.0000282		0.0003705	<RDL	0.0000115	--	--		0.0003745

< MDL Result below method detection limit

< RDL Result above method detection limit but below reportable detection limit

Table A-9 2001 Beach Water Column Monitoring
Dissolved Metals (mg/L) (page 6 of 6)

		Selenium		Silver		Thallium		Vanadium		Zinc	
Station	**Date**	**Qual**	**Value**	**Qual**	**Value**	**Qual**	**Value**	**Qual**	**Value**	**Qual**	**Value**
JSVW04	21-Mar-01	<MDL	0.00015	<MDL	0.000059	<RDL	0.0000098		0.00135	B	0.00159
	26-Jun-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.0000084		0.0011	<RDL,B	0.00066
	31-Jul-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.0000088			B	0.00147
	19-Sep-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.000011		0.00143	<RDL,B	0.00053
	19-Dec-01	<MDL	0.00015	<MDL	0.000083	--	--	--	--	B	0.00101
KSHZ03	31-Jul-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.0000077			B	0.00138
KSJX02	21-Mar-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.0000094		0.0014	B	0.000848
	19-Sep-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.00001		0.00139	<RDL,B	0.00066
	19-Dec-01	<MDL	0.00015	<MDL	0.000083	--	--	--	--	B	0.001
KSLU03	21-Mar-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.0000095		0.00136	B	0.000847
	26-Jun-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.0000092		0.00137	B	0.00338
	2-Aug-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.000009			B	0.00239
	19-Sep-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.0000091		0.00126		0.00297
	19-Dec-01	<MDL	0.00015	<MDL	0.000084	--	--	--	--	B	0.00363
KSQU01	21-Mar-01	<MDL	0.00015	<MDL	0.000059	<RDL	0.0000065		0.000904	B	0.00268
	26-Jun-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.0000074		0.00101	B	0.00246
	19-Sep-01	<MDL	0.00015	<MDL	0.000059	<RDL	0.0000062		0.000885		0.00385
	19-Dec-01	<MDL	0.00015	<MDL	0.000083	--	--	--	--	B	0.00137
KSSN04	1-Aug-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.0000083	--	--	B	0.00101
KSSN05	1-Aug-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.0000089	--	--	B	0.00086
LSKR01	1-Aug-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.0000086	--	--	<RDL,B	0.00059
MTLD03	1-Aug-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.0000093	--	--	B	0.000905

< MDL Result below method detection limit

< RDL Result above method detection limit but below reportable detection limit

B Method blank above MDL. The analyte concentration in the sample may include laboratory contamination

Table A-10 2001 Beach Water Monitoring
Total Metals (mg/L) (page 1 of 6)

		Antimony		Arsenic		Beryllium		Cadmium		Chromium	
Station	Date	Qual	Value	Qual	Value	Qual	Value	Qual	Value	Qual	Value
ITBOEINGCR	21-Mar-01	<RDL	0.000052		0.00113	<MDL	0.000015		0.0000726		0.000326
	26-Jun-01	H,TA	0.0000697		0.00107	<MDL	0.0000083		0.0000576		0.000302
	19-Sep-01		0.0000908		0.00109	<MDL	0.000015		0.0000589		0.000406
	19-Dec-01		0.0000562		0.00124	--	--		0.00006655		0.001215
ITBRACKETT	21-Mar-01	<RDL	0.00006		0.00109	<MDL	0.000015		0.0000828		0.000748
	26-Jun-01	H,TA	0.0000995		0.00097	<MDL	0.0000057		0.0000626	<RDL	0.00018
	19-Sep-01		0.00012		0.00105	<MDL	0.000015		0.0000663		0.000286
	19-Dec-01		0.0000737		0.0011	--	--		0.0000592	<RDL	0.00016
ITCARKEEKP	16-Jan-01	<RDL	0.000055		0.00107	<MDL	0.000015		0.0000693	<RDL	0.00018
	26-Feb-01	<RDL	0.00002		0.00136	<MDL	0.000015		0.0000749		0.00201
	21-Mar-01	<RDL	0.000032		0.00115	<MDL	0.000015		0.0000793		0.0015
	26-Jun-01	H,TA	0.00008655		0.00105	<MDL	0.0000064		0.00006445		0.000263
	19-Sep-01		0.0000895		0.00108	<MDL	0.000015		0.000071		0.000681
	19-Dec-01		0.0000594		0.000975	--	--		0.0000464	<RDL	0.00019
ITEDWARDSPT	16-Jan-01	<RDL	0.000064		0.00106	<MDL	0.000015		0.0000695	<RDL	0.0002
	26-Feb-01	<RDL	0.000061		0.00104	<MDL	0.000015		0.0000652	<RDL	0.00016
	21-Mar-01	<RDL	0.000059		0.00109	<MDL	0.000015		0.0000714		0.000669
	26-Jun-01	H,TA	0.0000875		0.000971	<MDL	0.0000065		0.0000609		0.000241
	19-Sep-01		0.0000805		0.00101	<MDL	0.000015		0.0000585		0.000494
	19-Dec-01		0.0000722		0.00116	--	--		0.0000638		0.00035
ITMEADOWBP	16-Jan-01	<RDL	0.00006		0.00104	<MDL	0.000015		0.0000667		0.000261
	26-Feb-01	<RDL	0.000061		0.00107	<MDL	0.000015		0.0000657	<RDL	0.00016
	21-Mar-01	<RDL	0.000054		0.00113	<MDL	0.000015		0.0000683		0.000238
	26-Jun-01	H,TA	0.000087		0.000965	<MDL	0.0000059		0.0000661	<RDL	0.00019
	19-Sep-01		0.0000808		0.00089	<MDL	0.000015		0.0000612		0.000283
	19-Dec-01		0.0000675		0.0011	--	--		0.0000665		0.000482

< MDL Result below method detection limit

< RDL Result above method detection limit but below reportable detection limit

B Method blank above MDL. The analyte concentration in the sample may include laboratory contamination

Table A-10 2001 Beach Water Monitoring
Total Metals (mg/L) (page 2 of 6)

		Cobalt		Copper		Lead		Mercury		Nickel	
Station	Date	Qual	Value	Qual	Value	Qual	Value	Qual	Value	Qual	Value
ITBOEINGCR	21-Mar-01		0.0000628		0.000561		0.0000831		0.000000563		0.000637
	26-Jun-01	--	--		0.000503		0.0000677	<RDL	0.00000046		0.000596
	19-Sep-01		0.000108		0.000582		0.000103		0.000000697		0.00088
	19-Dec-01	--	--		0.001235		0.0002125		0.000001365		0.001735
ITBRACKETT	21-Mar-01		0.000147		0.00117		0.00103		0.00000145		0.00105
	26-Jun-01	--	--		0.000509		0.00012		0.000000513		0.000442
	19-Sep-01		0.0000658		0.000701		0.000549		0.000000808		0.000586
	19-Dec-01	--	--		0.000423		0.0000981	<RDL	0.00000041		0.000465
ITCARKEEKP	16-Jan-01	<RDL	0.000024		0.000391	<RDL	0.000027	<RDL	0.00000027		0.000436
	26-Feb-01		0.000629		0.00212		0.000398		0.00000309		0.00341
	21-Mar-01		0.000376		0.0014		0.000282		0.00000181		0.00221
	26-Jun-01	--	--		0.0005155		0.00006175		0.000000573		0.000541
	19-Sep-01		0.000155		0.000688		0.000153	<RDL	0.00000047		0.00119
	19-Dec-01	--	--		0.00055		0.0000657		0.000000631		0.000487
ITEDWARDSPT	16-Jan-01		0.0000385		0.000426		0.0000427		0.00000101		0.000575
	26-Feb-01		0.0000295		0.000416		0.0000373		0.000000584		0.000433
	21-Mar-01		0.000114		0.00105		0.000153		0.000000725		0.00101
	26-Jun-01	--	--		0.000523		0.0000568		0.000000513		0.000481
	19-Sep-01		0.000113		0.000844		0.000139	<RDL	0.0000003		0.000834
	19-Dec-01	--	--		0.000517		0.000107		0.000000547		0.000576
ITMEADOWBP	16-Jan-01		0.0000405		0.000425		0.0000415		0.000000546		0.000546
	26-Feb-01	<RDL	0.000027		0.000411	<RDL	0.000033		0.00000178		0.000532
	21-Mar-01		0.0000327		0.000459	<RDL	0.000029		0.000000702		0.000477
	26-Jun-01	--	--		0.000444	<RDL	0.000022	<RDL	0.0000004		0.000421
	19-Sep-01		0.0000571		0.000412		0.0000515	<RDL	0.00000037		0.000628
	19-Dec-01	--	--		0.000575		0.000119		0.000000772		0.00083

< **MDL** Result below method detection limit

< **RDL** Result above method detection limit but below reportable detection limit

B Method blank above MDL. The analyte concentration in the sample may include laboratory contamination

Table A-10 2001 Beach Water Monitoring
Total Metals (mg/L) (page 3 of 6)

		Selenium		Silver		Thallium		Vanadium		Zinc	
Station	Date	Qual	Value	Qual	Value	Qual	Value	Qual	Value	Qual	Value
ITBOEINGCR	21-Mar-01	<MDL	0.00015	<MDL	0.000059	<RDL	0.000011		0.00155	B	0.000915
	26-Jun-01	<MDL	0.000096	<MDL	0.000037	<RDL	0.0000099		0.00148		0.000902
	19-Sep-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.000011		0.00165		0.000864
	19-Dec-01	<MDL	0.00015	<MDL	0.000084	--	--	--	--		0.00218
ITBRACKETT	21-Mar-01	<MDL	0.00015	<MDL	0.000059	<RDL	0.000012		0.00205		0.00308
	26-Jun-01	<MDL	0.000093	<MDL	0.000033	<RDL	0.000011		0.0014		0.000766
	19-Sep-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.0000098		0.00167		0.00121
	19-Dec-01	<MDL	0.00015	<MDL	0.000084	--	--	--	--		0.000768
ITCARKEEKP	16-Jan-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.00001		0.00136	<RDL	0.00062
	26-Feb-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.000015		0.0031		0.00368
	21-Mar-01	<MDL	0.00015	<MDL	0.000059	<RDL	0.000013		0.00254		0.00274
	26-Jun-01	<MDL	0.000125	<MDL	0.000041	<RDL	0.00001		0.001385	<RDL	0.0008125
	19-Sep-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.00001		0.00172		0.00129
	19-Dec-01	<MDL	0.00015	<MDL	0.000084	--	--	--	--		0.00093
ITEDWARDSPT	16-Jan-01	<MDL	0.00015	<MDL	0.000059	<RDL	0.000011		0.00142		0.000914
	26-Feb-01	<MDL	0.00015	<MDL	0.000059	<RDL	0.00001		0.00136	<RDL	0.00074
	21-Mar-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.000011		0.0017		0.00271
	26-Jun-01	<MDL	0.00012	<MDL	0.00004	<RDL	0.000011		0.00138		0.000838
	19-Sep-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.00001		0.0017		0.00104
	19-Dec-01	<MDL	0.00015	<MDL	0.000084	--	--	--	--		0.00106
ITMEADOWBP	16-Jan-01	<MDL	0.00015	<MDL	0.000059	<RDL	0.0000097		0.0014		0.000738
	26-Feb-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.000009		0.00137		0.00103
	21-Mar-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.00001		0.00143	<RDL,B	0.00071
	26-Jun-01	<MDL	0.000096	<MDL	0.000039	<RDL	0.000011		0.00131	<RDL	0.00047
	19-Sep-01	<MDL	0.00015	<MDL	0.000059	<RDL	0.0000096		0.00149	<RDL	0.00058
	19-Dec-01	<MDL	0.00015	<MDL	0.000083	--	--	--	--		0.00124

< MDL Result below method detection limit

< RDL Result above method detection limit but below reportable detection limit

B Method blank above MDL. The analyte concentration in the sample may include laboratory contamination

Table A-10 2001 Beach Water Monitoring
Total Metals (mg/L) (page 4 of 6)

		Antimony		Arsenic		Beryllium		Cadmium		Chromium	
Station	Date	Qual	Value	Qual	Value	Qual	Value	Qual	Value	Qual	Value
ITMUKILTSP	21-Mar-01	<RDL	0.000051		0.000949	<MDL	0.000015		0.0000537		0.0004
	26-Jun-01	H,TA	0.0000809		0.00093	<MDL	0.000006		0.0000614		0.000383
	19-Sep-01		0.0000947		0.00102	<MDL	0.000015		0.0000701	<RDL	0.00018
	19-Dec-01		0.0000636		0.00109	--	--		0.000059		0.000355
ITOCEANAVE	21-Mar-01	<RDL	0.000036		0.001295	<RDL	0.000019		0.00010295		0.00218
	26-Jun-01	H,TA	0.0000877		0.00104	<MDL	0.0000039		0.0000638	<RDL	0.00018
	19-Sep-01		0.00008555		0.000997	<MDL	0.000015		0.00006525	<RDL	0.000237
	19-Dec-01		0.0000697		0.00116	--	--		0.0000695		0.000392
ITPICNICPT	21-Mar-01	<RDL	0.000053		0.000986	<MDL	0.000015		0.0000591	<RDL	0.0002
	26-Jun-01	H,TA	0.0000917		0.000936	<MDL	0.0000051		0.0000492		0.000229
	19-Sep-01		0.0000748		0.00104	<MDL	0.000015		0.0000656		0.000239
	19-Dec-01		0.0000595		0.00108	--	--		0.0000662		0.00104
JSVW04	21-Mar-01	<RDL	0.000049		0.00113	--	--		0.0000722		0.000626
	26-Jun-01	H,TA	0.0000811		0.00101	<RDL	0.000019		0.0000597		0.00102
	19-Sep-01		0.000085		0.00103	<MDL	0.000015		0.0000631		0.000541
	19-Dec-01		0.0000723		0.00117	--	--		0.0000629		0.000249
KSJX02	21-Mar-01	<RDL	0.000018		0.00154	<RDL	0.000029		0.000118		0.00457
	19-Sep-01		0.0000841		0.00108	<MDL	0.000015		0.0000645		0.000331
	19-Dec-01		0.0000725		0.00107	--	--		0.0000497	<RDL	0.00019
KSLU03	21-Mar-01	<RDL	0.000053		0.00112	<MDL	0.000015		0.0000746		0.000373
	26-Jun-01	H,TA	0.0000762		0.000966	<MDL	0.0000047		0.0000529		0.000246
	19-Sep-01		0.0000853		0.00104	<MDL	0.000015		0.0000577	<RDL	0.00018
	19-Dec-01		0.000059		0.000957	--	--		0.0000387	<RDL	0.0002
KSQU01	21-Mar-01	<RDL	0.000056		0.000871	<MDL	0.000015		0.0000457	<RDL	0.00018
	26-Jun-01	H,TA	0.0000892		0.000898	<MDL	0.0000053		0.0000414	<RDL	0.00014
	19-Sep-01		0.000107		0.000943	<MDL	0.000015		0.0000351	<RDL	0.00013
	19-Dec-01	<RDL	0.000048		0.000681	--	--		0.0000286	<RDL	0.00014

< MDL Result below method detection limit

< RDL Result above method detection limit but below reportable detection limit

B Method blank above MDL. The analyte concentration in the sample may include laboratory contamination

Table A-10 2001 Beach Water Monitoring
Total Metals (mg/L) (page 5 of 6)

		Cobalt		Copper		Lead		Mercury		Nickel	
Station	Date	Qual	Value	Qual	Value	Qual	Value	Qual	Value	Qual	Value
ITMUKILTSP	21-Mar-01		0.000111		0.000721		0.000075		0.000000838		0.0008
	26-Jun-01	--	--		0.000675		0.0000978		0.000000955		0.000672
	19-Sep-01		0.0000415		0.000508		0.0000479	<RDL	0.0000003		0.000471
	19-Dec-01	--	--		0.000537		0.0000607		0.000000547		0.000704
ITOCEANAVE	21-Mar-01		0.000456		0.00216		0.0012235		0.00000466		0.0025
	26-Jun-01	--	--		0.000452	<RDL	0.000034	<RDL	0.00000047		0.000411
	19-Sep-01		0.00004375		0.0004685		0.000089	<RDL	0.000000415		0.00046
	19-Dec-01	--	--		0.000569		0.000203		0.00000168		0.000667
ITPICNICPT	21-Mar-01		0.0000603		0.000446		0.0000428		0.000000647		0.000562
	26-Jun-01	--	--		0.000513		0.000045		0.0000008		0.00049
	19-Sep-01		0.0000506		0.000483		0.0000452	<RDL	0.00000037		0.000519
	19-Dec-01	--	--		0.00101		0.000315		0.00000131		0.00162
JSVW04	21-Mar-01		0.000142		0.00119		0.0007		0.00000129		0.000991
	26-Jun-01	--	--		0.00103		0.00115	<RDL	0.00000046		0.00148
	19-Sep-01		0.0000877		0.000779		0.00046		0.00000214		0.000791
	19-Dec-01	--	--		0.00052		0.0000621	<RDL	0.00000046		0.000507
KSJX02	21-Mar-01		0.000972		0.00417		0.00237		0.00000461		0.00529
	19-Sep-01		0.000075		0.000499		0.0000862	<RDL	0.00000024		0.000761
	19-Dec-01	--	--		0.000622		0.000055	<RDL	0.00000044		0.000456
KSLU03	21-Mar-01		0.0000788		0.00059		0.00015		0.0000013		0.000732
	26-Jun-01	--	--		0.00208		0.0000762		0.000000567		0.000512
	19-Sep-01		0.0000332		0.00201		0.0000632	<RDL	0.00000035		0.000434
	19-Dec-01	--	--		0.00197		0.0000628	<RDL	0.00000046		0.000448
KSQU01	21-Mar-01	<RDL	0.00002		0.00185		0.0000731		0.000000603		0.000446
	26-Jun-01	--	--		0.00174		0.0000566		0.000000543		0.000425
	19-Sep-01	--	--		0.00239		0.0000799	RDL	0.0000005		0.000378
	19-Dec-01	--	--		0.000749		0.0000537	<RDL	0.00000043		0.000407

< MDL Result below method detection limit

< RDL Result above method detection limit but below reportable detection limit

B Method blank above MDL. The analyte concentration in the sample may include laboratory contamination

Table A-10 2001 Beach Water Monitoring
Total Metals (mg/L) (page 6 of 6)

		Selenium		Silver		Thallium		Vanadium		Zinc	
Station	Date	Qual	Value	Qual	Value	Qual	Value	Qual	Value	Qual	Value
ITMUKILTSP	21-Mar-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.0000085		0.00132	B	0.000934
	26-Jun-01	<MDL	0.000083	<MDL	0.000038	<RDL	0.0000099		0.00138		0.00113
	19-Sep-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.0000094		0.00133		0.000842
	19-Dec-01	<MDL	0.00015	<MDL	0.000084	--	--	--	--		0.000954
ITOCEANAVE	21-Mar-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.000016		0.00354		0.00552
	26-Jun-01	<MDL	0.00014	<MDL	0.00004	<RDL	0.0000094		0.00128	<RDL	0.00061
	19-Sep-01	<MDL	0.00015	<MDL	0.0000595	<RDL	0.0000096		0.00142		0.000782
	19-Dec-01	<MDL	0.00015	<MDL	0.000083	--	--	--	--		0.00125
ITPICNICPT	21-Mar-01	<MDL	0.00015	<MDL	0.000059	<RDL	0.0000091		0.00133	<RDL,B	0.0007
	26-Jun-01	<MDL	0.00012	<MDL	0.000037	<RDL	0.000011		0.00131	<RDL	0.00053
	19-Sep-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.0000085		0.00148	<RDL	0.00064
	19-Dec-01	<MDL	0.00015	<MDL	0.000084	--	--	--	--		0.00226
JSVW04	21-Mar-01	<MDL	0.00015	<MDL	0.000059	<RDL	0.000012		0.00182	B	0.00167
	26-Jun-01	<MDL	0.000071	<MDL	0.000031	<RDL	0.000012		0.00262		0.00302
	19-Sep-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.000011		0.00162		0.00102
	19-Dec-01	<MDL	0.00015	<MDL	0.000084	--	--	--	--		0.00128
KSJX02	21-Mar-01	<MDL	0.00015	<MDL	0.000059	<RDL	0.00002		0.00496		0.00968
	19-Sep-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.00001		0.0015		0.000748
	19-Dec-01	<MDL	0.00015	<MDL	0.000083	--	--	--	--		0.00102
KSLU03	21-Mar-01	<MDL	0.00015	<MDL	0.000059	<RDL	0.000011		0.00162	B	0.00126
	26-Jun-01	<MDL	0.00012	<MDL	0.000036	<RDL	0.0000089		0.00125		0.0035
	19-Sep-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.0000088		0.00122		0.00293
	19-Dec-01	<MDL	0.00015	<MDL	0.000084	--	--	--	--		0.00406
KSQU01	21-Mar-01	<MDL	0.00015	<MDL	0.000059	<RDL	0.0000071		0.000895		0.00272
	26-Jun-01	<MDL	0.000082	<MDL	0.000042	<RDL	0.0000064		0.000898		0.00241
	19-Sep-01	<MDL	0.00015	<MDL	0.00006	<RDL	0.0000062		0.000891		0.00339
	19-Dec-01	<MDL	0.00015	<MDL	0.000084	--	--	--	--		0.00112

< MDL Result below method detection limit

< RDL Result above method detection limit but below reportable detection limit

B Method blank above MDL. The analyte concentration in the sample may include laboratory contamination

Table A-11 2001 Beach Water Monitoring
Semi-Volatile Organics (µg/L) (page 1 of 2)

locator:	ITEDWARDSPT			ITEDWARDSPT			ITCARKEEKP			ITCARKEEKP			ITMEADOWBP			ITMEADOWBP		
collectdate:	16-Jan-01			26-Feb-01			16-Jan-01			26-Feb-01			1/16/01			26-Feb-01		
	MDL	Value	Qual	MDL	Value	Qual	MDL	Value	Qual	MDL	Value	Qual	MDL	Value	Qual	MDL	Value	Qual
1,2,4-Trichlorobenzene	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005	0.009	<RDL	0.005		<MDL
1,2-Dichlorobenzene	0.024		<MDL	0.026		<MDL	0.026		<MDL	0.026		<MDL	0.024		<MDL	0.026		<MDL
1,3-Dichlorobenzene	0.024		<MDL	0.026		<MDL	0.026		<MDL	0.026		<MDL	0.024		<MDL	0.026		<MDL
1,4-Dichlorobenzene	0.024		<MDL	0.026		<MDL	0.026		<MDL	0.026		<MDL	0.024		<MDL	0.026		<MDL
2,4,5-Trichlorophenol	0.059		<MDL	0.064		<MDL	0.064		<MDL	0.064		<MDL	0.06		<MDL	0.064		<MDL
2,4,6-Trichlorophenol	0.024		<MDL	0.026		<MDL	0.026		<MDL	0.026		<MDL	0.024		<MDL	0.026		<MDL
2,4-Dichlorophenol	0.047		<MDL	0.052		<MDL	0.052		<MDL	0.051		<MDL	0.048		<MDL	0.051		<MDL
2,4-Dimethylphenol	0.71		<MDL	0.77		<MDL	0.77		<MDL	0.77		<MDL	0.71		<MDL	0.77		<MDL
2,4-Dinitrophenol	0.47		<MDL	0.52		<MDL	0.52		<MDL	0.51		<MDL	0.48		<MDL	0.51		<MDL
2,4-Dinitrotoluene	0.024		<MDL	0.026		<MDL	0.026		<MDL	0.026		<MDL	0.024		<MDL	0.026		<MDL
2,6-Dinitrotoluene	0.024		<MDL	0.026		<MDL	0.026		<MDL	0.026		<MDL	0.024		<MDL	0.026		<MDL
2-Chloronaphthalene	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL
2-Chlorophenol	0.047		<MDL	0.052		<MDL	0.052		<MDL	0.051		<MDL	0.048		<MDL	0.051		<MDL
2-Methylphenol	0.12		<MDL	0.13		<MDL	0.13		<MDL	0.13		<MDL	0.12		<MDL	0.13		<MDL
2-Nitroaniline	0.047		<MDL	0.052		<MDL	0.052		<MDL	0.051		<MDL	0.048		<MDL	0.051		<MDL
2-Nitrophenol	0.024		<MDL	0.026		<MDL	0.026		<MDL	0.026		<MDL	0.024		<MDL	0.026		<MDL
3,3'-Dichlorobenzidine	0.35		<MDL	0.39		<MDL	0.39		<MDL	0.38		<MDL	0.36		<MDL	0.38		<MDL
3-Nitroaniline	0.24		<MDL	0.26		<MDL	0.26		<MDL	0.26		<MDL	0.24		<MDL	0.26		<MDL
4,6-Dinitro-O-Cresol	0.47		<MDL	0.52		<MDL	0.52		<MDL	0.51		<MDL	0.48		<MDL	0.51		<MDL
4-Bromophenyl Phenyl Ether	0.012		<MDL	0.013		<MDL	0.013		<MDL	0.013		<MDL	0.012		<MDL	0.013		<MDL
4-Chloro-3-Methylphenol	0.12		<MDL	0.13		<MDL	0.13		<MDL	0.13		<MDL	0.12		<MDL	0.13		<MDL
4-Chloroaniline	0.12		<MDL	0.13		<MDL	0.13		<MDL	0.13		<MDL	0.12		<MDL	0.13		<MDL
4-Chlorophenyl Phenyl Ether	0.012		<MDL	0.013		<MDL	0.013		<MDL	0.013		<MDL	0.012		<MDL	0.013		<MDL
4-Methylphenol	0.12		<MDL	0.13		<MDL	0.13		<MDL	0.13		<MDL	0.12		<MDL	0.13		<MDL
4-Nitroaniline	0.24		<MDL	0.26		<MDL	0.26		<MDL	0.26		<MDL	0.24		<MDL	0.26		<MDL
4-Nitrophenol	0.24		<MDL	0.26		<MDL	0.26		<MDL	0.26		<MDL	0.24		<MDL	0.26		<MDL
Acenaphthene	0.005	0.006	<RDL	0.005		<MDL	0.005		<MDL	0.005	0.006	<RDL	0.005	0.01	<RDL	0.005	0.008	<RDL
Acenaphthylene	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL
Anthracene	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL
Benzo(A)Anthracene	0.012		<MDL	0.013		<MDL	0.013		<MDL	0.013		<MDL	0.012		<MDL	0.013		<MDL
Benzo(A)Pyrene	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL
Benzo(B)Fluoranthene	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL
Benzo(G,H,I)Perylene	0.024		<MDL	0.026		<MDL	0.026		<MDL	0.026		<MDL	0.024		<MDL	0.026		<MDL
Benzo(K)Fluoranthene	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL
Benzyl Butyl Phthalate	0.005	0.014	B,L	0.005	0.02	B	0.005	0.028	B,L	0.005	0.015	B	0.005	0.034	B,L	0.005	0.015	B

< MDL Result below method detection limit

< RDL Result above method detection limit but below reportable detection limit

L Matrix spike or SRM recovery above acceptable range. High biased data, analyte concentration may be lower than the reported value

B Method blank above MDL. The analyte concentration in the sample may include laboratory contamination

