WORK PLAN FOR INDEPENDENT PHASE 2 ENVIRONMENTAL ASSESSMENT

Kimberly-Clark Mill Uplands, Everett, Washington

Prepared for: Kimberly-Clark Worldwide, Inc.

Project No. 110207-001-01 • May 21, 2012 Final

Aspect
CONSULTING

earth + water

WORK PLAN FOR INDEPENDENT PHASE 2 ENVIRONMENTAL ASSESSMENT

Kimberly-Clark Mill Uplands, Everett, Washington

Prepared for: Kimberly-Clark Worldwide, Inc.

Project No. 110207-001-01 • May 21, 2012 Final

Aspect Consulting, LLC

Brett T. Carp
Sr. Project Environmental Scientist
bcarp@aspectconsulting.com

Steve Germiat, LHG, CGWP
Sr. Associate Hydrogeologist
sgermiat@aspectconsulting.com

V:\110207 KC Everett Mill\Deliverables\Work Plan for Env Assessment\Final\Work Plan for Independent Phase 2 ESA - final.docx

Table of Contents

Tables

Figures

Appendices

Acronyms and Abbreviations

Aspect	Aspect Consulting, LLC
BNSF	BNSF Railway Inc.
BTEX	benzene, toluene, ethylbenzene, xylenes
CLARC	Ecology's Cleanup Levels and Risk Calculation database
COPC	contaminant of potential concern
EPA	U.S. Environmental Protection Agency
ESA	environmental site assessment
HSP	Health and Safety Plan
K-C	Kimberly-Clark Worldwide, Inc.
LUST	leaking underground storage tank
MTCA	Washington State Model Toxics Control Act Cleanup Regulation (Chapter 173-340 WAC)
NAPL	non-aqueous phase liquid
SAP	Sampling and Analysis Plan
QAPP	Quality Assurance Project Plan
QA/QC	quality assurance/quality control
TDS	total dissolved solids
TSS	total suspended solids
TEE	terrestrial ecological evaluation
TPH	total petroleum hydrocarbons
U.S.	United States
UST	underground storage tank
VI	vapor intrusion
WAC	Washington Administrative Code

1 Introduction

Aspect Consulting, LLC (Aspect) has prepared this Work Plan on behalf of Kimberly-Clark Worldwide, Inc. (K-C) to guide an ongoing independent Phase 2 Environmental Site Assessment (ESA) for the Kimberly-Clark Everett Pulp and Paper Mill located at 2600 Federal Avenue in Everett, Washington (Figure 1). Aspect understands that a pulp and paper mill has operated on the property since 1931, and that activities related to that operation have included the use of hazardous materials. Aspect further understands that K-C is preparing the mill property for sale. The Kimberly-Clark Everett Mill is currently on Ecology's database of confirmed and suspected contaminated sites under Facility/Site Number 9.

The environmental assessment will address the upland mill property, with a western boundary at mean higher high water (MHHW). The assessment does not include the East Waterway (Port Gardner Bay); however, an emphasis of the proposed assessment is generating information to evaluate whether the uplands mill property currently represents a source of contamination to the East Waterway.

The following sections present the objectives of this Work Plan as well as an overview of its organization.

1.1 Work Plan Objectives

The specific objectives of the Work Plan are to:

- Synthesize the prior environmental investigation and cleanup information for the mill property;
- Identify data gaps in the prior environmental investigation/cleanup information and other historical information, with respect to potential contaminant sources, migration, and exposure pathways for protection of future mill property uses and the adjacent East Waterway marine environment; and
- Define a scope of work for the uplands environmental assessment to address the identified data gaps. Following completion of the scope of work defined here, an additional phase of data collection may be warranted to further define the contaminant nature and extent for the purposes of assessing cleanup alternatives for the upland property. Any additional phase of this independent environmental assessment would be documented in an addendum to this Work Plan or other means.

The environmental assessment is currently being conducted as an independent remedial action. However, the Work Plan has been prepared in general accordance with MTCA, and is intended to meet the requirements for substantial equivalence under WAC 173-340-515 involving independent remedial actions. This assessment will support, not foreclose, selection of a cleanup action consistent with MTCA requirements.

Information and data gathered during the independent environmental assessment will be used to develop a comprehensive remedial investigation/feasibility study (RI/FS) work plan for the Kimberly-Clark Mill uplands in accordance with WAC 173-340-350. The RI/FS will be conducted to define and document the nature and extent of contamination, and define and evaluate cleanup alternatives for identified contamination, within the Kimberly-Clark Mill uplands,

1.2 Work Plan Organization

The Work Plan is organized into the following sections:

- **Section 2—Property History and Environmental Setting** describes the mill property location and zoning, operational history, and environmental setting, as obtained from readily available existing information.
- **Section 3—Environmental Assessment Screening Levels** describes the derivation of numerical screening levels for soil, groundwater, and soil gas that are proposed for evaluation of the environmental data collected during the assessment.
- **Section 4—Previous Remedial Actions** presents a summary of the previous investigations and independent cleanup actions conducted at the mill property, including the activities and results associated with the initial (Round 1) Phase 2 ESA conducted in February 2012. The environmental assessment activities described in this Work Plan are part of the ongoing Phase 2 ESA. Data gaps in the prior information are also identified.
- **Section 5—Data Gaps and Proposed Data Collection** summarizes data gaps in the prior environmental investigation/cleanup information and other historical information, and proposes data collection methods to address the identified data gaps.
- **Section 6—References** lists documents used or referenced in this Work Plan.

Appendices to the Work Plan include:

- **Appendix A—Sampling and Analysis Plan (SAP)** provides the details regarding sample collection and handling for soil and groundwater samples collected during the proposed data collection.
- **Appendix B—Quality Assurance Project Plan (QAPP)** provides analytical laboratory requirements for quality assurance/quality control (QA/QC) procedures related to execution of the proposed data collection.

Aspect will prepare under separate cover a site-specific Health and Safety Plan (HSP), in accordance with WAC 173-340-810, to be used by Aspect employees during execution of the proposed environmental assessment activities.

2 Property History and Environmental Setting

This section presents a brief overview of the mill property including location, operational history, environmental setting, and hydrogeologic setting.

2.1 Property Location and Zoning

The upland property is located in an industrial-port area on the west side of downtown Everett, Washington, within Section 19 of Township 29, Range 05 (Figure 1). It consists of 14 contiguous tax parcels totaling approximately 72.81 acres of land (Table 1, Figure 2). One parcel, 00597761800102, is reportedly owned by Chevron USA Inc. The property is located adjacent to the East Waterway (Waterway) which is a dredged waterway within the larger Port Gardner Bay, approximately 2.3 miles south of the mouth of the Snohomish River (Figure 1) (AECOM, 2011). The East Waterway contains a federal navigation channel maintained by the United States (U.S.) Army Corps of Engineers.

The eastern boundary of the property is formed by the BNSF Railway Inc. (BNSF) railroad tracks and West Marine View Drive beyond (Figure 2). The western boundary of the property is the Waterway shoreline, defined as MHHW for purposes of this assessment. The U.S. Naval Station Everett is located adjacent to the north. Adjacent to the south are multiple industrial properties owned by BNSF, the Ronan C. Bonnie Trustee, and the Port of Everett. Road-access to the property is gained via Federal Avenue at the southern end of the property and via West Marine View Drive on the east side of the property.

According to Snohomish County Planning and Development Department parcel web site, the mill property is zoned Industrial, M-2 Heavy Manufacturing. The zoning for adjacent properties is a mixture of industrial and residential uses.

2.2 Operational History

The upland property is currently developed as a sulfite pulp and paper mill, which produced bleached sulfite pulp and various tissue products. The mill ceased operations on April 15, 2012. However, mill operations have historically included four sections identified as tissue manufacturing/wastewater treatment, biomass receiving/distribution, pulp storage/bag house, and pulp processing warehouse.

The following information regarding the historical mill operations is largely copied from the *Phase I Environmental Site Assessment, Everett Pulp and Paper Mill, Everett, Washington,* dated April 2011 (AECOM, 2011). AECOM (2011) developed the historical summary from interviews, and a review of historical aerial photographs, city directories, topographic maps, records review, and information obtained from K-C and the City of Everett.

The historical use of the Subject Property could not be determined prior to 1892. Based on City of Everett Assessor and library records, the Subject Property was tidal flats for the Puget Sound until the early 1900’s when the Subject Property began to be filled. In

1927, the Puget Sound Pulp and Timber Company were founded, and in 1936 the Soundview Pulp Company assumed ownership. The pulp mill began operation in 1931 with five digesters and two pulp drying machines. Wastewater was discharged through Outfall 003 located on the shoreline bank of the Subject Property.

