Draft Final
Remedial Investigation Report
Port Uplands Area, MJB North Area, and Marine Area
Former Scott Paper Company Mill Site
Anacortes, Washington

August 14, 2008

Prepared for

Port of Anacortes
MJB Properties
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TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

Page No.

List of Tables

TABLE OF CONTENTS (CONTINUED)

List of Figures

TABLE OF CONTENTS (CONTINUED)

LIST OF APPENDICES (ATTACHED ON CD)

List of Acronyms and Abbreviations

ARI	Analytical Resources, Incorporated
ASTM	American Society of Testing and Materials
BGS	Below ground surface
CAP	Cleanup action plan
CLARC	Cleanup Levels and Risk Calculations database
cm	Centimeters
CM1	Commercial Marine (1) zoning
COPCs	Contaminants of potential concern
cPAHs	Carcinogenic polycyclic aromatic hydrocarbons
CSL	Cleanup Screening Level
DCI	Dakota Creek Industries
DMMP	Dredge Material Management Program
DNR	Washington State Department of Natural Resources
EPA	U.S. Environmental Protection Agency
FS	Feasibility study
ft	Feet/foot
GPS	Global positioning system
K-C	Kimberly-Clark Corporation
ug/L	Micrograms per liter
mg/kg	Milligrams per kilogram
mg/L	Milligrams per liter
mg-N/L	Milligrams nitrogen per liter
MHHW	Mean higher high water
MJB	MJB Properties

MLLW	Mean lower low water
MTCA	Model Toxics Control Act
ng/kg	Nanograms per kilogram
NFA	No further action
NOAA	U.S. National Oceanic and Atmospheric Administration
OC	Organic carbon
PAHs	Polycyclic aromatic hydrocarbons
PCBs	Polychlorinated biphenyls
PID	Photoionization detector
PSAMP	Puget Sound Ambient Monitoring Program
PSDDA	Puget Sound Dredged Disposal Analysis
PVC	Polyvinyl chloride
QAPP	Quality assurance project plan
RFBWP	Revised Final Integrated Fidalgo Bay-Wide Plan and EIS
RI	Remedial investigation
SAP	Sampling and analysis plan
SHS	Sun Healthcare Systems, Inc.
SMS	Sediment Management Standards
SQS	Sediment Quality Standard
SVOCs	Semivolatile organic compounds
TCLP	Toxicity characteristic leaching procedure
TEF	Toxicity equivalency factor
TEQ	Toxicity equivalent quotient
TOC	Total organic carbon
TPH	Total petroleum hydrocarbons
TSCA	Toxic Substances Control Act

TVS	Total volatile solids
URS	URS Corporation
USACE	U.S. Army Corps of Engineers
VCP	Voluntary Cleanup Program
VOCs	Volatile organic compounds
WAC	Washington Administrative Code

EXECUTIVE SUMMARY

This remedial investigation (RI) report describes investigations conducted between 2004 and 2008 at the former Scott Paper Company ("Scott Paper") Mill site (the "Site") in Anacortes, Washington (Figure ES-1) and the results of these investigations. The purpose of the investigations was to collect, develop, and evaluate sufficient information to determine if cleanup actions at the Site are necessary. Because the Site includes uplands areas and aquatic lands, as shown in Figure ES-1, the media investigated included soil, soil vapors, groundwater, and sediment. In addition to the 2004-2008 investigations, the scope and results of previous investigations are also described in this report to provide a comprehensive summary of Site conditions.

SITE DESCRIPTION

The former Scott Paper Mill operations extended from Cap Sante Boat Haven southward to about 20th Street, and from the inner harbor line in Fidalgo Bay westward to Q Avenue. These boundaries define the extent of the Site, as shown in Figure ES-2. The Site comprises three areas:

- The northern uplands portion of the Site, referred to as the "Port Uplands Area". The Port Uplands Areas is owned by the Port of Anacortes ("Port"), with the exception of the area known as Parcel 2, which was previously owned by the Port but is currently owned by several other entities;
- The southern uplands portion of the Site, referred to as the "MJB North Area", and owned by MJB Properties ("MJB"); and
- The "Marine Area", which consists of the aquatic lands immediately adjacent to the Port Uplands Area and the MJB North Area out to the inner harbor line.

Each of these areas is shown in Figure ES-2.

The Port Uplands Area consists of three Parcels, referred to as Port Parcels 1, 2, and 3. Port Parcel 1 is undeveloped. Port Parcel 2 is no longer owned by the Port and comprises office buildings, parking, and landscaped areas. Port Parcel 3 comprises Seafarers' Memorial Park (including grass, landscaped areas, and a community building) and asphalt-paved roads and parking areas.

The MJB North Area is mostly undeveloped, with one large building in the southwest corner that houses light industrial activities, and three smaller buildings. Undeveloped portions of the MJB North Area are largely unvegetated with the exception of non-native, invasive brush in the northeast corner. No known foundations remain of the former structures associated with the Scott Paper Mill on the MJB portion of the Site.

The Marine Area shoreline consists of fill materials including riprap, debris, and, to varying degrees, piling, sheet piling, concrete bulkheads, docks, and piers. The subtidal portion of the Marine Area contains relatively shallow subtidal habitat.

SITE HISTORY

Prior to development of the Site as an industrial area beginning in the late 1800s, the area was largely a shallow tideland. The tidelands were gradually filled and the grade modified. In 1890, a lumber mill was built that extended on pilings into Fidalgo Bay. The lumber mill was located in the area referred to as the Port Uplands Area. In 1925, a pulp mill was constructed on the property referred to as the MJB North Area. The pulp mill produced pulp using an acid-sulfate process and waste from the lumber mill. In 1940, Scott Paper Company purchased the pulp mill and lumber mill; it operated the lumber mill until

1955 and the pulp mill until 1978. Operations of the pulp mill were modified during that time, and included additions such as bleaching facilities in 1955 and a knots and tailings pond in 1959. Materials used at the former mill included petroleum, sulfur, anhydrous ammonia, ammonium hydroxide, and chlorine. Bunker C and diesel fuels were used to generate power and operate equipment. By the 1970s, approximately 90,000 gallons of petroleum was stored on site on a standby basis to power the mill's boilers (ThermoRetec 1999a). After the pulp mill was closed in 1978, the Site was divided into portions and sold. In 1995, Kimberly-Clark Corporation ("K-C") purchased the remaining assets of the Scott Paper Company.

In 1978 and 1979, the Port purchased the northern portion of the Site (Port Property), where the knots and tailings ponds and lumber mill were formerly located, and subsequently divided the property into three parcels. The extent of this area is shown in Figure ES-2. From about 1990 to 1993, the Port constructed and operated a log storage facility on Port Parcels 1 and 2. As part of the log storage facility construction, approximately 30,000 cubic yards of wood bark was removed from the west side of Port Parcel 1. Approximately 25,000 cubic yards of soil from the Anacortes publicly owned treatment works property was imported to Port Parcel 1 to replace the removed bark. This fill material reportedly consisted of dredged materials from the U.S. Army Corps of Engineers' 1968 expansion and dredging of the Cap Sante Marina. In 1994, approximately 100,000 cubic yards of dredged sand from the Swinomish Channel was delivered by the U.S. Army Corps of Engineers and used as geotechnical preload for proposed redevelopment of the Port Property.

In 1999, Port Parcel 2 was sold to Sun Healthcare Systems, Inc. ("SHS") for redevelopment. Development activities included a cleanup action conducted by SHS, with oversight by the Washington State Department of Ecology ("Ecology") under the Model Toxics Control Act (MTCA) Voluntary Cleanup Program. SHS prepared a Remedial Investigation/Feasibility Study and Cleanup Action Plan for soil at Port Parcel 2 (ThermoRetec 1999a,b), which identified areas where free-phase petroleum product was present in the subsurface soil and areas where carcinogenic polycyclic aromatic hydrocarbons (cPAHs), diesel- and motor oil-range petroleum hydrocarbons, copper, and polychlorinated biphenyls (PCBs) were present in the subsurface soil at concentrations exceeding preliminary cleanup levels.

Cleanup actions described in the Port Parcel 2 Cleanup Action Plan and Interim Action Work Plan, including Addendum 1 and Addendum 2 (Landau Associates 1999a,b,c), were implemented in 1999 and included removal and off-site disposal of petroleum-contaminated soil, soil capping, and institutional controls to prevent future exposure to subsurface soil at the property and to restrict groundwater use as drinking water. Work also included the installation of a sheet pile wall along the shoreline for containment of residual contaminated soil. A cleanup completion report for the Port Parcel 2 property was prepared in 2000 (ThermoRetec 2000).

In 2000, Ecology issued a no further action (NFA) letter for diesel-range and oil-range petroleum hydrocarbons, cPAHs, PCBs, dioxins/furans, wood debris, and metals in soil at Port Parcel 2 (Ecology 2000). The NFA determination was conditional on groundwater monitoring being conducted at Port Parcel 2. The SHS campus/office park was developed on Port Parcel 2 in 2000. SHS subsequently subdivided Parcel 2 into four sub-lots and sold these lots to four entities. Ecology modified the type of written opinions it provides under the Voluntary Cleanup Program in 2005, and no longer provides NFA letters for a single medium such as soil (Ecology 2005b). In 2006, Ecology rescinded the Port Parcel 2 NFA letter because the completed cleanup did not address all contamination in all media at the Site.

Port Parcels 1 and 3 are still owned by the Port. In 1995, Seafarers' Memorial Park was constructed on Port Parcel 3. As part of the Park construction, the Park soil was capped with 6 to 12 inches of topsoil mixture. The topsoil was prepared from the preload material combined with wood waste and bark that were remnants from the Port log storage yard. Parcel 1 is undeveloped.

The southern portion of the Site (MJB North Area; Figure ES-2) was purchased by Snelson-Anvil in 1979 to assemble portable buildings. The MJB North Area was the location of the former Scott Paper pulp mill offices and shop buildings. According to a previous site assessment (AGI 1987), Snelson-Anvil's policy for developing the MJB North Area was to remove wood waste and soft or deleterious soil and replace them with granular fill placed in layers and compacted. Based on a review of historical aerial photographs, it appears the mill buildings and a surge pond were removed and replaced by portable buildings in 1982. The aerial photographs indicate that portions of the MJB North Area, such as the northwest office and parking lot, the northeast triangular portion, and the central area around the small power building structure, have not been significantly excavated since the time of the mill operations. Other than these three discrete areas, excavation of structurally unsuitable fill, and replacement with better quality, compactable fill, occurred across much of the MJB North Area in about 1982. The source of this recent fill material was not indicated in the available Snelson-Anvil documents. In 1990, MJB purchased the southern portion of the Site from Snelson-Anvil and has used only a small portion of the property for light industrial operations; the property has otherwise been vacant.

SCOPE OF THE RI

Information available prior to the 2004-2008 investigations indicated that releases of hazardous substances used at the former mill have occurred. The objective of the 2004-2008 RI was to characterize soil, soil vapor, groundwater, and sediment quality for the purpose of developing and evaluating cleanup action alternatives. To evaluate soil, soil vapor, groundwater, and sediment quality, the Port performed soil vapor monitoring and collected soil samples and four rounds of groundwater samples in the northern portion of the Site; MJB collected soil samples and four rounds of groundwater samples in the southern portion of the Site; and K-C collected sediment samples, wellpoint groundwater samples, and porewater samples in the Marine Area. The results from these investigation activities, along with information collected during previous investigations, are evaluated in this report. The scope of the 2004-2008 RI also included identification of potential exposure pathways, development of preliminary cleanup standards, and development of a conceptual site model. For development of the conceptual site model, the 2004-2008 investigations included sitewide groundwater level monitoring to assess groundwater fluctuations and flow directions.

Pursuant to separate decrees and orders with Ecology, the Port, K-C, and MJB undertook RIs of various areas of the Site. To facilitate Ecology review and assure that sitewide issues are addressed, these parties agreed to combine the required RI reports for the Port Parcel 3 soil, Port Uplands Area groundwater, MJB North Area soil and groundwater, and the Marine Area into a single RI document.

RESULTS OF THE RI

The analytical results for soil, soil vapor, groundwater, and sediment samples collected during previous and 2004-2008 investigations, and the results of subsurface soil logging and groundwater level monitoring, are summarized below and are the basis for the conceptual site model presented in Figure ES-3.

Soil

Physical and chemical analytical results were generated from the investigations conducted to characterize Site soil.

Physical Characterization

Site soil consists of multiple layers of fill overlying native marine sediment and glacial deposits. Shallow soil is predominantly recent gravel and sand fill material with occasional mixed wood debris. The deeper subsurface soil contains a heterogeneous mixture of soil and wood debris. Relatively extensive wood

debris deposits of varying thickness are present throughout much of the Port Uplands Area, extending from 5 to 20 feet (ft) below ground surface, and continuing into the nearshore (intertidal and shallow subtidal) area of Fidalgo Bay at the Port Parcel 3 shoreline. A debris field consisting of dimensional lumber, wood fragments, and other debris is present directly on the sediment surface, most extensively across the intertidal area of the northern Marine Area. Fill material sometimes containing wood debris is found in the MJB North Area along the shoreline. The thickness of the wood-containing fill material ranges from less than a foot near the former mill surge ponds to nearly 15 ft at the shoreline. Wood debris is present in the upper 10 centimeters of sediment in the portion of the Marine Area adjacent to the MJB North Area.

Chemical Characterization

Chemical analytical results for soil were compared to soil concentrations protective of direct human contact, terrestrial ecological receptors, and groundwater as marine surface water. For those constituents detected in Site soil at concentrations greater than the concentrations protective of groundwater as marine surface water, an empirical demonstration was developed to show that the chemical concentrations present in soil are not causing an exceedance of groundwater concentrations protective of surface water at the proposed conditional point of compliance. Therefore, the existing soil concentrations are protective of groundwater, and preliminary soil cleanup levels were developed based on the remaining exposure pathways identified for Site soil (i.e., direct human contact and terrestrial ecological exposures).

To evaluate which constituents pose a potential risk to humans, plants, and/or animals, chemical concentrations detected in the upper 15 ft of soil at the Site were compared to preliminary soil cleanup levels protective of human health and terrestrial ecological receptors. This comparison identified metals (antimony, arsenic, chromium, copper, lead, mercury, nickel, and zinc), diesel-range and motor oil-range petroleum hydrocarbons, PCBs, cPAHs, and dioxins/furans at the Port Uplands Area at concentrations above the preliminary soil cleanup levels (Figures ES-4 through ES-7). In addition, metals (antimony, arsenic, chromium, copper, lead, nickel, thallium, and zinc) and cPAHs were identified in soil at the MJB North Area at concentrations above the preliminary soil cleanup levels (Figures ES-8 through ES-10).

Soil Vapor

Soil vapors at Port Parcel 3 have been monitored for the presence of hydrogen sulfide and methane. No detectable concentrations of either of these gases were measured during the 2004-2008 investigations. Previous monitoring of soil vapors at Port Parcel 3 identified low concentrations of hydrogen sulfide in ambient air samples collected in 1993.

Groundwater

Physical and chemical analytical results were generated from the investigations conducted to characterize Site groundwater.

Hydrogeologic Characterization

Two hydrogeologic units have been identified at the Site: a shallow water-bearing unit and a confining unit. The shallow water-bearing unit occurs in the fill material and ranges from 7 to 15 ft in thickness across the Site; the thinnest portion of the unit was encountered in the western portion of Parcel 1. The confining unit, which underlies the shallow water-bearing unit, consists of the native marine silts and clays. The thickness of the confining unit has not been determined, but appears to be greater than 2 ft throughout the Site. Some soil borings (e.g., B-3, B-7, MW-102, MW-103, MW-105, MW-5, MW-6, and MW-7) were advanced as much as 5 to 10 ft into the confining unit. The depth to groundwater ranges from 3 to 12 ft below ground surface. The inferred predominant groundwater flow directions are to the north toward Cap Sante Waterway in the northern portion of the Site, and to the east and southeast toward Fidalgo Bay in other areas of the Site. The predominant groundwater flow directions do not appear to be

significantly affected by tidal fluctuations. However, groundwater level data suggest that hydraulic gradients decrease or possibly reverse temporarily at high tide in the vicinity of some wells near the shoreline.

Chemical Characterization

To determine which groundwater chemical analytical results are of concern, the results of sitewide groundwater monitoring were compared to preliminary groundwater cleanup levels protective of marine surface water. Preliminary cleanup levels for diesel-range and motor oil-range petroleum hydrocarbons were based on MTCA Method A groundwater cleanup levels [in accordance with Washington Administrative Code Chapter 173-340-730(3)(b)(iii)(C)], because regulatory criteria protective of marine surface water have not been established for petroleum hydrocarbons. The proposed conditional point of compliance where preliminary groundwater cleanup levels will be attained is at the groundwater/surface water interface.

Except for petroleum hydrocarbons, the preliminary groundwater cleanup levels were developed based on exposure by aquatic organisms to hazardous substances in groundwater and ingestion by Site users of marine organisms contaminated by releases of affected Site groundwater. As detailed in the report, direct human ingestion of hazardous substances in groundwater is not a potential exposure pathway, because groundwater at the Site or potentially affected by Site soil is not a current or reasonably likely future source of drinking water.

A comparison of the RI data from interior monitoring wells at the Site to preliminary groundwater cleanup levels indicates exceedances of arsenic and bis(2-ethylhexyl)phthalate, which could pose a risk to marine surface water (and consequently aquatic organisms or Site users) if these constituents migrated to marine surface water via Site groundwater. In addition, diesel-range and motor oil-range petroleum hydrocarbons were detected at one interior well at concentrations above MTCA Method A cleanup levels, and free-phase petroleum product was detected in the same well.

Although the preliminary groundwater cleanup levels were exceeded for some constituents at some interior wells, the contaminants do not appear to be migrating to Fidalgo Bay and/or Cap Sante Waterway. Groundwater in the shoreline monitoring wells complies with preliminary cleanup levels and screening levels. Sporadic exceedances of 4-methylphenol, bis(2-ethylhexyl)phthalate, ammonia, and sulfide detected in shoreline wells were isolated and are not representative of groundwater conditions. Additionally, groundwater in wellpoints located downgradient of the interior wells and landward of the proposed conditional point of compliance complies with preliminary cleanup levels and screening levels, although sulfide concentrations detected at the wellpoints occasionally exceeded the screening level identified as protective of benthos at the 2005 Sediment Management Annual Review meeting. Porewater (0 to 10 centimeters) also complies with preliminary cleanup levels protective of marine surface water.

Sediments

Physical and chemical analytical results were generated from the sediment investigations conducted to characterize the Marine Area.

Physical Characterization

Relatively low rates of sediment deposition occur within the Site area. These results are consistent with observed wave action that contributes to periodic sediment transport, maintaining a mixed sand/gravel/cobble intertidal substrate in much of the Site area (Antrim et al. 2000). The contact between fine-grained native sediments and overlying material occurs at an elevation ranging from approximately -3 to -8 ft mean lower low water. This is consistent with the filling of the tide flat that historically extended southward from the Cap Sante area. Overlying the native sediments in the northern portion of

the Marine Area is fill that contains wood debris. This fill is thickest near the shoreline and tapers out in the Marine Area; the fill thickness in parts of the northern portion of the shoreline ranges from approximately 10 to 15 ft. Overlying the wood-containing fill along the northern portion of the shoreline is 10 to 15 ft of granular fill material consisting of poorly graded sand and silt or fine sand.

The wood debris content (based on visual observations) of surface sediments ranges from greater than 75 percent near the shoreline to less than 5 percent near the inner harbor line, and generally declines with distance to the south. Surface sediments potentially impacted by wood debris were screened against preliminary cleanup levels for wood debris content and total volatile solids (TVS) developed by Ecology based on site-specific biological analyses. A debris field consisting of dimensional lumber, wood fragments, and other debris exceeding one or both of these screening criteria is present directly on the sediment surface, most extensively across the intertidal area of the northern Marine Area. The extent of preliminary cleanup level exceedances within the Marine Area is depicted in Figure ES-11.

Chemical Characterization

The chemical analytical results for sediment samples collected throughout the Marine Area during previous and 2004-2008 investigations were compared to the preliminary cleanup levels developed by Ecology to identify contaminants of potential concern and indicator hazardous substances for the offshore portions of the Site.

Sediment samples collected from the intertidal beach area immediately offshore of the Site identified several metals (copper, lead, mercury, and zinc) and organics (PCBs and wood debris/TVS) at concentrations above preliminary cleanup levels. The sampling data define a localized area of elevated PCBs within the intertidal zone of the South Marine Area. An evaluation of data from previously collected tissue samples indicates that there is no evidence of bioaccumulation of mercury, PCBs, or dioxins/furans in crabs or shellfish within Fidalgo Bay.

LOCATIONS AND MEDIA REQUIRING CLEANUP ACTION EVALUATION IN FEASIBILITY STUDY

Port Uplands Area

Based on the information presented in this RI report, soil at Port Parcels 1 and 3 will require evaluation of cleanup action alternatives due to the presence of some constituents at concentrations exceeding preliminary cleanup levels protective of human health and terrestrial ecological receptors. Cleanup actions have been previously evaluated and implemented for soil at Port Parcel 2. These actions included placement of an indicator layer and clean soil cap over Parcel 2, construction and activation of a methane control system, implementation of infiltration controls, installation of a subsurface containment wall, and institutional controls (ThermoRetec 2000). However, because soil containing constituents at concentrations exceeding preliminary cleanup levels remains at Port Parcel 2, the need for further cleanup action at Parcel 2 will be evaluated in the feasibility study.

Groundwater in the shoreline monitoring wells, landward of the proposed conditional point of compliance, complies with preliminary cleanup levels protective of marine surface water. However, because there were some exceedances of preliminary cleanup levels at interior wells, and free-phase petroleum product has been observed at one interior well, remedial options for groundwater at the Port Uplands Area will be evaluated in the feasibility study.

MJB North Area

Shallow soil in discrete areas throughout much of the MJB North Area, and deeper subsurface soil within the northeast and southeast corners of the MJB North Area, will require evaluation of cleanup action

alternatives due to the presence of some constituents at concentrations exceeding preliminary cleanup levels protective of human health and terrestrial ecological receptors.

Groundwater in the shoreline monitoring wells, landward of the proposed conditional point of compliance, complies with preliminary cleanup levels protective of marine surface water. Consequently, the feasibility study will not evaluate remedial options for groundwater at the MJB North Area.

North Marine Area and Adjacent Shoreline Areas

Surface sediments in upper intertidal portions of the North Marine Area immediately adjacent to Port Parcel 3 will require evaluation of cleanup action alternatives due to the presence of some constituents at concentrations exceeding sediment preliminary cleanup levels. A potential source of these localized contaminated sediment deposits is erosion of adjacent upland fill material containing similarly elevated metal and organic chemical concentrations.

Surface and subsurface woody debris deposits in this area will require evaluation of cleanup action alternatives due to the presence of woody debris and TVS at concentrations exceeding cleanup levels protective of aquatic ecological receptors.

South Marine Area and Adjacent Shoreline Areas

Surface sediments in upper intertidal portions of the South Marine Area immediately adjacent to the MJB North Area will require evaluation of cleanup action alternatives due to the presence of some constituents (especially PCBs) at concentrations exceeding sediment preliminary cleanup levels. A potential source of these localized contaminated sediment deposits is erosion of upland fill materials within the North Marine Area containing similarly elevated metal and organic chemical concentrations. Shoreline stabilization performed by the Port in this area appears to have reduced transport of PCBs to the South Marine Area.

DRAFT FINAL
REMEDIAL INVESTIGATION REPORT
PORT UPLANDS AREA, MJB NORTH AREA, AND MARINE AREA
FORMER SCOTT PAPER COMPANY MILL SITE
ANACORTES, WASHINGTON
FOR
PORT OF ANACORTES
MJB PROPERTIES
KIMBERLY-CLARK CORPORATION

1.0 INTRODUCTION

This report presents the objectives and results of remedial investigation (RI) activities conducted between 2004 and 2008 at upland properties and aquatic lands of the former Scott Paper Company ("Scott Paper") Mill site (the "Site") in Anacortes, Washington (Figure 1). It includes the results of site characterization studies performed by the Port of Anacortes ("Port") within the uplands area of the northern portion of the Site (referred to as the "Port Uplands Area"); by Kimberly-Clark Corporation ("K-C") within the sitewide marine area (referred to as the "Marine Area"); and by MJB Properties ("MJB") within the uplands area of the southern portion of the Site (referred to as the "MJB North Area"). In addition to the studies completed between 2004 and 2008, this RI report also incorporates the results of earlier investigations to present a comprehensive summary of Site conditions. The areas addressed by this document are shown in Figure 2.

The northern portion of the Site includes the Port Uplands Area, which consists of three parcels (Port Parcels 1, 2, and 3), and the adjacent aquatic lands delineated by the federal channel to the north, the inner harbor line to the east, and the Port/MJB property line to the south. Port Parcels 1 and 3 and the adjacent aquatic lands are owned by the Port. Port Parcel 2 was previously owned by the Port; it currently comprises several sub-parcels owned by three entities: Northwest Educational Service, Anacortes Concepts LLC, and Seafarers' LLP. The Port has indemnified purchasers of former Port-owned property at the Site from past environmental liability.

The southern portion of the Site is owned by MJB, and consists of the MJB North Area and the adjacent aquatic lands delineated by the Port/MJB property line to the north, the inner harbor line to the east, and the MJB property line to the south. The Marine Area consists of the contiguous aquatic lands adjacent to the Port Uplands Area and the MJB North Area as defined above. The Marine Area is addressed as one contiguous area in this RI because of overlapping sediment conditions and common sediment transport pathways.

The 2004-2008 investigations of the northern portion of the Site were performed under Consent Decree No. 03 2 00492 1 (Consent Decree; Ecology 2003). The work required under the Consent Decree includes an RI and feasibility study (RI/FS) for soil at Port Parcel 1, an RI/FS for soil at Port Parcel 3 and groundwater at the Port Uplands Area, and a Marine Area RI/FS for nearshore sediments. The Port Uplands Area RI was conducted in accordance with the Port Uplands Area RI/FS work plan dated September 15, 2003 (Landau Associates 2003) and the addendum to the work plan dated January 14, 2004 (Landau Associates 2004a). The Port Uplands Area RI/FS work plan and addendum were approved by Ecology on February 10, 2004 (Ecology 2004a).

The 2004-2008 investigations of the southern portion of the Site were performed under Agreed Order No. DE 1783 (Agreed Order; Ecology 2004b) between K-C and Ecology. The work required under the

Agreed Order includes preparation of an RI/FS for soil and groundwater at the MJB North Area and for marine sediments offshore of the MJB North Area. MJB (pursuant to agreements with K-C) completed the RI at the MJB North Area. K-C (pursuant to its Agreed Order and agreements with the Port and MJB) completed the RI for the entire Marine Area. The Marine Area RI and the MJB North Area RI were conducted in accordance with the RI/FS work plan (Anchor Environmental 2005) and the *Additional Soil Characterization Uplands Remedial Investigation Revised Sampling and Analysis Plan* (SAP) (Geomatrix 2006). The Marine Area and MJB North Area RI/FS work plan was approved by Ecology on September 23, 2005 (Ecology 2005a); the Uplands RI revised SAP was approved by Ecology on January 31, 2006. In Fall 2007, Ecology approved the sediment SAP and quality assurance project plan (QAPP) addendum (Anchor Environmental 2007); the supplemental sediment data collected in Fall 2007 and supplemental wood debris surveys performed in April 2008 have been incorporated into this RI report.

In addition to the required work described above, the Port Consent Decree and the K-C Agreed Order require the Port and K-C, respectively, to identify whether any sitewide issues have not been addressed after submittal of the uplands and Marine Area RI/FS reports. If unaddressed sitewide issues are identified, the Port and K-C are required to address them. A draft RI/FS for Port Parcel 1 soil (Landau Associates 2004b) was submitted to Ecology for review in June 2004. A final RI/FS for Port Parcel 2 soil (ThermoRetec 1999a) was submitted to Ecology in January 1999. A draft RI for Port Parcel 3 soil and Port Uplands Area groundwater (Landau Associates 2005b) was submitted to Ecology in March 2005. To facilitate Ecology review and to assure that sitewide issues are addressed, the Port, K-C, and MJB agreed to combine the required RI reports into a single RI document. Soil quality conditions at Port Parcels 1 and 2 are summarized in this report to provide more complete information on the Port Uplands Area. Detailed descriptions of the investigations conducted at these parcels, as well as the cleanup action conducted at Port Parcel 2, are documented in the draft RI/FS for Port Parcel 1 soil (Landau Associates 2004b) and the Parcel 2 RI/FS, cleanup action plan (CAP), and completion report (ThermoRetec 1999a, 1999b, 2000), respectively.

The Port Uplands Area, MJB North Area, and Marine Area data evaluated in this report include information collected from past investigations at the Site and information from the RI studies conducted in 2004-2007.

1.1 STATEMENT OF OBJECTIVE

The objective of the 2004-2008 RI was to collect, develop, and evaluate sufficient information to determine if cleanup is necessary for Port Parcel 3 soil, Port Uplands Area groundwater, Marine Area sediments, and MJB North Area soil and groundwater. Although separate RIs were conducted for these areas and media in accordance with the relevant agreements with Ecology described in Section 2.5, activities were coordinated, and the results are combined in the present report to provide a comprehensive sitewide RI document. Results of prior soil investigations at Port Parcels 1 and 2 were previously submitted to Ecology. For completeness, the significant findings concerning the nature and extent of contamination at Port Parcels 1 and 2 are included in this report.

1.2 REPORT ORGANIZATION

Section 2.0 of this report describes the Site history, the environmental setting, current land uses, basis of concern, and the regulatory framework. Section 3.0 describes the development of cleanup standards. Section 4.0 describes soil investigations associated with the RI and presents the results of these investigations. Section 5.0 describes the soil vapor investigations conducted at the Port Uplands Area. Section 6.0 describes the groundwater investigations associated with the RI and presents the results of these investigations. Section 7.0 describes the RI activities conducted at the Marine Area and presents

and evaluates the Marine Area RI results in conjunction with historical Marine Area investigation results. Section 8.0 presents a conceptual site model based on existing data. Section 9.0 describes the locations and media that require cleanup action evaluation in the FS, based on the results of the RI. Section 10.0 describes the allowable uses of this report. Section 11.0 presents the references used in preparing this report.

2.0 SITE DESCRIPTION, HISTORY, AND REGULATORY FRAMEWORK

This section briefly describes the Site, including its history and current uses, and describes the existing regulatory framework. A more detailed description is provided in the *Comprehensive Evaluation of Existing Data, Former Scott Paper Mill Site, Anacortes, Washington* (Anchor Environmental et al. 2002) and the *Remedial Investigation and Feasibility Study for Soils at Parcel 2 of the Former Scott Paper Company Mill Site, Anacortes, Washington* (Port Parcel 2 Soil RI/FS; ThermoRetec 1999a).

2.1 HISTORICAL OPERATIONS AND SITE USES

The Scott Paper Mill was located in Anacortes, Washington on the west shore of Fidalgo Bay. The development of the shoreline as an industrial area began in the late 1800s with the construction of a lumber mill. Prior to development, the area was largely a shallow tideland.

In 1890, a lumber mill was built that extended on pilings into Fidalgo Bay. The lumber mill was located in the area referred to as the Port Uplands Area. Wharves and offshore log rafts were present at much of the northern portion of the Marine Area (extending from the shoreline to the inner harbor line) until the late 1940s. In 1925, a pulp mill was constructed at the property referred to as the MJB North Area. The pulp mill produced pulp using an acid-sulfate process and waste from the lumber mill. In 1940, Scott Paper purchased the pulp mill and lumber mill; they operated the lumber mill until 1955 and the pulp mill until 1978. Process improvements by Scott Paper included the conversion to an ammonium sulfite process in 1952, the construction of a 16-inch effluent pipeline to Guemes Channel and an onsite surge pond for the pipeline in May 1951, and the addition of pulp bleaching facilities in 1955. Effluent was discharged directly into Fidalgo Bay from 1925 to 1951. A knots and tailings pond was constructed in 1959, primarily on what is now Port Parcel 2, to reduce settleable solids in the plant effluent. The pulp mill closed in 1978. Scott Paper was acquired by K-C in December 1995.

Materials utilized at the former pulp mill included petroleum, sulfur, anhydrous ammonia, ammonium hydroxide, and chlorine. Bunker C and diesel fuels were used to generate power and operate equipment. By the 1970s, approximately 90,000 gallons of petroleum was stored onsite on a standby basis to power the mill's boilers (ThermoRetec 1999a). The history of the Site, including ownership and plant operations has also been described in other documents [Huckell/Weinman et al. 1996; Dingfield et al. 1996; AGI 1987; ThermoRetec 1999a; Ecology & Environment (E&E) 2000].

The former Scott Paper Mill operations were bounded by Cap Sante Boat Haven to the north, Fidalgo Bay to the east, and Q Avenue to the west. To the south, the maximum extent of former Scott Paper Mill operations was approximately 20th Street. Site boundaries are depicted in Figure 2. A 1969 aerial photograph of the Site overlaid with historical Site features is provided in Figure 3. In 1978 and 1979, the Port purchased the northern portion of the Site. The southern portion of the Site was purchased by Snelson-Anvil in 1979, and has been owned by MJB since 1990. In 2008, the Port acquired a narrow strip of the southernmost portion of the northern Marine Area offshore of the Port Uplands Area (Figure 2) from Mr. and Mrs. Lorren Levorsen and Mrs. Delores Snelson. The Site has been redeveloped since mill operations ceased. Initial redevelopment activities included demolition of mill buildings and wharves and removal of tailings pond waste. Site redevelopment is discussed further below.

2.1.1 Port Uplands Area Redevelopment and Previous Cleanup Actions

After closure of the mill, little activity occurred on the Port Uplands Area until 1990 when the Port constructed and operated a log storage facility on Parcels 1 and 2. The log storage yard was in operation through 1993. As part of the log storage yard construction, approximately 30,000 yd^3 of wood bark were removed from the west side of Parcel 1. Approximately 25,000 yd^3 of soil from the Anacortes publicly owned treatment works property was imported to Parcel 1 to replace the removed bark. This fill material reportedly consisted of dredged materials from the U.S. Army Corps of Engineers (USACE) 1968 expansion and dredging of the Cap Sante Marina.

In 1994, approximately 100,000 yd^3 of dredged sand from the Swinomish Channel was delivered by the USACE and used as geotechnical preload for proposed redevelopment of the Port Uplands Area. Chemical characterization data for this material is included in Appendix A. The preload material was initially located on the eastern portion of Port Parcel 1 and the western portion of Port Parcel 2, as shown in Figure A-1 in Appendix A. Subsequently, some of the preload material was provided to the City of Anacortes for their use. In 1995, the remaining preload material was shifted to the south and west, as shown in Figure A-1 in Appendix A. Since that time, additional preload material has been provided to the City of Anacortes. Since placement of the preload material, Port Parcels 2 and 3 have been developed. Construction of Seafarers' Memorial Park on Port Parcel 3 began in 1995. As part of the Park construction, the Park soil was capped with 6 to 12 inches of topsoil mixture. The topsoil was prepared from the preload material combined with wood waste and bark that were remnants from the Port log storage yard.

In 1998, an RI for Port Parcel 2 soil was performed by Sun Healthcare Systems, Inc. (SHS), a prospective purchaser of Parcel 2. The RI consisted of excavating 58 test pits throughout Parcel 2 and collecting soil samples from these test pits for laboratory analysis, collecting groundwater samples from new and existing monitoring wells for laboratory analysis, and monitoring groundwater levels to evaluate potential tidal influences. An RI/FS report was prepared by SHS following completion of the investigations (ThermoRetec 1999a). Following the RI/FS, SHS prepared a CAP for upland soil at Parcel 2 (ThermoRetec 1999b), and in March 1999 SHS purchased Parcel 2 from the Port. In 1999, a cleanup at Parcel 2 was conducted by SHS, with oversight by Ecology under the Model Toxics Control Act (MTCA) Voluntary Cleanup Program (VCP). The Parcel 2 cleanup implemented the cleanup actions described in the Port Parcel 2 CAP and Interim Action Work Plan, including Addendum 1 and Addendum 2 (Landau Associates 1999a, 1999b, 1999c), and included removal and off-site disposal of petroleum-contaminated soil, soil capping, and institutional controls to prevent future exposure to subsurface soil at the property and to restrict groundwater use for drinking water. The soil removal areas are shown in Figure 2 (Excavation Areas A and B); a total of 3,469 tons of soil was removed and disposed of at a permitted facility. Work also included the installation of a sheet pile wall along the shoreline for containment of residual contaminated soil, concurrently providing structural foundation support for the building constructed by SHS. A project completion report for the Parcel 2 property was submitted in 2000 (ThermoRetec 2000).

In 2000, Ecology issued a No Further Action (NFA) letter for diesel-range and oil-range petroleum hydrocarbons, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), dioxins/furans, wood debris, and metals in soil at Parcel 2 (Ecology 2000). The NFA letter was conditional on groundwater monitoring being conducted at Parcel 2. The SHS campus/office park was developed on Parcel 2 in 2000. SHS subsequently subdivided Parcel 2 into four sub-lots and sold these lots to four entities. Ecology modified the type of written opinions it provides under the VCP in 2005 and no longer provides NFA letters for a single media such as soil (Ecology 2005b). In 2006, Ecology

notified the Port that it planned to rescind the NFA letter because the completed cleanup did not address all contamination in all media at the Site.

2.1.2 MJB Property Redevelopment

The MJB North Area is the southern portion of the former Site operations area. Approximately 18.5 acres of upland and 13.5 acres of intertidal and subtidal lands comprise the MJB North Area north of 20th Street (according to the Skagit County Geographic Information System website). The MJB North Area (the term used in previous deliverables under the Agreed Order) refers to the area between 17th and 20th Streets, east of R Street (Figure 2). The MJB North Yard (the term used in communications relating to zoning and redevelopment) refers to the area between 17th and 22nd Street, east of R Street. This document addresses the MJB North Area (north of 20th Street).

Snelson-Anvil Corporation purchased the North Yard in 1979 for the assembly of portable buildings to be shipped to Alaska. According to a previous site assessment (AGI 1987), Snelson-Anvil Corporation's policy for developing the North Yard in the early 1980s was to remove wood waste and soft or deleterious soils and replace them with granular fill placed in layers and compacted. Geomatrix's review of the recent borings logs and historical aerial photos indicates that the unsuitable fill material may have been selectively excavated in areas where heavy loads were planned (e.g., construction of a heavy portable). A comparison of the March 9, 1981 aerial photo to the July 30, 1983 aerial photo indicates that many of the former Scott mill buildings and the surge pond were still intact in 1981, but had been removed and replaced by the construction of portable buildings in 1983. Historical aerial photos indicate that areas of the site, such as the northwest office and parking lot, the northeast triangular portion, and the central area around the electrical building have not been significantly excavated since the time of the mill operations. Other than these discrete areas, excavation of structurally unsuitable fill, and replacement with better quality, compactable fill, occurred in much of the Site in about 1982. The sources of the fill material are unknown. Since 1982, the MJB North Area has been used for light industrial operations.

2.2 ENVIRONMENTAL SETTING

This section describes the geology and hydrogeology of the Port Uplands Area and the MJB North Area. The description is based primarily on information collected during previous investigations; however, the summary of groundwater occurrence and flow directions also incorporates information from the 2004-2008 investigations. A more detailed description, based on all RI data collected, is included in Section 4.2.1 of this report. This section also describes the setting of the Marine Area including currents, sediment dynamics, habitat, and fish and shellfish resources, based on information available prior to the RI.

2.2.1 Uplands Areas

Much of the Site is located on former shallow tidelands. Previous Site investigations have characterized the geology of the Site and surrounding areas, including multiple layers of recent fill overlying native marine sediment and glacial deposits (Dames & Moore 1975; Roger Lowe Associates 1980; ENSR 1993; Advanced Soil Mechanics 1994; ThermoRetec 1999a, E&E 2000). The available geologic and geotechnical studies prior to the RI were summarized by Anchor Environmental et al. in 2002 (Appendix B).

Based on the data summary provided by Anchor Environmental et al. in 2002 (Appendix B), surficial soil present throughout the Site is predominantly recent gravel and sand fill materials with occasional mixed wood debris. With few exceptions (see Section 4.0), such surface soil contains chemical concentrations

that are below preliminary cleanup levels. Within the MJB North Area, approximately 1 foot (ft) of quarry spalls overlays 5 to 10 feet (ft) of granular fill material throughout much of the Site. Along the shoreline, fine to coarse-grained fill containing wood debris is present beneath the granular fill material. The thickness of the wood-containing fill material ranges from less than 1 ft near the former Mill surge ponds (see Figure 3) to nearly 15 ft at the shoreline.

Underlying the fill material throughout the Site is a native layer consisting primarily of silt and clay. The elevation of the native silt and clay unit contact ranges from approximately +10 ft above mean lower low water (MLLW) at the western (inland) Site boundary, to approximately -10 ft MLLW near the shoreline.

Groundwater is present at the Site at depths between approximately 3 and 12 ft below ground surface (BGS). Groundwater generally occurs within the fill material above the native silt deposits and is absent in some areas away from the shoreline where the fill is shallow and thin. Groundwater is inferred to generally flow north toward Cap Sante Waterway in the northern portion of the Site and east or southeast toward Fidalgo Bay in other areas of the Site (see Figures 21 and 25).

2.2.2 Marine Area

Available information on the estuarine setting of Fidalgo Bay and adjacent areas is summarized below. Fidalgo Bay oceanography, sediment dynamics, habitat, and fish and shellfish resources have been documented by Huckell/Weinman (1996), Antrim et al. (2000), Anchor Environmental et al. (2002), and in the *Revised Final Integrated Fidalgo Bay-Wide Plan and EIS* (RFBWP; City of Anacortes 1999). In addition, an evaluation of the former Scott Mill submarine outfall (SML 1974) provided oceanographic and marine resource information for the northern portion of Fidalgo Bay. The currents and sediment dynamics in the vicinity of the Site were reviewed to assess potential historical pathways of chemical transport from this facility. Available information on currents, sediment dynamics, habitat, and fish and shellfish resources were utilized in the development of the Site environmental setting.

The Site is located on the west shoreline of Fidalgo Bay, to the south of Cap Sante and the Guemes Channel (Figure 1). The western end of Guemes Channel connects to the Bellingham Channel. Fidalgo Bay is connected to the eastern end of Guemes Channel and is adjacent to Padilla Bay. March Point separates the southern part of Fidalgo Bay and Padilla Bay. There are no significant freshwater streams that flow into the Fidalgo Bay area (Antrim et al. 2000).

Fidalgo Bay was an ancient delta of the Skagit River. The northern part of Fidalgo Bay, adjacent to the Guemes Channel is relatively deep (greater than 60 ft below MLLW), whereas the central and southern portions of Fidalgo Bay are relatively shallow subtidal mudflats less than 12 ft below MLLW. Extensive intertidal mudflats occupy the southern area of Fidalgo Bay (City of Anacortes 1999). Antrim et al. (2000) noted that the present bathymetry of Fidalgo Bay appeared to be largely unchanged from conditions in the late 1800s. The exceptions were localized shoreline changes associated with nearshore dredging and filling activities occurring largely between 1900 and 1980. The entire shoreline in the vicinity of the Site consists of fill materials including riprap, debris, and, to varying degrees, piling, sheet piling, concrete bulkheads, docks, and piers.

The harbor areas adjacent to the Site contain relatively shallow subtidal habitat, and support a patchy eelgrass meadow, particularly in areas outside existing or historical navigation channels. Adjacent to the MJB North Area, the North Channel was originally dredged in 1975 to a depth of approximately 12 ft below MLLW to support barge transfer operations on the MJB North Area. No further dredging of the North Channel has occurred since that time. Two navigation channels continue to be routinely dredged in

the northern portion of Fidalgo Bay to allow medium and shallow draft ship navigation to marinas and industrial properties along the eastern shoreline (Figure 4 in City of Anacortes 1999).

The circulation of Fidalgo Bay is influenced by the tides moving through Guemes Channel. In the Fidalgo Bay/Guemes Channel area, the average difference in height between mean higher high water (MHHW) and MLLW is 8.5 ft. Currents in Fidalgo Bay are slow (averaging 0.1 knots between Cap Sante and March Point), while currents in the Guemes Channel are relatively strong (averaging 0.9 and 2.1 knots on flood and ebb tides respectively; Antrim et al. 2000). Tidal currents are affected to some extent by winds. Currents in Fidalgo Bay tend to follow a clockwise eddy on flood tides and a counterclockwise eddy on ebb tides.

The shoreline at the Site is protected from northerly wind and waves by Cap Sante. The wave action in the Site area, which is predominantly from the southeast and northeast, is strong enough to maintain a mixed sand/gravel/cobble intertidal substrate (Antrim et al. 2000). Wave and current modeling of the Site has shown that storm-generated wave and current action has resulted in significant erosion at the shoreline since at least 1962; the shoreline erosion that occurred between 1962 and 1969 is depicted in Figure 3. The shoreline along parts of the Port and MJB properties has been temporarily reinforced to minimize this erosion, and protection of the shoreline has required routine maintenance by the Port and MJB. The erosion of the shoreline along the MJB North Area has been less than that observed at the Port Uplands Area, likely due to its general orientation to the storm-generated waves. Net sediment transport along the western shore of Fidalgo Bay, in the vicinity of the Site, appears to be predominantly in a southerly direction (City of Anacortes 1999). In February 2005, the Port completed a Bank Stabilization Interim Action along the Seafarers' Memorial Park shoreline under the Port's Consent Decree (Landau Associates 2005a). Monitoring suggests that shoreline erosion has now ceased in the Interim Action area, and that stable and desirable beach substrate (i.e., pea gravel) is being maintained (Landau Associates 2006). However, the northeast shoreline of the MJB property has experienced continued erosion during MJB's time of ownership (since 1990), with an apparent increased rate of erosion within the past four years.

General sediment dynamics of the Fidalgo Bay region can be evaluated based on sediment grain size characteristics. Intertidal sediments along the MJB North Area are generally composed of silt and sand materials. Gravel was noted in several sediment samples collected near points where the shoreline was uneven (IS02, IS06 and IS12; E&E 2000). The larger particles (gravel) may indicate areas with higher energy, although the larger particles may also be a product of shoreline modification. Along the northern portion of the Marine Area (near Seafarers' Memorial Park), sediment samples are coarse grained, ranging to cobble-sized, and contain debris.

The most comprehensive discussion of upland and aquatic habitat in the vicinity of the Site is contained in the RFBWP (City of Anacortes 1999), which focused on the shoreline and subtidal environments, but also included a discussion of avifauna and marine mammals. Also available is an earlier Fidalgo Bay–Wide Plan prepared by Huckell/Weinman et al (1996). Antrim et al (2000) presents a Plan for Habitat Protection, Restoration, and Enhancement in the Fidalgo/Guemes Area that draws most of its resource information from the RFBWP (City of Anacortes 1999).

- Upland Shoreline - The shoreline along the Port Parcel 3 consists of maintained lawn with only low quality habitat. Areas with marginally functional terrestrial habitat exist along the MJB North Area shoreline. The patches of potential habitat are located within a larger commercial/industrial property, are of low habitat function consisting mainly of invasive plant species, and are unlikely to attract significant numbers of wildlife.

- Nearshore Area - The Washington State Department of Natural Resources (DNR) has classified the intertidal substrate near the Site as mixed fine, mixed coarse, and artificial materials (Antrim et al. 2000). Limited areas of the upper intertidal zone adjacent to the Site containing a mix of sand and gravel may provide suitable spawning habitat for sandlance (Ammodytes hexapterus) or surf smelt (Hypomesus pretiosus) (Antrim et al. 2000). The Site was not listed as a waterfowl concentration area, great blue heron colony, or harbor seal haulout (RFBWP; City of Anacortes 1999).
- Subtidal Area - Subtidal areas adjacent to the Site are generally unvegetated (RFBWP; City of Anacortes 1999; Antrim et al. 2000). Offshore areas consist primarily of eelgrass (Zostera spp.) beds of varying densities. These beds provide a number of ecological functions including support of prey species, substrate for spawning of Pacific herring (Clupea pallasi), and rearing for juvenile salmon and crab (Huckell/Weinman 1996; City of Anacortes 1999; Antrim et al. 2000). As discussed in Section 7, detailed eelgrass surveys of the MJB and Port Marine Area were performed during August 2004 and August 2007 by BioAquatics (2004) and Grette Associates (2007), respectively. In addition, green macroalgae (Ulva spp. and Enteromorpha spp.) were found where intertidal and subtidal substrates consisted mostly of mixed fines and mud (Antrim et al. 2000).

Fidalgo Bay supports numerous fish and shellfish resources including various forage fish, sandlance, surf smelt, Pacific herring, juvenile salmonids, flatfish, crabs, shrimp, gastropods, and bivalves (Huckell/Weinman 1996; City of Anacortes 1999; Antrim et al. 2000). The distribution of these species in relation to the Site is largely dependent on available habitat and suitable substrate, as discussed above. Specific areas of surf smelt and Pacific herring spawning are present adjacent to the Site. In addition, flatfish and crabs (including Dungeness crabs) likely utilize the areas adjacent to the Site; however, this area is not a suitable habitat for hardshell clams (City of Anacortes 1999).

2.3 CURRENT AND LIKELY FUTURE LAND USE

Port Parcels 1, 2, and 3 and the MJB North Area are zoned Commercial Marine (1) (CM1). This zoning provides for a mix of commercial, industrial, and recreational uses. CM1 properties are intended to be developed as pedestrian-friendly areas, welcoming and serving the needs of both residents and visitors.

Port Parcel 1 is currently undeveloped; development is planned following Ecology approval of the RI/FS investigations and any necessary cleanup. Port Parcel 2 has been developed with office buildings, parking, and landscaped areas. Port Parcel 3 consists of Seafarers' Memorial Park (including grass, landscaped areas, and a community building) and asphalt-paved roads and parking areas. The Port Marine Area is currently and is likely to remain part of Seafarers' Memorial Park.

The MJB North Area is mostly undeveloped, with one large building in the southwest corner that houses light industrial activities, and three smaller buildings. Undeveloped portions of the MJB North Area are largely unvegetated with the exception of non-native, invasive brush in the northeast corner. No foundations remain of the former structures associated with the Scott Paper Mill.

MJB is currently in the process of development planning for a marina at the MJB North Area. The conceptual plan for the marine area includes slips for pleasure boats and float planes, docks, and, potentially, a floating breakwater. A 12-ft wide (approximate) promenade, adjacent to a 25-ft wide landscaped set-back along the top of the bank, is planned as the transition from the offshore to the upland areas. The marina would also include support facilities (e.g., parking).

In addition to the commercial, industrial, and recreational uses that are currently allowed, MJB has made a preliminary determination that a water and waterview-dependent mixed-use development, with a

residential component, is a viable future development option. As part of the City's Comprehensive Plan update, MJB has requested that the Anacortes City Council consider incorporating limited residential uses into a mixed-use development at the MJB North Area, even though residential uses are not currently allowed. On May 31, 2006, the City Council met to deliberate on the Comprehensive Plan policies for Commercial Marine areas. The Council agreed on draft language that would allow limited residential uses in the CM1 zone as a component of a mixed-use development.

A mixed-use uplands development might include a hotel, retail shops, offices, restaurants, residences and parking structures. Residence styles would likely consist of townhouses, townhouses over flats, and/or stacked flats. These residences would primarily be situated above the lower non-residential levels or above an in-ground or above-ground parking structure. The uplands development area would be surfaced with concrete, asphalt, or structures, with localized and controlled landscaped areas.

Groundwater at or potentially affected by the Port Uplands Area and MJB North Area is not a reasonable future source of drinking water due to its proximity to marine surface water. The MTCA regulation, Washington Administrative Code (WAC) 173-340-720(2)(d), states that even if groundwater is classified as a potential future source of drinking water because it is present in sufficient quantity, contains less than 10,000 milligrams per liter (mg/L) total dissolved solids, and is not too deep to recover, the groundwater may still be classified as nonpotable due to its proximity to marine surface water. To be classified as nonpotable on the basis of its proximity to marine surface water, the following conditions must also be met:

- The groundwater does not serve as a current source of drinking water;
- Contaminated groundwater will not migrate to groundwater that is a current or potential future source of drinking water;
- There are known points of entry of the groundwater into surface water;
- The surface water is not classified as a suitable domestic water supply source; and
- The groundwater is sufficiently hydraulically connected the surface water that the groundwater is not practicable to use as a drinking water source.

The shallow groundwater at the Site meets at least four, and likely all five of these conditions. First, groundwater at the Site is not a current source of drinking water. Second, the groundwater migrates toward marine surface water and discharges at seeps in the intertidal and/or subtidal zone as discussed in later sections of this report. Third, the marine surface water offshore of the Site is not classified as a suitable domestic water supply. Fourth, the Site groundwater is hydraulically connected to marine surface water, as evidenced by the apparent tidal influence on groundwater levels in wells near the shoreline. Finally, migration of shallow groundwater to a lower aquifer that is a current or potential future source of drinking water is unlikely, due to the presence of a confining native silt/clay unit at the base of the shallow water-bearing unit at the Site (see Section 6.2.1 for further information regarding Site hydrogeology). Consequently, the Site groundwater qualifies as a nonpotable water source.

2.4 BASIS OF CONCERN

Information available prior to the 2004-2008 investigations indicated that releases to the environment of materials used at the former mill likely occurred. Ecology listed portions of the Site on their Confirmed and Suspected Contaminated Sites List due to the presence of metals and organic constituents in soil and/or groundwater. Wood debris from the mill is buried below some portions of the Site; ammonia and sulfide are common bacterially-derived wood breakdown products. Potential soil impacts include hazardous substances released to the soil from former mill activities or produced by decay of buried wood

debris. Potential groundwater impacts include hazardous substances that migrate from soil to groundwater or that are released within the saturated zone. In addition, contaminants in groundwater can potentially migrate to marine surface water. Off-shore marine sediments can be affected by hazardous substances transported in groundwater, by soil eroded from the Port Uplands Area and the MJB North Area to Fidalgo Bay, or by hazardous substances resulting from decay of wood debris in the Marine Area.

Potential exposure pathways related to these media are discussed below.

2.4.1 Soil

The following potential exposure pathways and receptors exist for contaminants in Site soil:

- Contact (dermal, incidental ingestion, or inhalation) by visitors, workers (including excavation workers), and potential future residents or other Site users with hazardous substances in soil;
- Contact (dermal, incidental ingestion, or inhalation) by terrestrial wildlife with hazardous substances in soil; and
- Contact by terrestrial plants and soil biota and/or food-web exposure to hazardous substances in soil.

Terrestrial ecological receptors are included in the exposure pathways for those portions of the uplands areas that are not covered by buildings and pavement, because these areas do not qualify for an exclusion from a terrestrial ecological evaluation. Also, although the Port Uplands Area is zoned CM1, the current use of Parcel 1 and the Seafarers' Park area of Parcel 3 is not considered commercial or industrial based on the definitions of "industrial property" and "commercial property" in WAC 173-340-7490(2)(c). Possible development plans for the MJB North Area include uses other than industrial and commercial. Accordingly, exposure pathways to terrestrial ecological receptors were considered for the MJB North Area and unpaved portions of the Port Uplands Area. Unpaved portions of the Port Uplands Area are considered low quality habitat because they are sparsely vegetated or landscaped and maintained primarily as lawn. The MJB North Area also is considered low quality habitat with patches of vegetation consisting mainly of invasive species. In addition, surface fill on the MJB North Area is generally coarse, angular rock with few fines that could be used to support vegetation.

Those portions of the Port Uplands Area that are currently covered by buildings or pavement qualify for an exclusion from terrestrial ecological evaluation in accordance with WAC 173-340-7491(1)(b), provided an institutional control is established per WAC 173-340-440. However, it may not be feasible or desirable to establish an institutional control requiring that a physical barrier (i.e., buildings/pavement) be kept in place to prevent future terrestrial ecological exposures. Consequently, exposure pathways to terrestrial ecological receptors also were considered in this RI for those portions of the Port Uplands Area that are currently covered by buildings or pavement, to account for potential future exposures.

2.4.2 Groundwater

The following potential exposure pathways and receptors exist for contaminants in Site groundwater:

- Exposure by aquatic organisms to impacted groundwater that may discharge to Fidalgo Bay or Cap Sante Waterway, resulting in acute or chronic effects; and
- Ingestion by Site visitors of aquatic organisms affected by the discharge of impacted groundwater to Fidalgo Bay or Cap Sante Waterway.

As described in Section 2.3, human ingestion of hazardous substances released from the Site in groundwater is not a potential exposure pathway because groundwater at the Site or potentially affected by Site soil is not a current or reasonable future source of drinking water.

E&E (2000) evaluated potential groundwater receptors within the vicinity of the Site. The closest groundwater well was approximately one mile west (upgradient) of the Site. Several wells were located to the north of the Site across Guemes Channel on Guemes Island. Based on reviews provided in ThermoRetec (2000) and E&E (2000), groundwater beneath or potentially affected by the Site is not currently used for consumption. Given the presence of a public water supply at the Site (provided by sources removed from potential Site influence), and also given the presence of further institutional controls at the Site that preclude future groundwater withdrawal (see Parcel 2 CAP; ThermoRetec 1999b), future drinking water use of Site groundwater is not a reasonable future exposure scenario.

2.4.3 Sediment

The following potential exposure pathways and receptors exist for contaminants in Site sediment:

- Exposure of benthic organisms to hazardous substances released from the Site in the biologically active zone of sediment, the upper 10 centimeters (cm) below the mudline;
- Ingestion by aquatic organisms of benthic organisms contaminated by hazardous substances released from the Site in sediment; and
- Ingestion by Site visitors of marine organisms contaminated by hazardous substances released from the Site in sediment.

2.5 REGULATORY FRAMEWORK

In 2003, the Port entered into Consent Decree No. 03 2 00492 1 (Consent Decree; Ecology 2003) with Ecology under the MTCA. Work to be performed under the Consent Decree includes an RI/FS for soil at Port Parcel 1, an RI/FS for soil at Port Parcel 3 and groundwater on the Port Uplands Area, and a Marine Area RI/FS for nearshore sediments adjacent to the Port Uplands Area. The draft RI/FS for Port Parcel 1 soil (Landau Associates 2004b) was submitted to Ecology on June 8, 2004. The draft RI for Port Parcel 3 soil and Port Uplands Area groundwater (Landau Associates 2005b) was submitted to Ecology on March 22, 2005. Ecology approved submission of the RI followed by submission of the FS when sufficient information about the Marine Area is available to consider integration of cleanup actions for the Port Uplands Area and Marine Area. This report includes the Port Parcel 3 soil and Port Uplands Area groundwater RI information from the March 22, 2005 draft RI, as well as results from subsequent groundwater monitoring. For completeness, soil quality conditions at Port Parcels 1 and 2 also are summarized in this report. Detailed descriptions of the investigations conducted at Parcels 1 and 2, as well as the cleanup action conducted at Port Parcel 2, are documented in the draft RI/FS for Port Parcel 1 soil (Landau Associates 2004b) and the Parcel 2 RI/FS, CAP, and completion report (ThermoRetec 1999a; 1999b, 2000). The Port Marine Area is addressed in this document as part of the Marine Area at the Site.

In 2004, K-C entered into an Agreed Order (Order No. DE 1783; Ecology 2004b) with Ecology to prepare an RI/FS for the southern portion of the Site, including soil and groundwater at the MJB North Area and associated marine sediments. K-C (pursuant to its Agreed Order with Ecology and agreements with the Port and MJB) conducted an RI for the entire Marine Area [i.e., the aquatic areas immediately adjacent to the MJB North Area and Port Uplands Area, including a triangular portion of the northern marine area bounded by the existing Cap Sante Boat Haven breakwater and the offshore (easterly)

property/inner harbor line (Figure 2)]. MJB (pursuant to agreements with K-C) conducted an RI at the MJB North Area. This report summarizes the investigations completed for these areas.

The Port, K-C, and MJB ("the cooperating parties") have jointly prepared this RI report for the entire Site, building on the previous RI/FS, CAP, and Parcel 2 completion report submittals (ThermoRetec 1999a, 1999b, 2000; Anchor Environmental et al. 2002) and other related documents. The original draft RI for the Port Uplands Area, MJB North Area, and Marine Area (Landau Associates et al. 2006) was submitted to Ecology on September 18, 2006. Ecology's comments on the draft RI (Ecology 2007a) were provided on May 30 and June 25, 2007. In Fall 2007, Ecology approved the supplemental Sediment SAP and QAPP Addendum (Anchor Environmental 2007), and these data have been incorporated into this revised draft RI. The cooperating parties concurrently prepared the draft FS to evaluate cleanup action alternatives for those media and contaminants posing unacceptable risks to human health and/or the environment.

3.0 DEVELOPMENT OF CLEANUP STANDARDS

Cleanup standards consist of: 1) cleanup levels that are protective of human health and the environment, and 2) the point of compliance at which the cleanup levels must be met. Preliminary cleanup standards are developed in this RI. Proposed cleanup standards for remedial alternative evaluation are presented in the FS, and serve as the basis for developing media-specific objectives for the cleanup action. Final cleanup standards for the Site will be established in the CAP to be prepared following completion of the FS.

3.1 CLEANUP LEVELS

Preliminary cleanup levels for soil that are protective of human health and terrestrial ecological receptors, and preliminary cleanup levels for groundwater that are protective of marine surface water, were developed in accordance with MTCA requirements. In addition, soil concentrations that are protective of groundwater as marine surface water were calculated and considered in the development of preliminary soil cleanup levels. Figures 4 and 5 are flow charts that illustrate the process used for developing preliminary cleanup levels for soil and groundwater. Preliminary cleanup levels for sediments protective of benthic infauna were developed in accordance with MTCA and Sediment Management Standards (SMS) requirements and direction provided by Ecology.

3.1.1 Soil

Preliminary soil cleanup levels for unrestricted land use were developed in accordance with WAC-173-340-740 using the exposure pathways outlined in Section 2.4.1. The Port Uplands and MJB North Areas are zoned CM1; however, to be consistent with MTCA requirements, this RI considers preliminary soil cleanup levels based on unrestricted land use, including the more stringent MTCA Method B cleanup levels developed assuming ground floor residential land use [WAC-173-340-740(3)]. During the Cleanup Action Plan (CAP), risk-based remediation levels for specific land uses and associated institutional controls may be considered as a component of cleanup action alternative development and evaluation.

Under MTCA Method B, soil cleanup levels must be as stringent as:

- Concentrations established under applicable state and federal laws;
- Concentrations protective of terrestrial ecological receptors;
- Concentrations protective of direct human contact with soil; and

- Concentrations protective of groundwater.

These criteria were considered during development of preliminary soil cleanup levels. The preliminary soil cleanup levels for constituents detected at the Port Uplands Area and the MJB North Area are shown in Table 1.

The only soil concentration established under applicable state or federal laws for hazardous substances detected at the Site is the concentration for total PCBs established under the Toxic Substances Control Act (TSCA; 40 CFR 761.61). The TSCA soil criterion for total PCBs is listed in Table 1.

Soil concentrations considered protective of terrestrial ecological receptors (plants and animals) were developed using a simplified terrestrial ecological evaluation (WAC 173-340-7492). Site-specific terrestrial ecological evaluation is not required for the Port Uplands Area and the MJB North Area because they do not meet any of the criteria in WAC 173-340-7491(2). Forms documenting this decision for Port Parcel 3 and the MJB North Area are included in Appendix C. Consistent with WAC 173-340-7492(1)(d), chemical concentrations listed in Table 749-2 of WAC 173-340-900, which are based on protection of terrestrial ecological receptors, were used in developing preliminary cleanup levels for constituents detected in soil. These concentrations are shown in Table 1. In accordance with Ecology guidance (Sternberg, personal communication, 2008), detections of dioxins and furans in Site soil were compared to concentrations of total dioxins and furans protective of terrestrial ecological receptors based on toxicity equivalency factor (TEF) methodology, using compound- and receptor-specific TEF values. TEF values for dioxins and furans are shown in Table 2. The listed TEF values for mammals and birds were used in the terrestrial ecological evaluation.

MTCA Method B soil concentrations (standard formula values) protective of direct human contact were determined in accordance with WAC 173-340-740(3) using Ecology's on-line Cleanup Levels and Risk Calculations (CLARC) database (Ecology 2008). Table 1 shows the MTCA Method B soil concentrations protective of human health. In accordance with WAC 173-340-708(8)(d), WAC 173-340-708(8)(e), and Ecology guidance (Ecology 2007b), detections of dioxins, furans, and carcinogenic polycyclic aromatic hydrocarbons (cPAHs) in Site soil were compared to concentrations of total dioxins/furans and total cPAHs protective of human health based on TEF methodology, using compound-specific TEF values. TEF values for dioxins, furans, and cPAHs are shown in Table 2.

In accordance with the MTCA regulation, WAC 173-340-7493(3)(b), the cooperating parties are planning to conduct a more detailed terrestrial ecological evaluation of the Site using soil bioassays and/or focused bioaccumulation testing. Potential risks to plant life and soil biota in target areas of the Site (i.e., where human health criteria are not exceeded and where the only soil exceedances are based on screening values listed in WAC 173-340-900, Table 749-2), will be addressed directly using tests described in the *Early Seedling Growth Protocol for Soil Toxicity Screening* (Ecology Publication No. 96-324) and *Earthworm Bioassay Protocol for Soil Toxicity Screening* (Ecology Publication No. 96-327), respectively. The soil bioassay and bioaccumulation results will be integrated into the forthcoming Cleanup Action Plan (CAP).

Soil concentrations protective of groundwater were calculated using the fixed parameter three-phase partitioning model in accordance with WAC 173-340-747(4). Because groundwater is not a current or likely future source of drinking water, and because it migrates to marine surface water, marine surface water concentrations protective of human health and aquatic organisms developed in accordance with WAC 173-340-730 were used in the calculations. Accordingly, the three-phase model provides a conservative estimate of the concentration of a contaminant in soil that is protective of groundwater as marine surface water. Calculated soil concentrations protective of groundwater as marine surface water are shown in Table 1.

For those constituents that are present in Site soil at concentrations greater than the calculated concentrations protective of groundwater, an empirical demonstration can be made indicating that existing concentrations present in soil are not causing an exceedance of preliminary groundwater cleanup levels. The Site meets the requirements for an empirical demonstration listed in WAC 173-340-747(9)(b), as described in Appendix D. Hazardous substances in soil from former industrial activities at the Port Uplands Area and the MJB North Area (such as lead) have been present for many years, allowing sufficient time for migration to shallow groundwater to have occurred. Despite this, measured chemical concentrations in proposed conditional point of compliance monitoring wells (see Section 3.2.2) are less than the preliminary groundwater cleanup levels, as discussed in Section 6.2.2. Current groundwater quality conditions at the proposed conditional point of compliance are considered to be representative of future conditions at the Site. Because the criteria for an empirical demonstration are satisfied at the Site, the calculated soil concentrations protective of groundwater derived using the fixed parameter three-phase partitioning model were not used in developing preliminary soil cleanup levels.

Soil cleanup levels may be adjusted to be no less than natural background concentrations in accordance with WAC 173-340-740(5)(c). Metals concentrations protective of terrestrial ecological receptors and direct human contact were compared to natural background soil metals concentrations in Washington State (Ecology 1994). Background soil metals concentrations are shown in Table 1. With the exception of chromium, the background metals concentrations were based on statewide 90th percentile values. According to a statewide background soil metals study conducted by Ecology (Ecology 1994), background chromium levels in the Northern Skagit and Whatcom County area are high relative to other areas of the state. Because the Site is outside of the four main regional areas evaluated in Ecology's study, a site-specific natural background concentration was calculated for chromium using the ten Ecology background sampling locations closest to the Site and the Ecology computer program MTCAStat. The MTCAStat results and the data used in the background chromium calculation are contained in Appendix T. The preliminary soil cleanup level for chromium was adjusted upward to the calculated site-specific natural background concentration of 117 milligrams per kilogram (mg/kg).

No adjustments of preliminary cleanup levels for multiple contaminants were made. A table showing non-carcinogenic toxic endpoints for detected constituents is included in Appendix E. Depending on the remedy selected for the Site and whether constituents are present in the same area, final – and likely minor – adjustments of cleanup levels may be appropriate during development of the CAP.

3.1.2 Groundwater

Although human ingestion of constituents in groundwater is not a potential exposure pathway, as described in Section 2.3, groundwater concentrations protective of hypothetical groundwater use as drinking water were developed for the Port Uplands Area and MJB North Area, as requested by Ecology. Table 3 presents the groundwater concentrations protective of hypothetical groundwater use as drinking water.

Because the groundwater at the Site migrates to Cap Sante Waterway and Fidalgo Bay, preliminary groundwater cleanup levels protective of marine surface water were developed for the Site. MTCA Method B preliminary cleanup levels protective of marine surface water were developed in accordance with WAC 173-340-730(3) for the detected constituents in groundwater. If necessary, preliminary groundwater cleanup levels were adjusted to be no less than the practical quantitation limit or natural background concentration, in accordance with WAC 173-340-730(5)(c). Preliminary groundwater cleanup levels protective of marine surface water are shown in Table 4.

Of importance in developing the preliminary groundwater cleanup level for nickel is the consideration of new peer-reviewed scientific data updating the existing aquatic life criteria for marine species. The chronic criterion for nickel [U.S. Environmental Protection Agency (EPA) 1986], promulgated under WAC 173-201A, the National Toxics Rule (40 CFR 131), and Section 304 of the Clean Water Act, was previously developed using acute-chronic ratios from only two freshwater species and one marine species. Recent scientific studies have updated the nickel criteria using appropriate marine species (Hunt et al. 2002). The most sensitive species was abalone and the ACR based on marine species was more than two times lower than the one previously promulgated by EPA. EPA is currently in the process of updating the marine nickel criteria. Interim updates to the criteria are provided in Hunt et al. (2002), including updated marine acute and chronic criteria using the methods specified in EPA's *Guidelines for Deriving Numerical Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses* (Stephan et al. 1985). The updated marine chronic value is 22.4 micrograms per liter (ug/L), while the updated acute value is 67 ug/L. The updated chronic value, which is a prospective MTCA Method B cleanup level, was used as the preliminary groundwater cleanup level for nickel in this RI.