Table A-11 2001 Beach Water Monitoring
Semi-Volatile Organics (µg/L) (page 2 of 2)

locator:	ITEDWARDSPT			ITEDWARDSPT			ITCARKEEKP			ITCARKEEKP			ITMEADOWBP			ITMEADOWBP		
collectdate:	16-Jan-01			26-Feb-01			16-Jan-01			26-Feb-01			1/16/01			26-Feb-01		
	MDL	VALUE	QUAL	MDL	VALUE	QUAL	MDL	VALUE	QUAL	MDL	VALUE	QUAL	MDL	VALUE	QUAL	MDL	VALUE	QUAL
Bis(2-Chloroethoxy)Methane	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL
Bis(2-Chloroethyl)Ether	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL
Bis(2-Chloroisopropyl)Ether	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL
Bis(2-Ethylhexyl)Phthalate	0.005	2.09		0.005	0.799	B	0.005	1.38	B	0.005	0.416	B	0.005	11.5		0.005	0.244	B
caffeine	0.005	0.009	<RDL	0.005		<MDL	0.005	0.011	<RDL	0.005		<MDL	0.005	0.009	<RDL	0.005		<MDL
Carbazole	0.012		<MDL	0.013		<MDL	0.013		<MDL	0.013		<MDL	0.012		<MDL	0.013		<MDL
Chrysene	0.012		<MDL	0.013		<MDL	0.013		<MDL	0.013		<MDL	0.012		<MDL	0.035		<MDL
Dibenzo(A,H)Anthracene	0.024		<MDL	0.026		<MDL	0.026		<MDL	0.026		<MDL	0.024		<MDL	0.026		<MDL
Dibenzofuran	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL
Diethyl Phthalate	0.005	0.018	B	0.005	0.023	B	0.005	0.017	B	0.005	0.025	B	0.005	0.015	B	0.005	0.027	B
Dimethyl Phthalate	0.005	0.005	<RDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL
Di-N-Butyl Phthalate	0.005	0.026	B,L	0.005	0.02	B	0.005	0.057	B,L	0.005	0.038	B	0.005	0.047	B,L	0.005	0.025	B
Di-N-Octyl Phthalate	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL
Fluoranthene	0.005	0.006	<RDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL
Fluorene	0.005	0.023		0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL
Hexachlorobenzene	0.012		<MDL	0.013		<MDL	0.013		<MDL	0.013		<MDL	0.012		<MDL	0.013		<MDL
Hexachlorobutadiene	0.024		<MDL	0.026		<MDL	0.026		<MDL	0.026		<MDL	0.024		<MDL	0.026		<MDL
Hexachloroethane	0.012		<MDL	0.013		<MDL	0.013		<MDL	0.013		<MDL	0.012		<MDL	0.013		<MDL
Indeno(1,2,3-Cd)Pyrene	0.024		<MDL	0.026		<MDL	0.026		<MDL	0.026		<MDL	0.024		<MDL	0.026		<MDL
Isophorone	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL
Napthalene	0.012	0.013	<RDL	0.013		<MDL	0.013		<MDL	0.013		<MDL	0.012		<MDL	0.013	0.014	<RDL
Nitrobenzene	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005		<MDL
N-Nitrosodimethylamine	0.012		<MDL	0.013		<MDL	0.013		<MDL	0.013		<MDL	0.012		<MDL	0.013		<MDL
N-Nitrosodi-N-Propylamine	0.047		<MDL	0.052		<MDL	0.052		<MDL	0.051		<MDL	0.048		<MDL	0.051		<MDL
N-Nitrosodiphenylamine	0.12		<MDL	0.13		<MDL	0.13		<MDL	0.13		<MDL	0.12		<MDL	0.13		<MDL
Pentachlorophenol	0.059		<MDL	0.064		<MDL	0.064		<MDL	0.064		<MDL	0.06		<MDL	0.064		<MDL
Phenanthrene	0.005	0.009	<RDL	0.005	0.007	<RDL	0.005	0.007	<RDL	0.005	0.007	<RDL	0.005	0.005	<RDL	0.005	0.006	<RDL
phenol	0.047		<MDL	0.052		<MDL	0.052		<MDL	0.051		<MDL	0.048		<MDL	0.051		<MDL
pyrene	0.005	0.006	<RDL	0.005		<MDL	0.005		<MDL	0.005		<MDL	0.005	0.013		0.005		<MDL

< MDL Result below method detection limit

< RDL Result above method detection limit but below reportable detection limit

L Matrix spike or SRM recovery above acceptable range. High biased data, analyte concentration may be lower than the reported value

B Method blank above MDL. The analyte concentration in the sample may include laboratory contamination

Table A-12 2001 Beach Water Monitoring
Chlorinated Pesticides/PCBs(µg/L)

Station:	ITEDWARDSPT			ITCARKEEKP			ITMEADOWBP		
Sample Date:	16-Jan-01			16-Jan-01			16-Jan-01		
Compound (ug/L)	**MDL**	**Value**	**Qual**	**MDL**	**Value**	**Qual**	**MDL**	**Value**	**Qual**
4,4'-DDD	0.005		<MDL	0.005		<MDL	0.005		<MDL
4,4'-DDE	0.005		<MDL	0.005		<MDL	0.005		<MDL
4,4'-DDT	0.005		<MDL	0.005		<MDL	0.005		<MDL
Aldrin	0.005		<MDL	0.005		<MDL	0.005		<MDL
Alpha-BHC	0.005		<MDL	0.005		<MDL	0.005		<MDL
Aroclor 1016	0.047		<MDL	0.052		<MDL	0.048		<MDL
Aroclor 1221	0.047		<MDL	0.052		<MDL	0.048		<MDL
Aroclor 1232	0.047		<MDL	0.052		<MDL	0.048		<MDL
Aroclor 1242	0.047		<MDL	0.052		<MDL	0.048		<MDL
Aroclor 1248	0.047		<MDL	0.052		<MDL	0.048		<MDL
Aroclor 1254	0.047		<MDL	0.052		<MDL	0.048		<MDL
Aroclor 1260	0.047		<MDL	0.052		<MDL	0.048		<MDL
Beta-Bhc	0.005		<MDL	0.005		<MDL	0.005		<MDL
Chlordane	0.024		<MDL	0.026		<MDL	0.024		<MDL
Delta-BHC	0.005		<MDL	0.005		<MDL	0.005		<MDL
Dieldrin	0.005		<MDL	0.005		<MDL	0.005		<MDL
Endosulfan I	0.005		<MDL	0.005		<MDL	0.005		<MDL
Endosulfan II	0.005		<MDL	0.005		<MDL	0.005		<MDL
Endosulfan Sulfate	0.005		<MDL	0.005		<MDL	0.005		<MDL
Endrin	0.005		<MDL	0.005		<MDL	0.005		<MDL
Endrin Aldehyde	0.005		<MDL	0.005		<MDL	0.005		<MDL
Gamma-BHC (Lindane)	0.005		<MDL	0.005		<MDL	0.005		<MDL
Heptachlor	0.005		<MDL	0.005		<MDL	0.005		<MDL
Heptachlor Epoxide	0.005		<MDL	0.005		<MDL	0.005		<MDL
Methoxychlor	0.024		<MDL	0.026		<MDL	0.024		<MDL
Toxaphene	0.047		<MDL	0.052		<MDL	0.048		<MDL

< MDL Result below method detection limit

Table A-13 2001 Beach Water Monitoring
Chlorinated Herbicides(µg/L)

Station:	ITEDWARDSPT			ITEDWARDSPT			ITCARKEEKP			ITCARKEEKP			ITMEADOWBP			ITMEADOWBP		
Sample Date:	16-Jan-01			26-Feb-01			16-Jan-01			26-Feb-01			16-Jan-01			26-Feb-01		
Compound (ug/L)	**MDL**	**Value**	**Qual**	**MDL**	**Value**	**Qual**	**MDL**	**Value**	**Qual**	**MDL**	**Value**	**Qual**	**MDL**	**Value**	**Qual**	**MDL**	**Value**	**Qual**
2,4-D	0.089		<MDL	0.089		<MDL	0.089		<MDL	0.089		<MDL	0.089		<MDL	0.089		<MDL
2,4-DB	0.11		<MDL	0.11		<MDL	0.11		<MDL	0.11		<MDL	0.11		<MDL	0.11		<MDL
2,4,5-T	0.081		<MDL	0.081		<MDL	0.081		<MDL	0.081		<MDL	0.081		<MDL	0.081		<MDL
2,4,5-TP (Silvex)	0.14		<MDL	0.14		<MDL	0.14		<MDL	0.14		<MDL	0.14		<MDL	0.14		<MDL
Dalapon	0.15		<MDL	0.15		<MDL	0.15		<MDL	0.15		<MDL	0.15		<MDL	0.15		<MDL
Dicamba	0.140		<MDL	0.140		<MDL	0.140		<MDL	0.140		<MDL	0.140		<MDL	0.14		<MDL
Dichloroprop	0.120		<MDL	0.120		<MDL	0.120		<MDL	0.120		<MDL	0.120		<MDL	0.12		<MDL
Dinoseb	0.064		<MDL	0.064		<MDL	0.064		<MDL	0.064		<MDL	0.064		<MDL	0.064		<MDL
MCPA	0.2		<MDL	0.2		<MDL	0.2		<MDL	0.2		<MDL	0.2		<MDL	0.2		<MDL
MCPP	0.11		<MDL	0.11		<MDL	0.11		<MDL	0.11		<MDL	0.11		<MDL	0.11		<MDL

< MDL Result below method detection limit

Table A-14 2001 Beach Water Monitoring
Organophosphorus Pesticides(µg/L)

Station:	ITEDWARDSPT			ITCARKEEKP			ITMEADOWBP		
Sample Date:	26-Feb-01			26-Feb-01			26-Feb-01		
Compound (µg/L)	**MDL**	**Value**	**Qual**	**MDL**	**Value**	**Qual**	**MDL**	**Value**	**Qual**
Chlorpyrifos	0.033		<MDL	0.035		<MDL	0.035		<MDL
Diazinon	0.041		<MDL	0.044		<MDL	0.044		<MDL
Disulfoton	0.026		<MDL	0.028		<MDL	0.028		<MDL
Malathion	0.046		<MDL	0.049		<MDL	0.049		<MDL
Parathion-Ethyl	0.043		<MDL	0.046		<MDL	0.046		<MDL
Parathion-Methyl	0.035		<MDL	0.037		<MDL	0.037		<MDL
Phorate	0.032		<MDL	0.034		<MDL	0.034		<MDL

< MDL Result below method detection limit

APPENDIX B

SEDIMENT MONITORING DATA

B-1 2001 Point source sediment conventionals
B-2 2001 Ambient sediment conventionals
B-3 2001 Point source offshore metals
B-4 2001 Beach metals
B-5 2001 Point source offshore semi-volatile organics
B-6 2001 Point source beach semi-volatile organics
B-7 2001 Ambient beach semi-volatile organics
B-8 2001 Point source offshore pesticides/PCBs
B-9 2001 Point source beach pesticides/PCBs
B-10 2001 Ambient beach pesticides/PCBs
B-11 2001 Point source offshore organotins
B-12 2001 Point source offshore comparison with dry weight standards
B-13 2001 Point source beach comparison with dry weight standards
B-14 2001 Ambient beach comparison with dry weight standards
B-15 2001 Point source offshore comparison with OC normalized standards

Table B-1. 2001 Point Source Sediment Monitoring
Conventionals

Station	Sample Date	Total Oil & Grease (mg/kg)	Total Sulfide (mg/kg)	Ammonia Nitrogen (mg/kg)	Total Organic Carbon (mg/kg dry wt.)	Total Volatile Solids (%)	Total Solids (%)	Grain Size Distribution			
								% Sand	% Silt	% Clay	% Gravel
Offshore											
AL143P	25-Oct-01	495	<1	1.37	2463	0.813	73.9	87.6	2.1	1.4	8.9
AL1500S	25-Oct-01	531	<1	1.52	2908	0.836	72.9	92	5.1	1.3	1.5
AL172N	25-Oct-01	540	<1	1.91	2626	0.677	65.5	94.3	2.3	1.6	1.7
AL172S	25-Oct-01	532	2.2	2.02	3478	0.917	71.6	68.4	9.8	1.6	20.1
AL343N	25-Oct-01	512	<1	1.63	2735	0.776	86.3	94.8	2.7	1.5	0.9
AL343S	25-Oct-01	549	<1	1.51	2284	0.747	74	86.6	10.4	0.9	2
RT2500R	7-Nov-01	<100	24	5.73	21927	2.24	30.1	12	56.9	31	0
RT412N	5-Nov-01	<100	61	7.23	22173	2.47	31.3	10.8	55.6	33.4	0
RT412NW	8-Nov-01	<100	62	5.51	22584	2.27	29.8	6	58.5	35.1	0.3
RT412S	6-Nov-01	110	92	4.53	21765	2.34	32.3	20.3	48.9	29.6	1.3
RT412SW	8-Nov-01	110	35	5.05	21903	2.25	31	7	59.2	33.8	0
RT625ND	6-Nov-01	100	53	3.55	23000	2.39	30	16.3	52	31.4	0.3
RT625NP	8-Nov-01	<100	45	4.49	22136	2.29	30.9	11	56.2	32.4	0.3
RT625SD	6-Nov-01	120	82	4.91	22907	2.54	31.3	19.6	48.2	30.5	1.6
RT625SP	8-Nov-01	<100	12	5.41	21387	2.35	31	3.9	59.7	36.3	0
RT700NS	6-Nov-01	<100	34	4.99	21485	2.42	30.3	13.6	53.1	33	0.3
RT715NSW	8-Nov-01	<100	53	5.77	23131	2.16	29.7	5.3	59.6	35.1	0
RT825N	7-Nov-01	<100	62	4.82	22596	2.19	28.5	7.1	57.3	34.6	1.2
RT825S	7-Nov-01	<100	44	4.71	22158	2.23	29.2	19.5	46.7	33.5	0.3
Beach											
KSHZ03	31-Jul-01	130	--	--	<520	--	96.1	69.2	0	0	30.7
KSSN04	1-Aug-01	150	--	--	1072	--	82.1	92.2	0.4	0.8	6.5
LSKR01	1-Aug-01	170	--	--	2189	--	77.2	75.7	4.7	0.9	18.8

Table B-2. 2001 Ambient Sediment Monitoring
Conventionals

Station	Sample Date	Total Oil & Grease (mg/kg)	Total Organic Carbon (mg/kg dry wt.)	Total Solids (%)	Grain Size Distribution			
					% Sand	% Silt	% Clay	% Gravel
Beach								
JSVW04	31-Jul-01	145	<514	97.3	91.6	0	0	8.25
KSYV02	2-Aug-01	150	1452	78.5	97.5	0.4	1	1
MTLD03	1-Aug-01	160	1432	76.8	95	3.3	1.4	0.2

Table B-3. 2001 Point Source Offshore Sediment Monitoring
Metals (dry weight) (page 1 of 4)

	RT2500R 7-Nov-01		RT412N 5-Nov-01		RT412NW 8-Nov-01		RT412S 6-Nov-01		RT412SW 8-Nov-01	
	Value	MDL	Value	MDL	Value	MDL	Value	MDL	Value	MDL
Total Solids (%)	30.1		31.3		29.8		32.3		31	
Parameter (mg/kg):										
Aluminum	21495	16	19904	16	21074	16	20155	15	20290	15
Antimony	<MDL	4.7	<MDL	4.8	<MDL	5.0	<MDL	4.3	<MDL	4.5
Arsenic	<MDL	8.0	<MDL	7.7	8.72	8.1	8.98	7.4	10.6	7.7
Beryllium	0.532	0.16	0.511	0.16	0.537	0.16	0.495	0.15	0.516	0.15
Cadmium	<MDL	0.47	<MDL	0.48	<MDL	0.50	<MDL	0.43	<MDL	0.45
Chromium	46.5	0.80	43.8	0.77	45.6	0.81	44.0	0.74	43.9	0.77
Copper	43.5	0.63	41.5	0.61	43.0	0.64	44.0	0.59	43.2	0.61
Iron	30299	8.3	30096	7.7	30201	8.4	29938	7.4	30258	8.1
Lead	26.8	4.7	24.1	4.8	25.5	5.0	29.2	4.3	26.1	4.5
Manganese	585	0.32	604	0.31	628	0.33	502	0.30	539	0.31
Mercury	0.226	0.07	0.179	0.06	0.168	0.07	0.204	0.06	0.177	0.06
Nickel	40.2	3.2	37.4	3.1	38.9	3.3	37.2	3.0	38.4	3.1
Selenium	<MDL	8.0	<MDL	7.7	<MDL	8.1	<MDL	7.4	<MDL	7.7
Silver	<MDL	0.63	<MDL	0.61	<MDL	0.64	<MDL	0.59	<MDL	0.61
Thallium	<MDL	32	<MDL	31	<MDL	33	<MDL	30	<MDL	31
Zinc	100	0.80	93.9	0.77	97.7	0.81	96.6	0.74	95.8	0.77

Table B-3. 2001 Point Source Offshore Sediment Monitoring
Metals (dry weight) (page 2 of 4)

	RT625ND 6-Nov-01		RT625NP 8-Nov-01		RT625SD 6-Nov-01		RT625SP 8-Nov-01		RT700NS 6-Nov-01	
	Value	MDL	Value	MDL	Value	MDL	Value	MDL	Value	MDL
Total Solids (%)	30		30.9		31.3		31		30.3	
Parameter (mg/kg):										
Aluminum	19600	16	21294	16	21374	16	19581	16	20858	17
Antimony	<MDL	4.7	<MDL	4.9	<MDL	4.8	<MDL	4.8	<MDL	5.0
Arsenic	11.7	8.0	<MDL	7.8	<MDL	8.0	9.03	8.1	8.91	8.3
Beryllium	0.500	0.16	0.550	0.16	0.543	0.16	0.484	0.16	0.528	0.17
Cadmium	<MDL	0.47	<MDL	0.49	<MDL	0.48	<MDL	0.48	<MDL	0.50
Chromium	43.7	0.80	46.3	0.78	47.3	0.80	42.3	0.81	45.2	0.83
Copper	44.7	0.63	44.3	0.65	47.0	0.64	41.0	0.65	43.6	0.66
Iron	29333	8.0	30971	7.8	30160	8.0	29839	7.7	29835	8.6
Lead	30.9	4.7	25.4	4.9	29.6	4.8	22.9	4.8	28.3	5.0
Manganese	447	0.32	544	0.32	601	0.31	542	0.32	571	0.33
Mercury	0.240	0.07	0.184	0.06	0.198	0.06	0.168	0.06	0.175	0.07
Nickel	36.3	3.2	40.5	3.2	39.6	3.1	37.1	3.2	38.9	3.3
Selenium	<MDL	8.0	<MDL	7.8	<MDL	8.0	<MDL	8.1	<MDL	8.3
Silver	<MDL	0.63	<MDL	0.65	<MDL	0.64	<MDL	0.65	<MDL	0.66
Thallium	<MDL	32	<MDL	32	<MDL	31	<MDL	32	<MDL	33
Zinc	101	0.80	99.7	0.78	104	0.80	91.9	0.81	98.7	0.83

Table B-3. 2001 Point Source Offshore Sediment Monitoring
Metals (dry weight) (page 3 of 4)

	RT715NSW 8-Nov-01		RT825N 7-Nov-01		RT825S 7-Nov-01		AL343N 25-Oct-01		AL172N 25-Oct-01	
	Value	MDL	Value	MDL	Value	MDL	Value	MDL	Value	MDL
Total Solids (%)	29.7		28.5		29.2		86.3		65.5	
Parameter (mg/kg):										
Aluminum	20774	17	23088	18	20377	17	5504	5.9	7756	7.5
Antimony	<MDL	5.1	<MDL	5.3	<MDL	5.1	<MDL	1.7	<MDL	2.3
Arsenic	9.09	8.4	<MDL	8.8	9.93	8.6	<MDL	2.9	<MDL	3.7
Beryllium	0.505	0.17	0.596	0.18	0.514	0.17	0.127	0.06	0.183	0.07
Cadmium	<MDL	0.51	<MDL	0.53	<MDL	0.51	<MDL	0.17	<MDL	0.23
Chromium	44.8	0.84	50.2	0.88	43.8	0.86	16.5	0.29	27.2	0.37
Copper	42.4	0.67	47.7	0.70	43.2	0.68	5.40	0.23	8.24	0.29
Iron	30640	8.4	30561	8.8	30103	8.6	9838	2.9	14473	3.7
Lead	24.9	5.1	30.4	5.3	28.7	5.1	6.14	1.7	5.80	2.3
Manganese	589	0.34	695	0.35	558	0.34	253	0.12	354	0.15
Mercury	0.172	0.06	0.182	0.07	0.175	0.07	0.087	0.02	0.038	0.03
Nickel	38.7	3.4	43.5	3.5	37.7	3.4	19.5	1.2	30.2	1.5
Selenium	<MDL	8.4	<MDL	8.8	<MDL	8.6	<MDL	2.9	<MDL	3.7
Silver	<MDL	0.67	<MDL	0.70	<MDL	0.68	<MDL	0.23	<MDL	0.29
Thallium	<MDL	34	<MDL	35	<MDL	34	<MDL	12	<MDL	15
Zinc	96.3	0.84	108	0.88	95.9	0.86	23.6	0.29	33.0	0.37

Table B-3. 2001 Point Source Offshore Sediment Monitoring
Metals (dry weight) (page 4 of 4)

	AL143P 25-Oct-01		AL172S 25-Oct-01		AL343S 25-Oct-01		AL1500S 25-Oct-01	
	Value	MDL	Value	MDL	Value	MDL	Value	MDL
Total Solids (%)	73.9		71.6		74		72.9	
Parameter (mg/kg):								
Aluminum	7605	6.6	7207	6.7	6797	6.5	6653	6.6
Antimony	<MDL	2.0	<MDL	2.0	<MDL	1.9	<MDL	1.9
Arsenic	<MDL	3.4	<MDL	3.4	<MDL	3.2	<MDL	3.3
Beryllium	0.203	0.07	0.182	0.07	0.176	0.06	0.165	0.07
Cadmium	<MDL	0.20	<MDL	0.20	<MDL	0.19	<MDL	0.19
Chromium	20.4	0.34	23.5	0.34	21.6	0.32	19.3	0.33
Copper	7.09	0.27	7.56	0.27	6.28	0.26	6.58	0.26
Iron	14344	3.4	13268	3.35	13149	3.2	12647	3.3
Lead	7.71	2.0	7.54	2.0	5.54	1.9	6.17	1.9
Manganese	330	0.13	250	0.13	264	0.13	381	0.13
Mercury	0.039	0.03	0.039	0.03	<MDL	0.03	0.033	0.03
Nickel	22.5	1.3	25.0	1.3	21.9	1.3	21.7	1.3
Selenium	<MDL	3.4	<MDL	3.4	<MDL	3.2	<MDL	3.3
Silver	<MDL	0.27	<MDL	0.27	<MDL	0.26	<MDL	0.26
Thallium	<MDL	13	<MDL	13	<MDL	13	<MDL	13
Zinc	33.2	0.34	30.6	0.34	28.9	0.32	29.1	0.33

Table B-4. 2001 Beach Sediment Monitoring
Meatals (dry weight)

	KSHZ03 31-Jul-01		KSSN04 1-Aug-01		LSKR01 1-Aug-01		JSVW04 31-Jul-01		KSYV02 2-Aug-01		MTLD03 1-Aug-01	
	Value	MDL	Value	MDL	Value	MDL	Value	MDL	Value	MDL	Value	MDL
Total Solids (%)	96.1		82.1		77.2		97.3		78.5		76.8	
Parameter (mg/kg):												
Aluminum	7045	5.1	5895	6.1	4961	6.5	7642	5.0	6764	6.5	5365	6.6
Arsenic	<MDL	2.6	<MDL	3.0	<MDL	3.2	<MDL	2.6	<MDL	3.2	<MDL	3.3
Beryllium	0.146	0.05	0.111	0.06	0.106	0.06	0.154	0.05	0.140	0.06	0.117	0.07
Cadmium	<MDL	0.16	<MDL	0.18	<MDL	0.19	0.163	0.15	<MDL	0.19	<MDL	0.20
Chromium	17.9	0.26	15.2	0.30	13.9	0.32	18.5	0.26	16.7	0.32	16.0	0.33
Copper	6.47	0.21	6.19	0.24	4.31	0.26	9.91	0.21	9.76	0.25	4.54	0.26
Iron	11134	2.6	8417	3.0	7604	3.2	12076	2.6	10828	3.2	7786	3.3
Lead	5.5	1.6	2.4	1.8	3.9	1.9	9.21	1.5	7.64	1.9	4.69	2.0
Manganese	160	0.10	143	0.12	117	0.13	190	0.10	154	0.13	102	0.13
Mercury	<MDL	0.02	0.03	0.02	<MDL	0.03	0.02	0.02	<MDL	0.03	<MDL	0.03
Nickel	27.4	1.0	21.0	1.2	13.0	1.3	25.3	1.0	19.7	1.3	14.7	1.3
Selenium	<MDL	2.6	<MDL	3.0	<MDL	3.2	<MDL	2.6	<MDL	3.2	<MDL	3.3
Silver	<MDL	0.21	<MDL	0.24	<MDL	0.26	<MDL	0.21	<MDL	0.26	<MDL	0.25
Zinc	27.2	0.26	18.4	0.30	19.2	0.32	30.4	0.26	36.2	0.32	21.7	0.33

Table B-5 2001 Point Source Offshore Sediment Monitoring
Semi Volatile Organics (dry weight) (page 1 of 10)

	7-Nov-01 RT2500R			5-Nov-01 RT412N			8-Nov-01 RT412NW			6-Nov-01 RT412S		
	MDL	Value	Qual	MDL	Value	Qual	MDL	Value	Qual	MDL	Value	Qual
Total Solids (%)	0.005	30.1		0.005	31.3		0.005	29.8		0.005	32.3	
Compound (µg/kg):												
Total Organic Carbon	2159	21927		2556	22173		2013	22584		2012	21765	
1,2,4-Trichlorobenzene	0.86		<MDL	0.83		<MDL	0.87		<MDL	0.80		<MDL
1,2-Dichlorobenzene	0.86		<MDL	0.83		<MDL	0.87		<MDL	0.80		<MDL
1,2-Diphenylhydrazine	33		<MDL	32		<MDL	34		<MDL	31		<MDL
1,3-Dichlorobenzene	0.86		<MDL	0.83		<MDL	0.87		<MDL	0.80		<MDL
1,4-Dichlorobenzene	0.43		<MDL	0.42		<MDL	0.44		<MDL	0.40		<MDL
2,4,5-Trichlorophenol	40		<MDL	38		<MDL	40		<MDL	37		<MDL
2,4,6-Trichlorophenol	43		<MDL	42		<MDL	44		<MDL	40		<MDL
2,4-Dichlorophenol	53		<MDL	51		<MDL	54		<MDL	50		<MDL
2,4-Dimethylphenol	23		<MDL	22		<MDL	23		<MDL	22		<MDL
2,4-Dinitrotoluene	10		<MDL	9.6		<MDL	10		<MDL	9.3		<MDL
2,6-Dinitrotoluene	33		<MDL	32		<MDL	34		<MDL	31		<MDL
2-Chloronaphthalene	53		<MDL	51		<MDL	54		<MDL	50		<MDL
2-Chlorophenol	27		<MDL	26		<MDL	27		<MDL	25		<MDL
2-Methylnaphthalene	47		<MDL	45		<MDL	47		<MDL	43		<MDL
2-Methylphenol	63		<MDL	61		<MDL	64		<MDL	59		<MDL
2-Nitrophenol	50		<MDL	48		<MDL	50		<MDL	46		<MDL
4-Bromophenyl Phenyl Ether	30		<MDL	29		<MDL	30		<MDL	28		<MDL
4-Chlorophenyl Phenyl Ether	43		<MDL	42		<MDL	44		<MDL	40		<MDL
4-Methylphenol	53		<MDL	51		<MDL	54		<MDL	50		<MDL
Acenaphthene	23		<MDL	22		<MDL	23		<MDL	22		<MDL
Acenaphthylene	50		<MDL	48		<MDL	50		<MDL	46		<MDL
Aniline	63		<MDL,X	61		<MDL,X	64		<MDL,X	59		<MDL,X
Anthracene	13		<MDL,G	13		<MDL,G	13		<MDL,G	12		<MDL,G

< MDL Result below method detection limit
< RDL Result above method detection limit but below reportable detection limit
L Matrix spike or SRM recovery above acceptable range. High biased data, analyte concentration may be lower than the reported value
G Matrix spike or SRM recovery below acceptable range. Low biased data, analyte concentration may be higher than the reported value
X Matrix spike or surrogate recovery <10%. Extremely low biased data, analyte concentration may be higher than the reported value
B Method blank above MDL. The analyte concentration in the sample may include laboratory contamination
N/A Not analyzed
E Relative percent difference in laboratory duplicate samples is greater than 100%

Table B-5 2001 Point Source Offshore Sediment Monitoring
Semi Volatile Organics (dry weight) (page 2 of 10)