In 1951, Soundview Pulp Company merged with Scott Paper Company. In 1951, the mill constructed a new wood-stave outfall (Outfall 001) in conjunction with the Weyerhaeuser mill located south of the Everett Mill which conveyed effluent (primarily digester wastes known as sulfite waste liquor and wash water) from both mills to the deep waters of Port Gardner Bay, in addition to the continued use of Outfall 003. Four Scott Paper machines were added to the facility from 1953 to 1955. The parking lots were constructed adjacent to the mill on the east side of West Marine View Drive.

The southern portion of the Subject Property was partially developed by 1930, including two tank farms and smaller facilities with associated railroad spurs owned by Tidewater/Associated Oil (predecessor to Texaco) and by Standard Oil/Chevron. The Bunker C fuel AST farm and property were purchased from Tidewater-Associated in 1957, and other property was purchased from Standard/Chevron in 1967. The current distribution/warehouse facility located on the south end of the site was constructed in 1959. Reportedly, Chevron still owns one parcel beneath the Warehouse.

In 1963, the mill's sanitary sewers were separated from the mill's process effluents and connected to the City of Everett's system. The two primary clarifiers were constructed in 1964 to remove suspended solids from the effluent. According to a June 1994 Scott Paper letter to CH2M Hill, chipping and log rafting operations were discontinued at the mill in 1970. In 1974, the mill constructed a sulfite recovery boiler (Boiler No. 10) to recover spent liquor from operations and to combust it for steam generation and the conversion of sulfur dioxide, which is reused in the process. Starting in 1980, a wastewater treatment plant, including secondary clarifiers and aeration basin, began treatment of high BOD waste from boiler condensates and the bleach plant. Outfall 008 was added on the shoreline bank of the mill property in 1979, as the third outfall, for the discharge of treated effluent from the secondary treatment clarifiers. The former log pond was filled by the early 1980s.

In 1995, five Dutch oven wood-fired boilers were replaced with a new boiler (Boiler No. 14), which is owned by the Snohomish County Public Utility District (PUD). Also in 1995, the PUD built the biomass fuel shipping pier and related conveyors, which it owns and which is used by the Everett Mill as well. In the mid-1990's, Scott Paper, working with the Navy, razed the former Naval Reserve Center (formerly located just south of the Everett Mill's secondary clarifiers) which consisted of offices, garage, boiler room, flammable storage shed, diesel AST, gasoline UST, machine/wood shop, classroom, and a gun range. The area is currently paved for semi-truck parking. In the late 1990's the Bunker C fuel AST farm located just north of the distribution/warehouse building was abandoned by removal.

In 2004, K-C constructed a deep water outfall (Outfall 100) that replaced Outfall 001, which was plugged and demolished in the nearshore area. Outfall 100 became fully operational in 2005. Use of Outfalls 003 and 008 were discontinued except for emergencies and shutdowns, as authorized in the Everett Mill's NPDES permit. The HR/Safety/Medical Building was razed in late 2009.

2.3 Topography

The local topography surrounding the property slopes westward toward the Waterway. Property ground surface elevations (above mean lower low water; MLLW) range from approximately 16 feet along the eastern boundary to approximately 5 feet on the western boundary.

2.4 Climate

The climate of the Everett area is maritime, characterized by cool summers and mild winters influenced by ocean air. The average annual minimum temperature is 42.6 degrees Fahrenheit and the average maximum temperature is 59.1 degrees Fahrenheit (Western Regional Climate Center, 2005). The average annual precipitation in Everett is 36.7 inches, with over 4 inches of precipitation per month from November through January.

2.5 Hydrogeologic Conditions

A wedge of fill, generally thickening from east to west, comprises the shallow subsurface soils across the property. The fill was placed on the Waterway tidal flats to create new upland beginning in the early 1900s. Within the west-center portion of the property, a former log pond was filled in stages between the mid-1950s and early 1980s to create upland for wood chip and hog fuel storage (labeled on Figure 3). The fill has variable composition, predominantly including sand and silty sand with shell fragments (probable dredge fill), and localized occurrences of gravel, variable debris, and wood.

A shallow unconfined (water table) water-bearing zone occurs within the fill, overlying the underlying siltier native tidal flat deposits which function as an aquitard, limiting vertical groundwater flow. The available data indicate that the water table is relatively shallow, generally ranging in depth from 3 to 6 feet below grade in the property's eastern areas to 8 to 15 feet below grade in the property's western areas. Consequently, groundwater generally flows toward the west across the property, with discharge to the Waterway. However, depending on the alignment of the shoreline, groundwater flow directions locally may range from northwesterly to southwesterly. For example, in the south end of the property, groundwater locally flows to the southwest toward off-loading dock slip. Groundwater in the fill is hydraulically connected to the Waterway, and the water table near the Waterway rises and falls up to 2 feet in response to diurnal tidal fluctuations (Landau, 1991).

3 Derivation of Screening Levels for Environmental Assessment

This section presents an overview for derivation of screening levels against which constituent concentrations in soil, groundwater, and, if sampled, soil gas media will be compared for the purposes of identifying affected media and contaminants of potential concern. These screening levels may change during other phases of the upland investigation based on site-specific data results and a better understanding of the conceptual site model. Cleanup levels used to define the nature and extent of contamination in the Kimberly-Clark uplands will be developed as part of the RI/FS. The screening levels are intended to be conservative and address the full range of potentially applicable exposure pathways and receptors under current and potential future uses of the property, in accordance with MTCA. An exceedance of a screening level does not indicate that cleanup is required, but may indicate that additional assessment is warranted. For any media, screening levels applied in the environmental assessment will not be set below background concentrations or below analytical practical quantitation limits (PQLs), in accordance with MTCA. While not listed in the screening level tables, regional background concentrations for common urban contaminants (e.g., cPAHs, heavy metals, dioxins/furans) will be considered in evaluation of the data collected during the assessment.

The screening levels to be applied in this assessment do not necessarily represent cleanup levels for the property under MTCA. Additional information may be collected in subsequent steps of the assessment process to support selection of cleanup levels and/or remediation levels for the property, in accordance with MTCA. This will be done as part of a subsequent RI/FS.

The following sections present the exposure pathways to be included in derivation of the screening levels. Because the soil screening levels will depend on site-specific organic carbon content (data to be collected in this round of assessment), the numerical values will be presented when the data are presented.

3.1 Overview of Exposure Pathways and Receptors

An exposure pathway describes the mechanisms by which human or ecological exposure to site contaminants can occur under current (baseline) conditions, assuming no remedial action or protective control is in place. To be considered complete, an exposure pathway has:

- An identified source of contaminant(s);
- A mechanism for contaminant release and transport from the source;
- An exposure route where contact with the contaminant can occur; and
- A receptor that can be exposed to the contaminant.

An exposure pathway is considered complete if a human or ecological receptor can be exposed to a contaminant via that pathway.

This subsection describes exposure pathways for contaminants in soil, groundwater, and air (soil gas) at the property.

3.1.1 Groundwater Exposure Pathways

Assuming the range of potential future land uses, current and future potentially complete exposure pathways for groundwater include:

- Residents, industrial/commercial workers, and visitors in buildings inhaling indoor air contaminated – via vapor intrusion – by the volatilization of contaminants from shallow groundwater; and
- Construction workers contacting (via dermal exposure and inhalation of vapors in outdoor air) contaminated shallow groundwater during excavation or other construction-related activities, if no worker protection controls are in place.

As discussed in Section 3.2.1, groundwater at the upland mill property is not considered a practicable source of potable water in accordance with MTCA. As such, human use of groundwater at the upland mill property for drinking water purposes is not considered a current or future potentially complete pathway. However, the shallow groundwater discharges to the adjacent East Waterway, as discussed in Section 2.5. Potentially complete exposure pathways associated with groundwater discharge to marine sediment and surface water include:

- Exposure of benthic organisms to contaminated groundwater discharging to the biologically active zone of sediment [the upper 10 centimeters (cm) below the mudline];
- Ingestion of contaminated benthic organisms as prey by higher trophic level organisms in the food chain (e.g., foraging fish, aquatic birds, marine mammals, etc.);
- Human ingestion of benthic organisms contaminated by groundwater discharge to sediment (upper 10 cm);
- Exposure of aquatic organisms to contaminated groundwater discharging to surface water;
- Ingestion of contaminated aquatic organisms as prey by higher trophic level organisms; and
- Human ingestion of aquatic organisms contaminated by groundwater discharge to surface water.

3.1.2 Soil Exposure Pathway

Assuming the full range of potential future land uses, current and future potentially complete exposure pathways for soil include:

- Construction workers contacting contaminated soils (skin contact and incidental ingestion) and/or inhaling contaminated dust or vapors in outdoor air during excavation or other construction-related activities, if no worker protection controls are in place; and

- Residents, industrial/commercial workers, and visitors contacting contaminated soils and/or inhaling contaminated dust or vapors in outdoor air in the future, if no controls are in place to restrict use of the property.