The ambient water quality criterion for ammonia listed in Chapter 173-201A WAC (0.035 mg-N/L) is for un-ionized ammonia. Concentrations measured during the RI were reported by the laboratories as total ammonia. The criterion for un-ionized ammonia can be expressed as total ammonia, based on salinity, temperature, and pH, using Ecology's *Spreadsheets for Water Quality-Based NPDES Permit Calculations* (Ecology 2004c; http://www.ecy.wa.gov/programs/eap/pwspread/pwspread.html). Using the measured temperature and pH in Port Uplands Area shoreline wells and salinity calculated from measured chloride concentrations in shoreline wells, the preliminary ammonia cleanup level expressed as total ammonia ranges between 3.2 and 74.4 mg-N/L.

For some detected constituents, adequate regulatory information to develop preliminary groundwater cleanup levels protective of marine surface water is not available. Other water quality information for some of these constituents is included in Table 4. These values are not preliminary cleanup levels, but provide context for evaluating detected concentrations and were used for screening purposes. For example, a sulfide concentration of 30 mg/L was identified during the 2005 Sediment Management Annual Review Meeting as a concentration in porewater above which significant amphipod mortality may result during standard marine sediment bioassays (Caldwell 2005). This concentration was used as a screening level for sulfide.

3.1.3 Sediment

Sediment cleanup levels were developed according to MTCA and SMS requirements and direction provided by Ecology. Two SMS criteria are promulgated by Ecology (WAC 173-204-320): the Sediment Quality Standard (SQS) – the concentration below which effects to benthos are unlikely, and the Cleanup Screening Level (CSL) – the concentration above which more than minor adverse biological effects may be expected. The SQS and CSL values have been developed for a suite of chemicals that includes metals, PAHs and other semivolatile organic compounds (SVOCs), PCBs, and ionizable organic compounds (Table 5). The SQS are the most stringent SMS criteria and were used as the preliminary cleanup levels for the SMS suite of chemicals.

There is no promulgated SMS criterion for wood debris in sediment. However, a SMS Clarification Paper published by Ecology (Kendall and Michelsen 1997) presents an approach to addressing the deleterious properties of wood debris accumulations in sediments. Consistent with the Clarification Paper and general Ecology policy under SMS, surface sediment total organic carbon (TOC) concentrations greater than 10 percent (dry weight basis), total volatile solids (TVS) levels greater than 25 percent (dry

weight basis), and wood debris levels greater than 50 percent (by volume) were initially identified as having the potential for deleterious biological effects.

As outlined above and presented in more detail in Section 7.0, in Fall 2007 Ecology approved the Sediment SAP and QAPP Addendum (Anchor Environmental 2007). The primary objective of this supplemental investigation was to conduct a suite of confirmatory biological tests (amphipod mortality bioassay, larval development bioassay and benthic infaunal community enumeration) on synoptic surface sediment samples collected from locations representing the range of wood debris content at the Site with the potential for deleterious effects. These data were then used to develop preliminary sediment cleanup levels for wood debris at the Site. Based on Ecology's initial interpretations of the fall 2007 biological data, surface sediment TVS levels greater than 9.7 percent (dry weight basis) and/or wood debris levels greater than 25 percent (by volume) were identified as having the potential for site-specific deleterious effects exceeding SQS biological criteria. Surface sediment TVS levels greater than 15 percent (dry weight basis) and/or wood debris levels greater than 50 percent (by volume) were identified as having the potential for deleterious effects exceeding CSL biological criteria.

A summary of screening levels for chemicals detected in sediment at the Site and the most stringent values identified and used for preliminary cleanup levels is provided in Table 5. Sediment samples were compared to the preliminary cleanup levels to determine the frequency of chemical detections and preliminary cleanup level exceedances (Table 5). This information was used to identify contaminants of potential concern (COPCs) and indicator hazardous substances for the offshore portions of the Site. The screening results and development of indicator hazardous substances are discussed in Section 7.2.2. The screening for each medium was summarized in tables providing chemical concentrations, laboratory detection limits, and relevant preliminary cleanup levels, including TVS and wood debris (Appendix F, Tables F-1 and F-2).

There is not an SMS screening level for dioxin, and cleanup levels for this group of compounds are under further evaluation by Ecology and other regulatory agencies. For this RI, sediment results were compared to the 2000 Dredge Material Management Program (DMMP) risk-based screening criterion for 2,3,7,8-TCDD of 5 nanograms per kilogram (ng/kg), and the calculated DMMP toxicity equivalent quotient (TEQ) concentration (all dioxin congeners combined) of 15 ng/kg [Puget Sound Dredged Disposal Analysis (PSDDA) 2000].

Consistent with MTCA human health risk assessment procedures (WAC 173-340-708), potential bioaccumulation risks associated with residual mercury and PCB exposure that may remain in the Marine Area following completion of cleanup actions are assessed in the FS. The residual risk assessment considers: 1) the footprint of cleanup actions at the Site under different alternatives; 2) the anticipated effectiveness of remedial technologies (e.g., removal and containment) also considering the potential for dredging residuals; and 3) potential bioaccumulation of post-remedy sediment concentrations using regional biota-sediment accumulation factors. The evaluation also considers Puget Sound regional background concentrations of PCBs as published by Ecology (1997c) and others. Based on the results of the residual risk assessment, the cleanup action alternatives may be modified (in the CAP) to ensure protection of human health.

3.2 POINTS OF COMPLIANCE

Under MTCA, the point of compliance is the point or location on a site where the cleanup levels must be attained. The points of compliance for affected media will be approved by Ecology and presented in the sitewide CAP. However, it is necessary to identify proposed points of compliance in order to develop and

evaluate the effectiveness of cleanup action alternatives in the FS. This section describes the proposed points of compliance for soil, groundwater, and sediment.

3.2.1 Soil

The standard point of compliance for the preliminary soil cleanup levels shown in Table 1 will be throughout the soil column from the ground surface to 15 ft BGS, in accordance with WAC 173-340-740(6)(d) and WAC 173-340-7490(4)(b). For potential terrestrial ecological exposures, MTCA regulations allow a conditional point of compliance to be established from the ground surface to 6 ft BGS (the biologically active zone according to MTCA default assumptions), provided institutional controls are used to prevent excavation of deeper soil [WAC 173-340-7490(4)(a)]. Accordingly, in areas of the Site where potential ecological exposures are a concern, and where appropriate institutional controls can be implemented, a conditional point of compliance for soil concentrations protective of terrestrial ecological receptors may be proposed throughout the soil column from the ground surface to 6 ft BGS.

3.2.2 Groundwater

Because the preliminary groundwater cleanup levels (Table 4) are based on protection of marine surface water and not protection of groundwater as drinking water, the proposed conditional point of compliance for the preliminary groundwater cleanup levels is the point of groundwater discharge to the Cap Sante Waterway and Fidalgo Bay. This corresponds to the groundwater/surface water interface at the Port Uplands Area and the MJB North Area. At the Port Uplands Area, existing shoreline wells (MW-101, MW 105, MW-106, MW-107, and MW-108) may be used to evaluate compliance. Monitoring well MW-112 is located near the Fidalgo Bay shoreline; however, this well is installed upgradient of a subsurface containment wall intended to retard migration of potentially contaminated groundwater to Fidalgo Bay; therefore, monitoring well MW-112 will not be used to evaluate compliance. At the MJB North Area, existing shoreline wells (MW-1, MW-2, MW-3, MW-5, and MW-6) may be used to evaluate compliance. Monitoring wells MW-4 and MW-7 are located farther west, away from the shoreline; therefore, they will not be used to evaluate compliance.

3.2.3 Sediment

For marine sediments potentially affected by Site releases, the point of compliance for protection of the environment is surface sediments within the biologically active surface water habitat zone, represented by samples collected across the top 10 cm (0 to 0.3 ft) below the mudline.

4.0 SOIL INVESTIGATIONS AND RESULTS

This section presents a description of the activities associated with the soil RIs conducted at Port Parcel 3 and the MJB North Area, and the physical and chemical characterization of the soil in both areas based on the results of the investigations. Previous chemical characterization results for soil at Port Parcels 1 and 2 also are summarized in this section.

4.1 SOIL INVESTIGATION ACTIVITIES

The activities associated with the Port Parcel 3 and the MJB North Area soil investigations are described below. Activities associated with Port Parcels 1 and 2 soil investigations are described in the draft RI/FS for Port Parcel 1 soil (Landau Associates 2004b) and the Parcel 2 RI/FS (ThermoRetec 1999a).

4.1.1 Port Parcel 3 Soil Investigation

This section describes the activities associated with the Port Parcel 3 soil investigation, including a brief description of previous soil investigations that have occurred on the parcel. Some activities associated with the Port Parcel 3 investigation, such as management of investigation-derived wastes and surveying of soil sample locations, are described in Appendix G.

4.1.1.1 Previous Soil Investigations

At least five investigations that included soil characterization were conducted at Port Parcel 3 prior to the 2004-2008 RI. These investigations included:

- Collection of four surface soil samples (S-3, S-4, S-5, and S-6; shown as locations LAI-S-3 through LAI-S-6 in Figure 6) by A-1 Pump in 1992 (A-1 Pump 1992) and analysis of the samples for benzene, toluene, ethylbenzene, and xylenes; total petroleum hydrocarbons (TPH); and metals. Subsequently, during Seafarers' Memorial Park development, 6 to 12 inches of topsoil was placed at the Park. Because of concerns about the accuracy of the arsenic results from the A-1 Pump investigation, samples from these locations (identified as LAI-S-3, LAI-S-4, LAI-S-5, and LAI-S-6) were collected at depths from 0 to 2 ft and analyzed for arsenic during the 2004-2007 RI. The arsenic results from the 2004-2007 RI were used to evaluate soil quality at Parcel 3.
- Installation of soil borings B-07 and B-08, located in the paved portion of Seafarers' Memorial Park and at the southern portion of "R" Avenue, respectively, by ENSR in March of 1993 (ENSR 1993). Both borings were drilled to a depth of 21.5 ft BGS. A soil sample was collected at boring B-07 from a depth of 18 ft BGS and submitted for analysis of TPH, SVOCs, and metals. A soil sample was collected at boring B-08 from a depth of 4 ft BGS and submitted for analysis of SVOCs, PAHs, and metals.
- Installation of soil borings B-13 and B-14, located at the western portion of Seafarers' Memorial Park, by ENSR in June of 1993 (ENSR 1993). The borings were drilled to depths of 24 ft and 24.5 ft BGS, respectively. Three soil samples were collected at boring B-13 from depth intervals of 3.5 to 5.0 ft, 6.0 to 7.5 ft, and 8.5 to 10.0 ft BGS. All three of the samples were analyzed for TPH. The shallowest and deepest samples were also analyzed for PAHs. Samples for chemical analysis were not collected from boring B-14.
- Installation of soil borings B-1 and B-2, located near the former smoke stack, by Advanced Soil Mechanics in December 1993 (Advanced Soil Mechanics 1994). Two soil samples were collected at boring B-1 from depths of 5.0 ft BGS and 9.2 ft BGS. Two soil samples were collected at boring B-2 from depths of 5.0 ft BGS and 16.0 ft BGS. All of the samples were analyzed for TPH.
- Collection of one soil sample from each of eight test pits (ET-TP01, ET-TP04, ET-TP11, ET-TP12, ET-TP13, ET-TP14, ET-TP15, and ET-TP16) by Earth Tech in 1998 (Earth Tech 1999b,c). The depth of the test pits ranged from 3 ft to 15 ft BGS. Each of the soil samples was analyzed for metals and dioxins/furans. The soil samples collected at test pits ET-TP11 and ET-TP12 were also analyzed for TPH.

Locations of previous investigation explorations are shown in Figure 6.

4.1.1.2 2004-2008 Investigation

The Port Parcel 3 soil investigation included drilling 13 soil borings on Port Parcel 3. Five of the borings were completed as monitoring wells. In addition, shallow soil samples were collected from hand-dug

holes at four locations in the Park. The soil lithology encountered in each soil boring was logged by a geologist.

Sampling Locations

Soil borings were drilled at Port Parcel 3 for installation of monitoring wells MW-101, MW-102, MW-105, MW-106, and MW-107. Additionally, to provide better sampling coverage in Seafarers' Memorial Park, the Park area was divided into six approximately 100-ft by 100-ft sampling grids (some grids are slightly larger and other grids are slightly smaller due to the irregularity of the Port Parcel 3 property line on the west side of the Park). At least one soil boring was located within each sampling grid. At one of the grids, five soil borings were drilled and sampled. Three soil borings (LSB-1, LSB-2, and LSB-3) were located near the former test pit ET-TP12 where, in 1998, dioxins/furans were detected at a depth of 4 ft BGS at a TEQ concentration (6.8 ng/kg) that slightly exceeded the corresponding MTCA Method B human-health criterion of 6.7 ng/kg TEQ in effect when the RI field work was conducted (the MTCA Method B criterion was revised to 11 ng/kg TEQ in 2007). During drilling of LSB-2, soil with a strong petroleum odor and slight sheen was encountered at 6.5 to 8.5 ft BGS and wood debris with an odor described as "burnt" was encountered at 17 to 21 ft BGS. To better characterize the area, a soil boring (LSB-7) was drilled approximately 30 ft west and a soil boring (LSB-8) was drilled approximately 50 ft north of LSB-2. At two of the sampling grids, the selected soil borings are the soil borings for monitoring wells MW-105 and MW-106. At the remaining grids, soil borings (LSB-4, LSB-5, and LSB-6) were located near the center of the grid, but in an area where explorations were not previously conducted. The sampling grids and soil boring locations are shown in Figure 6.

All of the Port Parcel 3 soil borings were drilled using a 4.25-inch inside-diameter hollow-stem auger. All of the borings extended at least to the fill/native material interface. The total depth of each soil boring is summarized in Table 6. Soil boring logs are provided in Appendix H.

Shallow soil samples (from 0 to 2 ft BGS) were collected at the same locations as the surface soil samples (S-3, S-4, S-5, and S-6) collected in 1992 by A-1 Pump. These shallow soil samples were collected to better characterize arsenic concentrations within the upper 2 ft of soil in the Park and are identified as LAI-S-3, LAI-S-4, LAI-S-5, and LAI-S-6. The shallow soil sample locations are shown in Figure 6.

Sample Collection

Soil samples were collected from each soil boring using a 3-inch outside-diameter split-spoon sampler. Soil samples were collected continuously at each exploration for the purpose of characterizing the physical appearance of the material and to identify the fill/native material interface. However, soil samples for chemical analysis were retained from the depth intervals specified in the work plan (if visible contamination was present, soil samples of representative intervals were also retained for chemical analysis). For each soil boring location on Port Parcel 3, the planned sampling depth intervals for chemical analysis and the actual sampling depth intervals submitted for chemical analysis are summarized in Table 7 and discussed below:

- At monitoring well MW-101, no indication of contamination (e.g., debris, presence of oil or sheen, odors, and/or discoloration) was observed; therefore, in accordance with the work plan, no samples were collected.
- At monitoring well MW-102, samples were collected from the planned depth intervals except the 14 to 15 ft depth interval. The soil boring was completed to 14 ft BGS (approximately 5.5 ft into the native silt unit). Groundwater was encountered at this location at the time of drilling at about 9.5 ft BGS; therefore, the 9-ft to 10-ft sample would include the capillary fringe.

- At monitoring well MW-105, the sampled depth intervals were slightly modified from the planned depth intervals. Samples were not collected at the planned 4 to 5 ft, 9 to 10 ft, or 14 to 15 ft depth intervals, but, instead, were collected at the 6 to 7 ft, 7 to 8 ft, 8 to 9 ft, and 15 to 16 ft depth intervals. There was no recovery in the split-spoon sampler at the 14 to 15 ft depth interval. Groundwater was encountered at this location at the time of drilling at about 8 ft BGS; therefore, the 7 to 8 ft sample would include the capillary fringe.
- At monitoring well MW-106, samples were collected from the planned depth intervals and one additional depth interval (7 to 8 ft BGS). A sample was collected at 7 to 8 ft BGS because a moderate sheen was observed in the soil/wood debris encountered at this depth. Groundwater was encountered at this location at the time of drilling at about 8 ft BGS; therefore, the 7 to 8 sample would include the capillary fringe.
- At soil boring LSB-1, samples were collected at the planned depth intervals and at additional depth intervals. The additional depth intervals include a 9- to 10-ft depth interval and an 18- to 19-ft depth interval. Groundwater was encountered at this location at the time of drilling at about 7 ft BGS; therefore, the 6- to 6.5-ft sample would include the capillary fringe. No zones of contamination were observed at the time of drilling.
- At soil boring LSB-2, samples were collected at the planned depth intervals and at zones of observed contamination. The zones of observed contamination included sample depth interval 6 to 7 ft where a strong petroleum-like odor and a slight sheen were observed and sample depth interval 17 to 18 ft where a "burnt" odor was observed. No soil sample was collected for chemical analysis below 18 ft due to lack of sample recovery in the split-spoon samples at the deeper depths. Groundwater was encountered at this location at the time of drilling at about 7.5 ft BGS; therefore, the 6- to 7-ft sample would include the capillary fringe.
- At soil boring LSB-3, samples were collected at the planned depth intervals. No zones of contamination were observed.
- At soil boring LSB-4, samples were collected at the planned depth intervals except at the 9 to 10 ft depth interval. No sample was collected at this depth interval due to poor sample recovery. Instead, a sample was collected at the 10 to 11 ft depth interval. No zones of contamination were observed. Groundwater was encountered at this location at the time of drilling at about 7.5 ft BGS; therefore, the 6- to 7-ft depth interval would include the capillary fringe.
- At soil boring LSB-5, samples were collected from the planned depth intervals, at zones of observed contamination, and at the zone below the observed contamination. The zones of observed contamination include the 9- to 10-ft and 10- to 11-ft depth intervals. A heavy sheen was observed at these depth intervals. Groundwater was encountered at this location at the time of drilling at about 8 ft BGS; therefore, the 7- to 8-ft sample would include the capillary fringe.
- At soil boring LSB-6, soil samples were collected at the planned depth intervals, except at the 9- to 10-ft depth interval. No sample was collected at this depth interval due to poor sample recovery. Groundwater was encountered at this location at the time of drilling at about 7.5 ft BGS; therefore, the 6- to 7-ft sample would include the capillary fringe. A slight sheen was also observed in the 6- to 7-ft sample.
- Borings LSB-7 and LSB-8 were not planned; however, samples were collected at the 4- to 5-ft depth interval at each location. A sample from the 7- to 8-ft depth interval was also collected at boring LSB-7 and a sample from the 6- to 7-ft depth interval was collected at boring LSB-8. No zones of contamination were observed at either location.

- The shallow soil samples (identified as LAI-S-3 through LAI-S-6) were collected from hand-dug holes. At each location a sample was collected from the following depth intervals: 0 to 6 inches BGS, 6 to12 inches BGS, 12 to 18 inches BGS, and 18 to 24 inches BGS.

For each soil sample, the lithology of the sample was recorded on a Log of Exploration form or, for the shallow soil samples; the lithology was recorded on a Sample Collection Form. A visual examination for discoloration of soil and the presence of sheens or non-aqueous phase liquid was made and the presence of any odor was documented. Soil samples to be submitted for chemical analysis of constituents other than volatile organic compounds (VOCs) or gasoline-range petroleum hydrocarbons were placed into separate decontaminated stainless-steel bowls and homogenized using a decontaminated stainless-steel spoon. Larger-sized material (gravel or wood fragments greater than 2 millimeters in diameter) was removed by hand-sorting. The sample was then transferred to the appropriate sample containers. Samples to be submitted for chemical analysis of VOCs or gasoline-range petroleum hydrocarbons were not homogenized and were instead placed directly into the appropriate sample container from the split-spoon sampler.

Chemical Analyses

During the Port Uplands Area RI, 52 soil samples from Port Parcel 3 were submitted to Analytical Resources, Incorporated (ARI) laboratory in Tukwila, Washington for chemical analysis. Thirty six (i.e., all of the soil samples except those collected at locations LAI-S-3, LAI-S-4, LAI-S-5, and LAI-S-6) of the soil samples submitted for chemical analyses were analyzed for metals (antimony, arsenic, cadmium, copper, lead, mercury, nickel, and thallium; Method 6000/7000 series); diesel-range and motor oil-range petroleum hydrocarbons (Method NWTPH-Dx); and dioxins/furans (EPA Method 8290). Soil samples from LSB-5 from all analyzed depths except the shallowest were also analyzed for gasoline-range petroleum hydrocarbons (Method NWTPH-Gx); VOCs (EPA Method 8260); and cPAHs (EPA Method 8270) because a heavy sheen was observed at some depth intervals. Soil samples from the following locations and depths were also analyzed for PCBs and PAHs (carcinogenic and non-carcinogenic) due to field observations of contamination indicators as described above under Sample Collection: MW-106 at 7 to 8 ft; LSB-2 at 6 to 7 ft and 17 to 18 ft, and LSB-6 at 6 to 7 ft. The 16 soil samples collected at locations LAI-S-3, LAI-S-4, LAI-S-5, and LAI-S-6 were analyzed only for arsenic (EPA Method 7060A).

In accordance with the work plan and addendum to the RI/FS work plan, samples collected from the capillary fringe at soil borings MW-105, MW-106, LSB-4, LSB-5, and LSB-6 were also analyzed for PCBs and cPAHs.

An acid/silica-gel cleanup was performed on each soil sample analyzed for diesel-range and motor oil-range petroleum hydrocarbons. Cleanup procedures and analytical methods described in Ecology's publication Analytical Methods for Petroleum Hydrocarbons (Ecology 1997a), including the use of gas chromatogram calibration standards that had undergone acid/silica-gel cleanup, were strictly adhered to by the laboratory. Additional information on the use of acid/silica-gel cleanup is provided in Appendix I.

A summary of chemical analyses performed for each soil sample is provided in Table 7.

4.1.2 MJB North Area Soil Investigation

In accordance with the RI/FS work plan dated June 2005 (Anchor Environmental 2005a and Additional Soil Characterization SAP dated February 2006 (Geomatrix 2006), the objectives for the MJB North Area Upland RI soil investigation were to:

- Determine if surface soil in the western portion of the MJB North Area contains metals exceeding MTCA preliminary cleanup levels.

- Determine the nature and extent of potential metals, PCBs, and SVOCs associated with historical fill activities onsite, including delineation of existing hotspots that were previously identified by EPA and URS Corporation (URS).
- Determine if historical operations at the former Hansen Pile Driving Company area have affected soil in the southeast portion of the property.

The objectives were accomplished by making field observations and collecting soil samples. The first part of the soil investigation, which was performed in July 2005, consisted of utility location; surface soil sampling (RI-SSOIL-1 to RI-SSOIL-4); test pit logging and associated soil sampling (TP-1 to TP-10); groundwater monitoring well installation (MW-5 to MW-7) and associated soil sampling. The second part of the soil investigation, which was performed from January to March 2006, consisted of direct-push soil sampling (PP-1 to PP-44) and surveying soil sampling locations. Figure 7 shows the sampling locations for the Upland RI at the MJB North Area. During test pit excavation and drilling in the MJB North Area, the soil lithology was logged in the field by a Geomatrix geologist under the direction of a Geomatrix geologist licensed by the State of Washington. Soil investigation methods are described in more detail in Section 4.1.2.2.

4.1.2.1 Previous Soil Investigations

At least two investigations that included soil characterization were conducted at the MJB North Area prior to the 2004-2008 investigations. Results from both of these previous investigations are hereby referred to as "previous" soil results.

A Preliminary Assessment/Site Inspection study was conducted under an EPA START contract at the request of MJB (E&E 2000). This study included collection of 11 (plus one background) soil borings in the MJB North Area. The study included advancing 12 (SB-01 to SB-12) soil borings to collect surface and subsurface soil and groundwater grab samples. Chemical analyses included SVOCs, pesticides, PCBs, and target analyte list metals for all soil samples (12 surface and 20 subsurface samples). Dioxin/furan analyses were conducted on 17 soil (surface or subsurface) samples. Extractable petroleum hydrocarbon concentrations were measured in 10 soil samples.

In November 2001, URS conducted a soil and groundwater investigation of the MJB North Area under Ecology's VCP. The data were reported in 2002 by URS and Anchor Environmental, on behalf of MJB and K-C, respectively (Anchor Environmental et al. 2002). As part of the investigation, URS installed 10 soil borings (SS-1 to SS-10) ranging in depth from 10 to 20 ft BGS throughout the MJB North Area. Most of the borings were concentrated in the northeastern portion of the MJB North Area in the vicinity of the former Scott Mill facilities. Soil samples were collected from each of these borings at several depth intervals. Selected soil samples were analyzed for concentrations of diesel-range and oil-range TPH (6 surface and 17 subsurface samples); PAHs (5 subsurface samples); SVOCs (2 subsurface samples); priority pollutant metals (8 surface and 17 subsurface samples); hexavalent chromium (2 surface samples); PCBs (5 subsurface samples); TOC (3 subsurface samples); and grain size distribution (3 subsurface samples). The results from both of these investigations are used for evaluation of soil quality in this RI report. Locations of previous investigation explorations are shown in Figure 7. The analytical results for the previous investigations are provided in Appendix K.

4.1.2.2 2004-2008 Soil Investigation

This section describes the soil sampling methods that were used during the completion of the RI sampling at the MJB North Area including surface soil sampling, test pits, soil samples collected during installation of the groundwater wells, and direct-push probe soil sampling. Soil sample locations are shown in Figure 7.

Prior to implementing field activities, Geomatrix staff located all underground utilities at the MJB North Area that could have interfered with the subsurface field investigation. Underground utilities were identified and located using the following methods:

- Notified Underground Service Alert, a regional utility notification center, a minimum of three days prior to the commencement of field activities in order to have all public utilities in the area clearly marked. The utility notification ticket numbers were 5218950 and 6027221.
- Hired a private underground utility locating service (Applied Professional Services of Issaquah, Washington) to clearly mark all onsite private utilities.

Once utilities were identified and marked, drilling and excavation locations were adjusted accordingly so that all sampling locations were at least 5 ft from a marked utility.

An acid/silica-gel cleanup was performed on each soil sample analyzed for diesel-range and motor oil-range petroleum hydrocarbons. PAH analyses were performed both with and without silica-gel/acid wash procedure on push probe soil samples conducted in February 2006, at the request of Ron Timm. Cleanup procedures and analytical methods described in Ecology's publication *Analytical Methods for Petroleum Hydrocarbons* (Ecology 1997a), including the use of gas chromatogram calibration standards that have undergone acid/silica-gel cleanup, were strictly adhered to by the laboratory. Additional information on the use of acid/silica-gel cleanup is provided in Appendix I.

Surface Soil Samples

Surface soil samples RI-SSOIL-1 to RI-SSOIL-4 were collected at four locations in the western portion of the MJB North Area, in accordance with the work plan approved by Ecology (2005a). Three of the surface soil samples were analyzed for total antimony, arsenic, cadmium, chromium, mercury, lead, copper, and zinc using the analytical methods specified in Table 11. One of the surface soil samples, RI-SSOIL-4, was analyzed for PCBs. This sample was not listed in the SAP because it was requested by Ecology via an e-mail dated July 8, 2005 from Ron Timm. The horizontal location and approximate surface elevation of the surface sample locations were recorded by Anchor Environmental using a differential global positioning system (GPS) surveying instrument.

Test Pits

Ten test pits (TP-1 through TP-10) were used to investigate the depth and nature of fill materials emplaced at the MJB North Area. Nine test pits were planned in the SAP, but Geomatrix had time to complete an additional test pit in an area of interest based on field observations. Work began on July 11, 2005 and lasted two days. The test pits were excavated by Gary Merlino Construction Company, using a Case 580L rubber-tired backhoe to a maximum depth of 12 ft.

Geomatrix's field geologist recorded all field observations on test pit logs. Significant changes in material penetrated, subsurface conditions, and stability of the test pit are recorded on the logs, as well as depths of samples collected. Lithologic descriptions were recorded on the test pit log using the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure) as described in the American Society of Testing and Materials (ASTM) Standard D 2488-00. This description includes the soil type, grain sizes and estimated percentages of each, moisture content, color according to the Munsell color charts (Kollmorgen Instruments Corp.), plasticity for fine-grained materials, consistency, and other pertinent information, such as degree of induration, calcareous content, presence of debris and other distinctive materials. Logs are presented in Appendix U.

The test pits were backfilled with the spoils excavated from the pit in approximately inverse order. The material was bucket-compacted as the test pit was backfilled. The center of the in-filled test pit was marked with the original sample location stake to facilitate later GPS locating by Anchor Environmental.

Soil samples were collected directly from the excavator bucket after the bucket was moved from the side of the excavation. Samples were collected using the same steps as outlined for surface soil samples with the exception that all the material was collected from the area of the bucket that represented the lithology of interest.

At least one soil sample was collected from each test pit and analyzed for total antimony, arsenic, cadmium, chromium, mercury, lead, copper, and zinc using the analytical methods specified in Table 11, with the exception of samples from TP-2 and TP-10, which were analyzed only for total lead. In addition, the test pit soil sample with the highest total chromium concentration was analyzed for hexavalent chromium.

Consistent with direction from Ecology, because odors were noted during excavation of test pits TP-1, TP-6, and TP-7, select samples from the test pits were analyzed for cPAHs and one sample from TP-1 was analyzed for diesel-range and motor oil-range petroleum hydrocarbons by Method NWTPH-Dx.

The horizontal location and approximate surface elevation of the center of the test pits were recorded by Anchor Environmental using a differential GPS surveying instrument.

Groundwater Monitoring Well Borings

Soil samples were collected during completion of the three new groundwater monitoring wells (MW-5, MW-6, and MW-7) on July 14, 2005. Installation of the three new monitoring wells is described in detail in Section 6.1.2.3. The monitoring wells were drilled by hollow stem auger. The planned depth of each boring was adjusted in the field based on field measurements of water levels and lithology. The drill rods, augers, hoses, bits, and other components that cuttings contacted were steam-cleaned before drilling, between borings, and at the completion of field activities. Drive samplers were cleaned with Alconox and water or steam-cleaned before each sampling event. Potable water from a municipal supply was used for decontamination of drilling equipment.

Standard Penetration Test split-spoon drive samples were obtained for logging purposes every 5 ft. The field geologist recorded information on boring logs pertaining to the sampling, such as rate of penetration, drive-hammer blow counts, and sample recovery. A lithologic description was recorded on boring logs using the ASTM Standard D 2488-00. This description included the soil type, grain sizes and estimated percentages of each, moisture content, color according to the Munsell color charts, plasticity for fine-grained materials, consistency, and other pertinent information, such as degree of induration, calcareous content, presence of debris, and other distinctive materials. Soil boring logs are provided in Appendix U.

Soil samples were collected for analysis directly from the split-spoon sampler in accordance with the work plan approved by Ecology (2005a). The samples were stored and labeled with the well number, depth of the sample, and analytical method. At least two soil samples were submitted from each well location and analyzed for total antimony, arsenic, cadmium, chromium, mercury, lead, copper, and zinc using the analytical methods specified in Table 11.

Soil samples from MW-5, installed near the former location of the Hansen Pile Driving Company, were also analyzed for diesel- and motor-oil range petroleum hydrocarbons, cPAHs, and PCBs. Petroleum hydrocarbons were added to the SAP-specified sampling suite per an e-mail received from Ron Timm of

Ecology on July 8, 2005 requesting that TPH be included in the sampling suite at the MW-5 boring location.

Direct-Push Probes

Soil samples were collected at 44 locations (PP-1 through PP-44) in the eastern portion of the MJB North Area as shown in Figure 7. Soil samples were collected using a direct-push probe mounted on the back of a small truck. The depth of each boring was approximately 12 ft. A Geomatrix field geologist specified to the drill rig operator the intended depth of soil sample collection, method of sample retrieval, and other matters pertaining to the satisfactory completion of the borings. The drill rods, bits, and other components were steam-cleaned at the beginning of the project, before drilling each boring, and at the completion of field activities. Samplers were cleaned with Alconox and water or steam-cleaned, or pre-decontaminated new equipment was used before each sampling event. Only potable water from a municipal supply was used for decontamination of drilling equipment.

Samples were obtained for logging purposes on a continuous basis, except where sample recovery was not 100 percent. The samples and/or drill cuttings were collected and described. The field geologist/engineer recorded information on the boring log (Appendix U) pertaining to the sampling, such as rate of penetration and sample recovery. In general, the sampler was opened for observation and logging of the retrieved core. Drill cuttings and core samples were observed in the field. A lithologic description was recorded on the Boring Log using ASTM Standard D 2488-00. This description included the soil type, grain sizes and estimated percentages of each, moisture content, color according to the Munsell color charts, plasticity for fine-grained materials, consistency, and other pertinent information, such as degree of induration, calcareous content, presence of debris, elemental sulfur, and other distinctive materials. The original field logs were retained by Geomatrix staff, reviewed by professional staff, and stored in the project files. All direct-push drilling was conducted according to the WAC by Cascade Drilling (Cascade) of Woodinville, Washington, a Washington State-licensed drilling company.

The soil samples were collected in accordance with the work plan approved by Ecology (2005a). Soil samples were collected from the direct-push probe borings at various depths depending on the composition of the materials encountered in the subsurface. At least one soil sample was collected from each boring. The sample locations were surveyed by Dale Herrigstad in March 2006.

4.2 SOIL INVESTIGATION RESULTS

The data collected during the RIs conducted at the Port Uplands Area and the MJB North Area included soil lithology, observations of sheens and odors, measurements of soil vapors using a photoionization detector (PID), and chemical data. These data are evaluated below to characterize the hydrogeologic conditions at the Site and to assess the nature and extent of contamination in soil on the Port Uplands Area and the MJB North Area.

4.2.1 Physical Characterization

The Port Uplands Area soil was physically characterized by collecting and logging continuous soil samples at two soil borings located on Port Parcel 1 and at thirteen soil borings at Port Parcel 3 during the Port Uplands Area RI. Logs for several soil borings and test pits from previous investigations were also used to characterize Port Uplands Area soil. Logs for the soil borings completed on Parcels 1 and 3 during the 2004-2007 RI are provided in Appendix H.

The MJB North Area was physically characterized using 10 test pits, 3 monitoring well soil borings, and 44 direct-push probes. Soil boring and test pit logs for the MJB North Area are provided in Appendix U.

4.2.1.1 Port Parcel 1

Based on the soil boring logs for monitoring wells MW-103, MW-111, boring B-05, and the test pit logs for the nine test pits excavated by Earth Tech in 1999, the thickness of the fill material is approximately 15 ft or greater on the eastern half of Parcel 1 and ranges between about 7 and 10 ft on the western half of Parcel 1. The upper 5 ft of the fill material consists primarily of dark gray sand with silt. Below this layer, the fill material consists primarily of wood debris (described as sawdust, wood chips, and lumber). Occasionally, metal debris and wire are reported as mixed in with the wood debris. In the center of the parcel (at locations ET-TP05, ET-TP06, and MW-111), a layer of gravel was encountered below the wood debris and above a layer of native gray very stiff silt. At most other locations, the native silt layer was encountered directly below the wood debris.

4.2.1.2 Port Parcel 3

Physical characterization is based on the soil boring logs for explorations LSB-1 through LSB-8; monitoring wells MW-101, MW-102, MW-105, MW-106, and MW-107 drilled during the Port Uplands Area RI; explorations B-07, B-08, B-13, B-14 drilled in 1993 by ENSR; explorations B-1 and B-2 drilled in 1993 by Advanced Soil Mechanics; and test pit logs for eight test pits excavated by Earth Tech in 1998. The logs indicate Port Parcel 3 soil generally consists of a granular (silty, gravelly sand) fill material, underlain in some areas by a black sandy silt fill material, which contains varying amounts of wood debris. This latter fill material may be dredged material placed as preload on the Property in 1994, as discussed in Section 2.2. The thickness of the sandy and/or silty fill material on Port Parcel 3 ranged from about 6 ft in the southern portion of Seafarers' Memorial Park to about 11.5 ft at LSB-05. Below this fill material was a relatively thick layer of wood debris (described as sawdust, wood chips, and lumber). The thickness of the wood debris across Port Parcel 3 ranged from about 7.5 ft in the northeastern portion of Seafarers' Memorial Park to about 12 ft in the southern portion of the Park. Along Seafarers' Way and "R" Avenue, the thickness of wood debris varied from 10.5 ft at MW-101 to 8.5 ft at MW-102. However, no wood debris was reportedly encountered at boring B-8. A layer of native gray silt was encountered beneath the wood debris. This fill/native material interface was encountered at Port Parcel 3 at depths up to 21 ft BGS. Four lithologic cross sections through Port Parcel 3 were prepared. The cross section locations are shown in Figure 8; the cross sections are shown in Figures 9 through 12. One of the cross sections (Figure 10) also extends through Parcels 1 and 2. Fill material and wood debris thicknesses at Port Parcel 3 are summarized in Table 6.

During the 2004-2007 investigations, soil samples from each soil boring location were evaluated using a PID and observations by field personnel to identify potential zones of contamination. At MW-106, a moderate sheen was observed in the soil/wood debris encountered at the sample depth interval 7 to 8 ft BGS. At LSB-2, strong petroleum-like odors and a slight sheen were observed at the sample depth interval 6 to 7 ft BGS and a "burnt" odor was observed at the sample depth interval 17 to 18 ft BGS. At soil boring LSB-5, a heavy sheen was observed from 9 to 11 ft BGS. At soil boring LSB-6, a slight sheen was observed in the wood debris encountered at the 6 to 7 ft depth interval. A strong, musty, garbage-like odor was observed from about 5.5 ft BGS to about 21 ft BGS at soil boring MW-110. Hydrogen sulfide odors were observed at most explorations, except LSB-6, MW-102, MW-109, and MW-110; however, no detectable concentrations were measured using a Gasport® multimeter. No metal, wire, or brick debris was observed.

A waxy substance with no odor was reported at a depth of 3.5 to 6 ft BGS and a "burnt" odor was reported at 13.5 BGS at previous investigation exploration B-13. The reported "burnt" odor may be due to refusal at this depth interval. Concrete, brick, and metal debris were encountered at depths less than 12 ft BGS at previous investigation test pits ET-TP01, ET-TP12, ET-TP13, and ET-TP16.

Positive PID results of about 3.0 ppm were measured at MW-104 between the depths of 11 to 13 ft BGS, and at MW-107 between the depths of 17.5 to 19 ft BGS. At MW-110, a positive PID result of 20 ppm was measured at depth interval 7.5 to 10 ft BGS, and positive PID results of 8 ppm and 9 ppm were measured at depth intervals of 11.5 to 13 ft and 16 to 17 ft BGS. No positive PID results were measured at other Port Uplands Area RI soil borings. Due to instrumentation malfunction, no PID measurements were performed at soil boring MW-109. Additionally, except at test pit ET-TP04, no positive PID results were reported for the test pit explorations performed by EarthTech in 1998 or for the soil borings performed by ENSR in 1993 located on Port Parcel 3. At ET-TP04, a positive PID result of 10 ppm was reported in the upper 6 ft of soil.

As discussed in Section 5.0, monitoring for hydrogen sulfide and methane in the air during drilling of each Port Uplands Area RI borehole did not indicate detectable concentrations of either of these gases at the Port Uplands Area investigation boreholes. Additionally, previous investigations that included hydrogen sulfide monitoring did not indicate detectable concentrations of the gas.

4.2.1.3 MJB North Area

Subsurface conditions encountered in the borings in the MJB North Area typically consisted of several different layers of fill underlain by native silt with sand. Listed below are some of the distinctive layers of fill and native soil that were encountered across the site:

- Fill - Poorly graded gravel with silt and sand (GP-GM): very dark grayish brown (10YR 3/2), fine to coarse subangular to angular gravel with angular cobbles up to 1 ft in diameter; gravel is fine-grained dark gray rock. Sometimes contains wood fragments. Found in all test pits and monitoring well borings except TP-2 and TP-8, and also in PP-9 through PP-16, PP-19, PP-20, and PP-31.
- Fill - Poorly graded sand with gravel (SP): brown (10YR 4/3), fine to coarse sand, fine to coarse subrounded to rounded gravel with round cobbles up to 4 inches in diameter, thought to be imported structural fill. Found in TP-2, TP-3, TP-4, TP-5, TP-6, TP-10, MW-5, MW-6, PP-1, PP-3 through PP-8, PP-20 through PP-28, PP-30, PP-36, and PP-38 through PP-42.
- Fill - Poorly graded sand with silt and gravel (SP-SM): greenish black (10Y 2.5/1), fine to coarse sand, fine to coarse subrounded to rounded gravel with cobbles up to 6 inches in diameter and matted wood material, sometimes odor, concrete chunks. Found in TP-1, TP-3, TP-4, TP-5, TP-7, TP-8, TP-10, MW-5, MW-6, PP-3, PP-7, and PP-28.
- Fill - Woody silty gravel with sand (GM) or silty sand with gravel (SM): greenish black (10Y 2.5/1) or black (10YR 2/1), fine to coarse rounded to subangular gravel, fine to coarse sand, nonplastic fines, contains wood shards, wood lagging, wood pilings, concrete chunks, orange rusty slag chunks, rebar, twine and rope, metal pipe debris, yellow elemental sulfur chunks, and can have mothball-like odor and sheen. Found in TP-1, TP-5, TP-6, TP-7, TP-10, PP-11, PP-14 through PP-17, PP-21 through PP-26, PP-33, PP-34, PP-37, PP-38, and PP-44.
- Fill - Wood: black, dark brown, or reddish brown, sometimes peaty or sandy. Varies from large chunks to fine peaty wet sawdust; has odor in areas. Sometimes contained fine yellow sulfur pieces. Found in MW-5, PP-9 through PP-23, PP-27, PP-29 through PP-38, PP-40, and PP-43.
- Fill - Woody Silt (ML), brown to black (10YR 2/1), up to 20 percent fine gravel or fine to coarse sand, nonplastic, soft to firm, contains rootlets and wood, odor, sometimes contains brick pieces up to 3" in diameter, can have wood matting on top. Sludgy below water table. Found in TP-1, TP-2, TP-8, MW-7, PP-10, PP-14, PP-15, PP-17, PP-18, and PP-35.

- Native - Silt (ML), very dark greenish gray (10Y 3/1) 10 percent fine gravel or fine to coarse sand, nonplastic, soft to firm, contains rootlets and wood. Found in PP-2 through PP-4, PP-6, PP-8, and PP-39.
- Native - Silt with sand (ML): dark greenish gray (10GY 4/1) mottled brown or yellowish brown, fine to coarse sand, low plasticity fines, soft to firm, trace fine gravel, contains inclusions of coarse silica sand with gold flakes (possibly mica) and sometimes pockets of dark gray fine sand and reddish rootlets/seams, can become brown, firm and blocky with depth. Found in TP-1, TP-2, TP-4, TP-6, TP-8, TP-9, MW-5, MW-6, MW-7, PP-1 to PP-6, PP-8, PP-25, PP-27, PP-28, PP-38 to PP-40, and PP-42.

4.2.2 Chemical Characterization

Chemical data for soil samples collected throughout the Site were compared to the preliminary soil cleanup levels shown in Table 1 to assess the nature and extent of contamination in soil. The results of the comparisons are described below.

4.2.2.1 Port Uplands Area

Chemical characterization of Port Uplands Area soil was based on analytical results for the Port Uplands Area RI samples and previous investigation soil samples. Analytical results for 13 soil samples collected at Parcel 1 during the previous and 2004-2008 investigations were used to characterize Parcel 1 soil, and analytical results for 69 soil samples collected at Parcel 3 during the previous and 2004-2008 investigations were used to characterize Parcel 3 soil. Analytical results for soil remaining at Parcel 2 were used to characterize Parcel 2 soil.

Analytical results for soil samples collected at Port Parcels 1 and 2 during previous investigations are presented in Tables 8 and 9. The data in Tables 8 and 9 were previously published in the Parcel 1 RI/FS report (Landau Associates 2004b) and the Parcel 2 RI/FS report (ThermoRetec 1999a). The analytical results for constituents detected in Parcel 3 soil during the 2004-2008 RI are summarized in Table 10. Complete analytical results for all soil investigations at Port Parcel 3 (including the 2004-2008 and previous investigations) are contained in Appendix J. Laboratory analytical reports for the 2004-2008 RI are presented in Appendix V.

The analytical results for Port Parcel 3 soil indicate that the following constituents or class of constituents have not been detected in Parcel 3 soil:

- Metals: antimony and thallium
- PCBs (except Aroclors 1254 and 1260)
- VOCs (except acetone, carbon disulfide, and m,p-xylene)

The soil analytical results for the Port Uplands Area were evaluated by comparing the detected chemical concentrations directly to the protective soil concentrations that were considered in the development of preliminary soil cleanup levels (Table 1; see Section 3.1.1). These protective soil concentrations include concentrations protective of groundwater, direct human contact, and terrestrial ecological receptors.

Comparison to Soil Concentrations Protective of Groundwater as Marine Surface Water

The comparison of concentrations of detected constituents in Port Uplands Area soil to the calculated soil concentrations protective of groundwater as marine surface water indicates that most constituents either were not detected in soil samples, or were detected at concentrations below the protective concentrations. Some metals, cPAHs, PCBs, and dioxins/furans were detected in Port Uplands Area soil at concentrations exceeding the calculated concentrations protective of groundwater. However, groundwater

concentrations of these constituents measured in downgradient monitoring wells during the four groundwater monitoring events do not exceed preliminary groundwater cleanup levels (as discussed in Section 6.2.2.1), indicating that existing soil concentrations are protective of groundwater. As a result, existing soil concentrations for these constituents are considered protective of groundwater based on empirical evidence, in accordance with WAC 173-340-747(9). Appendix D provides further documentation supporting the conclusion that existing soil concentrations are protective of groundwater.

Comparison to Soil Concentrations Protective of Direct Human Contact and Terrestrial Ecological Receptors

Locations where one or more constituents were detected at a concentration exceeding the preliminary cleanup levels protective of direct human contact and terrestrial ecological receptors within the upper 15 ft of soil are shown in Figures 13 through 16. For clarity of presentation, the locations of preliminary soil cleanup level exceedances are displayed for four different depth intervals: 0 to 2 ft BGS (shallow soil; Figure 13), 2 to 6 ft BGS (Figure 14), 6 to 10 ft BGS (Figure 15), and 10 to 15 ft BGS (Figure 16).

Port Parcel 1

No constituents were detected at concentrations above the preliminary cleanup levels in shallow soil (0 to 2 ft BGS) at Port Parcel 1. The only constituent detected at a concentration above the preliminary cleanup levels in soil between 2 and 15 ft BGS at Parcel 1 was arsenic. The extent of the arsenic contamination was limited to one location (ET-TP03) along the eastern boundary of Parcel 1 (Figure 15).

Port Parcel 2

No constituents were detected at concentrations above the preliminary cleanup levels in shallow soil (0 to 2 ft BGS) remaining at Port Parcel 2. Several constituents were detected at concentrations above the preliminary cleanup levels in deeper soil (2 to 15 ft BGS) remaining at Parcel 2, including metals, diesel- and motor oil-range petroleum hydrocarbons, cPAHs, PCBs (several Aroclors), and dioxins/furans. The locations of the preliminary soil cleanup level exceedances at Parcel 2 are shown in Figures 14, 15, and 16.

Port Parcel 3

For the purposes of this discussion, Port Parcel 3 is subdivided into four areas: the southern portion of the park, the northern portion of the park, the park paved areas, and "R" Avenue and Seafarers' Way. Soil characterization results for each of these areas are discussed below relative to the preliminary cleanup levels protective of human health and terrestrial ecological receptors.

Southern Portion of Park

During the RI, six soil borings (LSB-1, LSB-2, LSB-3, LSB-4, LSB-7, and LSB-8) were drilled and four shallow test pits were hand-dug (LAI-S-3, LAI-S-4, LAI-S-5, and LAI-S-6) in the southern portion of Seafarers' Memorial Park. Sixteen soil samples were collected from the shallow hand-dug test pits, at depths between 0 and 2 ft BGS. Eighteen soil samples were collected from the soil borings, at depths between 4 and 19 ft BGS. During previous investigations in 1992, 1993, and 1998 (A-1 Pump 1992; Advanced Soil Mechanics 1994; EarthTech 1999b,c), samples were collected in the southern portion of Seafarers' Memorial Park from four surface sample explorations (S-3, S-4, S-5, and S-6; coincident with 2004-2007 RI locations LAI-S-3, LAI-S-4, LAI-S-5, and LAI-S-6), two soil boring explorations (B-1 and B-2), and three test pit explorations (ET-TP11, ET-TP12, and ET-TP13). One soil sample was collected from each of the four surface sample explorations; two soil samples were collected from each of the two

soil borings (at depths between 5 and 16 ft BGS); and one soil sample was collected from each of the three test pits (at depths between 1 and 5 ft BGS). Three of the RI soil borings (LSB-1, LSB-2, and LSB-3) were drilled adjacent to the former test pit location ET-TP12 where, in 1998, dioxins/furans were detected at a depth of 4 ft BGS at a TEQ concentration (6.8 ng/kg) marginally exceeding the corresponding MTCA Method B human-health criterion of 6.7 ng/kg TEQ in effect when the RI field work was conducted (the MTCA Method B criterion was revised to 11 ng/kg TEQ in 2007).

Results for the five locations sampled within the 0 to 2 ft BGS depth interval in the southern portion of Seafarers' Memorial Park indicate that no constituents were detected above the preliminary cleanup levels in the upper 6 inches of soil. Arsenic was detected at concentrations above the preliminary cleanup level at one location (LAI-S-4), in soil between 6 and 24 inches BGS (Figure 13).

Results for the ten locations sampled within the 2 to 6 ft BGS depth interval in the southern portion of Seafarers' Memorial Park indicate that dioxins/furans were detected at a concentration above the preliminary cleanup levels at four locations (LSB-4, LSB-7, LSB-8, and ET-TP12). In addition, copper was detected at concentrations above the preliminary cleanup level at two locations (LSB-7 and LSB-8). The locations and concentrations of these exceedances are shown in Figure 14.

Results for the seven locations sampled within the 6 to 10 ft BGS depth interval in the southern portion of Seafarers' Memorial Park indicate that dioxins/furans were detected at concentrations above the preliminary cleanup levels at four locations (LSB-1, LSB-2, LSB-4, and LSB-8). Additionally, one or more of the constituents arsenic, lead, copper, diesel-range petroleum hydrocarbons, motor oil-range petroleum hydrocarbons, and cPAHs were detected at concentrations above the preliminary cleanup levels at three locations (LSB-1, LSB-2, and LSB-8). The locations and concentrations of these exceedances are shown in Figure 15.

Results for the two locations sampled within the 10 to 15 ft BGS depth interval in the southern portion of Seafarers' Memorial Park indicate that dioxins/furans were detected at concentrations exceeding preliminary cleanup levels at both locations (LSB-2 and LSB-4). Additionally, copper was detected at a concentration above the preliminary soil cleanup level at LSB-4, and copper, diesel- and motor oil-range petroleum hydrocarbons, and cPAHs were detected at concentrations above the preliminary cleanup levels at LSB-2. The locations and concentrations of these exceedances are shown in Figure 16.

Northern Portion of Park

During the RI, two explorations (MW-105 and MW-106) were completed near the shoreline in the northern portion of Seafarers' Memorial Park. At MW-105, four soil samples were collected at depths between 6 and 16 ft BGS. At MW-106, four soil samples were collected at depths between 4 and 15 ft BGS. During an earlier investigation (EarthTech 1999b,c), three test pits (ET-TP14, ET-TP15, and ET-TP16) were excavated near the shoreline in the northern portion of Seafarers' Memorial Park. Soil samples were collected above 3 ft BGS at each of the test pits.

Results for the two locations sampled within the 0 to 2 ft BGS depth interval and the two locations sampled within the 2 to 6 ft BGS depth interval in the northern portion of Seafarers' Memorial Park indicate that no constituents were detected above the preliminary cleanup levels within the upper 6 ft of soil in this portion of the park.

Results for the two locations sampled within the 6 to 10 ft BGS depth interval in the northern portion of Seafarers' Memorial Park indicate that dioxins/furans and copper were detected at concentrations above the preliminary cleanup levels at both locations (MW-105 and MW-106). Additionally, lead was detected

at a concentration above the preliminary cleanup level at MW-105, and diesel- and motor oil-range petroleum hydrocarbons were detected at concentrations above the preliminary cleanup levels at MW-106. The locations and concentrations of these exceedances are shown in Figure 15.

Results for the one location sampled within the 10 to 15 ft BGS depth interval in the northern portion of Seafarers' Memorial Park (MW-106) indicate that furans were detected at a concentration above the preliminary cleanup level protective of terrestrial ecological receptors at this location. The location and concentration of this exceedance is shown in Figure 16.

Park Paved Areas

During the RI, two soil explorations (LSB-5 and LSB-6) were completed in the parking lot of Seafarers' Memorial Park. Five soil samples were collected at LSB-5 and three soil samples were collected at LSB-6. The soil samples were collected from depths ranging between 4 and 15 ft BGS at each exploration. During an earlier investigation (Advanced Soil Mechanics 1994), three soil borings (B-07, B-13, and B-14) were completed in this area. The location for B-13 is underneath the Seafarers' Memorial Park building. One soil sample was collected at B-07 from 18 ft BGS and submitted for laboratory analysis. Three soil samples were collected at B-13 from depths intervals of 3.5 to 5 ft BGS, 6 to 7.5 ft BGS, and 8.5 to 10 ft BGS and submitted for laboratory analysis. Two soil samples were collected at B-14 from depth intervals of 10 to 11.5 ft BGS and 28.5 to 30 ft BGS and submitted for laboratory analysis.

No soil samples were collected from the 0-2 ft BGS depth interval in the paved areas of Seafarers' Memorial Park. Results for the three locations sampled within the 2-6 ft BGS depth interval in the paved areas of Seafarers' Memorial Park indicate that no constituents were detected above the preliminary cleanup levels in this interval (Figure 14).

Results for the three locations sampled within the 6 to 10 ft BGS depth interval in the paved areas of Seafarers' Memorial Park indicate that dioxins/furans and copper were detected at concentrations above the preliminary cleanup levels at one location (LSB-6), and diesel-range petroleum hydrocarbons and cPAHs were detected at concentrations above the preliminary cleanup levels at one location (B-13). The locations and concentrations of these exceedances are shown in Figure 15.

Results for the three locations sampled within the 10 to 15 ft BGS depth interval in the paved areas of Seafarers' Memorial Park indicate that diesel-range petroleum hydrocarbons were detected at concentrations above the preliminary cleanup levels at two locations (LSB-5 and B-14). Additionally, lead, motor oil-range petroleum hydrocarbons, and cPAHs were detected at concentrations above the preliminary cleanup levels at one location (LSB-5), and dioxins/furans were detected at concentrations above the preliminary cleanup levels protective of terrestrial ecological receptors at one location (LSB-6). The locations and concentrations of these exceedances are shown in Figure 16.

"R" Avenue and Seafarers' Way

One soil boring (for monitoring well MW-101) was completed in Seafarers' Way during the RI. Continuous soil samples were collected from this boring for visual observation and field screening. In accordance with the RI/FS work plan, because visual observations and field screening did not indicate the presence of contamination, no soil samples were submitted for analysis from MW-101. One soil sample was collected from 11 ft BGS at test pit ET-TP04, located in Seafarers' Way, during a previous investigation. This sample was analyzed for metals and dioxins/furans. No constituents were detected above the preliminary cleanup levels in the sample from ET-TP04 (Figure 16).

One soil boring (for monitoring well MW-102) was completed directly adjacent to "R" Avenue during the RI, and one soil boring (B-08) was completed at the present southern end of "R" Avenue during a previous investigation. Two soil samples were collected from 5-6 ft BGS and 6-7 ft BGS at MW-102 and submitted for laboratory analysis. One soil sample was collected from 4 ft BGS at B-08 and submitted for laboratory analysis.

Results for the soil sample collected at B-08 indicate that lead, copper, and cPAHs were detected at concentrations above the preliminary cleanup levels. At MW-102, arsenic was detected in the sample collected from 5-6 ft BGS at a concentration above the preliminary cleanup level; there were no preliminary cleanup level exceedances in the sample collected from 6-7 ft BGS. The locations and concentrations of the preliminary cleanup level exceedances at MW-102 and B-08 are shown in Figure 14.

4.2.2.2 MJB North Area

Soil analytical results for the MJB North Area RI (hereby referred to as "recent" soil sample results) are included in Table 11. Laboratory analytical reports and data validation memos are included in Appendix V. Geomatrix staff submitted 27 soil samples to ARI for analysis (16 test pit samples, four surface soil samples, and seven monitoring well boring samples), and 115 direct-push soil samples to OnSite Environmental, Inc., laboratory located in Redmond, Washington for analysis. Soil samples were selectively analyzed for total antimony, arsenic, cadmium, chromium, copper, mercury, thallium, zinc, and lead; hexavalent chromium; lead using the Toxicity Characteristic Leaching Procedure (TCLP); TPH-Dx; SVOCs; and PCBs. The detected analytical results presented in Table 11 were compared directly to the preliminary soil cleanup levels protective of terrestrial ecological receptors and direct human contact described in Section 3.1.1. Analysis for TCLP lead was included to provide information needed for evaluation of cleanup action alternatives in the FS. TEQ concentrations for soil cPAH results were calculated using toxicity equivalency methodology in WAC 173-340-708(8) and the TEF values shown in Table 2.

Comparison to Soil Concentrations Protective of Groundwater as Marine Surface Water

The comparison of concentrations of constituents in MJB North Area soil to calculated soil concentrations protective of groundwater as marine surface water indicates the presence of metals and SVOCs at concentrations exceeding these protective concentrations. However, groundwater concentrations of these constituents, measured in downgradient monitoring wells during the two groundwater monitoring events, do not exceed preliminary groundwater cleanup levels (as discussed in Section 6.2.2.1), indicating that existing soil concentrations are protective of groundwater. As a result, existing soil concentrations for these constituents are considered protective of groundwater based on empirical evidence [WAC 173-340-747(a)], as described in Appendix D.

Comparison to Soil Concentrations Protective of Direct Human Contact and Terrestrial Ecological Receptors

Locations in the MJB North Area where one or more constituents were detected at a concentration exceeding preliminary cleanup levels protective of direct human contact and terrestrial ecological receptors in the upper 15 ft of soil are shown in Figures 17 through 19. Of the 142 recent soil samples submitted for analysis, 23 samples had results that exceeded their respective preliminary cleanup levels. The analytes in soil detected at concentrations exceeding the preliminary cleanup levels (in previous or recent soil samples) were antimony, arsenic, chromium, copper, lead, nickel, thallium, zinc, and cPAHs. Each of these constituents is discussed below.

Antimony

The preliminary cleanup level for antimony is 32 mg/kg. Antimony was found at concentrations exceeding the cleanup level in five previous subsurface soil samples – SS-10 from 6 to 8 ft BGS, MW-1 from 7.5 to 8.5 ft BGS, SB-03 from 6.5 to 9 ft BGS, SB-10 from 9 to 11.5 ft BGS, and SB-11 from 9 to 11.5 ft BGS. The maximum concentration of antimony found was 822 mg/kg, at MW-1. The antimony exceedances are located at sampling locations where concentrations of other metals are also high.

Arsenic

The preliminary cleanup level for arsenic is 20 mg/kg. Arsenic was found at concentrations exceeding the cleanup level in five recent sample locations and 10 previous sample locations. The maximum concentration of arsenic was 142 mg/kg in SB-09 from 0 to 0.5 ft BGS. In general, the arsenic at the site appears to be limited to five discrete areas of surface soil (SS5, MW-5, MW-7, SB-07, and SB-01/SB-04) and one subsurface soil area (PP-15 through PP-17, between 6.5 and 9 ft). The arsenic was found in the surface fill layer consisting of dark grayish brown gravel, as well as a deeper very soft black woody silt layer with an odor, below the water table.

Chromium

The preliminary cleanup level for chromium is 117 mg/kg. Chromium was found at concentrations exceeding the cleanup level in only one location – previous sample location SB-04 between 0 and 0.5 ft BGS, at a concentration of 309 mg/kg. This is thought to be a sporadic exceedance, because chromium has been sampled extensively across the site and there were no other exceedances. Chromium has not been detected at concentrations exceeding the cleanup level in any recent soil samples.

Copper

The preliminary cleanup level for copper is 100 mg/kg. Copper was detected above cleanup levels in four recent surface soil samples and eleven previous surface soil samples and appears to be limited to surface soil around MW-4, RI-SSOIL-2, RI-SSOIL-3, SB-09/MW-7/SS-3, SB-07/SB-06, SB-01/SB-04, SS5/SB-05/SB-10, and SB-11/MW-5. The maximum concentration of copper in surface soil samples was 674 mg/kg at SB-05 between 0 and 0.5 ft BGS. In addition, copper was found to exceed the preliminary cleanup level in two recent subsurface samples and seven previous subsurface samples and appears to be limited to subsurface soil around SB-11/MW-5/RI-TP-1, MW-1/SB-10, SB-02/SS-10/SB-03, and SB-07. The maximum concentration of copper in subsurface soil samples was 2780 mg/kg at SS-10 between 6 and 8 ft BGS.

Lead

The preliminary cleanup level for lead is 220 mg/kg. Lead was found to exceed this cleanup level in eighteen samples, with a maximum concentration of 13,800 mg/kg at MW-1 between 7.5 and 8.5 ft BGS. The lead appears to be mostly limited to 4.5 to 11.5 ft in depth in the area between PP-15 and PP-27. The only near-surface sample exceeding cleanup levels was PP-25 at 1.0 foot, but because of poor core recovery, that sample could be interpreted as being from the upper 4 ft BGS (see boring log in Appendix U). The high concentrations of lead were found in either black silty sand or gravel with wood layer (sometimes this gravel was dark yellow vesiculated slag), or black and dark brown wood layer with odor below the water table. This wood layer sometimes contained red painted or stained wood and elemental sulfur. The lead was also found in the very soft black woody silt layer with odor below the water table.

The recent soil samples with the eight highest concentrations of lead were also analyzed for lead using the TCLP to provide information for the FS. Two of the eight samples contained lead at concentrations exceeding the TCLP threshold concentration of 5 mg/L. The soil present in PP-25 at 1.0 ft (15 mg/L lead) and PP-16 at 6.5 ft (8.2 mg/L lead) would be considered dangerous waste if excavated and disposed without pretreatment, because the soil contains lead at concentrations that exceed the TCLP threshold concentrations.

In the MJB North Area, any future excavated soil that contains lead at concentrations higher than 250 mg/kg will be assumed to fail the TCLP for lead, unless the excavated soil is analyzed and does not fail the TCLP.

Nickel

The preliminary cleanup level for nickel is 100 mg/kg. Nickel was found at concentrations exceeding the cleanup level at only two locations – previous sampling location SB-04 between 0 and 0.5 ft BGS, at a concentration of 218 mg/kg, and previous sampling location SS3 between 0 and 0.5 ft BGS, at a concentration of 117 mg/kg. These appear to be sporadic exceedances.

Thallium

The preliminary cleanup level for thallium is 5.6 mg/kg. Thallium was found at concentrations exceeding the cleanup level in three subsurface locations – previous sample locations SB-02 between 9 and 11.5 ft BGS, SB-10 between 9 and 11.5 ft BGS, and SB-11 between 9 and 11.5 ft BGS. The maximum concentration of thallium found was 50.5 mg/kg, at SB-02. The thallium exceedances are located in sampling locations where other metals are also high. Thallium was not detected at concentrations exceeding the cleanup level in any recent soil samples.

Zinc

The preliminary cleanup level for zinc is 270 mg/kg. Zinc was detected above cleanup levels in two recent surface samples and thirteen previous surface soil samples, and appears to be limited to the areas around RI-SSOIL-3, MW-5/SB-11, SS3/SB-09, SB-08/SB-06/SB-07, SS5, and the area in the northeast of the site stretching from SB-01 to SB-10, in generally the same locations as the copper exceedances. The zinc was found in the surface fill layer consisting of dark grayish brown gravel. Zinc was also found to exceed the preliminary cleanup level in one recent subsurface sample and four previous subsurface samples, and appears to be limited to the areas around RI-TP-8, SS-1, SB-11, SB-10, and SB-07. The maximum concentration of zinc was 1,670 mg/kg at SB-07 between 6.5 and 7 ft BGS.

cPAHs

The preliminary cleanup level for total cPAHs TEQ of 0.140 mg/kg was exceeded in eight recent and previous soil samples analyzed for SVOCs. The cPAH exceedances mostly occurred in the subsurface in the northeast portion of the property, between 6.5 and 11.5 feet BGS. The high concentrations of SVOCs were located below the water table in a dark brown to reddish brown peaty woodchip layer with an odor. Sometimes the wood appeared stained red or painted red. The layer contained fine yellow sulfur pieces and the soil was black. There was also one exceedance at SB-11 between 9 and 11.5 ft BGS in the southeast portion of the property, and one exceedance in surface soil at SB-04 in the northeast portion of the property. This surface soil sample had the highest concentration of cPAHs (0.9114 mg/kg TEQ).

4.2.2.3 Summary

This section summarizes the comparison of chemical concentrations detected in soil at the Port Uplands Area and the MJB North Area with the preliminary soil cleanup levels (Table 1).

Port Uplands Area

At Port Parcel 1, the only constituent detected in soil at a concentration above the preliminary cleanup levels was arsenic. Arsenic was detected at a concentration above the preliminary cleanup level at one location (ET-TP03; 6-10 ft BGS depth interval) near the northeastern corner of Parcel 1.

Multiple constituents were detected in soil remaining at Port Parcel 2 at concentrations above the preliminary cleanup levels, including metals (antimony, arsenic, chromium, copper, lead, mercury, nickel, and zinc), diesel- and motor oil-range petroleum hydrocarbons, cPAHs, PCBs, and dioxins/furans. These exceedances were concentrated in two areas: the rectangular parking lot near the center of Parcel 2 and the area of the subsurface containment wall in the southeastern portion of Parcel 2.

The nature and extent of soil contamination at Port Parcel 3 can be summarized as follows:

- **Arsenic in Shallow Soil (0 to 2 ft BGS)**. The only constituent detected in shallow soil at Parcel 3 at a concentration above the preliminary cleanup levels was arsenic. Arsenic was detected at concentrations above the preliminary cleanup level at one location (LAI-S-4) in Seafarers' Memorial Park.
- **Arsenic, Lead, Copper, Diesel- and Motor Oil-Range Petroleum Hydrocarbons, cPAHs, and Dioxins/Furans in Deeper Soil (2 to 15 ft BGS).** These constituents were detected at concentrations above the preliminary cleanup levels at Seafarers' Memorial Park and near the present southern end of "R" Avenue.

MJB North Area

There are two categories of soil at the MJB North Area that have concentrations of metals and cPAHs that exceed preliminary cleanup levels:

- **Arsenic, Copper, Zinc, Chromium, Lead, Nickel, and cPAHs in Shallow Soil (0 to 2 ft BGS).** Arsenic, copper, and zinc occur at concentrations exceeding preliminary cleanup levels at a number of sample locations across the MJB North Area in the uppermost grayish-brown gravelly fill layer from 0 to 2 ft BGS. Chromium, lead, and cPAHs were each detected in one sample of surface soil in the nearshore area, and nickel was detected in two samples, at concentrations above preliminary cleanup levels.
- **Antimony, arsenic, copper, lead, thallium, zinc, and cPAHs in Deeper Soil (2 to 15 ft BGS).** These constituents occur at concentrations exceeding preliminary cleanup levels in deeper soil in the northeast and/or southeast portion of the MJB North Area, and appear to be limited to the wood layer and woody fill layers in the subsurface from 4 to 11.5 ft BGS. Figure 20 shows a cross section trending north-south at the northeast portion of the MJB North Area, with exceedances of lead and cPAHs shown.

5.0 SOIL VAPOR INVESTIGATIONS AND RESULTS

Soil vapors at Port Parcel 3 were monitored during the 2004-2008 investigations using a Gasport® multimeter. Air around each borehole was monitored for hydrogen sulfide and methane gas during drilling of the borehole. No detectable concentrations of either of these gases were measured. Previous monitoring of soil vapors at Port Parcel 3 included the following:

- 1993. Ambient air hydrogen sulfide samples were collected by the Northwest Air Pollution Authority. Concentrations measured ranged from 0 to 1 ppmv (Port of Anacortes 1993).
- 1994. Air samples from shallow post holes were collected by Prezant. Hydrogen sulfide was not detected at a detection limit of 0.1 ppmv (Hart Crowser 1995).
- 1995. Six soil vapor monitoring wells (VM-1 through VM-6) were installed by Hart Crowser prior to construction of Seafarers' Memorial Park at the locations shown in Figure 6. The wells were constructed of 1-inch polyvinyl chloride (PVC) pipe with horizontal slots. The slotted pipe was placed from a depth of 4 ft BGS to the top of the groundwater table (typically 8 to 10 ft BGS). Gas samples collected from the soil vapor wells were analyzed in the field using Sensidyne tubes and a MSA 361 gas monitoring instrument. Hydrogen sulfide was not detected in any sample using either of the analytical methods (Hart Crowser 1995).
- 1998. Hydrogen sulfide was monitored for during the test pit explorations performed by EarthTech. No positive results were reported for the test pits located on Port Parcel 3 (Earth Tech 1999 b,c).

6.0 GROUNDWATER INVESTIGATIONS AND RESULTS

This section presents a description of the activities associated with the groundwater RIs conducted at the Port Uplands Area and the MJB North Area, and the hydrogeologic and chemical characterization of the groundwater in both areas based on the results of the investigations.

6.1 GROUNDWATER INVESTIGATION ACTIVITIES

Activities associated with the Port Uplands Area and MJB North Area groundwater investigations are discussed below.

6.1.1 Port Uplands Area Groundwater Investigation

The groundwater investigation for the Port Uplands Area included installation of 12 monitoring wells (MW-101 through MW-112, shown in Figures 2 and 6), development of each well, and collection of groundwater samples from the wells for chemical analyses during four monitoring events. Activities also included surveying the well casings and management of investigation-derived wastes, as described in Appendix G.

6.1.1.1 Well Drilling and Installation

Well drilling and installation for the Port Uplands Area groundwater investigation occurred between March 29 and April 5, 2004. Drilling and construction of the monitoring wells were conducted in accordance with the RI/FS work plan (Landau Associates 2003) and the Minimum Standards for Construction and Maintenance of Wells (Chapter 173-160 WAC).

Soil borings for each monitoring well were drilled using a truck-mounted hollow-stem auger rig. The boreholes extended to the top of the fill/native material interface, or a few ft into the native material (silt). The depth of the native/fill interface at each location was determined based on field observation of the soil samples collected continuously to the full depth of each boring (see Section 4.2.1.1).