	7-Nov-01 RT2500R			5-Nov-01 RT412N			8-Nov-01 RT412NW			6-Nov-01 RT412S		
Compound (µg/kg):	**MDL**	**Value**	**Qual**	**MDL**	**Value**	**Qual**	**MDL**	**Value**	**Qual**	**MDL**	**Value**	**Qual**
Benzo(A)Anthracene	6.6	39	B	6	44	B	7	53	B	6	49	B
Benzo(A)Pyrene	10	59	B	10	60	B	10	83	B	9	76	B
Benzo(B)Fluoranthene	10	38		10	49		10	55		9	55	
Benzo(G,H,I)Perylene	27		<MDL,G	26		<MDL,G	27		<MDL,G	25		<MDL,G
Benzo(K)Fluoranthene	10	21		10	28		10	43		9	32	
Benzoic Acid	20	385	X	19	553	X	20	383	X	19	378	X
Benzyl Alcohol	20		<MDL,X	19		<MDL,X	20		<MDL,X	19		<MDL,X
Benzyl Butyl Phthalate	20	29	<RDL	19	28	<RDL	20	30	<RDL	19	31	<RDL
Bis(2-Chloroethoxy)Methane	56		<MDL	54		<MDL	57		<MDL	53		<MDL
Bis(2-Chloroethyl)Ether	50		<MDL,G	48		<MDL,G	50		<MDL,G	46		<MDL,G
Bis(2-Chloroisopropyl)Ether	50		<MDL	48		<MDL	50		<MDL	46		<MDL
Bis(2-Ethylhexyl)Phthalate	22	183	B,L	21	203	B,L	22	104	B,L	21	152	B,L
Carbazole	23		<MDL	22		<MDL	23		<MDL	22		<MDL
Chrysene	13	47		13	47		13	67		12	63	
Coprostanol	47		<MDL	45		<MDL	47		<MDL	43		<MDL
Di-N-Butyl Phthalate	17	35	B	16	50	B	17	53	B	15	44	B
Di-N-Octyl Phthalate	27		<MDL	26		<MDL	27		<MDL	25		<MDL
Dibenzo(A,H)Anthracene	23		<MDL,L	22		<MDL,L	23		<MDL,L	22		<MDL,L
Dibenzofuran	47		<MDL	45		<MDL	47		<MDL	43		<MDL
Diethyl Phthalate	20		<MDL	19		<MDL	20		<MDL	19		<MDL
Dimethyl Phthalate	37		<MDL	35		<MDL	37		<MDL	34		<MDL
Fluoranthene	27	57		26	75		27	83		25	80	
Fluorene	43		<MDL	42		<MDL	44		<MDL	40		<MDL
Hexachlorobenzene	2		<MDL	2		<MDL	2		<MDL	2		<MDL
Hexachlorobutadiene	2		<MDL	2		<MDL	3		<MDL	2		<MDL
Hexachloroethane	50		<MDL,G	48		<MDL,G	50		<MDL,G	46		<MDL,G
Indeno(1,2,3-Cd)Pyrene	30	40	<RDL	29	45	<RDL	30	57	<RDL	28	50	<RDL
Isophorone	63		<MDL	61		<MDL	64		<MDL	59		<MDL
N-Nitrosodi-N-Propylamine	30		<MDL	29		<MDL	30		<MDL	28		<MDL
N-Nitrosodimethylamine	66		<MDL,X	64		<MDL,X	67		<MDL,X	62		<MDL,X
N-Nitrosodiphenylamine	66		<MDL	64		<MDL	67		<MDL	62		<MDL
Naphthalene	47		<MDL,G	45		<MDL,G	47		<MDL,G	43		<MDL,G
Nitrobenzene	53		<MDL,G	51		<MDL,G	54		<MDL,G	50		<MDL,G
Pentachlorophenol	17		<MDL	16		<MDL	17		<MDL	15		<MDL
Phenanthrene	13	35		13	39		13	49		12	43	
Phenol	30	37	<RDL,G,E	29	144	G,E	30	32	<RDL,G,E	28	43	<RDL,G,E
Pyrene	13	87		13	96		13	129		12	116	

< MDL Result below method detection limit
< RDL Result above method detection limit but below reportable detection limit
L Matrix spike or SRM recovery above acceptable range. High biased data, analyte concentration may be lower than the reported value
G Matrix spike or SRM recovery below acceptable range. Low biased data, analyte concentration may be higher than the reported value
X Matrix spike or surrogate recovery <10%. Extremely low biased data, analyte concentration may be higher than the reported value
B Method blank above MDL. The analyte concentration in the sample may include laboratory contamination
N/A Not analyzed
E Relative percent difference in laboratory duplicate samples is greater than 100%

Table B-5 2001 Point Source Offshore Sediment Monitoring
Semi Volatile Organics (dry weight) (page 3 of 10)

	8-Nov-01 RT412SW			6-Nov-01 RT625ND			8-Nov-01 RT625NP			6-Nov-01 RT625SD		
	MDL	Value	Qual	MDL	Value	Qual	MDL	Value	Qual	MDL	Value	Qual
Total Solids (%)	0.005	31		0.005	30		0.005	30.9		0.005	31.3	
Compound (µg/kg):												
Total Organic Carbon	2097	21903		2667	23000		2104	22136		2077	22907	
1,2,4-Trichlorobenzene	0.84		<MDL	0.87		<MDL	0.84		<MDL	0.83		<MDL
1,2-Dichlorobenzene	0.84		<MDL	0.87		<MDL	0.84		<MDL	0.83		<MDL
1,2-Diphenylhydrazine	32		<MDL	33		<MDL	32		<MDL	32		<MDL
1,3-Dichlorobenzene	0.84		<MDL	0.87		<MDL	0.84		<MDL	0.83		<MDL
1,4-Dichlorobenzene	0.42		<MDL	0.43		<MDL	0.42		<MDL	0.42		<MDL
2,4,5-Trichlorophenol	39		<MDL,G	40		<MDL	39		<MDL	38		<MDL
2,4,6-Trichlorophenol	42		<MDL,G	43		<MDL	42		<MDL	42		<MDL
2,4-Dichlorophenol	52		<MDL,G	53		<MDL	52		<MDL	51		<MDL
2,4-Dimethylphenol	23		<MDL,G	23		<MDL	23		<MDL	22		<MDL
2,4-Dinitrotoluene	9.7		<MDL	10		<MDL	9.7		<MDL	9.6		<MDL
2,6-Dinitrotoluene	32		<MDL	33		<MDL	32		<MDL	32		<MDL
2-Chloronaphthalene	52		<MDL	53		<MDL	52		<MDL	51		<MDL
2-Chlorophenol	26		<MDL,G	27		<MDL	26		<MDL	26		<MDL
2-Methylnaphthalene	45		<MDL	47		<MDL	45		<MDL	45		<MDL
2-Methylphenol	61		<MDL,G	63		<MDL	61		<MDL	61		<MDL
2-Nitrophenol	48		<MDL,G	50		<MDL	49		<MDL	48		<MDL
4-Bromophenyl Phenyl Ether	29		<MDL	30		<MDL	29		<MDL	29		<MDL
4-Chlorophenyl Phenyl Ether	42		<MDL	43		<MDL	42		<MDL	42		<MDL
4-Methylphenol	52		<MDL,G	53		<MDL	52		<MDL	51		<MDL
Acenaphthene	23		<MDL	23		<MDL	23		<MDL	22		<MDL
Acenaphthylene	48		<MDL	50		<MDL	49		<MDL	48		<MDL
Aniline	61		<MDL,X	63		<MDL,X	61		<MDL,X	61		<MDL,X
Anthracene	13		<MDL,G	13		<MDL,G	13		<MDL,G	13		<MDL,G

< MDL Result below method detection limit
< RDL Result above method detection limit but below reportable detection limit
L Matrix spike or SRM recovery above acceptable range. High biased data, analyte concentration may be lower than the reported value
G Matrix spike or SRM recovery below acceptable range. Low biased data, analyte concentration may be higher than the reported value
X Matrix spike or surrogate recovery <10%. Extremely low biased data, analyte concentration may be higher than the reported value
B Method blank above MDL. The analyte concentration in the sample may include laboratory contamination
N/A Not analyzed
E Relative percent difference in laboratory duplicate samples is greater than 100%

Table B-5 2001 Point Source Offshore Sediment Monitoring
Semi Volatile Organics (dry weight) (page 4 of 10)

	8-Nov-01 RT412SW			6-Nov-01 RT625ND			8-Nov-01 RT625NP			6-Nov-01 RT625SD		
Compound (µg/kg):	**MDL**	**Value**	**Qual**	**MDL**	**Value**	**Qual**	**MDL**	**Value**	**Qual**	**MDL**	**Value**	**Qual**
Benzo(A)Anthracene	6	43	B	7	44	B	6	47	B	6	55	B
Benzo(A)Pyrene	10	67	B	10	65	B	10	64	B	10	73	B
Benzo(B)Fluoranthene	10	29		10	57		10	52		10	56	
Benzo(G,H,I)Perylene	26		<MDL,G	27		<MDL,G	26		<MDL,G	26		<MDL,G
Benzo(K)Fluoranthene	10	35		10	24		10	33		10	42	
Benzoic Acid	19	345	G,X	20	487	X	19	385	X	19	403	X
Benzyl Alcohol	19		<MDL,X	20		<MDL,X	19		<MDL,X	19		<MDL,X
Benzyl Butyl Phthalate	19	31	<RDL	20	29	<RDL	19	42		19	30	<RDL
Bis(2-Chloroethoxy)Methane	55		<MDL	57		<MDL	55		<MDL	54		<MDL
Bis(2-Chloroethyl)Ether	48		<MDL,G	50		<MDL,G	49		<MDL,G	48		<MDL,G
Bis(2-Chloroisopropyl)Ether	48		<MDL	50		<MDL	49		<MDL	48		<MDL
Bis(2-Ethylhexyl)Phthalate	22	73	B,L	22	152	B,L	22	110	B,L	21	990	B,L
Carbazole	23		<MDL	23		<MDL	23		<MDL	22		<MDL
Chrysene	13	50		13	50		13	61		13	64	
Coprostanol	45		<MDL	47		<MDL	45		<MDL	45		<MDL
Di-N-Butyl Phthalate	16	56	B	17	46	B	16	50	B	16	41	B
Di-N-Octyl Phthalate	26		<MDL	27		<MDL	26		<MDL	26		<MDL
Dibenzo(A,H)Anthracene	23		<MDL,L	23		<MDL,L	23		<MDL,L	22		<MDL,L
Dibenzofuran	45		<MDL	47		<MDL	45		<MDL	45		<MDL
Diethyl Phthalate	19		<MDL	20		<MDL	19		<MDL	19		<MDL
Dimethyl Phthalate	35		<MDL	37		<MDL	36		<MDL	35		<MDL
Fluoranthene	26	60		27	70		26	70		26	83	
Fluorene	42		<MDL	43		<MDL	42		<MDL	42		<MDL
Hexachlorobenzene	2		<MDL	2		<MDL	2		<MDL	2		<MDL
Hexachlorobutadiene	2		<MDL	3		<MDL	2		<MDL	2		<MDL
Hexachloroethane	48		<MDL,G	50		<MDL,G	49		<MDL,G	48		<MDL,G
Indeno(1,2,3-Cd)Pyrene	29	48	<RDL	30	47	<RDL	29	52	<RDL	29	54	<RDL
Isophorone	61		<MDL	63		<MDL	61		<MDL	61		<MDL
N-Nitrosodi-N-Propylamine	29		<MDL	30		<MDL	29		<MDL	29		<MDL
N-Nitrosodimethylamine	65		<MDL,X	67		<MDL,X	65		<MDL,X	64		<MDL,X
N-Nitrosodiphenylamine	65		<MDL	67		<MDL	65		<MDL	64		<MDL
Naphthalene	45		<MDL,G	47		<MDL,G	45		<MDL,G	45		<MDL,G
Nitrobenzene	52		<MDL,G	53		<MDL,G	52		<MDL,G	51		<MDL,G
Pentachlorophenol	16		<MDL,G	17		<MDL	16		<MDL	16		<MDL
Phenanthrene	13	37		13	42		13	47		13	42	
Phenol	29		<MDL,G,E	30	95	G,E	29	32	<RDL,G,E	29	62	G,E
Pyrene	13	112		13	103		13	123		13	129	

< MDL Result below method detection limit
< RDL Result above method detection limit but below reportable detection limit
L Matrix spike or SRM recovery above acceptable range. High biased data, analyte concentration may be lower than the reported value
G Matrix spike or SRM recovery below acceptable range. Low biased data, analyte concentration may be higher than the reported value
X Matrix spike or surrogate recovery <10%. Extremely low biased data, analyte concentration may be higher than the reported value
B Method blank above MDL. The analyte concentration in the sample may include laboratory contamination
N/A Not analyzed
E Relative percent difference in laboratory duplicate samples is greater than 100%

Table B-5 2001 Point Source Offshore Sediment Monitoring
Semi Volatile Organics (dry weight) (page 5 of 10)

	8-Nov-01 RT625SP			6-Nov-01 RT700NS			8-Nov-01 RT715NSW			7-Nov-01 RT825N		
	MDL	Value	Qual	MDL	Value	Qual	MDL	Value	Qual	MDL	Value	Qual
Total Solids (%)	0.005	31		0.005	30.3		0.005	29.7		0.005	28.5	
Compound (µg/kg):												
Total Organic Carbon	2097	21387		1980	21485		2020	23131		2105	22596	
1,2,4-Trichlorobenzene	0.84		<MDL	0.86		<MDL	0.88		<MDL	0.91		<MDL
1,2-Dichlorobenzene	0.84		<MDL	0.86		<MDL	0.88		<MDL	0.91		<MDL
1,2-Diphenylhydrazine	32		<MDL	33		<MDL	34		<MDL	35		<MDL
1,3-Dichlorobenzene	0.84		<MDL	0.86		<MDL	0.88		<MDL	0.91		<MDL
1,4-Dichlorobenzene	0.42		<MDL	0.43		<MDL	0.44		<MDL	0.46		<MDL
2,4,5-Trichlorophenol	39		<MDL	40		<MDL	40		<MDL	42		<MDL
2,4,6-Trichlorophenol	42		<MDL	43		<MDL	44		<MDL	46		<MDL
2,4-Dichlorophenol	52		<MDL	53		<MDL	54		<MDL	56		<MDL
2,4-Dimethylphenol	23		<MDL	23		<MDL	24		<MDL	25		<MDL
2,4-Dinitrotoluene	9.7		<MDL	9.9		<MDL	10		<MDL	11		<MDL
2,6-Dinitrotoluene	32		<MDL	33		<MDL	34		<MDL	35		<MDL
2-Chloronaphthalene	52		<MDL	53		<MDL	54		<MDL	56		<MDL
2-Chlorophenol	26		<MDL	26		<MDL	27		<MDL	28		<MDL
2-Methylnaphthalene	45		<MDL	46		<MDL	47		<MDL	49		<MDL
2-Methylphenol	61		<MDL	63		<MDL	64		<MDL	67		<MDL
2-Nitrophenol	48		<MDL	50		<MDL	51		<MDL	53		<MDL
4-Bromophenyl Phenyl Ether	29		<MDL	30		<MDL	30		<MDL	32		<MDL
4-Chlorophenyl Phenyl Ether	42		<MDL	43		<MDL	44		<MDL	46		<MDL
4-Methylphenol	52		<MDL	53		<MDL	54		<MDL	56		<MDL
Acenaphthene	23		<MDL	23		<MDL	24		<MDL	25		<MDL
Acenaphthylene	48		<MDL	50		<MDL	51		<MDL	53		<MDL
Aniline	61		<MDL,X	63		<MDL,X	64		<MDL,X	67		<MDL,X
Anthracene	13		<MDL,G	13		<MDL,G	13		<MDL,G	14		<MDL,G

< MDL Result below method detection limit
< RDL Result above method detection limit but below reportable detection limit
L Matrix spike or SRM recovery above acceptable range. High biased data, analyte concentration may be lower than the reported value
G Matrix spike or SRM recovery below acceptable range. Low biased data, analyte concentration may be higher than the reported value
X Matrix spike or surrogate recovery <10%. Extremely low biased data, analyte concentration may be higher than the reported value
B Method blank above MDL. The analyte concentration in the sample may include laboratory contamination
N/A Not analyzed
E Relative percent difference in laboratory duplicate samples is greater than 100%

Table B-5 2001 Point Source Offshore Sediment Monitoring
Semi Volatile Organics (dry weight) (page 6 of 10)

	8-Nov-01 RT625SP			6-Nov-01 RT700NS			8-Nov-01 RT715NSW			7-Nov-01 RT825N		
Compound (µg/kg):	**MDL**	**Value**	**Qual**	**MDL**	**Value**	**Qual**	**MDL**	**Value**	**Qual**	**MDL**	**Value**	**Qual**
Benzo(A)Anthracene	6	45	B	7	47	B	7	45	B	7	44	B
Benzo(A)Pyrene	10	74	B	10	70	B	10	76	B	11	69	B
Benzo(B)Fluoranthene	10	51		10	48		10	43		11	46	
Benzo(G,H,I)Perylene	26		<MDL,G	26		<MDL,G	27		<MDL,G	28		<MDL,G
Benzo(K)Fluoranthene	10	38		10	28		10	28		11	35	
Benzoic Acid	19	342	X	20	439	X	20	350	X	21	396	X
Benzyl Alcohol	19		<MDL,X	20		<MDL,X	20		<MDL,X	21		<MDL,X
Benzyl Butyl Phthalate	19	32	<RDL	20	31	<RDL	20	28	<RDL	21	34	<RDL
Bis(2-Chloroethoxy)Methane	55		<MDL	56		<MDL	57		<MDL	60		<MDL
Bis(2-Chloroethyl)Ether	48		<MDL,G	50		<MDL,G	51		<MDL,G	53		<MDL,G
Bis(2-Chloroisopropyl)Ether	48		<MDL	50		<MDL	51		<MDL	53		<MDL
Bis(2-Ethylhexyl)Phthalate	22	65	B,L	22	109	B,L	23	53	B,L	24	143	B,L
Carbazole	23		<MDL	23		<MDL	24		<MDL	25		<MDL
Chrysene	13	51		13	53		13	51		14	58	
Coprostanol	45		<MDL	46		<MDL	47		<MDL	49		<MDL
Di-N-Butyl Phthalate	16	45	B	17	36	B	17	38	B	18	55	B
Di-N-Octyl Phthalate	26		<MDL	26		<MDL	27		<MDL	28		<MDL
Dibenzo(A,H)Anthracene	23		<MDL,L	23		<MDL,L	24		<MDL,L	25		<MDL,L
Dibenzofuran	45		<MDL	46		<MDL	47		<MDL	49		<MDL
Diethyl Phthalate	19		<MDL	20		<MDL	20		<MDL	21		<MDL
Dimethyl Phthalate	35		<MDL	36		<MDL	37		<MDL	39		<MDL
Fluoranthene	26	67		26	69		27	83		28	65	
Fluorene	42		<MDL	43		<MDL	44		<MDL	46		<MDL
Hexachlorobenzene	2		<MDL	2		<MDL	2		<MDL	2		<MDL
Hexachlorobutadiene	2		<MDL	2		<MDL	3		<MDL	3		<MDL
Hexachloroethane	48		<MDL,G	50		<MDL,G	51		<MDL,G	53		<MDL,G
Indeno(1,2,3-Cd)Pyrene	29	48	<RDL	30	46	<RDL	30	40	<RDL	32	49	<RDL
Isophorone	61		<MDL	63		<MDL	64		<MDL	67		<MDL
N-Nitrosodi-N-Propylamine	29		<MDL	30		<MDL	30		<MDL	32		<MDL
N-Nitrosodimethylamine	65		<MDL,X	66		<MDL,X	67		<MDL,X	70		<MDL,X
N-Nitrosodiphenylamine	65		<MDL	66		<MDL	67		<MDL	70		<MDL
Naphthalene	45		<MDL,G	46		<MDL,G	47		<MDL,G	49		<MDL,G
Nitrobenzene	52		<MDL,G	53		<MDL,G	54		<MDL,G	56		<MDL,G
Pentachlorophenol	16		<MDL	17		<MDL	17		<MDL	18		<MDL
Phenanthrene	13	41		13	33		13	42		14	39	
Phenol	29		<MDL,G,E	30	81	G,E	30		<MDL,G,E	32	49	<RDL,G,E
Pyrene	13	98		13	105		13	99		14	115	

< MDL Result below method detection limit
< RDL Result above method detection limit but below reportable detection limit
L Matrix spike or SRM recovery above acceptable range. High biased data, analyte concentration may be lower than the reported value
G Matrix spike or SRM recovery below acceptable range. Low biased data, analyte concentration may be higher than the reported value
X Matrix spike or surrogate recovery <10%. Extremely low biased data, analyte concentration may be higher than the reported value
B Method blank above MDL. The analyte concentration in the sample may include laboratory contamination
N/A Not analyzed
E Relative percent difference in laboratory duplicate samples is greater than 100%

Table B-5 2001 Point Source Offshore Sediment Monitoring
Semi Volatile Organics (dry weight) (page 7 of 10)

	7-Nov-01 RT825S			25-Oct-01 AL343N			25-Oct-01 AL172N			25-Oct-01 AL143P		
	MDL	Value	Qual	MDL	Value	Qual	MDL	Value	Qual	MDL	Value	Qual
Total Solids (%)	0.005	29.2		0.005	86.3		0.005	65.5		0.005	73.9	
Compound (µg/kg):												
Total Organic Carbon	2055	22158		463	2735		611	2626		541	2463	
1,2,4-Trichlorobenzene	0.89		<MDL	0.30		<MDL,G	0.40		<MDL,G	0.35		<MDL,G
1,2-Dichlorobenzene	0.89		<MDL	0.30		<MDL,G	0.40		<MDL,G	0.35		<MDL,G
1,2-Diphenylhydrazine	34		<MDL	12		<MDL	15		<MDL	14		<MDL
1,3-Dichlorobenzene	0.89		<MDL	0.30		<MDL,G	0.40		<MDL,G	0.35		<MDL,G
1,4-Dichlorobenzene	0.45		<MDL	0.15		<MDL,G	0.20		<MDL,G	0.18		<MDL,G
2,4,5-Trichlorophenol	41		<MDL	14		<MDL	18		<MDL	16		<MDL
2,4,6-Trichlorophenol	45		<MDL	15		<MDL	20		<MDL	18		<MDL
2,4-Dichlorophenol	55		<MDL	19		<MDL	24		<MDL	22		<MDL
2,4-Dimethylphenol	24		<MDL	8.1		<MDL	11		<MDL	9.5		<MDL
2,4-Dinitrotoluene	10		<MDL	3.5		<MDL	4.6		<MDL	4.1		<MDL
2,6-Dinitrotoluene	34		<MDL	12		<MDL	15		<MDL	14		<MDL
2-Chloronaphthalene	55		<MDL	19		<MDL	24		<MDL	22		<MDL
2-Chlorophenol	27		<MDL	9.3		<MDL,G	12		<MDL,G	11		<MDL,G
2-Methylnaphthalene	48		<MDL	16		<MDL	21		<MDL	19		<MDL
2-Methylphenol	65		<MDL	22		<MDL	29		<MDL	26		<MDL
2-Nitrophenol	51		<MDL	17		<MDL	23		<MDL	20		<MDL
4-Bromophenyl Phenyl Ether	31		<MDL	10		<MDL	14		<MDL	12		<MDL
4-Chlorophenyl Phenyl Ether	45		<MDL	15		<MDL	20		<MDL	18		<MDL
4-Methylphenol	55		<MDL	19		<MDL	24		<MDL	22		<MDL
Acenaphthene	24		<MDL	8		<MDL	11		<MDL	9.5		<MDL
Acenaphthylene	51		<MDL	17		<MDL	23		<MDL	20		<MDL
Aniline	65		<MDL,X	22		<MDL,X	29		<MDL,X	26		<MDL,X
Anthracene	14		<MDL,G	4.6		<MDL,G,E	6.1	15	G,E	5.4		<MDL,G,E

< MDL Result below method detection limit
< RDL Result above method detection limit but below reportable detection limit
L Matrix spike or SRM recovery above acceptable range. High biased data, analyte concentration may be lower than the reported value
G Matrix spike or SRM recovery below acceptable range. Low biased data, analyte concentration may be higher than the reported value
X Matrix spike or surrogate recovery <10%. Extremely low biased data, analyte concentration may be higher than the reported value
B Method blank above MDL. The analyte concentration in the sample may include laboratory contamination
N/A Not analyzed
E Relative percent difference in laboratory duplicate samples is greater than 100%

Table B-5 2001 Point Source Offshore Sediment Monitoring
Semi Volatile Organics (dry weight) (page 8 of 10)

	7-Nov-01 RT825S			25-Oct-01 AL343N			25-Oct-01 AL172N			25-Oct-01 AL143P		
Compound (µg/kg):	**MDL**	**Value**	**Qual**	**MDL**	**Value**	**Qual**	**MDL**	**Value**	**Qual**	**MDL**	**Value**	**Qual**
Benzo(A)Anthracene	7	52	B	2.3	7.7		3.1	11		2.7	6	
Benzo(A)Pyrene	10	73	B	3.5	13	B	4.6	19	B	4.1	12	B
Benzo(B)Fluoranthene	10	60		3.5	6.6	<RDL	4.6	7.2	<RDL	4.1	4	<RDL
Benzo(G,H,I)Perylene	27		<MDL,G	9.3		<MDL	12		<MDL	11		<MDL
Benzo(K)Fluoranthene	10	48		3.5	7.1	B	4.6	7.5	<RDL,B	4.1	5	<RDL,B
Benzoic Acid	21	404	X	7.0	204	G	9.2	227	G	8.1	196	G
Benzyl Alcohol	21		<MDL,X	7.0		<MDL,G	9.2		<MDL,G	8.1		<MDL,G
Benzyl Butyl Phthalate	21	30	<RDL	7.0	9	<RDL	9.2	13	<RDL	8.1		<MDL
Bis(2-Chloroethoxy)Methane	58		<MDL	20		<MDL	26		<MDL	23		<MDL
Bis(2-Chloroethyl)Ether	51		<MDL,G	17		<MDL,G	23		<MDL,G	20		<MDL,G
Bis(2-Chloroisopropyl)Ether	51		<MDL	17		<MDL	23		<MDL	20		<MDL
Bis(2-Ethylhexyl)Phthalate	23	122	B,L	7.8	22	B,L	10	18	<RDL,B,L	9.1	19	RDL,B,L
Carbazole	24		<MDL	8.1		<MDL	11		<MDL	9.5		<MDL
Chrysene	14	61		4.6	7.1	<RDL	6.1	10	<RDL	5.4	6	<RDL
Coprostanol	48		<MDL	16		<MDL	21		<MDL	19		<MDL
Di-N-Butyl Phthalate	17	52	B	5.8	15	B	7.6	19	B	6.8	14	B
Di-N-Octyl Phthalate	27		<MDL	9.3		<MDL	12		<MDL	11		<MDL
Dibenzo(A,H)Anthracene	24		<MDL,L	8.1		<MDL,B,L	11		<MDL,B,L	9		<MDL,B,L
Dibenzofuran	48		<MDL	16		<MDL	21		<MDL	19		<MDL
Diethyl Phthalate	21		<MDL	7.0		<MDL	9.2		<MDL	8.1		<MDL
Dimethyl Phthalate	38		<MDL	13		<MDL	17		<MDL	15		<MDL
Fluoranthene	27	102		9.3	10	<RDL,L	12	20	<RDL,L	11		<MDL,L
Fluorene	45		<MDL	15		<MDL	20		<MDL	18		<MDL
Hexachlorobenzene	2		<MDL	1		<MDL	1		<MDL	1		<MDL
Hexachlorobutadiene	3		<MDL	1		<MDL,G	1		<MDL,G	1		<MDL,G
Hexachloroethane	51		<MDL,G	17		<MDL,G	23		<MDL,G	20		<MDL,G
Indeno(1,2,3-Cd)Pyrene	31	41	<RDL	10		<MDL,G	14		<MDL,G	12		<MDL,G
Isophorone	65		<MDL	22		<MDL	29		<MDL	26		<MDL
N-Nitrosodi-N-Propylamine	31		<MDL	10		<MDL	14		<MDL	12		<MDL
N-Nitrosodimethylamine	68		<MDL,X	23		<MDL,X	31		<MDL,X	27		<MDL,X
N-Nitrosodiphenylamine	68		<MDL	23		<MDL	31		<MDL	27		<MDL
Naphthalene	48		<MDL,G	16		<MDL,G	21		<MDL,G	19		<MDL,G
Nitrobenzene	55		<MDL,G	19		<MDL,G	24		<MDL,G	22		<MDL,G
Pentachlorophenol	17		<MDL	6		<MDL	8		<MDL	7		<MDL
Phenanthrene	14	50		5		<MDL	6	20		5		<MDL
Phenol	31	45	<RDL,G,E	10		<MDL	14		<MDL	12		<MDL
Pyrene	14	111		5	17	L	6	30	L	5	18	L

< MDL Result below method detection limit
< RDL Result above method detection limit but below reportable detection limit
L Matrix spike or SRM recovery above acceptable range. High biased data, analyte concentration may be lower than the reported value
G Matrix spike or SRM recovery below acceptable range. Low biased data, analyte concentration may be higher than the reported value
X Matrix spike or surrogate recovery <10%. Extremely low biased data, analyte concentration may be higher than the reported value
B Method blank above MDL. The analyte concentration in the sample may include laboratory contamination
N/A Not analyzed
E Relative percent difference in laboratory duplicate samples is greater than 100%

Table B-5 2001 Point Source Offshore Sediment Monitoring
Semi Volatile Organics (dry weight) (page 9 of 10)