In addition to these pathways, contaminants in soil can leach to groundwater and be released to air through vapor intrusion of volatile contaminants. Therefore, the soil-to-groundwater and soil-to-groundwater-to-air exposure pathways are also considered in the environmental assessment. The soil-to-groundwater pathway considers the most stringent groundwater screening levels protective of the exposure pathways described above.

In addition, soil screening levels for terrestrial ecological protection will also be considered in the forthcoming RI/FS, in accordance with WAC 173-340-7490.

3.1.3 Air (Soil Gas) Exposure Pathways

Assuming the range of potential future land uses, current and future potentially complete exposure pathways for air (soil gas) include:

- Residents, industrial/commercial workers, and visitors in buildings inhaling indoor air contaminated – via vapor intrusion – by volatile contaminants originating from soil or groundwater;
- Residents, industrial/commercial workers, and visitors inhaling contaminated vapors in outdoor air in the future, if no controls are in place to restrict use of the property; and
- Construction workers breathing outdoor air contaminated by dust or vapors during excavation or other construction-related activities, if no worker protection controls are in place.

3.2 Screening Levels by Media

The following subsections present the basis for establishing numerical screening levels and points of compliance for groundwater, soil, and, if sampled, soil gas (air) to be applied in this environmental assessment. In deriving numerical screening levels, MTCA cleanup levels and chemical-specific parameters (distribution/ partition coefficients, Henry's Law constants, etc.) will be taken from Ecology's online CLARC database, and the date of download will be documented. For ionizing organics (e.g., chlorinated phenols), partition coefficients will be determined based on site-specific groundwater pH in accordance with MTCA.

3.2.1 Groundwater Screening Levels

This section presents the derivation of the environmental assessment groundwater screening levels.

Groundwater's Highest Beneficial Use

Discharge to marine water, not drinking water, is proposed as the highest beneficial use for groundwater beneath the mill upland mill property. Groundwater in the fill at the mill property is not a practicable source of potable water. This determination is based on the following factors, in accordance with MTCA requirements (WAC 173-340-720[2]):

1. **Groundwater does not serve as a current source of drinking water.** The mill property has been and is being supplied with potable water from City of Everett, and this will continue for future redevelopment of the upland mill property. Snohomish County Health Department will not approve private wells if located within the water service area of an approved public water system, which is the case for the mill property.
2. **Groundwater is not a potential future source of potable water due to elevated concentrations of naturally occurring inorganic constituents.** The existing data document that groundwater at the mill property is brackish, with total dissolved solids (TDS) commonly exceeding the 500 mg/L state drinking water standard. Brackish groundwater conditions throughout the fill at the upland mill property are attributable to proximity to the Waterway (saltwater intrusion) and the fact that much of the fill was likely dredged from the marine environment.
3. **Contamination in groundwater will not be transported to an aquifer that is a potential drinking water source.** There are no drinking water wells within or downgradient of the upland mill property and low-permeability tidal flat deposits (aquitard) underlie the fill. Furthermore, Port Gardner Bay (Puget Sound) is the regional groundwater discharge area, therefore regional groundwater flow is generally moving upward toward the discharge area, further limiting the potential for downward flow from the fill to deeper aquifers.
4. **Groundwater is immediately adjacent to marine water that is not classified as a domestic (potable) water supply under the state surface water quality standards (Chapter 173-201A WAC).** The fill groundwater discharges to, and is in direct hydraulic connection with, marine water of the Waterway. Pumping a well in the fill in sufficient quantity to serve as a viable water supply source could induce intrusion of saline water.

In addition to local ordinances prohibiting private water wells within the City’s municipal water service area, it is highly unlikely that the state Department of Health (DOH) would permit a well in the fill as a public water supply source. The fill has limited saturated thickness and relatively low average permeability, so would not be a reliable source in terms of yield. Furthermore, given the shallow water table condition, we expect that DOH would designate the fill as groundwater under the influence of surface water (GWI), thus requiring highly expensive treatment (filtration) to meet federal surface water treatment requirements for public water supply.

Based on the collective information, groundwater at the mill property is not considered a practicable source of potable water, now or in the future, relative to continuing to obtain potable water supply from the City.

Because drinking water is not a practicable future use for groundwater at the mill property, groundwater screening levels applied in this environmental assessment are the most stringent value based on protection of the adjacent marine environment (water and sediment) or vapor intrusion (VI) to future structures (indoor air) on the mill property. In accordance with MTCA (WAC 173-340-720[b]), groundwater screening levels protective of surface water incorporate MTCA surface water cleanup levels, including criteria from applicable state and federal laws (WAC 173-340-730). For arsenic, a 5 µg/L background-based concentration is included in the groundwater screening criteria (WAC 173-340-900 Table 720-1).

The derivation of groundwater screening levels for marine protection and VI protection is described below. For each constituent, the most stringent of the criteria considered will be applied as the screening level for this environmental assessment.

Protection of Marine Surface Water and Sediment

Considering the factors presented above, environmental assessment groundwater quality data are compared against groundwater screening levels that are the most stringent criterion based on protection of marine surface water and sediment, as described below.

Protection of Marine Water Quality (Water Column)

For protection of marine water quality, screening levels are the most stringent of the following aquatic life criteria (marine chronic) and human health criteria for consumption of aquatic organisms under state and federal laws:

- MTCA standard Method B surface water cleanup levels based on human consumption of fish (human health only);
- Washington State Water Quality Standards (WAC 173-201A-240);
- Federal National Recommended Water Quality Criteria pursuant to Section 304(a) of the Clean Water Act; and
- The Federal National Toxics Rule (NTR; 40 CFR 131.36).

Protection of Marine Sediment

The groundwater screening levels must protect against recontamination of marine sediment quality, assuming that groundwater contaminants transported from the upland mill property would partition from groundwater to sediment within the bioactive zone, which is operationally defined as the uppermost 10 centimeters (cm) of sediment below mudline. Any existing contamination of Waterway sediment is not considered in the derivation of upland groundwater screening levels for the purposes of the environmental assessment.

For protection of marine sediment quality, the groundwater criterion is calculated as the state Marine Sediment Quality Standard (SQS; WAC 173-204-320) divided by the sediment:water partition coefficient. For organics with the SQS expressed on a total organic carbon basis in WAC 173-204-320, the calculation uses the organic carbon SQS and sediment organic carbon:water partition coefficient (Koc), and the calculation is independent of sediment organic carbon content (foc). Sediment foc and Koc are incorporated into calculations for organics with dry-weight-based SQS in WAC 173-204-320. For inorganics, the calculation uses the dry weight SQS and sediment:water distribution coefficient (Kd).

Protection from Vapor Intrusion (VI)

Volatilization of contaminants in shallow groundwater can represent a potential issue for VI into future structures (indoor air) or outdoor ambient air on the upland mill property. For the purposes of this environmental assessment, conservative (“Tier 1”) groundwater VI screening levels are obtained from Table B-1 of Appendix B to Ecology’s draft guidance for evaluating soil gas intrusion (Ecology, 2009). If needed, measured soil gas data can also be used to assess the groundwater-to-air pathway, in accordance with Ecology (2009).

Point of Compliance for Groundwater Screening Levels

Under MTCA, the standard point of compliance for groundwater cleanup levels is throughout site groundwater, regardless of whether groundwater is potable or not (WAC 173-340-720(8)(b)). If it is not practicable to meet groundwater cleanup levels throughout the site, Ecology can approve a conditional point of compliance for groundwater, in accordance with WAC 173-340-720(8)(c) and (d).

For volatile groundwater contaminants that can pose of risk via VI, protectiveness is achieved by meeting VI-based groundwater cleanup levels, or generally with 100 feet of structures that would be built on grade in the future. Therefore, for VI protection, the point of compliance for groundwater is throughout the shallowest water-bearing zone (fill) at the mill property.

At the mill property, where groundwater’s highest beneficial use is proposed as discharge to marine water, protectiveness of that beneficial use is dependent on meeting marine-protection-based groundwater cleanup levels at the points where groundwater discharges to marine sediment (bioactive zone) and then the marine water column of the Waterway. Therefore, the groundwater conditional point of compliance is set at its point of discharge to surface water and is based on protection of the marine environment (sediment and water column) as previously discussed.

The practicability of meeting groundwater cleanup levels throughout the upland mill property would only be determined during evaluation of remedial alternatives in a feasibility study, not in this environmental assessment. Consequently, for the purposes of this environmental assessment, the MTCA standard point of compliance will be assumed, and data from each monitoring well will be compared against groundwater screening levels protective of both VI and marine protection. However, to assess whether the upland mill property is a current source of contaminants to the Waterway, the evaluations will focus on data from shoreline monitoring wells relative to screening levels for protection of the marine environment.

It is conservative to apply marine-based groundwater screening levels in wells upgradient of the sediment mudline where the screening levels technically apply, given the substantial natural attenuation of contaminant concentrations that can occur in the dynamic, tidally influenced nearshore portion of the fill. More detailed evaluation of attenuation of groundwater contaminants occurring prior to discharge to the marine environment could be considered if warranted in evaluating cleanup actions for the upland mill property.