Each monitoring well was constructed of 2-inch diameter, flush-threaded Schedule 40 PVC casing with PVC machine-slotted screen (0.010-inch). The screen interval for each well extended 15 ft upward from the top (or near the top) of the native silt, except at monitoring wells MW-102, MW-103, and MW-104. At these locations, the screen interval extended 5 ft above the top of the native silt. The reduced screen length was necessary due to the shallow depth of the native silt at these locations.

Following placement of the well screen and casing in the borehole, a filter pack was installed around each well screen. The filter pack extended from the bottom of the end cap to a minimum of 2 ft above the screen. Filter pack material consisted of commercially prepared, presized, prewashed No. 2-12 silica sand.

A bentonite chip seal at least 2-ft thick was placed above the sand pack to about 1 to 2 ft BGS. The surface of each well was completed with a concrete seal and surface pad extending from the top of the bentonite seal to slightly above the ground surface. Locking steel monuments (aboveground or flush-mount) were cemented in place from the surface to a depth of about 3 ft BGS. At each location where an aboveground monument was installed, a 4-inch thick concrete pad was constructed around the well at the ground surface to divert rainfall away from the well casing and three bollards were cemented in place around the wellhead. The well construction details are presented with the boring logs in Appendix H of this report.

6.1.1.2 Well Development

Each monitoring well was developed after the bentonite chip seal had been allowed to hydrate in the well annulus for a minimum of 24 hours. Development was accomplished using a centrifugal pump and the procedures described in the RI/FS work plan. Development continued until a minimum of five casing volumes were removed and turbidity of the discharged water was visibly low.

6.1.1.3 Groundwater Monitoring

Groundwater monitoring was performed in April, August, and November of 2004 and January 2006 and included measurements of groundwater levels and collection of samples for laboratory analysis at each of the onsite monitoring wells (MW-101 through MW-112).

Water Level Measurement

Groundwater levels for evaluating groundwater flow direction were measured at each well on May 12, August 30, and November 23, 2004 and on January 23, 2006. Each groundwater level measurement was obtained by measuring from a surveyed reference point (located on the northern edge of the top of the PVC well casing) to the top of the groundwater using an electronic water level indicator. These measurements were recorded to the nearest 0.01 ft. Surface water elevations for Cap Sante Waterway were estimated using a U.S. National Oceanic and Atmospheric Administration (NOAA) tidal chart for Anacortes, Guemes Channel for May 12, and were estimated based on tidal charts and/or observations of a fixed staff gauge installed by the Port on a dock of the Cap Sante Boat Haven for August 30 and November 23, 2004 and January 23, 2006.

In addition to the manual groundwater level measurements, groundwater levels were measured on a semicontinuous basis at selected wells using a submersible pressure sensor and electronic datalogger. The groundwater levels were measured at 5-minute intervals over a period of about 49 hours in December 2004. The wells selected for semicontinuous groundwater level monitoring included MW-101, MW-106, MW-110, MW-111, and MW-112.

Sample Collection

Groundwater quality samples from the Port Uplands Area monitoring wells were collected in April, August, and November 2004 and January 2006 using dedicated polyethylene tubing and a peristaltic pump. Prior to sample collection, each well was purged until field parameters (pH, conductivity, turbidity, dissolved oxygen, and temperature) were stabilized. Groundwater samples were collected directly into laboratory-prepared containers, labeled, stored on ice in a cooler, and transported to the laboratory in accordance with proper chain-of-custody procedures. To prevent degassing during sampling for VOCs and gasoline-range petroleum hydrocarbons, a pumping rate below 100 mL/min was

maintained. VOCs and gasoline-range petroleum hydrocarbon containers were filled completely so that no head space remained. Groundwater for dissolved metals analyses was collected last and was field filtered through a 0.45 micron, in-line disposable filter prior to placement in sample containers.

During the first (April 2004) groundwater monitoring event, 0.03 ft of free-phase petroleum product (free product) was observed on top of the groundwater surface in well MW-110; therefore, a groundwater sample was not collected at this location. A sample of the free product was collected using the peristaltic pump and disposable tubing and identified as MW-110B. Following sampling of the free product, an absorbent pad was placed in well MW-110 to remove free product from the groundwater surface. Prior to the second (August 2004) monitoring event, Ecology requested that a second sample of the free product be collected and analyzed for PCBs. However, during the second monitoring event, no measurable thickness of free product was observed in the well. In lieu of a free product sample, a sample of the surface of the groundwater present in the well was collected prior to purging the well. This pre-purge groundwater sample also was identified as MW-110B. No measurable free product was observed in well MW-110 during the third (November 2004) monitoring event; however, approximately 0.6 ft of free product was observed in well MW-110 during the fourth (January 2006) monitoring event. The free product present during the fourth monitoring event was not sampled. Groundwater samples were collected at well MW-110 during the second, third, and fourth groundwater monitoring events.

During each monitoring event, at each of the wells anticipated to be tidally influenced (shoreline wells MW-101, MW-105, MW-106, MW-107, and MW-108, and interior well MW-110), groundwater samples were collected within 2 hours of low tide.

Chemical Analyses

During each groundwater monitoring event, groundwater samples were analyzed for total and dissolved metals (EPA Method 6000/7000 series); diesel-range and motor oil-range petroleum hydrocarbons (EPA Method NWTPH-Dx); gasoline-range petroleum hydrocarbons (EPA Method NWTPH-Gx); PCBs (EPA Method 8082); VOCs (EPA Method 8260); SVOCs (EPA Method 8270); cPAHs (EPA Method 8270 with selective ion monitoring); resin acids; guaiacol; chlorinated guaiacols; phenol; chloride; nitrate; nitrite; ammonia; sulfate; sulfide; and tannins and lignins. During the first groundwater monitoring event, the groundwater samples were also analyzed for dioxins/furans (EPA Method 8290). However, because all detected dioxins/furans were either less than the practical quantitation limit or were associated with congeners with a TEF of 0.0, removal of dioxins/furans from the list of analytes for future groundwater monitoring events was requested and was verbally approved by Ecology on August 26, 2004 (Ecology 2004d). Analysis for dioxins/furans was not conducted on samples from any of the wells during the second and third groundwater monitoring events. At Ecology's request, samples from wells MW-101, MW-104, MW-106, MW-107, MW-108, MW-109, MW-110, and MW-112 were analyzed for dioxins/furans during the fourth groundwater monitoring event. Samples from wells MW-105, MW-106, MW-107, and MW-108 were analyzed for pesticides (EPA Method 8081) during all four groundwater monitoring events. Samples from monitoring wells MW-109 and MW-110 were also erroneously analyzed for pesticides during the second groundwater monitoring event.

During the first groundwater monitoring event, the sample of free product collected at well MW-110 was analyzed for diesel-range, motor oil-range, and gasoline-range petroleum hydrocarbons using Method NWTPH-HCID. During the second monitoring event, the sample of the surface of the groundwater collected at MW-110 was analyzed for PCBs, as requested by Ecology. Both samples were identified as MW-110B.

An acid/silica-gel cleanup was performed on each groundwater sample analyzed for diesel-range and motor oil-range petroleum hydrocarbons. Cleanup procedures and analytical methods described in

Ecology's publication Analytical Methods for Petroleum Hydrocarbons (Ecology 1997a), including the use of gas chromatogram calibration standards that have undergone acid/silica-gel cleanup, were strictly adhered to by the laboratory. Additional information on the use of acid/silica-gel cleanup is provided in Appendix I.

6.1.2 MJB North Area Groundwater Investigation

The groundwater investigation for the MJB North Area included installation of three monitoring wells (MW-5 to MW-7, shown in Figure 2), development of each well, and collection of groundwater samples from the wells (in addition to previously installed wells MW-1 to MW-4) for chemical analyses during two monitoring events.

6.1.2.1 Previous Investigations

At least two investigations that included groundwater were conducted at the MJB North Area prior to the 2004-2007 investigations. A Preliminary Assessment/Site Inspection study was conducted under an EPA START contract at the request of MJB (E&E 2000). The study included advancing 12 (SB-01 to SB-12) soil borings to collect surface and subsurface soil and groundwater grab samples. Groundwater was not encountered in boring SB-09. Chemical analyses included SVOCs, pesticides/PCBs, and target analyte list metals for all groundwater grab samples (11 total). Extractable petroleum hydrocarbon concentrations were measured in 11 groundwater grab samples.

In November 2001, URS conducted a soil and groundwater investigation of the MJB North Area under Ecology's VCP. The data were reported in 2002 by URS and Anchor Environmental, on behalf of MJB and K-C, respectively (Anchor Environmental et al. 2002). As part of the investigation, URS installed 10 soil borings (SS-1 to SS-10) ranging in depth from 10 to 20 ft BGS throughout the MJB North Area. Groundwater monitoring wells were installed in four of the soil borings (MW-1 to MW-4). Three shallow groundwater monitoring wells (MW-1 to MW-3) were installed along the northern portion of the MJB North Area shoreline, and one monitoring well (MW-4) was installed inland near the Port Parcel 1 boundary. In November 2001, following well development, groundwater samples were collected from each of these wells during a low tidal stage. All four groundwater samples were analyzed for diesel- and oil-range TPH, PAHs, SVOCs, total and dissolved priority pollutant metals, hexavalent chromium, PCBs, TOC, total suspended solids, and salinity. The results from this investigation are included in Table 17 and are used for evaluation of groundwater quality in this RI report. Locations of previous investigation explorations are shown in Figure 7. The analytical results for the previous investigations are provided in Appendix K.

6.1.2.2 2004-2008 Investigations

In accordance with the RI/FS work plan dated June 2005 (Anchor Environmental 2005a, the objectives for the MJB North Area RI groundwater investigation were to:

- Determine the hydraulic gradient for shallow groundwater across the site, and determine if groundwater has been affected by dissolved metals, sulfide, and ammonia exceeding MTCA preliminary surface water quality cleanup levels.
- Determine if historic operations at the former Hansen Pile Driving Company area have affected groundwater in the southeast portion of the property.

The objectives were accomplished by making field observations and collecting groundwater samples and groundwater elevation data. The first part of the groundwater investigation, which was performed in July 2005, consisted of groundwater monitoring well installation (MW-5 to MW-7, shown in Figure 2), surveying casing elevations, and one round of groundwater sampling and groundwater level measurement

(MW-1 to MW-7). The second part of the groundwater investigation, which was performed from January to March 2006, consisted of a second round of groundwater sampling and groundwater level measurement at monitoring wells MW-1 through MW-7.

As part of the groundwater investigation in the MJB North Area, groundwater samples were collected from the four existing groundwater monitoring wells (MW-1 to MW-4), and from three newly-installed groundwater monitoring wells (MW-5 to MW-7). Groundwater elevation measurements were also collected from the seven groundwater monitoring wells in conjunction with similar measurements collected at the Port Uplands Area.

The sections below describe groundwater monitoring well installation methods, methods used for groundwater sampling, and methods used to collect groundwater elevation measurements at the Site. Table 12 presents monitoring well completion data, Table 14 presents groundwater elevations, Table 17 presents groundwater analytical results, and Table 18 presents groundwater general field parameter results.

Well Drilling and Installation

On July 14, 2005, Cascade, under the direction of Geomatrix, completed three monitoring wells (MW-5 to MW-7) at the MJB North Area (Figure 2). The purpose of the well installation was to assist in assessing the extent of metals-contaminated groundwater.

Each groundwater monitoring well was designed to enable measurement of the potentiometric surface, to permit water sampling of shallow groundwater, and was constructed in a manner similar to the existing wells onsite. The field geologist, in consultation with the licensed project hydrogeologist, specified the screened interval for the well using the lithologic log information and field observations.

The well casing is 2-inch-diameter Schedule 40 PVC casing. The well screens consist of 0.010-inch wide machine-slotted PVC screens, which deviates from the 0.020-inch slot size specified in the SAP. This deviation was necessary because of an error in the SAP. This slot size matches the slot size of the pre-existing four wells onsite. The slot sizes are compatible with the selected filter material. The screened sections provide flow between the target zone and the well, allowing efficiency in well development and collection of representative samples. The sand pack material is well-graded, clean 2/12 silica sand, and is consistent with the monitoring wells already installed onsite.

Upon completion of drilling, each boring was sounded to verify the total depth then backfilled with bentonite chips placed from the total depth of each boring to approximately 2 ft below the bottom of the monitoring well, with the exception of MW-7. The well casing was then assembled and lowered into the boring. Well casing materials were measured to the nearest 0.01 ft before being lowered into the borehole. The well assembly was designed so that the well screen is opposite the target zone. The bottom of the well was fitted with a secure bottom-end cap. No PVC cement or other solvents were used to fasten the well casing joints, well screen joints, or end caps.

The sand pack was placed after the well assembly was lowered to the specific depth through the augers. The augers were incrementally raised as the filter sand was placed by free fall through the augers. The depth to the top of the sand pack was measured after each increment to detect possible bridging. The amount of water, if any, added to the borehole was noted on the boring log or well installation record.

Filter sand was placed in a calculated quantity sufficient to fill the annular space to approximately 2 ft above the top of the well screen. The depth to the top of the sand pack was verified by measuring, using a

weighted tape. The groundwater monitoring wells were surged before placement of the transition seal to promote filter material settlement, using a vented surge block.

Once the depth to the top of the filter material was verified, bentonite chips were placed in the annular space to approximately 2 ft in depth. The bentonite chips were hydrated during placement with potable water.

Upon completion of the well, a waterproof cap was fitted on the top of the riser casing to reduce the potential for entry of surface runoff or foreign matter. A traffic-rated cover was completed at the ground surface. All wells were locked for security and were designed to limit surface water infiltration.

A construction diagram for each well was completed in the field on the well log by the field geologist and submitted to the reviewing geologist upon completion of each well. Well installation and construction data are summarized on well installation logs in Appendix U.

The drill rig and associated drilling equipment were cleaned prior to the start of drilling and between well locations. Well casing materials were pre-cleaned and sealed in individual airtight plastic bags by the factory.

Well Development

On July 21, 2005, one week after the well installations were complete, the wells were developed by Cascade by surging and pumping. The objectives of well development were to remove sediment that may have accumulated during well installation, to consolidate the sand pack around the well screen, and to enhance the hydraulic connection between the target zone and the well. A small electric submersible pump was used to remove sediment and turbid water from the bottom of the well. A surge block was then used within the entire screened interval to flush the sand pack of fine sediment. Surging was conducted slowly to reduce disruption to the sand pack and screen. The well was pumped again to remove sediment drawn in by the surging process until suspended sediment was reduced.

During development, the turbidity of the water was visually monitored. Well development proceeded until the return water was of sufficient clarity. Well development equipment was cleaned before use.

Groundwater Monitoring

Groundwater monitoring was performed in July 2005 and January 2006, and included measurements of groundwater levels and collection of samples for laboratory analysis at each of the onsite monitoring wells (MW-1 through MW-7).

Water Level Measurement

Water levels for the seven monitoring wells were recorded in the field book and are listed in Table 14.

All wells were opened and vented to allow the water level in the well to stabilize before taking the water level measurement. Water level measurements were coordinated with the Port's consultants on the Port Uplands Area to allow for comparison of groundwater elevations across the entire Site. Water level measurements at the site were collected as quickly as practical, to best represent the potentiometric surface across the site at a single time. Groundwater level measurements were collected near the time of the low tide. Anacortes Guemes Channel tidal predictions were used for tide times.

Water level measurements were recorded to the nearest 0.01 ft. Equipment placed in the wells for water level and well depth measurements was cleaned prior to reuse. Care was taken not to drop foreign objects

into the wells and not to allow the tape or sounding device to touch the ground around the well during monitoring.

Water level measurements were performed using an electric sounder that consists of a contact electrode suspended by an insulated electric cable from a reel that has an ammeter, a buzzer, a light, or other closed circuit indicator attached. The indicator shows a closed circuit and flow of current when the electrode touches the water surface.

Solutions resulting from cleaning procedures were collected and stored properly for future disposal.

Sample Collection

Groundwater samples from the new and existing groundwater monitoring wells were collected using low-flow sampling techniques. A peristaltic pump was used to purge and collect groundwater samples. The groundwater wells were sampled as close to the time of low tide as possible. Water quality parameters were measured every 3 minutes until the wells stabilized.

Low flow sampling refers to the rate at which groundwater is drawn into the pump, typically 100 to 500 milliliters per minute. The pump or pump inlet is placed in the middle of the screen interval. Purging is typically done until water quality parameters have stabilized. Low-flow samples were collected using peristaltic pumps and disposable tubing. The groundwater samples were collected in accordance with the work plan approved by Ecology (2005a).

Groundwater samples were collected in preserved and unpreserved sample bottles, labeled, and stored in an ice-cooled chest for transport to ARI's laboratory in Tukwila, Washington. Samples were delivered to the laboratory under Geomatrix chain-of-custody procedures. Copies of the chain-of-custody records for the groundwater samples are included in Appendix V.

Chemical Analyses

All groundwater samples were analyzed for dissolved antimony, arsenic, cadmium, chromium, mercury, lead, copper, and zinc; ammonia; and sulfide using the analytical methods specified in Table 17. Groundwater samples from the groundwater monitoring well installed near the former Hansen Pile Driving Company location (MW-5) were also analyzed for TPH-Dx, PCBs, and cPAHs. The TPH-Dx analysis was not included in the SAP. Consistent with direction from Ecology, that visible signs of unexpected contamination, such as petroleum staining, should instigate additional sampling and an expanded analytes list, the groundwater sample from MW-5 was analyzed for TPH-Dx because an odor was noted in MW-5 boring during well installation.

An acid/silica-gel cleanup was performed on each groundwater sample analyzed for diesel-range and motor oil-range petroleum hydrocarbons (MW-5 sample for both the July 2005 and January 2006 event), as well as all groundwater samples for the July 2005 event. Acid/silica-gel cleanup was not used on samples submitted for PAH analysis in January 2006. Cleanup procedures and analytical methods described in Ecology's publication Analytical Methods for Petroleum Hydrocarbons (Ecology 1997a), including the use of gas chromatogram calibration standards that have undergone acid/silica-gel cleanup, were strictly adhered to by the laboratory. Additional information on the use of acid/silica-gel cleanup is provided in Appendix I.

6.2 GROUNDWATER INVESTIGATION RESULTS

This section presents the physical and chemical analytical results for Port Uplands Area and MJB North Area groundwater based on previous and 2004-2008 investigations.

6.2.1 Hydrogeologic Characterization

Hydrogeologic characterization of the Site included identifying hydrogeologic units (water-bearing and confining units), measuring depth to groundwater and converting these to groundwater elevations, and evaluating groundwater flow direction based on the calculated groundwater elevations. Measured depth to groundwater and calculated groundwater elevations for the Site, including approximate water levels for Cap Sante Waterway at the time groundwater levels were measured, are summarized in Tables 13 and 14. Representative groundwater elevation contour maps for the Site are presented in Figures 21, 22, 23, and 24. The inferred predominant groundwater flow directions, based on the groundwater elevation contours, are to the north toward Cap Sante Waterway in the northern portion of the Site, and to the east or southeast toward Fidalgo Bay in other areas of the Site. The predominant groundwater flow directions are illustrated in Figure 25. The remaining discussion of hydrogeologic conditions is by area (Port Uplands Area and MJB North Area).

6.2.1.1 Port Uplands Area

Hydrogeologic conditions at the Port Uplands Area were evaluated using geologic and hydrogeologic data collected during the previous and 2004-2008 investigations. Based on this information, two hydrogeologic units have been identified: a shallow water-bearing unit and an underlying confining unit. The shallow water-bearing unit occurs in the fill materials consisting of sand, silt, wood debris, and occasional wire, metal, and concrete debris, and ranges from 7 to 15 ft in thickness across the site. The thinnest portion of the shallow water-bearing unit was encountered in the western portion of Parcel 1. The confining unit underlies the shallow water-bearing unit, and consists of native marine silts and clays. The thickness of the confining unit has not been determined, but it appears to be greater than 2 ft throughout the site. Some soil borings (e.g., B-3, B-7, MW-102, MW-103, and MW-105) were advanced as much as 5 to 10 ft into the confining unit.

The depths to groundwater measured in May, August, and November 2004 and January 2006 ranged from 3 ft to 12 ft BGS. The depth to groundwater measurements were collected within 2 hours of low tide, when surface water elevations ranged from -0.5 to +4.9 ft MLLW. No measurements were collected with a hand-held water level indicator during a high tide. However, groundwater levels were measured electronically on a semi-continuous basis for a 49-hour period in December 2004 at five wells (MW-101, MW-106, MW-110, MW-111, and MW-112). Surface water elevations during this 49-hour period ranged from -0.6 to +8.6 ft MLLW, a fluctuation of about 9.2 ft.

Groundwater elevations recorded at the five monitoring wells during the 49-hour period indicate significant tidal influence at well MW-101, but little tidal influence at the other wells. The maximum groundwater level observed at well MW-101 during one tidal cycle was 8.4 ft MLLW and the minimum groundwater level observed at the same well during the tidal cycle was 1.9 ft MLLW, a fluctuation of 6.5 ft. At well MW-106 in Seafarers' Memorial Park near the Fidalgo Bay shoreline, the observed groundwater level fluctuation during a tidal cycle was only about 0.45 ft. Groundwater levels at well MW-106 appear to be anomalously high relative to other nearby wells, possibly due to perched groundwater in the vicinity of this well, or to well screen clogging or other well construction-related issues. The least amount of tidal influence was observed at monitoring well MW-111 in Port Parcel 1. The observed groundwater level fluctuation at well MW-111 during a tidal cycle was about 0.05 ft. Groundwater level fluctuations and tidal efficiency values calculated for each well monitored during the tidal study are shown in Figure 26. A graph of groundwater elevations recorded at wells MW-101, MW-

106, MW-110, MW-111, and MW-112 during the 49-hour period is presented in Figure 27. Tidal elevations for this 49-hour period based on NOAA data (Nautical Software, 1993-1997©) are also shown in Figure 27.

The effect of tidal fluctuations on groundwater flow direction was also evaluated using the information obtained during the 49-hour tidal study. Groundwater elevations at low tide and mid tide on December 2, 2004 at the wells monitored during the tidal study were contoured and are presented in Figures 28 and 29. As shown in these figures, groundwater flow direction does not change significantly between a low tide and a mid tide. Measured groundwater elevations at the wells during high tide on December 2, 2004 are shown in Figure 30. At high tide, the horizontal hydraulic gradient appears to decrease, and may reverse temporarily in the vicinity of wells along the shoreline.

6.2.1.2 MJB North Area

The shallow water-bearing unit underlying the MJB North Area occurs in the fill materials. The confining unit (underlying the shallow water-bearing unit) consists of the native marine silts and clays. The confining unit thickness appears to be at least 5 feet throughout the Site. Some soil borings (e.g., MW-5, MW-6, and MW-7) were advanced as much as 5 to 12 ft into the confining unit (Appendix U).

Groundwater in the MJB North Area was generally observed at depths ranging from 4 to 10 ft BGS during test-pit excavation, drilling, and well sampling (Table 14). At MW-4 and MW-7, the westernmost wells, the groundwater appears to be higher, at approximately 2 to 4 ft BGS. Groundwater was not observed during drilling of MW-7 or PP-13. During both of the recent monitoring events, groundwater in wells MW-1, MW-2, and MW-5 appeared to have a sulfur-like odor.

6.2.2 Chemical Characterization

Chemical data for groundwater samples collected at the Port Uplands Area and the MJB North Area were compared to the preliminary groundwater cleanup levels (Table 4) described in Section 3.1.2 to assess the nature and extent of groundwater contamination at the Site. The results of the comparisons are described below.

6.2.2.1 Port Uplands Area

Analytical results for groundwater samples collected at the Port Uplands Area monitoring wells during the four RI groundwater monitoring events were used to characterize groundwater at the Port Uplands Area. These results indicate that the following constituents or class of constituents have not been detected in groundwater at any of the monitoring wells during any monitoring event:

- PCBs;
- Gasoline-range petroleum hydrocarbons;
- Total and dissolved cadmium, mercury, and thallium;
- Dissolved lead;
- VOCs (except acetone, carbon disulfide, 2-butanone, toluene, styrene, and 4-isopropyltoluene);
- SVOCs excluding cPAHs and resin acids [except 4-methylphenol, benzoic acid, bis(2-ethylhexyl)phthalate, and benzo(g,h,i)perylene];
- Guaiacol and chlorinated guaiacols;
- Pesticides; and

- cPAHs [except chrysene and benzo(b)fluoranthene].

Analytical results for detected constituents in groundwater are presented in Table 15. The detected analytical results were compared directly to the preliminary groundwater cleanup levels (Table 4). Analytical results for the free product sample and pre-purge groundwater sample collected at well MW-110 in April and August 2004, respectively, are presented in Table 16. All analytical results for the Port Uplands Area groundwater samples are presented in Appendix L. The laboratory analytical reports for the 2004-2008 investigations are presented in Appendix V.

Comparison to Groundwater Concentrations Protective of Marine Surface Water

The comparison of concentrations of detected constituents in groundwater for all four monitoring events to concentrations protective of groundwater as marine surface water indicates no exceedance of preliminary cleanup levels at any well for the following constituents or class of constituents: total and dissolved metals (antimony, copper, and lead); VOCs (toluene); SVOCs (phenol, chrysene, and benzo(b)fluoranthene); and dioxins/furans. No preliminary cleanup levels were identified for some detected constituents, as shown in Table 4. Other water quality information was found for 4-isopropyltoluene, 4-methylphenol, benzoic acid, benzo(g,h,i)perylene, isopimaric acid, dehydroabietic acid, abietic acid, and sulfide, and was used for screening. 4-Methylphenol and sulfide were each detected at a concentration above the screening level one time in one well.

Groundwater in shoreline monitoring wells MW-101, MW-105, MW-106, MW-107, and MW-108, collected landward from the proposed conditional point of compliance at the groundwater/surface water interface (see Section 3.2.2), appears to comply with preliminary cleanup levels, although there were a few sporadic exceedances. At well MW-101, two constituents were detected above preliminary cleanup levels: during the third monitoring event, the concentration of bis(2-ethylhexyl)phthalate (7.4 ug/L) exceeded the preliminary cleanup level (4.9 ug/L), and during the fourth monitoring event, the concentration of ammonia (8.01 mg-N/L) exceeded the preliminary cleanup level (as described in Section 3.1.2). Because neither of these constituents was detected more than once in well MW-101 at a concentration above the preliminary cleanup level, the exceedances appear to be isolated and may be an artifact of sampling and analysis procedures. Total arsenic concentrations may be due to sampling-induced suspended soil particulates present in the samples. Bis(2-ethylhexyl)phthalate is a common laboratory and field contaminant, was detected during one monitoring event in the laboratory blank sample, and was detected sporadically in groundwater at concentrations within ten times the blank concentration. Bis(2-ethylhexyl)phthalate was also detected above the preliminary cleanup level during one monitoring event at shoreline wells MW-105 and MW-107, and during two monitoring events at shoreline well MW-108. These exceedances also appear to be isolated and are not considered to be representative of groundwater conditions.

The constituents identified above [bis(2-ethylhexyl)phthalate and ammonia], as well as other constituents (arsenic and petroleum hydrocarbons) that were detected at least once at interior monitoring wells at concentrations above preliminary cleanup levels, are discussed below. Sulfide and 4-methyphenol, which were detected at concentrations above screening levels, also are discussed.

Bis(2-ethylhexyl)phthalate

Bis(2-ethylhexyl)phthalate is used as a plasticizer in flexible PVC products and is a common contaminant in many laboratory materials and reagents, including plastics, glassware, aluminum foil, cork, rubber, glass wool, Teflon sheets, and solvents (ATSDR 2002). Bis(2-ethylhexyl)phthalate was detected in the laboratory blank sample during the second monitoring event, at a concentration of 2.2 ug/L. In accordance with EPA guidance, all sample detections less than ten times the blank concentration

(22 ug/L) were considered not to be detected above the reporting limit during this monitoring event. Bis(2-ethylhexyl)phthalate was also detected at similar concentrations in some wells during other monitoring events; all except one of these detections (MW-108 during the third monitoring event, at a concentration of 64 ug/L) was within ten times the laboratory blank concentration reported during the second monitoring event.

Bis(2-ethylhexyl)phthalate was not detected at monitoring wells MW-106 and MW-111 during any of the four groundwater monitoring events. Bis(2-ethylhexyl)phthalate was detected at a concentration below the preliminary cleanup level (4.9 ug/L) during one or more monitoring events at wells MW-102, MW-103 MW-104, MW-109, MW-110, and MW-112.

At shoreline wells MW-101, MW-105, and MW-107, bis(2-ethylhexyl)phthalate was detected once in each well at a concentration (7.4, 19, and 5.0 ug/L, respectively) above the preliminary cleanup level. These exceedances occurred during the third groundwater monitoring event at MW-101 and during the first monitoring event at MW-105 and MW-107. Bis(2-ethylhexyl)phthalate was not detected at these wells during any other monitoring event. At shoreline well MW-108, bis(2-ethylhexyl)phthalate was detected at concentrations (64 and 6.0 ug/L, respectively) above the preliminary cleanup level during the last two monitoring events. Bis(2-ethylhexyl)phthalate was not detected at this well during the first two monitoring events.

The source of the occasional bis(2-ethylhexyl)phthalate detections has not been determined. However, as described above, bis(2-ethylhexyl)phthalate is a common laboratory and field contaminant. Due to the sporadic nature of the detections, it is unlikely that the detected concentrations are representative of groundwater at the Port Uplands Area. Groundwater is considered to comply with the preliminary cleanup level for bis(2-ethylhexyl)phthalate in the shoreline monitoring wells, landward of the proposed conditional point of compliance.

Ammonia

Ammonia was detected in groundwater at all wells during all four monitoring events. The lowest concentrations of ammonia were observed at the wells located in Seafarers' Memorial Park near the shoreline (MW-105, MW-106, MW-107, and MW-108). Concentrations at these locations ranged from 0.206 to 2.35 mg-N/L. Concentrations at shoreline well MW-101 ranged from 7.25 to 8.01 mg-N/L. The highest concentrations of ammonia were measured at interior wells MW-102, MW-103, and MW-110. Concentrations at these locations ranged from 5.3 to 26.4 mg-N/L.

Preliminary cleanup levels for ammonia (expressed as total ammonia), based on pH, temperature, and salinity of the groundwater sample, were developed for the shoreline wells (as described in Section 3.1.2) and are shown in Table 15. The preliminary cleanup level was exceeded at only one location during one of the four monitoring events. The exceedance occurred at monitoring well MW-101 during the fourth monitoring event. The preliminary cleanup level during the fourth monitoring event at MW-101 was at least 80 percent lower than the calculated preliminary cleanup levels for the other monitoring events at this well, primarily because the measured pH was higher than those measured during the other monitoring events.

Arsenic

At all of the monitoring wells except MW-102 and MW-111, both total and dissolved arsenic concentrations during each of the four groundwater monitoring events were below the arsenic preliminary cleanup level. Dissolved arsenic was detected at interior well MW-111 during the third monitoring event

at a concentration (0.0087 mg/L) slightly above the preliminary cleanup level. Dissolved arsenic was not detected above the preliminary cleanup level at MW-111 during the other three monitoring events, and total arsenic was not detected above the preliminary cleanup level at this well during any of the monitoring events. Consequently, the groundwater at well MW-111 is considered to comply with the preliminary cleanup level for arsenic. Total and/or dissolved arsenic were detected at interior well MW-102 at concentrations above the preliminary cleanup level during all four monitoring events. Groundwater at the shoreline wells, landward of the proposed conditional point of compliance, complies with the arsenic preliminary cleanup level.

Petroleum Hydrocarbons

Dissolved diesel-range and motor oil-range petroleum hydrocarbons were detected only at monitoring well MW-110, and only during the fourth monitoring event. The detected concentrations (0.73 mg/L for diesel-range petroleum hydrocarbons and 0.86 mg/L for motor oil-range petroleum hydrocarbons) exceeded the preliminary cleanup levels (0.5 mg/L for each). Free product was observed in well MW-110 during the first and fourth monitoring events, at measured thicknesses of 0.03 and 0.6 ft, respectively. Due to the presence of free product in the first monitoring event, a groundwater sample was not collected at this well during the first monitoring event. Although free product was present during the fourth monitoring event, a groundwater sample was collected at well MW-110 during the fourth monitoring event.

Sulfide

Sulfide was detected during all four monitoring events at the shoreline wells (MW-101, MW-105, MW-106, MW-107, and MW-108), except during the second monitoring event at MW-107. Only one detected concentration in the shoreline wells exceeded the screening level (30 mg/L). This concentration (47 mg/L) occurred at well MW-101 during the first monitoring event. All other detected sulfide concentrations in the shoreline wells ranged from 0.5 mg/L to 23 mg/L.

Sulfide also was detected in each sample collected at interior well MW-110. Sulfide was only detected during the fourth monitoring event at interior wells MW-102, MW-103, and MW-104, and was not detected during any of the monitoring events at MW-111. At well MW-109, sulfide was detected during the second and third monitoring events at concentrations equal to or slightly above the reporting limit (0.05 mg/L). At well MW-112, sulfide was detected during the first monitoring event at a concentration of 2.82 mg/L.

4-Methylphenol

4-Methylphenol was not detected during any groundwater monitoring events at wells MW-102, MW-104, MW-105, MW-106, MW-108, and MW-111. At five of the other six wells (MW-101, MW-103, MW-107, MW-109, and MW-112), 4-methylphenol was detected at least once during the four monitoring events, but at concentrations significantly below the screening level of 30 ug/L described in Section 3.1.2. At interior well MW-110, 4-methylphenol was detected during the second monitoring event at a concentration (43 ug/L) above the screening level. 4-Methylphenol also was detected at this well during the third monitoring event, but at a concentration (7.5 ug/L) significantly below the screening level. There were no exceedances of the screening level for 4-methylphenol at the shoreline wells.

6.2.2.2 MJB North Area

As part of the MJB North Area groundwater sampling, Geomatrix staff submitted two sets of eight groundwater samples (seven samples plus one duplicate) to ARI for analysis. Groundwater samples were

analyzed for dissolved antimony, arsenic, cadmium, chromium, mercury, lead, copper, and zinc; TPH-Dx; cPAHs; and PCBs. Analytical results for MJB North Area groundwater are presented in Table 17; results for general field parameters are presented in Table 18. Laboratory analytical reports and data validation memos are included in Appendix V. The analytical results were compared directly to the groundwater preliminary cleanup levels protective of marine surface water (described in Section 3.1.2).

Of the fourteen recent primary groundwater samples submitted for analysis, dissolved arsenic in three samples exceeded the preliminary cleanup level. One sample exceeded the screening level for 4-methyphenol, and two samples exceeded the screening level for sulfide. These constituents, and ammonia, are discussed below.

Dissolved Arsenic

In November 2001, a groundwater sample from well MW-4 contained dissolved arsenic at a concentration of 8 ug/L (Anchor Environmental et al. 2002), which is equal to the preliminary cleanup level. In August 2004, July 2005, and January 2006, MW-4 contained dissolved arsenic at concentrations of 21, 13, and 10.2 ug/L, respectively, above the preliminary cleanup level of 8 ug/L. In August 2004, groundwater from MW-3 contained dissolved arsenic at a concentration of 10 ug/L, exceeding the preliminary cleanup level. In subsequent monitoring events, groundwater from MW-3 contained dissolved arsenic at concentrations well below the preliminary cleanup level (1.2 ug/L in July 2005 and 2.2 ug/L in January 2006). With the exception of MW-3 in August 2004, there were no exceedances of the preliminary cleanup level for dissolved arsenic in shoreline wells; therefore, the groundwater landward of the proposed conditional point of compliance complies with the dissolved arsenic preliminary cleanup level.

4-Methylphenol

Between November 2001 and August 2004, samples from wells MW-1 to MW-4 did not contain 4-methylphenol above a detection limit of 1 or 1.1 µg/L. In July 2005, a sample from MW-5 did not contain 4-methylphenol above a detection limit of 1 ug/L. In January 2006, a sample from MW-5 contained 4-methylphenol at a concentration of 31 ug/L, slightly above the screening level of 30 ug/L described in Section 3.1.2. An acid/silica-gel cleanup was performed on the July 2005 MW-5 sample, but was not performed on the January 2006 MW-5 sample.

Sulfide

Sulfide was not analyzed in well samples collected by URS in November 2001. Between April 2004 and January 2006, sulfide was only detected in wells MW-1 to MW-5, at concentrations ranging from 0.07 to 41.8 mg/L. Sulfide was detected in two samples from MW-2 above the preliminary screening level of 30 mg/L, at concentrations of 30.8 mg/L in April 2004 and 41.8 mg/L in August 2004. In subsequent monitoring events, sulfide concentrations at MW-2 were below the screening level. In January 2006, sulfide was detected in wells MW-1, MW-2, MW-3, MW-4, and MW-5, at a maximum concentration of 16.5 mg/L in well MW-2.

Ammonia

Preliminary cleanup levels for ammonia (expressed as total ammonia), based on pH, temperature, and salinity of the groundwater sample, can be developed using methods described in Section 3.1.2. However, salinity measurements were not collected during either of the MJB North Area groundwater monitoring events in July 2005 and January 2006, and pH measurements collected in July 2005 were unreliable due to instrument pH calibration malfunction. Ammonia was not analyzed in well samples collected by URS in November 2001. Between April 2004 and January 2006, ammonia was detected in all wells at concentrations ranging from 0.172 mg-N/L in MW-3 to 5.54 mg-N/L in MW-4. The highest concentrations of ammonia were detected in well MW-4 (average concentration of 4.60 mg-N/L). The

shoreline wells (MW-1, MW-2, MW-3, MW-5, and MW-6) average ammonia concentrations ranged from 1.21 mg-N/L (MW-3) to 1.91 mg-N/L (MW-2).

6.2.2.3 Summary

This section summarizes the comparison of chemical concentrations detected in groundwater in monitoring wells at the Port Uplands Area and the MJB North Area with preliminary groundwater cleanup levels (Table 4).

Port Uplands Area

The nature and extent of groundwater contamination at the Port Uplands Area can be summarized as follows:

- **Shoreline Monitoring Wells.** Groundwater in the shoreline wells (MW-101, MW-105, MW-106, MW-107, and MW-108) located landward from the proposed conditional point of compliance (i.e., the groundwater/surface water interface in the porewater discharge zone) complies with the preliminary groundwater cleanup levels. Although there were a few sporadic exceedances of preliminary cleanup levels or screening levels at shoreline wells (ammonia and sulfide at well MW-101; bis(2-ethylhexyl)phthalate at wells MW-101, MW-105, MW-107, and MW-108), these were isolated occurrences and are not representative of groundwater conditions.
- **Interior Monitoring Wells.** Groundwater in interior wells MW-103, MW-104, MW-109, and MW-111 complies with the preliminary groundwater cleanup levels, although there was one marginal exceedance of dissolved arsenic at well MW-111. This exceedance was isolated and is not representative of groundwater conditions. Total and/or dissolved arsenic were detected at concentrations above the preliminary cleanup level during four monitoring events at well MW-102. Diesel-range and motor oil-range petroleum hydrocarbons were detected at concentrations above the preliminary cleanup levels during one monitoring event at well MW-110, and free product was observed during two monitoring events at MW-110, at measured thicknesses of 0.03 ft and 0.6 ft.

MJB North Area

The nature and extent of groundwater contamination at the MJB North Area can be summarized as follows:

- **Shoreline Monitoring Wells.** Groundwater at the shoreline wells (located landward from the proposed conditional point of compliance at the groundwater/surface water interface in the porewater discharge zone) complies with the preliminary groundwater cleanup levels, although there was one marginal exceedance of dissolved arsenic at well MW-3, two marginal exceedances of sulfide at well MW-2 in 2004, and one very marginal exceedance of 4-methylphenol at well MW-5. These exceedances were isolated and are not representative of groundwater conditions.
- **Interior Monitoring Wells.** Groundwater at interior well MW-7 complies with the preliminary groundwater cleanup levels. At interior well MW-4, dissolved arsenic was detected in the groundwater at concentrations exceeding the preliminary cleanup level.

7.0 MARINE AREA INVESTIGATIONS, RESULTS, AND EVALUATION

7.1 HISTORICAL AND REMEDIAL INVESTIGATION ACTIVITIES

This section describes four main data investigation time periods/efforts:

- Sitewide historical data collected prior to 2002.

- Data collected on the MJB North Area and adjacent marine area in 2002 under Ecology's VCP by URS and Anchor Environmental, on behalf of MJB and K-C, respectively.
- Assessment of dioxin/furan at the Dakota Creek Industries (DCI)/Pier 1 dredge areas in Guemes Channel under the DMMP by Anchor Environmental (2004a) on behalf of K-C.
- Sitewide data collected for the RI/FS under the Ecology Agreed Order, as described in the Ecology-approved RI/FS Work Plans for this part of the Site (Anchor Environmental 2005a, 2007).

Provided below are descriptions of the surface and subsurface sediment investigations as well as investigations of nearshore groundwater using temporary well points. Figure 31 shows the historical and RI/FS sediment and nearshore groundwater sample locations. In addition, groundwater was sampled from the existing groundwater monitoring wells located on the MJB North Area and Port Uplands Area shorelines. These monitoring well data are presented in Section 6.2 of this report.

7.1.1 Data Summary Pre-RI/FS Sediment

A considerable number of nearshore and offshore sediment samples have been collected historically and analyzed for COPCs. Previous investigations of sediment quality in the vicinity of the Site include studies by:

- Hart Crowser (1989) of sediments within the Port Marine Area
- Otten (1997) of sediments within the Port Marine Area
- Pentec (1997) of sediments within and adjacent to MJB North, Central, and South Areas
- Earth Tech (1999a) of sediments within the Port Marine Area
- Landau Associates (1999d) of sediments within the Port Marine Area
- E&E (2000) of sediments within the MJB North and Central Areas
- NOAA, Ecology, DNR, Battelle, and others of marine sediments located offshore of the Site, and compiled into the most recent version of Ecology's SEDQUAL database
- Anchor Environmental et al. (2002) of intertidal and subtidal sediments within the MJB North Area

Each of these investigations is briefly outlined below.

Hart Crowser (1989) collected and analyzed a single surface sediment sample collected within the Port Marine Area. The sample was a composite of sediment from the beach and from the harbor, approximately 100 yards from the beach. Analyses included SVOCs, including resin acids and chlorinated guaiacols, priority pollutant metals, and chlorinated dioxins/furans. Because these data were more than ten years old, they were not carried forward in this RI.

Otten (1997) collected three subtidal surface sediment samples within the Port Marine Area using a van Veen sampler. Chemical analyses included metals, PAHs, PCBs, dioxins/furans, tributyltin, VOCs, TOC, and total solids.

Pentec (1997) collected 10 sediment samples (four surficial grab samples and six core samples) within and adjacent to the MJB North, Central, and South areas. Chemical

analyses of the six cores included DMMP parameters (conventional and COPCs). The four surficial grabs were analyzed for SMS COPCs.

Earth Tech (1999a) collected nine intertidal surface sediment samples within the Port Marine Area. Samples were collected with a manual core soil sampler. Chemical analyses included metals, SVOCs, PCBs (six samples), dioxins, TOC, and total solids.

Landau Associates (1999d) collected 12 subtidal samples, four within the northern portion of the Marine Area, for analysis of conventional sediment parameters including TVS and TOC.

E&E (2000) collected 13 surface sediment samples from the intertidal zone of the MJB North and Central areas and at a reference area using steel spoons. All samples were analyzed for target analyte list metals, SVOCs, and pesticides/PCBs. Seven samples were also analyzed for dioxins/furans and TOC.

Data compiled into Ecology's most recent version of the SEDQUAL (Release 5.0; 2004) database were used to assess offshore sediment in Fidalgo Bay and Guemes Channel, excluding sample clusters located within the immediate vicinity of the March Point refineries. Six studies were identified in the query: 2MARINAS, ANCHOR90, BIOEFF97, CUSPLY95, DNRREC91, and Puget Sound Ambient Monitoring Program (PSAMP) sampling from 1989 to 1995. 2MARINAS focused on the area of the Cap Sante Marina and included 21 sediment samples. ANCHOR90 evaluated sediment samples collected in Guemes Channel. BIOEFF97 was an investigation of sediment chemistry and toxicity conducted by NOAA and Ecology for north Puget Sound and included 12 stations in greater Fidalgo Bay. CUSPLY95 included 12 samples collected at the site of the Anacortes Plywood facility. DNRREC91 included four samples including one in the vicinity of the former Mill outfall in Guemes Channel and one south of the Mill Site in Fidalgo Bay. A single PSAMP routine sediment monitoring station was located in Fidalgo Bay near March Point. In addition to the studies above, Ecology has also sampled surface sediments within Fidalgo Bay (SEDQUAL Study ID = FIDALGO97); however, only the southern bay data (south of the railroad trestle) were provided in the database.

7.1.2 VCP Sediment Investigation

Anchor Environmental collected three surface sediment samples from the intertidal zone within the MJB North Area using steel spoons. Samples were analyzed for metals, PAHs, SVOCs, PCBs, TOC, and grain size (Anchor Environmental et al. 2002).

Anchor Environmental collected nine surface sediment samples from the subtidal zone within the MJB North Area using a hydraulic van Veen sampler. Samples were located to further delineate areas where SQS criteria exceedances had been previously observed. Samples were analyzed for metals, PAHs, PCBs, TOC, and grain size (Anchor Environmental et al. 2002).

7.1.3 DCI/Pier 1 PSDDA Sediment Investigation

To address DMMP concerns associated with the potential for historical pulp mill-related discharges from the former Scott Mill Guemes Channel outfall (Stirling 2003), four core samples were collected from the 1- to 3-ft layer within the established DCI and Pier 1 dredge material management units and analyzed for dioxin. The stations were located to sample historically deposited material present at the 1- to 3-ft interval. In addition to the samples collected within the established DCI and Pier 1 dredge material management units, two reference samples were collected from Fidalgo Bay and Padilla Bay and analyzed

to characterize regional background sediment dioxin chemical concentrations (Anchor Environmental (2004a,b).

7.1.4 RI/FS Sediment Investigation

In addition to the historical data collected in the Marine Area as outlined above, six data collection efforts were conducted in 2004, 2005, 2007, and 2008 in support of the RI/FS. This section outlines the primary investigation components of the RI/FS sediment sampling. Figure 31 shows the station locations for the historical and RI/FS sediment and nearshore groundwater sampling stations.

Areas of potential concern and specific COPCs were identified and targeted in the RI/FS sediment investigations, based on the results of the earlier studies described above. For example, several metals (copper, lead, and mercury) and organics (PCBs and wood debris) were previously detected above SQS chemical criteria in surface sediments collected from the intertidal beach area in Fidalgo Bay adjacent to the Site. The historical sampling data defined a localized area of SQS exceedance within the intertidal zone, and no SQS exceedances beyond this localized shoreline area (Anchor Environmental et al. 2002). However, since only limited subsurface sediment data were previously available within the Marine Area, the vertical distribution of sediment contaminants within this portion of Fidalgo Bay was further characterized in 2004 and 2005 to support this RI. Diver surveys were performed and additional surface sediment samples collected in 2004, 2005, 2007, and 2008 to refine characterization of the areal extent of wood debris at the Site.

As set forth in the Ecology-approved work plan (Anchor Environmental 2005a), core samples were collected at eight nearshore stations to characterize the vertical extent of sediment contamination and fill material at the Site (Figure 31). At four of the core stations, radioisotope samples were collected to characterize sediment deposition processes. A debris field present in this area of the Site, as described in Anchor Environmental et al. (2002), was previously characterized using low tide visual observations, underwater video, low tide surveys, and high-resolution bathymetry. Surficial wood debris present at the Site was further characterized by collecting 20 surface sediment (Power Grab) samples for visual determination (Anchor Environmental 2005b), and again in 2007 and 2008 by performing diver surveys of wood debris in the Marine Area, and collection (in Fall 2007) of an additional six surface samples for a suite of chemical and biological determinations.

A series of wood debris evaluations were conducted to address uncertainty regarding the nature and extent of wood debris from historical sources (i.e., former log rafting operations, over water storage of milled wood, placement of woody-debris-containing fill materials, and lumber/pilings remaining from the former pier structure) present at the Site. The visual determination of surface samples collected in 2004 recorded the type of wood debris, the percent wood by volume in the top 10 cm, the depths of sediment and wood strata, and other pertinent information. During the 2005 sampling effort, additional surface sediment samples were collected to better define the horizontal extent of surface sediment contamination. During August 2007 and March 2008, diver surveys were performed by Grette Associates along transects in the Marine Area to further characterize the extent of surficial wood debris (percent areal coverage, estimated to the nearest 10 percent).

In September 2007, surface sediments from eleven stations in the Marine Area were sampled to further characterize the areal extent of sediment chemical contamination, including samples collected within or adjacent to intertidal beach areas that previously contained wood debris, metals or PCBs at concentrations above preliminary cleanup levels. Sampling and analysis procedures followed the Ecology-approved supplemental Sediment SAP and QAPP Addendum (Anchor Environmental 2007). Laboratory analytical reports for the September 2007 sediment sampling event are provided in Appendix V.

Confirmatory biological testing was performed on samples collected from six stations in September 2007 and one reference sample from Samish Bay with similar grain size characteristics. One on-site station (AN-SED-07) contained sufficiently low wood debris (5 percent), TVS (2.5 percent), chemical concentrations (below SQS chemical criteria), and bioassay responses (below SQS biological criteria), that it was determined to be suitable as an additional on-site reference for benthic infaunal community evaluations. Site samples submitted for biological testing spanned wood debris levels ranging from approximately 5 to 75 percent by volume in the top 10 cm. TVS concentrations in these samples ranged from 2.5 to 17 percent (dry weight basis). The confirmatory biological testing data are presented in Appendix M.

As discussed in Section 3.1.3, the confirmatory biological tests (amphipod mortality bioassay, larval development bioassay and benthic infaunal community enumeration) and synoptic surface sediment physical and chemical analyses were used to develop preliminary sediment cleanup levels for wood debris at the Site. Based on Ecology's initial interpretations of the data, surface sediment TVS levels greater than 9.7 percent (dry weight basis) and/or wood debris levels greater than 25 percent (by volume) were identified as having the potential for site-specific deleterious effects exceeding SQS biological criteria. Surface sediment TVS levels greater than 15 percent (dry weight basis) and/or wood debris levels greater than 50 percent (by volume) were identified as having the potential for deleterious effects exceeding CSL biological criteria. These preliminary sediment cleanup levels were incorporated into this RI.

7.1.5 Nearshore Wellpoint Investigation

As part of the VCP and RI/FS investigations, groundwater discharge to surface water was characterized using temporary wellpoint stations established in the nearshore Marine Area. In 2002, wellpoint stations were sampled in areas adjacent to MW-1 and MW-2 on the MJB North Area. In 2005 and 2006, wellpoint stations were sampled adjacent to MW-2 on the MJB North Area and adjacent to MW-106 on Port Parcel 3. Given the presence of significant amounts of wood debris at the Site and elevated concentrations of certain wood waste degradation products in Site groundwater (especially sulfide), a primary focus of this effort was the characterization of groundwater-to-surface water transport pathways for these COPCs. The well points were installed along offshore transects (oriented to coincide with existing shoreline monitoring wells) at a mudline elevation of approximately 1.5 ft below MLLW. The well points were advanced and the screens completed at each location approximately 3 ft below the mudline to obtain subsurface groundwater samples. Screening-level 2-D Visual MODFLOW groundwater modeling was performed for this RI to characterize advection and dispersion processes occurring at the shoreline, to further describe fate and transport pathways for groundwater discharge into Fidalgo Bay. The modeling efforts were focused on the two transects: a) MW-106 to WP-2; and MW-2 to WP-1. Modeling assumptions and representative hydraulic parameters are discussed in Appendix N. The screening level groundwater modeling suggests that groundwater collected at or below the wellpoint sampling depth (i.e., 3 ft below mudline) is representative of groundwater discharge from the Site, and is likely to be relatively unaffected by tidal mixing processes. Concurrent with the well point groundwater sampling, surface sediment (top 10 cm) was collected at each location for chemical analyses of both bulk sediment and sediment porewater. In 2006, only wellpoint groundwater was collected, as sufficient volumes of porewater could not be extracted from the sandy sediment sample. Historical and RI/FS wellpoint station locations are shown in Figure 31.

7.1.6 Bathymetric Investigation

Blue Water Engineering conducted a bathymetric survey on October 13, 2005 to complete the survey of the Site within the southern portion of the Marine Area adjacent to the MJB North Area. Previously, in

April 2004, David Evans Associates conducted a survey of the Marine Area adjacent to the Port Uplands Area. Site bathymetric contours that integrate both surveys are depicted in Figure 32.

7.1.7 Biological Data Summary

The offshore Marine Area supports eelgrass (*Zostera* spp.) beds of varying densities. Detailed eelgrass surveys of the MJB and Port Marine Areas were performed during August 2004 and August 2007, respectively. Focused tissue sampling of bivalves and crab has also been performed in the Padilla and Fidalgo Bay area. In 1991, crabs were collected from Fidalgo Bay in an area between Anacortes and the oil refinery piers at March Point (PTI 1991). The Site shoreline is located within approximately 0.7 miles of the closest crab tissue sample location and within the expected home range of Dungeness crab (see below). Chemical analyses conducted were limited to dioxins/furans (PTI 1991).

In 1999, Ecology collected crabs and clams from the west shore of March Point in the southern portion of Fidalgo Bay (Ecology 1999a,b). The sample location was approximately 1.2 miles from the Site shoreline and also within the expected home range of Dungeness crab. Chemical analyses included metals, pesticides, PCBs, PAHs, and dioxins/furans (Ecology 1999a,b). Regional crab tissue sampling stations are shown in Figure 33. In 2007, SAIC (2008) collected tissue samples of fish, crab, and clams in various areas of Fidalgo Bay. Results of these analyses are pending.

Qualitative biological surveys of the Guemes Channel in the vicinity of the Site outfall were conducted in the early 1970s (SML 1974). In 1997, NOAA and Ecology (BIOEFF97) conducted an investigation of sediment toxicity and benthic infauna abundance at 12 locations within the greater Fidalgo Bay area, including locations offshore of the Site. Additional biological sampling was performed in September 2007, and included confirmatory biological tests (amphipod mortality bioassay, larval development bioassay and benthic infaunal community enumeration) on samples collected from six Marine Area stations plus one reference sample from Samish Bay. The confirmatory biological testing data are presented in Appendix M. As discussed in Section 3.1.3, these data were used to develop preliminary sediment cleanup levels for wood debris at the Site.

7.2 REMEDIAL INVESTIGATION RESULTS AND EVALUATION

7.2.1 Physical Characterization

7.2.1.1 Bathymetry

Blue Water Engineering conducted a bathymetric survey of the southern portion of the Marine Area on October 13, 2005. The survey area was approximately 1,000 ft by 850 ft and was comprised of 40 track lines at 25-ft spacing oriented approximately east-west with four tie lines run orthogonally. Positioning was provided using a Trimble Ag132 DGPS with an accuracy of about +/-3 ft. Depth measurements were taken using an Odom Hydrotrac single-beam survey-grade depth sounder using a 2-degree half angle 200 kHz transducer. Calibration of the depth sounder was performed using a bar check. Data management and track line control was conducted using Hypack Max Gold Version 4.3a run on a PC laptop platform. Tides were measured from a locally installed tide staff at 20- to 30-minute intervals. Field notes and control point data from the bathymetric survey are provided in Appendix O. Bathymetric contours are presented in Figure 32.

7.2.1.2 Sediment

As part of the RI/FS investigation, eight sediment cores were collected across the Marine Area to complete characterization of the vertical extent of COPCs at the Marine Area (Figure 31). At these eight stations, 14-foot cores were advanced to their full length or rejection to obtain samples for chemical analysis. With the exception of station SEDC-08 and SEDCR-06, samples were collected from targeted

locations; these core stations were relocated approximately 50 feet due to refusal, likely from debris (Anchor Environmental 2005b). At four of the stations, cores were also advanced for radioisotope analysis. The cores were processed on land. Samples were obtained from pre-defined strata for the radioisotope samples (Figure 34), consistent with the Ecology-approved Work Plan (Anchor Environmental 2005a,b). For the chemistry cores, samples were obtained based on the stratigraphy that was observed during the core logging. Core logs for both the chemistry and radioisotope cores are provided in Appendix P.

Radioisotope Data

Radioisotope data are provided in Anchor Environmental (2005b). The radioisotopes ^{137}Cs and ^{7}Be were typically undetected in all cores. ^{137}Cs concentrations in sediments are derived from atmospheric fallout from nuclear weapons testing between 1954 and 1963, while ^{7}Be is a naturally-occurring radioisotope with a relatively short half-life. The general absence of detectable ^{137}Cs and ^{7}Be concentrations at the Site is consistent with a low (or zero) rate of sediment deposition and a higher energy mixing environment at the four radioisotope core locations.

^{210}Pb is a decay product of volatilized atmospheric ^{222}Rn, and is present in sediments primarily as a result of recent atmospheric deposition. The ^{210}Pb activity measured in a sediment core represents the total ^{210}Pb activity and is composed of two components: 1) unsupported ^{210}Pb, which represents ^{210}Pb that is deposited on the earth's surface at an approximately constant rate via atmospheric deposition; and 2) supported ^{210}Pb, which is the background ^{210}Pb activity in the sediment. In aquatic environments, the activity of ^{210}Pb in sediment decreases exponentially as a function of its decay half-life of 22.3 years and, thus, serves as a useful tracer for estimating sedimentation rates. The estimation of sedimentation rate using ^{210}Pb data relies on the estimation of the unsupported fraction of the total ^{210}Pb activity, measured in the deeper sediments of that core (in this case, assumed to approach background). Unsupported ^{210}Pb concentrations were then computed by subtracting the supported ^{210}Pb level from the total ^{210}Pb concentrations measured throughout the sediment column. The unsupported ^{210}Pb concentrations were then transformed to natural logarithms, and a linear regression versus core depth performed. The slope of this line was used to estimate the average sedimentation rate (Ecology 2001). The ^{210}Pb profiles within the Site cores, which often exhibited a lack of highly defined patterns, are consistent with a relatively low rate of recent sediment deposition (less than roughly 0.1 cm/year) throughout most of the nearshore study area. The ^{210}Pb profile at the farthest offshore station AN-SEDCRD-07 (mudline elevation -5.8 ft MLLW) was slightly higher, calculated to range from approximately 0.1 to 0.2 cm/year.

Overall, the radioisotope data suggest that relatively low rates of sediment deposition occur within the Site area. Net deposition rates are particularly low within the intertidal zone. These results are consistent with wave action observed in the Site area that contributes to periodic sediment transport, maintaining a mixed sand/gravel/cobble intertidal substrate in much of the Site area (Antrim et al. 2000). In addition, the low deposition rate is further evidenced by the presence of historical wood debris at the sediment surface.

Geotechnical Data

Grain size determinations were performed on the majority of sediment samples collected from the Site and are summarized in Appendix Q. During the 2005 RI core sampling, Atterberg limit determinations were also conducted on selected intervals and are provided in Appendix R. These data will be utilized as appropriate in the FS.

7.2.2 Chemical Characterization and Identification of Indicator Hazardous Substances

7.2.2.1 Sediment

Horizontal Nature and Extent of Chemicals in Surface Sediment

Based on the combined pre-RI and RI datasets, several metals (copper, lead, and mercury) and organics (PCBs and wood debris) were detected above preliminary cleanup levels in surface sediments collected from the intertidal beach and adjacent shallow subtidal area. These data define a relatively limited extent of metal and PCB exceedances, confined to the upper intertidal zone immediately offshore of the Site. However, wood debris exceeding the preliminary cleanup level (SQS) of 25 percent by area or volume was observed in the Port Marine Area up to 500 feet from the existing shoreline. No exceedances were detected in sediments collected farther offshore, where net sediment deposition rates are higher.

Table 5 summarizes the sediment preliminary cleanup levels, analyte detections, and exceedance frequencies in sediment. Table 19 summarizes the analytical chemistry results for the surface and subsurface samples in the Marine Area screened against the preliminary cleanup levels (SQS) and CSL criteria. Appendix S contains the complete set of analytical data summary tables and includes chemicals that do not have screening criteria. The following discussion addresses the individual surface sediment COPCs that exceed the screening levels and their distribution.

Metals

Copper

The preliminary cleanup level for copper is 390 mg/kg, based on benthic infauna protection. Of the 78 surface sediment samples collected from the Site and analyzed for copper, two exceeded this level (Table 19). The sediment sample with the highest copper concentration in the Site vicinity (854 mg/kg; Station IS-02; E&E 2000) was collected in the intertidal beach adjacent to the southern part of the MJB central area, just beyond the Site boundary. The other sediment sample that exceeded the preliminary cleanup level (755 mg/kg; Station ET-SS04; Earth Tech 1999a), was collected in the intertidal beach adjacent to Port Parcel 2.

Lead

The preliminary cleanup level for lead is 450 mg/kg, based on benthic infauna protection. Of the 78 surface sediment samples collected from the Site and analyzed for lead, only one sample (1,020 mg/kg; Station ET-SS03; Earth Tech 1999a) exceeded this level (Table 19). Station ET-SS03 is located within the intertidal beach immediately adjacent to upland fill materials containing similarly elevated lead concentrations (Figures 15, 19, and 31). The shoreline in this area has historically exhibited erosion over time, though erosion controls (riprap and a subsurface containment wall) are currently in place. It is possible that prior erosion of upland soil/fill materials contributed to the localized release of lead detected in this shoreline area.

Mercury

The preliminary cleanup level for mercury is 0.41 mg/kg, based on benthic infauna protection. Potential bioaccumulation exposures and risks can be associated with somewhat higher sediment mercury concentrations (above 1 mg/kg; DMMP bioaccumulation trigger; Anchor Environmental and Hart Crowser 2000). Of the 78 surface sediment samples collected from the Site and analyzed for mercury, four exceeded this level (Table 19), and one (AN-SED-09; 3.24 mg/kg) exceeded the DMMP

bioaccumulation trigger. The highest sediment mercury concentration (3.24 mg/kg; Station AN-SED-09) was collected within the intertidal beach immediately adjacent to the MJB North Area containing the highest shoreline metal concentrations (Figures 19 and 36). Three other intertidal beach samples collected in this same area (Stations ET-SS02 and -SS03 and Station SED-2; Anchor Environmental et al. 2002) marginally exceeded the preliminary cleanup level. Since similarly elevated mercury concentrations were also detected in upland soil/fill materials in this area, it is possible that prior shoreline erosion contributed to the localized release of mercury detected in this area, similar to that described for lead.

Organics

As discussed above, two organic compound groups (PCBs and wood debris/TVS) were identified as COPCs in sediment at the Site. The spatial distribution of these chemicals in Site sediments is discussed below. Of the 70 surface sediment samples collected from the Site and analyzed for PAHs, none exceeded the preliminary cleanup levels (Table 19). Similarly, of the 23 surface sediment samples collected from the Site and analyzed for dioxins/furans, none exceeded the DMMP dioxin TEQ screening level of 15 ng/kg, or the 2,3,7,8-TCDD screening level of 5 ng/kg (Table 20).

Polychlorinated Biphenyls (PCBs)

The preliminary cleanup level for PCBs is 12 mg/kg organic carbon (OC) (i.e., expressed as a TOC-normalized concentration), based on SQS-level protection of benthic infauna and potential bioaccumulation exposures. Under SMS, the appropriate range of TOC for carbon normalization is 0.5 to 3.5 percent, and TOC-normalization was only performed within this range. The CSL chemical criterion for PCBs (based on the potential for more than minor adverse biological effects) is 65 mg/kg OC. Of the 73 surface sediment samples collected from the Site and analyzed for PCBs, seven exceeded the preliminary cleanup level (Table 5), and two also exceeded the CSL criterion. The highest sediment PCB concentration (108 mg/kg OC; Station SED-3; Anchor Environmental et al. 2002) was collected within the intertidal beach immediately adjacent to the MJB North Area (Figures 35 and 36). Several other surface sediment samples collected with the MJB North Area intertidal beach (Stations AN-SS-10 and -11, SED-3, IS-10, and GPC2) also exceeded the preliminary cleanup level.

The sampling data define a contiguous, although localized, area of PCBs within the upper intertidal beach area within the Northern Marine Area. The boundary of the sediment PCB area was developed using a mixture of location-specific sediment sampling data, Thiessen polygons, and bathymetric contour information.

Sediment samples surrounding this area, including all subtidal samples collected within the Site vicinity, were well below the preliminary cleanup level. A single elevated PCB concentration detected at Station ET-SS02 (32 mg/kg OC) was located approximately 850 ft north of the contiguous PCB area, although the sample result was not corroborated by the duplicate sample collected from this same station (duplicate results were an order of magnitude lower than the original sample; 1.5 mg/kg OC).

Elevated PCB concentrations have been detected in upland soil/fill materials at the former Mill Site. It is possible that prior shoreline erosion could have contributed to the localized release of PCBs detected in this area, similar to the condition discussed above for lead and mercury. However, historical releases from the former Mill outfall (located in the general vicinity of Station GPC-2) could also have contributed to the observed PCB detections. Since relatively low PCB concentrations have been detected in upland soil and fill materials in the MJB North Area (all soil samples collected from the MJB property contain PCB levels at or below SQS criteria), no ongoing release of PCBs from this upland area is indicated.

Wood Debris/TVS

There is no promulgated SMS criterion for wood debris in sediment. However, as discussed in Section 3.1.3, the confirmatory biological tests (amphipod mortality bioassay, larval development bioassay and benthic infaunal community enumeration) and synoptic surface sediment physical and chemical analyses were used to develop preliminary sediment cleanup levels for wood debris at the Site. Based on Ecology's initial interpretations of the data, surface sediment TVS levels greater than 9.7 percent (dry weight basis) and/or wood debris levels greater than 25 percent (by volume) were identified as having the potential for site-specific deleterious effects exceeding SQS biological criteria. Surface sediment TVS levels greater than 15 percent (dry weight basis) and/or wood debris levels greater than 50 percent (by volume) were identified as having the potential for deleterious effects exceeding CSL biological criteria. These preliminary sediment cleanup levels were incorporated into this RI.

Of the 72 surface sediment samples collected from the Site and analyzed for TVS, ten exceeded the preliminary cleanup level (SQS) of 9.7 percent, and seven also exceeded the CSL criterion of 15 percent. The highest sediment TVS concentration (35 percent; Station Sed-2) was collected within the intertidal MJB North Area beach in a deposition area containing accumulated fine grained wood debris.

As part of the RI/FS investigation, a wood debris evaluation was conducted to systematically sample the debris field present in the Marine Area to address the uncertainties in the pre-RI dataset. Table 21 presents the analytical data for the samples collected in 2004 and 2005 for the wood debris evaluation. Figure 36 depicts the areal extent of SQS and CSL exceedances for wood debris, TVS, and chemical parameters within the Marine Area.

Vertical Nature and Extent of Chemicals in Surface Sediment

Historical core samples in the Marine Area include samples for DMMP characterization collected from the 0- to 4-ft interval by Pentec (1997). None of the SMS chemicals measured exceeded the screening levels in these core samples (Table 19).

For the RI/FS investigation, 24 samples obtained from eight cores were submitted for analysis of SMS chemicals (Figure 31; Table 19). Only one sample exceeded the preliminary cleanup level, AN-RI-SEDC-08A, for 4-methylphenol at 680 mg/kg dry weight.

From these 24 core section samples, three samples were submitted for dioxin/furan analysis based on the identification of sediment layers that may have contained pulp tailings or combusted materials. The samples identified for the dioxin analyses were AN-RI-SEDC-03A, AN-RI-SEDC-06A, AN-RI-SEDCZ-08B. The dioxin TEQ concentration in these samples ranged from 2.1 to 4.1 ng/kg, all below the 2000 DMMP TEQ screening level of 15 ng/kg (Table 20). No local source of dioxin was identified in the RI.

The vertical distribution of wood in sediment core samples collected in the northern portion of the Marine Area is described in the core logs (Appendix P) and is depicted in cross sections in Figures 38 through 41. With the addition of subsurface soil borings and test pits, subsurface sediment cores, and completed bathymetry for the Marine Area, a comprehensive data set was available to characterize the nature of subsurface fill along the shoreline and into the Marine Area. Figures 37 through 41 provide the plan view and four cross sections across the length of the shoreline of the Site.

Across the northern portion of the Marine Area and directly adjacent uplands (cross sections A-A' and B-B'), the native contact was observed at an elevation ranging from approximately -3 to -8 ft MLLW. This is consistent with the filling of the tide flat that historically extended southward from the Cap Sante area.

Across the southern portion of the Site (cross sections C-C- and D-D'), the native contact in the Marine Area was observed at approximately -3 to -5 ft MLLW.

Overlying the native material in the northern portion of the Marine Area and the directly adjacent uplands (cross sections A-A' and B-B') is fill containing wood debris, which is thickest near the shoreline and tapers out in the Marine Area. The amount of fill containing wood debris in the northern portion of the shoreline was observed to be greatest in the vicinity of Smokestack Point and southward toward MW-108. The fill thickness in this area ranged from approximately 10 to 15 ft. Along the most northerly portion of the shoreline (cross section A-A'), fill containing wood debris was approximately 5- to 7-ft thick. Overlying the wood-containing fill along the northern portion of the shoreline was 10 to 15 ft of granular fill material consisting of poorly graded sand and silt or fine sand

In the southern portion of the Site (cross sections C-C' and D-D'), fill containing wood debris was not observed in the uplands adjacent to the Marine Area. Fill overlying the native material in the Marine Area and the directly adjacent uplands of the central portion of the MJB North Area (cross section C-C') is poorly graded sand and silty gravel. Fill overlying the native material in the Marine Area and the directly adjacent uplands of the southern portion of the MJB North Area, in the vicinity of the Former Hanson Pile Driving Co., is comprised of peat and poorly graded sand (cross section D-D') covered by silty gravel. Several vibracore and grab sampling efforts performed within the MJB North Channel (most recently in early 2006) revealed that the sediment surface in this area is comprised of native glacial till materials, with less than 10 cm of accumulated finer-grained surficial sediments.

In the Marine Area, wood debris was observed at declining thicknesses in the northern portion of the Site (cross sections A-A' and B-B'), ranging from approximately 2 ft at AN-RI-SEDC-06 and AN-RI-SEDC-08 to 0.5 ft at AN-RI-SEDC-09. The thickness of sediments above the native contact decreased away from the shoreline and to the east. Wood debris content mixed into the surface sediments ranged from 60 percent near the shoreline to less than 5 percent near the inner harbor line and generally declined with distance to the south (Figure 36).