	25-Oct-01 AL172S			25-Oct-01 AL343S			25-Oct-01 AL1500S		
	MDL	Value	Qual	MDL	Value	Qual	MDL	Value	Qual
Total Solids (%)	0.005	71.6		0.005	74		0.005	72.9	
Compound (µg/kg):									
Total Organic Carbon	559	3478		541	2284		549	2908	
1,2,4-Trichlorobenzene	0.36		<MDL,G	0.35		<MDL,G	0.36		<MDL,G
1,2-Dichlorobenzene	0.36		<MDL,G	0.35		<MDL,G	0.36		<MDL,G
1,2-Diphenylhydrazine	14		<MDL	14		<MDL	14		<MDL
1,3-Dichlorobenzene	0.36		<MDL,G	0.35		<MDL,G	0.36		<MDL,G
1,4-Dichlorobenzene	0.18		<MDL,G	0.18		<MDL,G	0.18		<MDL,G
2,4,5-Trichlorophenol	17		<MDL	16		<MDL	16		<MDL
2,4,6-Trichlorophenol	18		<MDL	18		<MDL	18		<MDL
2,4-Dichlorophenol	22		<MDL	22		<MDL	22		<MDL
2,4-Dimethylphenol	9.8		<MDL	9.5		<MDL	9.6		<MDL
2,4-Dinitrotoluene	4.2		<MDL	4.1		<MDL	4.1		<MDL
2,6-Dinitrotoluene	14		<MDL	14		<MDL	14		<MDL
2-Chloronaphthalene	22		<MDL	22		<MDL	22		<MDL
2-Chlorophenol	11		<MDL,G	11		<MDL,G	11		<MDL,G
2-Methylnaphthalene	20		<MDL	19		<MDL	19		<MDL
2-Methylphenol	27		<MDL	26		<MDL	26		<MDL
2-Nitrophenol	21		<MDL	20		<MDL	21		<MDL
4-Bromophenyl Phenyl Ether	13		<MDL	12		<MDL	12		<MDL
4-Chlorophenyl Phenyl Ether	18		<MDL	18		<MDL	18		<MDL
4-Methylphenol	22		<MDL	22		<MDL	22		<MDL
Acenaphthene	10		<MDL	9.5		<MDL	10		<MDL
Acenaphthylene	21		<MDL	20		<MDL	21		<MDL
Aniline	27		<MDL,X	26		<MDL,X	26		<MDL,X
Anthracene	5.6		<MDL,G,E	5.4		<MDL,G,E	5.5		<MDL,G,E

< MDL Result below method detection limit
< RDL Result above method detection limit but below reportable detection limit
L Matrix spike or SRM recovery above acceptable range. High biased data, analyte concentration may be lower than the reported value
G Matrix spike or SRM recovery below acceptable range. Low biased data, analyte concentration may be higher than the reported value
X Matrix spike or surrogate recovery <10%. Extremely low biased data, analyte concentration may be higher than the reported value
B Method blank above MDL. The analyte concentration in the sample may include laboratory contamination
N/A Not analyzed
E Relative percent difference in laboratory duplicate samples is greater than 100%

Table B-5 2001 Point Source Offshore Sediment Monitoring
Semi Volatile Organics (dry weight) (page 10 of 10)

	25-Oct-01 AL172S			25-Oct-01 AL343S			25-Oct-01 AL1500S		
Compound (µg/kg):	**MDL**	**Value**	**Qual**	**MDL**	**Value**	**Qual**	**MDL**	**Value**	**Qual**
Benzo(A)Anthracene	2.8	9		2.7	5.4	RDL	2.7	9	
Benzo(A)Pyrene	4.2	13	B	4.1		<MDL,B	4.1	11	B
Benzo(B)Fluoranthene	4.2	7	<RDL	4.1		<MDL	4.1		<MDL
Benzo(G,H,I)Perylene	11		<MDL	11		<MDL	11		<MDL
Benzo(K)Fluoranthene	4.2	6	<RDL,B	4.1		<MDL,B	4.1		<MDL,B
Benzoic Acid	8.4	219	G	8.1	220	G	8.2	236	G
Benzyl Alcohol	8.4		<MDL,G	8.1		<MDL,G	8.2		<MDL,G
Benzyl Butyl Phthalate	8.4	12	<RDL	8.1		<MDL	8.2		<MDL
Bis(2-Chloroethoxy)Methane	24		<MDL	23		<MDL	23		<MDL
Bis(2-Chloroethyl)Ether	21		<MDL,G	20		<MDL,G	21		<MDL,G
Bis(2-Chloroisopropyl)Ether	21		<MDL	20		<MDL	21		<MDL
Bis(2-Ethylhexyl)Phthalate	9.4		<MDL,B,L	9.1		<MDL,B,L	9.2		<MDL,B,L
Carbazole	10		<MDL	9.5		<MDL	10		<MDL
Chrysene	5.6	8	<RDL	5.4		<MDL	5.5	8	<RDL
Coprostanol	20		<MDL	19		<MDL	19		<MDL
Di-N-Butyl Phthalate	7.0	16	B	6.8	14	B	6.9	13	<RDL,B
Di-N-Octyl Phthalate	11		<MDL	11		<MDL	11		<MDL
Dibenzo(A,H)Anthracene	10		<MDL,B,L	9.5		<MDL,B,L	10		<MDL,B,L
Dibenzofuran	20		<MDL	19		<MDL	19		<MDL
Diethyl Phthalate	8		<MDL	8.1		<MDL	8.2		<MDL
Dimethyl Phthalate	15.4		<MDL	15		<MDL	15		<MDL
Fluoranthene	11		<MDL,L	11		<MDL,L	11	13	<RDL,L
Fluorene	18		<MDL	18		<MDL	18		<MDL
Hexachlorobenzene	1		<MDL	1		<MDL	1		<MDL
Hexachlorobutadiene	1		<MDL,G	1		<MDL,G	1		<MDL,G
Hexachloroethane	21		<MDL,G	20		<MDL,G	21		<MDL,G
Indeno(1,2,3-Cd)Pyrene	13		<MDL,G	12		<MDL,G	12		<MDL,G
Isophorone	27		<MDL	26		<MDL	26		<MDL
N-Nitrosodi-N-Propylamine	13		<MDL	12		<MDL	12		<MDL
N-Nitrosodimethylamine	28		<MDL,X	27		<MDL,X	27		<MDL,X
N-Nitrosodiphenylamine	28		<MDL	27		<MDL	27		<MDL
Naphthalene	20		<MDL,G	19		<MDL,G	19		<MDL,G
Nitrobenzene	22		<MDL,G	22		<MDL,G	22		<MDL,G
Pentachlorophenol	7		<MDL	7		<MDL	7		<MDL
Phenanthrene	6	9	<RDL	5	7	<RDL	5	14	
Phenol	13		<MDL	12		<MDL	12		<MDL
Pyrene	6	20	L	5	15	L	5	24	L

< MDL Result below method detection limit
< RDL Result above method detection limit but below reportable detection limit
L Matrix spike or SRM recovery above acceptable range. High biased data, analyte concentration may be lower than the reported value
G Matrix spike or SRM recovery below acceptable range. Low biased data, analyte concentration may be higher than the reported value
X Matrix spike or surrogate recovery <10%. Extremely low biased data, analyte concentration may be higher than the reported value
B Method blank above MDL. The analyte concentration in the sample may include laboratory contamination
N/A Not analyzed
E Relative percent difference in laboratory duplicate samples is greater than 100%

Table B-6 2001 Point Source Beach Sediment Monitoring
Semi Volatile Organics (dry weight) (page 1 of 2)

	31-Jul-01 KSHZ03			1-Aug-01 KSSN04			1-Aug-01 LSKR01		
	MDL	Value	Qual	MDL	Value	Qual	MDL	Value	Qual
Total Solids (%)	0.01	96.1		0.01	82.1		0.01	77.2	
Compound (µg/kg):									
Total Organic Carbon	520		<MDL	609	1072	<RDL	648	2189	
1,2,4-Trichlorobenzene	0.27		<MDL	0.32		<MDL	0.34		<MDL
1,2-Dichlorobenzene	0.27		<MDL	0.32		<MDL	0.34		<MDL
1,2-Diphenylhydrazine	10		<MDL	12		<MDL	13		<MDL
1,3-Dichlorobenzene	0.27		<MDL	0.32		<MDL	0.34		<MDL
1,4-Dichlorobenzene	0.14		<MDL	0.16		<MDL	0.17		<MDL
2,4,5-Trichlorophenol	12		<MDL	15		<MDL	16		<MDL
2,4,6-Trichlorophenol	14		<MDL	16		<MDL	17		<MDL
2,4-Dichlorophenol	17		<MDL	19		<MDL	21		<MDL
2,4-Dimethylphenol	7.3		<MDL	8.5		<MDL	9.1		<MDL
2,4-Dinitrotoluene	3.1		<MDL	3.7		<MDL	3.9		<MDL
2,6-Dinitrotoluene	10		<MDL	12		<MDL	13		<MDL
2-Chloronaphthalene	17		<MDL	19		<MDL	21		<MDL
2-Chlorophenol	8.3		<MDL	9.7		<MDL	10		<MDL
2-Methylnaphthalene	15		<MDL	17		<MDL	18		<MDL
2-Methylphenol	20		<MDL	23		<MDL	25		<MDL
2-Nitrophenol	16		<MDL	18		<MDL	19		<MDL
4-Bromophenyl Phenyl Ether	9.4		<MDL	11		<MDL	12		<MDL
4-Chlorophenyl Phenyl Ether	14		<MDL	16		<MDL	17		<MDL
4-Methylphenol	17		<MDL	19		<MDL	21		<MDL
Acenaphthene	7.3		<MDL	8.5	10	<RDL	9.1		<MDL
Acenaphthylene	16		<MDL	18	35	<RDL	19		<MDL
Aniline	20		<MDL,X	23	<MDL	<MDL,X	25		<MDL,X
Anthracene	4.2		<MDL,G	4.9	45	G	5.2		<MDL,G

< MDL Result below method detection limit
< RDL Result above method detection limit but below reportable detection limit
L Matrix spike or SRM recovery above acceptable range. High biased data, analyte concentration may be lower than the reported value
G Matrix spike or SRM recovery below acceptable range. Low biased data, analyte concentration may be higher than the reported value
X Matrix spike or surrogate recovery <10%. Extremely low biased data, analyte concentration may be higher than the reported value
B Method blank above MDL. The analyte concentration in the sample may include laboratory contamination
N/A Not analyzed
E Relative percent difference in laboratory duplicate samples is greater than 100%

Table B-6 2001 Point Source Beach Sediment Monitoring
Semi Volatile Organics (dry weight) (page 2 of 2)

	31-Jul-01 KSHZ03			1-Aug-01 KSSN04			1-Aug-01 LSKR01		
Compound (µg/kg):	**MDL**	**Value**	**Qual**	**MDL**	**Value**	**Qual**	**MDL**	**Value**	**Qual**
Benzo(A)Anthracene	2.1	3.4	<RDL	2.4	173		2.6		<MDL
Benzo(A)Pyrene	3.1	5.6	<RDL,E	3.7	188	E	3.9		<MDL,E
Benzo(B)Fluoranthene	3.1	8.4	E	3.7	145	E	3.9		<MDL,E
Benzo(G,H,I)Perylene	8.3		<MDL	9.7	143		10		<MDL
Benzo(K)Fluoranthene	3.1		<MDL	3.7	55		3.9		<MDL
Benzoic Acid	6.2	72	B,X	7.3	151	B,X	7.8	222	B,X
Benzyl Alcohol	6.2		<MDL	7.3		<MDL	7.8		<MDL
Benzyl Butyl Phthalate	6.2		<MDL	7.3		<MDL	7.8		<MDL
Bis(2-Chloroethoxy)Methane	18		<MDL	21		<MDL	22		<MDL
Bis(2-Chloroethyl)Ether	16		<MDL	18		<MDL	19		<MDL
Bis(2-Chloroisopropyl)Ether	16		<MDL	18		<MDL	19		<MDL
Bis(2-Ethylhexyl)Phthalate	7.0	16	B	8.2	18	B	8.7	31	B
Carbazole	7.3		<MDL	8.5		<MDL	9.1		<MDL
Chrysene	4.2	4.8	<RDL	4.9	153		5.2		<MDL
Coprostanol	15		<MDL,L	17		<MDL,L	18		<MDL,L
Di-N-Butyl Phthalate	5.2	12	B	6.1		<MDL,B	6.5		<MDL,B
Di-N-Octyl Phthalate	8.3		<MDL	9.7		<MDL	10		<MDL
Dibenzo(A,H)Anthracene	7.3		<MDL,L	8.5	23	L	9.1		<MDL,L
Dibenzofuran	15		<MDL	17		<MDL	18		<MDL
Diethyl Phthalate	6.2		<MDL	7.3		<MDL	7.8		<MDL
Dimethyl Phthalate	11		<MDL	13		<MDL	14		<MDL
Fluoranthene	8.3		<MDL	9.7			10		<MDL
Fluorene	14		<MDL	16		<MDL	17		<MDL
Hexachlorobenzene	0.69		<MDL	0.80		<MDL	0.85		<MDL
Hexachlorobutadiene	0.78		<MDL	0.91		<MDL	0.97		<MDL
Hexachloroethane	16		<MDL	18		<MDL	19		<MDL
Indeno(1,2,3-Cd)Pyrene	9.4		<MDL	11	140		12		<MDL
Isophorone	20		<MDL	23		<MDL	25		<MDL
N-Nitrosodi-N-Propylamine	9.4		<MDL	11		<MDL	12		<MDL
N-Nitrosodimethylamine	21		<MDL,X	24		<MDL,X	26		<MDL,X
N-Nitrosodiphenylamine	21		<MDL	24		<MDL	26		<MDL
Naphthalene	15		<MDL,G	17		<MDL,G	18		<MDL,G
Nitrobenzene	17		<MDL	19		<MDL	21		<MDL
Pentachlorophenol	5.2		<MDL	6.1		<MDL	6.5		<MDL
Phenanthrene	4.2		<MDL	4.9	150		5.2		<MDL
Phenol	9.4		<MDL	11	22	RDL	12	45	
Pyrene	4.2		<MDL,E	4.9	446	E	5.2		<MDL,E

< MDL Result below method detection limit
< RDL Result above method detection limit but below reportable detection limit
L Matrix spike or SRM recovery above acceptable range. High biased data, analyte concentration may be lower than the reported value
G Matrix spike or SRM recovery below acceptable range. Low biased data, analyte concentration may be higher than the reported value
X Matrix spike or surrogate recovery <10%. Extremely low biased data, analyte concentration may be higher than the reported value
B Method blank above MDL. The analyte concentration in the sample may include laboratory contamination
N/A Not analyzed
E Relative percent difference in laboratory duplicate samples is greater than 100%

Table B-7 2001 Ambient Beach Sediment Monitoring
Semi Volatile Organics (dry weight) (page 1 of 2)

	JSVW04 31-Jul-01			MTLD03 1-Aug-01			KSYV02 2-Aug-01		
	MDL	Value	Qual	MDL	Value	Qual	MDL	Value	Qual
Total Solids (%)		97.2			76.8			78.5	
Compound (µg/kg):									
Total Organic Carbon	514		<MDL	651	1432		637	1452	
1,2,4-Trichlorobenzene	0.27		<MDL	0.34		<MDL	0.33		<MDL
1,2-Dichlorobenzene	0.27		<MDL	0.34		<MDL	0.33		<MDL
1,2-Diphenylhydrazine	10		<MDL	13		<MDL	13		<MDL
1,3-Dichlorobenzene	0.27		<MDL	0.34		<MDL	0.33		<MDL
1,4-Dichlorobenzene	0.13		<MDL	0.17		<MDL	0.17		<MDL
2,4,5-Trichlorophenol	12		<MDL	16		<MDL	15		<MDL
2,4,6-Trichlorophenol	13		<MDL	17		<MDL	17		<MDL
2,4-Dichlorophenol	16		<MDL	21		<MDL	20		<MDL
2,4-Dimethylphenol	7.2		<MDL	9.1		<MDL	8.9		<MDL
2,4-Dinitrotoluene	3.1		<MDL	3.9		<MDL	3.8		<MDL
2,6-Dinitrotoluene	10		<MDL	13		<MDL	13		<MDL
2-Chloronaphthalene	16		<MDL	21		<MDL	20		<MDL
2-Chlorophenol	8.2		<MDL	10		<MDL	10		<MDL
2-Methylnaphthalene	14		<MDL	18		<MDL	18		<MDL
2-Methylphenol	20		<MDL	25		<MDL	24		<MDL
2-Nitrophenol	15		<MDL	20		<MDL	19		<MDL
4-Bromophenyl Phenyl Ether	9.3		<MDL	12		<MDL	11		<MDL
4-Chlorophenyl Phenyl Ether	13		<MDL	17		<MDL	17		<MDL
4-Methylphenol	16		<MDL	21		<MDL	20		<MDL
Acenaphthene	7.2		<MDL	9.1		<MDL	8.9		<MDL
Acenaphthylene	15		<MDL	20		<MDL	19		<MDL
Aniline	20		<MDL,X	25		<MDL,X	24		<MDL,X
Anthracene	4.1		<MDL,G	5.2		<MDL,G	5.1	15	G

< MDL Result below method detection limit
< RDL Result above method detection limit but below reportable detection limit
L Matrix spike or SRM recovery above acceptable range. High biased data, analyte concentration may be lower than the reported value
G Matrix spike or SRM recovery below acceptable range. Low biased data, analyte concentration may be higher than the reported value
X Matrix spike or surrogate recovery <10%. Extremely low biased data, analyte concentration may be higher than the reported value
B Method blank above MDL. The analyte concentration in the sample may include laboratory contamination
N/A Not analyzed
E Relative percent difference in laboratory duplicate samples is greater than 100%

Table B-7 2001 Ambient Beach Sediment Monitoring
Semi Volatile Organics (dry weight) (page 2 of 2)

	JSVW04 31-Jul-01			MTLD03 1-Aug-01			KSYV02 2-Aug-01		
Compound (µg/kg):	**MDL**	**Value**	**Qual**	**MDL**	**Value**	**Qual**	**MDL**	**Value**	**Qual**
Benzo(A)Anthracene	2.1		<MDL	2.6		<MDL	2.5	21	
Benzo(A)Pyrene	3.1		<MDL,E	3.9		<MDL,E	3.8	7.3	<RDL,E
Benzo(B)Fluoranthene	3.1	4.6	<RDL,E	3.9		<MDL,E	3.8	16	E
Benzo(G,H,I)Perylene	8.2		<MDL	10		<MDL	10		<MDL
Benzo(K)Fluoranthene	3.1		<MDL	3.9		<MDL	3.8	7.1	<RDL,E
Benzoic Acid	6.2	53	B,X	7.8	120	B,X	7.6	220	B,X
Benzyl Alcohol	6.2		<MDL	7.8		<MDL	7.6		<MDL
Benzyl Butyl Phthalate	6.2		<MDL	7.8		<MDL	7.6		<MDL
Bis(2-Chloroethoxy)Methane	17		<MDL	22		<MDL	22		<MDL
Bis(2-Chloroethyl)Ether	15		<MDL	20		<MDL	19		<MDL
Bis(2-Chloroisopropyl)Ether	15		<MDL	20		<MDL	19		<MDL
Bis(2-Ethylhexyl)Phthalate	6.9	18	B	8.7	26	B	8.5	17	<RDL,B
Carbazole	7.2		<MDL	9.1		<MDL	8.9		<MDL
Chrysene	4.1		<MDL	5.2		<MDL	5.1	17	
Coprostanol	14		<MDL,L	18		<MDL,L	18		<MDL,L
Di-N-Butyl Phthalate	5.1	8.4	<RDL,B	6.5	16	B	6.4		<MDL,B
Di-N-Octyl Phthalate	8.2		<MDL	10		<MDL	10		<MDL
Dibenzo(A,H)Anthracene	7.2		<MDL,L	9.1		<MDL,L	8.9		<MDL,L
Dibenzofuran	14		<MDL	18		<MDL	18		<MDL
Diethyl Phthalate	6		<MDL	7.8		<MDL	7.6		<MDL
Dimethyl Phthalate	11		<MDL	14		<MDL	14		<MDL
Fluoranthene	8.2		<MDL	10		<MDL	10	39	
Fluorene	13		<MDL	17		<MDL	17		<MDL
Hexachlorobenzene	0.68		<MDL	0.86		<MDL	0.84		<MDL
Hexachlorobutadiene	0.77		<MDL	0.98		<MDL	0.96		<MDL
Hexachloroethane	15		<MDL	20		<MDL	19		<MDL
Indeno(1,2,3-Cd)Pyrene	9.3		<MDL	12		<MDL	11		<MDL
Isophorone	20		<MDL	25		<MDL	24		<MDL
N-Nitrosodi-N-Propylamine	9.3		<MDL	12		<MDL	11		<MDL
N-Nitrosodimethylamine	21		<MDL,X	26		<MDL,X	25		<MDL,X
N-Nitrosodiphenylamine	21		<MDL	26		<MDL	25		<MDL
Naphthalene	14		<MDL,G	18		<MDL,G	18		<MDL,G
Nitrobenzene	16		<MDL	21		<MDL	20		<MDL
Pentachlorophenol	5.1		<MDL	6.5		<MDL	6.4		<MDL
Phenanthrene	4.1		<MDL	5.2		<MDL	5.1	42	
Phenol	9.3	11	<RDL	12	26		11	41	
Pyrene	4.1		<MDL,E	5.2		<MDL,E	5.1	14	E

< MDL Result below method detection limit
< RDL Result above method detection limit but below reportable detection limit
L Matrix spike or SRM recovery above acceptable range. High biased data, analyte concentration may be lower than the reported value
G Matrix spike or SRM recovery below acceptable range. Low biased data, analyte concentration may be higher than the reported value
X Matrix spike or surrogate recovery <10%. Extremely low biased data, analyte concentration may be higher than the reported value
B Method blank above MDL. The analyte concentration in the sample may include laboratory contamination
N/A Not analyzed
E Relative percent difference in laboratory duplicate samples is greater than 100%

Table B-8 2001 Point Source Offshore Sediment Monitoring
Pesticides and PCBs (dry weight) (page 1 of 4)

	RT2500R 7-Nov-01			RT412N 5-Nov-01			RT412NW 8-Nov-01			RT412S 6-Nov-01			RT412SW 8-Nov-01		
	MDL	Value	Qual	MDL	Value	Qual	MDL	Value	Qual	MDL	Value	Qual	MDL	Value	Qual
Total Solids (%)		30.1			31.3			29.8			32.3			31.0	
Compound (µg/kg)															
4,4'-Ddd	3.3		<MDL	3.2		<MDL	3.4		<MDL	3.1		<MDL	3.2		<MDL
4,4'-Dde	3.3		<MDL	3.2		<MDL	3.4		<MDL	3.1		<MDL	3.2		<MDL
4,4'-Ddt	3.3		<MDL	3.2		<MDL	3.4		<MDL	3.1		<MDL	3.2		<MDL
Aldrin	3.3		<MDL	3.2		<MDL	3.4		<MDL	3.1		<MDL	3.2		<MDL
Alpha-Bhc	1.7		<MDL	1.6		<MDL	1.7		<MDL	1.5		<MDL	1.6		<MDL
Aroclor 1016	4.3		<MDL	4.2		<MDL	4.4		<MDL	4.0		<MDL	4.2		<MDL
Aroclor 1221	8.3		<MDL	8.0		<MDL	8.4		<MDL	7.7		<MDL	8.1		<MDL
Aroclor 1232	8.3		<MDL	8.0		<MDL	8.4		<MDL	7.7		<MDL	8.1		<MDL
Aroclor 1242	4.3		<MDL	4.2		<MDL	4.4		<MDL	4.0		<MDL	4.2		<MDL
Aroclor 1248	4.3		<MDL	4.2		<MDL	4.4		<MDL	4.0		<MDL	4.2		<MDL
Aroclor 1254	4.3		<MDL	4.2		<MDL	4.4		<MDL	4.0		<MDL	4.2	20	
Aroclor 1260	4.3		<MDL	4.2		<MDL	4.4		<MDL	4.0		<MDL	4.2	9.2	
Beta-Bhc	1.7		<MDL	1.6		<MDL	1.7		<MDL	1.5		<MDL	1.6		<MDL
Chlordane	1.7		<MDL	1.6		<MDL	1.7		<MDL	1.5		<MDL	1.6		<MDL
Delta-Bhc	1.7		<MDL	1.6		<MDL	1.7		<MDL	1.5		<MDL	1.6		<MDL
Dieldrin	3.3		<MDL	3.2		<MDL	3.4		<MDL	3.1		<MDL	3.2		<MDL
Endosulfan I	3.3		<MDL	3.2		<MDL	3.4		<MDL	3.1		<MDL	3.2		<MDL
Endosulfan II	3.3		<MDL	3.2		<MDL	3.4		<MDL	3.1		<MDL	3.2		<MDL
Endosulfan Sulfate	3.3		<MDL	3.2		<MDL	3.4		<MDL	3.1		<MDL	3.2		<MDL
Endrin	3.3		<MDL	3.2		<MDL	3.4		<MDL	3.1		<MDL	3.2		<MDL
Endrin Aldehyde	6.6		<MDL,X	6.4		<MDL,X	6.7		<MDL,X	6.2		<MDL,X	6.5		<MDL,X
Gamma-Bhc (Lindane)	1.7		<MDL	1.6		<MDL	1.7		<MDL	1.5		<MDL	1.6		<MDL
Heptachlor	1.7		<MDL	1.6		<MDL	1.7		<MDL	1.5		<MDL	1.6		<MDL
Heptachlor Epoxide	1.7		<MDL	1.6		<MDL	1.7		<MDL	1.5		<MDL	1.6		<MDL
Methoxychlor	17		<MDL	16		<MDL	17		<MDL	15		<MDL	16		<MDL
Toxaphene	33		<MDL	32		<MDL	34		<MDL	31		<MDL	32		<MDL

< MDL Result below method detection limit

G Matrix spike or SRM recovery below acceptable range. Low biased data, analyte concentration may be higher than the reported value

X Matrix spike or surrogate recovery <10%. Extremely low biased data, analyte concentration may be higher than the reported value

Table B-8 2001 Point Source Offshore Sediment Monitoring
Pesticides and PCBs (dry weight) (page 2 of 4)

	RT625ND 6-Nov-01			RT625NP 8-Nov-01			RT625SD 6-Nov-01			RT625SP 8-Nov-01			RT700NS 6-Nov-01		
	MDL	Value	Qual	MDL	Value	Qual	MDL	Value	Qual	MDL	Value	Qual	MDL	Value	MDL
Total Solids (%)		30.0			30.9			31.3			31.0			30.3	
Compound (µg/kg)															
4,4'-Ddd	3.3		<MDL	3.2		<MDL	3.2		<MDL	3.2		<MDL	3.3		<MDL
4,4'-Dde	3.3		<MDL	3.2		<MDL	3.2		<MDL	3.2		<MDL	3.3		<MDL
4,4'-Ddt	3.3		<MDL	3.2		<MDL	3.2		<MDL	3.2		<MDL	3.3		<MDL
Aldrin	3.3		<MDL	3.2		<MDL	3.2		<MDL	3.2		<MDL	3.3		<MDL
Alpha-Bhc	1.7		<MDL	1.6		<MDL	1.6		<MDL	1.6		<MDL	1.7		<MDL
Aroclor 1016	4.3		<MDL	4.2		<MDL	4.2		<MDL	4.2		<MDL	4.3		<MDL
Aroclor 1221	8.3		<MDL	8.1		<MDL	8.0		<MDL	8.1		<MDL	8.3		<MDL
Aroclor 1232	8.3		<MDL	8.1		<MDL	8.0		<MDL	8.1		<MDL	8.3		<MDL
Aroclor 1242	4.3		<MDL	4.2		<MDL	4.2		<MDL	4.2		<MDL	4.3		<MDL
Aroclor 1248	4.3		<MDL	4.2		<MDL	4.2		<MDL	4.2		<MDL	4.3		<MDL
Aroclor 1254	4.3	17.7		4.2		<MDL	4.2		<MDL	4.2		<MDL	4.3		<MDL
Aroclor 1260	4.3		<MDL	4.2		<MDL	4.2		<MDL	4.2		<MDL	4.3		<MDL
Beta-Bhc	1.7		<MDL	1.6		<MDL	1.6		<MDL	1.6		<MDL	1.7		<MDL
Chlordane	1.7		<MDL	1.6		<MDL	1.6		<MDL	1.6		<MDL	1.7		<MDL
Delta-Bhc	1.7		<MDL	1.6		<MDL	1.6		<MDL	1.6		<MDL	1.7		<MDL
Dieldrin	3.3		<MDL	3.2		<MDL	3.2		<MDL	3.2		<MDL	3.3		<MDL
Endosulfan I	3.3		<MDL	3.2		<MDL	3.2		<MDL	3.2		<MDL	3.3		<MDL
Endosulfan II	3.3		<MDL	3.2		<MDL	3.2		<MDL	3.2		<MDL	3.3		<MDL
Endosulfan Sulfate	3.3		<MDL	3.2		<MDL	3.2		<MDL	3.2		<MDL	3.3		<MDL
Endrin	3.3		<MDL	3.2		<MDL	3.2		<MDL	3.2		<MDL	3.3		<MDL
Endrin Aldehyde	6.7		<MDL,X	6.5		<MDL,X	6.4		<MDL,X	6.5		<MDL,X	6.6		<MDL,X
Gamma-Bhc (Lindane)	1.7		<MDL	1.6		<MDL	1.6		<MDL	1.6		<MDL	1.7		<MDL
Heptachlor	1.7		<MDL	1.6		<MDL	1.6		<MDL	1.6		<MDL	1.7		<MDL
Heptachlor Epoxide	1.7		<MDL	1.6		<MDL	1.6		<MDL	1.6		<MDL	1.7		<MDL
Methoxychlor	17		<MDL	16		<MDL	16		<MDL	16		<MDL	17		<MDL
Toxaphene	33		<MDL	32		<MDL	32		<MDL	32		<MDL	33		<MDL