3.2.2 Soil Screening Levels

Soil screening levels depend on current and planned use of the upland mill property, which, in accordance with MTCA, can be divided into industrial use and everything else (“unrestricted”, which includes residential). The current use of the upland mill property is industrial and likely meets the requirement of a “traditional industrial use” under MTCA (WAC 173-340-745). The future use of the upland mill property could be industrial or another use (e.g., mixed use) which may not qualify as an industrial property under

MTCA. In addition to direct contact exposure to soil, the soil screening levels also need to address soil leaching to groundwater discharging to marine water/sediment, soil leaching to groundwater with volatilization to air, and, for petroleum hydrocarbons, generation of mobile non-aqueous phase liquids (residual saturation). If needed, the soil-to-air pathway may be evaluated using measured soil gas data, since numerical soil screening levels are not available for that pathway (Ecology, 2009).

Since the future land use is not currently known, the analytical data for upland mill property soil are compared against soil screening levels for both unrestricted and industrial land uses in this environmental assessment. Derivation of the environmental assessment unrestricted and industrial soil screening levels is described below.

Unrestricted Land Use Soil Screening Levels

Unrestricted soil screening levels are the most stringent concentration based on human-direct-contact and soil-leaching-to-groundwater exposure pathways for each constituent. The values considered for those exposure pathways are described below.

Direct Contact Pathway

Soil concentrations protective of human direct contact under unrestricted land use are the more stringent of MTCA Standard Method B soil cleanup levels[1] and select MTCA Method A unrestricted soil cleanup levels.

Most MTCA Method A unrestricted soil cleanup levels are based on either direct contact using the standard Method B equations (WAC 173-340-740[3][b]) or protection of groundwater for drinking water (potable) use. At the mill property, we propose that groundwater's highest beneficial use is discharge to marine water/sediment, not drinking water, as described in Section 3.1.1. Therefore, the Method A soil cleanup levels based on groundwater protection are not applicable, and this pathway is addressed separately using the most stringent groundwater screening levels developed in accordance with MTCA (described above). In addition, the Method A direct-contact-based values are covered by including standard Method B cleanup levels in the screening level derivation. For the purposes of this environmental assessment, the Method A values that are included in the unrestricted soil screening level derivation include arsenic (background-based), lead (no Method B value), total PCBs (from the Toxic Substances Control Act [TSCA], an applicable or relevant and appropriate requirement), and diesel- and oil-range total petroleum hydrocarbons (TPH) (based on generation of non-aqueous phase liquid [NAPL] petroleum).

Risk-based Method B (unrestricted) or Method C (industrial) soil screening levels can be calculated for TPH, addressing all exposure pathways, if volatile petroleum hydrocarbon (VPH) and/or extractable petroleum hydrocarbon (EPH) data are collected to quantify concentrations of aromatic and aliphatic hydrocarbons in specific carbon ranges, in accordance with MTCA.

Soil Leaching to Groundwater Pathway

Soil concentrations protective of groundwater's highest beneficial use are calculated conservatively using Ecology's variable parameter 3-phase partitioning model (WAC

---

[1] Downloaded from Ecology's Cleanup Level and Risk Calculation (CLARC) database (https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx).

173-340-747[5]), and using the most stringent groundwater screening level protective of VI for unrestricted land use, marine water quality, and marine sediment quality (described in Section 3.1.1). Separate values are developed for unsaturated vs. saturated soil (dilution factors of 20 vs. 1), in accordance with WAC 173-340-747(4)(e). MTCA-default parameters (WAC 173-340-747[4] and [5][2]) are used in the 3-phase model.

The soil concentrations generated by this MTCA-default methodology are intentionally conservative, and are intended for preliminary screening only. Soil concentrations above these screening levels may or may not actually be leaching contaminants to groundwater at concentrations of concern. MTCA provides a range of options to further evaluate site-specific soil concentrations protective of groundwater, including use of soil leaching tests and empirical groundwater quality data, as outlined in WAC 173-340-747.

Industrial Land Use

Industrial soil screening levels are the most stringent concentration based on human-direct-contact and soil-leaching-to-groundwater exposure pathways. The values considered for each exposure pathway are described below.

Direct Contact Pathway

Soil concentrations protective of human direct contact under unrestricted land use are the more stringent of MTCA Standard Method C soil cleanup levels[3] and select MTCA Method A industrial soil cleanup levels. For the same reasons described for unrestricted soil screening levels above, Method A values included in the industrial soil screening level derivation include arsenic (background-based), lead (no Method C value), total PCBs (from TSCA), and diesel- and oil-range TPH (based on generation of petroleum NAPL).

Soil Leaching to Groundwater Pathway

The derivation of industrial soil concentrations protective of groundwater is the same as described above for unrestricted soil screening levels, with the one exception that VI-based groundwater screening levels for industrial land use are included in selecting the most stringent groundwater screening level for use in the calculation.

Point of Compliance for Soil Screening Levels

In accordance with MTCA, the point of compliance for direct contact with soil extends to 15 feet below grade, based on a reasonable maximum depth of excavation and assumed placement of excavated soils at the surface where contact occurs. For the soil-leaching-to-groundwater pathway, the soil point of compliance is all depths, above and below the water table. For the soil-volatilization-to-air pathway, the soil point of compliance is also all depths; however, VI risks from soils below the water table are better assessed using empirical groundwater quality data (i.e., saturated soil leaching to groundwater and volatilization from groundwater to soil gas in the unsaturated zone).

3.2.3 Air (Soil Gas) Screening Levels

Soil gas data could be warranted if elevated concentrations of volatile organic compounds (VOCs) are detected in vadose zone soil or groundwater at the mill property. Ecology's guidance for evaluating vapor intrusion (Ecology, 2009) provides unrestricted (Method

---

[2] Downloaded from Ecology's CLARC database.

[3] Downloaded from Ecology's CLARC database.

B) and industrial (Method C) soil gas screening levels against which soil gas sample analytical results are compared in this environmental assessment.

Ecology’s sub-slab soil gas screening levels are equal to 10 times the corresponding MTCA standard air cleanup levels (for unrestricted or industrial land uses). This is based on EPA's Subsurface Vapor Intrusion Guidance (EPA, 2002), which allows the use of a 10-fold (0.1) slab attenuation factor to conservatively estimate indoor air concentrations using soil gas sample analytical results from sub-slab locations.

The point of compliance for air cleanup levels is ambient air throughout the upland mill property, whether indoors or outdoors. However, if soil gas data is collected in environmental assessment, concentrations in samples of subsurface soil gas would be compared against the air screening levels.

4 Previous Remedial Actions at Mill Property

This section summarizes previous remedial actions, including environmental investigations and independent cleanups, conducted at the K-C mill property. The summary is based on reports provided by K-C supplemented by information summarized in the Phase 1 ESA for the property (AECOM, 2011) where the original documents were not available. The UST investigations described below are associated with Ecology UST ID 5351 and release ID 1624. The approximate location of the features described below are provided on Figure 3.

4.1.1 Removal of Gasoline UST No. 69 (K-C, 1989)

UST No. 69, originally installed in around 1966, was formerly located between Buildings 29 and 37. During removal of this 260-gallon leaded gasoline UST No. 69 in 1989, six soil samples and one groundwater sample were collected for chemical analysis. Ethylbenzene was detected in one soil sample and xylenes were detected in four soil samples, all at concentrations below MTCA Method A soil cleanup levels for unrestricted use. BTEX compounds were not detected in the groundwater sample (K-C, 1989). K-C reported the findings to Ecology (AECOM, 2011). The lack of downgradient groundwater quality data is considered a data gap for this area.

4.1.2 Heavy Duty Shop Soil Removal (EcoChem, 1991)

In 1990, oily water from the Heavy Duty Shop sump was reportedly diverted to the hog fuel pile area north of the Shop. A test pit to 6-foot depth in the release area encountered “oil-saturated wood chips and soil” to a depth of 3 feet. TPH was detected at a concentration of 2,200 mg/kg in a sample of the oily soil. TPH was not detected in two soil samples collected below the oily soil layer.

In 1991, an estimated 40 to 50 cubic yards of visibly stained soil was removed from the release area. The memorandum describing the soil removal (EcoChem, 1991) was submitted to Ecology.

We are aware of no verification of groundwater quality data collected as part of the cleanup, which because of proximity to the Waterway, is considered a data gap.

4.1.3 Removal and Investigation of Five USTs (Landau, 1991)

Five underground storage tanks (USTs) at the mill property were permanently decommissioned by removal in November and December 1989 (Landau, 1991). The capacity and contents of the USTs reportedly included:

- One 250-gallon unleaded gasoline UST (Tank 68);
- One 1,000-gallon diesel fuel UST (Tank 70); and
- Three 12,000-gallon Bunker C fuel oil USTs (Tanks 71, 72, and 73).