7.2.2.2 Nearshore Groundwater/Porewater

Two wellpoint stations were established along offshore transects adjacent to MW-2 and MW-106 at approximately 1.5 ft MLLW. At each station, temporary well points were advanced approximately 2 to 3 ft below the mudline in areas with visible discharge of groundwater. In addition, in July 2005, at each wellpoint station, surface sediment (top 10 cm) was collected for chemical analyses of sediment porewater (Table 22).

Wellpoint groundwater and sediment porewater were screened against the preliminary cleanup levels for groundwater described above in Section 3.0, which were based on marine surface water quality criteria and adjusted for regional background concentrations, if needed. Arsenic was detected in many of the groundwater and porewater samples, but at concentrations that were less than the preliminary cleanup level (Table 22).

The only groundwater or porewater COPC identified from the screening analysis was sulfide, which exceeded the 30 mg/L screening level based on benthic infauna protection described in Section 3.1 (Table 22). Groundwater sulfide concentrations must also be considered in relation to recontamination of marine sediments. Sulfide is a common bacterially derived wood breakdown product in the presence of sulfate (which is a common constituent present in the brackish groundwater of the Site), and is regularly detected in Puget Sound sediments. Biodegradation of wood debris present in subsurface upland fill materials and nearshore sediment (see above) are the likely source of the sulfide detected in Site groundwater and porewater. While there is not a promulgated water quality criterion for sulfide, recent analyses of

regional sediment bioassay data (Caldwell 2005) suggests a provisional porewater sulfide benchmark concentration of approximately 30 mg/L to protect benthic infauna. This benchmark value was used as an initial screening level for Site.

Sulfide concentrations detected in groundwater in shoreline wells at the Site ranged from less than 1 to 48 mg/L. Groundwater sulfide concentrations exceeded the screening level in only one sample from one of the established upland well locations at the Site. During the RI sampling, groundwater sulfide concentrations in samples collected at the shoreline from the two wellpoint locations ranged between approximately 15 and 85 mg/L (Table 22). Overall, the concentrations of sulfide in shoreline wells and nearshore wellpoints were consistent with wood debris decomposition and, given the variability of the upland groundwater data, are consistent with the groundwater data across much of the Site. However, porewater (0 to 10 cm) sulfide concentrations were undetected (less than 0.05 mg/L). The paired wellpoint groundwater and porewater data are consistent with tidal mixing and associated oxidation of sediment porewater that occurs near the sediment/water interface. As discussed above, screening level 2-D Visual MODFLOW groundwater modeling suggests that groundwater collected at the wellpoint sampling depth (i.e., 3 ft below mudline) is representative of groundwater discharge from the Site, and is relatively unaffected by tidal mixing processes (i.e., little seawater is predicted to intrude into the porewater sampling zone; Appendix N). That is, most of the observed reduction in sulfide concentrations over the top 3 ft of the sediments is attributable to sulfide oxidation. In the presence of dissolved oxygen, sulfide rapidly undergoes chemical oxidation to sulfate. Thus, tidal mixing/dispersion and associated oxidation processes attenuate sulfide risks at the Site, such that benthic infauna that reside within the biologically active sediment zone (0 to 10 cm) are not exposed to potentially harmful sulfide concentrations. A similar condition occurs with ammonia.

7.2.2.3 Regional Historical Tissue Data

For the purpose of this data evaluation, tissue concentrations of potentially bioaccumulative chemicals in fish and shellfish (e.g., mercury, PCBs, and dioxins/furans) were screened against regional background levels and relevant risk-based concentrations using procedures described in MTCA for the protection of human health and the environment. Specific evaluation procedures for bioaccumulative chemicals are described below.

Validated tissue chemistry data for potentially bioaccumulative chemicals such as mercury, PCBs, and dioxins/furans are available for Dungeness crab samples collected in Fidalgo Bay (PTI 1991 and Ecology 1999a,b). More recent tissue data from SAIC (2008) are pending. Significantly, the home range of crabs collected from Fidalgo Bay sampling stations overlaps the area where, based on general review of fate and transport processes, potential releases from the Site, including historical effluent discharges into Guemes Channel, may have been deposited. Since crabs live in contact with sediments, and since benthic infauna is a primary food source of crabs, these organisms may be particularly appropriate in evaluations of the nature and extent of chemical releases (PTI 1991; Anchor Environmental & Hart Crowser 2000).

It is important to note that, in addition to the Site, several refineries and other industries have operated on Fidalgo Bay and have released COPCs to this marine environment. For example, a spill of approximately 20,000 gallons of oil occurred in February 1991 (Ecology 1997b). Concern about sediment contamination associated with refineries was cited as the reason for locating many of the prior sampling stations in Fidalgo Bay (PTI 1991; Ecology 1999a,b). Thus, chemicals detected in crab tissue samples could represent releases from a wide range of potential sources.

A home range of approximately 2,000 acres generally represents the area of potential bioaccumulation exposure to individual Dungeness crabs (PSDDA 1998; Anchor Environmental & Hart Crowser 2000). The 2,000-acre area can be approximated as a circle with a radius of approximately 1 mile. Both PTI

(1991) and Ecology (1999a,b) have collected Dungeness crab from Fidalgo Bay stations located within the Site home range area (Figure 33). Dungeness crab muscle tissues collected within this area have been analyzed for a broad suite of bioaccumulative chemicals, including mercury, PCBs, and dioxins/furans. These data are summarized in Table 23.

A composite sample of Dungeness crab muscle tissue collected by Ecology (1999a,b) from Fidalgo Bay contained a total mercury concentration of 0.056 mg/kg wet weight (Table 23). This concentration is well below EPA's provisional human health-based criterion and regional screening level of 0.3 mg/kg. Moreover, the mercury concentration detected in Dungeness crabs collected from Fidalgo Bay was lower than at the Samish Island regional reference site, which measured 0.070 mg/kg (Table 23).

Similarly, total PCBs were not detected below 2.1 micrograms per kilogram wet weight in Dungeness crab collected from Fidalgo Bay, compared with the estimated PCB concentration of 1.4 micrograms per kilogram detected near Samish Island (Ecology 1999a,b).

Based on tissue data summarized in Table 23, which presents sample results from crabs collected from Fidalgo Bay adjacent to the Site area, there is no evidence of bioaccumulation of either mercury or PCBs within the Site area. The lack of detectable bioaccumulation of these chemicals is consistent with the relatively small size of the identified sediment contamination area (approximately 1 acre; see Figure 35), representing less than 0.1 percent of the 2,000-acre home range area. The lack of detectable bioaccumulation is also consistent with the relatively low magnitude of exceedance of screening criteria.

No dioxin or furan congeners were detected in Ecology's most recent sampling of Dungeness crabs from Fidalgo Bay (Table 23; Ecology 1999a,b). While historical (1991 sampling) Dungeness crab tissue samples collected from Fidalgo Bay (PTI 1991) did contain some dioxin/furan congeners at concentrations slightly higher than in crabs collected from the designated reference area (Dungeness Bay; see Table 23), more recent samples of Dungeness crab collected from Fidalgo Bay have not contained any detectable quantity of dioxins/furans. The maximum detected historical TEQ concentration in Fidalgo Bay (0.18 ng/kg; PTI 1991) is also similar to regional background levels measured in Puget Sound (e.g., 0.13 ng/kg at Anderson-Ketron Island; see http://www.nws.usace.army.mil/), and well below screening criteria to protect sensitive ecological receptors (0.7 ng/kg wet weight; Boening 1995). All information considered, there is no evidence that potential releases of bioaccumulative chemicals of potential concern from the Site pose a risk to human health or the environment.

8.0 CONCEPTUAL SITE MODEL

This section provides the conceptual model for the Site based on the data presented in this report. The conceptual site model includes a discussion of the contaminant exposure pathways identified for the Site and the risk posed, if any, to potential receptors by contaminated soil, groundwater, and/or sediment at the Site.

Soil impacts at the Site likely resulted from past releases of hazardous substances to the soil; Site soil can also be impacted by the decay of buried wood debris. Possible sources of groundwater impacts include hazardous substances that migrate from soil to groundwater or that are released or produced in the saturated zone. Contaminants present in groundwater can migrate to marine surface water. Sediment impacts likely resulted from direct deposition of hazardous substances in the Marine Area, transport of contaminants in groundwater, erosion of contaminated soil from the Port Uplands Area and the MJB North Area to Fidalgo Bay, and/or decay of wood debris present below the surface sediment. The conceptual site model illustrating potential contaminant transport mechanisms is shown in Figure 42.

8.1 SOIL

Site soil consists of multiple layers of fill overlying native marine sediment and glacial deposits. Surface soil is predominantly recent gravel and sand fill material with occasional mixed wood debris. Metals were the only constituents detected in shallow soil samples (upper 2 ft) at concentrations above preliminary cleanup levels with the exception of one cPAH exceedance in the MJB North Area. Arsenic was detected at one location at Port Parcel 3, and arsenic, chromium, copper, nickel, and zinc were detected at the MJB North Area. The deeper soil contains a heterogeneous mixture of soil and wood debris. Constituents detected in the deeper soil samples at concentrations above preliminary cleanup levels include metals (antimony, arsenic, chromium, copper, lead, mercury, nickel, and zinc), diesel-range and motor oil-range petroleum hydrocarbons, cPAHs, PCBs, and dioxins/furans at the Port Uplands Area, and metals (antimony, arsenic, copper, lead, thallium, and zinc) and cPAHs at the MJB North Area.

The following potential exposure routes and receptors were previously identified in Section 2.4.1 for contaminants in Site soil:

- Contact (dermal, incidental ingestion, or inhalation) by visitors, workers (including excavation workers), and potential future residents or other Site users with hazardous substances in soil;
- Contact (dermal, incidental ingestion, or inhalation) by terrestrial wildlife with hazardous substances in soil; and
- Contact by terrestrial plants and soil biota and/or food-web exposure to hazardous substances in soil.

Constituents detected in the upper 15 ft of soil were evaluated to assess the potential risk to humans, plants, and animals posed by contaminated soil.

The soil sampling locations at the Port Uplands Area where constituents were detected at concentrations above preliminary cleanup levels protective of human health and terrestrial ecological receptors are shown in Figures 13 through 16. The majority of the soil exceedances occur within the 6-10 ft BGS depth interval at Seafarers' Memorial Park, the central parking lot at Parcel 2, and the area of the subsurface containment wall in the southeastern portion of Parcel 2. There are also several exceedances at selected sampling locations along "R" Avenue.

The RI data for the MJB North Area compared to preliminary soil cleanup levels protective of human health and terrestrial ecological receptors indicate that metals and cPAHs are present in soil (0 to 15 ft BGS) at a number of discrete areas in the MJB North Area at concentrations exceeding preliminary cleanup levels, as shown in Figures 17 through 19. The metals and cPAHs are most frequently present in the deeper soil (2 to 15 ft BGS) at concentrations exceeding preliminary cleanup levels. These exceedances occur at the northeast corner of the Site and appear to be mostly limited to the wood layer and woody fill layers in the subsurface from 4 to 11.5 ft BGS.

8.2 GROUNDWATER

Two hydrogeologic units have been identified at the Site: a shallow water-bearing unit and a confining unit. The shallow water-bearing unit occurs in the fill material and ranges from 7 to 15 ft in thickness across the Site. The thinnest portion of the water-bearing unit was encountered in the western portion of Port Parcel 1. The confining unit (underlying the shallow water-bearing unit) consists of the native marine silts and clays. The confining unit thickness has not been determined, but appears to be greater than 2 ft throughout the Site. Some soil borings (e.g., B-3, B-7, MW-5, MW-6, MW-7, MW-102, MW-103, and MW-105) were advanced as much as 5 to 10 ft into the confining unit. The depth to

groundwater (based on measurements collected within 2 hours of low tide) ranges from 3 to 12 ft BGS. Groundwater contours of the measured depths to groundwater indicate that horizontal groundwater flow at the Port Uplands Area is to the north toward Cap Sante Waterway in the northern portion of the Site and east and southeast toward Fidalgo Bay in the remaining portion of the Site. An evaluation of groundwater levels at low tide, mid tide, and high tide, indicate that the tides do not significantly effect groundwater flow direction, except close to the shoreline at high tide. At high tide the groundwater flow direction appears to be reversed at wells located in close proximity to the shoreline. Although constituents were found in inland monitoring wells at concentrations above preliminary cleanup levels protective of marine surface water, groundwater at or near the proposed conditional point of compliance (the groundwater/surface water interface) generally appears to meet preliminary cleanup levels. Even in interior wells, relatively few constituents were found at concentrations above preliminary cleanup levels.

The following potential exposure routes and receptors were previously identified in Section 2.4.2 for contaminants in Site groundwater:

- Exposure by aquatic organisms to impacted groundwater that may discharge to Fidalgo Bay or Cap Sante Waterway, resulting in acute or chronic effects; and
- Ingestion by Site visitors of aquatic organisms affected by the discharge of impacted groundwater to Fidalgo Bay or Cap Sante Waterway.

As described in Section 2.3, human ingestion of hazardous substances released from the Site in groundwater is not a potential exposure pathway because groundwater at the Site or potentially affected by Site soil is not a current or reasonable future source of drinking water.

The RI data compared to preliminary groundwater cleanup levels protective of marine surface water indicate the following constituent exceedances, which could pose a risk to marine surface water (and consequently aquatic organisms or Site visitors) if these constituents migrated to surface water via Site groundwater:

- At interior well MW-102, total and dissolved arsenic were detected above the preliminary cleanup level during three groundwater monitoring events. In addition, dissolved arsenic but not total arsenic was detected above the preliminary cleanup level during one monitoring event at MW-102.
- At interior well MW-110, diesel-range and motor oil-range petroleum hydrocarbons were detected above MTCA Method A cleanup levels during one groundwater monitoring event. Free product was observed during two monitoring events at MW-110, at measured thicknesses of 0.03 ft and 0.6 ft.
- At interior well MW-111, dissolved arsenic but not total arsenic was detected above the preliminary cleanup level during one groundwater monitoring event.
- At interior well MW-4, dissolved arsenic was detected at concentrations above the preliminary cleanup level.

Constituent concentrations exceeding preliminary groundwater cleanup levels protective of marine surface water at the interior wells do not appear to be migrating to Fidalgo Bay and/or Cap Sante Waterway, as indicated by the following:

- **Shoreline Monitoring Wells.** Groundwater in the shoreline wells (located downgradient of the interior wells and landward from the proposed conditional point of compliance at the groundwater/surface water interface in the porewater discharge zone) complies with the

preliminary cleanup levels, although there was one exceedance each of bis(2-ethylhexyl)-phthalate and ammonia at well MW-101. Sulfide also was detected during one monitoring event at well MW-101 and two monitoring events at MW-2 at a concentration greater than the screening level identified as protective of benthos at the 2005 Sediment Management Annual Review meeting. These exceedances, as well as sporadic exceedances of bis(2-ethylhexyl)phthalate at wells MW-105, MW-107, and MW-108, one marginal exceedance of dissolved arsenic at well MW-3, and one marginal exceedance of 4-methylphenol at well MW-5, were isolated and are not representative of groundwater conditions.

- **Wellpoints.** Groundwater in the wellpoints (located downgradient of the interior wells and landward from the proposed conditional point of compliance at the groundwater/surface water interface in the porewater discharge zone) complies with the preliminary cleanup levels. Sulfide concentrations detected in groundwater at the wellpoints occasionally exceeded the screening level identified as protective of benthos at the 2005 Sediment Management Annual Review meeting.
- **Porewater.** Porewater (0 to 10 cm) complies with the preliminary cleanup levels protective of marine surface water. Ammonia and sulfide concentrations measured at the proposed conditional point of compliance were rarely detected (less than 0.05 mg/L), and were well below the preliminary cleanup level for ammonia and the screening level for sulfide. These data are consistent with tidal mixing and associated oxidation of sediment porewater that occurs near the sediment/water interface. In the presence of dissolved oxygen, ammonia and sulfide both rapidly undergo chemical and biological oxidation to nitrate and sulfate, respectively. Thus, tidal mixing and associated oxidation processes appear to attenuate ammonia and sulfide risks at the Site, such that benthic infauna that reside within the biologically active sediment zone (0 to 10 cm) are not exposed to potentially harmful sulfide concentrations.

8.3 SEDIMENTS

Sediment impacts at the Site can be attributed to direct deposition of hazardous substances in the Marine Area and/or erosion of contaminated soil from the Port Uplands Area and the MJB North Area to Fidalgo Bay[1]. Site sediments can also be impacted by the decay of wood debris present below the surface sediment. The nature and extent of sediment contamination at the Site can be summarized as follows:

- Several metals (copper, lead, mercury, and zinc) and organics (PCBs and wood debris/TVS) have been detected above preliminary cleanup levels in sediments collected from the intertidal beach area in Fidalgo Bay immediately offshore of the Site. The sampling data define a localized area of PCB exceedance within the intertidal and shallow subtidal zone, as depicted in Figures 35 and 36.

[1] Soil erosion at the Port Uplands Area and the MJB North Area is most likely to occur along the shoreline. Shorelines are often in a state of fluctuation due to the natural process of erosion in which soil is transported and deposited elsewhere. Constant waves and swells created by winds and currents can loosen soil particles on shorelines and cause erosion, especially along points and other areas exposed to wind. Wave action from passing power boats and other watercraft can also cause soil erosion along the shoreline. Soil erosion along the Port Uplands Area and the MJB North Area shoreline could eventually result in exposure of potentially contaminated fill materials and transport of these materials towards and into Fidalgo Bay. The Port Uplands Area shoreline is currently stabilized with riprap. The southern portion of the shoreline was stabilized when the Park pier and boat launch float system was installed. Part of the northern portion of the shoreline was stabilized in 2005 when an interim action was implemented to stabilize the bank and protect the upper shoreline, the Park Building, and the beach area from further erosion. The shoreline area along the MJB North Area is primarily stabilized with riprap. A portion of the shoreline at the south end of the MJB North Area has a vertical bulkhead.

- A potential source of these localized metal and PCB contaminated sediment deposits is erosion of upland fill material containing similarly elevated metal and PCB chemical concentrations. Nearshore chemical source areas exceeding sediment cleanup screening levels (CSLs) are generally depicted in Figure 36, and include soil in parts of the Port Uplands Area (Port Parcel 3) and in a portion of the MJB North Area that contains elevated concentrations of metals and/or PCBs. The erosion of soil from these areas is the likely source of down-drift sediment contamination observed just to the south. These areas of the shoreline are armored with riprap.
- Historical sources of woody debris to the Site include former log rafting operations, over water storage of milled wood, placement of woody debris-containing fill materials (including sawdust, bark, and wood chips), and lumber/pilings remaining from the former pier structure. A range of surficial debris is present in the beach area, including dimensional lumber, bricks, and other construction materials. Debris accumulations are most evident within the intertidal and shallow subtidal zones extending from south of the Cap Sante Boat Haven breakwater to south of the existing kayak dock.
- Based on the available Site characterization data (generally summarized in Figures 38 through 41), relatively extensive wood debris deposits are present throughout much of the upland areas of the Site, extending 10 to 30 ft BGS, and continuing into the nearshore (intertidal and shallow subtidal) area of Fidalgo Bay.
- Intertidal and shallow subtidal surface sediments offshore of the MJB North Area are typically comprised of a relatively thin layer of silt and sand sediments overlying the wood debris deposits. The thickness of the naturally developed sediment "cap" in this area of the Site is typically approximately 0.5 to 1 ft at upper intertidal elevations, increasing in thickness at lower tidal elevations.
- As part of initial evaluations, sediment areas potentially impacted by wood debris were screened using conventional parameters such as wood debris content (based on visual observation) and TVS, comparing surface sediment levels to preliminary cleanup standards developed by Ecology based on site-specific biological analyses. A debris field consisting of dimensional lumber, wood fragments, and other debris exceeding one or both of these screening criteria is present on the sediment surface, most extensively across the intertidal area of the northern Marine Area (see Figure 36). Sediment-associated wood and other debris is also addressed above in this section and Sections 7.1.1.3 and 7.2.2.1.
- Validated tissue chemistry data for potentially bioaccumulative chemicals such as mercury, PCBs, and dioxins/furans are available for Dungeness crab samples collected in Fidalgo Bay. Significantly, the home range of crabs collected from Fidalgo Bay sampling stations overlaps the area where, based on general review of fate and transport processes, potential releases from the Site may have been deposited. Since crabs live in contact with sediments, and since benthic infauna is a primary food source of crabs, these organisms may be particularly appropriate in evaluations of the nature and extent of chemical releases. The maximum detected concentrations of mercury, PCBs, and dioxins/furans in Fidalgo Bay crab tissue are below risk screening criteria and/or are generally equivalent to regional background levels.
- Sediment core samples were collected from the DCI/Pier 1 area, adjacent to the Guemes Channel outfall of the former Scott Paper Mill. Samples were taken from proposed dredging areas. The sediment samples were analyzed for dioxin furans and compared to 2000 PSDDA screening levels and surface sediment reference samples from Fidalgo Bay. Results indicated that the detected dioxin furans were below PSDDA screening levels and that the proposed sediment for dredging was suitable for open water disposal.

9.0 LOCATIONS AND MEDIA REQUIRING CLEANUP ACTION EVALUATION IN FEASIBILITY STUDY

This section identifies the locations and environmental media (soil, groundwater, sediment) at the Site that require cleanup action evaluation in the FS.

9.1 PORT UPLANDS AREA

Based on the information presented in this RI report, soil at Port Parcels 1 and 3 will require evaluation of cleanup action alternatives due to the presence of some constituents at concentrations exceeding preliminary cleanup levels protective of human health and terrestrial ecological receptors. Potential erosional sources of localized contaminated sediment deposits have also been identified in Port upland shoreline areas (see Figure 36). Cleanup actions have been previously evaluated and implemented for soil at Port Parcel 2. However, because soil containing constituents at concentrations exceeding preliminary cleanup levels and source criteria remain at Port Parcel 2, the need for further cleanup action at Parcel 2 is evaluated in the FS.

As described previously, groundwater in the shoreline monitoring wells, landward of the proposed conditional point of compliance, appears to comply with preliminary cleanup levels protective of marine surface water. Sporadic exceedances of selected constituents at shoreline wells appear to be isolated as described in Section 6.2.2.1, and are not considered to be representative of groundwater conditions. Specifically, bis(2-ethylhexyl)phthalate (exceedances at MW-101, MW-105, MW-107, and MW-108) and ammonia (exceedance at MW-101) have not been identified as constituents of concern in Port Uplands Area soil, and the ammonia concentrations measured at shoreline well MW-101 were similar to those found at on-site upgradient well MW-103.

Despite the apparent compliance of groundwater in the shoreline wells, arsenic and petroleum hydrocarbons, respectively, were detected at concentrations above preliminary cleanup levels at interior monitoring wells MW-102 and MW-110. In addition, free product was observed in well MW-110 during two groundwater monitoring events, at measured thicknesses of 0.03 ft and 0.6 ft. Consequently, remedial options for groundwater at the Port Uplands Area are considered in the FS.

9.2 MJB NORTH AREA

Based on the information collected and evaluated in this RI, shallow soil in discrete areas throughout much of the MJB North Area, and deeper soil within the northeast and southeast corners of the MJB North Area, requires evaluation of cleanup action alternatives due to the presence of some constituents at concentrations exceeding preliminary cleanup levels protective of human health and terrestrial ecological receptors. Potential erosional sources of localized contaminated sediment deposits have also been identified in MJB North upland shoreline areas (see Figure 36).

As described previously, groundwater in the shoreline monitoring wells, landward of the proposed conditional point of compliance, complies with preliminary cleanup levels protective of marine surface water. Sporadic exceedances of selected constituents at shoreline wells appear to be isolated as described in Section 6.2.2.2, and are not considered to be representative of groundwater conditions. In particular, there was one marginal exceedance of dissolved arsenic at well MW-3, two marginal exceedances of sulfide at well MW-2 in 2004, and one marginal exceedance of 4-methylphenol at well MW-5. These exceedances appear to be isolated and are not considered to be representative of groundwater conditions.

Although dissolved arsenic was detected at concentrations above the preliminary cleanup level at interior monitoring well MW-4, the FS does not address remedial options for groundwater because arsenic has not been chronically problematic in the proposed shoreline conditional point of compliance wells.

9.3 NORTH MARINE AREA AND ADJACENT SHORELINE AREAS

Based on the information evaluated in this RI, surface sediments in upper intertidal portions of the North Marine Area immediately adjacent to Port Parcel 3 require evaluation of cleanup action alternatives due to the presence of some constituents at concentrations exceeding sediment preliminary cleanup levels. A potential source of these localized contaminated sediment deposits is erosion of adjacent upland fill material containing similarly elevated metal and organic chemical concentrations (see Figure 36).

Relatively extensive wood debris deposits are present throughout much of the upland areas of the Site, extending to depths of 10 to 30 ft BGS, and continuing into the nearshore (intertidal and shallow subtidal) area of Fidalgo Bay at the Port Parcel 3 shoreline. Surface and subsurface woody debris deposits in this area require evaluation of cleanup action alternatives due to the presence of woody debris and TVS at concentrations exceeding cleanup levels protective of aquatic ecological receptors and degraded habitat conditions.

Cleanup actions in the shoreline area (e.g., engineered caps) should consider designs that will allow continued attenuation of woody debris degradation compounds such as ammonia and sulfide and improve habitat conditions.

9.4 SOUTH MARINE AREA AND ADJACENT SHORELINE AREAS

Based on the information evaluated in the RI, surface sediments in upper intertidal portions of the South Marine Area immediately adjacent to the MJB North Area require evaluation of cleanup action alternatives due to the presence of some constituents (especially PCBs) at concentrations exceeding sediment preliminary cleanup levels. A potential source of these localized contaminated sediment deposits is erosion of upland fill materials within the North Marine Area containing similarly elevated metal and organic chemical concentrations (see Figure 36). Shoreline stabilization performed by the Port in this area appears to have reduced transport of PCBs to the South Marine Area. Cleanup actions in the shoreline area (e.g., engineered caps) should consider designs that will allow continued attenuation of woody debris degradation compounds such as ammonia and sulfide.

10.0 USE OF THIS REPORT

This RI has been prepared for the exclusive use of the Port of Anacortes, Kimberly-Clark Corporation, MJB Properties, and the Washington State Department of Ecology. Any use of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and written authorization by GeoEngineers, AMEC Geomatrix, Inc., and Anchor Environmental, shall be at the user's sole risk. Any unauthorized use of (or reliance on) this report shall release GeoEngineers, Geomatrix Consultants, and Anchor Environmental from any liability resulting from such use (or reliance). Within the limitations of scope, schedule, and budget, GeoEngineers', AMEC Geomatrix Inc.'s, and Anchor Environmental's respective services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession practicing in the same locality under similar conditions as this project. GeoEngineers, AMEC Geomatrix, Inc., and Anchor Environmental assume no responsibility for any consequence arising from any information or condition that was concealed, withheld, misrepresented, or otherwise not fully disclosed or available.

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TABLE 1
PRELIMINARY SOIL CLEANUP LEVELS FOR DETECTED CONSTITUENTS
FORMER SCOTT PAPER COMPANY MILL SITE

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Constituent	Concentration Protective of Direct Human Contact (a)	Concentration Protective of Groundwater as Marine Surface Water (b)	Concentration Protective of Terrestrial Ecological Receptors (c)	MTCA Method A Cleanup Level (Unrestricted Land Use)	Typical PQL	Natural Background Concentration (d)	**Preliminary Soil Cleanup Level**
METALS (mg/kg)							
Antimony	32	580	--	--	1.1	5	32
Arsenic	20 (e)(ca)	20 (e)	20	20	5.9	7	20
Cadmium	80	1.2	25	2	0.2	1	25
Trivalent Chromium	120,000	1,000,000	42 (f)	2,000	0.9	117 (f)(g)	117
Hexavalent Chromium	240	19	42 (f)	19	0.03	117 (f)(g)	117
Copper	2,960	1.4	100	--	0.4	36	100
Lead	250 (e)	1,600	220	250	1.2	17	220
Mercury	24	0.026	9	2	0.03	0.07	9
Nickel	1,600	11	100	--	3.8	38	100
Thallium	5.6	0.67	--	--	0.12	--	5.6
Zinc	24,000	101	270	--	3.4	86	270
TOTAL PETROLEUM HYDROCARBONS (mg/kg)							
Diesel-Range	2,000 (e)	2,000 (e)	460	2,000	18	--	460
Motor Oil-Range	2,000 (e)	2,000 (e)	--	2,000	24	--	2,000
PAHs (ug/kg)							
2-Chloronaphthalene	6,400,000	37,000	--	--	274	--	6,400,000
Naphthalene	1,600,000	138,000	--	5	6.9	--	1,600,000
2-Methylnaphthalene	--	--	--	--	14	--	--
Carbazole	50,000 (ca)	--	--	--	300	--	50,000
Dibenzofuran	160,000	--	--	--	240	--	160,000
Acenaphthylene	--	--	--	--	12	--	--
Acenaphthene	4,800,000	66,000	--	--	13	--	4,800,000
Fluorene	3,200,000	550,000	--	--	9.0	--	3,200,000
Phenanthrene	--	--	--	--	5.8	--	--
Anthracene	24,000,000	12,000,000	--	--	9.2	--	24,000,000
Fluoranthene	3,200,000	89,000	--	--	11	--	3,200,000
Pyrene	2,400,000	3.400.000	--	--	7.0	--	2,400,000
Benzo(g,h,i)perylene	--	--	--	--	270	--	--
Total cPAHs - TEQ	140 (ca)	350	30,000 (h)	100 (h)	--	--	140
SEMIVOLATILE ORGANIC COMPOUNDS (ug/kg)							
4-Methylphenol	400,000	--	--	--	210	--	400,000
Phenol	48,000,000	5,100,000	--	--	212	--	48,000,000

TABLE 1 **DRAFT FINAL**

PRELIMINARY SOIL CLEANUP LEVELS FOR DETECTED CONSTITUENTS
FORMER SCOTT PAPER COMPANY MILL SITE

Constituent	Concentration Protective of Direct Human Contact (a)	Concentration Protective of Groundwater as Marine Surface Water (b)	Concentration Protective of Terrestrial Ecological Receptors (c)	MTCA Method A Cleanup Level (Unrestricted Land Use)	Typical PQL	Natural Background Concentration (d)	**Preliminary Soil Cleanup Level**
VOLATILE ORGANIC COMPOUNDS (ug/kg)							
Acetone	8,000,000	--	--	--	29	--	8,000,000
Carbon Disulfide	8,000,000	--	--	--	2.5	--	8,000,000
m,p-Xylene	16,000,000	--	--	--	7.7	--	16,000,000
PCBs (ug/kg)							
Total PCBs	1,000 (e)(i)	--	2,000	1,000 (i)	--	--	1,000
DIOXINS AND FURANS (ng/kg)							
Total dioxins/furans - human health TEQ	11 (ca)	0.27	--	--	--	--	11
Total dioxins - ecological TEQ	--	--	5	--	--	--	5
Total furans - ecological TEQ	--	--	3	--	--	--	3

(a) Washington State Department of Ecology Cleanup Levels and Risk Calculations (CLARC) MTCA Method B standard formula values, except as noted.
(b) Calculated using fixed parameter three-phase partitioning model [WAC 173-340-747(4)] and preliminary groundwater cleanup levels shown in Table 4 of this report. Concentrations protective of groundwater as marine surface water were not selected as preliminary cleanup levels because groundwater is addressed through an emperical demonstration.
(c) Concentrations based on simplified terrestrial ecological evaluation in WAC 173-340-7492; concentrations listed in Table 749-2 (unrestricted land use values).
(d) Source: *Natural Background Soil Metals Concentrations in Washington State,* Ecology 1994. Listed values (except chromium) are statewide 90th percentile values.
(e) MTCA Method A value shown.
(f) Listed value is for total chromium.
(g) Site-specific natural background concentration, calculated per WAC 173-340-709 and guidance in *Natural Background Soil Metals Concentrations in Washington State,* Ecology 1994.
(h) Listed value is for benzo(a)pyrene.
(i) Concentration based on federal Toxic Substances Control Act (40 CFR 761.61).
(ca) Concentration based on carcinogenic effects.
cPAHs = Carcinogenic polycyclic aromatic hydrocarbons
PCBs = Polychlorinated biphenyls
PQL = Practical quantitation limit
TEQ = Toxicity Equivalent Quotient
-- = Not established, not applicable/available
mg/kg = milligrams per kilogram
ug/kg = micrograms per kilogram
ng/kg = nanograms per kilogram
Note: Shaded cell indicates basis for preliminary cleanup level.

TABLE 2
TOXICITY EQUIVALENCY FACTOR (TEF) VALUES
FORMER SCOTT PAPER COMPANY MILL SITE

	Human Health (a)	Mammals (a)	Birds (b)	Fish (b)
Dioxins				
2,3,7,8-TCDD	1	1	1	1
1,2,3,7,8-PeCDD	1	1	1	1
1,2,3,6,7,8-HxCDD	0.1	0.1	0.01	0.01
1,2,3,7,8,9-HxCDD	0.1	0.1	0.1	0.01
1,2,3,4,7,8-HxCDD	0.1	0.1	0.05	0.5
1,2,3,4,6,7,8-HpCDD	0.01	0.01	<0.001	0.001
Octa-Dibenzodioxin	0.0003	0.0003	0.0001	<0.0001
Furans				
2,3,7,8-TCDF	0.1	0.1	1	0.05
1,2,3,7,8-PeCDF	0.03	0.03	0.1	0.05
2,3,4,7,8-PeCDF	0.3	0.3	1	0.5
1,2,3,6,7,8-HxCDF	0.1	0.1	0.1	0.1
1,2,3,7,8,9-HxCDF	0.1	0.1	0.1	0.1
1,2,3,4,7,8-HxCDF	0.1	0.1	0.1	0.1
2,3,4,6,7,8-HxCDF	0.1	0.1	0.1	0.1
1,2,3,4,6,7,8-HpCDF	0.01	0.01	0.01	0.01
1,2,3,4,7,8,9-HpCDF	0.01	0.01	0.01	0.01
Octa-Dibenzofuran	0.0003	0.0003	0.0001	<0.0001
cPAHs				
Benzo(a)anthracene	0.1	--	--	--
Chrysene	0.01	--	--	--
Benzo(b)fluoranthene	0.1	--	--	--
Benzo(k)fluoranthene	0.1	--	--	--
Benzo(a)pyrene	1	--	--	--
Indeno(1,2,3-cd)pyrene	0.1	--	--	--
Dibenz(a,h)anthracene	0.1	--	--	--

(a) Dioxin/Furan TEF source: *The 2005 World Health Organization Reevaluation of Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds* (Van den Berg et al. 2006).
cPAHs TEF source: *Air Toxics Hot Spots Program Risk Assessment Guidelines, Part II Technical Support Document for Describing Available Cancer Potency Factors* (Cal-EPA 2005).

(b) Dioxin/Furan TEF Source: *Framework for Application of the Toxicity Equivalence Methodology for Polychlorinated Dioxins, Furans and Biphenyls in Ecological Risk Assessment (EPA 2003).*

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TABLE 3
GROUNDWATER CONCENTRATIONS PROTECTIVE OF HYPOTHETICAL GROUNDWATER USE AS DRINKING WATER
FORMER SCOTT PAPER COMPANY MILL SITE

Constituent	Maximum Contaminant Level (lowest of federal MCL, state MCL, state SMCL)	MTCA Method B Standard Formula Values Carcinogen	MTCA Method B Standard Formula Values Non Carcinogen	Concentration Associated with 10^{-5} Risk (if carcinogen)	MTCA Method A for Groundwater	**Unadjusted Protective Concentration**	PQL 2004	PQL 2006	Groundwater Background	**Adjusted Protective Concentration**
cPAHs (µg/L) **EPA 8270C-SIM**										
Benzo(a)pyrene	0.2	0.012	--	0.12	--	0.12	0.16	0.22	--	0.16
METALS (mg/L) **EPA 6010/7000**										
Antimony	0.006	--	0.0064	--	--	0.006	0.00015	0.00012	--	0.006
Arsenic	0.01	0.000058	0.0048	0.000583	0.005	0.00058	0.00024	0.00054	0.008	0.008
Cadmium	0.005	--	0.008	--	0.005	0.005	--	0.002	0.002	0.005
Chromium	0.1	--	0.048	--	0.05	0.048	--	0.011	0.01	0.1
Copper	--	--	0.59	--	--	0.59	0.0015	0.00072	0.020	0.59
Lead	--	--	--	--	0.015	0.015	0.0019	0.0040	0.010	0.015
Mercury	0.002	--	0.0048	--	0.002	0.002	--	0.00004	--	0.002
Nickel	0.1	--	0.32	--	--	0.1	0.00074	0.0027	--	0.1
Zinc	5	--	4.8	--	--	4.8	--	0.017	0.16	4.8
TOTAL DIESEL RANGE PETROLEUM HYDROCARBONS (µg/L) **NWTPH-Dx**										
Diesel-Range	--	--	--	--	500	500	--	180	--	500
Motor Oil-Range	--	--	--	--	500	500	--	430	--	500
VOLATILES (µg/L) **EPA 8260B**										
Acetone	--	--	800	--	--	800	12	22	--	800
Carbon Disulfide	--	--	800	--	--	800	0.9	0.6	--	800
2-Butanone	--	--	4,800	--	--	4,800	2.8	15	--	4,800
Toluene	1,000	--	640	--	1,000	640	1.2	0.87	--	640
Styrene	100	1.5	1,600	15	--	15	0.52	0.63	--	15
4-Isopropyltoluene	--	--	--	--	--	--	--	--	--	--
SEMIVOLATILES (µg/L) **EPA 8270C**										
Naphthalene	--	--	160	--	160	16	--	5.59	--	16
Acenaphthylene	--	--	--	--	--	--	--	5.52	--	--
Acenaphthene	--	--	960	--	--	960	--	5.81	--	960
Fluorene	--	--	640	--	--	640	--	5.99	--	640
Phenanthrene	--	--	--	--	--	--	--	6.3	--	--
Anthracene	--	--	2,400	--	--	2400	--	5.44	--	2400
Fluoranthene	--	--	640	--	--	640	--	6.32	--	640
Pyrene	--	--	480	--	--	480	--	6.78	--	480
Benzo(a)pyrene	0.2	0.012	--	0.12	0.1	0.12		4.72	--	4.72
Benzo(a)anthracene	--	0.012	--	0.12	--	0.12	--	6	--	6
Benzo(b)fluoranthene	--	0.012	--	0.12	--	0.12	--	4.93	--	4.93
Benzo(k)fluoranthene	--	0.012	--	0.12	--	0.12	--	7.19	--	7.19
Chrysene	--	0.012	--	0.12	--	0.12	--	6.99	--	6.99
Dibenzo(a,h)anthracene	--	0.012	--	0.12	--	0.12	--	6.88	--	6.88
Indeno(1,2,3-cd)pyrene	--	0.012	--	0.12	--	0.12	--	5.97	--	5.97
4-Methylphenol	--	--	80	--	--	80	3.0	6.2	--	80
Benzoic Acid	--	--	64,000	--	--	64,000	24	66	--	64,000
bis(2-Ethylhexyl)phthalate	6	6.3	320	63	--	6	4.9	6.8	--	6
Benzo(g,h,i)perylene	--	--	--	--	--	--	--	--	--	--

TABLE 3
GROUNDWATER CONCENTRATIONS PROTECTIVE OF HYPOTHETICAL GROUNDWATER USE AS DRINKING WATER
FORMER SCOTT PAPER COMPANY MILL SITE

Constituent	Maximum Contaminant Level (lowest of federal MCL, state MCL, state SMCL)	MTCA Method B Standard Formula Values Carcinogen	MTCA Method B Standard Formula Values Non Carcinogen	Concentration Associated with 10^{-5} Risk (if carcinogen)	MTCA Method A for Groundwater	**Unadjusted Protective Concentration**	PQL 2004	PQL 2006	Groundwater Background	**Adjusted Protective Concentration**
SEMIVOLATILES (µg/L)										
EPA 8270RA (Resin Acids)										
Sandaracopimaric Acid	---	---	---	---	--	--	--	--	--	--
Isopimaric Acid	---	---	---	---	--	--	--	--	--	--
Dehydroabietic Acid	---	---	---	---	--	--	--	--	--	--
Abietic Acid	--	--	--	--	--	--	--	--	--	--
CONVENTIONALS AND										
OTHER ORGANICS (mg/L)										
Chloride (EPA 325.2)	250	--	--	--	--	250	1.3	0.52	--	250
Ammonia (mg-N/L) (un-ionized)	--	--	--	--	--	--	0.04	0.03	--	--
Nitrate (mg-N/L, Calculated)	10	--	26	--	--	10		--	--	10
Nitrite (mg-N/L, EPA 353.2)	1	--	1.6	--	--	1	0.02	0.05	--	1
Sulfate (EPA 375.2)	250	--	--	--	--	250	11	3.2	--	250
Sulfide (EPA 376.2)	--	--	--	--	--	--	0.11	0.13	--	--
Phenol (EPA 420.1)	--	--	9.6	--	--	9.6	0.25	0.19	--	9.6
Tannins and Lignins (SM18 5550B)	--	--	--	--	--	--	--	--	--	--
PCBs (µg/L)										
EPA 8082										
Total PCBs	0.5	0.044	--	0.44	0.1	0.44	--	1.8	--	1.8
DIOXINS AND FURANS (ng/L)										
Total dioxins/furans TEQ	0.030	0.00058	--	0.0058	--	0.0058	0.018	0.034	--	0.018/0.034

PQL = Practical quantitation limit
TEQ = Toxicity Equivalent Quotient
mg/L = milligrams per liter
ug/L = micrograms per liter
ng/L = nanograms per liter
Note: Shaded cell indicates basis for protective concentration.

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TABLE 4
PRELIMINARY GROUNDWATER CLEANUP LEVELS PROTECTIVE OF MARINE SURFACE WATER FOR DETECTED CONSTITUENTS
FORMER SCOTT PAPER COMPANY MILL SITE

Constituent	AWQC for Protection of Aquatic Life - Acute (a)	AWQC for Protection of Aquatic Life - Chronic (a)	AWQC for Protection of Human Health - Organisms Only (b)	National Recommended Water Quality Criteria (c)			MTCA Method B Standard Formula Values Carcinogen	MTCA Method B Standard Formula Values Non Carcinogen	Concentration Associated with 10^{-5} Risk (if carcinogen)	**Unadjusted Preliminary Cleanup Level**	PQL 2004 (d)	PQL 2006 (d)	Background	Other Water Quality Information	**Adjusted Preliminary Cleanup Level**
				Protection of Aquatic Life - Acute	Protection of Aquatic Life - Chronic	Protection of Human Health - Organisms Only (Based on 10^{-6} risk for carcinogens)									
cPAHs (µg/L) **EPA 8270C-SIM**															
Benzo(a)pyrene	--	--	0.031	--	--	0.018	0.030	--	0.30	0.018	0.10	0.10	--	--	0.10
Chrysene	--	--	0.031	--	--	0.018	0.030	--	0.30	0.018	0.10	0.10	--	--	0.10
Benzo(b)fluoranthene	--	--	0.031	--	--	0.018	0.030	--	0.30	0.018	0.10	0.10	--	--	0.10
DISSOLVED METALS (mg/L) **EPA 6010/7000**															
Antimony	--	--	4.3	--	--	0.64	--	1.0	--	0.64	0.00015	0.00012	--	--	0.64
Arsenic	0.069	0.036	0.00014	0.069	0.036	0.00014	0.000098	0.018	0.00098	0.000098	0.00024	0.00054	0.0080 (e)	--	0.0080
Cadmium	0.04	0.0088	--	0.040	0.0088	--	--	0.0203	--	0.0088	--	0.0020	0.0020	--	0.0088
Chromium	1.1	0.050	--	1.1	0.050	--	--	0.486	--	0.050	--	0.011	0.010	--	0.050
Copper	0.005	0.0031	--	0.0048	0.0031	--	--	2.7	--	0.0031	0.0015	0.00072	0.020 (e)	--	0.020
Lead	0.21	0.0081	--	0.21	0.0081	--	--	--	--	0.0081	0.0019	0.0040	--	--	0.0081
Mercury	0.0018	0.000025	0.00015	0.0018	0.00094	0.3	--	--	--	0.000025	--	0.000040	--	--	0.000040
Nickel	0.074	0.0082	4.6	0.074	0.0082	4.6	--	1.1	--	0.0082	0.00074	0.0027	--	0.067; 0.0224 (m)	0.0224
Zinc	0.090	0.081	--	0.090	0.081	26	--	17	--	0.081	--	0.017	0.16	--	0.16
TOTAL PETROLEUM HYDROCARBONS (µg/L) **NWTPH-Dx**															
Diesel-Range	--	--	--	--	--	--	--	--	--	--	--	180	--	500 (n)	500 (n)
Motor Oil-Range	--	--	--	--	--	--	--	--	--	--	--	430	--	500 (n)	500 (n)
VOLATILES (µg/L) **EPA 8260B**															
Acetone	--	--	--	--	--	--	--	--	--	--	12	22	--	--	--
Carbon Disulfide	--	--	--	--	--	--	--	--	--	--	0.90	0.60	--	--	--
2-Butanone	--	--	--	--	--	--	--	--	--	--	2.8	15	--	--	--
Toluene	--	--	200,000	--	--	15,000	--	19,000	--	15,000	1.2	0.87	--	--	15,000
Styrene	--	--	--	--	--	--	--	--	--	--	0.52	0.63	--	--	--
4-Isopropyltoluene	--	--	--	--	--	--	--	--	--	--	--	--	--	4,400; 48,000 (f)	--
SEMIVOLATILES (µg/L) **EPA 8270C**															
Naphthalene	--	--	--	--	--	--	--	4,940	--	4,940	--	5.6	--	--	4,940
Acenaphthylene	--	--	--	--	--	--	--	--	--	--	--	5.5	--	--	--
Acenaphthene	--	--	--	--	--	990	--	643	--	643	--	5.8	--	--	643
Fluorene	--	--	14,000	--	--	5,300	--	3,460	--	3,460	--	6.0	--	--	3,460
Phenanthrene	--	--	--	--	--	--	--	--	--	--	--	6.3	--	--	--
Anthracene	--	--	110,000	--	--	--	--	25,900	--	25,900	--	5.4	--	--	25,900
Fluoranthene	--	--	370	--	--	140	--	90	--	90	--	6.3	--	--	90
Pyrene	--	--	11,000	--	--	4,000	--	2,590	--	2,590	--	6.8	--	--	2,590
4-Methylphenol	--	--	--	--	--	--	--	--	--	--	3.0	6.2	--	30; 120 (g)	--
Benzoic Acid	--	--	--	--	--	--	--	--	--	--	24	66	--	180,000 (h)	--
bis(2-Ethylhexyl)phthalate	--	--	5.9	--	--	2.2	3.6	400	36	2.2	4.9	6.8	--	--	4.9
Benzo(g,h,i)perylene	--	--	--	--	--	--	--	--	--	--	--	--	--	300 (i)	--
Benzo(a)pyrene	--	--	0.031	--	--	0.018	0.030	--	0.30	0.018	--	4.7	--	--	4.7
Benzo(a)anthracene	--	--	0.031	--	--	0.018	0.030	--	0.30	0.018	--	6.0	--	--	6.0
Benzo(b)fluoranthene	--	--	0.031	--	--	0.018	0.030	--	0.30	0.018	--	4.9	--	--	4.9
Benzo(k)fluoranthene	--	--	0.031	--	--	0.018	0.030	--	0.30	0.018	--	7.2	--	--	7.2
Chrysene	--	--	0.031	--	--	0.018	0.030	--	0.30	0.018	--	7.0	--	--	7.0
Dibenzo(a,h)anthracene	--	--	0.031	--	--	0.018	0.030	--	0.30	0.018	--	6.9	--	--	6.9
Indeno(1,2,3-cd)pyrene	--	--	0.031	--	--	0.018	0.030	--	0.30	0.018	--	6.0	--	--	6.0

TABLE 4
PRELIMINARY GROUNDWATER CLEANUP LEVELS PROTECTIVE OF MARINE SURFACE WATER FOR DETECTED CONSTITUENTS
FORMER SCOTT PAPER COMPANY MILL SITE

Constituent	AWQC for Protection of Aquatic Life - Acute (a)	AWQC for Protection of Aquatic Life - Chronic (a)	AWQC for Protection of Human Health - Organisms Only (b)	National Recommended Water Quality Criteria (c)			MTCA Method B Standard Formula Values Carcinogen	MTCA Method B Standard Formula Values Non Carcinogen	Concentration Associated with 10^{-5} Risk (if carcinogen)	**Unadjusted Preliminary Cleanup Level**	PQL 2004 (d)	PQL 2006 (d)	Background	Other Water Quality Information	**Adjusted Preliminary Cleanup Level**
				Protection of Aquatic Life - Acute	Protection of Aquatic Life - Chronic	Protection of Human Health - Organisms Only (Based on 10^{-6} risk for carcinogens)									
SEMIVOLATILES (µg/L) **EPA 8270RA (Resin Acids)**															
Sandaracopimaric Acid	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Isopimaric Acid	--	--	--	--	--	--	--	--	--	--	--	--	--	400 (j)	--
Dehydroabietic Acid	--	--	--	--	--	--	--	--	--	--	--	--	--	1,100 (j)	--
Abietic Acid	--	--	--	--	--	--	--	--	--	--	--	--	--	700 (j)	--
CONVENTIONALS AND OTHER ORGANICS (mg/L)															
Chloride (EPA 325.2)	--	--	--	--	--	--	--	--	-	--	1.3	0.52	--	--	--
Ammonia (mg-N/L) (unionized)	0.23	0.035	--	pH and temperature dependent		--	--	--	-	(k)	0.040	0.030	--	--	(k)
Nitrate (mg-N/L, Calculated)	--	--	--	--	--	--	--	--	-	--			--	--	--
Nitrite (mg-N/L, EPA 353.2)	--	--	--	--	--	--	--	--	-	--	0.020	0.050	--	--	--
Sulfate (EPA 375.2)	--	--	--	--	--	--	--	--	-	--	11	3.2	--	--	--
Sulfide (EPA 376.2)	--	--	--	--	--	--	--	--	-	--	0.11	0.13	--	30 (l)	--
Phenol (EPA 420.1)	--	--	4,600	--	--	1,700	--	1,100	-	1,100	0.25	0.19	--	--	1,100
Tannins and Lignins (SM18 5550B)	--	--		--	--	--	--	--	--	--	--	--	--	--	--
PCBs (µg/L)															
EPA 8082															
Total PCBs	10	0.030	0.00017	--	0.030	0.000064	--	--	--	0.000064	--	1.8	--	--	1.8
DIOXINS AND FURANS (ng/L)															
Total dioxins/furans TEQ	--	--	0.000014	--	--	0.0000051	8.6E-06	--	0.000086	0.0000051	0.018	0.034	--	--	0.018/0.034

(a) Ambient water quality criteria for protection of aquatic life from WAC 173-201A-040 and 40 C.F.R. Part 131.
(b) Ambient water quality criteria for protection of human health from 40 C.F.R. Part 131d (National Toxics Rule).
(c) National Recommmended Water Quality Criteria (EPA 2006).
(d) Practical quantitation limit (PQL) calculated from laboratory method detection limit (MDL); PQL = 10x MDL.
(e) Natural background based on "Draft Report, Sections 1-7 Background Concentrations of Selected Chemicals in Water, Soil, Sediments, or Air of Washington State (PTI 1989).
(f) LC50 Opossum shrimp, SW = 4,400; LC50 sheepshead minnow, SW = 48,000; from U.S. EPA EcoTox Database.
(g) Water quality objective, 6-month median; daily maximum from "A Compilation of Water Quality Goals" (CalEPA 2003).
(h) Fresh water ecological LC50 from U.S. EPA Superfund Chemical Data Matrix.
(i) NOAA SQUIRT Screening Quick Reference Tables.
(j) LC50 for rainbow trout from "Biological Degradation of Resin Acids in Wood Chips by Wood-Inhabiting Fungi" (Applied and Environmental Microbiology, Jan. 1995, p. 22-225).
(k) Water quality criterion for unionized ammonia is 0.035 mg N/L. Expressed as total ammonia, this criterion would be 3.2 - 74 mg N/L, using the temperature, pH, and chloride concentrations measured in the shoreline wells. Ammonia cleanup level expressed as total ammonia is calculated for each monitoring event in each shoreline well using Ecology Spreadsheet for Water Quality-Based NPDES Permit Calculations (Ecology 2004b).
(l) 30 mg/L was identified during the 2005 Sediment Management Annual Review Meeting as a concentration in porewater above which significant amphipod mortality may result during standard marine sediment bioassays (Caldwell 2005).
(m) Acute (0.067 mg/L) and chronic (0.0224 mg/L) values for protection of aquatic life based on peer-reviewed data (Hunt et al. 2002). EPA is in the process of updating marine nickel water quality criteria.
(n) MTCA Method A cleanup level used in accordance with WAC 173-340-730(3)(b)(iii)(C) because no cleanup levels protective of marine surface water have been established for TPH.

TEQ = Toxicity Equivalent Quotient
mg/L = milligrams per liter
ug/L = micrograms per liter
ng/L = nanograms per liter
Note: Shaded cell indicates basis for preliminary cleanup level.

TABLE 5
SUMMARY OF SMS CHEMICAL CRITERIA, DETECTION FREQUENCY, AND EXCEEDANCE FREQUENCY
FORMER SCOTT PAPER COMPANY MILL SITE

Chemicals	Preliminary Cleanup Level (1)	CSL	Number of Samples	Number of Detections	Number of Samples Exceeding Preliminary Cleanup Level	Number of Samples Exceeding CSL
Conventionals (%)						
Total organic carbon	--	--	98	98	--	--
Total volatile solids (%)	9.7 (2)	15 (3)	72	72	10	7
Metals (mg/kg)						
Arsenic	57	93	78	44	0	0
Cadmium	5.1	6.7	66	54	0	0
Chromium	260	270	40	40	0	0
Copper	390	390	78	78	2	2
Lead	450	530	78	77	1	0
Mercury	0.41	0.59	78	39	4	3
Silver	6.1	6.1	78	19	0	0
Zinc	410	960	78	78	0	0
PCBs (mg/kg-OC)						
Total PCBs	12	65	73	23	7	2
LPAHs (mg/kg-OC)						
Naphthalene	99	170	70	25	0	0
Acenaphthylene	66	66	70	8	0	0
Acenaphthene	16	57	70	8	0	0
Fluorene	23	79	70	12	0	0
Phenanthrene	100	480	70	43	0	0
Anthracene	220	1,200	70	13	0	0
2-Methylnaphthalene	38	64	70	9	0	0
Total LPAH	370	780	70	43	0	0
HPAHs (mg/kg-OC)						
Fluoranthene	160	1,200	70	47	0	0
Pyrene	1,000	1,400	70	48	0	0
Benzo(a)anthracene	110	270	70	31	0	0
Chrysene	110	460	70	38	0	0
Total benzofluoranthenes	230	450	70	32	0	0
Benzo(a)pyrene	99	210	70	25	0	0
Indeno(1,2,3-cd)pyrene	34	88	70	22	0	0
Dibenzo(a,h)anthracene	12	33	70	4	0	0
Benzo(g,h,i)perylene	31	78	70	17	0	0
Total HPAH	960	5,300	70	38	0	0
Misc. SVOCs (mg/kg-OC)						
1,2-Dichlorobenzene	2.3	2.3	18	0	0	0
1,4-Dichlorobenzene	3.1	9	18	0	0	0
1,2,4-Trichlorobenzene	0.81	1.8	43	0	0	0
Hexachlorobenzene	0.38	2.3	34	0	0	0
Dimethylphthalate	53	53	62	2	0	0
Diethylphthalate	61	110	62	1	0	0
Di-n-butylphthalate	220	1,700	62	2	0	0
Butylbenzylphthalate	4.9	64	62	3	0	0
bis(2-ethylhexyl)phthalate	47	78	72	20	0	0
Di-n-octylphthalate	58	4,500	62	0	0	0
Dibenzofuran	15	58	69	10	0	0
Hexachlorobutadiene	3.9	6.2	59	0	0	0
n-Nitroso-di-phenylamine	11	11	61	0	0	0
Misc. SVOCs (µg/kg)						
Phenol	420	1,200	62	13	0 (5)	0 (5)
2-Methylphenol	63	63	62	0	0	0
4-Methylphenol	670	670	43	23	1	0
2,4-Dimethylphenol	29	29	62	1	0	0
Pentachlorophenol	360	690	50	1	0	0
Benzyl alcohol	57	73	50	1	0	0
Benzoic acid	650	650	50	2	0	0
Dioxins/Furans (ng/kg)						
Dioxin TEQ	15 (4)	--	23	23	0	0

Notes:
(1) Preliminary cleanup levels are based on the SQS (Sediment Quality Standards - WAC 173-204-320) unless otherwise indicated.
(2) Total volatile solids SQS criterion based on site-specific bioassays (see text)
(3) Total volatile solids CSL criterion based on site-specific bioassays (see text)
(4) Dioxin toxicity equivalent quotient (TEQ) screening value (PSDDA 2000)
(5) Detection of phenol at Station IS-04 (2,800 µg/kg) was within the Northern Puget Sound regional bakground range at the time of sampling.
CSL - Cleanup Screening Level
Highlighted analytes denote chemicals of potential concern in Former Scott Mill Site sediments

TABLE 6
EXPLORATIONS AND FILL MATERIAL SUMMARY, PORT PARCEL 3
FORMER SCOTT PAPER COMPANY MILL SITE

Location	Exploration Date		Total Depth of Exploration (ft)	Sandy and/or Silty Fill Material Thickness (ft)	Wood Debris Thickness (ft)
LSB-1	4/1/2004		20.5	7	11
LSB-2	4/1/2004		24.5	8.5	12.5
LSB-3	4/2/2004		20.5	7	12
LSB-4	4/2/2004		20.5	8.5	10
LSB-5	3/31/2004		20.5	11.5	7.5
LSB-6	3/31/2004		20.5	6.5	12
LSB-7	4/2/2004		21	6	12.5
LSB-8	4/2/2004		20.5	11.5	6
MW-101	3/29/2004		20.5	7	10.5
MW-102	3/30/2004		14	8.5	Not Encountered
MW-105	3/31/2004		23.5	7	7.5
MW-106	3/31/2004		20.5	7	7.5
B-7	3/15/1993	*	21.5	None	18
B-8	3/16/1993	*	21.5	None	Not Encountered
B-13	6/16/1993	*	24.5	None	18.5
B-14	3/15/1993	*	25	10.5	11.5
B-1	12/13/1993	*	10	2	>8
B-2	12/13/1993	*	16	1.5	14.5
ET-TP01	11/17/1998		15	12	>3
ET-TP04	11/17/1998		12	6	4
ET-TP11	11/19/1998		10	9	>1
ET-TP12	11/19/1998		4	>4	Not Encountered
ET-TP13	11/19/1998		4	>4	Not Encountered
ET-TP14	11/19/1998		4	>4	Not Encountered
ET-TP15	11/19/1998		3	>3	Not Encountered
ET-TP16	11/19/1998		3	>3	Not Encountered

> indicates base of fill or wood not encountered.

* = Boring was completed prior to placement of preload material at Property and construction of Seafarers' Memorial Park.

TABLE 7
SOIL SAMPLE AND ANALYSIS SUMMARY, PORT PARCEL 3
FORMER SCOTT PAPER COMPANY MILL SITE

DRAFT FINAL

Location	Planned Sample Depth Interval (ft BGS)	Actual Sample Depth Interval (ft BGS)	Hexavalent Chromium	Total Chromium	Total Zinc	Total Metals (a)	NWTPH-Dx	NWTPH-Gx	PCBs	VOCs	cPAHs or PAHs (b)	Dioxins/Furans
MW-101	zone of contamination	not sampled										
	zone below contamination	not sampled										
MW-102	4-5	5-6				X					X	
	9-10	9-10				X					X	
	14-15	not sampled										
	zone of contamination	none										
	zone below contamination	none										
MW-105	4-5	6-7				X	X					X
	9-10	8-9				X	X					X
	14-15	15-16				X	X					X
	capillary fringe	7-8				X	X		X		X	X
	zone of contamination	none										
	zone below contamination	none										
MW-106	4-5	4-5				X	X					X
	9-10	see zone below contamination										
	14-15	14-15				X	X					X
	capillary fringe	see zone of contamination										
	zone of contamination	7-8				X	X		X		X	X
	zone below contamination	9-10				X	X					X
LSB-1	4-5	4-4.5				X	X					X
	6-7	6-6.5				X	X					X
		9-10				X	X					X
		18-19				X	X					X
	zones of contamination	none										
	zone below contamination	none										

TABLE 7
SOIL SAMPLE AND ANALYSIS SUMMARY, PORT PARCEL 3
FORMER SCOTT PAPER COMPANY MILL SITE

Location	Planned Sample Depth Interval (ft BGS)	Actual Sample Depth Interval (ft BGS)	Hexavalent Chromium	Total Chromium	Total Zinc	Total Metals (a)	NWTPH-Dx	NWTPH-Gx	PCBs	VOCs	cPAHs or PAHs (b)	Dioxins/Furans
LSB-2	4-5	4-5				X	X					X
	6-7	see capillary fringe										
	9-10	10-11				X	X					X
		see zone of										
	14-15	contamination				X	X					X
	capillary fringe	6-7				X	X		X		X	X
	zone of contamination	see capillary fringe										
	zone below contamination	10-11				X	X		X		X	X
	zone of contamination	17-18				X	X		X		X	X
LSB-3	4-5	4-5				X	X					X
	6-7	6-7				X	X					X
	zone of contamination	none										
	zone below contamination	none										
LSB-4	4-5	4-4.5				X	X					X
	9-10	10-11				X	X					X
	14-15	14-15				X	X					X
	capillary fringe	6-7				X	X		X		X	X
	zone of contamination	none										
	zone below contamination	none										
LSB-5	4-5	4-5				X	X		X		X	X
	9-10	see zone of contamination										
	14-15	see zone below contamination										
	capillary fringe	7-8				X	X		X		X	X
	zone of contamination	9-10				X	X	X	X	X	X	X
	zone of contamination	10-11				X	X	X	X	X	X	X
	zone below contamination	14-15				X	X	X	X	X	X	X

TABLE 7
SOIL SAMPLE AND ANALYSIS SUMMARY, PORT PARCEL 3
FORMER SCOTT PAPER COMPANY MILL SITE

Location	Planned Sample Depth Interval (ft BGS)	Actual Sample Depth Interval (ft BGS)	Hexavalent Chromium	Total Chromium	Total Zinc	Total Metals (a)	NWTPH-Dx	NWTPH-Gx	PCBs	VOCs	cPAHs or PAHs (b)	Dioxins/Furans
LSB-6	4-5	4-5				X	X		X		X	X
	9-10	6-7 (see below)										
	14-15	14-15 (see below)										
	capillary fringe	6-7										
	zone of contamination	6-7				X	X		X		X	X
	zone below contamination	14-15				X	X		X		X	X

X Indicates analyses was performed

Shading around the X indicates the analysis was planned.

BGS = below ground surface

TPH = total petroleum hydrocarbons

PCBs = polychlorinated biphenyls

VOCs = volatile organic compounds

PAHs = polycyclic aromatic hydrocarbons

cPAHs = carcinogenic PAHs

(a) Total Metals include antimony, arsenic, cadmium, copper, lead, mercury, nickel, and thallium.

(b) For any sample, if evidence of potential petroleum hydrocarbons was observed the sample was be analyzed for carcinogenic and non-carcinogenic PAHs.

TABLE 8
SOIL ANALYTICAL DETECTION SUMMARY
PORT PARCEL 1
FORMER SCOTT PAPER MILL SITE
ANACORTES, WASHINGTON

Source:	ENSR	Earth Tech	Earth Tech	Earth Tech	Earth Tech	Earth Tech	Earth Tech	Earth Tech	Earth Tech	Earth Tech	Landau 2004	Landau 2004	Landau 2004	Landau 2004
Sample Identification:	B-5-8	TP01-15	TP02-10	TP03-7	TP05-10	TP06-9	TP07-10	TP08-8	TP09-2	TP010-3	MW-103, 4-5	MW-103, 9-10	MW-111, 2-3	MW-111,4-5
Sample depth (feet below ground surface)	8	15	10	7	10	9	10	8	2	3	4-5	9-10	2-3	4-5
Date Collected:	3/17/1993	11/17/1998	11/17/1998	11/17/1998	11/17/1998	11/18/1998	11/18/1998	11/18/1998	11/18/1998	11/18/1998	3/30/2004	3/30/2004	3/29/2004	3/29/2004
Lab ID:	ATI	ARI	ARI	ARI	ARI	ARI	ARI	ARI	ARI	ARI	ARI GM58C	ARI GM58D	ARI GM58M	ARI GM58N
Compound														
POLYCYCLIC AROMATIC														
HYDROCARBONS (mg/kg)														
Method EPA 8270														
Acenaphthene	0.20 U										0.017	0.069		
Acenaphthylene	0.20 U										0.009	0.057 U		
Anthracene	0.20 U										0.012	0.063		
Benzo(a)anthracene	0.20 U										0.028	0.057 U	0.025 U	0.0075 U
Benzo(a)pyrene	0.20 U										0.029	0.057 U	0.025 U	0.0075 U
Benzo(b)fluoranthene	0.20 U										0.027	0.130	0.025 U	0.0075 U
Benzo(k)fluoranthene	0.20 U										0.027	0.110	0.025 U	0.0075 U
Benzo(ghi)perylene	0.20 U										0.011	0.057 U		
Chrysene	0.20 U										0.044	0.092	0.025 U	0.0075 U
Dibenzofuran											0.010	0.057 U		
Fluoranthene	0.20 U										0.100	0.170		
Fluorene	0.20 U										0.014	0.080		
Indeno(1,2,3-cd)pyrene	0.20 U										0.008	0.057 U	0.025 U	0.0075 U
2-Methylnaphthalene	0.20 U										0.015	0.057 U		
Naphthalene	0.20 U										0.034	0.058		
Phenanthrene	0.20 U										0.056	0.160		
Pyrene	0.20 U										0.082	0.110		
Total cPAHs (TEQ)	0.20 U										0.038	0.059	0.025 U	0.025 U
TOTAL PETROLEUM HYDROCARBONS (mg/kg)														
Method NWTPH-Dx (silica/acid gel cleanup)														
Diesel-Range										18			13	5.0 U
Motor Oil-Range										130			84	15
METALS (mg/kg)														
Method EPA 6000/7000														
Arsenic	5.6	10 U	7 U	30	6 U	6 U	7	6 U	5 U	5 U	3.0	3.8		3.6
Cadmium	1.5 U	0.7	0.4	U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.3	0.2 U	0.3 U		0.2 U
Chromium	37	38	34.4	38	38.2	24.3	47	45	34.6	71			37	46
Copper	35										21.8	26.6		25.7
Lead	5.1	90	51	25	5	6	6	5	4	6	18	19		7
Mercury	0.12 U	8.6	0.24	U	0.06 U	0.05 U	0.06 U	0.06 U	0.05 U	0.05 U	0.05 U	0.05 U		0.06
Nickel	36										35	35		37
Zinc	58												81	57.0
Hexavalent Chromium													0.153	0.112 U
VOLATILE ORGANICS (mg/kg)														
Method EPA 8260														
Acetone													0.005 U	0.010
Carbon Disulfide													0.001 M	0.001 M

TABLE 8
SOIL ANALYTICAL DETECTION SUMMARY
PORT PARCEL 1
FORMER SCOTT PAPER MILL SITE
ANACORTES, WASHINGTON

Source:	ENSR	Earth Tech	Earth Tech	Earth Tech	Earth Tech	Earth Tech	Earth Tech	Earth Tech	Earth Tech	Earth Tech	Landau 2004	Landau 2004	Landau 2004	Landau 2004
Sample Identification:	B-5-8	TP01-15	TP02-10	TP03-7	TP05-10	TP06-9	TP07-10	TP08-8	TP09-2	TP010-3	MW-103, 4-5	MW-103, 9-10	MW-111, 2-3	MW-111,4-5
Sample depth (feet below ground surface)	8	15	10	7	10	9	10	8	2	3	4-5	9-10	2-3	4-5
Date Collected:	3/17/1993	11/17/1998	11/17/1998	11/17/1998	11/17/1998	11/18/1998	11/18/1998	11/18/1998	11/18/1998	11/18/1998	3/30/2004	3/30/2004	3/29/2004	3/29/2004
Lab ID:	ATI	ARI	ARI	ARI	ARI	ARI	ARI	ARI	ARI	ARI	ARI GM58C	ARI GM58D	ARI GM58M	ARI GM58N
Compound														
DIOXINS/FURANS (ng/kg)														
Method EPA 8290														
DIOXINS														
2,3,7,8-TCDD		0.528 U	0.185 U	0.944 U	0.114 U	0.150 U	0.140 U	0.080 U	0.155 U	0.117 U			0.260 U	0.200 U
1,2,3,7,8-PeCDD		0.542 U	0.147 U	0.681 U	0.140 U	0.156 U	0.135 U	0.170 U	0.198 U	0.136 U			1.000 U	0.990 U
1,2,3,4,7,8-HxCDD		1.150 U	0.407	0.844 U	0.135 U	0.163 U	0.115 U	0.123 U	0.226 U	0.236 U			1.000 U	0.990 U
1,2,3,6,7,8-HxCDD		3.951	1.260	0.471 U	0.125 U	0.151 U	0.107 U	0.114 U	0.210 U	1.081			1.100 J	0.990 U
1,2,3,7,8,9-HxCDD		1.019 U	0.670	0.560 U	0.119 U	0.144 U	0.102 U	0.109 U	0.201 U	0.210 U			1.000 U	0.990 U
1,2,3,4,6,7,8-HpCDD		46.06	21.55	8.762	0.196 U	0.384 U	0.193 U	0.184 U	2.395	32.50			18.00	5.400
Octa-Dibenzodioxin		426.2	166.8	90.64	2.299 U	3.095 U	1.528 U	0.926 U	20.51	209.2			150.0	41.00
FURANS														
2,3,7,8-TCDF		5.482	0.424 U	1.021 U	0.627	0.196 U	0.162 U	0.262 U	0.323 U	0.163 U			0.250 U	0.200 U
1,2,3,7,8-PeCDF		0.555 U	0.140 U	0.538 U	0.102 U	0.115 U	0.086 U	0.086 U	0.205 U	0.141 U			1.000 U	0.990 U
2,3,4,7,8-PeCDF		0.564 U	0.142 U	0.562 U	0.104 U	0.117 U	0.087 U	0.088 U	0.208 U	0.143 U			1.000 U	0.990 U
1,2,3,4,7,8-HxCDF		6.465 U	1.872 U	0.470 U	0.112 U	0.240 U	0.102 U	0.084 U	0.156 U	3.955 U			1.000 U	0.990 U
1,2,3,6,7,8-HxCDF		0.763	0.217	0.313 U	0.108 U	0.105 U	0.099 U	0.082 U	0.151 U	0.179 U			1.000 U	0.990 U
1,2,3,7,8,9-HxCDF		0.871 U	0.215 U	0.511 U	0.136 U	0.132 U	0.124 U	0.102 U	0.189 U	0.225 U			1.000 U	0.990 U
2,3,4,6,7,8-HxCDF		0.780 U	0.193 U	0.459 U	0.122 U	0.119 U	0.111 U	0.092 U	0.170 U	0.202 U			1.000 U	0.990 U
1,2,3,4,6,7,8-HpCDF		28.66	5.090	2.087 U	0.130 U	0.106 U	0.072 U	0.072 U	0.212 U	14.88			3.700 J	1.200 J
1,2,3,4,7,8,9-HpCDF		2.599 U	0.349 U	1.579 U	0.162 U	0.133 U	0.091 U	0.090 U	0.266 U	0.826 U			1.000 U	0.990 U
Octa-Dibenzofuran		49.92	13.90	9.277	0.290 U	0.253 U	0.230 U	0.211 U	0.937	47.44			7.000 J	3.100 J
Total Dioxins/Furans TEQ (human health)		3.06	0.90	1.27	0.25	0.24	0.20	0.19	0.32	1.07			1.49	1.20
Total Dioxins TEQ (mammals)		1.63	0.67	1.02	0.15	0.18	0.15	0.14	0.24	0.64			1.07	0.81
Total Furans TEQ (mammals)		1.44	0.24	0.25	0.11	0.06	0.05	0.05	0.09	0.43			0.42	0.39
Total Furans TEQ (birds)		6.58	0.48	0.93	0.71	0.19	0.15	0.20	0.31	0.55			0.92	0.86

Notes:

Tabulated raw analytical data (does not include calculated cPAH and dioxin/furan TEQ values) from Landau Associates 2004b.

mg/kg = milligrams per kilogram

ng/kg = nanograms per kilogram

U = The analyte was analyzed for, but was not detected above the specified method reporting limit.