< MDL Result below method detection limit

G Matrix spike or SRM recovery below acceptable range. Low biased data, analyte concentration may be higher than the reported value

X Matrix spike or surrogate recovery <10%. Extremely low biased data, analyte concentration may be higher than the reported value

Table B-8 2001 Point Source Offshore Sediment Monitoring
Pesticides and PCBs (dry weight) (page 3 of 4)

	RT715NSW 8-Nov-01			RT825N 7-Nov-01			RT825S 7-Nov-01			AL343N 25-Oct-01			AL172N 25-Oct-01		
	MDL	Value	Qual	MDL	Value	Qual	MDL	Value	Qual	MDL	Value	Qual	MDL	Value	Qual
Total Solids (%)		29.7			28.5			29.2			86.3			65.5	
Compound (µg/kg)															
4,4'-Ddd	3.4		<MDL	3.5		<MDL	3.4		<MDL	1.2		<MDL	1.5		<MDL
4,4'-Dde	3.4		<MDL	3.5		<MDL	3.4		<MDL	1.2		<MDL	1.5		<MDL
4,4'-Ddt	3.4		<MDL	3.5		<MDL	3.4		<MDL	1.2		<MDL	1.5		<MDL
Aldrin	3.4		<MDL	3.5		<MDL	3.4		<MDL	1.2		<MDL	1.5		<MDL
Alpha-Bhc	1.7		<MDL	1.8		<MDL	1.7		<MDL	0.58		<MDL	0.76		<MDL
Aroclor 1016	4.4		<MDL	4.6		<MDL	4.5		<MDL	1.5		<MDL	2.0		<MDL
Aroclor 1221	8.4		<MDL	8.8		<MDL	8.6		<MDL	2.9		<MDL	3.8		<MDL
Aroclor 1232	8.4		<MDL	8.8		<MDL	8.6		<MDL	2.9		<MDL	3.8		<MDL
Aroclor 1242	4.4		<MDL	4.6		<MDL	4.5		<MDL	1.5		<MDL	2.0		<MDL
Aroclor 1248	4.4		<MDL	4.6		<MDL	4.5		<MDL	1.5		<MDL	2.0		<MDL
Aroclor 1254	4.4		<MDL	4.6		<MDL	4.5		<MDL	1.5		<MDL	2.0		<MDL
Aroclor 1260	4.4		<MDL	4.6		<MDL	4.5		<MDL	1.5		<MDL	2.0		<MDL
Beta-Bhc	1.7		<MDL	1.8		<MDL	1.7		<MDL	0.58		<MDL	0.8		<MDL
Chlordane	1.7		<MDL	1.8		<MDL	1.7		<MDL	0.58		<MDL	0.8		<MDL
Delta-Bhc	1.7		<MDL	1.8		<MDL	1.7		<MDL	0.58		<MDL	0.8		<MDL
Dieldrin	3.4		<MDL	3.5		<MDL	3.4		<MDL	1.2		<MDL	1.5		<MDL
Endosulfan I	3.4		<MDL	3.5		<MDL	3.4		<MDL	1.2		<MDL	1.5		<MDL
Endosulfan II	3.4		<MDL	3.5		<MDL	3.4		<MDL	1.2		<MDL	1.5		<MDL
Endosulfan Sulfate	3.4		<MDL	3.5		<MDL	3.4		<MDL	1.2		<MDL	1.5		<MDL
Endrin	3.4		<MDL	3.5		<MDL	3.4		<MDL	1.2		<MDL	1.5		<MDL
Endrin Aldehyde	6.7		<MDL,X	7.0		<MDL,X	6.8		<MDL,X	2.3		<MDL,G	3.1		<MDL,G
Gamma-Bhc (Lindane)	1.7		<MDL	1.8		<MDL	1.7		<MDL	0.6		<MDL	0.8		<MDL
Heptachlor	1.7		<MDL	1.8		<MDL	1.7		<MDL	0.6		<MDL	0.8		<MDL
Heptachlor Epoxide	1.7		<MDL	1.8		<MDL	1.7		<MDL	0.6		<MDL	0.8		<MDL
Methoxychlor	17		<MDL	18		<MDL	17		<MDL	5.8		<MDL	7.6		<MDL
Toxaphene	34		<MDL	35		<MDL	34		<MDL	12		<MDL	15		<MDL

< MDL Result below method detection limit

G Matrix spike or SRM recovery below acceptable range. Low biased data, analyte concentration may be higher than the reported value

X Matrix spike or surrogate recovery <10%. Extremely low biased data, analyte concentration may be higher than the reported value

Table B-8 2001 Point Source Offshore Sediment Monitoring
Pesticides and PCBs (dry weight) (page 4 of 4)

	AL143P 25-Oct-01			AL172S 25-Oct-01			AL343S 25-Oct-01			AL1500S 25-Oct-01		
	MDL	Value	Qual	MDL	Value	Qual	MDL	Value	Qual	MDL	Value	Qual
Total Solids (%)		73.9			71.6			74.0			72.9	
Compound (µg/kg)												
4,4'-Ddd	1.4		<MDL	1.4		<MDL	1.4		<MDL	1.4		<MDL
4,4'-Dde	1.4		<MDL	1.4		<MDL	1.4		<MDL	1.4		<MDL
4,4'-Ddt	1.4		<MDL	1.4		<MDL	1.4		<MDL	1.4		<MDL
Aldrin	1.4		<MDL	1.4		<MDL	1.4		<MDL	1.4		<MDL
Alpha-Bhc	0.68		<MDL	0.70		<MDL	0.68		<MDL	0.69		<MDL
Aroclor 1016	1.8		<MDL	1.8		<MDL	1.8		<MDL	1.8		<MDL
Aroclor 1221	3.4		<MDL	3.5		<MDL	3.4		<MDL	3.4		<MDL
Aroclor 1232	3.4		<MDL	3.5		<MDL	3.4		<MDL	3.4		<MDL
Aroclor 1242	1.8		<MDL	1.8		<MDL	1.8		<MDL	1.8		<MDL
Aroclor 1248	1.8		<MDL	1.8		<MDL	1.8		<MDL	1.8		<MDL
Aroclor 1254	1.8		<MDL	1.8		<MDL	1.8		<MDL	1.8		<MDL
Aroclor 1260	1.8		<MDL	1.8		<MDL	1.8		<MDL	1.8		<MDL
Beta-Bhc	0.7		<MDL	0.70		<MDL	0.68		<MDL	0.7		<MDL
Chlordane	0.7		<MDL	0.70		<MDL	0.68		<MDL	0.7		<MDL
Delta-Bhc	0.7		<MDL	0.70		<MDL	0.68		<MDL	0.7		<MDL
Dieldrin	1.4		<MDL	1.4		<MDL	1.4		<MDL	1.4		<MDL
Endosulfan I	1.4		<MDL	1.4		<MDL	1.4		<MDL	1.4		<MDL
Endosulfan II	1.4		<MDL	1.4		<MDL	1.4		<MDL	1.4		<MDL
Endosulfan Sulfate	1.4		<MDL	1.4		<MDL	1.4		<MDL	1.4		<MDL
Endrin	1.4		<MDL	1.4		<MDL	1.4		<MDL	1.4		<MDL
Endrin Aldehyde	2.7		<MDL,G	2.8		<MDL,G	2.7		<MDL,G	2.7		<MDL,G
Gamma-Bhc (Lindane)	0.7		<MDL	0.7		<MDL	0.7		<MDL	0.7		<MDL
Heptachlor	0.7		<MDL	0.7		<MDL	0.7		<MDL	0.7		<MDL
Heptachlor Epoxide	0.7		<MDL	0.7		<MDL	0.7		<MDL	0.7		<MDL
Methoxychlor	6.8		<MDL	7.0		<MDL	6.8		<MDL	6.9		<MDL
Toxaphene	14		<MDL	14		<MDL	14		<MDL	14		<MDL

< MDL Result below method detection limit

G Matrix spike or SRM recovery below acceptable range. Low biased data, analyte concentration may be higher than the reported value

X Matrix spike or surrogate recovery <10%. Extremely low biased data, analyte concentration may be higher than the reported value

Table B-9 2001 Point Source Beach Sediment Monitoring
Pesticides and PCBs (dry weight)

	KSHZ03 31-Jul-01			KSSN04 1-Aug-01			LSKR01 1-Aug-01		
	MDL	Value	Qual	MDL	VALUE	Qual	MDL	VALUE	Qual
Total Solids (%)		96.1			82.1			77.2	
Compound (µg/kg)									
4,4'-Ddd	1.0		<MDL	1.2		<MDL	1.3		<MDL
4,4'-Dde	1.0		<MDL	1.2		<MDL	1.3		<MDL
4,4'-Ddt	1.0		<MDL	1.2		<MDL	1.3		<MDL
Aldrin	1.0		<MDL	1.2		<MDL	1.3		<MDL
Alpha-Bhc	1.0		<MDL	1.2		<MDL	1.3		<MDL
Aroclor 1016	1.4		<MDL	1.6		<MDL	1.7		<MDL
Aroclor 1221	2.6		<MDL	3.0		<MDL	3.2		<MDL
Aroclor 1232	2.6		<MDL	3.0		<MDL	3.2		<MDL
Aroclor 1242	1.4		<MDL	1.6		<MDL	1.7		<MDL
Aroclor 1248	1.4		<MDL	1.6		<MDL	1.7		<MDL
Aroclor 1254	1.4		<MDL	1.6		<MDL	1.7		<MDL
Aroclor 1260	1.4		<MDL,L	1.6		<MDL,L	1.7		<MDL,L
Beta-Bhc	1.0		<MDL	1.2		<MDL	1.3		<MDL
Chlordane	1.0		<MDL	1.2		<MDL	1.3		<MDL
Delta-Bhc	1.0		<MDL	1.2		<MDL	1.3		<MDL
Dieldrin	1.0		<MDL	1.2		<MDL	1.3		<MDL
Endosulfan I	1.0		<MDL	1.2		<MDL	1.3		<MDL
Endosulfan II	1.0		<MDL	1.2		<MDL	1.3		<MDL
Endosulfan Sulfate	1.0		<MDL	1.2		<MDL	1.3		<MDL
Endrin	1.0		<MDL	1.2		<MDL	1.3		<MDL
Endrin Aldehyde	1.0		<MDL,G	1.2		<MDL,G	1.3		<MDL,G
Gamma-Bhc (Lindane)	1.0		<MDL	1.2		<MDL	1.3		<MDL
Heptachlor	1.0		<MDL	1.2		<MDL	1.3		<MDL
Heptachlor Epoxide	1.0		<MDL	1.2		<MDL	1.3		<MDL
Methoxychlor	5.2		<MDL	6.1		<MDL	6.5		<MDL
Toxaphene	10		<MDL	12		<MDL	13		<MDL

< MDL Result below method detection limit
L Matrix spike or SRM recovery above acceptable range. High biased data, analyte concentration may be lower than the reported value
G Matrix spike or SRM recovery below acceptable range. Low biased data, analyte concentration may be higher than the reported value

Table B-10 2001 Ambient Beach Sediment Monitoring
Pesticides and PCBs (dry weight)

	JSVW04 31-Jul-01			KSYV02 2-Aug-01			MTLD03 1-Aug-01		
	MDL	Value	Qual	MDL	Value	Qual	MDL	Value	Qual
Total Solids (%)		97.3			78.5			76.8	
Compound (µg/kg)									
4,4'-Ddd	1.0		<MDL	1.3		<MDL	1.3		<MDL
4,4'-Dde	1.0		<MDL	1.3		<MDL	1.3		<MDL
4,4'-Ddt	1.0		<MDL	1.3		<MDL	1.3		<MDL
Aldrin	1.0		<MDL	1.3		<MDL	1.3		<MDL
Alpha-Bhc	1.0		<MDL	1.3		<MDL	1.3		<MDL
Aroclor 1016	1.3		<MDL	1.7		<MDL	1.7		<MDL
Aroclor 1221	2.6		<MDL	3.2		<MDL	3.3		<MDL
Aroclor 1232	2.6		<MDL	3.2		<MDL	3.3		<MDL
Aroclor 1242	1.3		<MDL	1.7		<MDL	1.7		<MDL
Aroclor 1248	1.3		<MDL	1.7		<MDL	1.7		<MDL
Aroclor 1254	1.3		<MDL	1.7		<MDL	1.7		<MDL
Aroclor 1260	1.3		<MDL,L	1.7		<MDL,L	1.7		<MDL,L
Beta-Bhc	1.0		<MDL	1.3		<MDL	1.3		<MDL
Chlordane	1.0		<MDL	1.3		<MDL	1.3		<MDL
Delta-Bhc	1.0		<MDL	1.3		<MDL	1.3		<MDL
Dieldrin	1.0		<MDL	1.3		<MDL	1.3		<MDL
Endosulfan I	1.0		<MDL	1.3		<MDL	1.3		<MDL
Endosulfan II	1.0		<MDL	1.3		<MDL	1.3		<MDL
Endosulfan Sulfate	1.0		<MDL	1.3		<MDL	1.3		<MDL
Endrin	1.0		<MDL	1.3		<MDL	1.3		<MDL
Endrin Aldehyde	1.0		<MDL,G	1.3		<MDL,G	1.3		<MDL,G
Gamma-Bhc (Lindane)	1.0		<MDL	1.3		<MDL	1.3		<MDL
Heptachlor	1.0		<MDL	1.3		<MDL	1.3		<MDL
Heptachlor Epoxide	1.0		<MDL	1.3		<MDL	1.3		<MDL
Methoxychlor	5.1		<MDL	6.4		<MDL	6.5		<MDL
Toxaphene	10		<MDL	13		<MDL	13		<MDL

< MDL Result below method detection limit
L Matrix spike or SRM recovery above acceptable range. High biased data, analyte concentration may be lower than the reported value
G Matrix spike or SRM recovery below acceptable range. Low biased data, analyte concentration may be higher than the reported value

Table B-11 2001 Point Source Offshore Sediment Monitoring
Organotins (µg/kg dry weight)

	Sample	Total	Mono-n-butyltin			Di-n-butyltin			Tri-n-butyltin			Tetra-n-butyltin		
locator	Date	Solids	Value	MDL	Qual	Value	MDL	Qual	Value	MDL	Qual	Value	MDL	Qual
RT2500R	7-Nov-01	30.1	13.1	5.6	B	2.7	1.2	B	1.7	0.70	G		1.3	<MDL
RT412N	5-Nov-01	31.3	15.8	5.4	B	6.5	1.1	B	2.3	0.67	G		1.3	<MDL
RT412NW	8-Nov-01	29.8	17.1	5.7	B	7.4	1.2	B,G	9.7	0.70	B,G		1.3	<MDL
RT412S	6-Nov-01	32.3	11.9	5.3	B	4.6	1.1	B	1.8	0.65	G		1.2	<MDL
RT412SW	8-Nov-01	31	15.2	5.5	B	6.1	1.1	B,G	9.1	0.68	B,G		1.3	<MDL
RT625ND	6-Nov-01	30	13.0	5.7	B	2.6	1.2	B	2.0	0.70	G		1.3	<MDL
RT625NP	8-Nov-01	30.9	21.2	5.5	B	13.7	1.1	B,G	11.2	0.68	B,G		1.3	<MDL
RT625SD	6-Nov-01	31.3	12.2	5.4	B	2.6	1.1	B	1.6	0.67	G		1.3	<MDL
RT625SP	8-Nov-01	31	20.2	5.5	B	9.0	1.1	B,G	10.2	0.68	B,G		1.3	<MDL
RT700NS	6-Nov-01	30.3	13.3	5.6	B	3.3	1.2	B	2	0.69	G		1.3	<MDL
RT715NSW	8-Nov-01	29.7	17.5	5.7	B	7.6	1.2	B,G	9.8	0.71	B,G		1.3	<MDL
RT825N	7-Nov-01	28.5	14.2	6.0	B	4.4	1.2	B	2.4	0.74	G		1.4	<MDL
RT825S	7-Nov-01	29.2	16.5	5.8	B	7.2	1.2	B,G	9.8	0.72	B,G		1.4	<MDL
AL343N	25-Oct-01	86.3	3.0	2.0	<RDL,B		0.41	<MDL,B		0.24	<MDL,G		0.46	<MDL
AL172N	25-Oct-01	65.5	3.5	2.6	<RDL,B	0.53	0.53	<RDL,B		0.32	<MDL,G		0.61	<MDL
AL143P	25-Oct-01	73.9	2.8	2.3	<RDL,B		0.47	<MDL,B		0.28	<MDL,G		0.54	<MDL
AL172S	25-Oct-01	71.6	3.9	2.4	<RDL,B		0.49	<MDL,B		0.29	<MDL,G		0.56	<MDL
AL343S	25-Oct-01	74	3.0	2.3	<RDL,B		0.47	<MDL,B		0.28	<MDL,G		0.54	<MDL
AL1500S	25-Oct-01	72.9	3.4	2.3	<RDL,B		0.48	<MDL,B		0.29	<MDL,G		0.55	<MDL

< MDL Result below method detection limit

< RDL Result above method detection limit but below reportable detection limit

L Matrix spike or SRM recovery above acceptable range. High biased data, analyte concentration may be lower than the reported value

G Matrix spike or SRM recovery below acceptable range. Low biased data, analyte concentration may be higher than the reported value

B Method blank above MDL. The analyte concentration in the sample may include laboratory contamination

Table B-12 2001 Point Source Offshore Sediment Monitoring
Comparison With Standards-Dry Weights (page 1 of 4)

Station:	RT2500R		RT412N		RT412NW		RT412S		RT412SW		Sediment Quality Standards	Lowest Apparent Effects Threshold
Date:	7-Nov-01		5-Nov-01		8-Nov-01		6-Nov-01		8-Nov-01			
% Solids:	30.10		31.3		29.8		32.3		31			
TOC (mg/kg dry wt.):	21927		22173		22584		21765		21903			
	Value	MDL	Value	MDL	Value	MDL	Value	MDL	Value	MDL		
Metals (mg/kg dry wt.)												
Arsenic	<MDL	8.0	<MDL	7.7	8.72	8.1	8.98	7.4	10.6	7.7	57	--
Cadmium	<MDL	0.47	<MDL	0.48	<MDL	0.50	<MDL	0.43	<MDL	0.45	5.1	--
Chromium	46.5	0.80	43.8	0.77	45.6	0.81	44.0	0.74	43.9	0.77	260	--
Copper	43.5	0.63	41.5	0.61	43.0	0.64	44.0	0.59	43.2	0.61	390	--
Lead	26.8	4.7	24.1	4.8	25.5	5.0	29.2	4.3	26.1	4.5	450	--
Mercury	0.226	0.07	0.179	0.06	0.168	0.07	0.204	0.06	0.177	0.06	0.41	--
Silver	<MDL	0.63	<MDL	0.61	<MDL	0.64	<MDL	0.59	<MDL	0.61	6.1	--
Zinc	100	0.80	93.9	0.77	97.7	0.81	96.6	0.74	95.8	0.77	410	--
Nonionizable Organic Compounds (ug/kg dry wt.)												
2-Methylnaphthalene	<MDL	47	<MDL	45	<MDL	47	<MDL	43	<MDL	45	--	670
Acenaphthene	<MDL	23	<MDL	22	<MDL	23	<MDL	22	<MDL	23	--	1300
Acenaphthylene	<MDL	50	<MDL	48	<MDL	50	<MDL	46	<MDL	48	--	500
Anthracene	<MDL	13	<MDL	13	<MDL	13	<MDL	12	<MDL	13	--	960
Fluorene	<MDL	43	<MDL	42	<MDL	44	<MDL	40	<MDL	42	--	540
Naphthalene	<MDL	47	<MDL	45	<MDL	47	<MDL	43	<MDL	45	--	2100
Phenanthrene	35	13	39	13	49	13	43	12	37	13	--	1500
Total LPAHs	35	13	39	13	49	13	43	12	37	13	--	5200
Benzo(A)Anthracene	39	6.6	44	6	53	7	49	6	43	6	--	1300
Benzo(A)Pyrene	59	10	60	10	83	10	76	9	67	10	--	1600
Benzo(G,H,I)Perylene	<MDL	27	<MDL	26	<MDL	27	<MDL	25	<MDL	26	--	670
Chrysene	47	13	47	13	67	13	63	12	50	13	--	1400
Dibenzo(A,H)Anthracene	<MDL	23	<MDL	22	<MDL	23	<MDL	22	<MDL	23	--	230
Fluoranthene	57	27	75	26	83	27	80	25	60	26	--	1700
Indeno(1,2,3-Cd)Pyrene	40	30	45	29	57	30	50	28	48	29	--	600
Pyrene	87	13	96	13	129	13	116	12	112	13	--	2600
Total benzofluoranthenes	21	10	28	10	43	10	32	9	35	10	--	3200
Total HPAHs	351	30	395	29	515	30	465	28	415	29	--	12000
1,2,4-Trichlorobenzene	<MDL	0.86	<MDL	0.83	<MDL	0.87	<MDL	0.80	<MDL	0.84	--	31
1,2-Dichlorobenzene	<MDL	0.86	<MDL	0.83	<MDL	0.87	<MDL	0.80	<MDL	0.84	--	35
1,4-Dichlorobenzene	<MDL	0.43	<MDL	0.42	<MDL	0.44	<MDL	0.40	<MDL	0.42	--	110
Bis(2-Ethylhexyl)Phthalate	183	22	203	21	104	22	152	21	73	22	--	1300
Benzyl Butyl Phthalate	29	20	28	19	30	20	31	19	31	19	--	63
Di-N-Butyl Phthalate	35	17	50	16	53	17	44	15	56	16	--	1400
Di-N-Octyl Phthalate	<MDL	27	<MDL	26	<MDL	27	<MDL	25	<MDL	26	--	6200
Dibenzofuran	<MDL	47	<MDL	45	<MDL	47	<MDL	43	<MDL	45	--	540
Diethyl Phthalate	<MDL	20	<MDL	19	<MDL	20	<MDL	19	<MDL	19	--	200
Dimethyl Phthalate	<MDL	37	<MDL	35	<MDL	37	<MDL	34	<MDL	35	--	71
Hexachlorobenzene	<MDL	2	<MDL	2	<MDL	2	<MDL	2	<MDL	2	--	22
Hexachlorobutadiene	<MDL	2	<MDL	2	<MDL	3	<MDL	2	<MDL	2	--	11
N-Nitrosodiphenylamine	<MDL	66	<MDL	64	<MDL	67	<MDL	62	<MDL	65	--	28
Total PCBs	<MDL	8	<MDL	8	<MDL	8	<MDL	8	29	4	--	130
Ionizable Organic Compounds (µg/kg dry wt.)												
2,4-Dimethylphenol	<MDL	23	<MDL	22	<MDL	23	<MDL	22	<MDL	23	29	--
2-Methylphenol	<MDL	63	<MDL	61	<MDL	64	<MDL	59	<MDL	61	63	--
4-Methylphenol	<MDL	53	<MDL	51	<MDL	54	<MDL	50	<MDL	52	670	--
Benzoic Acid	385	20	553	19	383	20	378	19	345	19	650	--
Benzyl Alcohol	<MDL	20	<MDL	19	<MDL	20	<MDL	19	0	19	57	--
Pentachlorophenol	<MDL	17	<MDL	16	<MDL	17	<MDL	15	<MDL	16	360	--
Phenol	37	30	144	29	32	30	43	28	<MDL	29	420	--

< MDL Result below method detection limit

Table B-12 2001 Point Source Offshore Sediment Monitoring
Comparison With Standards-Dry Weights (page 2 of 4)

Station:	RT625ND		RT625NP		RT625SD		RT625SP		RT700NS		Sediment Quality Standards	Lowest Apparent Effects Threshold
Date:	6-Nov-01		8-Nov-01		6-Nov-01		8-Nov-01		6-Nov-01			
% Solids:	30	0.005	30.9	0.005	31.3	0.005	31	0.005	30.3	0.005		
TOC (mg/kg dry wt.):	23000		22136		22907		21387		21485			
	Value	**MDL**	**Value**	**MDL**	**Value**	**MDL**	**Value**	**MDL**	**Value**	**MDL**		
Metals (mg/kg dry wt.)												
Arsenic	11.7	8.0	<MDL	7.8	<MDL	8.0	9.03	8.1	8.91	8.3	57	--
Cadmium	<MDL	0.47	<MDL	0.49	<MDL	0.48	<MDL	0.48	<MDL	0.50	5.1	--
Chromium	43.7	0.80	46.3	0.78	47.3	0.80	42.3	0.81	45.2	0.83	260	--
Copper	44.7	0.63	44.3	0.65	47.0	0.64	41.0	0.65	43.6	0.66	390	--
Lead	30.9	4.7	25.4	4.9	29.6	4.8	22.9	4.8	28.3	5.0	450	--
Mercury	0.240	0.07	0.184	0.06	0.198	0.06	0.168	0.06	0.175	0.07	0.41	--
Silver	<MDL	0.63	<MDL	0.65	<MDL	0.64	<MDL	0.65	<MDL	0.66	6.1	--
Zinc	101	0.80	99.7	0.78	104	0.80	91.9	0.81	98.7	0.83	410	--
Nonionizable Organic Compounds (ug/kg dry wt.)												
2-Methylnaphthalene	<MDL	47	<MDL	45	<MDL	45	<MDL	45	<MDL	46	--	670
Acenaphthene	<MDL	23	<MDL	23	<MDL	22	<MDL	23	<MDL	23	--	1300
Acenaphthylene	<MDL	50	<MDL	49	<MDL	48	<MDL	48	<MDL	50	--	500
Anthracene	<MDL	13	<MDL	13	<MDL	13	<MDL	13	<MDL	13	--	960
Fluorene	<MDL	43	<MDL	42	<MDL	42	<MDL	42	<MDL	43	--	540
Naphthalene	<MDL	47	<MDL	45	<MDL	45	<MDL	45	<MDL	46	--	2100
Phenanthrene	42	13	47	13	42	13	41	13	33	13	--	1500
Total LPAHs	42	13	47	13	42	13	41	13	33	13	--	5200
Benzo(A)Anthracene	44	7	47	6	55	6	45	6	47	7	--	1300
Benzo(A)Pyrene	65	10	64	10	73	10	74	10	70	10	--	1600
Benzo(G,H,I)Perylene	<MDL	27	<MDL	26	<MDL	26	<MDL	26	<MDL	26	--	670
Chrysene	50	13	61	13	64	13	51	13	53	13	--	1400
Dibenzo(A,H)Anthracene	<MDL	23	<MDL	23	<MDL	22	<MDL	23	<MDL	23	--	230
Fluoranthene	70	27	70	26	83	26	67	26	69	26	--	1700
Indeno(1,2,3-Cd)Pyrene	47	30	52	29	54	29	48	29	46	30	--	600
Pyrene	103	13	123	13	129	13	98	13	105	13	--	2600
Total benzofluoranthenes	24	10	33	10	42	10	38	10	28	10	--	3200
Total HPAHs	402	30	450	29	500	29	420	29	418	30	--	12000
1,2,4-Trichlorobenzene	<MDL	0.87	<MDL	0.84	<MDL	0.83	<MDL	0.84	<MDL	0.86	--	31
1,2-Dichlorobenzene	<MDL	0.87	<MDL	0.84	<MDL	0.83	<MDL	0.84	<MDL	0.86	--	35
1,4-Dichlorobenzene	<MDL	0.43	<MDL	0.42	<MDL	0.42	<MDL	0.42	<MDL	0.43	--	110
Bis(2-Ethylhexyl)Phthalate	152	22	110	22	990	21	65	22	109	22	--	1300
Benzyl Butyl Phthalate	29	20	42	19	30	19	32	19	31	20	--	63
Di-N-Butyl Phthalate	46	17	50	16	41	16	45	16	36	17	--	1400
Di-N-Octyl Phthalate	<MDL	27	<MDL	26	<MDL	26	<MDL	26	<MDL	26	--	6200
Dibenzofuran	<MDL	47	<MDL	45	<MDL	45	<MDL	45	<MDL	46	--	540
Diethyl Phthalate	<MDL	20	<MDL	19	<MDL	19	<MDL	19	<MDL	20	--	200
Dimethyl Phthalate	<MDL	37	<MDL	36	<MDL	35	<MDL	35	<MDL	36	--	71
Hexachlorobenzene	<MDL	2	<MDL	2	<MDL	2	<MDL	2	<MDL	2	--	22
Hexachlorobutadiene	<MDL	3	<MDL	2	<MDL	2	<MDL	2	<MDL	2	--	11
N-Nitrosodiphenylamine	<MDL	67	<MDL	65	<MDL	64	<MDL	65	<MDL	66	--	28
Total PCBs	18	4	<MDL	8	<MDL	8	<MDL	8	<MDL	8	--	130
Ionizable Organic Compounds (µg/kg dry wt.)												
2,4-Dimethylphenol	<MDL	23	<MDL	23	<MDL	22	<MDL	23	<MDL	23	29	--
2-Methylphenol	<MDL	63	<MDL	61	<MDL	61	<MDL	61	<MDL	63	63	--
4-Methylphenol	<MDL	53	<MDL	52	<MDL	51	<MDL	52	<MDL	53	670	--
Benzoic Acid	487	20	385	19	403	19	342	19	439	20	650	--
Benzyl Alcohol	<MDL	20	<MDL	19	<MDL	19	<MDL	19	<MDL	20	57	--
Pentachlorophenol	<MDL	17	<MDL	16	<MDL	16	<MDL	16	<MDL	17	360	--
Phenol	95	30	32	29	62	29	<MDL	29	81	30	420	--