The approximate locations of these USTs are depicted on Figure 3. As part of the UST decommissioning activities, soil and groundwater samples were collected and submitted for laboratory analysis. The laboratory analytical results indicated that releases of petroleum hydrocarbons had occurred proximate to each of the tank pit locations. Based on the laboratory analytical results, contaminated soil was excavated from each tank pit location.

Following removal of the five USTs, Landau conducted a subsurface investigation in November and December 1990, to further assess soil and groundwater quality in the vicinity of the former USTs. The investigation consisted of advancing seven soil borings, three around former UST No. 68 and four around former UST No. 70; collecting soil samples for laboratory analysis; completing all seven borings as groundwater monitoring wells; and conducting a groundwater sampling event. Figure 3 depicts the approximate locations of the monitoring wells MW-68-1, -2, and -3, and MW-70-1, -2, -3, and -4 in the two areas.

Applying the screening levels in Section 3, the results of the subsurface investigation are as follows:

- Groundwater flow is toward the shoreline in both areas: southwesterly near UST No. 68, and westerly near UST No. 70. The water table in the former UST No. 70 area fluctuated up to 2 feet in response to tidal fluctuations, while the water table in the former UST No. 68 area fluctuated less than 0.3 feet; however, tidal influences do not significantly affect groundwater flow directions in these areas;
- Concentrations of TPH as gasoline (gasoline-range TPH) were detected at concentrations up to 670 mg/kg in soil samples within the footprint of the former UST No. 68, but the VOCs benzene, toluene, ethylbenzene, and total xylenes (BTEX) were not detected in soil.
- Gasoline-range TPH, benzene, toluene, and xylenes were detected in groundwater samples collected from the three groundwater monitoring wells installed at and generally downgradient of former UST 68. The detected groundwater BTEX concentrations in the three wells were below groundwater screening levels for protection of the Waterway marine environment. Comparison of groundwater concentrations relative to screening levels based on VI is as follows:
  - At well MW-68-1, within the footprint of former UST No. 68, detected BTEX concentrations were below groundwater screening levels based on VI for unrestricted use.
  - Approximately 30 feet to the southwest of UST No. 68, the 1,700 µg/L xylenes concentration detected in well MW-68-3 was above the VI-based groundwater screening levels for unrestricted and industrial land uses.
  - Approximately 85 feet south-southwest of UST No. 68, the 7.2 µg/L benzene concentration detected in well MW-68-2 was above the VI-based groundwater screening level for unrestricted land use but below that for industrial land use.
- Concentrations of diesel-range TPH or Bunker C were detected in soil samples collected proximate to former UST No. 70 at concentrations below the 2,000 mg/kg soil screening level for unrestricted and industrial land uses, based on potential for accumulation of NAPL, aka “free product”;

- Diesel-range and/or Bunker C TPH was detected in groundwater samples from well MW-70-3 located south of former UST No. 70 (4,400 µg/L), and from well MW-70-4 located west of it (greater than 20,000 µg/L). TPH was not detected in groundwater samples from wells MW-70-1 or MW-70-2 located east and north, respectively, of the former tank. Because groundwater is not considered a drinking water source, and there are no marine water quality criteria for TPH mixtures, there are no groundwater screening levels for oil-range TPH; and
- One inch of floating Bunker C product was detected in the recovery sump installed in the tank pit of former USTs 71, 72, and 73. No explorations were conducted around these former USTs;

Landau recommended that additional groundwater monitoring be conducted to further assess groundwater quality proximate to each of the former tanks. Soil or groundwater samples collected during the investigation were not analyzed for polycyclic aromatic hydrocarbons (PAHs), a predominant component of Bunker C and a required analyte for oil-range TPH releases under MTCA.

Groundwater flows southwesterly from the former UST No. 68 location toward the off-loading dock slip (small slip of water on south end of mill property). A pair of monitoring wells installed along the slip shoreline generally downgradient of the UST No. 68 area during Aspect's 2012 Phase 2 ESA had no detectable gasoline-range TPH or BTEX in groundwater (discussed in Section 4.2.1). Nevertheless, there are no data to document current groundwater quality between the shoreline and the former UST No. 68.

Based on the investigation findings, the nature and extent of petroleum impacts to soil and groundwater proximate to the former USTs No. 68, 70, 71, 72, and 73 has not been sufficiently characterized, and therefore is considered a data gap for the mill property.

4.1.4 Investigation in Vicinity of Former Paint Shop (Landau, 1994)

In June 1994, a strong solvent odor and a thin floating layer of a viscous, brown-black substance were observed within a localized length of utility trench excavated proximate to the salvage warehouse. The location is reportedly near a former paint shop that operated until the early 1970s. A grab sample of water within the trench was collected for chemical analysis of gasoline-, diesel-, and oil-range TPH, VOCs, and PCBs. One VOC, p-isopropyltoluene (aka 4-isopropyltoluene or cymene), was detected in the water sample at a concentration of 11,000 µg/L, along with 380 µg/L gasoline-range TPH. Landau interpreted the p-isopropyltoluene to be a component of turpentine solvent used in the former paint shop. There are no marine-based or VI-based groundwater screening levels for p-isopropyltoluene.

Subsequently, Landau conducted an investigation in August 1994 to assess soil and groundwater quality in the vicinity of the solvent occurrence. The subsurface investigation consisted of advancing seven soil borings (B1 through B7) and collecting soil samples and reconnaissance groundwater samples[4] for laboratory analysis of gasoline-range TPH/BTEX and diesel-range TPH. In addition, the groundwater sample

---

[4] Grab groundwater samples collected from the soil borings during drilling; no monitoring well was installed.

from boring B4, located west (downgradient) of the solvent occurrence, was analyzed for the full suite of VOCs. The approximate locations of the solvent occurrence and associated borings are depicted on Figure 3.

The soil samples and the reconnaissance groundwater samples from the seven borings did not contain detectable concentrations of gasoline-range TPH or BTEX. Additionally, no VOCs were detected in the downgradient B4 groundwater sample. Both soil samples collected from boring B3 contained diesel-range TPH concentrations below 140 mg/kg, well below the 2,000 mg/kg soil screening level.

The 1994 investigation results indicate a highly localized historical release of paint thinner, with no evidence for migration of contaminated groundwater at that time. We identify no data gaps warranting further exploration for this area.

4.1.5 UST No. 29 Xylene Cleanup (Scott Paper, 1994)

A 12,500-gallon xylene UST located immediately south of the Pulp Prep Building was removed in 1989. A release of xylene contaminated the soil and groundwater in the vicinity of the former UST. An adjacent 12,500-gallon UST No. 67 stored kerosene. No kerosene release was reported for this UST, but it was within the area of xylene contamination from the UST No. 29 release.

Between 1992 and 1994, Scott Paper implemented soil gas extraction (SVE) to remediate the xylene release, as an independent cleanup. Scott Paper (1994) reported that the SVE system successfully cleaned up the contaminated soil, and recommended no additional remedial measures. Scott Paper submitted the report to Ecology. Ecology made no determination on sufficiency of the independent cleanup. In 2002, Ecology listed the Facilities Leaking Underground Storage Tank (LUST) ID No. 1624 as inactive. The lack of data to confirm residual concentrations at this former UST location is a data gap.

4.1.6 Naval Reserve Parcel Remediation (K-C, 1997)

K-C engaged in a land exchange with the U.S. Navy in the mid-1990s. The land exchange deeded K-C land at the north end of the mill property to the U.S. Navy in exchange for a Naval Reserve property located between the paper mill and the new secondary treatment plant. As part of the exchange agreement, the U.S. Navy agreed to remediate contamination previously identified on that parcel (K-C, 1997). According to Mr. Robert Waddle, formerly of K-C, the land deeded to K-C from the U.S. Navy in the property transaction included Snohomish County Tax Parcel No. 29051900201300 (Figure 2).

Based on the 1997 memorandum, two areas of contamination were identified on the former U.S. Navy parcel. The approximate locations of the two areas, based on unscaled maps included in K-C (1997), are depicted on Figure 3.

The first is an area where petroleum USTs were removed on the western end of the parcel. In that area, gasoline-range TPH soil concentrations up to 1,900 mg/kg and diesel-range/oil-range TPH soil concentrations up to 11,000 mg/kg were detected at a depth of about 8.5 feet in boring BOR-19 located immediately northwest of the former UST(s). The soil TPH contamination was generally delineated laterally by surrounding borings. The map in the 1997 memorandum also depicts a 14 mg/kg soil mercury concentration at a depth of 4.5 to 6 feet near the flammable storage shed due north of the former USTs (boring BOR-02), which is above a soil screening level based on leaching to protect marine water. The approximate location of petroleum-contaminated soil reported in this area is identified on Figure 3.