J = Data validation flag indicating the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

M = Indicates an estimated value of analyte detected and confirmed by analyst with low spectral match parameters.

Blank space indicates analysis for indicated constituent was not performed on that sample.

TEQ = Toxicity Equivalent Quotient

cPAH and dioxin/furan TEQ values for samples with at least one positive cPAH or dioxin/furan detection were calculated using MTCA TEF values in effect as of January 2008 (see Table 2).

Blue outline = value exceeds MTCA Terrestrial Ecological Criteria only (criteria are in Table 1).

Red outline = value exceeds MTCA Terrestrial Ecological and Human Health Criteria, or Human Health Criteria only if no Terrestrial Ecological Criteria established or if Terrestrial Ecological Criteria are greater than the Human Health Criteria (criteria are in Table 1).

Preliminary cleanup levels are presented in Table 1.

TABLE 9
SOIL ANALYTICAL DETECTION
SUMMARY, PORT PARCEL 2
FORMER SCOTT PAPER MILL SITE
ANACORTES, WASHINGTON

CONCENTRATION MEASUREMENTS FOR HYDROCARBON CONTAMINATION

Consultant	Date	Location	Depth	Measured TPH Concentration (mg/kg)
1993 ENSR Study				
ENSR	3/15/93	B-2	4 feet	100
ENSR	3/15/93	B-2	20 feet	< 13
ENSR	3/16/93	B-4 / MW-2	18 feet	8,500
ENSR	3/16/93	B-4	19 feet	16,000
ENSR	3/15/93	B-7	18 feet	< 12
ENSR	3/16/93	B-10	15 feet	< 13
ENSR	6/16/93	B-11	13.5 feet	240
ENSR	6/16/93	B-11	19.5 feet	< 13
ENSR	6/16/93	B-12 / MW-5	9 feet	< 16
ENSR	6/16/93	B-12 / MW-5	16.5 feet	150
ENSR	6/16/93	B-12 / MW-5	25 feet	< 13
ENSR	6/16/93	B-13	3.5 feet	< 19
ENSR	6/16/93	B-13	6.0 feet	54
ENSR	6/16/93	B-13	8.5 feet	1,600
ENSR	6/16/93	B-14 / MW-6	10 feet	4,900
ENSR	6/16/93	B-14 / MW-6	28.5 feet	< 13
ENSR	6/16/93	B-15	3.5 feet	190
ENSR	6/16/93	B-15	25 feet	< 13
ENSR	6/16/93	B-16	23.5 feet	< 13
ENSR	6/16/93	B-17	3.5 feet	40
ENSR	6/16/93	B-17	23.5 feet	< 12
ENSR	6/16/93	B-18	3.0 feet	80
ENSR	6/16/93	B-18	22 feet	23
ENSR	6/16/93	MW-2	18.feet	8,500
-1 Pump Study for Park Surface Soils (Before Capping)				
A-1 Pump	4/24/92	Sample 3	Surface	161
A-1 Pump	4/24/92	Sample 4	Surface	< 25
A-1 Pump	4/24/92	Sample 5	Surface	233
A-1 Pump	4/24/92	Sample 6	Surface	301
Advanced Soil Mechanics Study				
ASM	12/13/93	B-1	5 feet	< 40
ASM	12/13/93	B-1	9.2 feet	< 58
ASM	12/13/93	B-2	5 feet	190
ASM	12/13/93	B-2	16 feet	355

VISUAL OBSERVATIONS OF HYDROCARBON CONTAMINATION

Consultant	Date	Location	Depth	Reported Visual Observations
ENSR	3/16/93	B-4	18-20 feet	Oily liquid with tar like drops, wet.
ENSR	3/15/93	B-12	19-24 feet	Strong odor (decomposition), burnt smell
ENSR	3/17/93	B-13	3.5-21 feet	Black waxy substance.
ENSR	3/15/93	B-14	3.5-9 feet	Black tar like substance mixed with soil
ENSR	3/15/93	B-15	8.5-13.5 feet	Cuttings black.
ENSR	3/15/93	B-16	4.5-8.5 feet	Black sludge material present, no odor.
ENSR	3/17/93	B-17	8.5-13.5	Black cuttings.
ENSR	3/15/93	B-18	3-8 feet	Diesel odor in soil.
Otten	8/23/96	TP-101	7-8 feet	Black viscous oil on soil at 7 to 8 feet. Slight sheen on water.
Otten	8/23/96	TP-102	7-11 feet	Oily soil noted at 7 to 8 feet. Slight sheen on water.
Otten	8/23/96	TP-103	8.5-10 feet	Oils sheen in isolated spots on water
Otten	8/23/96	TP-104	8.5-10 feet	Oils sheen in isolated spots on water
Otten	8/23/96	TP-105	8-9 feet	Slight diesel sheen on soils.
Otten	8/23/96	TP-107	8.5-11 feet	Slight oil sheen.

Notes:
Tabulated raw analytical data (does not include calculated cPAH and dioxin/furan TEQ values) from ThermoRetec 1999a.
mg/kg = milligrams per kilogram
ng/kg = nanograms per kilogram
TEQ = Toxicity Equivalent Quotient
(a) TEQ values calculated using MTCA Toxicity Equivalent Factor values in effect as of January 2008 (see Table 2).
Blue shading indicates soil removed during Parcel 2 Soil Cleanup Action
Blue outline = value exceeds MTCA Terrestrial Ecological Criteria only (criteria are in Table 1).
Red outline = value exceeds MTCA Terrestrial Ecological and Human Health Criteria, or Human Health Criteria only if no Terrestrial Ecological Criteria established or if Terrestrial Ecological Criteria are greater than the Human Health Criteria (criteria are in Table 1).
Preliminary cleanup levels are presented in Table 1.

TABLE 9
SOIL ANALYTICAL DETECTION SUMMARY, PORT PARCEL 2
FORMER SCOTT PAPER MILL SITE
ANACORTES, WASHINGTON

Parameter	Sampling Location	B-10	B-4	B-8	B-2	B-2	B-5
	Consultant	ENSR	ENSR	ENSR	ENSR	ENSR	ENSR
	Sample Depth	13 feet	9 feet	4 feet	4 feet	20 feet	8 feet
	Sample ID Number	9303-211-4	9303-211-6	9303-211-9	9303-204-2	9303-204-3	9303-204-4
	Sampling Date	3/16/93	3/16/93	3/16/93	3/15/93	3/15/93	3/17/93
Heavy Metals (mg/kg)							
Antimony		< 3.2	< 12	5.4	< 3.4	< 3.4	< 3.1
Arsenic		4.1	8.3	8.2	6.0	4.6	5.6
Barium		nt	nt	nt	nt	nt	nt
Beryllium		< 0.32	< 1.2	< 0.52	< 0.34	< 0.34	< 0.31
Cadmium		< 1.6	< 1.2	< 2.6	< 1.7	< 1.7	< 5.1
Chromium		32	17	50	25	36	0.12
Copper		33	68	300	49	37	36
Lead		5.3	32	540	65	6.5	6.7
Mercury		< 0.11	< 0.43	2.4	< 0.12	< 0.11	< 0.12
Nickel		37	17	55	26	39	36
Selenium		< 1.7	< 5.7	< 1.1	< 1.8	< 1.7	< 1.5
Silver		< 1.6	< 1.2	< 2.6	< 1.7	< 1.7	< 1.5
Thallium		< 0.35	< 1.1	< 0.53	< 0.37	< 0.34	< 0.3
Zinc		55	100	89	110	64	58
BTEX (EPA 8020) (mg/kg)							
Benzene		nt	nt	nt	nt	nt	nt
Toluene		nt	nt	nt	nt	nt	nt
Ethylbenzene		nt	nt	nt	nt	nt	nt
Total Xylenes		nt	nt	nt	nt	nt	nt
PAH (EPA 8270/8310) (mg/kg)							
Naphthalene		< 0.22	< 0.76	< 0.35	0.11 J	< 0.22	< 0.20
1-Methylnaphthalene		nt	nt	nt	nt	nt	nt
2-Methylnaphthalene		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
Acenaphthylene		< 0.22	< 0.76	0.3 J	< 0.23	< 0.22	< 0.20
Acenaphthene		< 0.22	< 0.76	< 0.35	0.69	< 0.22	< 0.20
Fluorene		< 0.22	< 0.76	< 0.35	0.59	< 0.22	< 0.20
Phenanthrene		< 0.22	< 0.76	0.72	1.2	< 0.22	< 0.20
Anthracene		< 0.22	< 0.76	0.24 J	0.22 J	< 0.22	< 0.20
Fluoranthene		< 0.22	< 0.76	1.8	0.96	< 0.22	< 0.20
Pyrene		< 0.22	< 0.76	1.9	0.92	< 0.22	< 0.20
Benzo(a)anthracene *		< 0.22	< 0.76	0.94	0.23	< 0.22	< 0.20
Chrysene *		< 0.22	< 0.76	1.2	0.28	< 0.22	< 0.20
Benzo(b)fluoranthene *		< 0.22	< 0.76	1.4	0.23	< 0.22	< 0.20
Benzo(k)fluoranthene *		< 0.22	< 0.76	0.56	< 0.23	< 0.22	< 0.20
Benzo(a)pyrene *		< 0.22	< 0.76	1.1	0.15 J	< 0.22	< 0.20
Dibenzo(a,h)anthracene *		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
Indeno(1,2,3-cd)pyrene *		< 0.22	< 0.76	0.72	< 0.23	< 0.22	< 0.20
Benzo(g,h,I)perylene		< 0.22	< 0.76	0.8	< 0.23	< 0.22	< 0.20
Total PAH		1.87	6.46	12.555	6.27	1.87	1.7
Toal Carcinogenic PAH (*)		0.77	2.66	1.492 (a)	0.233 (a)	0.77	0.7
Detected Semivolatile Organics (EPA 8270) (mg/kg)							
Dibenzofuran		< 0.22	< 0.76	< 0.35	0.38	0.22	0.20
Bis(2-Ethylhexyl)Phthalate		0.8	< 0.76	< 0.35	0.29	0.12 J	< 0.20
Other Semivolatile Organics (mg/kg)							
N-Nitrosodimethylamine		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
Phenol		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
Aniline		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
Bis(2-Chloroethyl)ether		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
2-Chlorophenol		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
1,2-Dichlorobenzene		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
1,4-Dichlorobenzene		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
Benzyl Alcohol		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
1,2-Dichlorobenzene		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
2-Methylphenol		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
Bis(2-chloroisopropyl)ether		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
4-Methylphenol		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
N-Nitroso-di-N-propylamine		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
Hexachloroethane		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
Nitrobenzene		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
Isophorone		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
2-Nitrophenol		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
2,4-Dimethylphenol		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
Benzoic Acid		< 1.1	< 3.9	< 1.8	< 1.1	< 1.1	< 1.0
Bis(2-Chloroethoxy)methane		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
2,4-Dichlorophenol		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
1,2,4-Trichlorobenzene		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
4-Chloroaniline		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
Hexachlorobutadiene		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
4-Chloro-3-methylphenol		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
Hexachlorocyclopentadiene		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
2,4,6-Trichlorophenol		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
2,4,5-Trichlorophenol		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
2-Chloronaphthalene		< 1.1	< 3.9	< 1.8	< 1.1	< 1.1	< 1.0
2-Nitroaniline		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
Dimethylphthalate		< 1.1	< 3.9	< 1.8	< 1.1	< 1.1	< 1.0
3-Nitroaniline		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
2,4-Dinitrophenol		< 1.1	< 3.9	< 1.8	< 1.1	< 1.1	< 1.0
4-Nitrophenol		< 1.1	< 3.9	< 1.8	< 1.1	< 1.1	< 1.0
2,4-Dinitrotoluene		< 1.1	< 3.9	< 1.8	< 1.1	< 1.1	< 1.0
2,6-Dinitrotoluene		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
Diethylphthalate		< 0.22	< 0.76	< 0.35	< 0.23	< 0.23	< 0.20
4-Chlorophenyl-Phenylether		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
4-Nitroaniline		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
4-6-Dinitro-2-methylphenol		< 1.1	< 3.9	< 1.8	< 1.1	< 1.1	< 1.0
N-Nitrosodiphenylamine		< 1.1	< 3.9	< 1.8	< 1.1	< 1.1	< 1.0
4-Bromophenyl-phenylether		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
Hexachlorobenzene		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
Pentachlorophenol		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
Di-N-butylphthalate		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
Benzidine		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
Butylbenzylphthalate		< 2.2	< 7.6	< 3.5	< 2.3	< 2.2	< 2.0
3,3'-Dichlorobenzidine		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20
Di-N-octylphthalate		< 0.45	< 1.5	< 0.72	< 0.46	< 0.45	< 0.40
		< 0.22	< 0.76	< 0.35	< 0.23	< 0.22	< 0.20

Notes:
Tabulated raw analytical data (does not include calculated cPAH and dioxin/furan TEQ values) from ThermoRetec 1999a.
mg/kg = milligrams per kilogram
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TEQ = Toxicity Equivalent Quotient
(a) TEQ values calculated using MTCA Toxicity Equivalent Factor values in effect as of January 2008 (see Table 2).
Blue shading indicates soil removed during Parcel 2 Soil Cleanup Action
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TABLE 9
SOIL ANALYTICAL DETECTION SUMMARY, PORT PARCEL 2
FORMER SCOTT PAPER MILL SITE, ANACORTES, WASHINGTON

Parameter & Method	Location	Shoreline Contaminated Area (Impacted Soils)								Shoreline Contaminated Area (Clean Surrounding Samples)												
	Depth	RTP-2	RTP-5	RTP-43	RTP-44	RTP-44	RTP-44	RTP-45	RTP-46	RTP-1	RTP-3	RTP-4(b)	RTP-39	RTP-39	RTP-40	RTP-40	RTP-41	RTP-41	RTP-42	RTP-43	RTP-45	RTP-46	RTP-47
	Observations	9 feet	8 feet	12 feet	7 feet	10 feet	12 feet	7 feet	7 feet	6 feet	7 feet	7 feet	7 feet	13 feet	7 feet	12 feet	6 feet	12 feet	12 feet	10 feet	10 feet	12 feet	10 feet
	Soil Layer	9 to 11 ft.																					
	Date Sampled	9/2/98	9/1/98	12/9/98	12/9/98	12/9/98	12/9/98	12/9/98	12/9/98	9/2/98	9/1/98	9/2/98	12/9/98	12/9/98	12/9/98	12/9/98	12/9/98	12/9/98	12/9/98	12/9/98	12/9/98	12/9/98	12/9/98
Heavy Metals																							
(EPA 6010 and 7000 series)																							
Antimony		60 <	10 <	21 <	15 <	29 <	14 <	11 <	21 <	7.6 <	13 <	8.6 <	15 <	17 <	9.3 <	13 <	7.7 <	12 <	23 <	19 <	15 <	16 <	19
Arsenic		< 20 <	20 <	21	40 <	29 <	12.6 <	11.4 <	21 <	15 <	26 <	17 <	15 <	17 <	9.4 <	13 <	15 <	12 <	23 <	19 <	14 <	16 <	19
Beryllium		< 0.4 <	1 <	0.42 <	0.41 <	0.58 <	0.58 <	0.23 <	0.42 <	0.76 <	1.3 <	0.86 <	0.29 <	0.35	0.26 <	0.26 <	0.3 <	0.24 <	0.46 <	0.29 <	0.28 <	0.33 <	0.37
Cadmium		4.7 <	1	2.3	0.91	6.4	1.8	0.97 <	0.84	1.1 <	1.3 <	0.86 <	0.58	0.91	0.42 <	0.51 <	0.46	1.16	1.1	1.16	0.9 <	0.65 <	0.75
Chromium		143	94	26	75	135	58	77	34	17	30	26	26	25	37	32	49	54	31	25	44	31	23
Copper		2,170	3,700	166	1798	9599	359	135	105	93	150	110	135	181	59	160	103	138	158	124	113	395	137
Lead		1,230	390	79	6,428	962	214	231	1011	57	68 <	8.6	159	59	72	56	213	64	74	67	124	42	63
Mercury		15 <	0.5	0.2	0.931	1.65	1.8	29	0.28 <	0.38	0.67 <	0.43	0.28	0.22	2.2	3.1	13.7	0.94 <	0.22	0.21	1.3	0.22 <	0.08
Nickel		194	80	33	78	108	64	31	22	29	25	31	22	21	40	18	39	40	32	31	33	36	22
Selenium		< 20 <	20 <	21 <	21	52	17	13 <	21 <	15 <	26 <	17 <	15 <	17 <	9.4 <	13 <	9.9 <	12 <	23 <	19 <	14 <	16 <	19
Silver		< 1 <	1 <	1.3 <	1.3	4.8	1.2	1.7 <	1.3	1.6 <	1.3 <	0.86	0.88 <	1 <	0.6 <	0.77	0.72	6.2 <	1.4 <	1.1	1.3 <	0.97 <	1.12
Thallium		< 20 <	10 <	21 <	21 <	29 <	13 <	11 <	21 <	7.6 <	13 <	8.6 <	15 <	17 <	15 <	13 <	7.7 <	12 <	23 <	19 <	14 <	16 <	19
Zinc		1,320	940	273	861	1076	629	243	106	220	170	93	142	198	130	126	138	262	155	177	305	128	218
Petroleum Hydrocarbons																							
(WTPH-d extended)																							
Diesel Range Hydrocarbons		9,400	450	nt	nt	nt	nt	nt	nt	48	610	91	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
Motor Oil		50,000	720	nt	nt	nt	nt	nt	nt	45	3,000	120	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
Interim TPH Policy Testing																							
Direct Ingestion Pathway		Fail	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
Leaching to Groundwater Pathway		Pass	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
Polychlorinated Biphenyls																							
(EPA 8081)																							
Aroclor 1016		< 1.8 <	2.0 <	3.4 <	1.7 <	2.6 <	1.8 <	2.2 <	1.7 <	1.2 <	2.1 <	1.2 <	1.3 <	2.9 <	1.5 <	2.9 <	1.3 <	2.4 <	3.9 <	3.3 <	2.1 <	2.6 <	1.6
Aroclor 1221		< 3.5 <	3.9 <	6.7 <	3.3 <	5.2 <	3.6 <	4.4 <	3.5 <	2.4 <	4.3 <	2.5 <	2.6 <	5.8 <	3.0 <	5.9 <	2.6 <	4.8 <	7.8 <	6.6 <	4.3 <	5.2 <	3.2
Aroclor 1232		< 1.8 <	2.0 <	3.4 <	1.7 <	2.6 <	1.8 <	2.2 <	1.7 <	1.2 <	2.1 <	1.2 <	1.3 <	2.9 <	1.5 <	2.9 <	1.3 <	2.4 <	3.9 <	3.3 <	2.1 <	2.6 <	1.6
Aroclor 1242		8.8 <	2.0 <	3.4 <	1.7 <	2.6 <	1.8 <	2.2 <	1.7 <	1.2 <	2.1 <	1.2 <	1.3 <	2.9 <	1.5 <	2.9 <	1.3 <	2.4 <	3.9 <	3.3 <	2.1 <	2.6 <	1.6
Aroclor 1248		< 1.8 <	2.0 <	3.4 <	1.7 <	2.6 <	1.8 <	2.2 <	1.7 <	1.2 <	2.1 <	1.2 <	1.3 <	2.9 <	1.5 <	2.9 <	1.3 <	2.4 <	3.9 <	3.3 <	2.1 <	2.6 <	1.6
Aroclor 1254		< 1.8 <	2.0 <	3.4 <	1.7	4.3	1.2 <	2.2 <	1.7 <	1.2 <	2.1 <	1.2 <	1.3 <	2.9 <	1.5 <	2.9 <	1.3 <	2.4 <	3.9 <	3.3 <	2.1 <	2.6 <	1.6
Aroclor 1260		15 <	2.0 <	3.4 <	1.7	2.2 <	1.8 <	2.2 <	1.7 <	1.2 <	2.1 <	1.2 <	1.3 <	2.9 <	1.5 <	2.9 <	1.3 <	2.4 <	3.9 <	3.3 <	2.1 <	2.6 <	1.6
PAH Compounds (EPA 8270)																							
Naphthalene		6.2	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
2-Methylnaphthalene		0.31	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
Acenaphthene		< 0.29	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
Acenaphthylene		< 0.29	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
Anthracene		< 0.29	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
Fluorene		< 0.29	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
Phenanthrene		0.35	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
Fluoranthene		0.62	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
Pyrene		1.2	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
Chrysene *		0.7	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
Benzo(a)anthracene *		0.42	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
Benzo(a)pyrene *		< 0.29	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
Benzo(b)fluoranthene *		< 0.29	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
Benzo(k)fluoranthene *		< 0.29	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
Dibenz(a,h)anthracene *		< 0.29	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
Indeno(1,2,3-cd)pyrene *		< 0.29	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
Benzo(g,h,i)perylene		< 0.29	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
Total PAH		**11.3**	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Total Carcinogenic PAH (*)		**0.252 (a)**	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc
Other Detected Semivolatile Organics																							
(EPA 8270)																							
bis(2-Ethylhexyl)phthalate		4.7	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
Carbazole		< 0.29	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
Dibenzofuran		< 0.29	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
4-Methylphenol		0.94	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt
Pentachlorophenol		< 1.5	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt	nt

Notes:
All concentrations on this page reported in mg/kg.
Tabulated raw analytical data (does not include calculated cPAH and dioxin/furan TEQ values) from ThermoRetec 1999a.
mg/kg = milligrams per kilogram
ng/kg = nanograms per kilogram
nt = not tested
nc = not calculated
TEQ = Toxicity Equivalent Quotient
(a) TEQ values calculated using MTCA Toxicity Equivalent Factor values in effect as of January 2008 (see Table 2).
Blue shading indicates soil removed during Parcel 2 Soil Cleanup Action
Blue outline = value exceeds MTCA Terrestrial Ecological Criteria only (criteria are in Table 1).
Red outline = value exceeds MTCA Terrestrial Ecological and Human Health Criteria, or Human Health Criteria only if no Terrestrial Ecological Criteria established or if Terrestrial Ecological Criteria are greater than the Human Health Criteria (criteria are in Table 1).
Preliminary cleanup levels are presented in Table 1.

TABLE 9
SOIL ANALYTICAL DETECTION SUMMARY, PORT PARCEL 2
FORMER SCOTT PAPER MILL SITE, ANACORTES, WASHINGTON

Parameter & Method	Location	Surface Soils				Pulp Tailings		Scott Tank Farm Area				Northern TPH Area			Soils with Ash or Debris			Sediments	Other Soils	
	Depth	RTP-14	RTP-30	RTP-38	RTP-6(a)	RTP-30	RTP-38	RTP-11	RTP-6(c)	RTP-7	RTP-10	RTP-13	RTP-14	RTP-12	RTP-16	RTP-9	RTP-9	RTP-38	RTP-33	RTP-32
		1.5 feet	1.5 feet	6.5 feet	1.5 feet	9.25 feet	13 feet	13 feet	7.5 feet	9.5 feet	10 feet	9.5 feet	10 feet	6 feet	4.5 feet	3.5 feet	9.5 feet	7.5 feet	7 feet	6 feet
	Observations	Gravels above geotextile	Gravels above geotextile	Gravels above geotextile	Surface soils	Tailings	Tailings	Free oily product in soils	Black oily coating on soils	Heavy black oily film on soil	Slight oily film on soils	Waxy film beneath tailings	Black soil staining	Wood debris & shells	Ash	Debris, nails & charcoal	Ash & possible hydrocarbon	Dredged sediments	Surge Pond Area	Sub-Surf. Soils
	Soil Layer	0 to 2.5 ft	0 to 2.5 ft	0 to 0.5 ft	Top 1.5 ft.			9 to 14 ft.		9.5 to 12 ft.	6 to 12 ft.	9.5 to 13	10 to 14							
	Date Sampled	9/8/98	9/10/98	9/9/98	9/1/98	9/10/98	9/9/98	9/2/98	9/1/98	9/1/98	9/2/98	9/8/98	9/8/98	9/3/98	9/8/98	9/10/98	9/10/98	9/9/98	9/9/98	9/3/98
Heavy Metals (EPA 6010 and 7000 series)																				
Antimony		< 5	< 5	< 5	< 5	< 20	< 20	< 10	< 20	nt	nt	< 20	nt	< 7	< 20	< 7	< 10	< 6	< 6	nt
Arsenic		< 5	< 5	< 5	< 5	< 20	< 20	< 10	< 20	nt	nt	< 20	nt	< 7	< 20	10 <	10	< 6	< 6	nt
Beryllium		0.2	0.2	0.2	< 0.1	< 0.4	< 0.4	< 0.2	< 0.3	nt	nt	< 0.4	nt	< 0.1	< 0.3	0.2 <	0.2	< 0.1	0.2	nt
Cadmium		< 0.2	< 0.2	< 0.2	0.2	< 0.8	< 0.8	1.4 <	0.7	nt	nt	< 0.7	nt	0.6	< 0.6	0.9 <	0.4	0.3	< 0.2	nt
Chromium		27.8	37.1	36	31.2	< 2	2	20	28	nt	nt	15	nt	34.4	32	54.9	36	22.4	36.6	nt
Copper		19.3	24.2	23.3	53.8	6.9	6.3	192	166	nt	nt	53.4	nt	66	84.8	107	75.8	18.6	13.8	nt
Lead		3	3	4	25	< 8	< 8	90	73	nt	nt	128	nt	36	43	32	18	10	5	nt
Mercury		< 0.05	< 0.05	< 0.05	0.13	< 0.2	< 0.2	< 0.1	< 0.08	nt	nt	< 0.2	nt	< 0.07	< 0.07	< 0.06	< 0.1	< 0.06	< 0.05	nt
Nickel		43	67	46	37	< 4	4	75	28	nt	nt	22	nt	42	33	69	39	28	19	nt
Selenium		< 5	< 5	< 5	< 5	< 20	< 20	10 <	20	nt	nt	< 20	nt	< 7	< 20	7 <	10	< 6	< 6	nt
Silver		< 0.3	0.4 <	0.3	< 0.3	< 1	< 1	< 0.7	< 1	nt	nt	< 1	nt	< 0.4	< 1	0.4 <	0.6	< 0.3	< 0.4	nt
Thallium		< 5	< 5	< 5	< 5	< 20	< 20	< 10	< 20	nt	nt	< 20	nt	< 7	< 20	7 <	10	< 6	< 6	nt
Zinc		34.9	41.1	42.6	66.9	13	7	325	124	nt	nt	115	nt	133	132	1710	121	47.2	37.4	nt
Petroleum Hydrocarbons (WTPH-d extended)																				
Diesel Range Hydrocarbons		< 5.3	< 5	13	98	1,600	500	42,000	440	30,000	3,000	7,800	8,190	60	18	93	140 J	32	< 9	< 9
Motor Oil		< 11	12	29	270	700	440	22,000	1,100	23,000	4,600	31,000	31,900	210	30	110	310 J	150	18	26
Interim TPH Policy Testing																				
Direct Ingestion Pathway		nt	nt	nt	nt	nt	nt	Fail	Pass	nt	nt	Fail	nt	nt	nt	nt	Pass	nt	nt	nt
Leaching to Groundwater Pathway		nt	nt	nt	nt	nt	nt	Pass	Pass	nt	nt	Pass	nt	nt	nt	nt	Pass	nt	nt	nt
Polychlorinated Biphenyls (EPA 8081)																				
Aroclor 1016		< 0.84	< 0.82	< 0.89	< 0.87	< 3.3	< 3.3	< 1.7	< 1.3	nt	nt	< 2.9	nt	< 1.1	< 1.4	< 1.1	< 1.7	< 1.0	< 0.95	nt
Aroclor 1221		< 1.7	< 1.6	< 1.8	< 1.7	< 6.6	< 6.5	< 3.4	< 2.6	nt	nt	< 5.8	nt	< 2.2	< 2.8	< 2.1	< 3.3	< 2.0	< 1.9	nt
Aroclor 1232		< 0.84	< 0.82	< 0.89	< 0.87	< 3.3	< 3.3	< 1.7	< 1.3	nt	nt	< 2.9	nt	< 1.1	< 1.4	< 1.1	< 1.7	< 1.0	< 0.95	nt
Aroclor 1242		< 0.84	< 0.82	< 0.89	< 0.87	< 3.3	< 3.3	< 1.7	< 1.3	nt	nt	< 2.9	nt	< 1.1	< 1.4	< 1.1	< 1.7	< 1.0	< 0.95	nt
Aroclor 1248		< 0.84	< 0.82	< 0.89	< 0.87	< 3.3	< 3.3	< 1.7	< 1.3	nt	nt	< 2.9	nt	< 1.1	< 1.4	< 1.1	< 1.7	< 1.0	< 0.95	nt
Aroclor 1254		< 0.84	< 0.82	< 0.89	< 0.87	< 3.3	< 3.3	< 1.7	< 1.3	nt	nt	< 2.9	nt	< 1.1	< 1.4	< 1.1	< 1.7	< 1.0	< 0.95	nt
Aroclor 1260		< 0.84	< 0.82	< 0.89	< 0.87	< 3.3	< 3.3	< 1.7	< 1.3	nt	nt	< 2.9	nt	< 1.1	< 1.4	< 1.1	< 1.7	< 1.0	< 0.95	nt
PAH Compounds (EPA 8270)																				
Naphthalene		< 0.07	< 0.069	< 0.075	< 0.073	< 0.27	0.8	4.7	0.18	nt	nt	< 0.71	nt	0.75	< 0.12	0.12 <	0.14	< 0.084	< 0.12	nt
2-Methylnaphthalene		< 0.07	< 0.069	< 0.075	< 0.073	< 0.27	0.8	61	0.48	nt	nt	< 0.71	nt	0.3	< 0.12	0.097	0.42	< 0.084	< 0.12	nt
Acenaphthene		< 0.07	< 0.069	< 0.075	< 0.073	< 0.27	0.8	12 <	0.11	nt	nt	< 0.71	nt	0.25	< 0.12 <	0.089 <	0.14	< 0.084	< 0.12	nt
Acenaphthylene		< 0.07	< 0.069	< 0.075	< 0.073	< 0.27	0.8	< 1.1	< 0.11	nt	nt	< 0.71	nt <	0.093	< 0.12 <	0.089 <	0.14	< 0.084	< 0.12	nt
Anthracene		< 0.07	< 0.069	< 0.075	< 0.073	< 0.27	0.8	7.9	< 0.11	nt	nt	< 0.71	nt	0.47	< 0.12 <	0.089 <	0.14	< 0.084	< 0.12	nt
Fluorene		< 0.07	< 0.069	< 0.075	< 0.073	< 0.27	0.8	21	< 0.11	nt	nt	< 0.71	nt	0.25	< 0.12 <	0.089 <	0.14	< 0.084	< 0.12	nt
Phenanthrene		< 0.07	< 0.069	< 0.075	< 0.073	< 0.27	0.8	33	0.23	nt	nt	< 0.71	nt	2	< 0.12	0.35 <	0.14	< 0.084	< 0.12	nt
Fluoranthene		< 0.07	< 0.069	< 0.075	0.12	< 0.27	0.8	3.4	< 0.11	nt	nt	< 0.71	nt	3.1	< 0.12	0.23 <	0.14	< 0.084	< 0.12	nt
Pyrene		< 0.07	< 0.069	< 0.075	0.076	< 0.27	0.8	18	< 0.11	nt	nt	< 0.71	nt	1.6	< 0.12	0.23 <	0.14	< 0.084	< 0.12	nt
Chrysene *		< 0.07	< 0.069	< 0.075	< 0.073	< 0.27	0.8	14	< 0.11	nt	nt	< 0.71	nt	0.98	< 0.12 <	0.089 <	0.14	< 0.084	< 0.12	nt
Benzo(a)anthracene *		< 0.07	< 0.069	< 0.075	< 0.073	< 0.27	0.8	10	< 0.11	nt	nt	< 0.71	nt	0.86	< 0.12 <	0.089 <	0.14	< 0.084	< 0.12	nt
Benzo(a)pyrene *		< 0.07	< 0.069	< 0.075	< 0.073	< 0.27	0.8	5.2	< 0.11	nt	nt	< 0.71	nt	0.56	< 0.12 <	0.089 <	0.14	< 0.084	< 0.12	nt
Benzo(b)fluoranthene *		< 0.07	< 0.069	< 0.075	< 0.073	< 0.27	0.8	3.3	< 0.11	nt	nt	< 0.71	nt	0.46	< 0.12 <	0.089 <	0.14	< 0.084	< 0.12	nt
Benzo(k)fluoranthene *		< 0.07	< 0.069	< 0.075	< 0.073	< 0.27	0.8	< 1.1	< 0.11	nt	nt	< 0.71	nt	0.51	< 0.12 <	0.089 <	0.14	< 0.084	< 0.12	nt
Dibenz(a,h)anthracene *		< 0.07	< 0.069	< 0.075	< 0.073	< 0.27	0.8	< 1.1	< 0.11	nt	nt	< 0.71	nt <	0.093	< 0.12 <	0.089 <	0.14	< 0.084	< 0.12	nt
Indeno(1,2,3-cd)pyrene *		< 0.07	< 0.069	< 0.075	< 0.073	< 0.27	0.8	< 1.1	< 0.11	nt	nt	< 0.71	nt	0.24	< 0.12 <	0.089 <	0.14	< 0.084	< 0.12	nt
Benzo(g,h,i)perylene		< 0.07	< 0.069	< 0.075	< 0.073	< 0.27	0.8	2.4	< 0.11	nt	nt	< 0.71	nt	0.28	< 0.12 <	0.089	0.19	< 0.084	< 0.12	nt
Total PAH		0.6	0.6	0.6	0.7	2.3	6.8	198.1	1.7	nc	nc	6.0	nc	12.7	1.0	1.6	1.7	0.7	1.0	nc
Total Carcinogenic PAH (*)		0.1	0.1	0.1	0.1	0.4	1.1	33.2	0.2	nc	nc	1.0	nc	0.781 (a)	0.2	0.1	0.2	0.1	0.2	nc
Other Detected Semivolatile Organics (EPA 8270)																				
bis(2-Ethylhexyl)phthalate		0.22	0.32	0.13	0.16	< 0.27	1.0	1.2	0.29	nt	nt	5.9	nt	0.19	0.54	0.23 <	0.14	< 0.084	< 0.12	nt
Carbazole		< 0.07	< 0.069	< 0.075	< 0.073	< 0.27	0.8	< 1.3	< 0.11	nt	nt	0.71	nt	0.13	< 0.12 <	0.089 <	0.14	< 0.084	< 0.12	nt
Dibenzofuran		< 0.07	< 0.069	< 0.075	< 0.073	< 0.27	0.8	6.8	< 0.11	nt	nt	< 0.71	nt	0.28	< 0.12 <	0.086 <	0.14	< 0.084	< 0.12	nt
4-Methylphenol		< 0.07	< 0.069	< 0.075	0.098	5.5	12	< 1.1	< 0.11	nt	nt	< 0.71	nt <	0.093	< 0.12 <	0.089 <	0.14	< 0.084	< 0.12	nt
Pentachlorophenol		< 0.35	< 0.34	< 0.37	< 0.36	2.6	7.0	< 5.3	< 0.54	nt	nt	< 3.6	nt <	0.16	< 0.58	0.46 <	0.69	< 0.42	< 0.6	nt

Notes:
All concentrations on this page reported in mg/kg.
Tabulated raw analytical data (does not include calculated cPAH and dioxin/furan TEQ values) from ThermoRetec 1999a.
mg/kg = milligrams per kilogram
ng/kg = nanograms per kilogram
nt = not tested
nc = not calculated
TEQ = Toxicity Equivalent Quotient
(a) TEQ values calculated using MTCA Toxicity Equivalent Factor values in effect as of January 2008 (see Table 2).
Blue shading indicates soil removed during Parcel 2 Soil Cleanup Action
Blue outline = value exceeds MTCA Terrestrial Ecological Criteria only (criteria are in Table 1).
Red outline = value exceeds MTCA Terrestrial Ecological and Human Health Criteria, or Human Health Criteria only if no Terrestrial Ecological Criteria established or if Terrestrial Ecological Criteria are greater than the Human Health Criteria (criteria are in Table 1).
Preliminary cleanup levels are presented in Table 1.

TABLE 9
SOIL ANALYTICAL DETECTION SUMMARY, PORT PARCEL 2
FORMER SCOTT PAPER MILL SITE
ANACORTES, WASHINGTON

	South Property Line	Gravels Over Geotextile			Other Surface	Pulp Tailings			Tank Farm	North Area	Ash in Soil		Dredged Sed.	South Area
Sample Identification:	B-10	RTP-38*	RTP-14	RTP-30	RTP-6A	RTP-25	RTP-38	RTP-30	RTP-11	RTP-13	RTP-16	RTP-9	RTP-38	RTP-33
Sample depth (feet below ground surface):	8	6.5	1.5	1.5	1.5	7.5	13	9.25	13	9.5	4.5	9.5	7.5	7
DIOXINS AND FURANS (ng/kg)														
Method EPA 8290														
DIOXINS														
2,3,7,8-TCDD	0.20 U	0.41 U	0.16 U	0.16 U	0.75 U	0.69 U	0.60 U	0.34 U	6.30	11.00 U	0.25	1.30 U	0.14	0.61 U
1,2,3,7,8-PeCDD	0.30 U	0.53 U	0.41 U	0.35 U	1.10 U	3.10	2.70	1.50	37.00	13.00 U	0.69	2.00	0.36 U	0.94 U
1,2,3,4,7,8-HxCDD	0.40 U	0.78 U	0.40 U	0.32 U	1.10	4.00	2.60	2.70	22.00	23.00 U	0.75	2.00	0.60 U	0.75 U
1,2,3,6,7,8-HxCDD	0.30	1.10 U	0.54 U	0.38 U	1.90	28.00	17.00	50.00	36.00	16.00	1.70	11.00	1.30 U	0.91 U
1,2,3,7,8,9-HxCDD	0.33	0.53 U	0.50 U	0.29 U	1.00	7.90	4.60	5.20	35.00	17.00 U	0.87	3.60 U	0.54	0.72 U
1,2,3,4,6,7,8-HpCDD	3.80	1.60	1.10	0.67	33.00	300.00	200.00	980.00	360.00	160.00	26.00	240.00	15.00	8.20
Octa-Dibenzodioxin	43.60	12.00	6.20	6.50	320.00	1200.00	1100.00	6800.00	3200.00 J	1500.00	230.00	2500.00	170.00	89.00
FURANS														
2,3,7,8-TCDF**	1.60	0.34	0.19 U	0.22	2.00	1.50	0.73	0.83	26.00	4.40	1.10	1.30	0.55	0.44
1,2,3,7,8-PeCDF	0.39	0.72 U	0.29 U	0.23 U	55.00 U, E	48.00 U	32.00 U	190.00 U	20.00	4.40	11.00 U	8.60 U	12.00 U	2.30 U
2,3,4,7,8-PeCDF	0.24 U	0.14 U	0.48 U	0.20 U	2.10	1.10	0.97	1.40 U	24.00	5.70	0.73	2.10	0.71	0.50 U
1,2,3,4,7,8-HxCDF	0.22	0.55	0.43	0.42	1.60	2.10	2.10	3.30	15.00	14.00 U	0.67	2.30 U	0.71	0.37
1,2,3,6,7,8-HxCDF	0.20 U	0.32	0.22 U	0.17	1.40	1.30	1.30	4.40	14.00	14.00 U	0.60	2.10 U	0.44 U	0.58 U
2,3,4,6,7,8-HxCDF	0.37	0.34	0.40	0.42 U	1.90	4.10	3.10	8.50	13.00	16.00 U	1.10	1.90	0.68	0.62
1,2,3,7,8,9-HxCDF	0.30 U	0.52 U	0.43 U	0.26 U	1.60	0.80	0.50	0.86	3.50	14.00 U	0.69 U	1.30	0.61 U	0.80 U
1,2,3,4,6,7,8-HpCDF	0.48 U	0.56	0.27	0.26 U	7.30	48.00	34.00	190.00	59.00	48.00	4.30	18.00	3.30	4.30
1,2,3,4,7,8,9-HpCDF	0.40 U	0.59 U	0.85 U	0.28 U	3.10 U	5.20	4.60	17.00	16.00 U	40.00 U	1.20 U	1.70	0.84 U	0.81 U
Octa-Dibenzofuran	1.60	0.80	0.68 U	0.39	32.00	330.00	110.00	580.00	90.00	120.00	9.60	68.00	9.20	8.40
Total Dioxins/Furans TEQ (human health)	**0.68**	**0.83**	**0.58**	**0.46**	**5.10**	**13.46**	**9.71**	**26.39**	**72.81**	**23.55**	**2.42**	**8.93**	**1.35**	**1.37**
Total Dioxins TEQ (mammals)	**0.4**	**0.6**	**0.4**	**0.3**	**2.25**	**10.8**	**7.8**	**19.3**	**57.2**	**17.7**	**1.6**	**7.3**	**0.7**	**1.0**
Total Furans TEQ (mammals)	**0.3**	**0.2**	**0.2**	**0.2**	**2.86**	**2.7**	**2.0**	**7.1**	**15.6**	**5.9**	**0.8**	**1.6**	**0.7**	**0.4**
Total Furans TEQ (birds)	**1.8**	**0.6**	**0.5**	**0.4**	**9.24**	**6.4**	**4.4**	**14.9**	**57.2**	**14.1**	**2.7**	**4.6**	**2.1**	**1.0**

Notes:
Tabulated raw analytical data (does not include calculated cPAH and dioxin/furan TEQ values) from ThermoRetec 1999a.
mg/kg = milligrams per kilogram
ng/kg = nanograms per kilogram
U = The analyte was analyzed for, but was not detected above the specified method reporting limit.
J = Data validation flag indicating the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
E = Raised detection limit.
* = Sample location was within preload area. Interval sampled represents surface gravels immediately beneath clean preload sediments.
** = Lab notes that this value may include contribution from other TCDF isomers.
TEQ = Toxicity Equivalent Quotient
TEQ values calculated using MTCA TEF values in effect as of January 2008 (see Table 2).
Blue shading indicates soil removed during Parcel 2 Soil Cleanup Action
Blue outline = value exceeds MTCA Terrestrial Ecological Criteria only (criteria are in Table 1).
Red outline = value exceeds MTCA Terrestrial Ecological and Human Health Criteria, or Human Health Criteria only if no Terrestrial Ecological Criteria established or if Terrestrial Ecological Criteria are greater than the Human Health Criteria (criteria are in Table 1).
Preliminary cleanup levels are presented in Table 1.

TABLE 10
SOIL ANALYTICAL DETECTION SUMMARY
PORT PARCEL 3
FORMER SCOTT PAPER MILL SITE
ANACORTES, WASHINGTON

	SOUTHERN PORTION OF PARK																			
	0-2 ft																			
	LAI-S-3 (0-6) HU75A 3/7/2005	LAI-S-3 (6-12) HU75B 3/7/2005	LAI-S-3 (12-18) HU75C 3/7/2005	LAI-S-3 (18-24) HU75D 3/7/2005	A1-Pump S-3 MTC 06/06/92	LAI-S-4 (0-6) HU75E 3/7/2005	LAI-S-4 (6-12) HU75F 3/7/2005	LAI-S-4 (12-18) HU75G 3/7/2005	LAI-S-4 (18-24) HU75H 3/7/2005	A1-Pump S-4 MTC 06/06/92	LAI-S-5 (0-6) HU75I 3/7/2005	LAI-S-5 (6-12) HU75J 3/7/2005	LAI-S-5 (12-18) HU75K 3/7/2005	LAI-S-5 (18-24) HU75L 3/7/2005	A1-Pump S-5 MTC 06/06/92	LAI-S-6 (0-6) HU75M 3/7/2005	LAI-S-6 (6-12) HU75N 3/7/2005	LAI-S-6 (12-18) HU75O 3/7/2005	LAI-S-6 (18-24) HU75P 3/7/2005	A1-Pump S-6 MTC 06/06/92	Earth Tech TP13-01 ARI 11/19/98
TOTAL METALS (mg/kg)																					
Method EPA 6000/7000 series																					
Arsenic	3.1	3.8	3.9	3.5	31.5 (a)	6.3	106	71	54	47.1 (a)	3.9	2.7	1.7	2.7	33.25 (a)	3.1	3.4	2.4	3.9	37.95	12
Cadmium	NA	NA	NA	NA	0.4	NA	NA	NA	NA	0.45	NA	NA	NA	NA	0.45	NA	NA	NA	NA	0.2	0.2 U
Copper	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	80.5	NA	NA	NA	NA	77	NA	NA	NA	NA	67	NA	NA	NA	NA	64.5	15
Mercury	NA	NA	NA	NA	0.3	NA	NA	NA	NA	0.25	NA	NA	NA	NA	0.2	NA	NA	NA	NA	0.7	0.05 U
Nickel	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	NA	NA	NA	NA	36.35	NA	NA	NA	NA	37.3	NA	NA	NA	NA	27	NA	NA	NA	NA	24.85	NA
TOTAL PETROLEUM HYDROCARBONS (mg/kg)																					
Method NWTPH-Dx (silica/acid gel cleanup)																					
Diesel-Range Petroleum Hydrocarbons	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Motor Oil-Range Petroleum Hydrocarbons	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TPH 418.1					161					25 U					233					301	NA
Diesel-Range Hydrocarbons (WTPH-D)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TPH Diesel (method unknown)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Motor Oil-Range Hydrocarbons (method unknown)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYCYCLIC AROMATIC HYDROCARBONS (µg/kg)																					
Method EPA 8270C-SIM																					
Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total cPAHs (TEQ)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
VOLATILES (µg/kg)																					
Method EPA 8260																					
Acetone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon Disulfide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
m,p-Xylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYCHLORINATED BIPHENYLS (µg/kg)																					
Method EPA 8082																					
Aroclor 1254	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DIOXINS AND FURANS (ng/kg)																					
Method EPA 8290																					
DIOXINS																					
2,3,7,8-TCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.26 U
1,2,3,7,8-PeCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.24 U
1,2,3,4,7,8-HxCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.35 U
1,2,3,6,7,8-HxCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.2 U
1,2,3,7,8,9-HxCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.2 U
1,2,3,4,6,7,8-HpCDD	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	24.3
Octa-Dibenzodioxin	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	116.6
FURANS																					
2,3,7,8-TCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.3
1,2,3,7,8-PeCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.3 U
2,3,4,7,8-PeCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.3 U
1,2,3,4,7,8-HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.4 U
1,2,3,6,7,8-HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.13 U
2,3,4,6,7,8-HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.19 U
1,2,3,7,8,9-HxCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.22 U
1,2,3,4,6,7,8-HpCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.2 U
1,2,3,4,7,8,9-HpCDF	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.32 U
Octa-Dibenzofuran	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.1 U
Total Dioxins/Furans TEQ (human health)																					**0.70**
Total Dioxins TEQ (mammals)																					**0.6**
Total Furans TEQ (mammals)																					**0.1**
Total Furans TEQ (birds)																					**0.5**

TABLE 10
SOIL ANALYTICAL DETECTION SUMMARY
PORT PARCEL 3
FORMER SCOTT PAPER MILL SITE
ANACORTES, WASHINGTON

	SOUTHERN PORTION OF PARK (continued)																	
	2-6 ft								2-6 ft		6-10 ft							
	LAI LSB-1,4-4.5 GM76A 04/01/04	LAI LSB-2,4-5 GM76E 04/01/04	LAI LSB-3,4-5 GM76M 04/02/04	LAI LSB-4,4-5 GM76O 04/02/04	LAI LSB-7,4-5 GM76I 04/02/04	LAI LSB-8,4-5 GM76K 04/02/04	Earth Tech TP11-05 ARI 11/19/98	Earth Tech TP12-04 ARI 11/19/98	Adv. Soil Mech. B-1-5.0 12/13/93	Adv. Soil Mech. B-2-5.0 12/13/93	LAI LSB-1,6-6.5 GM76B 04/01/04	LAI LSB-1,9-10 GM76C 04/01/04	LAI LSB-2,6-7 GM76F 04/01/04	LAI LSB-3,6-7 GM76N 04/02/04	LAI LSB-4,6-7 GM76P 04/02/04	LAI LSB-7,7-8 GM76J 04/02/04	LAI LSB-8,6-7 GM76L 04/02/04	Adv. Soil Mech. B-1-9.2 12/13/93
TOTAL METALS (mg/kg)																		
Method EPA 6000/7000 series																		
Arsenic	4.2	1.6	3.8	4.0	6.4	6.1	20 U	14	NA	NA	3.1	4.2	14	6.7	6.5	4.7	28	NA
Cadmium	0.7 U	0.2 U	1.4	0.2 U	0.8 U	0.8 U	0.6 U	1.1	NA	NA	1 U	0.5 U	7.0	1 U	1.3	1 U	2 U	NA
Copper	89.9	24.0	98.1	19.1	138	123	NA	NA	NA	NA	77	132	1040	90	85.6	28	855	NA
Lead	49	4	41	12	93	56	29	166	NA	NA	20	74	1610	30	187	20	2930	NA
Mercury	0.14	0.05 U	0.07 U	0.04 U	0.07 U	0.13	0.07 U	0.57	NA	NA	0.13	0.1 U	2.37	0.1 U	0.28	0.2 U	0.08	NA
Nickel	42	35	44	26	38	47	NA	NA	NA	NA	29	59	50	34	72	5 U	67	NA
Chromium	NA	NA	NA	NA	NA	NA	35	69.5	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL PETROLEUM HYDROCARBONS (mg/kg)																		
Method NWTPH-Dx (silica/acid gel cleanup)																		
Diesel-Range Petroleum Hydrocarbons	52	5.0 U	13	6.0	31	7.4	NA	NA	NA	NA	9.9	44	10000	5.0 U	120	11 U	30	NA
Motor Oil-Range Petroleum Hydrocarbons	260	10 U	20	32	210	59	NA	NA	NA	NA	48	140	54000	10 U	41 U	22	210	NA
TPH 418.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diesel-Range Hydrocarbons (WTPH-D)	NA	NA	NA	NA	NA	NA	19	88	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TPH Diesel (method unknown)	NA	NA	NA	NA	NA	NA	NA	NA	40 U	190	NA	NA	NA	NA	NA	NA	NA	58 U
Motor Oil-Range Hydrocarbons (method unknown)	NA	NA	NA	NA	NA	NA	66	190	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYCYCLIC AROMATIC HYDROCARBONS (µg/kg)																		
Method EPA 8270C-SIM																		
Naphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2300	NA	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5800	NA	NA	NA	NA	NA
Acenaphthylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	580	NA	NA	NA	NA	NA
Acenaphthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	710	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1800	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	10000	NA	NA	NA	NA	NA
Anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1600	NA	NA	NA	NA	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	6000	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	8200	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2400	NA	110 U	NA	NA	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3900	NA	140	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2100	NA	110 U	NA	NA	NA
Benzo(k)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1700	NA	110 U	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2000	NA	110 U	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	970	NA	110 U	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	320 U	NA	110 U	NA	NA	NA
Total cPAHs (TEQ)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2772	NA	84	NA	NA	NA
VOLATILES (µg/kg)																		
Method EPA 8260																		
Acetone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon Disulfide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
m,p-Xylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYCHLORINATED BIPHENYLS (µg/kg)																		
Method EPA 8082																		
Aroclor 1254	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	660	NA	190	NA	NA	NA
Aroclor 1260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	270	NA	54 U	NA	NA	NA
DIOXINS AND FURANS (ng/kg)																		
Method EPA 8290																		
DIOXINS																		
2,3,7,8-TCDD	0.26 J	0.190 U	0.200 U	0.91 J	0.91 J	0.92 J	0.39 U	0.33 U	NA	NA	0.26 J	4.7	10	0.38 U	3.2	0.200 U	5.0	NA
1,2,3,7,8-PeCDD	0.980 U	0.940 U	0.990 U	3.70 J	2.60 J	6.60	0.35 U	1.47 U	NA	NA	0.980 U	15.0	74	1.1 J	17.0	0.990 U	27.0	NA
1,2,3,4,7,8-HxCDD	0.980 U	0.940 U	0.990 U	2.90 J	1.50 J	4.00 J	0.49 U	2.63 U	NA	NA	0.980 U	8.5	32 J	1.1 J	12.0	0.990 U	18.0	NA
1,2,3,6,7,8-HxCDD	1.50 J	0.940 U	0.990 U	5.90	2.30 J	8.10	0.3 U	10.9 U	NA	NA	0.980 U	14.0	86	5.7	30.0	1.50 J	29.0	NA
1,2,3,7,8,9-HxCDD	0.980 U	0.940 U	0.990 U	4.60 J	1.60 J	5.20	0.3 U	3.6 U	NA	NA	0.980 U	11.0	47 J	1.8 J	14.0	0.990 U	17.0	NA
1,2,3,4,6,7,8-HpCDD	22.00	2.20 J	7.60	45.00	9.10	49.00	12.9	306.5	NA	NA	12.00	82.0	290	81.0	380.0	16.00	150.0	NA
Octa-Dibenzodioxin	210.00	13.00	78.00	230.00	34.00	130.00	149.0	1691.0	NA	NA	100.00	400.0	530	900.0	3800.0	100.00	420.0	NA
FURANS																		
2,3,7,8-TCDF	0.98	0.190 U	0.21 J	3.50	2.50	3.70	0.6 U	4.3	NA	NA	0.44 U	16.0	29	1.10 U	16 U	0.59 J	24.0	NA
1,2,3,7,8-PeCDF	0.980 U	0.940 U	0.990 U	2.70 J	1.50 J	1.3 U	0.3 U	15.2	NA	NA	0.980 U	10.0	1900 U	0.980 U	18 U	0.990 U	31 U	NA
2,3,4,7,8-PeCDF	1.10 J	0.940 U	0.990 U	4.70 J	2.80 J	15.00	0.4 U	7.2 U	NA	NA	0.980 U	14.0	460	1.4 J	16.0	0.990 U	29.0	NA
1,2,3,4,7,8-HxCDF	2.00 J	0.940 U	0.990 U	2.30 J	0.99 U	3.10 J	1.3	24.1 U	NA	NA	1.10 J	6.5 U	93	0.980 U	13 U	0.990 U	17.0	NA
1,2,3,6,7,8-HxCDF	0.980 U	0.940 U	0.990 U	2.50 J	1.20 J	4.00 J	0.44	5.24 U	NA	NA	0.980 U	7.2	93	0.980 U	13.0	0.990 U	20 U	NA
2,3,4,6,7,8-HxCDF	0.980 U	0.940 U	0.990 U	3.40 J	1.30 J	3.30 J	0.49 U	7.67 U	NA	NA	0.980 U	7.0	93	1.0 J	15.0	0.990 U	14.0	NA
1,2,3,7,8,9-HxCDF	0.980 U	0.940 U	0.990 U	1.000 U	0.99 U	1.50 J	0.55 U	8.54 U	NA	NA	0.980 U	1.8 U	42 J	0.980 U	4.9 J	0.990 U	5.6	NA
1,2,3,4,6,7,8-HpCDF	6.10	0.940 U	1.90 J	8.50	3.10 J	14.00	2.7	64.8	NA	NA	3.40 J	26.0	130	9.6	62.0	6.10	44.0	NA
1,2,3,4,7,8,9-HpCDF	0.980 U	0.940 U	0.990 U	1.10 J	0.99 U	1.30 J	0.64 U	4.39	NA	NA	0.980 U	2.1 J	24 J	1.2 J	7.5	0.990 U	5.0	NA
Octa-Dibenzofuran	8.70 J	1.900 U	3.90 J	9.10 J	4.20 J	13.00	7.8	163.4	NA	NA	5.30 J	28.0	33 J	24.0	120.0	2.50 J	38.0	NA
Total Dioxins/Furans TEQ (human health)	**2.14**	**1.09**	**1.25**	**9.28**	**5.67**	**16.02**	**0.95**	**10.31**			**1.53**	**32.21**	**306.61**	**4.08**	**41.28**	**1.52**	**56.75**	
Total Dioxins TEQ (mammals)	**1.3**	**0.7**	**0.8**	**6.47**	**4.2**	**9.8**	**0.6**	**5.3**			**1.0**	**24.0**	**103.6**	**3.2**	**30.7**	**1.0**	**40.0**	
Total Furans TEQ (mammals)	**0.9**	**0.4**	**0.4**	**2.8**	**1.5**	**6.2**	**0.3**	**5.0**			**0.5**	**8.2**	**203.0**	**0.9**	**10.5**	**0.5**	**16.7**	
Total Furans TEQ (birds)	**2.5**	**0.8**	**1.0**	**9.4**	**5.8**	**20.1**	**0.7**	**12.4**			**1.1**	**33.1**	**617.6**	**2.4**	**29.55**	**1.4**	**59.7**	

TABLE 10
SOIL ANALYTICAL DETECTION SUMMARY
PORT PARCEL 3
FORMER SCOTT PAPER MILL SITE
ANACORTES, WASHINGTON

	SOUTHERN PORTION OF PARK (continued)						NORTHERN PORTION OF PARK										
	10-15 ft			>15 ft			0-2 ft		2-6 ft		6-10 ft					10-15 ft	>15 ft
	LAI LSB-2,10-11 GM76G 04/01/04	LAI LSB-4,10-11 GM76Q 04/02/04	LAI LSB-4,14-15 GM76R 04/02/04	LAI LSB-1,18-19 GM76D 04/01/04	LAI LSB-2,17-18 GM76H 04/01/04	Adv. Soil Mech. B-2-16.0 12/13/93	Earth Tech TP14-0.5 ARI 11/19/98	Earth Tech TP16-02 ARI 11/19/98	LAI MW-106,4-5 GM58I 03/31/04	Earth Tech TP15-03 ARI 11/19/98	LAI MW-105,6-7 GM58E 03/31/04	LAI MW-105,7-8 GM58F 03/31/04	LAI MW-105,8-9 GM58G 03/31/04	LAI MW-106,7-8 GM58J 03/31/04	LAI MW-106,9-10 GM58K 03/31/04	LAI MW-106,14-15 GM58L 03/31/04	LAI MW-105,15-16 GM58H 03/31/04
TOTAL METALS (mg/kg)																	
Method EPA 6000/7000 series																	
Arsenic	17	14	1.5	5.8	4.3	NA	16	7	19	6 U	6.9	2.3	3.5	7.5	7.5	4.0	5.4
Cadmium	3.8	5	0.9 U	0.9	1.8	NA	0.2 U	0.3	0.7	0.2 U	0.6 U	0.9 U	1 U	1.0	0.8 U	1 U	0.7
Copper	145	536	24.8	19.7	91.2	NA	NA	NA	46.1	NA	333	22.7	41	322	94.4	80	10.1
Lead	206	60	12	4	215	NA	22	37	21	13	225	13	30	81	94	80	3 U
Mercury	0.4	0.3	0.2 U	0.05 U	0.6	NA	0.05 U	0.08	0.10	0.05 U	0.5	0.2 U	0.4	0.2	0.2	0.2 U	0.05 U
Nickel	23	65	5 U	30	18	NA	NA	NA	44	NA	38	7	13	17	21	8	15
Chromium	NA	NA	NA	NA	NA	NA	26.7	40	NA	34.3	NA	NA	NA	NA	NA	NA	NA
TOTAL PETROLEUM HYDROCARBONS (mg/kg)																	
Method NWTPH-Dx (silica/acid gel cleanup)																	
Diesel-Range Petroleum Hydrocarbons	670	130	120	5 U	2600	NA	NA	NA	8.3	NA	7.4 U	30	7.0	1600	320	260	5.0 U
Motor Oil-Range Petroleum Hydrocarbons	4200	170	260	10 U	12000	NA	NA	NA	31	NA	18	53	29	7500	850	670	10 U
TPH 418.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diesel-Range Hydrocarbons (WTPH-D)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TPH Diesel (method unknown)	NA	NA	NA	NA	NA	35 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Motor Oil-Range Hydrocarbons (method unknown)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYCYCLIC AROMATIC HYDROCARBONS (µg/kg)																	
Method EPA 8270C-SIM																	
Naphthalene	210 U	NA	NA	NA	380	NA	NA	NA	NA	NA	NA	98 U	NA	180 U	NA	NA	NA
2-Methylnaphthalene	400	NA	NA	NA	2000	NA	NA	NA	NA	NA	NA	98 U	NA	180 U	NA	NA	NA
Acenaphthylene	210 U	NA	NA	NA	250 U	NA	NA	NA	NA	NA	NA	98 U	NA	180 U	NA	NA	NA
Acenaphthene	210 U	NA	NA	NA	250 U	NA	NA	NA	NA	NA	NA	98 U	NA	180 U	NA	NA	NA
Fluorene	210 U	NA	NA	NA	400	NA	NA	NA	NA	NA	NA	98 U	NA	180 U	NA	NA	NA
Phenanthrene	670	NA	NA	NA	1600	NA	NA	NA	NA	NA	NA	98 U	NA	180 U	NA	NA	NA
Anthracene	210 U	NA	NA	NA	250 U	NA	NA	NA	NA	NA	NA	98 U	NA	180 U	NA	NA	NA
Fluoranthene	830	NA	NA	NA	650	NA	NA	NA	NA	NA	NA	98 U	NA	180 U	NA	NA	NA
Pyrene	790	NA	NA	NA	1200	NA	NA	NA	NA	NA	NA	98 U	NA	180 U	NA	NA	NA
Benzo(a)anthracene	270	NA	NA	NA	420	NA	NA	NA	NA	NA	NA	98 U	NA	180 U	NA	NA	NA
Chrysene	380	NA	NA	NA	680	NA	NA	NA	NA	NA	NA	98 U	NA	200	NA	NA	NA
Benzo(b)fluoranthene	350	NA	NA	NA	250 U	NA	NA	NA	NA	NA	NA	98 U	NA	180 U	NA	NA	NA
Benzo(k)fluoranthene	250	NA	NA	NA	250 U	NA	NA	NA	NA	NA	NA	98 U	NA	180 U	NA	NA	NA
Benzo(a)pyrene	330	NA	NA	NA	280	NA	NA	NA	NA	NA	NA	98 U	NA	180 U	NA	NA	NA
Indeno(1,2,3-cd)pyrene	210 U	NA	NA	NA	250 U	NA	NA	NA	NA	NA	NA	98 U	NA	180 U	NA	NA	NA
Dibenz(a,h)anthracene	210 U	NA	NA	NA	250 U	NA	NA	NA	NA	NA	NA	98 U	NA	180 U	NA	NA	NA
Total cPAHs (TEQ)	442	NA	NA	NA	379	NA	NA	NA	NA	NA	NA	98 U	NA	137	NA	NA	NA
VOLATILES (µg/kg)																	
Method EPA 8260																	
Acetone	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Carbon Disulfide	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
m,p-Xylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYCHLORINATED BIPHENYLS (µg/kg)																	
Method EPA 8082																	
Aroclor 1254	170 U	NA	NA	NA	120 U	NA	NA	NA	NA	NA	NA	160 U	NA	120 U	NA	NA	NA
Aroclor 1260	170 U	NA	NA	NA	120 U	NA	NA	NA	NA	NA	NA	160 U	NA	120 U	NA	NA	NA
DIOXINS AND FURANS (ng/kg)																	
Method EPA 8290																	
DIOXINS																	
2,3,7,8-TCDD	2.1	1.2	0.41 U	0.27 U	4.2 J	NA	0.25 U	0.29 U	0.23 U	0.27 U	1.1	0.76 J	0.43 J	0.87 U	1.20 U	1.10 U	0.200 U
1,2,3,7,8-PeCDD	15.0	5.9	0.98 U	0.96 U	24.0 J	NA	0.28 U	0.18 U	0.99 U	0.17 U	3.4 J	2.20 J	1.40 J	3.1 J	3.8 J	1.00 U	0.980 U
1,2,3,4,7,8-HxCDD	5.5	4.4 J	0.98 U	0.96 U	10.00 U	NA	0.54 U	0.29 U	0.99 U	0.23 U	2.8 J	1.000 U	0.99 U	2.1 J	2.6 J	1.00 U	0.980 U
1,2,3,6,7,8-HxCDD	14.0	12.0	0.98 U	0.96 U	27.0 J	NA	0.3 U	0.3	1.20 J	0.1 U	8.0	3.30 J	3.90 J	5.9	7.2	1.3 J	0.980 U
1,2,3,7,8,9-HxCDD	7.8	5.8	0.98 U	0.96 U	16.0 J	NA	0.4 U	0.2 U	0.99 U	0.2 U	3.2 J	1.70 J	1.40 J	3.8 J	4.7 J	1.0 U	0.980 U
1,2,3,4,6,7,8-HpCDD	46.0	120.0	3.5 J	0.96 U	80.0	NA	32.0	2.2	33.00	3.0	140.0	54.00	67.00	110.0	94.0	14.0	0.980 U
Octa-Dibenzodioxin	150.0	720.0	20.0	1.90 U	240.0	NA	769.5	10.2	270.00	235.6	1200.0	360.00	470.00	660.0 J	640.0	93.0	3.20 J
FURANS																	
2,3,7,8-TCDF	11.0	4.1	0.54 U	0.29 U	9.4 J	NA	0.7	1.1	0.49 J	0.2 U	5.1	2.70	1.30	0.38 U	3.8	3.5	0.200 U
1,2,3,7,8-PeCDF	20 U	34 U	0.98 U	0.96 U	920 U	NA	0.3 U	0.3 U	0.99 U	0.2 U	1.3 J	1.20 J	0.99 U	3.4 U	5.3	1.1 J	0.980 U
2,3,4,7,8-PeCDF	35.0	5.5	0.98 U	0.96 U	280.0	NA	0.3 U	0.8 U	1.10 J	0.2 U	3.6 J	1.70 J	2.00 J	2.7 U	3.5 J	1.2 J	0.980 U
1,2,3,4,7,8-HxCDF	11.0	4.2 J	0.98 U	0.96 U	41.0 J	NA	3.3 U	4.3 U	1.4 U	0.1 U	4.3 J	1.10 J	3.20 J	2.5 J	7.1 U	1.2 U	0.980 U
1,2,3,6,7,8-HxCDF	13.0	3.5 J	0.98 U	0.96 U	45.0 J	NA	0.35 U	0.98 U	0.99 U	0.09 U	2.2 J	1.000 U	1.70 J	1.1 J	3.1 J	1.00 U	0.980 U
2,3,4,6,7,8-HxCDF	11.0	3.1 J	0.98 U	0.96 U	43.0 J	NA	0.51 U	3.45	0.99 U	0.13 U	2.9 J	1.00 J	1.70 J	2.1 J	2.3 J	1.00 U	0.980 U
1,2,3,7,8,9-HxCDF	5.5	2.8 J	0.98 U	0.96 U	18.0 J	NA	0.57 U	0.37 U	0.99 U	0.14 U	0.990 U	1.000 U	0.99 U	1.00 U	1.4 J	1.00 U	0.980 U
1,2,3,4,6,7,8-HpCDF	22.0	43.0	2.2 J	0.96 U	56.0	NA	1.5	1.3	7.80	0.3 U	60.0	20.00	29.00	27.0	30.0	4.9 J	0.980 U
1,2,3,4,7,8,9-HpCDF	3.1 J	2.4 J	0.98 U	0.96 U	10.00 U	NA	0.53 U	0.22 U	0.99 U	0.35 U	3.7 J	1.000 U	1.50 J	1.9 U	2.6 J	1.00 U	0.980 U
Octa-Dibenzofuran	11.0	59.0	9.6 J	1.90 U	20.00 U	NA	4.3	0.6	12.00	0.2 U	160.0	34.00	42.00	54.0	52.0	6.9 J	2.000 U
Total Dioxins/Furans TEQ (human health)	**36.54**	**15.14**	**1.30**	**1.14**	**147.93**		**1.25**	**1.19**	**1.94**	**0.41**	**10.96**	**5.50**	**4.99**	**7.40**	**9.95**	**2.46**	**1.12**
Total Dioxins TEQ (mammals)	**20.3**	**10.7**	**0.9**	**0.8**	**33.9**		**0.9**	**0.3**	**1.2**	**0.3**	**7.7**	**4.2**	**3.2**	**6.0**	**7.0**	**1.4**	**0.7**
Total Furans TEQ (mammals)	**16.2**	**4.4**	**0.4**	**0.4**	**114.1**		**0.4**	**0.9**	**0.7**	**0.1**	**3.3**	**1.3**	**1.8**	**1.4**	**3.0**	**1.0**	**0.4**
Total Furans TEQ (birds)	**51.3**	**13.1**	**1.0**	**0.9**	**350.7**		**1.2**	**2.1**	**1.9**	**0.2**	**10.47**	**5.0**	**4.4**	**2.6**	**9.2**	**5.1**	**0.8**