< MDL Result below method detection limit

Table B-12 2001 Point Source Offshore Sediment Monitoring
Comparison With Standards-Dry Weights (page 3 of 4)

Station:	RT715NSW		RT825N		RT825S		AL343N		AL172N		Sediment Quality Standards	Lowest Apparent Effects Threshold
Date:	8-Nov-01		7-Nov-01		7-Nov-01		25-Oct-01		25-Oct-01			
% Solids:	29.7	0.005	28.5	0.005	29.2	0.005	86.3	0.005	65.5	0.005		
TOC (mg/kg dry wt.):	23131		22596		22158		2735		2626			
	Value	**MDL**	**Value**	**MDL**	**Value**	**MDL**	**Value**	**MDL**	**Value**	**MDL**		
Metals (mg/kg dry wt.)												
Arsenic	9.09	8.4	<MDL	8.8	9.93	8.6	<MDL	2.9	<MDL	3.7	57	--
Cadmium	<MDL	0.51	<MDL	0.53	<MDL	0.51	<MDL	0.17	<MDL	0.23	5.1	--
Chromium	44.8	0.84	50.2	0.88	43.8	0.86	16.5	0.29	27.2	0.37	260	--
Copper	42.4	0.67	47.7	0.70	43.2	0.68	5.40	0.23	8.24	0.29	390	--
Lead	24.9	5.1	30.4	5.3	28.7	5.1	6.14	1.7	5.80	2.3	450	--
Mercury	0.172	0.06	0.182	0.07	0.175	0.07	0.087	0.02	0.038	0.03	0.41	--
Silver	<MDL	0.67	<MDL	0.70	<MDL	0.68	<MDL	0.23	<MDL	0.29	6.1	--
Zinc	96.3	0.84	108	0.88	95.9	0.86	23.6	0.29	33.0	0.37	410	--
Nonionizable Organic Compounds (ug/kg dry wt.)												
2-Methylnaphthalene	<MDL	47	<MDL	49	<MDL	48	<MDL	16	<MDL	21	--	670
Acenaphthene	<MDL	24	<MDL	25	<MDL	24	<MDL	8	<MDL	11	--	1300
Acenaphthylene	<MDL	51	<MDL	53	<MDL	51	<MDL	17	<MDL	23	--	500
Anthracene	<MDL	13	<MDL	14	<MDL	14	<MDL	4.6	15	6.1	--	960
Fluorene	<MDL	44	<MDL	46	<MDL	45	<MDL	15	<MDL	20	--	540
Naphthalene	<MDL	47	<MDL	49	<MDL	48	<MDL	16	<MDL	21	--	2100
Phenanthrene	42	13	39	14	50	14	<MDL	5	20	6	--	1500
Total LPAHs	42	13	39	14	50	14	<MDL	5	35	6	--	5200
Benzo(A)Anthracene	45	7	44	7	52	7	7.7	2.3	11	3.1	--	1300
Benzo(A)Pyrene	76	10	69	11	73	10	13	3.5	19	4.6	--	1600
Benzo(G,H,I)Perylene	<MDL	27	<MDL	28	<MDL	27	<MDL	9.3	<MDL	12	--	670
Chrysene	51	13	58	14	61	14	7.1	4.6	10	6.1	--	1400
Dibenzo(A,H)Anthracene	<MDL	24	<MDL	25	<MDL	24	<MDL	8.1	<MDL	11	--	230
Fluoranthene	83	27	65	28	102	27	10	9.3	20	12	--	1700
Indeno(1,2,3-Cd)Pyrene	40	30	49	32	41	31	<MDL	10	<MDL	14	--	600
Pyrene	99	13	115	14	111	14	17	5	30	6	--	2600
Total benzofluoranthenes	28	10	35	11	48	10	7	4	8	5	--	3200
Total HPAHs	422	30	411	32	451	31	62	10	97	14	--	12000
1,2,4-Trichlorobenzene	<MDL	0.88	<MDL	0.91	<MDL	0.89	<MDL	0.30	<MDL	0.40	--	31
1,2-Dichlorobenzene	<MDL	0.88	<MDL	0.91	<MDL	0.89	<MDL	0.30	<MDL	0.40	--	35
1,4-Dichlorobenzene	<MDL	0.44	<MDL	0.46	<MDL	0.45	<MDL	0.15	<MDL	0.20	--	110
Bis(2-Ethylhexyl)Phthalate	53	23	143	24	122	23	22	7.8	18	10	--	1300
Benzyl Butyl Phthalate	28	20	34	21	30	21	9	7.0	13	9.2	--	63
Di-N-Butyl Phthalate	38	17	55	18	52	17	15	5.8	19	7.6	--	1400
Di-N-Octyl Phthalate	<MDL	27	<MDL	28	<MDL	27	<MDL	9.3	<MDL	12	--	6200
Dibenzofuran	<MDL	47	<MDL	49	<MDL	48	<MDL	16	<MDL	21	--	540
Diethyl Phthalate	<MDL	20	<MDL	21	<MDL	21	<MDL	7.0	<MDL	9.2	--	200
Dimethyl Phthalate	<MDL	37	<MDL	39	<MDL	38	<MDL	13	<MDL	17	--	71
Hexachlorobenzene	<MDL	2	<MDL	2	<MDL	2	<MDL	1	<MDL	1	--	22
Hexachlorobutadiene	<MDL	3	<MDL	3	<MDL	3	<MDL	1	<MDL	1	--	11
N-Nitrosodiphenylamine	<MDL	67	<MDL	70	<MDL	68	<MDL	23	<MDL	31	--	28
Total PCBs	<MDL	8	<MDL	8	<MDL	8	<MDL	3	<MDL	4	--	130
Ionizable Organic Compounds (µg/kg dry wt.)												
2,4-Dimethylphenol	<MDL	24	<MDL	25	<MDL	24	<MDL	8.1	<MDL	11	29	--
2-Methylphenol	<MDL	64	<MDL	67	<MDL	65	<MDL	22	<MDL	29	63	--
4-Methylphenol	<MDL	54	<MDL	56	<MDL	55	<MDL	19	<MDL	24	670	--
Benzoic Acid	350	20	396	21	404	21	204	7.0	227	9.2	650	--
Benzyl Alcohol	<MDL	20	<MDL	21	<MDL	21	<MDL	7.0	<MDL	9.2	57	--
Pentachlorophenol	<MDL	17	<MDL	18	<MDL	17	<MDL	6	<MDL	8	360	--
Phenol	<MDL	30	49	32	45	31	<MDL	10	<MDL	14	420	--

< MDL Result below method detection limit

Table B-12 2001 Point Source Offshore Sediment Monitoring
Comparison With Standards-Dry Weights (page 4 of 4)

Station:	AL143P		AL172S		AL343S		AL1500S		Sediment Quality Standards	Lowest Apparent Effects Threshold
Date:	25-Oct-01		25-Oct-01		25-Oct-01		25-Oct-01			
% Solids:	73.9	0.005	71.6	0.005	74	0.005	72.9	0.005		
TOC (mg/kg dry wt.):	2463		3478		2284		2908			
	Value	MDL	Value	MDL	Value	MDL	Value	MDL		
Metals (mg/kg dry wt.)										
Arsenic	<MDL	3.4	<MDL	3.4	<MDL	3.2	<MDL	3.3	57	--
Cadmium	<MDL	0.20	<MDL	0.20	<MDL	0.19	<MDL	0.19	5.1	--
Chromium	20.4	0.34	23.5	0.34	21.6	0.32	19.3	0.33	260	--
Copper	7.09	0.27	7.56	0.27	6.28	0.26	6.58	0.26	390	--
Lead	7.71	2.0	7.54	2.0	5.54	1.9	6.17	1.9	450	--
Mercury	0.039	0.03	0.039	0.03	<MDL	0.03	0.033	0.03	0.41	--
Silver	<MDL	0.27	<MDL	0.27	<MDL	0.26	<MDL	0.26	6.1	--
Zinc	33.2	0.34	30.6	0.34	28.9	0.32	29.1	0.33	410	--
Nonionizable Organic Compounds (ug/kg dry wt.)										
2-Methylnaphthalene	<MDL	19	<MDL	20	<MDL	19	<MDL	19	--	670
Acenaphthene	<MDL	9.5	<MDL	10	<MDL	9.5	<MDL	10	--	1300
Acenaphthylene	<MDL	20	<MDL	21	<MDL	20	<MDL	21	--	500
Anthracene	<MDL	5.4	<MDL	5.6	<MDL	5.4	<MDL	5.5	--	960
Fluorene	<MDL	18	<MDL	18	<MDL	18	<MDL	18	--	540
Naphthalene	<MDL	19	<MDL	20	<MDL	19	<MDL	19	--	2100
Phenanthrene	<MDL	5	9	6	7	5	14	5	--	1500
Total LPAHs	<MDL	5	9	6	7	5	14	5	--	5200
Benzo(A)Anthracene	6	2.7	9	2.8	5.4	2.7	9	2.7	--	1300
Benzo(A)Pyrene	12	4.1	13	4.2	<MDL	4.1	11	4.1	--	1600
Benzo(G,H,I)Perylene	<MDL	11	<MDL	11	<MDL	11	<MDL	11	--	670
Chrysene	6	5.4	8	5.6	<MDL	5.4	8	5.5	--	1400
Dibenzo(A,H)Anthracene	<MDL	9	<MDL	10	<MDL	9.5	<MDL	10	--	230
Fluoranthene	<MDL	11	<MDL	11	<MDL	11	13	11	--	1700
Indeno(1,2,3-Cd)Pyrene	<MDL	12	<MDL	13	<MDL	12	<MDL	12	--	600
Pyrene	18	5	20	6	15	5	24	5	--	2600
Total benzofluoranthenes	5	4	6	4	<MDL	4	<MDL	4	--	3200
Total HPAHs	47	12	56	13	21	12	65	12	--	12000
1,2,4-Trichlorobenzene	<MDL	0.35	<MDL	0.36	<MDL	0.35	<MDL	0.36	--	31
1,2-Dichlorobenzene	<MDL	0.35	<MDL	0.36	<MDL	0.35	<MDL	0.36	--	35
1,4-Dichlorobenzene	<MDL	0.18	<MDL	0.18	<MDL	0.18	<MDL	0.18	--	110
Bis(2-Ethylhexyl)Phthalate	19	9.1	<MDL	9.4	<MDL	9.1	<MDL	9.2	--	1300
Benzyl Butyl Phthalate	<MDL	8.1	12	8.4	<MDL	8.1	<MDL	8.2	--	63
Di-N-Butyl Phthalate	14	6.8	16	7.0	14	6.8	13	6.9	--	1400
Di-N-Octyl Phthalate	<MDL	11	<MDL	11	<MDL	11	<MDL	11	--	6200
Dibenzofuran	<MDL	19	<MDL	20	<MDL	19	<MDL	19	--	540
Diethyl Phthalate	<MDL	8.1	<MDL	8	<MDL	8.1	<MDL	8.2	--	200
Dimethyl Phthalate	<MDL	15	<MDL	15.4	<MDL	15	<MDL	15	--	71
Hexachlorobenzene	<MDL	1	<MDL	1	<MDL	1	<MDL	1	--	22
Hexachlorobutadiene	<MDL	1	<MDL	1	<MDL	1	<MDL	1	--	11
N-Nitrosodiphenylamine	<MDL	27	<MDL	28	<MDL	27	<MDL	27	--	28
Total PCBs	<MDL	3	<MDL	4	<MDL	3	<MDL	3	--	130
Ionizable Data (µg kg/dry wt.)										
2,4-Dimethylphenol	<MDL	9.5	<MDL	9.8	<MDL	9.5	<MDL	9.6	29	--
2-Methylphenol	<MDL	26	<MDL	27	<MDL	26	<MDL	26	63	--
4-Methylphenol	<MDL	22	<MDL	22	<MDL	22	<MDL	22	670	--
Benzoic Acid	196	8.1	219	8.4	220	8.1	236	8.2	650	--
Benzyl Alcohol	<MDL	8.1	<MDL	8.4	<MDL	8.1	<MDL	8.2	57	--
Pentachlorophenol	<MDL	7	<MDL	7	<MDL	7	<MDL	7	360	--
Phenol	<MDL	12	<MDL	13	<MDL	12	<MDL	12	420	--

< MDL Result below method detection limit

Table B-13 2001 Point Source Beach Sediment Monitoring
Comparison With Standards-Dry Weight

Station: Date: % Solids: TOC (mg/kg dry wt.):	**KSHZ03** **31-Jul-01** 96.1 <520		**KSSN04** **1-Aug-01** 82.1 1072		**LSKR01** **1-Aug-01** 77.2 2189		Sediment Quality Standards	Lowest Apparent Effects Threshold
	Value	**MDL**	**Value**	**MDL**	**Value**	**MDL**		
Metals (mg/kg dry wt.)								
Arsenic	<MDL	2.6	<MDL	3.0	<MDL	3.2	57	--
Cadmium	<MDL	0.16	<MDL	0.18	<MDL	0.19	5.1	--
Chromium	17.9	0.26	15.2	0.30	13.9	0.32	260	--
Copper	6.5	0.21	6.2	0.24	4.3	0.26	390	--
Lead	5.5	1.6	2.4	1.8	3.9	1.9	450	--
Mercury	<MDL	0.02	0.03	0.02	<MDL	0.03	0.41	--
Silver	<MDL	0.21	<MDL	0.24	<MDL	0.26	6.1	--
Zinc	27.2	0.26	18.4	0.30	19.2	0.32	410	--
Nonionizable Organic Compounds (ug/kg dry wt.)								
2-Methylnaphthalene	<MDL	15	<MDL	17	<MDL	18	--	670
Acenaphthene	<MDL	7.3	10	8.5	<MDL	9.1	--	1300
Acenaphthylene	<MDL	16	35	18	<MDL	19	--	500
Anthracene	<MDL	4.2	45	4.9	<MDL	5.2	--	960
Fluorene	<MDL	14	<MDL	16	<MDL	17	--	540
Naphthalene	<MDL	15	<MDL	17	<MDL	18	--	2100
Phenanthrene	<MDL	4.2	150	4.9	<MDL	5.2	--	1500
Total LPAHs	<MDL	16	241	18	<MDL	18	--	5200
Benzo(A)Anthracene	3.4	2.1	173	2.4	<MDL	2.6	--	1300
Benzo(A)Pyrene	5.6	3.1	188	3.7	<MDL	3.9	--	1600
Benzo(G,H,I)Perylene	<MDL	8.3	143	9.7	<MDL	10	--	670
Chrysene	4.8	4.2	153	4.9	<MDL	5.2	--	1400
Dibenzo(A,H)Anthracene	<MDL	7.3	23	8.5	<MDL	9.1	--	230
Fluoranthene	<MDL	8.3	535	9.7	<MDL	10	--	1700
Indeno(1,2,3-Cd)Pyrene	<MDL	9.4	140	11	<MDL	12	--	600
Pyrene	<MDL	4.2	446	4.9	<MDL	5.2	--	2600
Total benzofluoranthenes	<MDL	3.0	55	4.0	<MDL	4.0	--	3200
Total HPAHs	13.8	9	1855	10	<MDL	9.0	--	12000
1,2,4-Trichlorobenzene	<MDL	0.27	<MDL	0.32	<MDL	0.34	--	31
1,2-Dichlorobenzene	<MDL	0.27	<MDL	0.32	<MDL	0.34	--	35
1,4-Dichlorobenzene	<MDL	0.14	<MDL	0.16	<MDL	0.17	--	110
Bis(2-Ethylhexyl)Phthalate	16	7.0	18	8.2	31	8.7	--	1300
Benzyl Butyl Phthalate	<MDL	6.2	<MDL	7.3	<MDL	7.8	--	63
Di-N-Butyl Phthalate	12	5.2	<MDL	6.1	<MDL	6.5	--	1400
Di-N-Octyl Phthalate	<MDL	8.3	<MDL	9.7	<MDL	10	--	6200
Dibenzofuran	<MDL	15	<MDL	17	<MDL	18	--	540
Diethyl Phthalate	<MDL	6.2	<MDL	7.3	<MDL	7.8	--	200
Dimethyl Phthalate	<MDL	11	<MDL	13	<MDL	14	--	71
Hexachlorobenzene	<MDL	0.69	<MDL	0.80	<MDL	0.85	--	22
Hexachlorobutadiene	<MDL	0.78	<MDL	0.91	<MDL	0.97	--	11
N-Nitrosodiphenylamine	<MDL	21	<MDL	24	<MDL	26	--	28
Total PCBs	<MDL	3	<MDL	3	<MDL	3	--	130
Ionizable Organic Compounds (µg/kg dry wt.)								
2,4-Dimethylphenol	<MDL	7.3	<MDL	8.5	<MDL	9.1	29	--
2-Methylphenol	<MDL	20	<MDL	23	<MDL	25	63	--
4-Methylphenol	<MDL	17	<MDL	19	<MDL	21	670	--
Benzoic Acid	72	6.2	151	7.3	222	7.8	650	--
Benzyl Alcohol	<MDL	6.2	<MDL	7.3	<MDL	7.8	57	--
Pentachlorophenol	<MDL	5.2	<MDL	6.1	<MDL	6.5	360	--
Phenol	<MDL	9.4	22	11	45	12	420	--

< MDL Result below method detection limit

Table B-14 2001 Ambient Beach Sediment Monitoring
Comparison With Standards-Dry Weight

Station:	JSVW04		MTLD03		KSYV02		Sediment Quality Standards	Lowest Apparent Effects Threshold
Date:	31-Jul-01		1-Aug-01		2-Aug-01			
% Solids:	97.2		76.8		78.5			
TOC (mg/kg dry wt.):	<514		1432		1452			
	Value	MDL	Value	MDL	Value	MDL		
Metals (mg/kg dry wt.)								
Arsenic	<MDL	2.6	<MDL	3.2	<MDL	3.3	57	--
Cadmium	0.163	0.15	<MDL	0.19	<MDL	0.20	5.1	--
Chromium	18.5	0.26	16.7	0.32	16.0	0.33	260	--
Copper	9.91	0.21	9.76	0.25	4.54	0.26	390	--
Lead	9.21	1.5	7.64	1.9	4.69	2.0	450	--
Mercury	0.02	0.02	<MDL	0.03	<MDL	0.03	0.41	--
Silver	<MDL	0.21	<MDL	0.26	<MDL	0.25	6.1	--
Zinc	30.4	0.26	36.2	0.32	21.7	0.33	410	--
Nonionizable Organic Compounds (ug/kg dry wt.)								
2-Methylnaphthalene	<MDL	14	<MDL	18	<MDL	18	--	670
Acenaphthene	<MDL	7.2	<MDL	9.1	<MDL	8.9	--	1300
Acenaphthylene	<MDL	15	<MDL	20	<MDL	19	--	500
Anthracene	<MDL	4.1	<MDL	5.2	15	5.1	--	960
Fluorene	<MDL	13	<MDL	17	<MDL	17	--	540
Naphthalene	<MDL	14	<MDL	18	<MDL	18	--	2100
Phenanthrene	<MDL	4.1	<MDL	5.2	42	5.1	--	1500
Total LPAHs	<MDL	7	<MDL	20	56	19	--	5200
Benzo(A)Anthracene	<MDL	2.1	<MDL	2.6	21	2.5	--	1300
Benzo(A)Pyrene	<MDL	3.1	<MDL	3.9	7.3	3.8	--	1600
Benzo(G,H,I)Perylene	<MDL	8.2	<MDL	10	<MDL	10	--	670
Chrysene	<MDL	4.1	<MDL	5.2	17	5.1	--	1400
Dibenzo(A,H)Anthracen	<MDL	7.2	<MDL	9.1	<MDL	8.9	--	230
Fluoranthene	<MDL	8.2	<MDL	10	39	10	--	1700
Indeno(1,2,3-Cd)Pyren	<MDL	9.3	<MDL	12	<MDL	11	--	600
Pyrene	<MDL	4.1	<MDL	5.2	14	5.1	--	2600
Total benzofluoranthe	<MDL	3	<MDL	4	7	4	--	3200
Total HPAHs	<MDL	9	<MDL	10	104	10	--	12000
1,2,4-Trichlorobenzen	<MDL	0.27	<MDL	0.34	<MDL	0.33	--	31
1,2-Dichlorobenzene	<MDL	0.27	<MDL	0.34	<MDL	0.33	--	35
1,4-Dichlorobenzene	<MDL	0.13	<MDL	0.17	<MDL	0.17	--	110
Bis(2-Ethylhexyl)Phth	18	6.9	26	8.7	17	8.5	--	1300
Benzyl Butyl Phthalat	<MDL	6.2	<MDL	7.8	<MDL	7.6	--	63
Di-N-Butyl Phthalate	8.4	5.1	16.28	6.5	<MDL	6.4	--	1400
Di-N-Octyl Phthalate	<MDL	8.2	<MDL	10	<MDL	10	--	6200
Dibenzofuran	<MDL	14	<MDL	18	<MDL	18	--	540
Diethyl Phthalate	<MDL	6	<MDL	7.8	<MDL	7.6	--	200
Dimethyl Phthalate	<MDL	11	<MDL	14	<MDL	14	--	71
Hexachlorobenzene	<MDL	0.68	<MDL	0.86	<MDL	0.84	--	22
Hexachlorobutadiene	<MDL	0.77	<MDL	0.98	<MDL	0.96	--	11
N-Nitrosodiphenylamin	<MDL	21	<MDL	26	<MDL	25	--	28
Total PCBs	<MDL	3	<MDL	3	<MDL	3	--	130
Ionizable Organic Compounds (µg/kg dry wt.)								
2,4-Dimethylphenol	<MDL	7.2	<MDL	9.1	<MDL	8.9	29	--
2-Methylphenol	<MDL	20	<MDL	25	<MDL	24	63	--
4-Methylphenol	<MDL	16	<MDL	21	<MDL	20	670	--
Benzoic Acid	53	6.2	120	7.8	220	7.6	650	--
Benzyl Alcohol	<MDL	6.2	<MDL	7.8	<MDL	7.6	57	--
Pentachlorophenol	<MDL	5.1	<MDL	6.5	<MDL	6.4	360	--
Phenol	11	9.3	26	12	41	11	420	--

< **MDL** Result below method detection limit

Table B-15 2001 Point Source Offshore Sediment Monitoring
Comparison With Organic Carbon Normalized Standards (page 1 of 3)

Station:	RT2500R		RT412N		RT412NW		RT412S		RT412SW		Sediment Quality Standards	Lowest Apparent Effects Threshold
Date:	7-Nov-01		5-Nov-01		8-Nov-01		6-Nov-01		8-Nov-01			
% Solids:	30.10		31.3		29.8		32.3		31			
TOC (mg/kg dry wt.):	21927		22173		22584		21765		21903			
	Value	**MDL**	**Value**	**MDL**	**Value**	**MDL**	**Value**	**MDL**	**Value**	**MDL**		
Nonionizable Organic Compounds (mg/kg organic carbon.)												
2-Methylnaphthalene	<MDL	2.1	<MDL	2.0	<MDL	2.1	<MDL	2.0	<MDL	2.1	38	64
Acenaphthene	<MDL	1.1	<MDL	1.0	<MDL	1.0	<MDL	1.0	<MDL	1.0	66	66
Acenaphthylene	<MDL	2.3	<MDL	2.2	<MDL	2.2	<MDL	2.1	<MDL	2.2	16	57
Anthracene	<MDL	0.61	<MDL	0.58	<MDL	0.59	<MDL	0.57	<MDL	0.59	220	1200
Fluorene	<MDL	2.0	<MDL	1.9	<MDL	1.9	<MDL	1.8	<MDL	1.9	23	79
Naphthalene	<MDL	2.1	<MDL	2.0	<MDL	2.1	<MDL	2.0	<MDL	2.1	99	170
Phenanthrene	1.6	0.61	1.7	0.58	2.2	0.59	2.0	0.57	1.7	0.59	100	480
Total LPAHs	1.6	0.61	1.7	0.58	2.2	0.59	2.0	0.57	1.7	0.59	370	780
Benzo(A)Anthracene	1.8	0.30	2.0	0.29	2.3	0.30	2.2	0.28	1.9	0.29	110	270
Benzo(A)Pyrene	2.7	0.45	2.7	0.43	3.7	0.45	3.5	0.43	3.0	0.44	99	210
Benzo(G,H,I)Perylene	<MDL	1.2	<MDL	1.2	<MDL	1.2	<MDL	1.1	<MDL	1.2	31	78
Chrysene	2.1	0.61	2.1	0.58	3.0	0.59	2.9	0.57	2.3	0.59	110	460
Dibenzo(A,H)Anthracene	<MDL	1.1	<MDL	1.0	<MDL	1.0	<MDL	1.0	<MDL	1.0	12	33
Fluoranthene	2.6	1.2	3.4	1.2	3.7	1.2	3.7	1.1	2.7	1.2	160	1200
Indeno(1,2,3-Cd)Pyrene	1.8	1.4	2.0	1.3	2.5	1.3	2.3	1.3	2.2	1.3	34	88
Pyrene	4.0	0.6	4.3	0.58	5.7	0.59	5.3	0.57	5.1	0.59	1000	1400
Total benzofluoranthenes	0.96	0.46	1.26	0.45	1.90	0.44	1.47	0.41	1.60	0.46	230	450
Total HPAHs	16.0	7.3	17.8	6.9	22.8	7.1	21.4	6.8	19.0	7.1	960	5300
1,2,4-Trichlorobenzene	<MDL	0.04	<MDL	0.04	<MDL	0.04	<MDL	0.04	<MDL	0.04	0.81	1.8
1,2-Dichlorobenzene	<MDL	0.04	<MDL	0.04	<MDL	0.04	<MDL	0.04	<MDL	0.04	2.3	2.3
1,4-Dichlorobenzene	<MDL	0.02	<MDL	0.02	<MDL	0.02	<MDL	0.02	<MDL	0.02	3.1	9
Bis(2-Ethylhexyl)Phthalate	8.3	1.0	9.1	0.97	4.6	1.0	7.0	0.95	3.3	1.0	47	78
Benzyl Butyl Phthalate	1.3	0.91	1.3	0.86	1.3	0.89	1.4	0.85	1.4	0.88	4.9	64
Di-N-Butyl Phthalate	1.6	0.76	2.3	0.72	2.4	0.74	2.0	0.71	2.6	0.74	220	1700
Di-N-Octyl Phthalate	<MDL	1.2	<MDL	1.2	<MDL	1.2	<MDL	1.1	<MDL	1.2	58	4500
Dibenzofuran	<MDL	2.1	<MDL	2.0	<MDL	2.1	<MDL	2.0	<MDL	2.1	15	58
Diethyl Phthalate	<MDL	0.91	<MDL	0.86	<MDL	0.89	<MDL	0.85	<MDL	0.88	61	110
Dimethyl Phthalate	<MDL	1.7	<MDL	1.6	<MDL	1.6	<MDL	1.6	<MDL	1.6	53	53
Hexachlorobenzene	<MDL	0.10	<MDL	0.10	<MDL	0.10	<MDL	0.09	<MDL	0.10	0.38	2.3
Hexachlorobutadiene	<MDL	0.11	<MDL	0.11	<MDL	0.11	<MDL	0.11	<MDL	0.11	3.9	6.2
N-Nitrosodiphenylamine	<MDL	3.0	<MDL	2.9	<MDL	3.0	<MDL	2.8	<MDL	2.9	11	11
Total PCBs	<MDL	0.36	<MDL	0.36	<MDL	0.35	<MDL	0.37	1.33	0.19	12	65