The second area is located on the eastern side of a former shooting range building, where concentrations of arsenic (to 1,600 mg/kg), cadmium (13 mg/kg), and lead (to 2,500 mg/kg) were detected at concentrations above screening levels in surficial soil samples. The approximate location of reported metals-contaminated soil in this area is identified on Figure 3.

The memorandum includes unscaled maps with the aforementioned data posted, including hand-written information, but no additional information from which to determine whether other samples were collected that help delineate contaminant distribution with depth etc. The memorandum further indicates that the Navy planned to excavate and dispose of the TPH- and metals-contaminated soils from the two areas. However, no additional information regarding the cleanup was reported in the memorandum and we are not aware of additional documents regarding the cleanup action. The memorandum also provides no information regarding groundwater monitoring.

In February 2012, Aspect installed a soil boring (DP-16) and completed it as monitoring well MW-5, along the shoreline west of the former Naval Reserve parcel (Figure 3). A soil sample and groundwater sample were collected from the exploration. The soil sample was analyzed for gasoline-, diesel-, and oil-range TPH, BTEX, metals, SVOCs, and PCBs. The groundwater sample was analyzed for gasoline-, diesel-, and oil-range TPH, BTEX, dissolved metals, SVOCs including low-level PAHs, TDS, and TSS. The well was located prior to receiving the 1997 memo with maps, and may not be strictly downgradient of the reported petroleum-contaminated areas within the former Naval Reserve parcel.

The only constituent detected above unrestricted soil screening levels in the DP-16 soil sample was total carcinogenic polycyclic aromatic hydrocarbons (total cPAHs[5]). The only constituents exceeding marine-based water quality screening levels in the groundwater sample from well MW-5 was dissolved copper. Refer to Section 4.2.3 for additional discussion of the data from this location.

Based on the lack of information regarding cleanup of contaminated areas, the nature and extent of contamination within the former Naval Reserve parcel is considered a data gap for the mill property.

4.1.7 Investigation of Former Bulk Fuel Facilities (PEG, 1998)

On behalf of K-C, Chevron, Texaco, and BNSF, Pacific Environmental Group (PEG) conducted a subsurface investigation to assess petroleum contamination previously encountered adjacent to the City of Everett Combined Sewer Outfall (CSO) line which runs east-west immediately south of the K-C shipping warehouse in the southeast corner of the mill property (Figure 3). In 1995, petroleum product had been observed discharging from the CSO line into the East Waterway. Investigation determined that

---

[5] Total cPAHs, calculated as toxic equivalent concentration of benzo(a)pyrene, in accordance with MTCA (WAC 173-340-708[8]).

petroleum product was entering a segment of the CSO line that was constructed of clay tiles which had settled and cracked. In summer 1996, portions of the CSO line were replaced, and the remaining portions of it were slip-lined. Reportedly, 1,450,800 gallons of water and 23,050 gallons of petroleum product were removed by dewatering conducted during the construction (AMEC, 2010).

The purpose of the PEG (1998) investigation was to evaluate soil and groundwater quality in the vicinity of former petroleum bulk facilities located north of the CSO (on K-C mill property) and south of it (on ExxonMobil ADC site) to assess whether the historical facilities contributed to petroleum contamination documented at the CSO line. In the Phase 1 ESA for the mill property (AECOM, 2011), the facilities on the K-C property constitute REC 2, whereas the facilities on the ExxonMobil ADC Site constitute REC 1 (described in Section 4.1.13).

The investigation consisted of advancing 17 soil borings (Probe-1 through Probe-15[6], KC-1, and KC-2); collecting and analyzing three soil samples from borings Probe-7, Probe-11, and KC-1, based on presence of petroleum sheen visible during field screening; collecting and analyzing reconnaissance groundwater samples from 14 borings; completing two borings as groundwater monitoring wells inside of the K-C warehouse (KC-1 and KC-2); and collecting groundwater samples from the wells. The approximate locations of the borings and monitoring wells are depicted on Figure 3.

Concentrations of TPH and BTEX detected in the three soil samples were well below unrestricted soil screening levels (TPH below 150 mg/kg, and negligible BTEX). The highest groundwater concentrations of diesel-range plus oil-range TPH were detected in groundwater samples from Probe 7 (91,000 µg/L) and Probe 11 (100,000 µg/L), located adjacent to the CSO line. Those two groundwater samples also contained gasoline-range TPH (327 and 736 µg/L, respectively), but BTEX concentrations were below screening levels for marine protection and VI protection. PEG (1998) provided no interpretation of petroleum type for the samples.

Much lower groundwater TPH concentrations were detected in wells KC-1 and KC-2, located within the footprint of the K-C warehouse (430 µg/L at well KC-1; non-detect at well KC-2). These data may suggest that the source of TPH encountered along the CSO line (Probes 7 and 11) is not migrating from the K-C mill property. However, additional data are warranted to better define the nature and extent of petroleum impacts in this area.

Detectable TPH-related concentrations in groundwater samples collected in the area of the former Associated Oil Company fuel facilities located north of the KC-warehouse are as follows:

- Probe 3: 766 µg/L oil-range TPH;
- Probe-4: 137 µg/L gasoline-range TPH, 276 µg/L diesel-range TPH, and BTEX concentrations below applicable screening levels (e.g., 0.88 µg/L benzene);
- Probe 5: 65 µg/L gasoline-range TPH;
- Probe 13: 1,420 µg/L oil-range TPH;

---

[6] Boring Probe-1 was a shallow hand-augered boring.

- Probe 14: 311 µg/L diesel-range TPH, and 2,930 µg/L oil-range TPH; and
- Probe-15: 172 µg/L gasoline-range TPH, and BTEX concentrations below applicable screening levels (e.g., non-detect benzene).

No samples were collected within the footprint of the former Associated Oil Company tank farm. Probes 13, 14, and 15 are located generally along a former Bunker C pipeline that reportedly ran from the slip shoreline to the tank farm. No PAH analyses were conducted in the investigation.

Based on the investigation findings, the extent of TPH in soil and groundwater in the area of the former Associated Oil Company tank farm and associated Bunker C pipeline has not been sufficiently characterized and therefore is a data gap for the mill property. K-C will conduct additional investigation of REC 1 during Round 3 of the ESA in later summer 2012, following review of the findings from ExxonMobil/ADC’s source removal activities recently completed on K-C property and south of it.

4.1.8 PCB Decontamination of Substations (Safety-Kleen, 1998)

K-C removed significant PCB-containing equipment from the mill between 1995 and 2004 (AECOM, 2011). After cleaning concrete pads beneath electrical transformers 5 & 6 within Screen/Bleach Unit 2, the concrete was found to contain residual PCB concentrations above the EPA cleanup level based on wipe sampling. The concrete was removed, and soils beneath them sampled for PCBs. PCB concentrations in the subgrade soils contained 1.4 and 3.4 mg/kg, above the 1 mg/kg unrestricted screening level for unsaturated soil.

While additional sampling for PCBs would be warranted at locations where PCB-containing transformers have been located, this activity can occur as part of mill demolition. No additional sampling and analysis is warranted prior to demolition as part of the environmental assessment.

4.1.9 Removal of UST No. 68R (BEK McDonnell Engineering, 1999)

In November 1999, BEK McDonnell Engineering (BEK) conducted a site assessment during the permanent decommissioning by excavation and removal of a 500-gallon unleaded gasoline UST and associated dispensing pump located northwest of the K-C warehouse. Based on information in Section 5.4 of AECOM (2011), we infer that this UST was UST No. 68R, presumably located east of the previously decommissioned UST No. 68 (described in Section 4.1.3).

BEK’s site assessment consisted of collecting and analyzing three soil samples from the final limits of the UST excavation from one sample from under the pump island, and completing Ecology’s site assessment checklist.

BEK reported that the removed UST was in very good condition, with no visual evidence of corrosion or holes. BEK reported that groundwater was not observed in the tank pit prior to removal of the tank; however, a very slight gasoline sheen was observed on pea gravel at the base of the tank pit. A pressurized water line was present within the tank pit, and was supported beneath by gravel fill. To avoid disturbance of the water line, the fill was not removed, so soil sampling beneath it was not conducted.

Gasoline-range TPH and BTEX were not detected in the four soil samples collected from the tank pit. Based on the results of the site assessment, BEK concluded that contamination was not present in the tank pit or adjacent pump island area.

Although the base of the tank pit was reportedly above the water table, the observation of gasoline sheen was observed at the pit base, but there were no data to verify whether groundwater had been impacted. Groundwater should flow southwesterly from this location toward the off-loading dock slip. Groundwater samples collected from a pair of monitoring wells installed along the slip shoreline generally downgradient of the UST No. 68R area during Aspect's Round 1 of the Phase 2 ESA had no detectable gasoline-range TPH or BTEX (discussed in Section 4.2.1). The lack of groundwater quality data closer to the former UST No. 68R is considered a data gap.