TABLE 10
SOIL ANALYTICAL DETECTION SUMMARY
PORT PARCEL 3
FORMER SCOTT PAPER MILL SITE
ANACORTES, WASHINGTON

	PARK PAVED AREA													"R" AVENUE / SEAFARER'S WAY			
	2-6 ft			6-10 ft					10-15 ft				>15 ft		2-6 ft		6-10 ft	10-15 ft
	LAI LSB-5,4-5 GM58O 03/31/04	LAI LSB-6,4-5 GM58T 03/31/04	ENSR B-13-3.5-5 ATI 06/16/93	LAI LSB-5,7-8 GM58P 03/31/04	LAI LSB-5,9-10 GM58Q 03/31/04	LAI LSB-6,6-7 GM58U 03/31/04	ENSR B-13-6.0-7.5 ATI 06/16/93	ENSR B-13-8.5-10.0 ATI 06/16/93	LAI LSB-5,10-11 GM58R 03/31/04	LAI LSB-5,14-15 GM58S 03/31/04	LAI LSB-6,14-15 GM58V 03/31/04	ENSR B-14-10-11.5 ATI 06/17/93	ENSR B-7-18 ATI 03/15/93	ENSR B-14-28.5-30 ATI 06/17/93	LAI MW-102,5-6 GM58A 03/30/04	ENSR B-8-4 ATI 03/16/93	LAI MW-102,9-10 GM58B 03/30/04	Earth Tech TP04-11 ARI 11/17/98
TOTAL METALS (mg/kg)																		
Method EPA 6000/7000 series																		
Arsenic	2.5	4.1	NA	4.4	8	9.6	NA	NA	6.4	11	4.4	NA	0.73	NA	25	8.2	19	5 U
Cadmium	1 U	0.7 U	NA	0.8 U	0.8 U	0.9 U	NA	NA	1 U	2.6	0.6 U	NA	1.6 U	NA	0.4	2.6 U	0.3 U	0.2 U
Copper	52	54.4	NA	63.6	76.0	139	NA	NA	84	26.6	54.5	NA	35	NA	38.9	300	47.3	NA
Lead	10 U	9	NA	18	12	69	NA	NA	40	257	37	NA	4.5	NA	71	540	28	3
Mercury	0.06 U	0.05 U	NA	0.07 U	0.08 U	0.07 U	NA	NA	0.1	0.2 U	0.1 U	NA	0.11 U	NA	0.08	2.4	0.07	0.06 U
Nickel	39	28	NA	31	43	29	NA	NA	46	12	23	NA	34	NA	100	55	35	NA
Chromium	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	33	NA	NA	50	NA	24.4
TOTAL PETROLEUM HYDROCARBONS (mg/kg)																		
Method NWTPH-Dx (silica/acid gel cleanup)																		
Diesel-Range Petroleum Hydrocarbons	5.0 U	5.0 U	NA	8.3	9.0	14	NA	NA	1300	1700	98	NA	NA	NA	NA	NA	NA	NA
Motor Oil-Range Petroleum Hydrocarbons	14	10 U	NA	32	13	72	NA	NA	1900	4200	670	NA	NA	NA	NA	NA	NA	NA
TPH 418.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diesel-Range Hydrocarbons (WTPH-D)	NA	NA	19 U	NA	NA	NA	54	1600	NA	NA	NA	4900	12 U	13 U	NA	NA	NA	NA
TPH Diesel (method unknown)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Motor Oil-Range Hydrocarbons (method unknown)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POLYCYCLIC AROMATIC HYDROCARBONS (µg/kg)																		
Method EPA 8270C-SIM																		
Naphthalene	8.5 U	23	160 U	10 U	20	57 U	NA	340	57 U	160 U	23 U	NA	0.19 U	NA	72	350 U	8.4 U	NA
2-Methylnaphthalene	8.5 U	10 U	330 U	10 U	64	57 U	NA	330 U	440	160 U	23 U	NA	0.19 U	NA	13	350 U	8.4 U	NA
Acenaphthylene	8.5 U	10 U	330 U	10 U	15 U	57 U	NA	330 U	57 U	160 U	23 U	NA	0.19 U	NA	20	300 J	8.4 U	NA
Acenaphthene	8.5 U	10 U	330 U	10 U	15 U	57 U	NA	330 U	86	160 U	23 U	NA	0.19 U	NA	13	350 U	8.4 U	NA
Fluorene	8.5 U	10 U	33 U	10 U	17	57 U	NA	33 U	140	160 U	23 U	NA	0.19 U	NA	17	350 U	8.4 U	NA
Phenanthrene	8.5 U	10 U	16 U	11	20	86	NA	460 B	480	160 U	33	NA	0.19 U	NA	140	970	8.4 U	NA
Anthracene	8.5 U	10 U	16 U	10 U	15 U	57 U	NA	70	130	160 U	23 U	NA	0.19 U	NA	24	240 J	8.4 U	NA
Fluoranthene	8.5 U	10 U	33 U	10 U	15 U	69	NA	1500	120	160 U	40	NA	0.19 U	NA	240	1800	19	NA
Pyrene	8.5 U	10 U	33 U	10 U	15 U	69	NA	1800	600	190	35	NA	0.19 U	NA	180	1900	16	NA
Benzo(a)anthracene	8.5 U	10 U	33 U	10 U	15 U	57 U	NA	810	200	160 U	23 U	NA	0.19 U	NA	74	940	8.4 U	NA
Chrysene	8.5 U	10 U	33 U	10 U	15 U	57 U	NA	750	460	160 U	23 U	NA	0.19 U	NA	83	1200	8.4 U	NA
Benzo(b)fluoranthene	8.5 U	10 U	33 U	10 U	15 U	57 U	NA	830	66	160 U	23 U	NA	0.19 U	NA	67	1400	8.4 U	NA
Benzo(k)fluoranthene	8.5 U	10 U	33 U	10 U	15 U	57 U	NA	440	66	160 U	26	NA	0.19 U	NA	80	560	8.4 U	NA
Benzo(a)pyrene	8.5 U	10 U	33 U	10 U	15 U	57 U	NA	1000	180	160 U	35	NA	0.19 U	NA	83	1100	8.4 U	NA
Indeno(1,2,3-cd)pyrene	8.5 U	10 U	33 U	10 U	15 U	57 U	NA	120	57 U	160 U	23 U	NA	0.19 U	NA	33	720	8.4 U	NA
Dibenz(a,h)anthracene	8.5 U	10 U	65 U	10 U	15 U	57 U	NA	67 U	57 U	160 U	23 U	NA	0.19 U	NA	9.4	350 U	8.4 U	NA
Total cPAHs (TEQ)	8.5 U	10 U	33 U	10 U	15 U	57 U	NA	1231	224	160 U	42	NA	0.19 U	NA	110	1492	8.4 U	NA
VOLATILES (µg/kg)																		
Method EPA 8260																		
Acetone	NA	NA	NA	66	15		NA	NA	16	100	NA	NA	NA	NA	NA	NA	NA	NA
Carbon Disulfide	NA	NA	NA	4.5	1.4 U		NA	NA	1.7 U	4.9 U	NA	NA	NA	NA	NA	NA	NA	NA
m,p-Xylene	NA	NA	NA	5.0	1.4 U		NA	NA	1.7 U	9.5	NA	NA	NA	NA	NA	NA	NA	NA
POLYCHLORINATED BIPHENYLS (µg/kg)																		
Method EPA 8082																		
Aroclor 1254	43 U	51 U	NA	51 U	77 U	58 U	NA	NA	58 U	170 U	120 U	NA	NA	NA	NA	NA	NA	NA
Aroclor 1260	43 U	51 U	NA	51 U	77 U	58 U	NA	NA	58 U	170 U	120 U	NA	NA	NA	NA	NA	NA	NA
DIOXINS AND FURANS (ng/kg)																		
Method EPA 8290																		
DIOXINS																		
2,3,7,8-TCDD	0.200 U	0.200 U	NA	0.250 U	0.200 U	4.8	NA	NA	0.55 U	2.30 U	1.1	NA	NA	NA	NA	NA	NA	0.13 U
1,2,3,7,8-PeCDD	0.990 U	1.000 U	NA	0.990 U	1.000 U	21.0	NA	NA	0.97 U	1.7 J	3.6 J	NA	NA	NA	NA	NA	NA	0.12 U
1,2,3,4,7,8-HxCDD	0.990 U	1.000 U	NA	0.990 U	1.000 U	11.0	NA	NA	0.97 U	1.20 U	1.8 J	NA	NA	NA	NA	NA	NA	0.17 U
1,2,3,6,7,8-HxCDD	0.990 U	1.000 U	NA	0.990 U	2.10 J	23.0	NA	NA	1.00 J	1.6 J	3.9 J	NA	NA	NA	NA	NA	NA	0.2 U
1,2,3,7,8,9-HxCDD	0.990 U	1.000 U	NA	0.990 U	1.000 U	15.0	NA	NA	1.20 J	1.2 J	2.2 J	NA	NA	NA	NA	NA	NA	0.1 U
1,2,3,4,6,7,8-HpCDD	2.30 J	1.50 J	NA	2.90 J	55.00	150.0	NA	NA	15.00	19.0	19.0	NA	NA	NA	NA	NA	NA	0.2 U
Octa-Dibenzodioxin	27.00	8.30 J	NA	45.00	530.00	360.0	NA	NA	110.00	82.0	64.0	NA	NA	NA	NA	NA	NA	1.0 U
FURANS																		
2,3,7,8-TCDF	0.200 U	0.32 J	NA	0.200 U	0.27 J	14.0	NA	NA	1.00	2.2	3.4	NA	NA	NA	NA	NA	NA	0.2 U
1,2,3,7,8-PeCDF	0.990 U	1.000 U	NA	0.990 U	1.000 U	13 U	NA	NA	0.97 U	1.70 U	1.3 J	NA	NA	NA	NA	NA	NA	0.1 U
2,3,4,7,8-PeCDF	0.990 U	1.000 U	NA	0.990 U	1.000 U	13.0	NA	NA	0.97 U	1.20 U	2.6 J	NA	NA	NA	NA	NA	NA	0.1 U
1,2,3,4,7,8-HxCDF	0.990 U	1.000 U	NA	0.990 U	1.000 U	3.9 J	NA	NA	0.97 U	1.00 U	0.970 U	NA	NA	NA	NA	NA	NA	0.1 U
1,2,3,6,7,8-HxCDF	0.990 U	1.000 U	NA	0.990 U	1.000 U	6.0	NA	NA	0.97 U	1.00 U	0.970 U	NA	NA	NA	NA	NA	NA	0.08 U
2,3,4,6,7,8-HxCDF	0.990 U	1.000 U	NA	0.990 U	1.000 U	6.8	NA	NA	1.20 J	1.2 J	1.1 J	NA	NA	NA	NA	NA	NA	0.09 U
1,2,3,7,8,9-HxCDF	0.990 U	1.000 U	NA	0.990 U	1.000 U	1.7 J	NA	NA	0.97 U	1.00 U	0.970 U	NA	NA	NA	NA	NA	NA	0.10 U
1,2,3,4,6,7,8-HpCDF	0.990 U	1.000 U	NA	0.990 U	4.40 J	12.0	NA	NA	7.80	5.9	3.3 J	NA	NA	NA	NA	NA	NA	0.1 U
1,2,3,4,7,8,9-HpCDF	0.990 U	1.000 U	NA	0.990 U	1.000 U	1.5 J	NA	NA	0.97 U	1.00 U	0.970 U	NA	NA	NA	NA	NA	NA	0.12 U
Octa-Dibenzofuran	2.000 U	2.000 U	NA	2.000 U	12.00	11.0	NA	NA	8.70 J	7.0 J	5.6 J	NA	NA	NA	NA	NA	NA	0.2 U
Total Dioxins/Furans TEQ (human health)	**1.16**	**1.17**		**1.19**	**2.06**	**39.78**			**1.82**	**4.17**	**7.15**							**0.20**
Total Dioxins TEQ (mammals)	**0.8**	**0.8**		**0.8**	**1.6**	**32.3**			**1.2**	**3.4**	**5.7**							**0.2**
Total Furans TEQ (mammals)	**0.4**	**0.4**		**0.4**	**0.4**	**7.5**			**0.6**	**0.8**	**1.5**							**0.0**
Total Furans TEQ (birds)	**0.9**	**1.1**		**0.9**	**1.1**	**29.6**			**1.9**	**3.2**	**6.4**							**0.2**

Notes:

Tabulated raw analytical data (does not include calculated cPAH and dioxin/furan TEQ values) from Landau Associates et al. 2006.

mg/kg = milligrams per kilogram

µg/kg = micrograms per kilogram

ng/kg = nanograms per kilogram

NA = Not analyzed.

J = Indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

U = Indicates the compound was undetected at the reported concentration.

TEQ = Toxicity Equivalent Quotient

cPAH and dioxin/furan TEQ values for samples with at least one positive cPAH or dioxin/furan detection were calculated using MTCA TEF values in effect as of January 2008 (see Table 2).

Blue outline = value exceeds MTCA Terrestrial Ecological Criteria only (criteria are in Table 1).

Red outline = value exceeds MTCA Terrestrial Ecological and Human Health Criteria, or Human Health Criteria only if no Terrestrial Ecological Criteria established or if Terrestrial Ecological Criteria are greater than the Human Health Criteria (criteria are in Table 1).

(a) This datum is not used in the Remedial Investigation because of concerns over accuracy of arsenic analysis results.

Preliminary cleanup levels are presented in Table 1.

TABLE 11
SOIL ANALYTICAL RESULTS[1]
MJB North Area
Anacortes, Washington

Concentrations in ppm (mg/kg)

	Sample ID	MTCA Method B Cleanup Level Protective of Direct Human Contact	MTCA Method B Protective of Groundwater as Marine Surface Water	MTCA Method B Cleanup Level Protective of Terrestrial Ecological Receptors	Preliminary Soil Cleanup Level	RI-TP-1-1.5	RI-TP-1-3.0	RI-TP-1-7.0	RI-TP-2-3.5	RI-TP-3-5.0	RI-TP-4-1.0	RI-TP-4-4.5	RI-TP-5-5.5	RI-TP-6-0.0	RI-TP-6-6.0	RI-TP-7-5.5
	Sample Depth (feet bgs)					1.5 to 2.5	3 to 4	7 to 10	3.5 to 4.5	5 to 7	1 to 2	4.5 to 6.5	5.5 to 8	0 to 1	6 to 8	5.5 to 6.5
	Date Sampled					7/12/2005	7/12/2005	7/12/2005	7/12/2005	7/12/2005	7/12/2005	7/12/2005	7/12/2005	7/12/2005	7/12/2005	7/12/2005
Total Metals	Antimony	**32**	**580**	--[14]	**32**	--	30U	20U	--	6U	5U	--	7U	10U	--	6U
	Arsenic	**20**[15]	**20**[15]	**20**	**20**	--	6.8	20U	--	6U	5U	--	7U	10	--	6U
	Cadmium	**80**	**1.2**	**25**	**25**	--	1U	0.9U	--	0.2U	0.2U	--	0.3U	0.5U	--	0.2U
	Chromium	**120,000**	**1,000,000**	**42**[16]	**117**	--	24	44	--	35	27.5	--	30.5	61	--	30
	Hexavalent Chromium	**240**	**19**	**42**[16]	**117**	--	--	--	--	--	--	--	--	0.118UJ	--	--
	Copper	**2,960**	**1.4**	**100**	**100**	--	70	**109**	--	30.1	30.3	--	39.1	91.8	--	30.1J
	Lead	**250**[15]	**1600**	**220**	**220**	--	57	104	27	2.7	2.7	4	27	10	14	8
	Mercury	**24**	**0.026**	**9**	**9**	--	0.06U	0.08	--	0.05U	0.05U	--	0.06U	0.27	--	0.06U
	Thallium	**5.6**	**0.67**	--	**5.6**	--	--	--	--	--	--	--	--	--	--	--
	Zinc	**24,000**	**101**	**270**	**270**	--	168	206	--	44.9	43.5	--	68.3	134	--	54.3
TPH-D[4]		**2000**[15]	**2000**[15]	**460**	**460**	40	--	--	--	--	--	--	--	--	--	--
TPH-HO[4]		**2000**[15]	**2000**[15]	--	**2,000**	38	--	--	--	--	--	--	--	--	--	--
PCBs[3]		**1.0**[15]	--	**2,000**	**1**	--	--	0.032U	--	--	--	--	--	--	--	--
SVOCs	4-Methylphenol	**400**	--	--	**400**	--	--	0.065U	--	--	--	--	--	--	0.064U	--
	Phenol	**48,000**	**5,100**	--	**48,000**	--	--	0.065U	--	--	--	--	--	--	0.064U	--
PAHs[5]	2-Chloronapththalene	**6,400**	**37**	--	**6400**	--	--	0.065U	--	--	--	--	--	--	0.064U	--
	2-Methylnapththalene	--	--	--	--	--	--	0.065U	--	--	--	--	--	--	0.1	--
	Carbazole	**50**	--	--	**50**	--	--	0.065U	--	--	--	--	--	--	0.064U	--
	Dibenzofuran	**160**	--	--	**160**	--	--	0.065U	--	--	--	--	--	--	0.15	--
	Naphthalene	**1,600**	**138**	--	**1,600**	--	--	0.065U	--	--	--	--	--	--	0.21	--
	Acenaphthylene	--	--	--	--	--	--	0.065U	--	--	--	--	--	--	0.064U	--
	Acenaphthene	**4,800**	**66**	--	**4,800**	--	--	0.065U	--	--	--	--	--	--	0.43	--
	Fluorene	**3,200**	**550**	--	**3,200**	--	--	0.065U	--	--	--	--	--	--	0.27	--
	Phenanthrene	--	--	--	--	--	--	0.065U	--	--	--	--	--	--	0.68	--
	Anthracene	**24,000**	**12,000**	--	**24,000**	--	--	0.065U	--	--	--	--	--	--	0.088	--
	Fluoranthene	**3,200**	**89**	--	**3,200**	--	--	0.065U	--	--	--	--	--	--	0.46	--
	Pyrene	**2,400**	**3,400**	--	**2,400**	--	--	0.065U	--	--	--	--	--	--	0.22	--
	Benzo(g,h,i)perylene	--	--	--	--	--	--	0.065U	--	--	--	--	--	--	0.064U	--
	Benzo(a)pyrene	**See total cPAHs**	**0.35**	--	**See total cPAHs**	--	--	0.065U	--	--	--	--	--	--	0.064U	--
	Benzo(a)anthracene	**See total cPAHs**	**0.13**	--	**See total cPAHs**	--	--	0.065U	--	--	--	--	--	--	0.094	--
	Benzo(b)fluoranthene	**See total cPAHs**	**0.44**	--	**See total cPAHs**	--	--	0.065U	--	--	--	--	--	--	0.064U	--
	Benzo(k)fluoranthene	**See total cPAHs**	**0.44**	--	**See total cPAHs**	--	--	0.065U	--	--	--	--	--	--	0.064U	--
	Chrysene	**See total cPAHs**	**0.14**	--	**See total cPAHs**	--	--	0.065U	--	--	--	--	--	--	0.096	--
	Dibenzo(a,h)anthracene	**See total cPAHs**	**0.64**	--	**See total cPAHs**	--	--	0.065U	--	--	--	--	--	--	0.064U	--
	Indeno(1,2,3-cd)pyrene	**See total cPAHs**	**1.2**	--	**See total cPAHs**	--	--	0.065U	--	--	--	--	--	--	0.064U	--
PAHs Toxicity Equivalents[6]	*Benzo(a)pyrene*	--	--	--	--	--	--	0.0325	--	--	--	--	--	--	0.032	--
	Benzo(a)anthracene	--	--	--	--	--	--	0.00325	--	--	--	--	--	--	0.0094	--
	Benzo(b)fluoranthene	--	--	--	--	--	--	0.00325	--	--	--	--	--	--	0.0032	--
	Benzo(k)fluoranthene	--	--	--	--	--	--	0.00325	--	--	--	--	--	--	0.0032	--
	Chrysene	--	--	--	--	--	--	0.000325	--	--	--	--	--	--	0.00096	--
	Dibenzo(a,h)anthracene	--	--	--	--	--	--	0.00325	--	--	--	--	--	--	0.0032	--
	Indeno(1,2,3-cd)pyrene	--	--	--	--	--	--	0.00325	--	--	--	--	--	--	0.0032	--
	Toxicity Total	**0.14**	**0.35**	--	**0.14**	--	--	0.049075	--	--	--	--	--	--	0.05516	--

Notes:
1. Soil samples analyzed by Analytical Resources, Inc. or OnSite Environmental, Inc. by EPA Methods 7060A, 7196A, 6020, 6010B, 7471A, and 1311, PCBs by EPA Method 8082, petroleum by NWTPH-Dx, and SVOCs by 8270C.
3. PCBs = polychlorinated biphenyls.
4. TPH = Total Petroleum Hydrocarbons as D (diesel) and as HO (heavy or motor oil).
5. PAHs = Polycyclic aromatic hydrocarbons
6. Toxicity equivalents calculated using toxicity equivalency methodology in WAC 173-340-708(8)
7. "U" indicates chemical concentration not detected at or above the laboratory reporting limit shown.
8. **Bold** indicates exceedence of preliminary soil cleanup level.
9. ND = not detected
10. If no result is listed, then the analyses were not performed for that sample.
11. R: Result was rejected for use.
12. J: The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
13. J+: The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample biased high.
14. Safe concentration not established.
15. MTCA Method A value shown.
16. Listed value is for total chromium.

TABLE 11
SOIL ANALYTICAL RESULTS[1]
MJB North Area
Anacortes, Washington

Concentrations in ppm (mg/kg)

	Sample ID	MTCA Method B Cleanup Level Protective of Direct Human Contact	MTCA Method B Protective of Groundwater as Marine Surface Water	MTCA Method B Cleanup Level Protective of Terrestrial Ecological Receptors	RI-TP-7X-5.5	RI-TP-7-6.5	RI-TP-8-3.5	RI-TP-9-0.0	RI-TP-10-6.5	RI-SSOIL-1-0.25	RI-SSOIL-2-0.25	RI-SSOIL-3-0.25	RI-SSOIL-4-0.25	MW-5-0.0	MW-5-5.0	MW-5-10.0
	Sample Depth (feet bgs)				**5.5 to 6.5**	**6.5 to 7.5**	**3.5 to 4.5**	**0 to 3.5**	**6.5 to 7.5**	**0.25 to 0.5**	**0.25 to 0.5**	**0.25 to 0.5**	**0.25 to 0.5**	**0 to 1**	**5 to 6**	**10 to 11.5**
	Date Sampled				**7/12/2005**	**7/12/2005**	**7/12/2005**	**7/12/2005**	**7/12/2005**	**7/12/2005**	**7/12/2005**	**7/12/2005**	**7/12/2005**	**7/14/2005**	**7/14/2005**	**7/14/2005**
Total Metals	Antimony	**32**	**580**	--[14]	5U	--	20U	10R	--	10U	10U	10U	--	10U	10U	8U
	Arsenic	**20**[15]	**20**[15]	**20**	5U	--	20U	10	--	16	20	17	--	**21**	10	8U
	Cadmium	**80**	**1.2**	**25**	0.2U	--	0.9	0.5U	--	0.5U	0.5U	2	--	0.5U	0.5U	0.3U
	Chromium	**120,000**	**1,000,000**	**42**[16]	24.1	--	32	38	--	41	52	60	--	51	52	30.2
	Hexavalent Chromium	**240**	**19**	**42**[16]	--	--	--	--	--	--	--	--	--	--	--	--
	Copper	**2,960**	**1.4**	**100**	22J	--	41.3	81.5 J+	--	100	**128**	**114**	--	**447**	**128**	14.8
	Lead	**250**[15]	**1600**	**220**	8	7	39	10	24	26	17	21	--	18J	13.8	15.8
	Mercury	**24**	**0.026**	**9**	0.04U	--	0.09	0.25	--	0.26	0.32	0.2	--	0.15	0.06	0.08U
	Thallium	**5.6**	**0.67**	--	--	--	--	--	--	--	--	--	--	--	--	--
	Zinc	**24,000**	**101**	**270**	67.7	--	**479**	124 J+	--	159	169	**304**	--	**568J**	257	40.2
TPH-D[4]		**2000**[15]	**2000**[15]	**460**	--	--	--	--	--	--	--	--	--	--	--	84
TPH-HO[4]		**2000**[15]	**2000**[15]	--	--	--	--	--	--	--	--	--	--	--	--	350
PCBs[3]		**1.0**[15]	--	**2,000**	--	--	--	--	--	--	--	--	0.032U	--	--	0.058
SVOCs	4-Methylphenol	**400**	--	--	--	0.063U	--	--	--	--	--	--	--	--	--	0.065U
	Phenol	**48,000**	**5,100**	--	--	0.063U	--	--	--	--	--	--	--	--	--	0.065U
PAHs[5]	2-Chloronapththalene	**6,400**	**37**	--	--	0.063U	--	--	--	--	--	--	--	--	--	0.065U
	2-Methylnapththalene	--	--	--	--	0.51	--	--	--	--	--	--	--	--	--	0.065U
	Carbazole	**50**	--	--	--	0.11	--	--	--	--	--	--	--	--	--	0.065U
	Dibenzofuran	**160**	--	--	--	0.48	--	--	--	--	--	--	--	--	--	0.065U
	Naphthalene	**1,600**	**138**	--	--	0.6	--	--	--	--	--	--	--	--	--	0.065U
	Acenaphthylene	--	--	--	--	0.063U	--	--	--	--	--	--	--	--	--	0.065U
	Acenaphthene	**4,800**	**66**	--	--	0.64	--	--	--	--	--	--	--	--	--	0.065U
	Fluorene	**3,200**	**550**	--	--	0.5	--	--	--	--	--	--	--	--	--	0.065U
	Phenanthrene	--	--	--	--	1.2	--	--	--	--	--	--	--	--	--	0.065U
	Anthracene	**24,000**	**12,000**	--	--	0.15	--	--	--	--	--	--	--	--	--	0.065U
	Fluoranthene	**3,200**	**89**	--	--	0.77	--	--	--	--	--	--	--	--	--	0.065U
	Pyrene	**2,400**	**3,400**	--	--	0.37	--	--	--	--	--	--	--	--	--	0.065U
	Benzo(g,h,i)perylene	--	--	--	--	0.063U	--	--	--	--	--	--	--	--	--	0.065U
	Benzo(a)pyrene	**See total cPAHs**	**0.35**	--	--	0.063U	--	--	--	--	--	--	--	--	--	0.065U
	Benzo(a)anthracene	**See total cPAHs**	**0.13**	--	--	0.13	--	--	--	--	--	--	--	--	--	0.065U
	Benzo(b)fluoranthene	**See total cPAHs**	**0.44**	--	--	0.063U	--	--	--	--	--	--	--	--	--	0.065U
	Benzo(k)fluoranthene	**See total cPAHs**	**0.44**	--	--	0.063U	--	--	--	--	--	--	--	--	--	0.065U
	Chrysene	**See total cPAHs**	**0.14**	--	--	0.14	--	--	--	--	--	--	--	--	--	0.065U
	Dibenzo(a,h)anthracene	**See total cPAHs**	**0.64**	--	--	0.063U	--	--	--	--	--	--	--	--	--	0.065U
	Indeno(1,2,3-cd)pyrene	**See total cPAHs**	**1.2**	--	--	0.063U	--	--	--	--	--	--	--	--	--	0.065U
PAHs Toxicity Equivalents[6]	*Benzo(a)pyrene*	--	--	--	--	0.0315	--	--	--	--	--	--	--	--	--	0.0325
	Benzo(a)anthracene	--	--	--	--	0.013	--	--	--	--	--	--	--	--	--	0.00325
	Benzo(b)fluoranthene	--	--	--	--	0.00315	--	--	--	--	--	--	--	--	--	0.00325
	Benzo(k)fluoranthene	--	--	--	--	0.00315	--	--	--	--	--	--	--	--	--	0.00325
	Chrysene	--	--	--	--	0.0014	--	--	--	--	--	--	--	--	--	0.000325
	Dibenzo(a,h)anthracene	--	--	--	--	0.00315	--	--	--	--	--	--	--	--	--	0.00325
	Indeno(1,2,3-cd)pyrene	--	--	--	--	0.00315	--	--	--	--	--	--	--	--	--	0.00325
	Toxicity Total	**0.14**	**0.35**	--	--	0.05850	--	--	--	--	--	--	--	--	--	0.049075

Notes:
1. Soil samples analyzed by Analytical Resources, Inc. or OnSite Environmental, Inc. by EPA Methods 7060A, 7196A, 6020, 6010B, 7471A, and 1311, PCBs by EPA Method 8082, petroleum by NWTPH-Dx, and SVOCs by 8270C.
3. PCBs = polychlorinated biphenyls.
4. TPH = Total Petroleum Hydrocarbons as D (diesel) and as HO (heavy or motor oil).
5. PAHs = Polycyclic aromatic hydrocarbons
6. Toxicity equivalents calculated using toxicity equivalency methodology in WAC 173-340-708(8)
7. "U" indicates chemical concentration not detected at or above the laboratory reporting limit shown.
8. **Bold** indicates exceedence of preliminary soil cleanup level.
9. ND = not detected
10. If no result is listed, then the analyses were not performed for that sample.
11. R: Result was rejected for use.
12. J: The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
13. J+: The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample biased high.
14. Safe concentration not established.
15. MTCA Method A value shown.
16. Listed value is for total chromium.

TABLE 11
SOIL ANALYTICAL RESULTS[1]
MJB North Area
Anacortes, Washington

Concentrations in ppm (mg/kg)

	Sample ID	MTCA Method B Cleanup Level Protective of Direct Human Contact	MTCA Method B Protective of Groundwater as Marine Surface Water	MTCA Method B Cleanup Level Protective of Terrestrial Ecological Receptors	MW-6-5.0	MW-6-10.0	MW-7-0.0	MW-7-5.0	PP-1-0.0	PP-1-4.0	PP-1-8.0	PP-2-0.0	PP-2-5.0	PP-2-8.5	PP-3-0.0	PP-3-4.0	PP-3-8.0	PP-4-0.0	PP-4-4.0	PP-4-8.0	PP-5-0.0	PP-5-4.0	PP-5-8.0	PP-5-9.0	PP-6-0.0
	Sample Depth (feet bgs)				5 to 6	10 to 11.5	0 to 0.5	5 to 6.5	0 to 1	4 to 5	8 to 9.5	0 to 1	5 to 6	8.5 to 9.5	0 to 1	4 to 5	8 to 9	0 to 1	4 to 5	8 to 9.5	0 to 1	4 to 4.5	8 to 9	9 to 10	0 to 1
	Date Sampled				7/14/2005	7/14/2005	7/14/2005	7/14/2005	2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/9/2006
Total Metals	Antimony	**32**	**580**	--[14]	5U	6U	10U	6U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Arsenic	**20**[15]	**20**[15]	**20**	5U	6U	**21**	6U	5.7	--	--	6.0	--	--	5.8	--	--	5.4	--	--	5.6	--	--	--	5.3U
	Cadmium	**80**	**1.2**	**25**	0.2U	0.2U	0.5U	0.2U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Chromium	**120,000**	**1,000,000**	**42**[16]	44.6	24.9	57	35.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Hexavalent Chromium	**240**	**19**	**42**[16]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Copper	**2,960**	**1.4**	**100**	30.2	21.2	**107**	14.1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Lead	**250**[15]	**1600**	**220**	88	14.1	19	4.2	--	5.7U	7.0	--	7.3	110	--	8.8	12	--	10.0U	5.9U	--	23	170	61	--
	Mercury	**24**	**0.026**	**9**	0.05U	0.04U	0.27	0.04U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Thallium	**5.6**	**0.67**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Zinc	**24,000**	**101**	**270**	44.4	39.1	205	35.7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TPH-D[4]		**2000**[15]	**2000**[15]	**460**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TPH-HO[4]		**2000**[15]	**2000**[15]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCBs[3]		**1.0**[15]	--	**2,000**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SVOCs	4-Methylphenol	**400**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Phenol	**48,000**	**5,100**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PAHs[5]	2-Chloronapththalene	**6,400**	**37**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2-Methylnapththalene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Carbazole	**50**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Dibenzofuran	**160**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Naphthalene	**1,600**	**138**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Acenaphthylene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Acenaphthene	**4,800**	**66**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Fluorene	**3,200**	**550**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Phenanthrene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Anthracene	**24,000**	**12,000**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Fluoranthene	**3,200**	**89**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Pyrene	**2,400**	**3,400**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Benzo(g,h,i)perylene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Benzo(a)pyrene	**See total cPAHs**	**0.35**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Benzo(a)anthracene	**See total cPAHs**	**0.13**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Benzo(b)fluoranthene	**See total cPAHs**	**0.44**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Benzo(k)fluoranthene	**See total cPAHs**	**0.44**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Chrysene	**See total cPAHs**	**0.14**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Dibenzo(a,h)anthracene	**See total cPAHs**	**0.64**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Indeno(1,2,3-cd)pyrene	**See total cPAHs**	**1.2**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PAHs Toxicity Equivalents[6]	*Benzo(a)pyrene*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Benzo(a)anthracene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Benzo(b)fluoranthene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Benzo(k)fluoranthene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Chrysene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Dibenzo(a,h)anthracene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Indeno(1,2,3-cd)pyrene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Toxicity Total	**0.14**	**0.35**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:
1. Soil samples analyzed by Analytical Resources, Inc. or OnSite Environmental, Inc. by EPA Methods 7060A, 7196A, 6020, 6010B, 7471A, and 1311, PCBs by EPA Method 8082, petroleum by NWTPH-Dx, and SVOCs by 8270C.
3. PCBs = polychlorinated biphenyls.
4. TPH = Total Petroleum Hydrocarbons as D (diesel) and as HO (heavy or motor oil).
5. PAHs = Polycyclic aromatic hydrocarbons
6. Toxicity equivalents calculated using toxicity equivalency methodology in WAC 173-340-708(8)
7. "U" indicates chemical concentration not detected at or above the laboratory reporting limit shown.
8. **Bold** indicates exceedence of preliminary soil cleanup level.
9. ND = not detected
10. If no result is listed, then the analyses were not performed for that sample.
11. R: Result was rejected for use.
12. J: The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
13. J+: The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample biased high.
14. Safe concentration not established.
15. MTCA Method A value shown.
16. Listed value is for total chromium.

TABLE 11
SOIL ANALYTICAL RESULTS[1]
MJB North Area
Anacortes, Washington

Concentrations in ppm (mg/kg)

	Sample ID	MTCA Method B Cleanup Level Protective of Direct Human Contact	MTCA Method B Protective of Groundwater as Marine Surface Water	MTCA Method B Cleanup Level Protective of Terrestrial Ecological Receptors	PP-6-4.0	PP-6-8.5	PP-7-0.0	PP-7-4.5	PP-7-6.0	PP-7-8.0	PP-8-0.0	PP-8-4.5	PP-8-6.0	PP-8-8.0	PP-9-0.0	PP-9-4.5	PP-9-6.0	PP-9-9.0	PP-10-0.0	PP-10-4.0	PP-10-6.0	PP-10-9.0	PP-11-0.0	PP-11-5.0	PP-11-8.0	PP-12-0.0	PP-12-4.5
	Sample Depth (feet bgs)				4 to 5	8.5 to 9.5	0 to 1	4.5 to 5.5	6 to 6.5	8 to 9	0 to 1	4.5 to 5.5	6 to 7	8 to 9.5	0 to 1	4.5 to 5.5	6 to 7	9 to 10	0 to 1	4 to 5.5	6 to 6.5	9 to 10	0 to 1	5 to 6	8 to 9	0 to 2.5	4.5 to 5.5
	Date Sampled				2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/9/2006	2/9/2006	2/9/2006	2/10/06	2/10/06
Total Metals	Antimony	**32**	**580**	--[14]	--	--	--	--	--	--	--	--	--	--	--	--	2.4U	--	--	--	1.2U	--	--	--	2.4U	--	--
	Arsenic	**20**[15]	**20**[15]	**20**	--	--	8.6	--	--	--	5.9	--	--	--	7.5	--	12U	--	6.0U	--	5.9U	--	5.5U	--	12U	5.4U	--
	Cadmium	**80**	**1.2**	**25**	--	--	--	--	--	--	--	--	--	--	--	--	1.2U	--	--	--	0.59U	--	--	--	1.2U	--	--
	Chromium	**120,000**	**1,000,000**	**42**[16]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Hexavalent Chromium	**240**	**19**	**42**[16]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Copper	**2,960**	**1.4**	**100**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Lead	**250**[15]	**1600**	**220**	5.4U	5.6U	--	110	69	47	--	140	9.1U	47	--	63	29	--	--	130	5.9U	--	--	140	220	--	21
	Mercury	**24**	**0.026**	**9**	--	--	--	--	--	--	--	--	--	--	--	--	0.61U	--	--	--	0.29U	--	--	--	1.5	--	--
	Thallium	**5.6**	**0.67**	--	--	--	--	--	--	--	--	--	--	--	--	--	0.24U	--	--	--	0.12U	--	--	--	0.24U	--	--
	Zinc	**24,000**	**101**	**270**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TPH-D[4]		**2000**[15]	**2000**[15]	**460**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TPH-HO[4]		**2000**[15]	**2000**[15]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCBs[3]		**1.0**[15]	--	**2,000**	--	--	--	--	--	--	--	--	--	--	--	--	--	0.13U	--	--	--	0.16U	--	--	--	--	--
SVOCs	4-Methylphenol	**400**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Phenol	**48,000**	**5,100**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PAHs[5]	2-Chloronapththalene	**6,400**	**37**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2-Methylnapththalene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Carbazole	**50**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Dibenzofuran	**160**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Naphthalene	**1,600**	**138**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Acenaphthylene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Acenaphthene	**4,800**	**66**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Fluorene	**3,200**	**550**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Phenanthrene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Anthracene	**24,000**	**12,000**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Fluoranthene	**3,200**	**89**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Pyrene	**2,400**	**3,400**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Benzo(g,h,i)perylene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Benzo(a)pyrene	**See total cPAHs**	**0.35**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Benzo(a)anthracene	**See total cPAHs**	**0.13**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Benzo(b)fluoranthene	**See total cPAHs**	**0.44**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Benzo(k)fluoranthene	**See total cPAHs**	**0.44**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Chrysene	**See total cPAHs**	**0.14**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Dibenzo(a,h)anthracene	**See total cPAHs**	**0.64**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Indeno(1,2,3-cd)pyrene	**See total cPAHs**	**1.2**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PAHs Toxicity Equivalents[6]	*Benzo(a)pyrene*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Benzo(a)anthracene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Benzo(b)fluoranthene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Benzo(k)fluoranthene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Chrysene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Dibenzo(a,h)anthracene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Indeno(1,2,3-cd)pyrene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Toxicity Total	**0.14**	**0.35**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:
1. Soil samples analyzed by Analytical Resources, Inc. or OnSite Environmental, Inc. by EPA Methods 7060A, 7196A, 6020, 6010B, 7471A, and 1311, PCBs by EPA Method 8082, petroleum by NWTPH-Dx, and SVOCs by 8270C.
3. PCBs = polychlorinated biphenyls.
4. TPH = Total Petroleum Hydrocarbons as D (diesel) and as HO (heavy or motor oil).
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15. MTCA Method A value shown.
16. Listed value is for total chromium.

TABLE 11
SOIL ANALYTICAL RESULTS[1]
MJB North Area
Anacortes, Washington

Concentrations in ppm (mg/kg)

	Sample ID	MTCA Method B Cleanup Level Protective of Direct Human Contact	MTCA Method B Protective of Groundwater as Marine Surface Water	MTCA Method B Cleanup Level Protective of Terrestrial Ecological Receptors	PP-12-6.0	PP-12-9.0	PP-13-0.0	PP-13-4.0	PP-13-8.0	PP-14-0.0	PP-14-4.5	PP-14-8.0	PP-15-0.0	PP-15-4.5	PP-15-8.0	PP-16-0.0	PP-16-4.0	PP-16-6.5	PP-17-0.0	PP-17-4.5	PP-17-8.0	PP-18-0.0	PP-18-4.5	PP-18-6.0	PP-19-0.0
	Sample Depth (feet bgs)				6 to 7	9 to 11	0 to 2	4 to 5.5	8 to 9	0 to 1	4.5 to 5.5	8 to 9	0 to 1	4.5 to 5.5	8 to 9	0 to 1	4 to 5	6.5 to 7	0 to 1	4.5 to 6	8 to 9	0 to 1	4.5 to 5.5	6 to 7	0 to 1
	Date Sampled				2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/9/2006	2/10/06
Total Metals	Antimony	**32**	**580**	--[14]	4.0U	--	--	--	1.2U	--	--	2.1U	--	--	20	--	--	16	--	--	21	--	--	2.6	--
	Arsenic	**20**[15]	**20**[15]	**20**	4.0U	--	5.7U	--	6.0U	7.1	--	15	5.6U	--	**34**	8.9	--	**26**	5.6	--	**100**	5.7U	--	7.1U	5.3U
	Cadmium	**80**	**1.2**	**25**	1.0U	--	--	--	0.60U	--	--	1.1	--	--	7.1	--	--	2.7	--	--	3.6	--	--	0.71U	--
	Chromium	**120,000**	**1,000,000**	**42**[16]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Hexavalent Chromium	**240**	**19**	**42**[16]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Copper	**2,960**	**1.4**	**100**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Lead	**250**[15]	**1600**	**220**	29	--	--	63	25	--	51	47	--	**1,600**	**1,600**	--	150	**2,300**	--	**2,100**	**820**	--	44	30	--
	Mercury	**24**	**0.026**	**9**	1.0U	--	--	--	0.36	--	--	0.52U	--	--	0.89U	--	--	1.3	--	--	0.68U	--	--	0.50	--
	Thallium	**5.6**	**0.67**	--	0.40U	--	--	--	0.12U	--	--	0.21U	--	--	0.36U	--	--	0.29U	--	--	0.27U	--	--	0.14U	--
	Zinc	**24,000**	**101**	**270**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TPH-D[4]		**2000**[15]	**2000**[15]	**460**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TPH-HO[4]		**2000**[15]	**2000**[15]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCBs[3]		**1.0**[15]	--	**2,000**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SVOCs	4-Methylphenol	**400**	--	--	--	0.39	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Phenol	**48,000**	**5,100**	--	--	0.12U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PAHs[5]	2-Chloronapththalene	**6,400**	**37**	--	--	0.12U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2-Methylnapththalene	--	--	--	--	0.12U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Carbazole	**50**	--	--	--	0.12U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Dibenzofuran	**160**	--	--	--	0.12U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Naphthalene	**1,600**	**138**	--	--	0.12U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Acenaphthylene	--	--	--	--	0.12U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Acenaphthene	**4,800**	**66**	--	--	0.12U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Fluorene	**3,200**	**550**	--	--	0.12U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Phenanthrene	--	--	--	--	0.43	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Anthracene	**24,000**	**12,000**	--	--	0.12U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Fluoranthene	**3,200**	**89**	--	--	0.12U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Pyrene	**2,400**	**3,400**	--	--	0.37	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Benzo(g,h,i)perylene	--	--	--	--	0.12U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Benzo(a)pyrene	**See total cPAHs**	**0.35**	--	--	0.15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Benzo(a)anthracene	**See total cPAHs**	**0.13**	--	--	0.15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Benzo(b)fluoranthene	**See total cPAHs**	**0.44**	--	--	0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Benzo(k)fluoranthene	**See total cPAHs**	**0.44**	--	--	0.12U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Chrysene	**See total cPAHs**	**0.14**	--	--	0.19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Dibenzo(a,h)anthracene	**See total cPAHs**	**0.64**	--	--	0.12U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Indeno(1,2,3-cd)pyrene	**See total cPAHs**	**1.2**	--	--	0.12U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PAHs Toxicity Equivalents[6]	*Benzo(a)pyrene*	--	--	--	--	0.1500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Benzo(a)anthracene	--	--	--	--	0.0150	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Benzo(b)fluoranthene	--	--	--	--	0.0200	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Benzo(k)fluoranthene	--	--	--	--	0.0060	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Chrysene	--	--	--	--	0.0019	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Dibenzo(a,h)anthracene	--	--	--	--	0.0060	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Indeno(1,2,3-cd)pyrene	--	--	--	--	0.0060	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Toxicity Total	**0.14**	**0.35**	--	--	**0.2049**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:
1. Soil samples analyzed by Analytical Resources, Inc. or OnSite Environmental, Inc. by EPA Methods 7060A, 7196A, 6020, 6010B, 7471A, and 1311, PCBs by EPA Method 8082, petroleum by NWTPH-Dx, and SVOCs by 8270C.
3. PCBs = polychlorinated biphenyls.
4. TPH = Total Petroleum Hydrocarbons as D (diesel) and as HO (heavy or motor oil).
5. PAHs = Polycyclic aromatic hydrocarbons
6. Toxicity equivalents calculated using toxicity equivalency methodology in WAC 173-340-708(8)
7. "U" indicates chemical concentration not detected at or above the laboratory reporting limit shown.
8. **Bold** indicates exceedence of preliminary soil cleanup level.
9. ND = not detected
10. If no result is listed, then the analyses were not performed for that sample.
11. R: Result was rejected for use.
12. J: The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
13. J+: The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample biased high.
14. Safe concentration not established.
15. MTCA Method A value shown.
16. Listed value is for total chromium.

TABLE 11
SOIL ANALYTICAL RESULTS[1]
MJB North Area
Anacortes, Washington

Concentrations in ppm (mg/kg)

	Sample ID	MTCA Method B Cleanup Level Protective of Direct Human Contact	MTCA Method B Protective of Groundwater as Marine Surface Water	MTCA Method B Cleanup Level Protective of Terrestrial Ecological Receptors	PP-19-4.5	PP-19-6.0	PP-19-9.5	PP-20-4.5	PP-20-9.0	PP-21-4.5	PP-21-6.0	PP-21-8.5	PP-22-1.5	PP-22-4.0	PP-22-8.0	PP-22-9.0	PP-23-2.0	PP-23-4.0	PP-23-8.0	PP-23-9.0	PP-24-2.0	PP-24-4.5	PP-24-8.0	PP-25-1.0	PP-25-4.0
	Sample Depth (feet bgs)				4.5 to 5.5	6 to 7	9.5 to 11	4.5 to 5.5	9 to 10.5	4.5 to 5.5	6 to 6.5	8.5 to 9	1.5 to 2	4 to 5.5	8 to 8.5	9 to 10.5	2 to 2.5	4 to 5.25	8 to 8.5	9 to 10.5	2 to 2.5	4.5 to 5.5	8 to 9	1 to 1.5	4 to 5
	Date Sampled				2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06
Total Metals	Antimony	**32**	**580**	--[14]	--	3.6U	--	--	--	--	1.5U	--	--	--	1.4U	--	--	--	1.1U	--	--	--	1.1U	--	--
	Arsenic	**20**[15]	**20**[15]	**20**	--	3.6U	--	--	12	--	7.6U	--	--	--	6.8U	--	--	--	5.6U	--	--	--	5.6U	--	--
	Cadmium	**80**	**1.2**	**25**	--	0.89U	--	--	1.6	--	0.76U	--	--	--	0.73	--	--	--	0.56U	--	--	--	0.56U	--	--
	Chromium	**120,000**	**1,000,000**	**42**[16]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Hexavalent Chromium	**240**	**19**	**42**[16]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Copper	**2,960**	**1.4**	**100**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Lead	**250**[15]	**1600**	**220**	39	150	--	170	**510**	19	170	18	5.3U	6.4	**2,500**	**1,800**	5.4U	17	49	**510**	5.4U	**260**	71	**1,500**	130
	Mercury	**24**	**0.026**	**9**	--	0.89U	--	--	--	--	0.38U	--	--	--	0.34U	--	--	--	0.28U	--	--	--	0.28U	--	--
	Thallium	**5.6**	**0.67**	--	--	0.36U	--	--	--	--	0.15U	--	--	--	0.14U	--	--	--	0.11U	--	--	--	0.11U	--	--
	Zinc	**24,000**	**101**	**270**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TPH-D[4]		**2000**[15]	**2000**[15]	**460**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TPH-HO[4]		**2000**[15]	**2000**[15]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCBs[3]		**1.0**[15]	--	**2,000**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SVOCs	4-Methylphenol	**400**	--	--	--	--	13	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Phenol	**48,000**	**5,100**	--	--	--	7.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PAHs[5]	2-Chloronapththalene	**6,400**	**37**	--	--	--	0.17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2-Methylnapththalene	--	--	--	--	--	0.12U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Carbazole	**50**	--	--	--	--	0.12U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Dibenzofuran	**160**	--	--	--	--	0.12U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Naphthalene	**1,600**	**138**	--	--	--	0.12U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Acenaphthylene	--	--	--	--	--	0.14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Acenaphthene	**4,800**	**66**	--	--	--	0.12U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Fluorene	**3,200**	**550**	--	--	--	0.12U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Phenanthrene	--	--	--	--	--	0.69	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Anthracene	**24,000**	**12,000**	--	--	--	0.18	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Fluoranthene	**3,200**	**89**	--	--	--	0.12U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Pyrene	**2,400**	**3,400**	--	--	--	0.37	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Benzo(g,h,i)perylene	--	--	--	--	--	0.12U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Benzo(a)pyrene	**See total cPAHs**	**0.35**	--	--	--	0.45	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Benzo(a)anthracene	**See total cPAHs**	**0.13**	--	--	--	0.27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Benzo(b)fluoranthene	**See total cPAHs**	**0.44**	--	--	--	0.55	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Benzo(k)fluoranthene	**See total cPAHs**	**0.44**	--	--	--	0.17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Chrysene	**See total cPAHs**	**0.14**	--	--	--	0.37	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Dibenzo(a,h)anthracene	**See total cPAHs**	**0.64**	--	--	--	0.12U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Indeno(1,2,3-cd)pyrene	**See total cPAHs**	**1.2**	--	--	--	0.35	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PAHs Toxicity Equivalents[6]	*Benzo(a)pyrene*	--	--	--	--	--	0.4500	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Benzo(a)anthracene	--	--	--	--	--	0.0270	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Benzo(b)fluoranthene	--	--	--	--	--	0.0550	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Benzo(k)fluoranthene	--	--	--	--	--	0.0170	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Chrysene	--	--	--	--	--	0.0037	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Dibenzo(a,h)anthracene	--	--	--	--	--	0.0060	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Indeno(1,2,3-cd)pyrene	--	--	--	--	--	0.0350	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Toxicity Total	**0.14**	**0.35**	--	--	--	**0.5937**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:
1. Soil samples analyzed by Analytical Resources, Inc. or OnSite Environmental, Inc. by EPA Methods 7060A, 7196A, 6020, 6010B, 7471A, and 1311, PCBs by EPA Method 8082, petroleum by NWTPH-Dx, and SVOCs by 8270C.
3. PCBs = polychlorinated biphenyls.
4. TPH = Total Petroleum Hydrocarbons as D (diesel) and as HO (heavy or motor oil).
5. PAHs = Polycyclic aromatic hydrocarbons
6. Toxicity equivalents calculated using toxicity equivalency methodology in WAC 173-340-708(8)
7. "U" indicates chemical concentration not detected at or above the laboratory reporting limit shown.
8. **Bold** indicates exceedence of preliminary soil cleanup level.
9. ND = not detected
10. If no result is listed, then the analyses were not performed for that sample.
11. R: Result was rejected for use.
12. J: The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
13. J+: The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample biased high.
14. Safe concentration not established.
15. MTCA Method A value shown.
16. Listed value is for total chromium.

TABLE 11
SOIL ANALYTICAL RESULTS[1]
MJB North Area
Anacortes, Washington

Concentrations in ppm (mg/kg)

	Sample ID	MTCA Method B Cleanup Level Protective of Direct Human Contact	MTCA Method B Protective of Groundwater as Marine Surface Water	MTCA Method B Cleanup Level Protective of Terrestrial Ecological Receptors	PP-25-8.0	PP-26-1.5	PP-26-4.0	PP-26-8.0	PP-27-4.0	PP-27-8.0	PP-27-9.0	PP-28-6.0	PP-28-9.0	PP-29-8.0	PP-29-9.0	PP-30-6.0	PP-30-9.0	PP-31-6.0	PP-31-9.0	PP-32-5.5	PP-32-8.0	PP-32-9.0	PP-33-9.0	PP-34-8.0	PP-35-8.0
	Sample Depth (feet bgs)				8 to 9	1.5 to 2	4 to 5.5	8 to 9	4 to 5	8 to 8.5	9 to 10	6 to 6.5	9 to 10	8 to 8.5	9 to 10.5	6 to 6.5	9 to 10.5	6 to 6.5	9 to 11	5.5 to 6	8 to 8.5	9 to 10.5	9 to 10.5	8 to 9	8 to 9
	Date Sampled				2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	2/10/06	3/22/06	3/22/06	3/22/06
Total Metals	Antimony	**32**	**580**	--[14]	1.3R	--	--	1.1U	--	1.2U	--	--	1.3U	--	2.2U	--	4.0	--	4.3	--	--	3.2U	--	--	6.9U
	Arsenic	**20**[15]	**20**[15]	**20**	6.3U	--	--	5.5U	--	6.1U	--	--	6.3U	--	12	--	8.2	--	11	--	--	11	--	--	14U
	Cadmium	**80**	**1.2**	**25**	0.63U	--	--	0.55U	--	0.61U	--	--	0.63U	--	1.1U	--	0.86U	--	1.0U	--	--	0.81U	--	--	1.4U
	Chromium	**120,000**	**1,000,000**	**42**[16]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Hexavalent Chromium	**240**	**19**	**42**[16]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Copper	**2,960**	**1.4**	**100**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Lead	**250**[15]	**1600**	**220**	20	14	21	8.4	5.4U	13	**440**	6.3U	16	6.5	76	11	100	160	33	5.4U	23	48	--	22U	100
	Mercury	**24**	**0.026**	**9**	0.31U	--	--	0.27U	--	0.30U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.69U
	Thallium	**5.6**	**0.67**	--	0.32	--	--	0.11U	--	0.12U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.69U
	Zinc	**24,000**	**101**	**270**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TPH-D[4]		**2000**[15]	**2000**[15]	**460**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TPH-HO[4]		**2000**[15]	**2000**[15]	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCBs[3]		**1.0**[15]	--	**2,000**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.14U	--	--
SVOCs	4-Methylphenol	**400**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Phenol	**48,000**	**5,100**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PAHs[5]	2-Chloronapththalene	**6,400**	**37**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2-Methylnapththalene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.019U	--	--
	Carbazole	**50**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Dibenzofuran	**160**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Naphthalene	**1,600**	**138**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.019U	--	--
	Acenaphthylene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.019U	--	--
	Acenaphthene	**4,800**	**66**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.019U	--	--
	Fluorene	**3,200**	**550**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.019U	--	--
	Phenanthrene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.061	--	--
	Anthracene	**24,000**	**12,000**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.019	--	--
	Fluoranthene	**3,200**	**89**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.130	--	--
	Pyrene	**2,400**	**3,400**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.120	--	--
	Benzo(g,h,i)perylene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.048	--	--
	Benzo(a)pyrene	**See total cPAHs**	**0.35**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.067	--	--
	Benzo(a)anthracene	**See total cPAHs**	**0.13**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.061	--	--
	Benzo(b)fluoranthene	**See total cPAHs**	**0.44**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.078	--	--
	Benzo(k)fluoranthene	**See total cPAHs**	**0.44**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.026	--	--
	Chrysene	**See total cPAHs**	**0.14**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.098	--	--
	Dibenzo(a,h)anthracene	**See total cPAHs**	**0.64**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.019U	--	--
	Indeno(1,2,3-cd)pyrene	**See total cPAHs**	**1.2**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.039	--	--
PAHs Toxicity Equivalents[6]	*Benzo(a)pyrene*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0670	--	--
	Benzo(a)anthracene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0061	--	--
	Benzo(b)fluoranthene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0078	--	--
	Benzo(k)fluoranthene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0026	--	--
	Chrysene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0010	--	--
	Dibenzo(a,h)anthracene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0010	--	--
	Indeno(1,2,3-cd)pyrene	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0039	--	--
	Toxicity Total	**0.14**	**0.35**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.08933	--	--

Notes:
1. Soil samples analyzed by Analytical Resources, Inc. or OnSite Environmental, Inc. by EPA Methods 7060A, 7196A, 6020, 6010B, 7471A, and 1311, PCBs by EPA Method 8082, petroleum by NWTPH-Dx, and SVOCs by 8270C.
3. PCBs = polychlorinated biphenyls.
4. TPH = Total Petroleum Hydrocarbons as D (diesel) and as HO (heavy or motor oil).
5. PAHs = Polycyclic aromatic hydrocarbons
6. Toxicity equivalents calculated using toxicity equivalency methodology in WAC 173-340-708(8)
7. "U" indicates chemical concentration not detected at or above the laboratory reporting limit shown.
8. **Bold** indicates exceedence of preliminary soil cleanup level.
9. ND = not detected
10. If no result is listed, then the analyses were not performed for that sample.
11. R: Result was rejected for use.
12. J: The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
13. J+: The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample biased high.
14. Safe concentration not established.
15. MTCA Method A value shown.
16. Listed value is for total chromium.

TABLE 12
MONITORING WELL COMPLETION DATA
Remedial Investigation
MJB North Area
Anacortes, Washington

Well Number	Date Installed	Installed by	Ground Elevation (feet MLLW)	Top of Casing Elevation (feet MLLW)	Total Well Depth (ft bgs)	Casing Diameter (inches)	Screen Interval Depth (ft bgs)	Screen Specifications
MW-1	11/5/2001	URS Corporation	13.20	12.79	14.5	2	4 to 14	2" Schedule 40 PVC 0.010" slot
MW-2	11/5/2001	URS Corporation	13.07	12.83	14.5	2	4 to 14	2" Schedule 40 PVC 0.010" slot
MW-3	11/6/2001	URS Corporation	16.01	15.68	19.5	2	4 to 19	2" Schedule 40 PVC 0.010" slot
MW-4	11/5/2001	URS Corporation	13.54	13.03	8.5	2	3 to 8	2" Schedule 40 PVC 0.010" slot
MW-5	7/14/2005	Geomatrix	13.42	12.80	14.35	2	4.22 to 14	2" Schedule 40 PVC 0.010" slot
MW-6	7/14/2005	Geomatrix	13.42	13.04	14.34	2	4.20 to 14	2" Schedule 40 PVC 0.010" slot
MW-7	7/14/2005	Geomatrix	13.24	12.98	14.47	2	4.21 to 14	2" Schedule 40 PVC 0.010" slot

Notes:
bgs = below ground surface
Elevation Datum: Vertical Datum Bench Mark at top of 1/2" iron pipe located at the NE corner of Seafarer's Park Elev. 13.12' MLLW
MLLW = Mean Low Level Water
btoc = below top of casing
Survey of all well heads on August 10, 2005 by Herrigstad.

TABLE 13
SUMMARY OF SURVEYED ELEVATIONS AND
CALCULATED GROUNDWATER ELEVATIONS, PORT UPLANDS AREA
FORMER SCOTT PAPER COMPANY MILL SITE

DRAFT FINAL

Well	Ground Surface Elevation (ft, MLLW)	Reference Elevation (a) (ft, MLLW)	5/12/2004		8/30/2004		11/23/2004		1/123/2006	
			Calculated Groundwater Elevation (ft, MLLW)	Measured Depth to Groundwater (ft)	Calculated Groundwater Elevation (ft, MLLW)	Measured Depth to Groundwater (ft)	Calculated Groundwater Elevation (ft, MLLW)	Measured Depth to Groundwater (ft)	Calculated Groundwater Elevation (ft, MLLW)	Measured Depth to Groundwater (ft)
MW-101	13.99	13.56	4.30	9.69	1.33	12.66	2.58	11.41	3.23	10.76
MW-102	14.41	14.18	10.28	4.13	10.54	3.87	10.78 (b)	3.63	11.00	3.40
MW-103	16.46	18.65	10.91	5.55	10.41	6.05	11.89	4.57	13.37	3.09
MW-104	17.58	17.15	8.85	8.73	10.02	7.56	11.12	6.46	10.78	6.80
MW-105	10.91	10.65	5.65	5.26	5.12	5.79	5.50	5.41	5.40	5.50
MW-106	13.39	13.00	6.58	6.81	6.80	6.59	6.35	7.04	6.91	6.48
MW-107	14.50	17.11	5.65	8.85	6.67	7.83	6.28	8.22	7.07	7.42
MW-108	15.56	15.44	6.91	8.65	7.44	8.12	8.24	7.32	7.91	7.65
MW-109	15.46	15.54	5.75	9.71	7.18	8.28	6.78	8.68	8.03	7.43
MW-110	14.41	14.08	6.06	8.35	6.71	7.70	6.58	7.83	6.77	7.63
MW-111	15.96	18.07	8.10	7.86	7.83	8.13	8.67	7.29	9.79	6.17
MW-112	15.14	14.96	5.76	9.38	7.26	7.88	7.01	8.13	7.70	7.44
Surface Water, Cap Sante Boat Haven			4.9 (c)		-0.5 (d)		2.75 (e)		2.0 (e)	

(a) Top of PVC well casing.
(b) Groundwater elevation calculated from depth to groundwater measured on November 22, 2004, prior to purging and sampling well. The groundwater elevation (8.64 ft MLLW) calculated based on the measured depth to groundwater on November 23, 2004 indicates that the water level had not yet fully recovered from previous day's activities.
(c) Estimated based on tidal chart for May 12, 2004 (first round groundwater samples collected on April 20, 2004).
(d) Estimated based on staff gauge measurement at Cap Sante Boat Haven and tidal chart for August 30, 2004.
(e) Based on staff gauge located at Cap Sante Boat Haven.

TABLE 14
GROUNDWATER ELEVATIONS
Remedial Investigation
MJB North Area
Anacortes, Washington

Well Number	Top of Casing Elevation (feet MLLW)	Depth to Water (feet btoc)				Groundwater Elevation (feet MLLW)			
		4/20/04	8/30/04	7/21/05	1/23/06	4/20/04	8/30/04	7/21/05	1/23/06
MW-1	12.79	6.17	6.61	6.03	6.22	6.62	6.18	6.76	6.57
MW-2	12.83	5.62	5.26	4.96	5.13	7.21	7.57	7.87	7.70
MW-3	15.68	7.90	6.29	7.70	6.12	7.78	9.39	7.98	9.56
MW-4	13.03	3.40	2.43	3.53	2.74	9.63	10.6	9.50	10.29
MW-5	12.80	--	--	5.91	6.90	--	--	6.89	5.90
MW-6	13.04	--	--	6.21	5.75	--	--	6.83	7.29
MW-7	12.98	--	--	3.80	2.96	--	--	9.18	10.02

Notes:
Elevation Datum: Vertical Datum Bench Mark at top of 1/2" iron pipe located at the NE corner of Seafarer's Park Elev. 13.12' MLLW
MLLW = Mean Lower Low Water
btoc = below top of casing
Survey of all well heads on August 10, 2005 by Herrigstad.