< MDL Result below method detection limit

Table B-15 2001 Point Source Offshore Sediment Monitoring
Comparison With Organic Carbon Normalized Standards (page 2 of 3)

Station:	RT625ND		RT625NP		RT625SD		RT625SP		RT700NS		Sediment Quality Standards	Lowest Apparent Effects Threshold
Date:	6-Nov-01		8-Nov-01		6-Nov-01		8-Nov-01		6-Nov-01			
% Solids:	30	0.005	30.9	0.005	31.3	0.005	31	0.005	30.3	0.005		
TOC (mg/kg dry wt.):	23000		22136		22907		21387		21485			
	Value	**MDL**	**Value**	**MDL**	**Value**	**MDL**	**Value**	**MDL**	**Value**	**MDL**		
Nonionizable Organic Compounds (mg/kg organic carbon.)												
2-Methylnaphthalene	<MDL	2.1	<MDL	2.0	<MDL	2.0	<MDL	2.1	<MDL	2.1	38	64
Acenaphthene	<MDL	1.1	<MDL	1.0	<MDL	1.0	<MDL	1.0	<MDL	1.1	66	66
Acenaphthylene	<MDL	2.3	<MDL	2.2	<MDL	2.1	<MDL	2.2	<MDL	2.3	16	57
Anthracene	<MDL	0.61	<MDL	0.6	<MDL	0.6	<MDL	0.59	<MDL	0.60	220	1200
Fluorene	<MDL	2.0	<MDL	1.90	<MDL	1.8	<MDL	1.9	<MDL	2.0	23	79
Naphthalene	<MDL	2.1	<MDL	2.0	<MDL	2.0	<MDL	2.1	<MDL	2.1	99	170
Phenanthrene	1.9	0.61	2.1	0.58	1.9	0.57	1.9	0.59	1.5	0.60	100	480
Total LPAHs	1.9	0.61	2.1	0.58	1.9	0.57	1.9	0.59	1.5	0.60	370	780
Benzo(A)Anthracene	2.0	0.30	2.1	0.29	2.4	0.28	2.0	0.30	2.1	0.30	110	270
Benzo(A)Pyrene	3.0	0.46	2.9	0.44	3.2	0.42	3.4	0.44	3.2	0.45	99	210
Benzo(G,H,I)Perylene	<MDL	1.2	<MDL	1.2	<MDL	1.1	<MDL	1.2	<MDL	1.2	31	78
Chrysene	2.3	0.61	2.8	0.58	2.8	0.57	2.3	0.59	2.4	0.60	110	460
Dibenzo(A,H)Anthracene	<MDL	1.1	<MDL	1.0	<MDL	1.0	<MDL	1.0	<MDL	1.1	12	33
Fluoranthene	3.2	1.2	3.2	1.2	3.7	1.1	3.1	1.2	3.1	1.2	160	1200
Indeno(1,2,3-Cd)Pyrene	2.1	1.4	2.3	1.3	2.4	1.3	2.2	1.3	2.1	1.4	34	88
Pyrene	4.7	0.61	5.6	0.58	5.7	0.57	4.5	0.59	4.8	0.60	1000	1400
Total benzofluoranthenes	1.0	0.4	1.5	0.5	1.8	0.4	1.8	0.5	1.3	0.5	230	450
Total HPAHs	18.3	7.3	20.3	7.0	22.1	6.8	19.3	7.1	19.1	7.2	960	5300
1,2,4-Trichlorobenzene	<MDL	0.04	<MDL	0.04	<MDL	0.04	<MDL	0.04	<MDL	0.04	0.81	1.8
1,2-Dichlorobenzene	<MDL	0.04	<MDL	0.04	<MDL	0.04	<MDL	0.04	<MDL	0.04	2.3	2.3
1,4-Dichlorobenzene	<MDL	0.02	<MDL	0.02	<MDL	0.02	<MDL	0.02	<MDL	0.02	3.1	9
Bis(2-Ethylhexyl)Phthalate	6.9	1.0	5.0	1.0	43.9	0.95	3.0	1.0	5.0	1.0	47	78
Benzyl Butyl Phthalate	1.3	0.91	1.9	0.88	1.3	0.85	1.5	0.89	1.4	0.90	4.9	64
Di-N-Butyl Phthalate	2.1	0.76	2.3	0.73	1.8	0.71	2.1	0.74	1.7	0.75	220	1700
Di-N-Octyl Phthalate	<MDL	1.2	<MDL	1.2	<MDL	1.1	<MDL	1.2	<MDL	1.2	58	4500
Dibenzofuran	<MDL	2.1	<MDL	2.0	<MDL	2.0	<MDL	2.1	<MDL	2.1	15	58
Diethyl Phthalate	<MDL	0.91	<MDL	0.88	<MDL	0.85	<MDL	0.89	<MDL	0.90	61	110
Dimethyl Phthalate	<MDL	1.7	<MDL	1.6	<MDL	1.6	<MDL	1.6	<MDL	1.7	53	53
Hexachlorobenzene	<MDL	0.10	<MDL	0.10	<MDL	0.09	<MDL	0.10	<MDL	0.10	0.38	2.3
Hexachlorobutadiene	<MDL	0.11	<MDL	0.11	<MDL	0.11	<MDL	0.11	<MDL	0.11	3.9	6.2
N-Nitrosodiphenylamine	<MDL	3.0	<MDL	2.9	<MDL	2.8	<MDL	3.0	<MDL	3.0	11	11
Total PCBs	0.77	0.19	<MDL	0.36	<MDL	0.35	<MDL	0.37	<MDL	0.37	12	65

< MDL Result below method detection limit

Table B-15 2001 Point Source Offshore Sediment Monitoring
Comparison With Organic Carbon Normalized Standards (page 3 of 3)

Station:	RT715NSW		RT825N		RT825S		Sediment Quality Standards	Lowest Apparent Effects Threshold
Date:	8-Nov-01		7-Nov-01		7-Nov-01			
% Solids:	29.7	0.005	28.5	0.005	29.2	0.005		
TOC (mg/kg dry wt.):	23131		22596		22158			
	Value	**MDL**	**Value**	**MDL**	**Value**	**MDL**		
Nonionizable Organic Compounds (mg/kg organic carbon.)								
2-Methylnaphthalene	<MDL	2.1	<MDL	2.2	<MDL	2.1	38	64
Acenaphthene	<MDL	1.1	<MDL	1.1	<MDL	1.1	66	66
Acenaphthylene	<MDL	2.3	<MDL	2.4	<MDL	2.3	16	57
Anthracene	<MDL	0.61	<MDL	0.63	<MDL	0.61	220	1200
Fluorene	<MDL	2.0	<MDL	2.1	<MDL	2.0	23	79
Naphthalene	<MDL	2.1	<MDL	2.2	<MDL	2.1	99	170
Phenanthrene	1.9	0.61	1.8	0.63	2.2	0.61	100	480
Total LPAHs	1.9	0.61	1.8	0.63	2.2	0.61	370	780
Benzo(A)Anthracene	2.0	0.3	2.0	0.3	2.3	0.3	110	270
Benzo(A)Pyrene	3.5	0.5	3.1	0.5	3.2	0.5	99	210
Benzo(G,H,I)Perylene	<MDL	1.2	<MDL	1.3	<MDL	1.2	31	78
Chrysene	2.3	0.6	2.6	0.6	2.7	0.6	110	460
Dibenzo(A,H)Anthracene	<MDL	1.1	<MDL	1.1	<MDL	1.1	12	33
Fluoranthene	3.8	1.2	2.9	1.3	4.5	1.2	160	1200
Indeno(1,2,3-Cd)Pyrene	1.8	1.4	2.2	1.4	1.8	1.4	34	88
Pyrene	4.5	0.6	5.2	0.6	4.9	0.6	1000	1400
Total benzofluoranthenes	1.2	0.4	1.5	0.5	2.2	0.5	230	450
Total HPAHs	19.2	7.3	19.6	7.6	21.7	7.3	960	5300
1,2,4-Trichlorobenzene	<MDL	0.04	<MDL	0.04	<MDL	0.04	0.81	1.8
1,2-Dichlorobenzene	<MDL	0.04	<MDL	0.04	<MDL	0.04	2.3	2.3
1,4-Dichlorobenzene	<MDL	0.02	<MDL	0.02	<MDL	0.02	3.1	9
Bis(2-Ethylhexyl)Phthalate	2.4	1.0	6.4	1.1	5.4	1.0	47	78
Benzyl Butyl Phthalate	1.3	0.92	1.6	0.95	1.3	0.91	4.9	64
Di-N-Butyl Phthalate	1.7	0.77	2.48	0.79	2.32	0.76	220	1700
Di-N-Octyl Phthalate	<MDL	1.2	<MDL	1.3	<MDL	1.2	58	4500
Dibenzofuran	<MDL	2.1	<MDL	2.2	<MDL	2.1	15	58
Diethyl Phthalate	<MDL	0.92	<MDL	0.95	<MDL	0.91	61	110
Dimethyl Phthalate	<MDL	1.7	<MDL	1.7	<MDL	1.7	53	53
Hexachlorobenzene	<MDL	0.10	<MDL	0.10	<MDL	0.10	0.38	2.3
Hexachlorobutadiene	<MDL	0.12	<MDL	0.12	<MDL	0.11	3.9	6.2
N-Nitrosodiphenylamine	<MDL	3.1	<MDL	3.2	<MDL	3.0	11	11
Total PCBs	<MDL	0.35	<MDL	0.35	<MDL	0.36	12	65

< MDL Result below method detection limit

APPENDIX C

SHELLFISH MONITORING DATA

C-1 2001 Metals
C-2 2001 Semi-volatile organics
C-3 2001 Chlorinated pesticides/PCBs
C-4 2001 Bacteria

Table C-1 2001 Shellfish Monitoring
Metals

	KSHZ03 18-Jul-01			KSSN04 19-Jul-01			KSSN05 19-Jul-01			LSKR01 17-Jul-01			JSVW04 18-Jul-01			MTLD03 17-Jul-01		
	MDL	Wet Wt	Dry Wt	MDL	Wet Wt	Dry Wt	MDL	Wet Wt	Dry Wt	MDL	Wet Wt	Dry Wt	MDL	Wet Wt	Dry Wt	MDL	Wet Wt	Dry Wt
Total solids (%)		20.5			18.2			18.4			19			17.4			17.9	
Parameter (mg/kg)																		
Aluminum	1	19.2	93.7	1	33.8	186	1	86.1	468	0.99	38	200	1	20	115	1	19.05	106
Arsenic	0.02	2.31	11.3	0.02	2.73	15	0.02	2.45	13.3	0.02	3.19	16.8	0.02	3.42	19.7	0.02	3.295	18.4
Beryllium	0.008	<MDL	<MDL	0.008	<MDL	<MDL	0.008	<MDL	<MDL	0.008	<MDL	<MDL	0.008	<MDL	<MDL	0.008	<MDL	<MDL
Cadmium	0.004	0.0567	0.277	0.004	0.0593	0.326	0.004	0.0577	0.314	0.004	0.0588	0.309	0.004	0.059	0.339	0.004	0.0697	0.389
Chromium	0.05	0.322	1.57	0.05	0.556	3.05	0.05	0.519	2.82	0.05	0.419	2.21	0.05	0.465	2.67	0.05	0.3715	2.08
Copper	0.04	1.97	9.61	0.04	1.94	10.7	0.04	1.71	9.29	0.04	2.2	11.6	0.04	4.05	23.3	0.04	1.405	7.85
Iron	0.5	38.9	190	0.5	54	296.7	0.5	146	793	0.5	68.7	361.6	0.5	41.5	239	0.5	35.15	196
Lead	0.008	0.135	0.659	0.008	0.0811	0.446	0.008	0.0875	0.476	0.008	0.0989	0.521	0.008	0.137	0.787	0.008	0.0603	0.337
Manganese	0.02	1.54	7.51	0.02	1.66	9.12	0.02	2.78	15.1	0.02	1.57	8.26	0.02	1.4	8.05	0.02	0.894	4.99
Mercury	0.0038	0.0057	0.028	0.004	0.0063	0.035	0.0039	0.006	0.033	0.004	0.0058	0.031	0.0039	0.0079	0.045	0.0038	0.0099	0.055
Nickel	0.012	0.82	4	0.012	0.904	4.97	0.012	1.14	6.20	0.012	0.937	4.93	0.012	0.798	4.59	0.012	0.722	4.03
Selenium	0.06	0.489	2.39	0.06	0.37	2.03	0.06	0.354	1.92	0.06	0.526	2.77	0.06	0.405	2.33	0.06	0.3135	1.75
Silver	0.04	0.535	2.61	0.04	0.671	3.69	0.04	0.2	1.09	0.04	0.946	4.98	0.04	1.45	8.33	0.04	0.755	4.22
Zinc	0.05	16	78.0	0.05	17.6	96.7	0.05	17.3	94.0	0.05	16.9	88.9	0.05	14.2	81.6	0.05	14.35	80.2

Ambient stations are shaded

< **MDL** Result below method detection limit

Table C-2 2001 Shellfish Monitoring
Semi-volatile Organics (dry weight) (page 1 of 2)

	KSHZ03		KSSN04		KSSN05		LSKR01		JSVW04		MTLD03	
	18-Jul-01		19-Jul-01		19-Jul-01		17-Jul-01		18-Jul-01		17-Jul-01	
	Value	MDL	Value	MDL	Value	MDL	Value	MDL	Value	MDL	Value	MDL
Total solids	20.5		18.2		18.4		19		17.4		16.35	
% Lipids	0.69	0.05	0.51	0.05	0.45	0.05	0.5	0.05	0.52	0.05	0.43	0.05
Compound (µg/kg)												
1,2,4-Trichlorobenzene	<MDL	5.3	<MDL	5.3	<MDL	5.3	<MDL	5.3	<MDL	5.3	<MDL	5.3
1,2-Dichlorobenzene	<MDL	5.3	<MDL	5.3	<MDL	5.3	<MDL	5.3	<MDL	5.3	<MDL	5.3
1,2-Diphenylhydrazine	<MDL	130	<MDL	130	<MDL	130	<MDL	130	<MDL	130	<MDL	130
1,3-Dichlorobenzene	<MDL	5.3	<MDL	5.3	<MDL	5.3	<MDL	5.3	<MDL	5.3	<MDL	5.3
1,4-Dichlorobenzene	<MDL	2.6	<MDL	2.6	<MDL	2.6	<MDL	2.6	<MDL	2.6	<MDL	2.6
2,4,5-Trichlorophenol	<MDL	53	<MDL	53	<MDL	53	<MDL	53	<MDL	53	<MDL	53
2,4,6-Trichlorophenol	<MDL	53	<MDL	53	<MDL	53	<MDL	53	<MDL	53	<MDL	53
2,4-Dichlorophenol	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
2,4-Dimethylphenol	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
2,4-Dinitrophenol	<MDL	130	<MDL	130	<MDL	130	<MDL	130	<MDL	130	<MDL	130
2,4-Dinitrotoluene	<MDL	53	<MDL	53	<MDL	53	<MDL	53	<MDL	53	<MDL	53
2,6-Dinitrotoluene	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
2-Chloronaphthalene	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
2-Chlorophenol	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
2-Methylnaphthalene	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
2-Methylphenol	<MDL	53	<MDL	53	<MDL	53	<MDL	53	<MDL	53	<MDL	53
2-Nitroaniline	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
2-Nitrophenol	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
3-Nitroaniline	<MDL	53	<MDL	53	<MDL	53	<MDL	53	<MDL	53	<MDL	53
4,6-Dinitro-O-Cresol	<MDL	53	<MDL	53	<MDL	53	<MDL	53	<MDL	53	<MDL	53
4-Bromophenyl Phenyl Ether	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
4-Chloro-3-Methylphenol	<MDL,L	53	<MDL,L	53	<MDL,L	53	<MDL,L	53	<MDL,L	53	<MDL,L	53
4-Chloroaniline	<MDL	53	<MDL	53	<MDL	53	<MDL	53	<MDL	53	<MDL	53
4-Chlorophenyl Phenyl Ether	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
4-Methylphenol	<MDL	53	<MDL	53	<MDL	53	<MDL	53	<MDL	53	<MDL	53
4-Nitroaniline	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
4-Nitrophenol	<MDL	130	<MDL	130	<MDL	130	<MDL	130	<MDL	130	<MDL	130
Acenaphthene	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
Acenaphthylene	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
Aniline	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
Anthracene	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27

Ambient stations are shaded

L Matrix spike or SRM recovery above acceptable range. High biased data, analyte concentration may be lower than the reported value

< MDL Result below method detection limit

Table C-2 2001 Shellfish Monitoring
Semi-volatile Organics (dry weight) (page 2 of 2)

	KSHZ03		KSSN04		KSSN05		LSKR01		JSVW04		MTLD03	
	18-Jul-01		19-Jul-01		19-Jul-01		17-Jul-01		18-Jul-01		17-Jul-01	
	Value	MDL	Value	MDL	Value	MDL	Value	MDL	Value	MDL	Value	MDL
Total solids	20.5		18.2		18.4		19		17.4		16.35	
% Lipids	0.69	0.05	0.51	0.05	0.45	0.05	0.5	0.05	0.52	0.05	0.43	0.05
Compound (µg/kg)												
Benzo(A)Anthracene	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
Benzo(A)Pyrene	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
Benzo(B)Fluoranthene	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
Benzo(G,H,I)Perylene	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
Benzo(K)Fluoranthene	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
Benzoic Acid	1580	53	1990	53	2060	53	2920	53	1150	53	3100	53
Benzyl Alcohol	<MDL	53	<MDL	53	<MDL	53	<MDL	53	<MDL	53	<MDL	53
Benzyl Butyl Phthalate	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
Bis(2-Chloroethoxy)Methane	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
Bis(2-Chloroethyl)Ether	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
Bis(2-Chloroisopropyl)Ether	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
Bis(2-Ethylhexyl)Phthalate	105	27	441	27	145	27	<MDL	27	95.5	27	135	27
Carbazole	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
Chrysene	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
Coprostanol	<MDL	270	<MDL	270	<MDL	270	<MDL	270	<MDL	270	<MDL	270
Di-N-Butyl Phthalate	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
Di-N-Octyl Phthalate	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
Dibenzo(A,H)Anthracene	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
Dibenzofuran	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
Diethyl Phthalate	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
Dimethyl Phthalate	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
Fluoranthene	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
Fluorene	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
Hexachlorobenzene	<MDL	13	<MDL	13	<MDL	13	<MDL	13	<MDL	13	<MDL	13
Hexachlorobutadiene	<MDL	15	<MDL	15	<MDL	15	<MDL	15	<MDL	15	<MDL	15
Hexachlorocyclopentadiene	<MDL	53	<MDL	53	<MDL	53	<MDL	53	<MDL	53	<MDL	53
Hexachloroethane	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
Indeno(1,2,3-Cd)Pyrene	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
Isophorone	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
N-Nitrosodi-N-Propylamine	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
N-Nitrosodimethylamine	<MDL	130	<MDL	130	<MDL	130	<MDL	130	<MDL	130	<MDL	130
N-Nitrosodiphenylamine	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
Naphthalene	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
Nitrobenzene	<MDL	53	<MDL	53	<MDL	53	<MDL	53	<MDL	53	<MDL	53
Pentachlorophenol	<MDL,L	53	<MDL,L	53	<MDL,L	53	<MDL,L	53	<MDL,L	53	<MDL,L	53
Phenanthrene	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27	<MDL	27
Phenol	<MDL	130	<MDL	130	<MDL	130	<MDL	130	<MDL	130	<MDL	130
Pyrene	<MDL,L	27	<MDL,L	27	<MDL,L	27	<MDL,L	27	<MDL,L	27	<MDL,L	27

Ambient stations are shaded

L Matrix spike or SRM recovery above acceptable range. High biased data, analyte concentration may be lower than the reported value

< MDL Result below method detection limit

Table C-3 2001 Shellfish Monitoring
Chlorinated Pesticides/PCBs (dry weight)

	KSHZ03		KSSN04		KSSN05		LSKR01		JSVW04		MTLD03	
	18-Jul-01		19-Jul-01		19-Jul-01		17-Jul-01		18-Jul-01		17-Jul-01	
	Value	MDL	Value	MDL	Value	MDL	Value	MDL	Value	MDL	Value	MDL
Total solids (%)	20.5		18.2		18.4		19		17.4		16.35	
% Lipids	0.69	0.05	0.51	0.05	0.45	0.05	0.5	0.05	0.52	0.05	0.43	0.05
Compound (µg/kg)												
4,4'-Ddd	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3
4,4'-Dde	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3
4,4'-Ddt	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3
Aldrin	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3
Alpha-Bhc	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3
Aroclor 1016	<MDL	13	<MDL	13	<MDL	13	<MDL	13	<MDL	13	<MDL	13
Aroclor 1221	<MDL	13	<MDL	13	<MDL	13	<MDL	13	<MDL	13	<MDL	13
Aroclor 1232	<MDL	13	<MDL	13	<MDL	13	<MDL	13	<MDL	13	<MDL	13
Aroclor 1242	<MDL	13	<MDL	13	<MDL	13	<MDL	13	<MDL	13	<MDL	13
Aroclor 1248	<MDL	13	<MDL	13	<MDL	13	<MDL	13	<MDL	13	<MDL	13
Aroclor 1254	<MDL	13	<MDL	13	<MDL	13	<MDL	13	<MDL	13	<MDL	13
Aroclor 1260	<MDL	13	<MDL	13	<MDL	13	<MDL	13	<MDL	13	<MDL	13
Beta-Bhc	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3
Chlordane	<MDL	6.7	<MDL	6.7	<MDL	6.7	<MDL	6.7	<MDL	6.7	<MDL	6.7
Delta-Bhc	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3
Dieldrin	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3
Endosulfan I	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3
Endosulfan Ii	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3
Endosulfan Sulfate	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3
Endrin	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3
Endrin Aldehyde	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3
Gamma-Bhc (Lindane)	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3
Heptachlor	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3
Heptachlor Epoxide	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3	<MDL	1.3
Methoxychlor	<MDL	6.7	<MDL	6.7	<MDL	6.7	<MDL	6.7	<MDL	6.7	<MDL	6.7
Toxaphene	<MDL	13	<MDL	13	<MDL	13	<MDL	13	<MDL	13	<MDL	13

Ambient stations are shaded

< **MDL** Result below method detection limit

Table C-4 2001 Shellfish Monitoring
Bacteria (page 1 of 2)

Station	Date	Fecal Coliform (MPN/100g)	*Enterococcus* (MPN/100g)
KSHZ03	21-May-01	130	200
	25-Jun-01	330	1300
	23-Jul-01	24000	4900
	21-Aug-01	20	110
	18-Sep-01	80	130
KSSN04	21-May-01	270	80
	26-Jun-01	170	170
	23-Jul-01	330	110
	20-Aug-01	330	170
	17-Sep-01	220	420
LSKR01	23-May-01	490	70
	25-Jun-01	1700	790
	23-Jul-01	490	940
	21-Aug-01	13000	4900
	16-Sep-01	80	270
MSSM05	22-May-01	490	190
	25-Jun-01	790	330
	24-Jul-01	3300	13000
	20-Aug-01	3500	1700
	16-Sep-01	11000	1700

Ambient stations are shaded

Table C-4 2001 Shellfish Monitoring
Bacteria (page 2 of 2)

Station	Date	Fecal Coliform (MPN/100g)	*Enterococcus* (MPN/100g)
MTEC01	22-May-01	490	230
	25-Jun-01	20	70
	23-Jul-01	50	330
	20-Aug-01	20	80
	17-Sep-01	130	170
MTLD03	21-May-01	250	100
	26-Jun-01	150	80
	24-Jul-01	105	490
	22-Aug-01	150	210
	17-Sep-01	50	50
JSVW04	21-May-01	130	140
	25-Jun-01	340	700
	18-Jul-01	230	220
	21-Aug-01	330	790
	17-Sep-01	230	1300
KRJY01	21-May-01	460	130
	25-Jun-01	130	790
	24-Jul-01	80	790
	20-Aug-01	700	940
	17-Sep-01	80	220
KSLU03	21-May-01	460	4600
	25-Jun-01	170	1100
	23-Jul-01	50	490
	21-Aug-01	490	2300
	18-Sep-01	1300	500

Ambient stations are shaded

APPENDIX D

ALGAE MONITORING DATA

D-1 2001 Point source metals
D-2 2001 Ambient metals

Table D-1 2001 Point Source Macroalgae Monitoring
Metals (dry weight)

	KSHZ03 31-Jul-01		KSSN04 1-Aug-01		KSSN05 1-Aug-01		LSKR01 1-Aug-01	
	Value	**MDL**	**Value**	**MDL**	**Value**	**MDL**	**Value**	**MDL**
Total solids (%)	9.97		17.1		14.35		15	
Parameter								
Aluminum	373	10	607	5.9	2310	7	154	7
Arsenic	3.85	0.20	5.32	0.12	6.56	0.14	4.95	0.13
Beryllium	<MDL	0.08	<MDL	0.05	0.06	0.06	<MDL	0.05
Cadmium	0.292	0.04	0.425	0.02	0.262	0.03	0.557	0.03
Chromium	1.60	0.50	2.10	0.30	6.62	0.35	0.87	0.33
Copper	10.6	0.4	33.2	0.24	29.4	0.3	7.5	0.3
Iron	618	5	1033	3.0	3471	4	243	3
Lead	0.829	0.08	0.834	0.05	1.51	0.06	0.140	0.05
Manganese	27.0	0.2	30.2	0.12	213.1	0.1	21.0	0.1
Mercury	<MDL	0.04	<MDL	0.02	<MDL	0.03	<MDL	0.03
Nickel	2.01	2.0	2.96	1.2	9.17	1.4	2.20	1.3
Selenium	<MDL	1.5	<MDL	0.89	<MDL	1.06	<MDL	1.00
Silver	<MDL	0.08	<MDL	0.05	0.059	0.06	<MDL	0.05
Zinc	11.4	0.5	15.8	0.30	18.9	0.4	9.9	0.3

Table D-2 2001 Ambient Macroalgae Monitoring
Metals (dry weight)

	JSVW04 2-Aug-01		MTLD03 2-Aug-01		KSYV02 2-Aug-01		KSLU03 2-Aug-01	
	Value	**MDL**	**Value**	**MDL**	**Value**	**MDL**	**Value**	**MDL**
Total solids (%)	12.2		13.2		14.9		12.9	
Parameter								
Aluminum	234	8	1697	8	364	7	268	8
Arsenic	3.75	0.16	4.73	0.15	6.12	0.13	4.04	0.16
Beryllium	<MDL	0.07	<MDL	0.06	<MDL	0.05	<MDL	0.06
Cadmium	0.212	0.03	0.661	0.03	0.201	0.03	0.274	0.03
Chromium	0.90	0.41	5.20	0.38	1.34	0.34	0.93	0.39
Copper	7.6	0.3	53.0	0.3	30.9	0.3	13.6	0.3
Iron	402	4	1924	4	698	3	422	4
Lead	0.604	0.07	1.93	0.06	0.625	0.05	0.287	0.06
Manganese	16.5	0.2	98.5	0.2	25.5	0.1	22.3	0.2
Mercury	<MDL	0.04	<MDL	0.03	<MDL	0.03	<MDL	0.03
Nickel	3.03	1.6	5.61	1.5	2.35	1.3	1.71	1.6
Selenium	<MDL	1.23	<MDL	1.14	<MDL	1.01	<MDL	1.16
Silver	<MDL	0.07	<MDL	0.06	<MDL	0.05	<MDL	0.06
Zinc	9.0	0.4	14.7	0.4	18.5	0.3	10.5	0.4

APPENDIX E

BENTHIC COMMUNITY DATA

E-1 2001 South Division (Renton) TP outfall benthic data

Table E-1. 2001 Benthic Community Data (collected November 6-8, 2001)
South Treatment Plant Outfall (page 1 of 3)