4.1.10 Bunker C Soil Removal, Bleach Unit 2 (K-C, 1999)

During construction of Screen/Bleach Unit 2, and relocation of a water line at the northeast corner of Screen/Bleach Unit 1, soil contaminated with Bunker C oil was reportedly encountered (Figure 3). The inferred source was an abandoned fuel pipeline between the former fuel tank farm on the south and the boiler house on the north. An estimated 15 cubic yards of contaminated soil was removed and disposed of during the construction project. No sampling was conducted within the excavation following soil removal.

4.1.11 Latex Spill Investigation (Aspect, 2009)

Aspect conducted an investigation to evaluate a release of latex product (AIRFLEX® EN1165) that occurred proximate to the southwest corner of the tissue mill between September and November 2008. The latex product contained less than 1% vinyl acetate and less than 0.1% acetaldehyde, 1,4-dioxane, ethylene oxide, and formaldehyde. K-C used the latex in manufacture of household paper towels, and unloaded it from tank cars at the terminus of a rail spur that runs along the loading dock.

K-C discovered the spill when latex was observed seeping out of the ground next to the loading dock during pumping operations. The spill occurred from subsurface piping, which may have been damaged when a tank car derailed at the spur terminus in September 2008. Upon discovery of the spill, the subsurface pipeline was immediately taken out of service and replaced with a temporary above-grade pipeline. Based on unloading records, K-C estimated that up to 250,000 pounds (roughly 28,000 gallons) of product were spilled.

After learning of the release, K-C notified Ecology regarding the spill, and conducted an investigation into the chemical properties of the latex product to determine its hazard potential. Using data supplied by the vendor, and confirmatory laboratory analysis of the as-delivered product for formaldehyde content, K-C determined that the spill did not constitute a reportable quantity under 40 CFR 302 and 40 CFR 355. Between February and April 2009, K-C removed approximately 15,500 gallons of the spilled product from beneath the mill using vacuum extraction (vactor truck). During the final removal effort, the flow of product from beneath the tissue mill building dissipated to a trickle.

Based on evaluation of the collective information, Aspect (2009) concluded that the residual latex product poses negligible environmental concern and no adverse threat to industrial workers at the mill property, and that it would be impracticable to attempt removal actions more aggressive than ongoing vactor recovery of visible product. However, the lack of groundwater quality information downgradient from the area is considered a data gap for the mill property.

4.1.12 Characterization of Soil Removed from Sand Filter 1 Foundation (CRETE Consulting, 2011)

CRETE conducted sampling and analysis of stockpiled soil to profile it for off-site disposal. The soil had been excavated from within the 7, 8, & 9 Old Boiler House Building, adjacent to Dutch Ovens 1 through 5, to allow construction of the foundation for new Sand Filter 1.

A composite sample of the stockpiled soil was collected for analysis of gasoline-, diesel- and oil-range TPH, RCRA 8 metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver), and TCLP lead. In addition, a discrete soil sample was collected for VOC analysis, and a discrete sample of soil suspected of containing spent sulfite liquor (SSL) was analyzed for RCRA 8 metals.

Concentrations of arsenic (35 mg/kg) and mercury (0.9 mg/kg) in the composite soil sample exceeded the respective soil screening levels for unrestricted site use applied in this environmental assessment. The sample containing suspect SSL had no detected concentrations above unrestricted soil screening levels, and VOCs were not detected in the discrete sample. The stockpiled soil was properly disposed of at Roosevelt Regional Landfill.

The metals concentrations detected in the soil removed, while not high, exceed prospective soil screening levels based on unrestricted direct contact and/or groundwater protection. It is uncertain whether additional or more highly contaminated soil may exist in that area. There are no downgradient groundwater quality data to assess whether contaminated soils in the area are leaching to groundwater. The limited soil and groundwater data for this area is considered a data gap.

4.1.13 Phase I ESA (AECOM, 2011)

In April 2011, AECOM conducted a Phase I ESA for the mill property, in accordance with American Society for Testing Materials (ASTM) Standard E1527-05 (AECOM, 2011). Based on the results of the Phase I ESA, AECOM identified the following seven recognized environmental conditions (RECs) at the mill property:

- **REC 1: ExxonMobil ADC Site**. Prior investigation activities for this REC are described in Section 4.1.7;
- **REC 2**: Former Oil House and Former Gasoline/Bunker C Above Ground Storage Tanks (ASTs). Prior investigation activities for this REC are described in Section 4.1.7;
- **REC 3: Heavy Duty Shop Sump**. Prior investigation activities for this REC are described in Section 4.1.2;
- **REC 4: Railcar Dumper Hydraulic System Building**. We are aware of no prior investigation activities for this REC;

- **REC 5: Dutch Ovens 1 through 5**. Prior investigation activities for this REC are described in Section 4.1.12;
- **REC 6: Latex Spill Area**. Prior investigation activities for this REC are described in Section 4.1.11; and
- **REC 7: East Waterway**. The Waterway is outside of the upland area being investigated for this environmental assessment, but the Waterway will be addressed in its own RI/FS.

The Phase 1 ESA also identified six historical RECs (HRECs), which "in the past would have been considered a REC but may or may not be considered a REC currently." The six identified HRECs are as follows:

- **HREC 1: UST Removals (UST numbers 29, 67, 68, 68R, 69, 70, 70R, 71, 72, 73)**. The ten USTs were removed and reported, including any detected releases, to Ecology. Ecology inactivated the LUST ID number for the mill property in 2002. There are reportedly no active USTs currently on the mill property (AECOM, 2011). Prior investigation activities for this HREC are described in Sections 4.1.1, 4.1.3, 4.1.5, and 4.1.9. Former UST No. 70R was reportedly a 2,000-gallon diesel UST installed in 1989 (double-walled tank, cathodic protection, overflow sensor) in the same location as former UST No. 70; it was decommissioned by removal in 1995 (AECOM, 2011). We are aware of no sampling conducted during the decommissioning of UST 70R;
- **HREC 2: Naval Reserve Property**. Prior investigation activities for this HREC are described in Section 4.1.6;
- **HREC 3: Bleaching Tower Area (area of Bunker C soil removal)**. Prior cleanup activities for this HREC are described in Section 4.1.10;
- **HREC 4: PCB Transformer**. Prior cleanup activities for this HREC are described in Section 4.1.8;
- **HREC 5: Former Paint Shop**. Prior investigation activities for this HREC are described in Section 4.1.4; and
- **HREC 6: Rail Car Dumper Containment Vault Valve**. This HREC was defined based on a valve failure which allowed release of two gallons of hydraulic fluid to the Waterway in 1995. The spill was contained, cleaned up, inspected by Ecology, and the matter closed (ERNS No. 547098). We are aware of no prior investigation activities for this HREC.

Additional details regarding the RECs and HRECs identified by AECOM are provided in the *Phase I Environmental Site Assessment, Everett Pulp and Paper Mill, Everett, Washington* dated April 2011 prepared by AECOM. Based on the results of the Phase I ESA, additional assessment of each of the RECs appears warranted.

4.2 Phase 2 Environmental Site Assessment

In early 2012, Aspect conducted a Round 1 of the Phase 2 ESA to further evaluate environmental conditions for the following three areas of the mill property:

- Former Oil House and Former Fuel ASTs (REC 2);
- The former Log Pond Area (wood chip pile storage area); and
- Nearshore groundwater quality downgradient of the former Naval Reserve parcel (HREC 2).

The Phase 2 ESA data collection and findings for the three areas are described below. Tables 2 and 3 present the soil and groundwater quality data, respectively, collected during the Round 1 assessment.

4.2.1 REC 2 (Former Oil House and Fuel ASTs)

REC 2 includes an underground fuel pipe line that ran from the unloading dock just south of the old machine shop to the former fuel AST farm and former oil house. The PEG (1998) data indicated release(s) of gasoline- and oil-range TPH to groundwater. Because petroleum hydrocarbons are readily degradable, and the prior data represent conditions 14 years ago, additional soil and groundwater quality data were collected to assess, for current conditions, the presence/absence of soil and groundwater contamination exceeding applicable screening levels. The assessment also included collection of nearshore groundwater quality data to assess the area as a potential source of contaminants to the Waterway.