TABLE 15
GROUNDWATER ANALYTICAL DETECTIONS SUMMARY, PORT UPLANDS AREA
FORMER SCOTT PAPER COMPANY MILL SITE

Constituent	Concentration Protective of Groundwater as Drinking Water (a)	Concentration Protective of Marine Surface Water (b)	Other Water Quality Information	MW-101 GO20A/F 4/20/2004	MW-101 HA23A 8/30/2004	MW-101 HJ95B 11/22/2004	MW-101 IZ30K / IZ17D 1/23/2006	MW-102 GO34F/L 4/21/2004	MW-102 HA44A 8/31/2004	Dup of MW-102 MW-202 HA44H 8/31/2004	MW-102 HJ95G 11/23/2004	Dup of MW-102 MW-202 HJ95F 11/23/2004	MW-102 IZ30A / JB44A 1/24/2006	Dup of MW-102 MW-113 IZ30C / JB44B 1/24/2006	MW-103 GO20B/G 4/20/2004	MW-103 HA23B 8/30/2004	MW-103 HJ95I 11/23/2004	MW-103 IZ30I / IZ17B 1/23/2006	MW-104 GO56A/E 4/22/2004	MW-104 HA44B 8/31/2004	MW-104 HJ95H 11/23/2004	MW-104 IZ30B 1/24/2006	MW-105 GO34E/K 4/21/2004
cPAHs (µg/L)																							
EPA8270C-SIM																							
Chrysene	0.012	0.10		0.010 U	0.010 U	0.020 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Benzo(b)fluoranthene	0.012	0.10		0.010 U	0.010 U	0.020 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
cPAH TEQ		---		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TOTAL METALS (mg/L)																							
Antimony	0.006	0.64		0.05 U	0.0002	0.0003	0.0002 U	0.05 U	0.0005 U	0.0005 U	0.0005	0.0005	0.006	0.005	0.05 U	0.0005 U	0.0004	0.0003	0.05 U	0.0005 U	0.0005	0.0002 U	0.2 U
Arsenic	0.008	0.008		0.003	0.0084	0.0014	0.0019	0.006	**0.046 J**	**0.063 J**	**0.0313 J**	**0.0549** J	**0.038**	**0.039**	0.002	0.0038	0.0023	0.0033	0.001 U	0.0021	0.0017	0.0008	0.01 U
Copper	0.59	0.02		0.002 U	0.0045	0.0026	0.0016	0.002 U	0.002	0.002	0.0018	0.0015	0.002	0.002	0.002 U	0.002	0.0013	0.0011	0.002 U	0.001	0.0013	0.0005 U	0.01 U
Lead	.015 (c)	0.0081		0.02 U	0.002 U	0.001 U	0.001 U	0.02 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.02 U	0.001 U	0.001 U	0.001 U	0.02 U	0.001 U	0.001 U	0.001 U	0.1 U
Nickel	0.1	0.008		0.01 U	**0.017**	0.0053	0.0051	**0.02**	**0.0156**	**0.0187**	**0.011**	**0.0115**	**0.01**	**0.011**	0.01 U	**0.0122**	0.008	0.0051	0.01 U	**0.0094**	0.0025	0.0008	0.05 U
DISSOLVED METALS (mg/L)																							
Antimony	0.006	0.64		0.05 U	0.0005 U	0.0002 U	0.0005 U	0.05 U	0.0005 U	0.0005 U	0.0005	0.0005	0.001 U	0.001 U	0.05 U	0.0005 U	0.0004	0.0003	0.05 U	0.0005 U	0.0005	0.0003	0.2 U
Arsenic	0.008	0.008		0.001	0.004	0.002	0.001 U	**0.015**	**0.067 J**	**0.039 J**	**0.031**	**0.0276**	**0.036**	**0.036**	0.003	0.0033	0.0025	0.0032	0.002	0.002	0.0018	0.0013	0.002
Copper	0.59	0.02		0.002 U	0.004	0.0019	0.002	0.002 U	0.001	0.002	0.0014	0.0015	0.002 U	0.002 U	0.002 U	0.002	0.0014	0.0013	0.002 U	0.001 U	0.0005 U	0.0006	0.01 U
Nickel	0.1	0.008		0.01 U	**0.016**	0.0057	0.006	**0.02**	**0.0191**	**0.0156**	**0.0099**	**0.0103**	**0.009**	**0.009**	0.01 U	**0.0147**	**0.0111**	0.0051	0.01 U	**0.0094**	0.001 U	0.001	0.05 U
VOLATILES (µg/L)																							
SW8260B																							
Acetone	800	---		5.0 U	3.8	2.30 U	5 UJ	6.5	13 UJ	12 U	9.0 UJ	5.50 UJ	3.7	4.0	5.0 U	13	9.30 U	1.8	5.0 U	5.6 U	2.30 U	6.6	5.0 U
Carbon Disulfide	800	---		1.0 U	0.2 U	0.20 U	1.4 J	1.0 U	0.4 J	0.3	0.70	0.60	0.2	0.2 U	1.0 U	0.2 U	0.20 U	0.2 U	1.0 U	0.2 U	0.20 U	3.3	1.0 U
2-Butanone	4800	---		5.0 U	1.5	1.0 U	5 UJ	5.0 U	3.2 J	1.4 J	1.0 U	1.00 U	1 U	1 U	5.0 U	1.6	1.0 U	1 U	5.0 U	1.0 U	1.0 U	1 U	5.0 U
Toluene	640	15,000		1.0 U	0.2 U	0.20 U	1 UJ	1.0 U	0.2 UJ	0.2 U	0.20 U	0.20 U	0.2 U	0.2 U	1.0 U	0.2 U	0.20 U	0.2 U	1.0 U	0.2 U	0.20 U	0.2 U	1.0 U
Styrene	15	---		1.0 U	0.2 U	0.20 U	1 UJ	1.0 U	0.2 UJ	0.2 U	0.20 U	0.20 U	0.2 U	0.2 U	1.0 U	0.2 U	0.20 U	0.2 U	1.0 U	0.2 U	0.20 U	0.2 U	1.0 U
4-Isopropyltoluene	--	---	4,400; 48,000 (d)	1.0 U	0.2 U	0.20 U	1 UJ	1.0 U	0.2 UJ	0.2 U	0.20 U	0.20 U	0.2 U	0.2 U	1.0 U	0.2 U	0.20 U	0.2 U	1.0 U	0.2 U	0.20 U	0.2 U	1.5
SEMIVOLATILES (µg/L)																							
SW8270C																							
4-Methylphenol	80	---	30; 120 (e)	4.3	1.0 U	1.0 U	1 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1 U	1 U	1.0 U	1.0	1.0 U	1 U	1.0 U	1.0 U	1.0 U	1 U	1.0 U
Benzoic Acid	64,000	---	180,000 (f)	10 U	10 U	10.0 U	10 U	10 U	10 U	10 U	10.0 U	10.0 U	10 U	10 U	10 U	10 U	10.0 U	10 U	10 U	10 U	10.0 U	10 U	10 U
bis(2-Ethylhexyl)phthalate	6	4.9		1.0 U	1.0 U	**7.4**	1 U	1.0 U	1.0 U	1.0 U	1.1	1.1	1 U	1.5	1.0 U	1.0 U	1.3	1 U	1.0 U	1.0 U	2.0	1 U	**19**
Benzo(g,h,i)perylene	---	---	300 (g)	1.0 U	1.0 U	1.0 U	1 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1 U	1 U	1.0 U	1.0 U	1.0 U	1 U	1.0 U	1.0 U	1.0 U	1 U	1.0 U
SEMIVOLATILES (µg/L)																							
SW8270RA (Resin Acids)																							
Sandaracopimaric Acid	---	---		2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Isopimaric Acid	---	---	400 (h)	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Dehydroabietic Acid	---	---	1,100 (h)	31	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	9.0
Abietic Acid	---	---	700 (h)	2.0 U	2.0 UJ	2.0 U	2.0 U	2.0 U	2.0 UJ	2.0 UJ	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 UJ	2.0 U	2.0 U	2.0 U	2.0 UJ	2.0 U	2.0 U	2.0 U
TOTAL PETROLEUM HYDROCARBONS																							
Si/Acid Cleaned NWTPH-D																							
Diesel-Range Hydrocarbons	0.5 (c)	0.5 (c)		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Motor Oil-Range Hydrocarbons	0.5 (c)	0.5 (c)		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
CONVENTIONALS AND																							
OTHER ORGANICS (mg/L)																							
Chloride (EPA 325.2)	250	---		4,730	9,540	3,770	3710	1,920	2,680 J	1,780 J	3,010 J	1,720 J	2,040	2,470	187	688	540	296	85	43	24	47	16,400
N-Ammonia (mg-N/L)	---	(i)		7.25	7.34	7.98	**8.01**	12.2	14.4	14.8	11.5 J	15.7 J	13.8	13.4	5.32	8.09	9.21	7.17	4.14	6.55	3.58	4.95	0.605
N-Nitrate (mg-N/L, Calculated)	10	--		0.010 U	0.010 UJ	0.010 U	0.021	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	1 U	1 U	0.010 U	0.010 UJ	0.010 U	0.5 U	0.010 U	0.010 U	0.010 U	1 U	0.015
N-Nitrite (mg-N/L, EPA 353.2)	1	--		0.049	0.041 J	0.072	0.029	0.010 U	0.049 J	0.010 UJ	0.010	0.010 U	1 U	1 U	0.010 U	0.014 J	0.010 U	0.5 U	0.010 U	0.010 U	0.010 U	1 U	0.010 U
Nitrate + Nitrite (NO3+NO2) (mg-N/L, EPA 353.2)	---	--		0.033	0.029 J	0.045	0.05	0.010 U	0.042 J	0.010 UJ	0.011	0.010 U	1 U	1 U	0.010 U	0.010 UJ	0.010 U	0.5 U	0.010 U	0.010 U	0.010 U	1 U	0.015
Sulfate (EPA 375.2)	250	--		528	191	310	216	125	118	108	117 J	37.2 J	64.8 J	86.6 J	114	125	37.1	42.5	3.6	9.2	3.60	9.7	1960
Sulfide (EPA 376.2)	---	--	30 (j)	47.5	18.6	17.3	23	0.05 U	0.05 U	0.05 U	0.050 U	0.050 U	9.7 J	14.2 J	0.05 U	0.05 U	0.050 U	1.8	0.05 U	0.05 U	0.050 U	1.1	17.5
Phenol (EPA 420.1)	9.6	1,100		0.52 J	0.10	0.040 U	0.44	1.35	0.04 UJ	0.09 UJ	0.040 U	0.040 U	0.09 J	0.3 J	0.96	0.04 U	0.040 U	0.04 U	0.03 U	0.04 U	0.040 U	0.04 U	0.03 U
Tannins and Lignins (SM18 5550B)	---	--		8.52	21.6	10.2	40.6	11.2	12.3	12.1	15.8	14.2	17.5 J	24.0 J	6.93	6.47	6.21	5.36	2.77	4.03	2.71	2.60	0.969
DIOXINS AND FURANS (ng/L)																							
Total TCDF				0.038	NA	NA	0.00200 U	0.00210 U	NA	NA	NA	NA	NA	NA	0.00210 U	NA	NA	NA	0.00220 U	NA	NA	0.0021 U	0.00210 U
Total PeCDF				0.016 J	NA	NA	0.01000 U	0.01100 U	NA	NA	NA	NA	NA	NA	0.01000 U	NA	NA	NA	0.01100 U	NA	NA	0.0100 U	0.01000 U
Total HxCDF				0.014 J	NA	NA	0.01000 U	0.01100 U	NA	NA	NA	NA	NA	NA	0.01000 U	NA	NA	NA	0.01100 U	NA	NA	0.0100 U	0.01000 U
1,2,3,4,6,7,8-HpCDF				0.015 J	NA	NA	0.01000 U	0.01100 U	NA	NA	NA	NA	NA	NA	0.01000 U	NA	NA	NA	0.01100 U	NA	NA	0.0100 U	0.01000 U
Total HpCDF				0.015 J	NA	NA	0.01000 U	0.01100 U	NA	NA	NA	NA	NA	NA	0.01000 U	NA	NA	NA	0.01100 U	NA	NA	0.0100 U	0.01000 U
1,2,3,4,6,7,8-HpCDD				0.01100 U	NA	NA	0.022 J	0.01100 U	NA	NA	NA	NA	NA	NA	0.01000 U	NA	NA	NA	0.01100 U	NA	NA	0.0100 U	0.01000 U
Total HpCDD				0.01100 U	NA	NA	0.037 J	0.01100 U	NA	NA	NA	NA	NA	NA	0.01000 U	NA	NA	NA	0.01100 U	NA	NA	0.0100 U	0.01000 U
OCDF				0.02200 U	NA	NA	0.02000 U	0.02100 U	NA	NA	NA	NA	NA	NA	0.02100 U	NA	NA	NA	0.035 J	NA	NA	0.0210 U	0.02100 U
OCDD				0.038 J	NA	NA	0.160	0.02100 U	NA	NA	NA	NA	NA	NA	0.02100 U	NA	NA	NA	0.046 J	NA	NA	0.0210 U	0.02100 U
Total Dioxins/Furans TEQ	0.018/0.034	0.018/0.034		0.00019 J*	NA	NA	0.00038 J	0.00	NA	NA	NA	NA	NA	NA	0.00	NA	NA	NA	0.000080 J*	NA	NA	0.00	0.00
FIELD PARAMETERS																							
pH				6.66	6.52	6.79	7.53	6.50	6.23	NM	6.89	NM	6.56	6.56	6.45	6.41	6.74	6.95	6.48	6.62	6.94	6.71	6.62
Temperature (deg C)				11.9	16.1	13.0	11.6	14.5	19.4	NM	13.47	NM	12.6	12.7	12.6	17.5	12.2	10.8	11.5	19.0	13.0	10.9	11.5
Conductivity (µS)				1773	31350	10225	3600	622	7410	NM	6540	NM	5930	5960	242	4430	3710	2940	1450	1690	1035	1270	4563
Dissolved Oxygen (mg/L)				1.13	0.00	0.71	0.00	0.00	0.00	NM	0.43	NM	0.00	0.00	1.09	0.18	0.74	0.00	0.00	2.02	0.78	0.00	0.00
Turbidity (NTU)				3	3	2	0	2	2	NM	9	NM	18	19	18	20	26	0	2	7	23	0	3
Calculated Salinity (g/L) = Chloride in mg/L * 1.8/1,000 mg/g (k)	N/A	N/A		8.5	17.2	6.8	6.7	3.5	4.8	3.2	5.4	3.1	3.7	4.4	0.3	1.2	1.0	0.5	0.2	0.1	0.0	0.1	29.5
Preliminary Cleanup Level as Total Ammonia (mg-N/L)	--	y Ammonia Cleanup Level Expressed as Total Ammonia for Shoreline		30.8	32.6	20.9	4.2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	39.1

TABLE 15
GROUNDWATER ANALYTICAL DETECTIONS SUMMARY, PORT UPLANDS AREA
FORMER SCOTT PAPER COMPANY MILL SITE

Constituent	Concentration Protective of Groundwater as Drinking Water (a)	Concentration Protective of Marine Surface Water (b)	Other Water Quality Information	MW-105 HA23C 8/30/2004	MW-105 HJ95C 11/22/2004	MW-105 IZ30L / IZ17E 1/23/2006	MW-106 GO34D/J 4/21/2004	MW-106 HA23D 8/30/2004	MW-106 HJ95D 11/22/2004	MW-106 IZ30M / IZ17F 1/23/2006	MW-107 GO34C/I 4/21/2004	MW-107 HA23E 8/30/2004	MW-107 HJ95E 11/22/2004	MW-107 IZ30F 1/24/2006	MW-108 GO56C/G 4/22/2004	MW-108 HA44C 8/31/2004	MW-108 HJ95J 11/23/2004	MW-108 IZ30D 1/24/2006	MW-109 GO34B/H 4/21/2004	Dup of MW-109 MW-119 GO34A/G 4/21/2004	MW-109 HA44D 8/31/2004	MW-109 HJ95L 11/23/2004	MW-109 IZ30J / IZ17C 1/23/2006	MW-110 HA44E 8/31/2004
cPAHs (µg/L)																								
EPA8270C-SIM																								
Chrysene	0.012	0.10		0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.022
Benzo(b)fluoranthene	0.012	0.10		0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
cPAH TEQ		---		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00022
TOTAL METALS (mg/L)																								
Antimony	0.006	0.64		0.0005 U	0.001 U	0.001 U	0.2 U	0.0005 U	0.0002 U	0.001 U	0.05 U	0.0005 U	0.0005	0.0008	0.05 U	0.0005 U	0.0002	0.0002 U	0.05 U	0.05 U	0.0005 U	0.0002	0.0002 U	0.0005 U
Arsenic	0.008	0.008		0.0026	0.005 U	0.005	0.01 U	0.002	0.0017	0.002 U	0.005	0.0024	0.0011	0.001 U	0.001 U	0.001 U	0.0005 U	0.003	0.001	0.001	0.0018	0.0016	0.0033	0.007
Copper	0.59	0.02		0.006	0.014	0.008	0.01	0.008	0.0048	0.006	0.002	0.003	0.0016	0.002	0.002 U	0.004	0.0033	0.002 U	0.002 U	0.002 U	0.001	0.0024	0.0009	0.005
Lead	.015 (c)	0.0081		0.002 U	0.005 U	0.005 U	0.1 U	0.002 U	0.001 U	0.005 U	0.02 U	0.001 U	0.001 U	0.001 U	0.02 U	0.001	0.001	0.001	0.02 U	0.02 U	0.001 U	0.001 U	0.001 U	0.002
Nickel	0.1	0.008		**0.017**	**0.015**	**0.012**	0.05 U	**0.012**	0.0061	**0.01**	0.01 U	0.0078	0.0048	0.007	0.01 U	0.0029	0.0028	0.003	0.01 U	0.01 U	**0.0147**	0.0066	0.0065	**0.0156**
DISSOLVED METALS (mg/L)																								
Antimony	0.006	0.64		0.0005 U	0.0005 U	0.001 U	0.2 U	0.0005 U	0.0005 U	0.0005 U	0.05 U	0.0005 U	0.0004	0.0008	0.05 U	0.0005 U	0.0002 U	0.002 U	0.05 U	0.05 U	0.0005 U	0.0002 U	0.0002 U	0.0005 U
Arsenic	0.008	0.008		0.0019	0.005 U	0.004	0.002	0.0048	0.004	0.0046	0.002	0.0022	0.0013	0.001	0.001 U	0.001 U	0.0005 U	0.0016	0.001	0.001 U	0.001 U	0.0012	0.0029	0.004
Copper	0.59	0.02		0.007	0.008	0.007	0.01 U	0.005	0.008	0.005	0.002 U	0.002	0.0016	0.001	0.002 U	0.001 U	0.0007	0.0006	0.002 U	0.002 U	0.001 U	0.001	0.001	0.001
Nickel	0.1	0.008		**0.017**	**0.01**	**0.011**	0.05 U	**0.012**	**0.014**	**0.011**	0.01 U	0.0083	0.007	0.006	0.01 U	0.0028	0.001	0.0023	0.01 U	0.01 U	**0.0142**	0.002	0.0064	**0.0126**
VOLATILES (µg/L)																								
SW8260B																								
Acetone	800	---		7.6	3.50 U	5 U	5.0 U	7.8	3.30 U	5 U	5.0 U	7.6 J	3.50 U	1 U	7.4 U	1.0 U	3.10 U	5 U	5.0 U	5.0 U	53 J	8.0 U	19 J	53
Carbon Disulfide	800	---		0.2 U	0.20 U	1 U	1.0 U	0.2 U	0.20 U	1 U	1.0 U	0.3 J	0.20 U	0.2 U	1.0 U	0.2 U	0.20 U	1 U	1.0 U	1.0 U	0.2 UJ	0.20 U	0.2 UJ	0.2 U
2-Butanone	4800	---		2.1	1.0 U	5 U	5.0 U	2.0	1.0 U	5 U	5.0 U	1.9 J	1.0 U	1 U	5.0 U	1.0 U	1.00 U	5 U	5.0 U	5.0 U	1.0 UJ	1.0 U	0.2 UJ	1.0 U
Toluene	640	15,000		0.2 U	0.20 U	1 U	1.0 U	0.2 U	0.20 U	1 U	1.0 U	0.2 UJ	0.20 U	0.2 U	1.0 U	0.2 U	0.20 U	1 U	1.0 U	1.0 U	0.2 UJ	0.20 U	0.2 UJ	0.2 U
Styrene	15	---		0.2 U	0.20 U	1 U	1.0 U	0.2 U	0.20 U	1 U	1.0 U	0.2 J	0.20 U	0.2 U	1.0 U	0.2 U	0.20 U	1 U	1.0 U	1.0 U	0.2 UJ	0.20 U	0.2 UJ	0.2 U
4-Isopropyltoluene	--	---	4,400; 48,000 (d)	0.2 U	0.20 U	1 U	1.0 U	0.2 U	0.20 U	1 U	7.6	1.2 J	0.20 U	0.2 U	1.0 U	0.2 U	0.20 U	1 U	21	20	16 J	3.30	0.2 UJ	15
SEMIVOLATILES (µg/L)																								
SW8270C																								
4-Methylphenol	80	---	30; 120 (e)	1.0 U	1.0 U	1 U	1.0 U	1.0 U	1.0 U	1 U	15	1.0 U	1.0 U	1 U	1.0 U	1.0 U	1.0 U	1 U	1.0 U	1.0 U	1.2	1.0 U	1 U	43
Benzoic Acid	64,000	---	180,000 (f)	10 U	10.0 U	10 U	10 U	10 U	10.0 U	10 U	10 U	10 U	10.0 U	10 U	10 U	10 U	10.0 U	10 U	10 U	10 U	10 U	10.0 U	10 U	10 U
bis(2-Ethylhexyl)phthalate	6	4.9		1.0 U	1.0 U	1 U	1.0 U	1.0 U	1.0 U	1 U	5.0	1.0 U	1.0 U	1 U	1.0 U	1.0 U	**64**	**6.0**	1.0 U	1.0 U	1.0 U	2.2	1 U	1.0 U
Benzo(g,h,i)perylene	---	---	300 (g)	1.0 U	1.0 U	1 U	1.0 U	1.0 U	1.0 U	1 U	1.0	1.0 U	1.0 U	1 U	1.0 U	1.0 U	1.0 U	1 U	1.0 U	1.0 U	1.0 U	1.0 U	1 U	1.0 U
SEMIVOLATILES (µg/L)																								
SW8270RA (Resin Acids)																								
Sandaracopimaric Acid	---	---		2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 UJ	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Isopimaric Acid	---	---	400 (h)	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 UJ	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	5.4	3.5	2.0 U	2.0 U	2.0 U	2.0 U
Dehydroabietic Acid	---	---	1,100 (h)	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 UJ	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	33 J	20 J	18	2.0 U	2.0 U	9.5
Abietic Acid	---	---	700 (h)	2.0 UJ	2.0 U	2.0 U	2.0 U	2.0 UJ	2.0 U	2.0 UJ	2.0 U	2.0 UJ	2.0 U	2.0 U	2.0 U	2.0 UJ	2.0 U	2.0 U	6.7	5.9	2.0 UJ	2.0 U	2.0 U	2.0 UJ
TOTAL PETROLEUM HYDROCARBONS																								
Si/Acid Cleaned NWTPH-D																								
Diesel-Range Hydrocarbons	0.5 (c)	0.5 (c)		0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Motor Oil-Range Hydrocarbons	0.5 (c)	0.5 (c)		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
CONVENTIONALS AND																								
OTHER ORGANICS (mg/L)																								
Chloride (EPA 325.2)	250	---		14,900	2,000 U	16,500	16,200	9,880	2,000 U	10,900	4,250	698	848	925	157	361	262	271	501	512	739	324	256	1,680
N-Ammonia (mg-N/L)	---	(i)		0.206	0.214	0.53	0.481	0.560	0.522	0.492	0.837	0.72	2.06	1.74	1.42	2.35	1.81	2.16	8.27	8.31	7.03	7.10	6.06	26.4
N-Nitrate (mg-N/L, Calculated)	10	--		0.010 UJ	0.013	0.2 U	0.010 U	0.010 J	0.011	0.2 U	0.010 U	0.035 J	0.010 U	0.46	0.010 U	0.010 U	0.010 U	0.05 U	0.010 U	0.010 U	0.010 U	0.010 U	0.2 U	0.010 U
N-Nitrite (mg-N/L, EPA 353.2)	1	--		0.010 J	0.010 U	0.2 U	0.010 U	0.010 UJ	0.010 U	0.2 U	0.026	0.013 J	0.010 U	0.01 U	0.021	0.022	0.010	0.05 U	0.010 U	0.010 U	0.010 U	0.010 U	0.2 U	0.021
Nitrate + Nitrite (NO3+NO2) (mg-N/L, EPA 353.2)	---	--		0.010 UJ	0.013	0.2 U	0.010 U	0.010 J	0.011	0.2 U	0.011	0.048 J	0.010 U	0.046	0.013	0.017	0.010 U	0.05 U	0.010 U	0.010 U	0.010 U	0.010 U	0.2 U	0.016
Sulfate (EPA 375.2)	250	--		730	2,180	1970	1880	1270	187	1330	494	86.4	58.9	89.5	8.8	38.5	33.4	63.8	8.0	8.4	21.7	9.50	14.8	49
Sulfide (EPA 376.2)	---	--	30 (j)	9.12	16.7	9.6	1.56	1.82	2.24	3.8	14.6	0.05 U	0.50	2	2.86	4.48	3.37	4.8	0.50 U	0.50 U	0.07	0.050	0.05 U	3.81
Phenol (EPA 420.1)	9.6	1,100		0.09	0.040 U	0.04 U	0.03 U	0.04 U	0.040 U	0.040 U	0.03 U	0.04 U	0.040 U	0.04 U	0.03 U	0.04 U	0.040 U	0.04	0.03 U	0.03 U	0.04 U	0.040 U	0.2	0.09
Tannins and Lignins (SM18 5550B)	---	--		1.81	0.501	1.05	1.70	2.96	0.913	1.20	5.66	1.88	2.09	1.97	5.22	7.40	5.43	3.30	5.66	5.52	6.58	6.40	3.00	17.2
DIOXINS AND FURANS (ng/L)																								
Total TCDF				NA	NA	NA	0.00210 U	NA	NA	0.00210 U	0.00210 U	NA	NA	0.0023 U	0.00220 U	NA	NA	0.00210 U	0.00220 U	NA	NA	NA	0.00210 U	NA
Total PeCDF				NA	NA	NA	0.01000 U	NA	NA	0.01000 U	0.01100 U	NA	NA	0.0110 U	0.01100 U	NA	NA	0.01000 U	0.01100 U	NA	NA	NA	0.01000 U	NA
Total HxCDF				NA	NA	NA	0.01000 U	NA	NA	0.01000 U	0.01100 U	NA	NA	0.0110 U	0.01100 U	NA	NA	0.01000 U	0.01100 U	NA	NA	NA	0.01000 U	NA
1,2,3,4,6,7,8-HpCDF				NA	NA	NA	0.01000 U	NA	NA	0.01000 U	0.01100 U	NA	NA	0.0110 U	0.01100 U	NA	NA	0.01000 U	0.01100 U	NA	NA	NA	0.01000 U	NA
Total HpCDF				NA	NA	NA	0.01000 U	NA	NA	0.01000 U	0.01100 U	NA	NA	0.0120 J	0.01100 U	NA	NA	0.01000 U	0.01100 U	NA	NA	NA	0.01000 U	NA
1,2,3,4,6,7,8-HpCDD				NA	NA	NA	0.01000 U	NA	NA	0.01000 U	0.01100 U	NA	NA	0.050 J	0.01100 U	NA	NA	0.0120 J	0.01100 U	NA	NA	NA	0.01000 U	NA
Total HpCDD				NA	NA	NA	0.01000 U	NA	NA	0.01000 U	0.01100 U	NA	NA	0.081 U	0.01100 U	NA	NA	0.0240 J	0.01100 U	NA	NA	NA	0.01000 U	NA
OCDF				NA	NA	NA	0.02100 U	NA	NA	0.00210 U	0.02100 U	NA	NA	0.0230	0.02200 U	NA	NA	0.02100 U	0.02200 U	NA	NA	NA	0.00210 U	NA
OCDD				NA	NA	NA	0.02100 U	NA	NA	0.00210 U	0.02100 U	NA	NA	0.310	0.047 J	NA	NA	0.280 U	0.02200 U	NA	NA	NA	0.00210 U	NA
Total Dioxins/Furans TEQ	0.018/0.034	0.018/0.034		NA	NA	NA	0.00	NA	NA	0	0.00	NA	NA	0.000833 J	0.000047 J*	NA	NA	0.00012	0.00	NA	NA	NA	0.00	NA
FIELD PARAMETERS																								
pH				6.68	7.095	7.3	6.67	6.85	7.13	7.76	6.22	6.89	7.148	7.23	6.40	6.17	6.64	6.72	6.63	6.63	6.40	6.86	6.97	6.42
Temperature (deg C)				17.0	11.3	8.8	10.5	18.9	12.3	9.4	13.6	17.8	13.6	11.3	11.8	15.2	12.8	10.8	12.2	12.2	16.2	13.5	11.6	15.9
Conductivity (µS)				40425	31225	33500	4400	21050	28425	33900	1226	4365	4900	4050	737	1810	1342	343	372	372	4410	3420	3320	6310
Dissolved Oxygen (mg/L)				0.04	1.46	0.00	0.00	1.58	0.27	0.00	0.19	0.99	0.35	1.40	0.00	0.24	0.90	1.12	0.00	0.00	1.01	0.52	0.00	0.00
Turbidity (NTU)				0	12	80	23	4	7	4	6	0	9	0	6	0	46	0	5	5	89	4	0	15
Calculated Salinity (g/L) = Chloride in mg/L * 1.8/1,000 mg/g (k)	N/A	N/A		26.8	3.6	29.7	29.2	17.8	3.6	19.6	7.7	1.3	1.5	1.7	0.3	0.6	0.5	0.5	0.9	0.9	1.3	0.6	0.5	3.0
Preliminary Cleanup Level as Total Ammonia (mg-N/L)	--	y Ammonia Cleanup Level Expressed as Total Ammonia for Shoreline		22.3	11.6	10.0	37.5	12.4	9.9	3.2	74.4	11.3	8.5	8.4	54.0	71.3	28.9	27.9	--	--	--	--	--	--

TABLE 15
GROUNDWATER ANALYTICAL DETECTIONS SUMMARY, PORT UPLANDS AREA
FORMER SCOTT PAPER COMPANY MILL SITE

Constituent	Concentration Protective of Groundwater as Drinking Water (a)	Concentration Protective of Marine Surface Water (b)	Other Water Quality Information	MW-110 HJ95M 11/23/2004	MW-110 IZ30G 1/24/2006	MW-111 GO20C/H 4/20/2004	MW-111 HA44F 8/30/2004	MW-111 HJ95A 11/22/2004	MW-111 IZ30H / IZ17A 1/23/2006	MW-112 GO56B/F 4/22/2004	MW-112 HA44G 8/31/2004	MW-112 HJ95K 11/23/2004	MW-112 IZ30E 1/24/2006
cPAHs (µg/L)													
EPA8270C-SIM													
Chrysene	0.012	0.10		0.028	0.025	0.010 U	0.010 UJ	0.010 U	0.01 U	0.010 U	0.010 U	0.010 U	0.01 U
Benzo(b)fluoranthene	0.012	0.10		0.010 U	0.012	0.010 U	0.010 U	0.010 U	0.01 U	0.010 U	0.010 U	0.010 U	0.01 U
cPAH TEQ		---		0.00028	0.00145	ND	ND	ND	ND	ND	ND	ND	ND
TOTAL METALS (mg/L)													
Antimony	0.006	0.64		0.0002 U	0.0002 U	0.05 U	0.0005 U	0.0002 U	0.0002 U	0.05 U	0.0005 U	0.0003	0.0002 U
Arsenic	0.008	0.008		0.0044	0.002	0.003	0.007	0.0068	0.0052	0.002	0.0076	0.0069	0.001 U
Copper	0.59	0.02		0.0012	0.008	0.002 U	0.002	0.0022	0.0009	0.003	0.008	0.0031	0.003
Lead	.015 (c)	0.0081		0.001 U	0.001 U	0.02 U	0.001 U	0.001 U	0.001 U	0.02 U	0.001 U	0.001 U	0.001 U
Nickel	0.1	0.008		0.0044	0.0051	0.01 U	0.0064	0.0032	0.0023	0.01 U	0.0058	0.0022	0.004
DISSOLVED METALS (mg/L)													
Antimony	0.006	0.64		0.0002 U	0.0002 U	0.05 U	0.0005 U	0.0002 U	0.0002 U	0.05 U	0.0005 U	0.0002	0.0002 U
Arsenic	0.008	0.008		0.0038	0.0022	0.005	0.0079	**0.0087**	0.0062	0.001	0.0075	0.0065	0.0025
Copper	0.59	0.02		0.0009	0.0008	0.002 U	0.002	0.0016	0.0009	0.002 U	0.002	0.0006	0.001 U
Nickel	0.1	0.008		0.0046	0.0053	0.01 U	0.0062	0.0031	0.0023	0.01 U	0.0066	0.0032	0.004
VOLATILES (µg/L)													
SW8260B													
Acetone	800	---		3.60 U	1.8	5.0 U	10 U	2.80 U	3.2	10 U	7.1 U	3.20 U	1 U
Carbon Disulfide	800	---		0.20 U	0.2 U	1.0 U	0.2 U	0.20 U	0.2 U	1.0 U	0.2	0.20 U	0.2 U
2-Butanone	4800	---		2.70	1 U	5.0 U	1.3	1.0 U	1 U	5.0 U	1.0 U	1.0 U	1 U
Toluene	640	15,000		1.60	0.2 U	1.0 U	0.2 U	0.20 U	0.2 U	1.0 U	0.2 U	0.20 U	0.2 U
Styrene	15	---		0.20 U	0.2 U	1.0 U	0.2 U	0.20 U	0.2 U	1.0 U	0.2 U	0.20 U	0.2 U
4-Isopropyltoluene	--	---	4,400; 48,000 (d)	0.20 U	0.2 U	1.0 U	0.2 U	0.20 U	0.2 U	8.4	0.2 U	0.20 U	0.2 U
SEMIVOLATILES (µg/L)													
SW8270C													
4-Methylphenol	80	---	30; 120 (e)	7.5	1 U	1.0 U	1.0 U	1.0 U	1 U	4.3	1.0 U	1.0 U	1 U
Benzoic Acid	64,000	---	180,000 (f)	10.0 U	10 U	10 U	10 U	10.0 U	10 U	79	10 U	10.0 U	10 U
bis(2-Ethylhexyl)phthalate	6	4.9		3.9	1.4	1.0 U	1.0 U	1.0 U	1 U	3.6	1.0 U	2.4	1.4
Benzo(g,h,i)perylene	---	---	300 (g)	1.0 U	1 U	1.0 U	1.0 U	1.0 U	1 U	1.0 U	1.0 U	1.0 U	1 U
SEMIVOLATILES (µg/L)													
SW8270RA (Resin Acids)													
Sandaracopimaric Acid	---	---		2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.5	2.0 U	2.0 U	2.0 U
Isopimaric Acid	---	---	400 (h)	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	4.4	2.0 U	2.0 U	2.0 U
Dehydroabietic Acid	---	---	1,100 (h)	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	56	2.0 U	2.0 U	2.0 U
Abietic Acid	---	---	700 (h)	2.0 U	2.0 U	2.0 U	2.0 UJ	2.0 U	2.0 U	5.2	2.0 UJ	2.0 U	2.0 U
TOTAL PETROLEUM HYDROCARBONS													
Si/Acid Cleaned NWTPH-D													
Diesel-Range Hydrocarbons	0.5 (c)	0.5 (c)		0.25 U	**0.73**	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
Motor Oil-Range Hydrocarbons	0.5 (c)	0.5 (c)		0.50 U	**0.86**	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
CONVENTIONALS AND													
OTHER ORGANICS (mg/L)													
Chloride (EPA 325.2)	250	---		1,790	1,010	986	1,130	1,100	560	889	293	176	286
N-Ammonia (mg-N/L)	---	(i)		15.2	12.2	3.19	3.89	3.70	2.96	4.26	3.01	2.67	2.69
N-Nitrate (mg-N/L, Calculated)	10	--		0.010 U	0.1 U	0.010 U	0.010 U	0.010 U	0.02 U	0.508	0.010 U	0.010 U	0.1 U
N-Nitrite (mg-N/L, EPA 353.2)	1	--		0.018	0.1 U	0.010 U	0.010 U	0.010 U	0.02 U	0.010 U	0.010 U	0.010 U	0.1 U
Nitrate + Nitrite (NO3+NO2) (mg-N/L, EPA 353.2)	---	--		0.014	0.1 U	0.010 U	0.010 U	0.010 U	0.02 U	0.508	0.010 U	0.010 U	0.1 U
Sulfate (EPA 375.2)	250	--		19.0	14.2	318	249	225	73.6	10.9	16.8	4.60	34
Sulfide (EPA 376.2)	---	--	30 (j)	4.91	8.2	0.50 U	0.05 U	0.050 U	0.05 U	2.82	0.05 U	0.050 U	0.05 U
Phenol (EPA 420.1)	9.6	1,100		0.040 U	0.34	0.45	0.04 U	0.040 U	0.07	0.74	0.04 U	0.040 U	0.04 U
Tannins and Lignins (SM18 5550B)	---	--		12.3	8.19	4.91	5.86	5.39	5.4	15.3	2.67	3.13	2.00
DIOXINS AND FURANS (ng/L)													
Total TCDF				NA	0.00210 U	0.00220 U	NA	NA	NA	0.00230 U	NA	NA	0.00200 U
Total PeCDF				NA	0.01000 U	0.01100 U	NA	NA	NA	0.01200 U	NA	NA	0.01000 U
Total HxCDF				NA	0.01000 U	0.01100 U	NA	NA	NA	0.01200 U	NA	NA	0.01000 U
1,2,3,4,6,7,8-HpCDF				NA	0.01000 U	0.01100 U	NA	NA	NA	0.01200 U	NA	NA	0.01000 U
Total HpCDF				NA	0.01000 U	0.01100 U	NA	NA	NA	0.01200 U	NA	NA	0.01000 U
1,2,3,4,6,7,8-HpCDD				NA	0.01000 U	0.01100 U	NA	NA	NA	0.01200 U	NA	NA	0.01000 U
Total HpCDD				NA	0.01000 U	0.01100 U	NA	NA	NA	0.01200 U	NA	NA	0.01000 U
OCDF				NA	0.00210 U	0.02200 U	NA	NA	NA	0.02300 U	NA	NA	0.02000 U
OCDD				NA	0.023 J	0.02200 U	NA	NA	NA	0.041 J	NA	NA	0.02000 U
Total Dioxins/Furans TEQ	0.018/0.034	0.018/0.034		NA	0.000023	0.00	NA	NA	NA	0.000041 J*	NA	NA	0.00
FIELD PARAMETERS													
pH				6.82	6.37	6.57	6.77	6.73	7.42	6.74	6.78	7.02	6.93
Temperature (deg C)				13.2	12	11.9	18.7	12.85	11.7	13.8	15.7	13.5	11.9
Conductivity (µS)				7600	5650	422	5540	4917.5	3430	4140	2220	1560	1940
Dissolved Oxygen (mg/L)				0.79	0.00	0.00	1.27	1.20	0.00	0.00	1.04	1.05	0.00
Turbidity (NTU)				12	22	13	42	11	0	12	0	7	0
Calculated Salinity (g/L) = Chloride in mg/L * 1.8/1,000 mg/g (k)	N/A	N/A		3.2	1.8	1.8	2.0	2.0	1.0	1.6	0.5	0.3	0.5
Preliminary Cleanup Level as Total Ammonia (mg-N/L)	--	y Ammonia Cleanup Level Expressed as Total Ammonia for Shoreline		--	--	--	--	--	--	--	--	--	--

TABLE 15
GROUNDWATER ANALYTICAL DETECTIONS SUMMARY, PORT UPLANDS AREA
FORMER SCOTT PAPER COMPANY MILL SITE

Notes:

NA = Not analyzed.

NM = Not measured.

U = Indicates the compound was undetected at the reported concentration.

J = Indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

UJ = The analyte was not detected in the sample; the reported sample detection limit is an estimate.

TEQ = Toxicity Equivalent Quotient

mg/L = milligrams per liter

ug/L = micrograms per liter

ng/L = nanograms per liter

(a) Development of groundwater concentrations protective of groundwater as drinking water shownin Table 3.

(b) Development of preliminary groundwater cleanup levels protective of marine surface water shownin Table 4.

(c) Listed value based on MTCA Method A cleanup level for groundwater.

(d) LC50 Opossum shrimp, SW = 4,400; LC50 sheepshead minnow, SW = 48,000; from U.S. EPA EcoTox Database.

(e) Water quality objective, 6-month median; daily maximum from "A Compilation of Water Quality Goals" (CalEPA 2003).

(f) Fresh water ecological LC50 from U.S. EPA Superfund Chemical Data Matrix.

(g) NOAA SQUIRT Screening Quick Reference Tables.

(h) LC50 for rainbow trout from "Biological Degradation of Resin Acids in Wood Chips by Wood-Inhabiting Fungi" (Applied and Environmental Microbiology, Jan. 1995, p. 22-225).

(i) Water quality criterion for un-ionized ammonia is 0.035 mg N/L. Expressed as total ammonia, this criterion would range from 3.2 to 74.4 mg N/L, using the temperature, pH, and chloride concentrations measured in the shoreline wells. See bottom row for ammonia cleanup level expressed as total ammonia for each monitoring event in each shoreline well.

(j) Sulfide concentration protective of benthos as presented in Sediment Management Annual Review Meeting (Caldwell 2005) and summarized by Anchor (2005b)

(k) Chloride is assumed to be approximately 55 percent of total salinity.

(l) Ammonia preliminary cleanup level expressed as total ammonia derived from Ecology Spreadsheets for Water Quality-Based NPDES Permit Calculations (Ecology 2000).

*All detections are either less than the PQL or are for congeners with a TEF of 0.0.

Note: Bolded values exceed preliminary cleanup levels.

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TABLE 16
FREE PRODUCT AND PRE-PURGE GROUNDWATER SAMPLE ANALYTICAL RESULTS, PORT UPLANDS AREA FORMER SCOTT PAPER COMPANY MILL SITE

Analysis	MW-110B (a) GO20D 4/20/2004	MW-110B (b) HA23F 8/30/2004
NWTPH-HCID (mg/kg)		
Diesel-Range Hydrocarbons	200,000 J	
Motor Oil-Range Hydrocarbons	390,000 J	
Gasoline-Range Hydrocarbons	2,400 U	
PCBs (µg/L)		
EPA 8082		
Aroclor 1016		0.015 U
Aroclor 1242		0.015 U
Aroclor 1248		0.015 U
Aroclor 1254		0.015 U
Aroclor 1260		0.015 U
Aroclor 1221		0.015 U
Aroclor 1232		0.015 U
Total PCBs		ND

U = Indicates the compound was undetected at the reported concentration.
J = Indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
ND = Not detected
mg/kg = milligrams per kilogram
ug/L = micrograms per liter
(a) Free product sample
(b) Pre-purge groundwater sample collected from top of water column in well

TABLE 17
GROUNDWATER ANALYTICAL RESULTS[1]
MJB North Area
Anacortes, Washington

Concentrations in ppb (ug/l)

	Well ID	Preliminary Cleanup Level Protective of Groundwater as Drinking Water	Preliminary Cleanup Level Protective of Marine Surface Water (or Other Water Quality Info)[11]	MW-1					MW-2					MW-2 (field duplicate)
	Sample ID			MW-1-110901	MW01GW-040420	MW01GW-040830	MW-1-0705	MW-1-0106	MW-2-110901	MW02GW-040420	MW02GW040830	MW-2-0705	MW-2-0106	MW52GW-040420
	Date Sampled			11/9/2001	4/20/2004	8/30/2004	7/21/2005	1/24/2006	11/9/2001	4/20/2004	8/30/2004	7/21/2005	1/24/2006	4/20/2004
Dissolved Metals	Antimony	**6**	**640**	1U	50U	0.20U	0.2U	0.2U	1	50U	0.2	0.3	0.2U	50U
	Arsenic	**8**	**8**	1U	1U	1.0U	0.5U	2.1	4	1U	1.0U	0.5U	0.8	1U
	Cadmium	**5**	**8.8**	1U	2U	0.20U	2U	2U	1U	2U	0.20U	2U	2U	2U
	Chromium	**100**	**50**	5U	5U	1.1	12	5U	5U	5U	1.3	20	5U	5U
	Copper	**590**	**20**[12]	3	2	1.1	2U	2	3	2U	1.4	2U	2U	2
	Lead	**15**	**8.1**	5U	1U	1.0U	1U	1U	5U	1U	1.0U	1U	1U	1U
	Mercury	**2**	**0.04**	0.1U	0.1U	0.10U	0.1U	0.1U	0.1U	0.1U	0.10U	0.1U	0.1U	0.1U
	Zinc	**4,800**	**160**	6U	6U	6	6U	6U	6U	6U	4.0U	6U	6U	6U
Ammonia		---		--	1,260	1,740	1,450	1,640	--	1,670	2,360	2,800	730	1,760
Sulfide		---	**30,000**[17]	--	14,000	19,200	13,300	12,700	--	**30,800**	**41,800**	28,000	16,500	28,000
TPH-D[4]		**500**	--	250U	250U	250U	--	--	250U	250U	250U	--	--	250U
TPH-HO		**500**	--	500U	500U	500U	--	--	500U	500U	500U	--	--	500U
PCBs[3]		**1.8**	**1.8**	0.2 UJ	0.025U	0.25U	--	--	0.2UJ	0.050U	0.05U	--	--	0.25U
SVOCs	Benzoic Acid	**64,000**	**180,000**[14]	50U	11U	10U	--	--	50U	11U	10U	--	--	11U
	4-Methylphenol	**80**	**30; 120**[13]	1U	1.1U	1.0U	--	--	1U	1.1U	1.0U	--	--	1.1U
	Phenol	**9,600**	**1,100,000**	2U	2.1U	2.0U	--	--	2U	2.1U	2.0U	--	--	2.1U
PAHs[5]	Naphthalene	**16**	**4,940**	0.1U	0.5U	0.50U	--	--	0.75	0.5U	0.50U	--	--	0.5U
	Acenaphthylene	--	--	--	--	--	--	--	--	--	--	--	--	--
	Acenaphthene	**960**	**643**	0.1U	1.1U	1.0U	--	--	12	19	14	--	--	17
	Fluorene	**640**	**3460**	0.1U	0.011U	0.01U	--	--	2.2	1.6	1.9	--	--	1.4
	Phenanthrene	--	--	--	--	--	--	--	--	--	--	--	--	--
	Anthracene	**2,400**	**25,900**	0.1U	0.011U	0.01U	--	--	0.18	0.012	0.1	--	--	0.093J
	Fluoranthene	**640**	**90.2**	0.1U	0.011U	0.01U	--	--	0.31	0.15	0.23	--	--	0.12
	Pyrene	**480**	**2,590**	0.1U	0.011U	0.01U	--	--	0.16	0.060J	0.12	--	--	0.057J
	Benzo(g,h,i)perylene	---	**300**[15]	--	--	--	--	--	--	--	--	--	--	--
	Benzo(a)pyrene	**0.16**	**4.72**	0.1U	0.011U	0.01U	--	--	0.1U	0.011U	0.01U	--	--	0.021U
	Benzo(a)anthracene	**6**	**6**	0.1U	0.011UJ	0.01U	--	--	0.1U	0.011U	0.01U	--	--	0.021U
	Benzo(b)fluoranthene	**4.93**	**4.93**	0.1U	0.011U	0.01U	--	--	0.1U	0.011U	0.01	--	--	0.021U
	Benzo(k)fluoranthene	**7.19**	**7.19**	0.1U	0.011U	0.01U	--	--	0.1U	0.011U	0.01	--	--	0.021U
	Chrysene	**6.99**	**6.99**	0.1U	0.011U	0.01U	--	--	0.1U	0.011U	0.01U	--	--	0.021U
	Dibenzo(a,h)anthracene	**6.88**	**6.88**	0.1U	0.011U	0.01U	--	--	0.1U	0.011U	0.01U	--	--	0.021U
	Indeno(1,2,3-cd)pyrene	**5.97**	**5.97**	0.1U	0.011U	0.01U	--	--	0.1U	0.011U	0.01U	--	--	0.021U

Notes:
1. Groundwater samples analyzed by Analytical Resources, Inc. of Tukwila, Washington: Metals by EPA Methods 7421, 6010B and 7470A, Ammonia by EPA Method 350.1, Sulfide by EPA Method 376.2, PCBs by EPA Method 8082, TPH-D and TPH-HO by NWTPH-Dx, and SVOCs by EPA Method 8270D.
3. PCBs = polychlorinated biphenyls.
4. TPH = Total Petroleum Hydrocarbons as D (diesel) and as HO (heavy or motor oil).
5. PAHs = Polycyclic aromatic hydrocarbons
6. Toxicity equivalents calculated using toxicity equivalency methodology in WAC 173-340-708(8)
7. "U" indicates chemical concentration not detected at or above the laboratory reporting limit shown.
8. **Bold** indicates exceedence of the listed cleanup level.
9. ND = not detected
10. If no result is listed, then the analyses were not performed for that sample.
11. Based on ambient water quality criteria for protection of aquatic life (WAC 173-201A-040) and for protection of human health (Chapter 173-201A-WAC and 40 C.F.R. Part 131) unless otherwise indicated.
12. Value adjusted upward to natural background based on "Draft Report, Sections 1-7 Background Concentrations of Selected Chemicals in Water, Soil, Sediments, and Air of Washington State" (PTI 1989).
13. Water quality objective, 6-month median, from "A Compilation of Water Quality Goals" (California Environmental Protection Agency, August 2000).
14. Fresh water ecological LC50 from U.S. EPA Superfund Chemical Data Matrix.
15. NOAA SQUIRT Screening Quick Reference Tables.
16. National Recommended Water Quality Criteria
17. Sulfide concentration protective of benthos as presented in Sediment Management Annual Review Meeting (SMARM 2005) and summarized by Anchor (2005)
18. Monitoring wells MW-1 through MW-4 were installed in 2001; MW-5 through MW-7 were installed in July, 2005

TABLE 17
GROUNDWATER ANALYTICAL RESULTS[1]
MJB North Area
Anacortes, Washington

Concentrations in ppb (ug/l)

	Well ID	Preliminary Cleanup Level Protective of Groundwater as Drinking Water	Preliminary Cleanup Level Protective of Marine Surface Water (or Other Water Quality Info)[11]	MW-3					MW-3 (field duplicate)		MW-4			
	Sample ID			MW-3-110901	MW03GW-040420	MW03GW-040830	MW-3-0705	MW-3-0106	MW-13-110901	MW53GW-040830	MW-4-110901	MW04GW-040830	MW-4-0705	MW-4-0106
	Date Sampled			11/9/2001	4/20/2004	8/30/2004	7/21/2005	1/24/2006	11/9/2001	8/30/2004	11/9/2001	8/30/2004	7/21/2005	1/24/2006
Dissolved Metals	Antimony	**6**	**640**	1U	50U	0.6	0.2U	0.2U	1U	0.5	1	0.6	0.6	0.6
	Arsenic	**8**	**8**	4	1	**10**	1.2	2.2	4	**10**	8	**21**	**13**	**10.2**
	Cadmium	**5**	**8.8**	1U	2U	0.20U	2U	2U	1U	0.20U	1U	0.20U	2U	2U
	Chromium	**100**	**50**	5U	5U	0.9	5	5U	5	1	9	13	20	9
	Copper	**590**	**20**[12]	3	2U	1	2U	2U	3	1	11	1.9	3	2U
	Lead	**15**	**8.1**	5U	1U	1.0U	1U	1U	5U	1.0U	5U	1.0U	1U	1U
	Mercury	**2**	**0.04**	0.1U	0.1U	0.10U	0.1U	0.1U	0.1U	0.10U	0.1U	0.10U	0.1U	0.1U
	Zinc	**4,800**	**160**	6U	6U	4.0U	6U	6U	6U	4.0U	6	6	6U	6U
Ammonia		---		--	2,040	720	1,840	172	--	790	--	4,220	5,540	4,040
Sulfide		---	**30,000**[17]	--	110	50U	50U	70	--	50U	--	50U	50U	3,700
TPH-D[4]		**500**	--	250U	250U	250U	--	--	250U	250U	250 UJ	250	--	--
TPH-HO		**500**	--	500U	500U	500U	--	--	500U	500U	500 UJ	500U	--	--
PCBs[3]		**1.8**	**1.8**	0.2UJ	0.10U	0.25U	--	--	0.2UJ	0.25U	0.2UJ	0.02UJ	--	--
SVOCs	Benzoic Acid	**64,000**	**180,000**[14]	50U	10U	10U	--	--	50U	10U	50U	10U	--	--
	4-Methylphenol	**80**	**30; 120**[13]	1U	1.0U	1.0U	--	--	1U	1.0U	1U	1.0U	--	--
	Phenol	**9,600**	**1,100,000**	2U	2.1U	2.0U	--	--	2U	2.0U	2U	2.0U	--	--
PAHs[5]	Naphthalene	**16**	**4,940**	0.12	0.5U	1.0U	--	--	0.11	0.50U	0.1U	1.0U	--	--
	Acenaphthylene	--	--	--	--	--	--	--	--	--	--	--	--	--
	Acenaphthene	**960**	**643**	0.1U	1.0U	1.0U	--	--	0.1U	1.0U	0.26	1.0U	--	--
	Fluorene	**640**	**3460**	0.14	0.047	0.01U	--	--	0.16	0.01U	0.1U	0.02	--	--
	Phenanthrene	--	--	--	--	--	--	--	--	--	--	--	--	--
	Anthracene	**2,400**	**25,900**	0.1U	0.022J	0.01U	--	--	0.1U	0.01U	0.1U	0.01U	--	--
	Fluoranthene	**640**	**90.2**	0.15	0.012	0.01U	--	--	0.17	0.01U	0.1U	0.02	--	--
	Pyrene	**480**	**2,590**	0.12	0.013J	0.01U	--	--	0.14	0.01U	0.11	0.02	--	--
	Benzo(g,h,i)perylene	---	**300**[15]	--	--	--	--	--	--	--	--	--	--	--
	Benzo(a)pyrene	**0.16**	**4.72**	0.1U	0.010U	0.01U	--	--	0.1U	0.01U	0.1U	0.01U	--	--
	Benzo(a)anthracene	**6**	**6**	0.1U	0.010U	0.01U	--	--	0.1U	0.01U	0.1U	0.01U	--	--
	Benzo(b)fluoranthene	**4.93**	**4.93**	0.1U	0.010U	0.01U	--	--	0.1U	0.01U	0.1U	0.01U	--	--
	Benzo(k)fluoranthene	**7.19**	**7.19**	0.1U	0.010U	0.01U	--	--	0.1U	0.01U	0.1U	0.01U	--	--
	Chrysene	**6.99**	**6.99**	0.1U	0.010U	0.01U	--	--	0.1U	0.01U	0.1U	0.01U	--	--
	Dibenzo(a,h)anthracene	**6.88**	**6.88**	0.1U	0.010U	0.01U	--	--	0.1U	0.01U	0.1U	0.01U	--	--
	Indeno(1,2,3-cd)pyrene	**5.97**	**5.97**	0.1U	0.010U	0.01U	--	--	0.1U	0.01U	0.1U	0.01U	--	--

Notes:
1. Groundwater samples analyzed by Analytical Resources, Inc. of Tukwila, Washington: Metals by EPA Methods 7421, 6010B and 7470A, Ammonia by EPA Method 350.1, Sulfide by EPA Method 376.2, PCBs by EPA Method 8082, TPH-D and TPH-HO by NWTPH-Dx, and SVOCs by EPA Method 8270D.
3. PCBs = polychlorinated biphenyls.
4. TPH = Total Petroleum Hydrocarbons as D (diesel) and as HO (heavy or motor oil).
5. PAHs = Polycyclic aromatic hydrocarbons
6. Toxicity equivalents calculated using toxicity equivalency methodology in WAC 173-340-708(8)
7. "U" indicates chemical concentration not detected at or above the laboratory reporting limit shown.
8. **Bold** indicates exceedence of the listed cleanup level.
9. ND = not detected
10. If no result is listed, then the analyses were not performed for that sample.
11. Based on ambient water quality criteria for protection of aquatic life (WAC 173-201A-040) and for protection of human health (Chapter 173-201A-WAC and 40 C.F.R. Part 131) unless otherwise indicated.
12. Value adjusted upward to natural background based on "Draft Report, Sections 1-7 Background Concentrations of Selected Chemicals in Water, Soil, Sediments, and Air of Washington State" (PTI 1989).
13. Water quality objective, 6-month median, from "A Compilation of Water Quality Goals" (California Environmental Protection Agency, August 2000).
14. Fresh water ecological LC50 from U.S. EPA Superfund Chemical Data Matrix.
15. NOAA SQUIRT Screening Quick Reference Tables.
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17. Sulfide concentration protective of benthos as presented in Sediment Management Annual Review Meeting (SMARM 2005) and summarized by Anchor (2005)
18. Monitoring wells MW-1 through MW-4 were installed in 2001; MW-5 through MW-7 were installed in July, 2005

TABLE 17
GROUNDWATER ANALYTICAL RESULTS[1]
MJB North Area
Anacortes, Washington

Concentrations in ppb (ug/l)

	Well ID	Preliminary Cleanup Level Protective of Groundwater as Drinking Water	Preliminary Cleanup Level Protective of Marine Surface Water (or Other Water Quality Info)[11]	MW-5		MW-6		MW-6 (field duplicate)		MW-7		Seep AN-WP01	Seep AN-WP02
	Sample ID			MW-5-0705	MW-5-0106	MW-6-0705	MW-6-0106	MW-6X-0705	MW-6X-0106	MW-7-0705	MW-7-0106	ANRI-GW-WP01	ANRI-GW-WP02
	Date Sampled			7/21/2005	1/24/2006	7/21/2005	1/24/2006	7/21/2005	1/24/2006	7/21/2005	1/24/2006	7/21/2005	7/21/2005
Dissolved Metals	Antimony	**6**	**640**	2	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U	0.2U	1.0U	1.0U
	Arsenic	**8**	**8**	2U	2	6.5	5.1	6.5	5.2	2.5	0.8	1.0U	1U
	Cadmium	**5**	**8.8**	4U	4U	2U	2U	2U	2U	2U	2U	1.0U	1U
	Chromium	**100**	**50**	50	10U	5	5U	6	5U	6	5U	--	5U
	Copper	**590**	**20**[12]	4U	4U	2U	6	2U	2U	2U	2U	10	7
	Lead	**15**	**8.1**	1U	5U	1U	1U	1U	1U	1U	1	5.0U	5.0U
	Mercury	**2**	**0.04**	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.1U	0.10U	0.10U
	Zinc	**4,800**	**160**	10U	10U	6U	10	6U	6U	6U	6U	30	20U
Ammonia		---		725	2,300	1,710	1,360	1,680	1,330	271	244	340	440
Sulfide		---	**30,000**[17]	50U	8,000	50U	50U	50U	50U	50U	50U	15,000J	23,900J
TPH-D[4]		**500**	--	250U	250U	--	--	--	--	--	--	--	--
TPH-HO		**500**	--	500U	500U	--	--	--	--	--	--	--	--
PCBs[3]		**1.8**	**1.8**	1.0U	1.0U	--	--	--	--	--	--	--	--
SVOCs	Benzoic Acid	**64,000**	**180,000**[14]	10U	11	--	--	--	--	--	--	--	--
	4-Methylphenol	**80**	**30; 120**[13]	1.0U	**31**	--	--	--	--	--	--	1.0U	1.0U
	Phenol	**9,600**	**1,100,000**	1.0U	1.1	--	--	--	--	--	--	--	--
PAHs[5]	Naphthalene	**16**	**4,940**	1.0U	1.0U	--	--	--	--	--	--	--	--
	Acenaphthylene	--	--	1.0U	1.0U	--	--	--	--	--	--	--	--
	Acenaphthene	**960**	**643**	1.0U	1.0U	--	--	--	--	--	--	--	--
	Fluorene	**640**	**3460**	1.0U	1.0U	--	--	--	--	--	--	--	--
	Phenanthrene	--	--	1.0U	1.0U	--	--	--	--	--	--	--	--
	Anthracene	**2,400**	**25,900**	1.0U	1.0U	--	--	--	--	--	--	--	--
	Fluoranthene	**640**	**90.2**	1.0U	1.0U	--	--	--	--	--	--	--	--
	Pyrene	**480**	**2,590**	1.0U	1.0U	--	--	--	--	--	--	--	--
	Benzo(g,h,i)perylene	---	**300**[15]	1.0U	1.0U	--	--	--	--	--	--	--	--
	Benzo(a)pyrene	**0.16**	**4.72**	1.0U	1.0U	--	--	--	--	--	--	--	--
	Benzo(a)anthracene	**6**	**6**	1.0U	1.0U	--	--	--	--	--	--	--	--
	Benzo(b)fluoranthene	**4.93**	**4.93**	1.0U	1.0U	--	--	--	--	--	--	--	--
	Benzo(k)fluoranthene	**7.19**	**7.19**	1.0U	1.0U	--	--	--	--	--	--	--	--
	Chrysene	**6.99**	**6.99**	1.0U	1.0U	--	--	--	--	--	--	--	--
	Dibenzo(a,h)anthracene	**6.88**	**6.88**	1.0U	1.0U	--	--	--	--	--	--	--	--
	Indeno(1,2,3-cd)pyrene	**5.97**	**5.97**	1.0U	1.0U	--	--	--	--	--	--	--	--

Notes:
1. Groundwater samples analyzed by Analytical Resources, Inc. of Tukwila, Washington: Metals by EPA Methods 7421, 6010B and 7470A, Ammonia by EPA Method 350.1, Sulfide by EPA Method 376.2, PCBs by EPA Method 8082, TPH-D and TPH-HO by NWTPH-Dx, and SVOCs by EPA Method 8270D.
3. PCBs = polychlorinated biphenyls.
4. TPH = Total Petroleum Hydrocarbons as D (diesel) and as HO (heavy or motor oil).
5. PAHs = Polycyclic aromatic hydrocarbons
6. Toxicity equivalents calculated using toxicity equivalency methodology in WAC 173-340-708(8)
7. "U" indicates chemical concentration not detected at or above the laboratory reporting limit shown.
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17. Sulfide concentration protective of benthos as presented in Sediment Management Annual Review Meeting (SMARM 2005) and summarized by Anchor (2005)
18. Monitoring wells MW-1 through MW-4 were installed in 2001; MW-5 through MW-7 were installed in July, 2005

TABLE 18
GROUNDWATER GENERAL FIELD PARAMETER RESULTS
Remedial Investigation
MJB North Area
Anacortes, Washington

Well ID	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7
Date	7/21/2005	7/21/2005	7/21/2005	7/21/2005	7/21/2005	7/21/2005	7/21/2005
Field Data							
Temperature (degrees C)	18.3	18.1	16.4	18.6	17.9	18.1	17.8
Field pH (units)	*8.45*	*8.49*	*8.37*	*8.13*	*7.72*	*7.85*	*7.99*
Specific Conductivity (mS/cm)	13.9	13.4	0.94	4.2	39.8	2.85	1.26
Dissolved Oxygen (mg/L)	1.03	1.06	1.19	1.57	1.99	1.96	3.07
Redox Potential (mV)	-295	-331	-231	-165	33	4	-14
Turbidity (NTUs)	0	0	0	80	0	0	84

Well ID	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7
Date	1/24/2006	1/24/2006	1/24/2006	1/24/2006	1/24/2006	1/24/2006	1/24/2006
Field Data							
Temperature (degrees C)	11.28	10.6	11.25	10.39	11.8	11.4	11.86
Field pH (units)	8.35	8.28	6.27	6.58	8.45	6.49	5.74
Specific Conductivity (mS/cm)	6.72	2.18	0.372	3.09	13.8	1.7	0.653
Dissolved Oxygen (mg/L)	3.91	4.06	4.92	6.04	3.66	5.71	5.42
Redox Potential (mV)	-326	-332	-3	-39	-318	-49	104
Turbidity (NTUs)	0	0	33.6	0	0	19.2	0

1. C = Celsius
2. mS/cm = millisiemens/centimeter
3. mg/L = milligrams per liter
4. mV = millivolts
5. NTU = nephelometric turbidity units
6. *pH probe would not calibrate; therefore, pH measurements on 7/21/05 are unreliable.*

TABLE 19
Summary of SMS Chemical Concentrations in Marine Area Sediments

Location ID			CTB-7	CTB-7	CTB-3	GPC-2	GPC-5	GPC-6	SB-SED01	SB-SED03	SB-SED04	ET-SS01	ET-SS02	ET-SS03	ET-SS04	ET-SS06	ET-SS07	ET-SS08	ET-SS09	IS-01
Sample ID			154007011	154007012	154007014	154007015	154007016	154007017	B708114-12	B708114-13	B708114-14	ET-SS01-12/11/1998	ET-SS02-12/11/1998	ET-SS03-12/11/1998	ET-SS04-12/11/1998	ET-SS06-12/11/1998	ET-SS07-12/11/1998	ET-SS08-12/11/1998	ET-SS09-12/11/1998	294000
Sample Date			6/5/1997	6/5/1997	6/5/1997	6/6/1997	6/6/1997	6/6/1997	8/6/1997	8/6/1997	8/6/1997	12/11/1998	12/11/1998	12/11/1998	12/11/1998	12/11/1998	12/11/1998	12/11/1998	12/11/1998	7/17/2000
Depth Interval	Preliminary		0-4 ft	0-4 ft	0-4 ft	0-0.33 ft	0-0.33 ft	0-0.33 ft	0-0.3 ft	0-0.13 ft	0-0.2 ft	0-0.33 ft	0-0.33 ft	0-0.33 ft	0-0.33 ft	0-0.33 ft	0-0.33 ft	0-0.33 ft	0-0.33 ft	0-0.5 ft
Sample Matrix	Cleanup	SMS	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE
Sample Type	Level	CSL	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Conventionals (%)																				
Total organic carbon	--	--	**1**	**0.76**	**1**	**1.2**	**1.9**	**2.2**	**0.3**	**0.44**	**2.46**	**0.72**	**8.7**	**13**	**0.64**	**5.2**	**5.7**	**1.6**	**0.45**	--
Total solids	--	--	**61.6**	**71.4**	**60.8**	**73.6**	**48.5**	**44.6**	**71.2**	**74.4**	**55.8**	**88.2**	**0.71**	**78.5**	**93.3**	**77.8**	**62.9**	**88.7**	**83**	--
Total volatile solids	9.7	15	**3.7**	**2.1**	**3.9**	**2.5**	**7.4**	**6.5**	--	--	--	--	--	--	--	--	--	--	--	--
Grain Size (%)																				
Gravel	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sand	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silt	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Clay	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fines	--	--	**87**	**63**	**81**	**10**	**84**	**92**	--	--	--	--	--	--	--	--	--	--	--	--
Metals (mg/kg)																				
Arsenic	57	93	5 U	7 U	8 U	8 U	9 U	10 U	**3 J**	**3 J**	**4 J**	**7**	**6**	**9**	**7**	**13**	**6**	**14**	**6**	**5**
Cadmium	5.1	6.7	**0.4**	**0.5**	**0.9**	**0.3**	**1.1**	**0.7**	**0.2**	**0.2**	**2.1**	0.5 U	0.3 U	**0.4**	**0.5**	**0.7**	**0.7**	**0.6**	**0.3**	--
Chromium	260	270	--	--	--	**22**	**36**	**41**	**25**	**6**	**13**	**52**	**36**	**46**	**59**	**39**	**39**	**61**	**45**	**26 J**
Copper	390	390	**15**	**16**	**20**	**101**	**38**	**38**	**60**	**34**	**91**	**91**	**109**	**130**	**755 * #**	**177**	**107**	**214**	**86**	**30**
Lead	450	530	**4**	**6**	**9**	**99**	**17**	**17**	**50 J**	**12 J**	**29 J**	**62**	**81**	**1020 * #**	**81**	**402**	**109**	**52**	**46**	**6 J**
Mercury	0.41	0.59	**0.02**	**0.02**	**0.03**	**0.13**	**0.09**	**0.07**	0.1 U	0.1 U	0.1 U	**0.16**	**0.88 * #**	**0.48 ***	0.05 U	0.06 U	**0.08**	0.05 U	0.06 U	**0.1 J**
Silver	6.1	6.1	**0.3**	**0.4**	**0.5**	0.5 U	0.5 U	0.7 U	**0.05**	**0.02**	**0.05**	**0.04**	**0.09**	**0.3**	**0.03**	**0.08**	**0.06**	**0.05**	**0.06**	0.3 U
Zinc	410	960	**38**	**43**	**50**	**40**	**76**	**76**	**67**	**18**	**335**	**138**	**128**	**143**	**206**	**178**	**221**	**234**	**117**	**90**
PCBs (mg/kg-OC)																				
Total PCBs (SMS)	12	65	3.80 U	5.0 U	3.80 U	**16.7 ***	--	1.73 U	16.7 U	11.4 U	--	**4.17**	**32.0 ***	**10.8**	**7.34**	1.54 U	**1.40**	--	--	--
LPAH (mg/kg-OC)																				
Naphthalene	99	170	**4.40**	2.50 U	**2.30**	--	**1.47**	0.86 U	**9.67**	4.55 U	**3.21**	2.64 U	0.23 U	0.14 U	2.97 U	0.36 U	**1.75**	1.19 U	4.22 U	--
Acenaphthylene	66	66	1.90 U	2.50 U	1.90 U	--	1.05 U	0.86 U	6.67 U	4.55 U	0.40 U	2.64 U	0.23 U	0.14 U	2.97 U	0.36 U	**0.52**	1.19 U	4.22 U	--
Acenaphthene	16	57	1.90 U	2.50 U	1.90 U	--	**1.53**	0.86 U	6.67 U	4.55 U	**0.77**	2.64 U	0.23 U	0.14 U	2.97 U	0.36 U	**5.96**	1.19 U	4.22 U	--
Fluorene	23	79	1.90 U	2.50 U	1.90 U	--	**1.89**	0.86 U	6.67 U	4.55 U	**0.73**	2.64 U	0.23 U	0.14 U	2.97 U	0.36 U	**10**	1.19 U	4.22 U	--
Phenanthrene	100	480	**4.0**	2.50 U	**2.60**	--	**10**	**2.41**	**20.7**	4.55 U	**7.89**	2.64 U	**0.23**	0.14 U	5.94 U	0.36 U	**80.7**	**5.62**	**17.8**	--
Anthracene	220	1200	1.90 U	2.50 U	1.90 U	--	**3.84**	0.86 U	6.67 U	4.55 U	**1.46**	2.64 U	0.23 U	0.14 U	2.97 U	0.36 U	**19.3**	1.19 U	4.22 U	--
2-Methylnaphthalene	38	64	1.90 U	2.50 U	1.90 U	--	1.05 U	0.86 U	6.67 U	4.55 U	**0.52**	2.64 U	0.23 U	0.14 U	2.97 U	0.36 U	**5.61**	1.19 U	4.22 U	--
Total LPAH (SMS)	370	780	**8.40**	2.50 U	**4.90**	--	**18.7**	**2.41**	**30.3**	4.55 U	**14.1**	2.64 U	**0.23**	0.14 U	5.94 U	0.36 U	**118**	**5.62**	**17.8**	--
HPAH (mg/kg-OC)																				
Fluoranthene	160	1200	**4.40**	2.50 U	**2.50**	**2.92**	**14.7**	**5.0**	**29**	4.55 U	**6.71**	2.64 U	0.23 U	0.14 U	**6.25**	0.36 U	**26.3**	**5.0**	**20**	--
Pyrene	1000	1400	**4.60**	2.50 U	**2.0**	**2.33**	**14.2**	**5.0**	**27.3**	4.55 U	**8.17**	2.64 U	**0.28**	0.14 U	**6.25**	0.36 U	**52.6**	**5.0**	**17.8**	--
Benzo(a)anthracene	110	270	1.90 U	2.50 U	1.90 U	1.58 U	**4.68**	**1.68**	**10.7**	4.55 U	**2.48**	2.64 U	0.23 U	0.14 U	2.97 U	0.36 U	**21.1**	**1.88**	**4.44**	--
Chrysene	110	460	**2.50**	2.50 U	1.90 U	1.58 U	**9.47**	**4.09**	**15**	4.55 U	**2.76**	2.64 U	**0.28**	0.14 U	**3.12**	0.36 U	**22.8**	**3.12**	**8.89**	--
Benzo(a)pyrene	99	210	1.90 U	2.50 U	1.90 U	1.58 U	**4.58**	**1.68**	**9.0**	4.55 U	**2.11**	2.64 U	0.23 U	0.14 U	2.97 U	0.36 U	**16.5**	**1.88**	**8.89**	--
Indeno(1,2,3-cd)pyrene	34	88	1.90 U	2.50 U	1.90 U	1.58 U	**2.63**	0.86 U	6.67 U	4.55 U	**1.26**	2.64 U	0.23 U	0.14 U	2.97 U	0.36 U	**6.14**	**2.50**	**4.44**	--
Dibenzo(a,h)anthracene	12	33	1.90 U	2.50 U	1.90 U	1.58 U	1.05 U	0.86 U	6.67 U	4.55 U	0.40 U	2.64 U	0.23 U	0.14 U	2.97 U	0.36 U	**2.28**	1.19 U	4.22 U	--
Benzo(g,h,i)perylene	31	78	1.90 U	2.50 U	1.90 U	1.58 U	**2.26**	**1.0**	6.67 U	4.55 U	**1.67**	2.64 U	0.23 U	0.14 U	2.97 U	0.36 U	**7.37**	**1.25**	**6.67**	--
Total HPAH (SMS)	960	5300	**11.5**	2.50 U	**4.50**	**5.25**	**62.3**	**22.7**	**102**	4.55 U	**28.5**	2.64 U	**0.57**	0.14 U	**15.6**	0.36 U	**174**	**25**	**84.4**	--
Total benzofluoranthenes	230	450	--	--	--	1.58 U	**9.74**	**4.27**	**11**	4.55 U	**3.33**	2.64 U	0.23 U	0.14 U	2.97 U	0.36 U	**19.3**	**4.38**	**13.3**	--
Chlorinated Hydrocarbons (mg/kg-OC)																				
1,4-Dichlorobenzene	3.1	9	1.90 U	2.50 U	1.90 U	--	1.05 U	0.86 U	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichlorobenzene	2.3	2.3	1.90 U	2.50 U	1.90 U	--	1.05 U	0.86 U	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4-Trichlorobenzene	0.81	1.8	1.90 U	2.50 U	1.90 U	--	1.05 U	0.86 U	--	--	--	--	--	--	--	--	--	--	--	--
Hexachlorobenzene	0.38	2.3	1.90 U	2.50 U	1.90 U	--	1.05 U	0.86 U	13.3 U	9.09 U	1.63 U	--	--	--	--	--	--	--	--	--
Phthalates (mg/kg-OC)																				
Dimethylphthalate	53	53	1.90 U	2.50 U	1.90 U	1.58 U	1.05 U	0.86 U	13.3 U	9.09 U	1.63 U	--	--	--	--	--	--	--	--	--
Diethylphthalate	61	110	1.90 U	2.50 U	1.90 U	1.58 U	1.05 U	0.86 U	13.3 U	9.09 U	1.63 U	--	--	--	--	--	--	--	--	--
Di-n-butylphthalate	220	1700	1.90 U	2.50 U	1.90 U	1.58 U	1.05 U	0.86 U	333 U	227 U	40.7 U	--	--	--	--	--	--	--	--	--
Butylbenzylphthalate	4.9	64	1.90 U	2.50 U	1.90 U	1.58 U	1.05 U	0.86 U	66.7 U	45.5 U	8.13 U	--	--	--	--	--	--	--	--	--
bis(2-ethylhexyl)phthalate	47	78	**9.80 B**	2.50 U	**16 B**	**7.83 B**	**4.21 B**	**2.36 B**	333 U	227 U	40.7 U	**3.89**	**0.32**	**0.18**	2.97 U	0.36 U	**0.57**	1.19 U	**6.67**	--
Di-n-octylphthalate	58	4500	1.90 U	2.50 U	1.90 U	1.58 U	1.05 U	0.86 U	333 U	227 U	40.7 U	--	--	--	--	--	--	--	--	--
Misc Extractables (mg/kg-OC)																				
Dibenzofuran	15	58	1.90 U	2.50 U	1.90 U	--	**1.21**	0.86 U	13.3 U	9.09 U	1.63 U	2.64 U	0.23 U	0.14 U	2.97 U	0.36 U	**1.11**	1.19 U	4.22 U	--
Hexachlorobutadiene	3.9	6.2	1.90 U	2.50 U	1.90 U	--	1.05 U	0.86 U	13.3 U	9.09 U	1.63 U	--	--	--	--	--	--	--	--	--
n-Nitroso-di-phenylamine	11	11	1.90 U	2.50 U	1.90 U	--	1.05 U	0.86 U	13.3 U	9.09 U	1.63 U	--	--	--	--	--	--	--	--	--
Phenols (µg/kg)																				
Phenol	420	1200	19 U	19 U	19 U	19 U	20 U	**72**	40 U	40 U	40 U	--	--	--	--	--	--	--	--	570 U
2-Methylphenol	63	63	19 U	19 U	19 U	19 U	20 U	19 U	40 U	40 U	40 U	--	--	--	--	--	--	--	--	570 U
4-Methylphenol	670	670	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4-Dimethylphenol	29	29	19 U	19 U	19 U	19 U	20 U	19 U	40 U	40 U	40 U	--	--	--	--	--	--	--	--	570 U
Pentachlorophenol	360	690	95 U	95 U	94 U	94 U	100 U	96 U	20 U	20 U	10 U	--	--	--	--	--	--	--	--	--
Misc Extractables (µg/kg)																				
Benzyl alcohol	57	73	19 U	19 U	19 U	19 U	20 U	19 U	40 U	40 U	40 U	--	--	--	--	--	--	--	--	--
Benzoic acid	650	650	19 U	19 U	19 U	2 U	10 U	4 U	200 U	200 U	200 U	--	--	--	--	--	--	--	--	--