Station:	RT412N			RT700NS			RT625ND			RT2500R			RT625SD			RT412S		
Taxa	Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3
ANNELIDA																		
Ampharete acutifrons	2	2	1	1	5	4	1	2		15	13	3		2	1	4	1	6
Amphitrite robusta	1		1															
Aricidea lopezi			1				2	1	1	1						1		1
Barantolla nr americana									1							1	1	5
Brada sachalina	7	1		4		4		1	5	3	5	1	4	2	4	1		3
Chaetozone commonalis			1													1	1	
Cossura bansei	2	3	4	1		2	2	4	4	1	1					1		1
Cossura pygodactylata		1						3	1	1	5	1	2				1	
Dipolydora caulleryi																		19
Drilonereis sp																	1	
Euclumeninae							1											
Eulalie sp N1		1																
Eunoe uniseriata		1												1				
Gattyana treadwelli	1			2	1	2	1		1		4	3		1	2		1	1
Glycera nana		1		2	1	1	4	1	1	2		3	2	2	1	5	2	4
Glycinde armigera								1	1							1	2	1
Goniada brunnea	1	1			1	1			1					1			1	1
Goniada sp juv							1											
Grubepolynoe tuta			1															
Harmothoinae juv					1	1												
Hesperonoe laevis						1				1	1							
Heteromastus sp																		1
Laonice cirrata					1				1									
Leitoscoloplos pugettensis			1	2		1	1	5		4	1	3						
Lepidasthenia berkeleyae											1							
Lepidasthenia longicirrata	1																	
Lepidonotus sp juv		1																
Levinsenia gracilis		1		3			8	6	6	1			1			3	2	3
Levinsenia oculata	7	10	8	9	8	5	4	5	4	3	5	4	4	9	1		3	17
Maldane sarsi				1	4	4	2	3	1							1		
Malmgreniella bansei						1	1					1						1
Malmgreniella scriptoria	2	1	2	2	1	1	1	2	1			4	5	5	4	1		2
Mediomastus ambiseta			1															
Mediomastus sp	2	1	1		4	2	1	2	3	1	3	1				3	1	2
Nephtys cornuta			1	1								1	1	2		2	1	1
Nephtys ferruginea		1								2				4				
Nephtys punctata	1			1	1	1				1	1				2			
Oligochaeta								1								1		2
Onuphis iridescens	5	1	2	6	3	7	10	6	6	4	3	5	9	8	6	5	8	6
Ophelina acuminata														1	1			
Paraprionospio pinnata	1	1	1	1	1	3	2	6	5	6	1	3	2	6		4	4	2
Pectinaria californiensis	17	7	4	3	7	16	8	9	13	11	29	17	11	1	7	11	7	23
Pholoe sp								1		1		1						1
Phyllodoce sp juv												1						
Phyllodoce hartmanae	1																	
Phyllodoce longipes								1									3	
Pista nr brevibranchiata		1																
Pista wui								1										
Podarkeopsis glabra							1				1	3	1	1				
Polycirrus californicus						1												
Praxillella pacifica				1		2	2			1	3	1				1		2
Prionospio lighti	3	7		1	6		1		13	2							1	4
Prionospio steenstrupi					2			2			1		2	1				1
Rhodine bitorquata						1												
Scoletoma luti				2				1		1		2						2
Sigambra nr bassi			2			1	3		7	1	1			3	1	1		4
Spiophanes berkeleyorum	1		5	3	1	5	3	21	5	5	5	2	3	19		4	6	1
Sternaspis cf fossor								1										
Tenonia priops																1		
Terebellides sp									1									
Thelepus setosus					1													
Total # of annelids:	**55**	**43**	**37**	**46**	**49**	**67**	**60**	**86**	**82**	**68**	**84**	**60**	**47**	**69**	**30**	**53**	**47**	**117**
Annelid biomass (g):	**20.31**	**2.21**	**11.34**	**4.09**	**5.19**	**3.39**	**5.52**	**2.88**	**5.05**	**5.39**	**6.81**	**3.3**	**4.34**	**3.49**	**8.75**	**5.03**	**2.38**	**8.39**

Table E-1. 2001 Benthic Community Data (collected November 6-8, 2001)
South Treatment Plant Outfall (page 2 of 3)

Station:	RT412N			RT700NS			RT625ND			RT2500R			RT625SD			RT412S		
Taxa	Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3
CRUSTACEA																		
Ostracoda																		
Bathyleberis sp.					1							1	1	6				5
Euphilomedes carcharodonata				1									1					

Euphilomedes producta	18	9	34	51	46	15	16	25	33	28	41	63	12	19	6	8	18	28
Tanaidacea																		
Anarthruridae sp.																	1	
Leptochelia dubia														1				
Cumacea																		
Diastylis pellucida			1	1			1			1		1		1	1			
Leptostylis sp.														1				
Eudorella pacifica	7		13	21	17	15	4	8	3	6	5	14	8	6	3	13	2	3
Eudorellopsis longirostris													1					
Eudorellopsis integra	6	1	10	30	25	16	5	12	19	7	4	13				6	9	26
Leucon subnasica				1														
Amphipoda Gammaridea																		
Ampelisca unsocalae *						1	1											
Argissa hamatipes															1			
Eusirus columbianus				1													1	
Oradarea longimana														2	6			
Protomedeia prudens			1	7			5	3	4	1	4	4	7	13	8			1
Anonyx lilljeborgi		1			1		1	2				1						
Cyphocaris challengeri					1					1				2	1			
Orchomene pacificus														1				
Orchomene cf. pinguis								1						1				
Orchomene decipiens					1													
Melitidae sp.																		1
Desdimelita desdichada				1		1	1		5	6		2	8	5	2			3
Melphidippidae								2										
Americhelidium variabilum							1											
Aceroides sp.	1						3	3	1		1							1
Bathymedon pumilis				2	3	4	9	2				2		1		1		1
Westwoodilla caecula													1					
Rhynohalicella halona									1									
Harpiniopsis fulgens	5	7	18	11	2	5		9	7	7	7	8	3	4	1	13	4	2
Heterophoxus affinis	3	9	14	6	8	10	3	6	9	14	11	20	4	6	3	4	1	5
Paraphoxus communis		1		3	13	14			11	4	1	13		4			1	7
Stegocephalidae sp.														6	5			
Talitroidea sp.	1																	
Themisto pacifica															1			
Mysidacea																		
Inusitatomysis insolita														1				
Pseudomma sp.				3	1	1		1	1			3						
Decapoda																		
Eualus avinus						1	1		1					4				
Pasiphaea pacifica									1									
Pinnixa schmitti/occidentalis		1				1				1		3				1		2
Calocarides spinulicauda		1					1							1				
Isopoda																		
Asellota sp. indet.					1													
Total # of crustaceans:	**41**	**30**	**91**	**139**	**120**	**84**	**52**	**74**	**96**	**76**	**74**	**148**	**46**	**85**	**38**	**46**	**37**	**85**
Crustacean biomass (g):	**0.03**	**0.16**	**0.08**	**0.15**	**0.1**	**0.19**	**0.09**	**0.08**	**0.29**	**0.11**	**0.08**	**0.24**	**0.08**	**0.41**	**0.05**	**0.13**	**0.01**	**0.18**
MOLLUSCA																		
Bivalvia																		
Acila castrensis							1	1	1			1		3	3		1	
Adontorhina cyclia						1					1							
Axinopsida serricata	1	2	1	1	9	3	18	16	5	13	41	19	5	3	6			2
Compsomyax subdiaphana		1															1	
Ennucula tenuis															1			
Lucinoma annulatum				1			2	2	2		1						1	
Macoma carlottensis	9	1	10	6	13	13	24	51	35	33	35	42	44	72	36	1	8	6
Macoma sp. juv.												3				6	3	2
Megayoldia martyria													1					

Table E-1. 2001 Benthic Community Data (collected November 6-8, 2001)
South Treatment Plant Outfall (page 3 of 3)

Station:	RT412N			RT700NS			RT625ND			RT2500R			RT625SD			RT412S		
Taxa	Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3	Rep 1	Rep 2	Rep 3
Nemocardium centifilosum														1				
Panopea abrupta		2																
Parvilucina tenuisculpta		1	1	3	1	3	8	11	4	6	12	8			2	2	8	3
Rochefortia tumida														1				
Yoldia seminuda			1															
Gastropoda																		
Lirobittium eschrichtii	1	1	3	3	4	3	7	5	7	6	5		1	1	5	9	6	1
Melanochlamys diomedea					1	1	1	3	1	1			1	1		1		2
Odostomia sp.			2		3			1	1		2			1		1		
Corambe pacifica						1												
Aplacophora																		
Chaetoderma sp.	1			2	2	2	1	2	2	2							1	
Total # of mollusca:	**12**	**8**	**18**	**16**	**33**	**27**	**62**	**92**	**58**	**61**	**97**	**73**	**52**	**83**	**53**	**20**	**29**	**16**
Mollusca biomass (g):	**0.1**	**68.81**	**1**	**0.21**	**0.46**	**0.17**	**0.87**	**0.63**	**2.14**	**0.53**	**0.49**	**0.66**	**0.15**	**0.28**	**0.61**	**0.34**	**2.07**	**0.12**

MISCELLANEOUS																		
Cnidaria																		
Pachycerianthus fimbriatus																	1	
Nynantheae sp.					1													
Halcampa decemtentaculata			1									1						
Turbellaria																		
Notoplana sp.														3				
Nemertea																		
Tubulanus pellucidus	1			2						1		1						
Tubulanus sp. indet.	1		2							1	1	1		1			2	1
Lineidae sp. indet.					1	1	3				2	1		1				1
Cerebratulus sp.						1							1	1				
Amphiporus sp.				1										1			1	
Echiura																		
Arhynchite pugettensis						1												
Echinodermata																		
Amphiuridae sp. indet.		2										1						1
Amphiodia spp. indet.												1	1	2				
Brisaster latifrons	1	2	2	1	1	2		1	1			1	2	2	2	1		1
Molpadia intermedia	4	4	3	3	1	1	2	3	2	2	5	3	3	1	3		2	4
Pentamera sp. indet.				1														
Other																		
Enteropneusta sp. indet.										1								
Invertebrate egg mass						1												
Total # miscellaneous:	**7**	**8**	**8**	**8**	**4**	**7**	**5**	**4**	**3**	**5**	**8**	**10**	**7**	**12**	**5**	**1**	**6**	**8**
Miscellaneous biomass (g):	**116.1**	**112.3**	**127.2**	**160.8**	**65.53**	**63.64**	**48.43**	**131.6**	**105**	**16.16**	**151.8**	**131.6**	**166.9**	**112.3**	**128.7**	**4.23**	**85.03**	**96.06**

* Denotes Ampelisca careyi has recently been synonomized with A. unsocalae

APPENDIX F

STATION LOCATIONS

F-1 2001 Point source stations
F-2 2001 Ambient/MOSS stations
F-3 South Plant sediment grab samples
F-4 Alki CSO TP sediment grab samples
F-5 CTD transect stations

Table F-1. Location of 2001 Point Source Stations

Station	Location	Bottom Depth (m)	NAD 83 Northing	NAD 83 Easting	NAD 83 Latitude	NAD 83 Longitude
Offshore/Nearshore						
RT825N *	South plant outfall	193	224597	1248032	47 36 16	122 25 26
RT412N *	South plant outfall	194	224190	1247748	47 36 12	122 25 30
RT625ND *	South plant outfall	192	224034	1247454	47 36 10	122 25 34
RT700NS *	South plant outfall	194	223269	1247409	47 36 03	122 25 35
RT625SD *	South plant outfall	191	222535	1247422	47 35 56	122 25 34
RT412S *	South plant outfall	194	222115	1247500	47 35 51	122 25 33
RT825S *	South plant outfall	195	221830	1247579	47 35 49	122 25 32
RT412NW *	South plant outfall	194	224473	1247371	47 36 15	122 25 36
RT625NP *	South plant outfall	192	224097	1247181	47 36 11	122 25 38
RT715NSW *	South plant outfall	193	223351	1247149	47 36 04	122 25 38
RT625SP *	South plant outfall	194	222662	1247133	47 35 57	122 25 39
RT412SW *	South plant outfall	194	222264	1247177	47 35 53	122 25 38
RT2500R *	South plant outfall	194	222917	1244630	47 35 59	122 25 15
LSEP01	South plant outfall	192	223637	1247496	47 36 12	122 25 33
AL343N *	Alki CSO outfall	55	212291	1247994	47 34 15	122 25 23
AL172N *	Alki CSO outfall	52	212177	1248075	47 34 14	122 25 22
AL143P *	Alki CSO outfall	51	212047	1248146	47 34 12	122 25 21
AL172S *	Alki CSO outfall	49	211953	1248223	47 34 11	122 25 19
AL343S *	Alki CSO outfall	50	211833	1248293	47 34 10	122 25 18
AL1500S *	Alki CSO outfall	53	211004	1249174	47 34 02	122 25 05
LSKQ06	Alki CSO outfall	48	212165	1248493	47 34 14	122 25 16
VO50E	Vashon Island outfall	19	169454	1243253	47 27 11	122 26 19
KSSK02	West Point outfall	77	245156	1242705	47 39 38	122 26 50
CK200P	Carkeek CSO outfall	54	263862	1257836	47 42 46	122 23 15
LTBC41	Denny Way CSO outfall	18	230921	1261799	47 37 02	122 21 44
Beach						
KSHZ03	Carkeek Park	--	263736	1259784	47 42 45	122 22 46
KSSN04	West Point	--	245728	1246032	47 39 45	122 26 02
KSSN05	West Point	--	245272	1245980	47 39 40	122 26 03
LSKR01	Alki Point	--	213666	1249416	47 34 29	122 25 03
LSKS01	Alki Point	--	212834	1250427	47 34 21	122 24 48

* Indicates the coordinate listed is an average of multiple grabs. Coordinates for specific grabs are listed in Tables F-3 and F-4.

Table F-2. Location of 2001 Ambient / MOSS Stations

Station	Location	Bottom Depth (m)	NAD 83 Northing	NAD 83 Easting	NAD 83 Latitude	NAD 83 Longitude
Offshore/Nearshore						
KSBP01	Point Jefferson	260	275214	1247880	47 44 36	122 25 44
KSRU02	Lake WA Ship Canal	--	247213	1254282	47 40 01	122 24 02
LSNT01	Dolphin Point	207	198653	1245194	47 32 00	122 26 00
LTED04	Elliott Bay	90	224199	1264780	47 36 16	122 21 22
ADMIRALC14	Admiralty Inlet	130	338890	1240055	47 55 02	122 27 58
COLVOSPASS	Colvos Passage	120	191996	1232377	47 30 51	122 29 04
POSSESSC14	Possession Sound	225	329007	1266691	47 53 30	122 21 24
EDMDS-CTD4	Edmonds	60	317945	1244931	47 51 37	122 26 40
EDMDS-CTD2	Edmonds	135	311577	1259203	47 50 37	122 23 09
PtWells1	Point Wells	145	290395	1253659	47 47 06	122 24 24
LTEH02	inner Elliott Bay	--	222696	1269069	47 36 02	122 20 19
Beach						
JSVW04	Richmond Beach	--	286171	1257194	47 46 25	122 23 35
MTEC01	Seahurst park	--	174011	1260832	47 27 59	122 22 09
KSLU03	Golden Gardens	--	256354	1253305	47 41 31	122 24 19
MTLD03	Normandy Park	--	165142	1263285	47 26 33	122 21 26
MSSM05	Tramp Harbor	--	154907	1243459	47 24 47	122 26 16
KRJY01	Fay Bainbridge Park	--	261334	1228574	47 42 14	122 30 26
KSQU01	Shilshole Bay	--	249160	1253227	47 40 20	122 24 18
KSYV02	Magnolia	--	234436	1254742	47 37 55	122 23 51
LTAB01	inner Elliott Bay	--	232168	1261581	47 37 34	122 22 11
LSGY01	Seacrest	--	218711	1258776	47 35 21	122 22 48
LSFX01	Duwamish Head	--	222264	1256896	47 35 55	122 23 16
LSHV01	West Seattle	--	217159	1253750	47 35 04	122 24 01
LSTU01	Lincloln Park	--	197288	1253039	47 31 48	122 24 05
LSVW01	Fauntleroy Cove	--	194969	1254846	47 31 26	122 23 38
KTHA01	Piper's Creek	--	263290	1261108	47 42 41	122 22 27
ITPICNICPT	Picnic Point	--	324868	1272488	47 52 50	122 19 58
ITMEADOWBP	Meadowdale Park	--	317128	1271813	47 51 34	122 20 05
ITOCEANAVE	Ocean Avenue	--	305093	1262971	47 49 33	122 22 12
ITBRACKETT	Brackett's Landing	--	300713	1259740	47 48 50	122 22 58
ITMUKILTSP	Mukilteo State Park	--	348724	1279072	47 56 47	122 18 28
ITEDWARDSPT	Edwards Point	--	297035	1256652	47 48 13	122 23 42
ITBOEINGCR	Boeing Creek area	--	276958	1259102	47 44 55	122 23 00
ITCARKEEKP	Carkeek Park	--	263756	1259917	47 42 45	122 22 44
KSJX02	Blue Ridge	--	260178	1256882	47 42 09	122 23 27

MOSS stations are shaded.

Table F-3. Location of South Plant Sediment Grab Samples

(page 1 of 2)

Date/GPS Time of Creation	Station and Grab Number	NAD 83 Latitude	NAD 83 Longitude	NAD 83 Northing	NAD 83 Easting
11/5/01 13:58	RT412N- cast #1: 2 tax	47 36 12	122 25 30	224167	1247740
11/5/01 14:21	RT412N- cast #2: 1 chem, 1 tax	47 36 12	122 25 31	224188	1247695
11/5/01 14:52	RT412N- cast #3: 2 chem	47 36 12	122 25 30	224202	1247771
11/5/01 15:21	RT412N- cast #4: 1 chem	47 36 12	122 25 30	224218	1247762
11/5/01 15:41	RT412N- cast #5: 1 chem	47 36 12	122 25 30	224219	1247771
11/5/01 16:05	RT412N- cast #6: 2 chem	47 36 12	122 25 30	224145	1247747
11/6/01 9:07	RT625ND- cast #1: 2 tax	47 36 11	122 25 34	224119	1247478
11/6/01 9:21	RT625ND- cast #2: 1 chem, 1 tax	47 36 11	122 25 34	223991	1247450
11/6/01 9:40	RT625ND- cast #3: 2 chem	47 36 10	122 25 35	224181	1247399
11/6/01 10:09	RT625ND- cast #4: 2 chem	47 36 12	122 25 35	224041	1247431
11/6/01 10:36	RT625ND- cast #5: 2 chem	47 36 10	122 25 33	223969	1247510
11/6/01 10:53	RT625ND- cast #6: 2 chem	47 36 09	122 25 34	223905	1247458
11/6/01 11:27	RT700NS- cast #1: 2 tax	47 36 03	122 25 36	223264	1247384
11/6/01 11:42	RT700NS- cast #2: 1 chem, 1 tax	47 36 03	122 25 34	223298	1247455
11/6/01 12:22	RT700NS- cast #3: 2 chem	47 36 03	122 25 34	223245	1247441
11/6/01 12:34	RT700NS- cast #4: 2 chem	47 36 03	122 25 35	223268	1247357
11/6/01 13:08	RT625SD- cast #1: 2 tax	47 35 56	122 25 34	222545	1247437
11/6/01 13:28	RT625SD- cast #2: 1 tax	47 35 56	122 25 34	222542	1247420
11/6/01 13:47	RT625SD- cast #3: 2 chem	47 35 56	122 25 34	222535	1247426
11/6/01 14:13	RT625SD- cast #4: 2 chem	47 35 56	122 25 34	222532	1247416
11/6/01 14:38	RT625SD- cast #5: 2 chem	47 35 55	122 25 34	222522	1247410
11/6/01 15:25	RT412S- cast #1: 2 tax	47 35 52	122 25 33	222126	1247472
11/6/01 15:41	RT412S- cast #2: 1 tax	47 35 51	122 25 33	222087	1247505
11/6/01 15:58	RT412S- cast #3: 2 chem	47 35 51	122 25 33	222112	1247509
11/6/01 16:21	RT412S- cast #4: 1 chem	47 35 52	122 25 33	222164	1247527
11/6/01 16:38	RT412S- cast #5: 2 chem	47 35 51	122 25 33	222088	1247489
11/7/01 9:18	RT2500R- cast #1: 2 tax	47 35 59	122 26 16	222908	1244602
11/7/01 10:02	RT2500R- cast #2: 1 chem, 1 tax	47 35 58	122 26 16	222884	1244642
11/7/01 10:29	RT2500R- cast #3: 2 chem	47 35 59	122 26 15	222987	1244616
11/7/01 10:57	RT2500R- cast #4: 2 chem	47 35 59	122 26 15	222912	1244650
11/7/01 11:24	RT2500R- cast #5: 2 chem	47 35 59	122 26 15	222895	1244640
11/7/01 12:53	RT825N- cast #1: 2 chem	47 36 16	122 25 26	224570	1248042
11/7/01 13:22	RT825N- cast #2: 2 chem	47 36 16	122 25 26	224575	1248047
11/7/01 13:46	RT825N- cast #3: 2 chem	47 36 16	122 25 26	224595	1248035
11/7/01 14:12	RT825N- cast #4: 2 chem	47 36 17	122 25 26	224649	1248004
11/7/01 14:50	RT825S- cast #1: 1 chem	47 35 49	122 25 31	221884	1247616
11/7/01 15:13	RT825S- cast #2: 2 chem	47 35 49	122 25 32	221822	1247557
11/7/01 16:05	RT825S- cast #3: 2 chem	47 35 49	122 25 32	221887	1247550
11/7/01 16:33	RT825S- cast #4: 2 chem	47 35 49	122 25 31	221831	1247597
11/7/01 17:12	RT825S- cast #5: 2 chem	47 35 48	122 25 32	221726	1247574
11/8/01 9:51	RT412NW- cast #1: 2 chem	47 36 15	122 25 36	224452	1247371
11/8/01 10:11	RT412NW- cast #2: 2 chem	47 36 15	122 25 35	224485	1247383
11/8/01 10:29	RT412NW- cast #3: 2 chem	47 36 15	122 25 36	224482	1247360
11/8/01 11:03	RT625NP- cast #1: 2 chem	47 36 11	122 25 38	224115	1247196
11/8/01 11:18	RT625NP- cast #2: 2 chem	47 36 11	122 25 38	224081	1247175
11/8/01 11:35	RT625NP- cast #3: 1 chem	47 36 11	122 25 38	224094	1247173

Table F-3. Location of South Plant Sediment Grab Samples

(page 2 of 2)

Date/GPS Time of Creation	Station and Grab Number	NAD 83 Latitude	NAD 83 Longitude	NAD 83 Northing	NAD 83 Easting
11/8/01 12:03	RT715NSW- cast #1: 2 chem	47 36 04	122 25 39	223390	1247141
11/8/01 12:20	RT715NSW- cast #2: 2 chem	47 36 03	122 25 39	223325	1247157
11/8/01 12:35	RT715NSW- cast #3: 2 chem	47 36 03	122 25 38	223339	1247150
11/8/01 13:33	RT625SP- cast #1: 2 chem	47 35 57	122 25 39	222662	1247132
11/8/01 13:50	RT625SP- cast #2: 1 chem	47 35 57	122 25 39	222664	1247130
11/8/01 14:06	RT625SP- cast #3: 2 chem	47 35 57	122 25 38	222659	1247137
11/8/01 14:34	RT412SW- cast #1: 2 chem	47 35 53	122 25 37	222260	1247196
11/8/01 14:49	RT412SW- cast #2: 2 chem	47 35 53	122 25 38	222266	1247151
11/8/01 15:03	RT412SW- cast #3: 2 chem	47 35 53	122 25 38	222267	1247185

* All NAD 83 coordinates provided by u/w Trackpoint II navigation system.

'Tax' indicates sample was collected for benthic taxonomy.
'Chem' indicates sample was collected for chemical analyses.

Table F-4. Location of Alki CSO Sediment Grab Samples

(page 1 of 1)

Date/GPS Time of Creation	Station and Grab Number	NAD 83 Latitude	NAD 83 Longitude	NAD 83 Northing	NAD 83 Easting
10/25/01 9:08	AL172N grb#1,2	47 34 14.022 N	122 25 22.176 W	212176	1248072
10/25/01 9:26	AL172N grb#3	47 34 14.034 N	122 25 22.104 W	212177	1248077
10/25/01 9:58	AL343N grb#1,2	47 34 15.166 N	122 25 23.447 W	212294	1247988
10/25/01 10:23	AL343N grb#3,4	47 34 15.101 N	122 25 23.268 W	212287	1248000
10/25/01 10:41	AL143P grb#1	47 34 12.971 N	122 25 21.269 W	212068	1248132
10/25/01 11:16	AL143P grb#2	47 34 12.78 N	122 25 20.914 W	212048	1248156
10/25/01 11:32	AL143P grb#3	47 34 12.702 N	122 25 21.204 W	212041	1248136
10/25/01 11:45	AL143P grb#4	47 34 12.618 N	122 25 20.872 W	212032	1248159
10/25/01 11:59	AL172S grb#1	47 34 11.692 N	122 25 19.9 W	211937	1248223
10/25/01 12:10	AL172S grb#2	47 34 12.004 N	122 25 19.92 W	211968	1248223
10/25/01 12:31	AL343S grb#1	47 34 10.661 N	122 25 18.882 W	211831	1248291
10/25/01 12:53	AL343S grb#2	47 34 10.688 N	122 25 18.788 W	211834	1248298
10/25/01 13:02	AL343S grb#3,4	47 34 10.685 N	122 25 18.892 W	211833	1248290
10/25/01 13:20	AL1500S grb#1,2	47 34 02.737 N	122 25 05.82 W	211010	1249170
10/25/01 13:32	AL1500S grb#3	47 34 02.624 N	122 25 05.699 W	210998	1249178

Table F-5. Location of CTD Transect Stations

(page 1 of 1)

Station	Location	NAD 83 Northing	NAD 83 Easting	NAD 83 Latitude	NAD 83 Longitude
Alki #1	Alki Pt. to Restoration Pt.	215921	1235803	47 34 48	122 28 22
Alki #2	Alki Pt. to Restoration Pt.	214733	1238986	47 34 37	122 27 35
Alki #3	Alki Pt. to Restoration Pt.	213860	1242007	47 34 29	122 26 51
Alki #4	Alki Pt. to Restoration Pt.	212921	1245163	47 34 20	122 26 04
LSKQ06	Alki Pt. to Restoration Pt.	212065	1248334	47 34 12	122 25 18
WP#1	West Point to Skiff Point	245431	1232816	47 39 38	122 29 15
WP#2	West Point to Skiff Point	245379	1235280	47 39 38	122 28 39
WP#3	West Point to Skiff Point	245326	1237743	47 39 38	122 28 03
WP#4	West Point to Skiff Point	245274	1240207	47 39 38	122 27 27
KSSK02	West Point to Skiff Point	245121	1242738	47 39 38	122 26 50
Wells-1,C14	Point Wells to Appletree Cove	290395	1253659	47 47 06	122 24 24
Pt Wells-2	Point Wells to Appletree Cove	289703	1249901	47 46 59	122 25 18
Pt Wells-3	Point Wells to Appletree Cove	289199	1245553	47 46 53	122 26 22
Pt Wells-4	Point Wells to Appletree Cove	289199	1241793	47 46 52	122 27 17
Pt Wells-5	Point Wells to Appletree Cove	289115	1237789	47 46 51	122 28 15
Edmds-1	Rose Point to Brown's Bay	309467	1264061	47 50 17	122 21 57
Edmds-2	Rose Point to Brown's Bay	311577	1259203	47 50 37	122 23 09
Edmds-3	Rose Point to Brown's Bay	314127	1253414	47 51 01	122 24 34
Edmds-4	Rose Point to Brown's Bay	317945	1244931	47 51 37	122 26 40
Edmds-5	Rose Point to Brown's Bay	316690	1239838	47 51 23	122 27 54
Edmds-6	Rose Point to Brown's Bay	315364	1234191	47 51 09	122 29 16
Poss Snd-1	Possession Pt. to Picnic Pt.	332018	1263017	47 53 59	122 22 19
Poss Snd-2	Possession Pt. to Picnic Pt.	330392	1264945	47 53 43	122 21 50
Poss-3,C14	Possession Pt. to Picnic Pt.	329007	1266691	47 53 30	122 21 24
Poss Snd-4	Possession Pt. to Picnic Pt.	327561	1268558	47 53 16	122 20 56
Poss Snd-5	Possession Pt. to Picnic Pt.	326176	1270365	47 53 03	122 20 29