TABLE 19
Summary of SMS Chemical Concentrations in Marine Area Sediments

Location ID			IS-02	IS-03	IS-04	IS-05	IS-06	IS-07	IS-08	IS-09	IS-10	IS-11	IS-12	Sed-1	Sed-2	Sed-3	AN-SS-1	AN-SS-2	AN-SS-3	AN-SS-4	AN-SS-5	AN-SS-6	AN-SS-7	AN-SS-8	AN-SS-9
Sample ID			294001	294002	294003	294004	294005	294006	294007	294008	294009	294010	294011	Sed-1	Sed-2	Sed-3	AN-SS-1	AN-SS-2	AN-SS-3	AN-SS-4	AN-SS-5	AN-SS-6	AN-SS-7	AN-SS-8	AN-SS-9
Sample Date			7/17/2000	7/18/2000	7/18/2000	7/18/2000	7/18/2000	7/18/2000	7/18/2000	7/19/2000	7/19/2000	7/19/2000	7/19/2000	11/14/2001	11/14/2001	11/14/2001	2/12/2002	2/12/2002	2/12/2002	2/12/2002	2/12/2002	2/12/2002	2/12/2002	2/12/2002	2/12/2002
Depth Interval	Preliminary Cleanup Level	SMS CSL	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.33 ft	0-0.33 ft	0-0.33 ft	0-0.33 ft	0-0.33 ft	0-0.33 ft	0-0.33 ft	0-0.33 ft	0-0.33 ft	0-0.33 ft	0-0.33 ft	0-0.33 ft	0-0.33 ft
Sample Matrix			SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE
Sample Type			N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Conventionals (%)																										
Total organic carbon	--	--	**1.47**	--	**1.04**	--	**2.13**	--	**1.16**	--	**2.29**	--	**1.52**	**0.38**	**6.3**	**2.6**	**1.6**	**1.1**	**2.2**	**2.2**	**1.6**	**1.4**	**1.2**	**1.3**	**1**
Total solids	--	--	--	--	--	--	--	--	--	--	**0.83**	--	**0.8**	**72.7**	**47**	**70.8**	--	--	--	--	--	--	--	--	--
Total volatile solids	9.7	15	--	--	--	--	--	--	--	--	--	--	--	**3.1**	**35 * #**	**4.8**	--	--	--	--	--	--	--	--	--
Grain Size (%)																									
Gravel	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sand	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silt	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Clay	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fines	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Metals (mg/kg)																									
Arsenic	57	93	**28**	**10**	**10**	**5**	**4**	**6**	**5**	**4**	**6**	**4**	**4**	**4.2**	**6**	**2.4**	**9**	8 U	10 U	**10**	**7**	7 U	8 U	7 U	8 U
Cadmium	5.1	6.7	--	--	--	--	--	--	--	--	--	--	--	0.3 U	**0.6**	0.3 U	**0.3**	**0.5**	**0.7**	**0.8**	0.3 U	**0.5**	**0.4**	0.3 U	**0.7**
Chromium	260	270	**49 J**	**24 J**	**18 J**	**26 J**	**27 J**	**29 J**	**32 J**	**20 J**	**78 J**	**25 J**	**27 J**	**123 J**	**41**	**18.1**	--	--	--	--	--	--	--	--	--
Copper	390	390	**854 * #**	**50**	**74**	**41**	**34**	**46**	**48**	**44**	**176**	**64**	**64**	**50.5 J**	**120**	**34.1**	**13.7**	**17.3**	**42.8**	**36.6**	**238**	**23**	**12.4**	**230**	**14.2**
Lead	450	530	**16 J**	**13 J**	**14 J**	**10 J**	**32 J**	**7 J**	**8 J**	**40 J**	**66 J**	**48 J**	**67 J**	**46**	**104**	**80**	**5**	**6**	**13**	**10**	**71**	**9**	**4**	**37**	**4**
Mercury	0.41	0.59	**0.08 J**	**0.11 J**	**0.07 J**	**0.09 J**	**0.12 J**	**0.09 J**	**0.14**	**0.2**	**0.19**	**0.1 J**	**0.09 J**	**0.1**	**0.53 ***	**0.08**	0.07 U	0.07 U	**0.13**	0.08 U	**0.19**	0.06 U	0.06 U	0.06 U	0.06 U
Silver	6.1	6.1	**0.4 J**	0.3 U	0.2 U	0.2 U	0.3 U	0.2 U	0.3 U	0.3 U	**4.5**	0.2 U	0.2 U	**0.06**	**0.15**	**4.2**	0.5 U	0.5 U	0.7 U	0.7 U	0.4 U	0.4 U	0.5 U	0.4 U	0.5 U
Zinc	410	960	**379**	**114**	**79**	**63**	**87**	**81**	**65**	**100**	**86**	**87**	**102**	**64.1**	**113**	**45.4**	**37.2**	**46**	**80**	**75**	**26.4**	**32**	**37.3**	**24.5**	**40**
PCBs (mg/kg-OC)																									
Total PCBs (SMS)	12	65	2.79 U	--	4.42 U	--	1.97 U	--	3.28 U	--	**21.0 ***	--	**6.32**	**8.95**	**71.4 * #**	**108 * #**	**1.06**	3.18 U	**1.09**	1.73 U	2.38 U	2.50 U	3.17 U	2.92 U	3.80 U
LPAH (mg/kg-OC)																									
Naphthalene	99	170	27.9 U	--	44.2 U	--	19.7 U	--	32.8 U	--	21 U	--	**7.89 J**	5.26 U	**3.49**	0.76 U	--	--	2.64 U	--	--	--	--	**1.69**	--
Acenaphthylene	66	66	27.9 U	--	44.2 U	--	19.7 U	--	32.8 U	--	21 U	--	29.6 U	5.26 U	**6.03**	**1.15**	--	--	2.64 U	--	--	--	--	1.46 U	--
Acenaphthene	16	57	27.9 U	--	44.2 U	--	19.7 U	--	32.8 U	--	21 U	--	**5.86 J**	5.26 U	**2.38**	0.76 U	--	--	2.64 U	--	--	--	--	1.46 U	--
Fluorene	23	79	27.9 U	--	44.2 U	--	19.7 U	--	32.8 U	--	21 U	--	**6.18 J**	5.26 U	**5.56**	**0.80**	--	--	2.64 U	--	--	--	--	1.46 U	--
Phenanthrene	100	480	27.9 U	--	**12.5 J**	--	**7.04 J**	--	32.8 U	--	**12.7 J**	--	**48.7**	**11.1**	**54**	**8.08**	--	--	**5.45**	--	--	--	--	**3.31**	--
Anthracene	220	1200	27.9 U	--	**4.81 J**	--	19.7 U	--	32.8 U	--	21 U	--	**13.8 J**	5.26 U	**9.52**	**1.77**	--	--	2.64 U	--	--	--	--	1.46 U	--
2-Methylnaphthalene	38	64	27.9 U	--	44.2 U	--	19.7 U	--	32.8 U	--	21 U	--	29.6 U	5.26 U	**2.06**	0.76 U	--	--	2.64 U	--	--	--	--	1.46 U	--
Total LPAH (SMS)	370	780	27.9 U	--	**17.3**	--	**7.04**	--	32.8 U	--	**12.7**	--	**82.4**	**11.1**	**81**	**11.8**	--	--	**5.45**	--	--	--	--	**5.0**	--
HPAH (mg/kg-OC)																									
Fluoranthene	160	1200	27.9 U	--	**17.3 J**	--	**9.86 J**	--	32.8 U	--	**13.1 J**	--	**48**	**16.6**	**57.1**	**10.4**	--	--	**12.7**	--	--	--	--	**4.54**	--
Pyrene	1000	1400	27.9 U	--	**17.3 J**	--	**8.45 J**	--	32.8 U	--	**15.3 J**	--	**46.1**	**13.2**	**47.6**	**9.62 J**	--	--	**7.27**	--	--	--	--	**3.23**	--
Benzo(a)anthracene	110	270	27.9 U	--	**6.63 J**	--	**2.58 J**	--	32.8 U	--	**5.68 J**	--	**19.7 J**	**6.32**	**15.9**	**5.77**	--	--	**3.09**	--	--	--	--	**1.54**	--
Chrysene	110	460	27.9 U	--	**7.21 J**	--	**3.52 J**	--	32.8 U	--	**7.42 J**	--	**20.4 J**	**7.63**	**20.6**	**7.69**	--	--	**6.36**	--	--	--	--	**1.92**	--
Benzo(a)pyrene	99	210	27.9 U	--	**5.96 J**	--	19.7 U	--	32.8 U	--	**4.80 J**	--	**12.5 J**	5.26 U	**20.6**	**4.62**	--	--	2.64 U	--	--	--	--	1.46 U	--
Indeno(1,2,3-cd)pyrene	34	88	27.9 U	--	44.2 U	--	19.7 U	--	32.8 U	--	**2.40 J**	--	**3.82 J**	5.26 U	**8.57**	**2.15**	--	--	2.64 U	--	--	--	--	1.46 U	--
Dibenzo(a,h)anthracene	12	33	27.9 U	--	44.2 U	--	19.7 U	--	32.8 U	--	21 U	--	29.6 U	5.26 U	**4.44**	0.76 U	--	--	2.64 U	--	--	--	--	1.46 U	--
Benzo(g,h,i)perylene	31	78	27.9 U	--	44.2 U	--	19.7 U	--	32.8 U	--	21 U	--	**3.68 J**	5.26 U	**7.78**	**1.92**	--	--	2.64 U	--	--	--	--	1.46 U	--
Total HPAH (SMS)	960	5300	27.9 U	--	**61.4**	--	**27.4**	--	32.8 U	--	**57.9**	--	**178**	**43.7**	**215**	**52.2**	--	--	**36.3**	--	--	--	--	**14.3**	--
Total benzofluoranthenes	230	450	27.9 U	--	**7.02**	--	**3.0**	--	32.8 U	--	**9.17**	--	**23.9**	5.26 U	**32.2**	**10**	--	--	**6.82**	--	--	--	--	**3.08**	--
Chlorinated Hydrocarbons (mg/kg-OC)																									
1,4-Dichlorobenzene	3.1	9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.64 U	--	--	--	--	1.46 U	--
1,2-Dichlorobenzene	2.3	2.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.64 U	--	--	--	--	1.46 U	--
1,2,4-Trichlorobenzene	0.81	1.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.64 U	--	--	--	--	1.46 U	--
Hexachlorobenzene	0.38	2.3	27.9 U	--	44.2 U	--	19.7 U	--	32.8 U	--	21 U	--	29.6 U	5.26 U	0.30 U	0.76 U	--	--	--	--	--	--	--	--	--
Phthalates (mg/kg-OC)																									
Dimethylphthalate	53	53	27.9 U	--	44.2 U	--	19.7 U	--	32.8 U	--	21 U	--	29.6 U	5.26 U	**0.60**	0.76 U	--	--	2.64 U	--	--	--	--	1.46 U	--
Diethylphthalate	61	110	27.9 U	--	44.2 U	--	19.7 U	--	32.8 U	--	21 U	--	29.6 U	5.26 U	0.30 U	0.76 U	--	--	2.64 U	--	--	--	--	1.46 U	--
Di-n-butylphthalate	220	1700	27.9 U	--	44.2 U	--	19.7 U	--	32.8 U	--	21 U	--	29.6 U	5.26 U	0.30 U	**1.23**	--	--	2.64 U	--	--	--	--	1.46 U	--
Butylbenzylphthalate	4.9	64	27.9 U	--	44.2 U	--	19.7 U	--	32.8 U	--	21 U	--	29.6 U	5.26 U	0.30 U	0.76 U	--	--	2.64 U	--	--	--	--	1.46 U	--
bis(2-ethylhexyl)phthalate	47	78	27.9 U	--	44.2 U	--	19.7 U	--	32.8 U	--	21 U	--	29.6 U	6.32 U	**20.6**	**15.4**	--	--	2.64 U	--	--	--	--	1.46 U	--
Di-n-octylphthalate	58	4500	27.9 U	--	44.2 U	--	19.7 U	--	32.8 U	--	21 U	--	29.6 U	5.26 U	0.30 U	0.76 U	--	--	2.64 U	--	--	--	--	1.46 U	--
Misc Extractables (mg/kg-OC)																									
Dibenzofuran	15	58	27.9 U	--	44.2 U	--	19.7 U	--	32.8 U	--	21 U	--	**3.42 J**	5.26 U	**2.70**	0.76 U	--	--	2.64 U	--	--	--	--	1.46 U	--
Hexachlorobutadiene	3.9	6.2	27.9 U	--	44.2 U	--	19.7 U	--	32.8 U	--	21 U	--	29.6 U	5.26 U	0.30 U	0.76 U	--	--	--	--	--	--	--	--	--
n-Nitroso-di-phenylamine	11	11	27.9 U	--	44.2 U	--	19.7 U	--	32.8 U	--	21 U	--	29.6 U	5.26 U	0.30 U	0.76 U	--	--	2.64 U	--	--	--	--	1.46 U	--
Phenols (µg/kg)																									
Phenol	420	1200	410 U	560 U	**2800**	420 U	420 U	370 U	380 U	530 U	480 U	410 U	450 U	20 U	**55**	20 U	--	--	58 U	--	--	--	--	19 U	--
2-Methylphenol	63	63	410 U	560 U	460 U	420 U	420 U	370 U	380 U	530 U	480 U	410 U	450 U	20 U	19 U	20 U	--	--	58 U	--	--	--	--	19 U	--
4-Methylphenol	670	670	--	--	--	--	--	--	--	--	--	--	--	**27**	**110**	20 U	--	--	58 U	--	--	--	--	**55**	--
2,4-Dimethylphenol	29	29	410 U	560 U	460 U	420 U	420 U	370 U	380 U	530 U	480 U	410 U	450 U	20 U	**22**	20 U	--	--	58 U	--	--	--	--	19 U	--
Pentachlorophenol	360	690	--	--	--	--	--	--	--	--	--	--	--	98 UJ	**78 J**	98 UJ	--	--	290 U	--	--	--	--	95 U	--
Misc Extractables (µg/kg)																									
Benzyl alcohol	57	73	--	--	--	--	--	--	--	--	--	--	--	20 U	19 U	20 U	--	--	58 U	--	--	--	--	19 U	--
Benzoic acid	650	650	--	--	--	--	--	--	--	--	--	--	--	200 U	190 U	200 U	--	--	580 U	--	--	--	--	190 U	--

TABLE 19
Summary of SMS Chemical Concentrations in Marine Area Sediments

Location ID			AN-SEDC-01	AN-SEDC-01	AN-SEDC-01	AN-SEDC-02	AN-SEDC-02	AN-SEDC-03	AN-SEDC-03	AN-SEDC-03	AN-SEDC-04	AN-SEDC-04	AN-SEDC-04	AN-SEDC-06	AN-SEDC-06	AN-SEDC-06	AN-SEDC-07	AN-SEDC-07
Sample ID			AN-RI-SEDC-01A	AN-RI-SEDC-01B	AN-RI-SEDC-01C	AN-RI-SEDC-02A	AN-RI-SEDC-02B	AN-RI-SEDC-03A	AN-RI-SEDC-03B	AN-RI-SEDC-03C	AN-RI-SEDC-04A	AN-RI-SEDC-04B	AN-RI-SEDC-04C	AN-RI-SEDC-06A	AN-RI-SEDC-06B	AN-RI-SEDC-06C	AN-RI-SEDC-07A	AN-RI-SEDC-07B
Sample Date			7/15/2005	7/15/2005	7/15/2005	7/14/2005	7/14/2005	7/15/2005	7/15/2005	7/15/2005	7/15/2005	7/15/2005	7/15/2005	7/14/2005	7/14/2005	7/14/2005	7/14/2005	7/14/2005
Depth Interval	Preliminary Cleanup Level	SMS CSL	0-14 in	14-28 in	28-40 in	0-7 in	7-15 in	0-7 in	7-16 in	16-26 in	0-5 in	5-15 in	15-25 in	5-15 in	15-21 in	21-29 in	0-7 in	7-13 in
Sample Matrix			SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE
Sample Type			N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Conventionals (%)																		
Total organic carbon	--	--	**1.20**	**0.532**	**0.259**	**1.83**	**0.31**	**3.23**	**0.607**	**0.297**	**2.48**	**0.621**	**0.864**	**10.6**	**2.21**	**1.05**	**1.04**	**3.99**
Total solids	--	--	**78**	**78.4**	**80.1**	**78.5**	**83.7**	**73.7**	**78.7**	**82.7**	**61.3**	**62.7**	**63.9**	**38.7**	**62.4**	**65.2**	**62.2**	**52**
Total volatile solids	9.7	15	**1.44 J**	**0.797 J**	**0.541 J**	**2.01 J**	**0.517 J**	**7.44 J**	**1.31 J**	**0.51 J**	**5.0 J**	**2.83 J**	**2.31 J**	**25.3 J * #**	**4.74 J**	**1.91 J**	**3.04 J**	**12.0 J**
Grain Size (%)																		
Gravel	--	--	**4.10**	**18**	**4.50**	**32.5**	**14.5**	**30**	**10.6**	**10.5**	**10.5**	**1.70**	**1.40**	**12.1**	**3.40**	**0.30**	**1.50**	**5.10**
Sand	--	--	**82.1**	**65.8**	**31.9**	**55.9**	**59.2**	**48.4**	**45.5**	**44.4**	**51.4**	**17.7**	**11.3**	**50.0**	**32.3**	**22.7**	**25.3**	**40.6**
Silt	--	--	**9.90**	**10.8**	**39.3**	**8.0**	**16.0**	**14.1**	**28.9**	**30.9**	**29.8**	**64.2**	**71.5**	**29.0**	**50.7**	**61.3**	**56.2**	**40.3**
Clay	--	--	**4.0**	**5.40**	**24.3**	**3.40**	**10.2**	**7.40**	**15.0**	**14.2**	**8.30**	**16.3**	**15.8**	**8.90**	**13.6**	**15.8**	**17.1**	**13.9**
Fines	--	--	**13.9**	**16.2**	**63.6**	**11.4**	**26.2**	**21.5**	**43.9**	**45.1**	**38.1**	**80.5**	**87.3**	**37.9**	**64.3**	**77.1**	**73.3**	**54.2**
Metals (mg/kg)																		
Arsenic	57	93	**6.0**	**7.0**	**7.0**	6.0 U	**6.0**	8.0 U	**8.0**	**8.0**	7.0 U	8.0 U	**8.0**	10 U	**11**	**8.0**	8.0 U	9.0 U
Cadmium	5.1	6.7	**0.80**	**0.50**	0.20 U	**0.30**	0.20 U	**0.50**	0.30 U	0.20 U	**0.80**	**1.10**	**0.70**	**0.80**	**0.90**	**1.10**	**1.20**	**1.0**
Chromium	260	270	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Copper	390	390	**10**	**10.7**	**41.1**	**34**	**25.3**	**79**	**37.9**	**37**	**24**	**15.3**	**17.4**	**21.9**	**14.2**	**13.5**	**16.7**	**102**
Lead	450	530	**5.0**	2.0 U	**6.0**	**16**	**5.0**	**52**	**8.0**	**5.0**	**6.0**	**4.0**	**4.0**	**8.0**	**6.0**	**4.0**	**4.0**	**7.0**
Mercury	0.41	0.59	0.06 U	0.06 U	0.06 U	**0.10**	0.05 U	**0.21**	0.06 U	0.06 U	**0.07**	0.08 U	0.08 U	0.10 U	0.08 U	0.06 U	0.07 U	0.08 U
Silver	6.1	6.1	0.40 U	0.40 U	0.40 U	0.40 U	0.30 U	0.50 U	0.40 U	0.30 U	0.40 U	0.50 U	0.40 U	0.70 U	0.40 U	0.40 U	0.50 U	0.50 U
Zinc	410	960	**26.6**	**19.5**	**62.7**	**38.5**	**44.4**	**43.6**	**47.8**	**53.1**	**31.7**	**40.7**	**44.8**	**50**	**35.9**	**38.9**	**40.9**	**40**
PCBs (mg/kg-OC)																		
Total PCBs (SMS)	12	65	1.58 U	3.58 U	7.60 U	1.04 U	6.13 U	**1.55**	3.33 U	6.90 U	0.76 U	3.23 U	2.33 U	0.18 U	0.86 U	1.81 U	1.92 U	0.50 U
LPAH (mg/kg-OC)																		
Naphthalene	99	170	1.67 U	3.58 U	8.0 U	1.04 U	6.13 UJ	1.86 U	3.33 U	6.90 U	**3.10**	3.23 U	2.33 U	**0.30**	**1.09**	1.81 U	1.92 U	**1.53**
Acenaphthylene	66	66	1.67 U	3.58 U	8.0 U	1.04 U	6.13 UJ	1.86 U	3.33 U	6.90 U	0.80 U	3.23 U	2.33 U	0.25 U	0.86 U	1.81 U	1.92 U	0.50 U
Acenaphthene	16	57	1.67 U	3.58 U	8.0 U	1.04 U	6.13 UJ	1.86 U	3.33 U	6.90 U	0.80 U	3.23 U	2.33 U	0.25 U	0.86 U	1.81 U	1.92 U	0.50 U
Fluorene	23	79	1.67 U	3.58 U	8.0 U	1.04 U	6.13 UJ	1.86 U	3.33 U	6.90 U	0.80 U	3.23 U	2.33 U	0.25 U	0.86 U	1.81 U	1.92 U	0.50 U
Phenanthrene	100	480	1.67 U	3.58 U		1.04 U	6.13 UJ	**4.03**	3.33 U	6.90 U	**1.49**	3.23 U	2.33 U	**0.46**	**1.45**	1.81 U	1.92 U	**1.53**
Anthracene	220	1200	1.67 U	3.58 U	8.0 U	1.04 U	6.13 UJ	1.86 U	3.33 U	6.90 U	0.80 U	3.23 U	2.33 U	0.25 U	0.86 U	1.81 U	1.92 U	0.50 U
2-Methylnaphthalene	38	64	1.67 U	3.58 U	8.0 U	1.04 U	6.13 UJ	1.86 U	3.33 U	6.90 U	0.80 U	3.23 U	2.33 U	0.25 U	0.86 U	1.81 U	1.92 U	0.50 U
Total LPAH (SMS)	370	780	1.67 U	3.58 U	8.0 U	1.04 U	6.13 UJ	**4.03**	3.33 U	6.90 U	**4.60**	3.23 U	2.33 U	**0.76**	**2.53**	1.81 U	1.92 U	**3.06**
HPAH (mg/kg-OC)																		
Fluoranthene	160	1200	**4.0**	3.58 U	8.0 U	**2.24**	6.13 UJ	**4.33**	3.33 U	6.90 U	**1.86**	3.23 U	2.33 U	**1.13**	**1.76**	1.81 U	1.92 U	**2.18**
Pyrene	1000	1400	**4.0**	3.58 U	8.0 U	**1.20**	6.13 UJ	**4.03**	3.33 U	6.90 U	**1.61**	3.23 U	2.33 U	**0.94**	**1.49**	1.81 U	1.92 U	**2.23**
Benzo(a)anthracene	110	270	**1.75**	3.58 U	8.0 U	1.04 U	6.13 UJ	1.86 U	3.33 U	6.90 U	0.80 U	3.23 U	2.33 U	**0.67**	0.86 U	1.81 U	1.92 U	**0.60**
Chrysene	110	460	**2.92**	3.58 U	8.0 U	1.04 U	6.13 UJ	1.86 U	3.33 U	6.90 U	0.80 U	3.23 U	2.33 U	**0.79**	**0.86**	1.81 U	1.92 U	**0.72**
Benzo(a)pyrene	99	210	1.67 U	3.58 U	8.0 U	1.04 U	6.13 UJ	1.86 U	3.33 U	6.90 U	0.80 U	3.23 U	2.33 U	**0.92**	0.86 U	1.81 UJ	1.92 U	**0.77**
Indeno(1,2,3-cd)pyrene	34	88	1.67 U	3.58 U	8.0 U	1.04 U	6.13 UJ	1.86 U	3.33 U	6.90 U	0.80 U	3.23 U	2.33 U	**0.40**	0.86 U	1.81 UJ	1.92 U	0.50 U
Dibenzo(a,h)anthracene	12	33	1.67 UJ	3.58 UJ	8.0 UJ	1.04 U	6.13 UJ	1.86 UJ	3.33 UJ	6.90 UJ	0.80 U	3.23 U	2.33 U	0.25 U	0.86 U	1.81 UJ	1.92 U	0.50 U
Benzo(g,h,i)perylene	31	78	1.67 U	3.58 U	8.0 U	1.04 U	6.13 UJ	1.86 U	3.33 U	6.90 U	0.80 U	3.23 U	2.33 U	**0.34**	0.86 U	1.81 UJ	1.92 U	0.50 U
Total HPAH (SMS)	960	5300	**14.3**	3.58 U	8.0 U	**3.44**	6.13 UJ	**8.36**	3.33 U	6.90 U	**3.47**	3.23 U	2.33 U	**7.06**	**6.20**	1.81 U	1.92 U	**7.94**
Total benzofluoranthenes	230	450	**1.67**	3.58 U	8.0 U	1.04 U	6.13 UJ	1.86 U	3.33 U	6.90 U	0.80 U	3.23 U	2.33 U	**1.84**	**2.08**	1.81 U	1.92 U	**1.43**
Chlorinated Hydrocarbons (mg/kg-OC)																		
1,4-Dichlorobenzene	3.1	9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichlorobenzene	2.3	2.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4-Trichlorobenzene	0.81	1.8	1.67 U	3.58 U	8.0 U	1.04 U	6.13 UJ	1.86 U	3.33 U	6.90 U	0.80 U	3.23 U	2.33 U	0.25 U	0.86 U	1.81 U	1.92 U	0.50 U
Hexachlorobenzene	0.38	2.3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phthalates (mg/kg-OC)																		
Dimethylphthalate	53	53	1.67 U	3.58 U	8.0 U	1.04 U	6.13 UJ	1.86 U	3.33 U	6.90 U	0.80 U	3.23 U	2.33 U	0.25 U	0.86 U	1.81 U	1.92 U	0.50 U
Diethylphthalate	61	110	1.67 U	3.58 U	8.0 U	1.04 U	6.13 UJ	1.86 U	3.33 U	6.90 U	0.80 U	3.23 U	2.33 U	0.25 U	0.86 U	1.81 U	1.92 U	0.50 U
Di-n-butylphthalate	220	1700	1.67 U	3.58 U	8.0 U	1.53 U	6.13 UJ	1.86 U	3.33 U	6.90 U	0.80 U	3.23 U	2.33 U	0.25 U	0.86 U	1.81 U	1.92 U	0.50 U
Butylbenzylphthalate	4.9	64	1.67 U	3.58 U	8.0 U	1.04 U	6.13 UJ	**2.91**	3.33 U	6.90 U	0.80 U	3.23 U	2.33 U	0.25 U	0.86 U	1.81 U	1.92 U	**0.50**
bis(2-ethylhexyl)phthalate	47	78	**3.67**	3.58 U	8.0 U	**2.24**	6.13 UJ	**4.33**	3.33 U	6.90 U	0.80 U	3.23 U	2.33 U	0.25 U	0.86 U	1.81 U	1.92 U	0.50 U
Di-n-octylphthalate	58	4500	1.67 U	3.58 U	8.0 U	1.04 U	6.13 UJ	1.86 U	3.33 U	6.90 U	0.80 U	3.23 U	2.33 U	0.25 U	0.86 U	1.81 UJ	1.92 U	0.50 U
Misc Extractables (mg/kg-OC)																		
Dibenzofuran	15	58	1.67 U	3.58 U	8.0 U	1.04 U	6.13 UJ	1.86 U	3.33 U	6.90 U	0.80 U	3.23 U	2.33 U	0.25 U	0.86 U	1.81 U	1.92 U	0.50 U
Hexachlorobutadiene	3.9	6.2	1.67 U	3.58 U	8.0 U	1.04 U	6.13 UJ	1.86 U	3.33 U	6.90 U	0.80 U	3.23 U	2.33 U	0.25 U	0.86 U	1.81 U	1.92 U	0.50 U
n-Nitroso-di-phenylamine	11	11	1.67 UJ	3.58 UJ	8.0 UJ	1.04 UJ	6.13 UJ	1.86 UJ	3.33 UJ	6.90 UJ	0.80 UJ	3.23 UJ	2.33 UJ	0.25 UJ	0.86 UJ	1.81 UJ	1.92 UJ	0.50 UJ
Phenols (µg/kg)																		
Phenol	420	1200	20 U	19 U	20 U	19 U	19 UJ	60 U	20 U	20 U	20 U	20 U	20 U	27 U	19 U	19 U	20 U	20 U
2-Methylphenol	63	63	20 U	19 U	20 U	19 U	19 UJ	60 U	20 U	20 U	20 U	20 U	20 U	27 U	19 U	19 U	20 U	20 U
4-Methylphenol	670	670	**110**	19 U	20 U	19 U	19 UJ	60 U	20 U	20 U	**73**	20 U	20 U	**60**	**23**	19 U	20 U	**130**
2,4-Dimethylphenol	29	29	20 U	19 U	20 U	19 U	19 UJ	60 U	20 U	20 U	20 U	20 U	20 U	27 U	19 U	19 U	20 U	20 U
Pentachlorophenol	360	690	98 U	97 U	98 U	97 U	96 UJ	300 U	98 U	98 U	99 U	99 U	98 U	130 U	97 U	97 U	99 U	98 U
Misc Extractables (µg/kg)																		
Benzyl alcohol	57	73	20 UJ	19 UJ	20 UJ	19 U	19 UJ	60 UJ	20 UJ	20 UJ	20 UJ	20 UJ	20 UJ	27 U	19 U	19 UJ	20 U	20 U
Benzoic acid	650	650	200 U	190 U	200 U	190 U	190 UJ	600 U	200 U	200 U	200 U	200 U	200 U	270 U	190 U	190 U	200 U	200 U

TABLE 19
Summary of SMS Chemical Concentrations in Marine Area Sediments

Location ID			AN-SEDC-08	AN-SEDC-08	AN-SEDC-08	AN-SEDC-08	AN-SEDC-08	AN-SEDC-09	AN-SEDC-09	AN-SEDC-09	AN-SEDS-05	AN-WP01	AN-WP02	AN-SED-01	AN-SED-02	AN-SED-03	AN-SED-04	AN-SED-05	AN-SED-06
Sample ID			AN-RI-SEDC-08A	AN-RI-SEDC-08B	AN-RI-SEDC-08C	AN-RI-SEDCZ-08A	AN-RI-SEDCZ-08B	AN-RI-SEDC-09A	AN-RI-SEDC-09B	AN-RI-SEDC-09C	AN-RI-SEDS-05-SS	ANRISED-WP01	ANRISED-WP02	AN-SS-01	AN-SS-02	AN-SS-03	AN-SS-04	AN-SS-05	AN-SS-06
Sample Date			7/13/2005	7/13/2005	7/13/2005	7/13/2005	7/13/2005	7/13/2005	7/13/2005	7/13/2005	7/14/2005	7/21/2005	7/21/2005	9/27/2007	9/27/2007	9/28/2007	9/28/2007	9/27/2007	9/28/2007
Depth Interval	Preliminary Cleanup Level	SMS CSL	0-12 in	12-23 in	23-40 in	6-14 in	14-24 in	4-10 in	10-16 in	16-21 in	0-10 cm	0-10 cm	0-10 cm	0-10 cm	0-10 cm	0-10 cm	0-10 cm	0-10 cm	0-10 cm
Sample Matrix			SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE
Sample Type			N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Conventionals (%)																			
Total organic carbon	--	--	**8.48**	**6.70**	**0.724**	**6.28**	**3.66**	**1.27**	**0.629**	**0.537**	**1.69**	**5.13**	**4.20**	**1.43 J**	**4.84 J**	**2.53 J**	**6.13 J**	**2.42 J**	**1.40 J**
Total solids	--	--	**38.2**	**50.5**	**66.7**	**49**	**48.8**	**66.5**	**77.1**	**86**	**70.7**	**69.4**	**60.7**	**61.4**	**53.8**	**67.2**	**66.9**	**61.7**	**75.7**
Total volatile solids	9.7	15	**22.9 J * #**	**14.6 J ***	**1.39 J**	**15.5 J * #**	**22.9 J * #**	**4.24 J**	**1.02 J**	**0.58 J**	**2.30 J**	**9.93 J ***	**4.98 J**	**17.02 * #**	**7.8**	**3.8**	**9.0**	**6.4**	**16.57 * #**
Grain Size (%)																			
Gravel	--	--	**6.60**	**5.10**	**0.80**	**3.10**	--	**5.50**	**19.1**	**66.6**	**0.30**	--	--	**26**	**7**	**4**	**42**	**4**	**51**
Sand	--	--	**22.2**	**31.0**	**23.9**	**21.4**	--	**43.7**	**42.2**	**18.1**	**77.3**	--	--	**42**	**68**	**80**	**48**	**89**	**48**
Silt	--	--	**45.7**	**48.3**	**61.7**	**54.5**	--	**40.0**	**30.1**	**11.8**	**14.7**	--	--	**24**	**16**	**12**	**6**	**4**	**0**
Clay	--	--	**25.4**	**15.7**	**13.7**	**21.0**	--	**10.8**	**8.60**	**3.50**	**7.70**	--	--	**8**	**9**	**4**	**4**	**3**	**0**
Fines	--	--	**71.1**	**64.0**	**75.4**	**75.5**	--	**50.8**	**38.7**	**15.3**	**22.4**	--	--	**32**	**25**	**16**	**10**	**7**	**1**
Metals (mg/kg)																			
Arsenic	57	93	10 U	9.0 U	7.0 U	**10**	--	**8.0**	**10**	**11**	7.0 U	7.0 U	**9.0**	9 U	9 U	7 U	**20**	8 U	7 U
Cadmium	5.1	6.7	**2.10**	**1.20**	**1.0**	**1.30**	--	**1.0**	**0.80**	**0.40**	**0.40**	0.30 U	**0.40**	**0.9**	**0.9**	**0.4**	0.8 U	**0.5**	**0.3**
Chromium	260	270	--	--	--	--	--	--	--	--	--	--	--	**20**	**20**	**12**	**42**	**14**	**34**
Copper	390	390	**42.5**	**26.1**	**16.5**	**32.5**	--	**20.1**	**13.9**	**15.5**	**28.5**	**68**	**153**	**26**	**153**	**58**	**215**	**138**	**46**
Lead	450	530	**21**	**9.0**	**3.0**	**11**	--	**6.0**	**4.0**	**3.0**	**10**	**53**	**252**	**8**	**33**	**6**	**388**	**39**	**136**
Mercury	0.41	0.59	0.10 U	0.07 U	0.07 U	0.09 U	--	0.06 U	0.06 U	0.05 U	0.06 U	**0.22**	0.07 U	0.07 U	**0.19**	0.07 U	**0.31**	0.06 U	**0.28**
Silver	6.1	6.1	0.70 U	0.50 U	0.40 U	0.60 U	--	0.40 U	0.40 U	0.30 U	0.40 U	0.40 U	0.50 U	0.5 U	0.6 U	0.4 U	1 U	0.5 U	0.4 U
Zinc	410	960	**87**	**46**	**37.4**	**59**	--	**37.8**	**34.9**	**29.3**	**31**	**51.5**	**86.6**	**45**	**65**	**30**	**267**	**33**	**65**
PCBs (mg/kg-OC)																			
Total PCBs (SMS)	12	65	0.23 U	0.29 U	2.64 U	0.30 U	0.54 U	1.50 U	3.06 U	3.77 U	1.18 U	--	--	**0.6**	**0.2**	0.2 U	**2.9**	0.2 U	**3.2**
LPAH (mg/kg-OC)																			
Naphthalene	99	170	**4.95**	**1.36**	2.64 U	**0.92**	**1.18**	**4.65**	3.23 U	3.77 U	1.18 U	--	--	**7.0**	**1.5**	**1.5**	0.33 U	0.83 U	1.43 U
Acenaphthylene	66	66	**0.59**	0.29 U	2.64 U	0.30 U	0.62 U	1.50 U	3.23 U	3.77 U	1.18 U	--	--	1.4 U	**0.48**	0.79 U	0.33 U	0.83 U	1.43 U
Acenaphthene	16	57	0.23 U	0.29 U	2.64 U	0.30 U	0.62 U	1.50 U	3.23 U	3.77 U	1.18 U	--	--	1.4 U	0.41 U	0.79 U	0.33 U	0.83 U	1.43 U
Fluorene	23	79	**0.37**	0.29 U	2.64 U	0.30 U	0.62 U	1.50 U	3.23 U	3.77 U	1.18 U	--	--	1.4 U	**0.45**	0.79 U	0.33 U	0.83 U	1.43 U
Phenanthrene	100	480	**2.59**	**1.06**	2.64 U	**1.24**	**1.12**	**2.36**	3.23 U	3.77 U	**2.37**	--	--	**6.3**	**4.3**	**1.9**	**0.55**	**1.7**	**1.9**
Anthracene	220	1200	**0.47**	0.29 U	2.64 U	0.30 U	0.62 U	1.50 U	3.23 U	3.77 U	1.18 U	--	--	1.4 U	**0.85**	0.79 U	0.33 U	0.83 U	1.43 U
2-Methylnaphthalene	38	64	**0.27**	0.29 U	2.64 U	0.30 U	0.62 U	1.50 U	3.23 U	3.77 U	1.18 U	--	--	1.4 U	**0.50**	0.79 U	0.33 U	0.83 U	1.43 U
Total LPAH (SMS)	370	780	**8.99**	**2.42**	2.64 U	**2.17**	**2.30**	**7.01**	3.23 U	3.77 U	**2.37**	--	--	**13**	**7.6**	**3.4**	**0.55**	**1.7**	**1.9**
HPAH (mg/kg-OC)																			
Fluoranthene	160	1200	**3.30**	**1.46**	2.64 U	**1.59**	**1.37**	**3.39**	3.23 U	3.77 U	**2.84**	--	--	**13**	**7.0**	**2.8**	**0.72**	**11**	**2.9**
Pyrene	1000	1400	**3.42**	**1.42**	2.64 U	**1.46**	**0.92**	**2.99**	3.23 U	3.77 U	**2.07**	--	--	**8.4**	**3.5**	**2.4**	**0.54**	**3.5**	**1.8**
Benzo(a)anthracene	110	270	**0.84**	**0.35**	2.64 U	**0.51**	0.62 U	1.50 U	3.23 U	3.77 U	1.18 U	--	--	**1.8**	**1.2**	0.79 U	0.33 U	**1.2**	**1.6**
Chrysene	110	460	**0.96**	**0.41**	2.64 U	**0.55**	0.62 U	1.50 U	3.23 U	3.77 U	1.18 U	--	--	**2.8**	**1.6**	**0.87**	**0.42**	**1.4**	**2.1**
Benzo(a)pyrene	99	210	**1.06 J**	**0.50**	2.64 U	**0.58**	0.62 U	1.50 U	3.23 U	3.77 U	1.18 U	--	--	**2.0**	**1.5**	0.79 U	0.33 U	**1.2**	1.43 U
Indeno(1,2,3-cd)pyrene	34	88	**0.50 J**	0.29 U	2.64 U	**0.38**	0.62 U	1.50 U	3.23 U	3.77 U	1.18 U	--	--	1.4 U	**0.60**	0.79 U	0.33 U	0.83 U	1.43 U
Dibenzo(a,h)anthracene	12	33	0.23 UJ	0.29 U	2.64 U	0.30 U	0.62 U	1.50 U	3.23 U	3.77 U	1.18 U	--	--	1.4 U	0.41 U	0.79 U	0.33 U	0.83 U	1.43 U
Benzo(g,h,i)perylene	31	78	**0.44 J**	0.29 U	2.64 U	**0.44**	0.62 U	1.50 U	3.23 U	3.77 U	1.18 U	--	--	1.4 U	**0.56**	0.79 U	0.33 U	0.83 U	1.43 U
Total HPAH (SMS)	960	5300	**12.7**	**5.36**	2.64 U	**6.50**	**2.30**	**6.38**	3.23 U	3.77 U	**4.91**	--	--	**32**	**17**	**6.9**	**1.7**	**20**	**10.0**
Total benzofluoranthenes	230	450	**2.16**	**1.19**	2.64 U	**0.95**	0.62 U	1.50 U	3.23 U	3.77 U	1.18 U	--	--	**4.5**	**2.9**	**0.87**	0.33 U	**2.4**	**1.6**
Chlorinated Hydrocarbons (mg/kg-OC)																			
1,4-Dichlorobenzene	3.1	9	--	--	--	--	--	--	--	--	--	--	--	1.4 U	0.41 U	0.79 U	0.33 U	0.83 U	1.43 U
1,2-Dichlorobenzene	2.3	2.3	--	--	--	--	--	--	--	--	--	--	--	1.4 U	0.41 U	0.79 U	0.33 U	0.83 U	1.43 U
1,2,4-Trichlorobenzene	0.81	1.8	0.23 U	0.29 U	2.64 U	0.30 U	0.62 U	1.50 U	3.23 U	3.77 U	1.18 U	--	--	1.4 U	0.41 U	0.79 U	0.33 U	0.83 U	1.43 U
Hexachlorobenzene	0.38	2.3	--	--	--	--	--	--	--	--	--	--	--	1.4 U	0.41 U	0.79 U	0.33 U	0.83 U	1.43 U
Phthalates (mg/kg-OC)																			
Dimethylphthalate	53	53	0.23 U	0.29 U	2.64 U	0.30 U	0.62 U	1.50 U	3.23 U	3.77 U	1.18 U	--	--	1.4 U	0.41 U	0.79 U	0.33 U	0.83 U	1.43 U
Diethylphthalate	61	110	0.23 U	0.29 U	2.64 U	0.30 U	0.62 U	1.50 U	3.23 U	3.77 U	1.18 U	--	--	1.4 U	0.41 U	0.79 U	**0.54**	0.83 U	1.43 U
Di-n-butylphthalate	220	1700	0.23 U	0.29 U	2.64 U	0.47 U	0.62 U	1.50 U	10 U	3.77 U	1.18 U	--	--	1.4 U	0.41 U	0.79 U	0.33 U	8.26 U	1.43 U
Butylbenzylphthalate	4.9	64	0.23 U	**0.34**	2.64 U	0.30 U	0.62 U	1.50 U	3.23 U	3.77 U	1.18 U	--	--	1.4 U	0.41 U	0.79 U	0.33 U	0.83 U	1.43 U
bis(2-ethylhexyl)phthalate	47	78	0.23 U	0.29 U	2.64 U	0.30 U	0.62 U	1.50 U	3.23 U	3.77 U	1.18 U	**8.19**	0.47 U	1.4 U	0.41 U	0.79 U	1.79 U	0.83 U	1.43 U
Di-n-octylphthalate	58	4500	0.23 UJ	0.29 U	2.64 U	0.30 U	0.62 U	1.50 U	3.23 U	3.77 U	1.18 U	--	--	1.4 U	0.41 U	0.79 U	0.33 U	0.83 U	1.43 U
Misc Extractables (mg/kg-OC)																			
Dibenzofuran	15	58	**0.27**	0.29 U	2.64 U	0.30 U	0.62 U	1.50 U	3.23 U	3.77 U	1.18 U	--	--	1.4 U	**0.43**	0.79 U	0.33 U	0.83 U	1.43 U
Hexachlorobutadiene	3.9	6.2	0.23 U	0.29 U	2.64 U	0.30 U	0.62 U	1.50 U	3.23 U	3.77 U	1.18 U	--	--	1.4 U	0.41 U	0.79 U	0.33 U	0.83 U	1.43 U
n-Nitroso-di-phenylamine	11	11	0.23 UJ	0.29 UJ	2.64 UJ	0.30 UJ	0.62 UJ	1.50 UJ	3.23 UJ	3.77 UJ	1.18 UJ	--	--	1.4 U	0.41 U	0.79 U	0.33 U	0.83 U	1.43 U
Phenols (µg/kg)																			
Phenol	420	1200	20 U	20 U	19 U	19 U	23 U	19 U	20 U	20 U	20 U	--	--	**49**	**29**	**33**	**20**	**69**	**46**
2-Methylphenol	63	63	20 U	20 U	19 U	19 U	23 U	19 U	20 U	20 U	20 U	--	--	20 U	20 U	20 U	20 U	20 U	20 U
4-Methylphenol	670	670	**680 * #**	**56**	19 U	**160**	**120**	**320**	20 U	20 U	**43**	20 U	20 U	**7.7**	**390**	**200**	20 U	**60**	**230**
2,4-Dimethylphenol	29	29	20 U	20 U	19 U	19 U	23 U	19 U	20 U	20 U	20 U	--	--	20 U	20 U	20 U	20 U	20 U	20 U
Pentachlorophenol	360	690	98 U	98 U	96 U	97 U	110 U	97 U	98 U	98 U	99 U	--	--	99 U	99 U	99 U	99 U	100 U	98 U
Misc Extractables (µg/kg)																			
Benzyl alcohol	57	73	20 UJ	20 U	19 U	19 U	23 U	19 U	20 U	20 U	20 UJ	--	--	20 U	20 U	20 U	20 U	20 U	20 U
Benzoic acid	650	650	200 U	200 U	190 U	190 U	230 U	190 U	200 U	200 U	200 U	--	--	200 U	200 U	200 U	200 U	**280**	200 U

TABLE 20
SUMMARY OF DIOXIN AND FURAN CONCENTRATIONS IN MARINE AREA, DAKOTA CREEK/PIER 1, AND REFERENCE SEDIMENT

Location ID Sample ID Sample Date Depth Interval Sample Matrix Sample Type Task Code	Screening Value	SB-SED01 B708114-12 8/6/1997 0-0.3 ft SE N FB_SBSN	SB-SED03 B708114-13 8/6/1997 0-0.13 ft SE N FB_SBSN	ET-SS01 ET-SS01 12/11/1998 0-0.33 ft SE N FB_SHPSD	ET-SS02 ET-SS02 12/11/1998 0-0.33 ft SE N FB_SHPSD	ET-SS03 ET-SS03 12/11/1998 0-0.33 ft SE N FB_SHPSD	ET-SS04 ET-SS04 12/11/1998 0-0.33 ft SE N FB_SHPSD	ET-SS06 ET-SS06 12/11/1998 0-0.33 ft SE N FB_SHPSD	ET-SS07 ET-SS07 12/11/1998 0-0.33 ft SE N FB_SHPSD	ET-SS08 ET-SS08 12/11/1998 0-0.33 ft SE N FB_SHPSD	ET-SS09 ET-SS09 12/11/1998 0-0.33 ft SE N FB_SHPSD
Conventionals											
Total organic carbon (%)	10	**0.3**	**0.44**	**0.72**	**8.7**	**13**	**0.64**	**5.2**	**5.7**	**1.6**	**0.45**
Total solids (%)	--	**71.2**	**74.4**	**88.2**	**0.71**	**78.5**	**93.3**	**77.8**	**62.9**	**88.7**	**83**
Dioxins/Furans (ng/kg)											
1,2,3,4,6,7,8-HpCDD	--	**30**	**9.9**	**20.3**	**9.4**	**20.3**	**51.1**	**5.7**	**8.8**	**36.3**	**9.3**
1,2,3,4,6,7,8-HpCDF	--	**12**	2.4 U	**3.2**	**2.2**	**3.5**	**11**	**1.9**	**1.1**	**6.2**	**2.8**
1,2,3,4,7,8,9-HpCDF	--	1.7 U	0.2 U	0.5 U	0.6 U	0.4 U	1.5 U	0.2 U	0.4 U	0.8 U	0.5 U
1,2,3,4,7,8-HxCDD	--	5.3 U	0.3 U	**1.5**	**6.5**	**2.1**	**3.2**	**0.4**	**0.8**	**1.4**	**0.8**
1,2,3,4,7,8-HxCDF	--	1.7 U	0.2 U	0.4 U	0.3 U	0.3 U	0.5 U	0.2 U	0.3 U	**0.8**	0.3 U
1,2,3,6,7,8-HxCDD	--	2.8 U	0.3 U	0.2 U	0.1 U	0.1 U	**0.5**	0.1 U	0.1 U	0.4 U	0.2 U
1,2,3,6,7,8-HxCDF	--	3.6 U	0.7 U	**0.5**	0.1 U	**0.9**	**1.5**	0.1 U	**0.5**	**1.7**	**0.6**
1,2,3,7,8,9-HxCDD	--	3.1 U	0.7 U	0.2 U	0.2 U	0.2 U	0.3 U	0.2 U	0.1 U	0.6 U	0.2 U
1,2,3,7,8,9-HxCDF	--	3.4 U	0.4 U	0.2 U	0.2 U	0.2 U	1.8	0.1 U	1.1	2.1	0.2 U
1,2,3,7,8-PeCDD	--	3.1 U	0.4 U	0.1 U	0.6	0.2 U	0.2 U	0.1 U	0.1 U	0.4	0.2 U
1,2,3,7,8-PeCDF	--	2 U	0.5 U	0.3 U	0.3 U	0.3 U	0.7 U	0.3 U	0.2 U	0.4	0.3 U
2,3,4,6,7,8-HxCDF	--	0.6 U	0.3 U	0.4 U	0.2 U	0.2 U	0.4 U	0.2 U	0.1 U	0.7 U	0.2 U
2,3,4,7,8-PeCDF	--	3 U	0.4 U	0.1 U	0.2 U	0.2 U	0.6	0.1 U	0.1 U	0.5	0.2 U
2,3,7,8-TCDD	--	0.9 U	0.4 U	0.1 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
2,3,7,8-TCDF	--	2.6	0.5 U	1	0.1 U	0.2 U	2	0.6	0.1 U	1.6	1.1
OCDD	--	150	66	208.1	137.3	193.7	595.3	75.5	43.8	325.9	68.8
OCDF	--	11	4.9 U	10.5	4.1	11	22.4	6.2	2.7	13.7	7.8
Total HpCDD	--			--	--	--	--	--	--	--	--
Total HpCDF	--	--	--	--	--	--	--	--	--	--	--
Total HxCDD	--	--	--	--	--	--	--	--	--	--	--
Total HxCDF	--	--	--	--	--	--	--	--	--	--	--
Total PeCDD	--	--	--	--	--	--	--	--	--	--	--
Total PeCDF	--	--	--	--	--	--	--	--	--	--	--
Total TCDD	--			--	--	--	--	--	--	--	--
Total TCDF	--	1.8 J	1 U	--	--	--	--	--	--	--	--
TEQ (U=0)	15 (1)	0.7	0.11	0.56	0.81	0.55	1.86	0.19	0.33	1.87	0.38

(1) Sediment Screening Level (PSDDA 2000)

Highlighted value indicates concentration exceeded SQS criteria

U - Compound was undetcted at the reported concentration.

J - Compound was positively identified; the numerical value is an estimate

TABLE 20
SUMMARY OF DIOXIN AND FURAN CONCENTRATIONS IN MARINE AREA, DAKOTA CREEK/PIER 1, AND REFERENCE SEDIMENT

Location ID Sample ID Sample Date Depth Interval Sample Matrix Sample Type Task Code	Screening Value	IS-02 294001 7/17/2000 0-0.5 ft SE N SM_MJBPI	IS-04 294003 7/18/2000 0-0.5 ft SE N SM_MJBPI	IS-06 294005 7/18/2000 0-0.5 ft SE N SM_MJBPI	IS-08 294007 7/18/2000 0-0.5 ft SE N SM_MJBPI	IS-10 294009 7/19/2000 0-0.5 ft SE N SM_MJBPI	IS-12 294011 7/19/2000 0-0.5 ft SE N SM_MJBPI	AN-REF-1 AN-REF-1-01-SD 7/13/2004 0-15 cm SE N AN_DCI	AN-REF-2 AN-REF-2-01-SD 7/13/2004 0-15 cm SE N AN_DCI	AN-DCI-1A AN-DCI-1 7/15/2004 1-3 ft SE N AN_DCI	AN-DCI-2 AN-DCI-2 7/15/2004 1-3 ft SE N AN_DCI
Conventionals											
Total organic carbon (%)	10	**1.47**	**1.04**	**2.13**	**1.16**	**2.29**	**1.52**	**1.17**	**0.74**	**2.24**	**4.25**
Total solids (%)	--	--	--	--	--	**0.83**	**0.8**	**58**	**70.6**	**60**	**60.4**
Dioxins/Furans (ng/kg)											
1,2,3,4,6,7,8-HpCDD	--	**41.4**	**21.7**	**15.4**	**16.7**	**18.5**	**8.2**	**2.742 J**	**6.001**	**55.574**	**25.002**
1,2,3,4,6,7,8-HpCDF	--	**3.2**	**3.9**	**3.6**	--	**9.8**	**6**	2.5 U	2.5 U	**5.652**	**5.104**
1,2,3,4,7,8,9-HpCDF	--	0.4 U	0.4 U	0.6 U	0.4 U	1.1 U	**4.1**	2.5 U	2.5 U	2.5 U	2.5 U
1,2,3,4,7,8-HxCDD	--	0.1 U	--	--	--	--	--	2.5 U	2.5 U	2.5 U	2.5 U
1,2,3,4,7,8-HxCDF	--	0.1 U	0.1 U	0.1 U	--	0.3 U	0.8 U	2.5 U	2.5 U	2.5 U	2.5 U
1,2,3,6,7,8-HxCDD	--	0.1 U	0.3 U	--	0.1 U	--	**1**	2.5 U	2.5 U	**1.76 JK**	2.5 U
1,2,3,6,7,8-HxCDF	--	**2**	--	0.1 U	**0.9**	--	0.8 U	2.5 U	2.5 U	2.5 U	2.5 U
1,2,3,7,8,9-HxCDD	--	0.1 U	0.4 U	0.1 U	0.1 U	0.3 U	**1**	2.5 U	2.5 U	2.5 U	2.5 U
1,2,3,7,8,9-HxCDF	--	1.3	0.1 U	0.1 U	0.5	0.3 U	0.8 U	2.5 U	2.5 U	2.5 U	2.5 U
1,2,3,7,8-PeCDD	--	0 U	0.1 U	0.1 U	0 U	0.2 U	--	2.5 U	2.5 U	2.5 U	2.5 U
1,2,3,7,8-PeCDF	--	--	0.1 U	0.2 U	0.1 U	1 U	3.1 U	2.5 U	2.5 U	2.5 U	2.5 U
2,3,4,6,7,8-HxCDF	--	0.1 U	0.3 U	0.1 U	0.1 U	0.2 U	0.3 U	2.5 U	2.5 U	2.5 U	2.5 U
2,3,4,7,8-PeCDF	--	0 U	0.1 U	0.1 U	0 U	0.6	--	2.5 U	2.5 U	2.5 U	2.5 U
2,3,7,8-TCDD	--	0.1 U	0.1 U	0.1 U	0 U	0.5 U	2.6 U	1 U	1 U	1 U	1 U
2,3,7,8-TCDF	--	0 U	0.1 U	0.1 U	0 U	0.1 U	2.4	1 U	1 U	1 U	1 UC
OCDD	--	233.9	--	145	126.7	166	108	16.972	47.747 B	589.61 B	206.812 B
OCDF	--	5.2	10.4	4.5	4.2	14.5	20.3	5 U	5 U	10.785	18.241
Total HpCDD	--							2.742	13.324	187.883	74.169
Total HpCDF	--	--	--	--	--	--	--	2.5 U	2.5 U	17.656	15.014
Total HxCDD	--	--	--	--	--	--	--	1.218	2.5 U	14.483	4.915
Total HxCDF	--	--	--	--	--	--	--	2.5 U	2.5 U	8.325	6.699
Total PeCDD	--	--	--	--	--	--	--	2.5 U	2.5 U	2.5 U	3.567
Total PeCDF	--	--	--	--	--	--	--	2.5 U	2.5 U	0.737	4.561
Total TCDD	--							1 U	1 U	1 U	5
Total TCDF	--	9.3 J	2.6 U	1.3 U	0.5 U	1.7 U	1.2 U	1 U	1 U	1 U	1.084
TEQ (U=0)	15 (1)	0.79	0.27	0.21	0.32	0.58	0.64	0.044	0.108	1.39	0.635

(1) Sediment Screening Level (PSDDA 2000)

Highlighted value indicates concentration exceeded SQS criteria

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J - Compound was positively identified; the numerical value is an estima

TABLE 20
SUMMARY OF DIOXIN AND FURAN CONCENTRATIONS IN MARINE AREA, DAKOTA CREEK/PIER 1, AND REFERENCE SEDIMENT

Location ID Sample ID Sample Date Depth Interval Sample Matrix Sample Type Task Code	Screening Value	AN-P1-1 AN-P1-1 7/15/2004 1-3 ft SE N AN_DCI	AN-P1-2 AN-P1-2 7/15/2004 1-3 ft SE N AN_DCI	AN-SEDC-08 AN-RI-SEDCZ-08B 7/13/2005 SE N AN_RI_05	AN-SEDC-06 AN-RI-SEDC-06A 7/14/2005 5-15 in SE N AN_RI_05	AN-SEDC-03 AN-RI-SEDC-03A 7/15/2005 0-7 in SE N AN_RI_05
Conventionals						
Total organic carbon (%)	10	**0.27**	**0.64**	**3.66**	**10.6**	**3.23**
Total solids (%)	--	**87.2**	**78.2**	**48.8**	**38.7**	**73.7**
Dioxins/Furans (ng/kg)						
1,2,3,4,6,7,8-HpCDD	--	2.5 U	2.5 U	**3.70 J**	**6.70**	**79.5**
1,2,3,4,6,7,8-HpCDF	--	2.5 U	2.5 U	**1.10 J**	**1.90 J**	**35.2**
1,2,3,4,7,8,9-HpCDF	--	2.5 U	2.5 U	0.34 U	0.30 U	**2.0 J**
1,2,3,4,7,8-HxCDD	--	2.5 U	2.5 U	0.43 U	0.45 U	0.77 U
1,2,3,4,7,8-HxCDF	--	2.5 U	2.5 U	0.64 U	0.67 U	**3.30 J**
1,2,3,6,7,8-HxCDD	--	2.5 U	2.5 U	0.62 U	0.94 U	0.10 U
1,2,3,6,7,8-HxCDF	--	2.5 U	2.5 U	0.53 U	0.46 U	**1.40 J**
1,2,3,7,8,9-HxCDD	--	2.5 U	2.5 U	**0.79 J**	**0.81 J**	**1.80 J**
1,2,3,7,8,9-HxCDF	--	2.5 U	2.5 U	0.32 U	0.27 U	0.77 U
1,2,3,7,8-PeCDD	--	2.5 U	2.5 U	0.78 J	0.75 J	1.10 J
1,2,3,7,8-PeCDF	--	2.5 U	2.5 U	0.76 J	0.66 J	0.50 U
2,3,4,6,7,8-HxCDF	--	2.5 U	2.5 U	0.36 U	0.37 U	1.50 J
2,3,4,7,8-PeCDF	--	2.5 U	2.5 U	0.69 J	0.73 J	1.10 J
2,3,7,8-TCDD	--	1 U	1 U	0.46 J	0.45 J	0.30 U
2,3,7,8-TCDF	--	1 U	1 U	R	R	0.68 J
OCDD	--	10.782 BJ	9.1 BJ	16.4	41	850 J
OCDF	--	5 U	5 U	4.30 J	4.60 J	54.3
Total HpCDD	--	1.144	2.5 U	8.20	15.5	185
Total HpCDF	--	2.5 U	2.5 U	2.10	3.70	110
Total HxCDD	--	2.5 U	2.5 U	9.60	12.4	29.1
Total HxCDF	--	2.5 U	2.5 U	3.0 U	5	90.3
Total PeCDD	--	2.5 U	2.5 U	7.30	8.80	5.40
Total PeCDF	--	2.5 U	2.5 U	5.70	7.5	65.9
Total TCDD	--	1 U	1 U	14.4	19.6	10
Total TCDF	--	1 U	1 U	12.4	16.5	78.3
TEQ (U=0)	15 (1)	0.0108	0.0091	2.11	2.18	4.1

(1) Sediment Screening Level (PSDDA 2000)

Highlighted value indicates concentration exceeded SQS criteria

U - Compound was undetcted at the reported concentration.

J - Compound was positively identified; the numerical value is an estima

TABLE 21
Summary of Wood Debris Sample Analytical Results

Sample ID	TS (%)	TOC (%)	TVS (%)
AN-RI-WD-01	72.8	1.6	3.5
AN-RI-WD-02	51.1	3.28	6.4
AN-RI-WD-03	62.7	1.5	4.3
AN-RI-WD-04	69.9	1.59	1.7
AN-RI-WD-05	65.7	0.909	3.4
AN-RI-WD-06	64.3	3.57	3.4
AN-RI-WD-07	67.9	3.09	3.7
AN-RI-WD-08	59.4	5.3	6.3
AN-RI-WD-09	60.4	4.07	4.6
AN-RI-WD-10	63.6	4.84	0.5
AN-RI-WD-11[a]	57.5	3.98	7.8
AN-RI-WD-12	53.4	8.4	15.1
AN-RI-WD-13	54.1	8.3	13.3
AN-RI-WD-14	60.8	1.31	4.2
AN-RI-WD-15	45.2	8.77	14.4
AN-RI-WD-16	59.3	1.37	12.8
AN-RI-WD-17	65.2	0.982	4.1
AN-RI-WD-18	68	3.03	10.8
AN-RI-WD-19	68.5	4.98	4.2
AN-RI-SEDS-20	64.1	1.56	5.8

All units in dry weight
TS = Total Solids by EPA 160.3 Method
TOC = Total Organic Carbon by Plumb, 1981 Method
TVS = Total Volatile Solids by ASTM D2974 Method
a—Not enough material in sample to get the minimum weight for method, results are estimated
TOC screening criterion is 10%; TVS screening criterion is 25% (Anchor 2004c; Appendix G)

TABLE 22
SUMMARY OF WELLPOINT GROUNDWATER, POREWATER, AND SEDIMENT DATA
FORMER SCOTT PAPER COMPANY MILL SITE

Location ID			AN-WP01	AN-WP02	AN-WP01	AN-WP02	AN-WP01	AN-WP02	AN-WP01	AN-WP02	AN-WP02
Sample ID			ANRI-GW-WP01	ANRI-GW-WP02	ANRISED-WP01	ANRISED-WP02	ANRISED-WP01	ANRISED-WP02	AN-RI-WP-01	AN-RI-WP-02	AN-RI-WP-02-D
Sample Date	Preliminary Cleanup Level		7/21/2005	7/21/2005	7/21/2005	7/21/2005	7/21/2005	7/21/2005	1/24/2006	1/24/2006	1/24/2006
Matrix	Surface Water	Sediment	GW	GW	PW	PW	SE	SE	GW	GW	GW
Depth Interval			0-3 ft	0-3 ft	0-10 cm	0-10 cm	0-10 cm	0-10 cm	2-3 ft	2-3 ft	2-3 ft
Conventionals											
Ammonia (mg/L)	8.7 (1)	--	0.34	0.44	1.65	1.3	--	--	0.322	1.65	1.62
Sulfide (mg/L)	30 (2)	--	15	23.9	0.05 U	0.05 U	--	--	15.5	84.9	84.9
Total solids (%)	--	--	--	--	69.4	60.7	69.4	60.7			
Total organic carbon (%)	--	--	--	--	5.13	4.2	5.13	4.2			
Field Parameters (3)											
Temperature (C)	--	--	18.7	18.1	--	--	--	--	8.9	8.8	--
Dissolved Oxygen (mg/L)	--	--	4.3	4.94	--	--	--	--	1.45	3.22	--
pH	--	--	8.41	8.91	--	--	--	--	7.12	7.81	--
Redox (Eh)	--	--	-301	-312	--	--	--	--	-286	-357	--
Turbidity (NTU)	--	--	3	-10	--	--	--	--	7	2	--
Conductivity (mS)	--	--	42.3	39	--	--	--	--	48.6	50.4	--
Salinity	--	--	2.9	2.5	--	--	--	--	3.1	3.2	--
TDS (mg/L)	--	--	24	24	--	--	--	--	30	30	--
Metals (µg/L)											
Antimony	640	--	1.0 U	1.0 U	5	2	--	--	2 U	2 U	2 U
Arsenic	8	--	1.0 U	2	4	5	--	--	2 U	4	3
Cadmium	9.3	--	1.0 U	1.0 U	0.20 U	0.20 U	--	--	2 U	2 U	2 U
Copper	20	--	10	7	7.3	6.6	--	--	6	5 U	5
Lead	8.1	--	5.0 U	5.0 U	1.0 U	1.0 U	--	--	10 U	10 U	10 U
Mercury	0.025	--	0.10 U	0.10 U	0.10 U	0.10 U	--	--	0.1 U	0.1 U	0.1 U
Nickel (4)	22	--	12	11	11.4	11.7	--	--	14	12	11
Silver	1.9	--	1.0 U	1.0 U	0.20 U	0.20 U	--	--	2 U	2 U	2 U
Zinc	81	--	30	20 U	9	6	--	--	40 U	40 U	40 U
Metals (mg/kg)											
Antimony	--		--	--	--	--	7.0 U	8.0 U			
Arsenic	--	57	--	--	--	--	7.0 U	9			
Cadmium	--	5.1	--	--	--	--	0.30 U	0.4			
Copper	--	390	--	--	--	--	68	153			
Lead	--	450	--	--	--	--	53	252			
Mercury	--	0.41	--	--	--	--	0.22	0.07 U			
Nickel	--	--	--	--	--	--	21	21			
Silver	--	6.1	--	--	--	--	0.40 U	0.50 U			
Zinc	--	410	--	--	--	--	51.5	86.6			
SVOCs (µg/L)											
4-Methylphenol	30	--	1.0 U	1.0 U	--	--	--	--	1 U	1 U	1 U
bis(2-ethylhexyl)phthalate	5.9	--	1.0 U	1.0 U	--	--	--	--	2.1	2.3	1 U
SVOCs (µg/kg)											
4-Methylphenol		670	--	--	--	--	20 U	20 U			
bis(2-ethylhexyl)phthalate		1700	--	--	--	--	420	20 U			

(1) Presented criterion is the most conservative based on the site-specific pH, salinity, and temperature data from the two samples. Criterion calculated using Washington Department of Ecology Spreadsheets for Water Quality-Based NPDES Permit Calculations, which is consistent with WAC 173-201A and EPA 440/5-99-004. Spreadsheet updated July, 2004 by Greg Pelletier (http://www.ecy.wa.gov/programs/eap/pwspread/pwspread.html).

(2) Sulfide concentration protective of benthos as presented in Sediment Management Annual Review Meeting (SMARM 2005) and summarized by Anchor (2005b).

(3) Multiprobe flow through cell was not calibrating properly during the July 2005 field sampling. The July 2005 water quality measures are therefore of uncertain accuracy. in January 2006, the multiprobe flow through cell calibrated without error. For both the 2005 and 2006 sampling events, the dissolved oxygen concentrations are suspect given the Eh measurements and presence of sulfide.

(4) Nickel preliminary cleanup level based on updated marine chronic value of 22.4 ug/L (Hunt et al 2002). Please refer to Section 3.1.2 for details.

U - Compound was undetcted at the reported concentration.

UJ - Compound was undetected; the reported concentration is an estimate.

J - Compound was positively identified; the numerical value is an estimate.

Highlighted text indicates value that exceeded the media-specific screening criterion

Table 23
Summary of Crab Muscle Data for Bioaccumulative Chemicals: Fidalgo Bay and Reference Areas

Data Source / Sample Location		Reference Areas		Fidalgo Bay Sites	
		PSEP 1991 Dungeness Bay	Ecology 1999 Samish Island	PSEP 1991 March Point	Ecology 1999 Fidalgo Bay
Metals (ug/kg wet wt)					
Mercury		NM	70	NM	56
Polychlorinated Biphenyls (ug/kg wet wt)					
Total PCBs		NM	1.4 J	NM	2.1 U
TEF (1)	**PCDD/PCDF** (ng/kg wet wt):				
1	2,3,7,8-TCDD	0.15 U	0.79 U	0.15 U	0.41 U
1	1,2,3,7,8-PeCDD	0.2 U	0.89 U	0.2 U	0.58 U
0.1	1,2,3,4,7,8-HxCDD	0.2 U	0.93 U	0.2 U	0.57 U
0.1	1,2,3,6,7,8-HxCDD	0.15 U	1.6 U	0.54	0.62 U
0.1	1,2,3,7,8,9-HxCDD	0.2 U	0.76 U	0.2 U	0.7 U
0.01	1,2,3,4,6,7,8-HpCDD	0.25 U	1.8 U	0.46	0.65 U
0.0001	OCDD	3.8	1.2 U	2.5	2.6 U
0.1	2,3,7,8-TCDF	0.1 U	0.51 J	0.95	0.39 U
0.05	1,2,3,7,8-PeCDF	0.15 U	0.79 U	0.15 U	0.69 U
0.5	2,3,4,7,8-PeCDF	0.15 U	0.69 U	0.15 U	0.53 U
0.1	1,2,3,4,7,8-HxCDF	0.15 U	0.58 U	0.15 U	0.45 U
0.1	1,2,3,6,7,8-HxCDF	0.1 U	1.2 U	0.1 U	0.68 U
0.1	1,2,3,7,8,9-HxCDF	0.19	1.2 U	0.22	1.5 U
0.1	2,3,4,6,7,8-HxCDF	0.15 U	0.67 U	0.15 U	0.64 U
0.01	1,2,3,4,6,7,8-HpCDF	0.1 U	1.5 U	0.1 U	0.98 U
0.01	1,2,3,4,7,8,9-HpCDF	0.15 U	0.53 U	0.2 U	0.58 U
0.0001	OCDF	0.3 U	1.8 U	0.35 U	0.86 U
	Calculated TEQ	0.02	0.05	0.18	NC

(1) From EPA's June 2000 Draft Dioxin Reassessment, based on World Health Organization 1998 toxicity equivalency factors (TEFs) for mammalian receptors.
NM: Not measured

APPENDICES A THROUGH V
(See Separate Folder)