Assessment Data Collection

The February 2012 data collection for this area included the following activities (exploration locations shown on Figure 3):

- Subcontracted a utility locating contractor to remotely trace the subsurface alignment of the anticipated fuel conveyance pipeline leading from the dock to the former AST farm area;
- Advanced 15 direct push soil borings (DP-1 through DP-15) for the purposes of field screening for presence/absence of VOCs and collecting soil samples for chemical analysis. Borings DP-1 through DP-10 were completed within and surrounding for the former fuel ASTs. Borings DP-11 through DP-15 were completed along the inferred trace of the subsurface fuel conveyance pipeline;
- Analyzed two soil samples from each boring for gasoline-range TPH with BTEX and diesel- and oil-range TPH, based on field screening information. The two soil samples with highest TPH-Dx concentrations (2.5- to 3-foot sample from DP-1, and 4- to 5-foot sample from DP-3), and samples of soil below those samples, were also analyzed for low-level PAHs. The soil sample with the highest photoionization detector (PID) reading during field screening was also analyzed for the gasoline oxygenates EDB, EDC, and MTBE as well as total lead, in accordance with MTCA;
- Completed four of the borings as groundwater monitoring wells. Monitoring wells MW-1 and MW-2 were installed along the off-loading dock slip shoreline to assess REC 2 groundwater as a potential source of contaminants to the Waterway. Monitoring wells MW-3 and 4 were installed on the downgradient edge of the former AST farm to assess groundwater quality adjacent to the former fuel storage locations; and

- Collected a groundwater sample on February 17, 2012, from each of the four monitoring wells during an outgoing tide (shoreline wells sampled with tide elevations between approximately 2.5 and 0.5 feet MLLW). The four groundwater samples were analyzed for gasoline-range TPH with BTEX, diesel- and oil-range TPH, low-level PAHs, dissolved lead, total dissolved solids (TDS), and total suspended solids (TSS). Groundwater samples from wells MW-3 and MW-4 were also analyzed for gasoline oxygenate additives (EDB, EDC, and MTBE), in accordance with MTCA. Groundwater field parameters (temperature, pH, electrical conductance, dissolved oxygen, and oxidation-reduction potential [ORP]) were measured in the field during sampling.

Assessment Findings

Soil Quality Data

Two of the 15 soil borings, DP-1 and DP-3, had elevated oil-range TPH (presumed Bunker C) soil concentrations above the 2,000 mg/kg soil screening level, which is a conservative MTCA-default value based on preventing accumulation of petroleum free product. No free product was observed in those, or any of the other explorations. In fact, at DP-1 and DP-3 the Bunker C contamination was restricted to shallow soils, with no evidence of deeper downward migration based on the deeper non-detect analytical results. Borings DP-1 and DP-3 are located adjacent to a former fuel AST, presumed to have stored Bunker C fuel (Figure 3). None of the other 13 borings, including those positioned within the footprint of the former Bunker C storage tank and along the subsurface fuel pipeline, had Bunker C detections above the screening level.

At boring DP-1, 16,400 mg/kg Bunker C[7] was detected in the 2.5- to 3.5-foot sample, whereas Bunker C was not detected in the 5.5- to 6-foot sample. This is consistent with field screening (visual, olfactory) observations. Likewise, total cPAH concentrations[8] exceeded the 0.14 mg/kg unrestricted soil screening level in the 2.5- to 3.5-foot sample (7.2 mg/kg) but were below it in the 5.5- to 6-foot sample (0.008 mg/kg).

At boring DP-3, Bunker C was detected at a concentration of 31,000 mg/kg in the 4- to 5-foot sample, but was not detected in the 6- to 7-foot sample. This is consistent with field screening (visual, olfactory) observations. As observed at DP-1, elevated total cPAH concentrations occurred only with the elevated Bunker C (6.1 mg/kg in 4- to 5-foot sample, but not detected in the 6- to 7-foot sample).

Low gasoline-range TPH and BTEX concentrations were detected in select soil samples from the 15 borings within the REC 2 area. The maximum gasoline-range TPH and BTEX concentrations were detected in the 4- to 5-foot sample from DP-3 (where the highest Bunker C was also detected): 46 mg/kg gasoline-range TPH, 0.055 mg/kg benzene, 0.52 mg/kg ethylbenzene, 0.1 mg/kg toluene, and 1.5 mg/kg xylenes. In that sample, gasoline oxygenates were not detected, and total lead was detected at only 2.4 mg/kg. Low concentrations of gasoline-range TPH were also detected in samples of

---

[7] Sum of detected diesel- and oil-range TPH concentrations since they represent a single petroleum product type, in accordance with MTCA.

[8] Calculated as toxic equivalent concentration of benzo(a)pyrene, in accordance with MTCA (WAC 173-340-708[8]).

saturated soil from DP-5 (21 mg/kg), DP-7 (7 mg/kg), and DP-9 (4.9 mg/kg); total BTEX concentrations in the three samples were below 1 mg/kg.

Groundwater Quality Data

The February 2012 groundwater quality data from wells MW-1 through MW-4 indicate no petroleum-related concentrations above MTCA screening levels based on marine water quality and VI.

Gasoline-range TPH was detected at a concentration of 350 µg/L in the groundwater sample from well MW-3, positioned at the downgradient edge of the two larger southern former fuel ASTs (collocated with boring DP-9). Detected BTEX concentrations at MW-3 were well below groundwater screening levels for marine and VI protection (benzene was not detected). The sample also contained 80 µg/L diesel-range TPH, and non-carcinogenic PAH (e.g., naphthalene) concentrations below respective screening levels. The sample contained no detectable dissolved lead, gasoline oxygenates, oil-range TPH, or cPAHs. Because groundwater is not considered a drinking water source, there is no groundwater screening level for gasoline-range TPH; however, the detected 350 µg/L concentration is below an 800 or 1,000 µg/L drinking water-based MTCA groundwater cleanup level.

The groundwater sample from well MW-4, positioned at the downgradient edge of the two smaller, northern former fuel ASTs (collocated with boring DP-7), contained 130 µg/L diesel-range TPH. Gasoline-range TPH, BTEX, gasoline oxygenates, oil-range TPH, and cPAHs were not detected, and detected non-carcinogenic PAH concentrations were below screening levels. However, dissolved lead was detected at an anomalously high concentration (26.8 µg/L) in the MW-4 groundwater sample. The detection is anomalous since lead is not very mobile unless there are acidic conditions or high concentrations of leaded gasoline, neither of which is true at or around MW-4. The laboratory re-ran the lead analysis and confirmed approximately the same concentration. Although the analytical data quality indicates no issues, the result remains anomalous and warrants confirmation through re-sampling as part of the assessment.

Downgradient of the former ASTs and adjacent to the Waterway shoreline, gasoline-, diesel-, and oil-range TPH, BTEX, and PAHs (carcinogenic and non-carcinogenic) were not detected in groundwater samples collected from wells MW-1 and MW-2.

The general groundwater quality in the REC 2 area is indicative of organic-rich fill within a brackish nearshore environment. The four wells had ORP readings indicating moderately reducing conditions. The groundwater is moderately to highly brackish with lab-measured TDS concentrations ranging from 297 mg/L at inland well MW-3 to 22,632 mg/L at shoreline well MW-1, consistent with field electric conductance (EC) readings ranging from 6,260 to 36,650 µS/cm.

Conclusion Regarding REC 2 Current Conditions

The assessment data indicate a localized volume of Bunker C-contaminated soil within the area of the inferred former Bunker C storage tank. No free product is observed in the area, and there is no dissolved-phase contamination (e.g., naphthalenes) detected in downgradient groundwater, indicating that the residual Bunker C is not a source of contamination to the Waterway. Nevertheless, the detected soil concentrations are high enough that generation of petroleum free product is a potential concern, and the contamination warrants remediation to support future use of the mill property.

Based on the current data, the vertical extent of Bunker C soil contamination in the REC 2 area appears to be generally defined within the upper 6 feet. However, the lateral extent of Bunker C soil contamination warrants more detailed delineation prior to designing and costing its remediation, and is thus considered a data gap.

There are no residual concentrations of gasoline-range VOCs (BTEX) in soil or groundwater that represent a threat to the Waterway or vapor intrusion (VI) issue for unrestricted future use of mill property.

The dissolved lead detection in the MW-4 groundwater sample remains anomalous, and is a data gap warranting confirmation through re-sampling.

4.2.2 Former Log Pond Fill

The mill's wood chip storage area was historically a log pond (Figure 3) that, by the early 1980s, was filled to create upland used for materials storage. The composition and source of the fill material is uncertain (AECOM, 2011). Soil and groundwater quality data were collected to assess the chemical quality of the fill underlying the wood chips, and of groundwater along the shoreline downgradient of the fill to assess the area as a potential source of contaminants to the Waterway.

Assessment Data Collection

The 2012 data collection for this area included the following activities (exploration locations shown on Figure 3):

- Advanced six soil borings (DP-17 through DP-22) for the purposes of field screening for presence/absence of VOCs and collecting soil samples for chemical analysis;
- From each boring, collected one sample of fill soil for laboratory analysis of total metals[9] (arsenic, cadmium, total chromium, copper, lead, mercury, nickel, selenium, silver, and zinc), gasoline-, diesel-, and oil-range TPH, PCBs, and the full suite of semivolatile organic compounds (SVOCs);
- Completed one of the borings as a groundwater monitoring well (MW-6) near the downgradient edge of the fill, proximate to the Waterway shoreline; and
- Collected a groundwater sample from MW-6 during an outgoing tide, and analyzed it for gasoline-range TPH with BTEX, diesel- and oil-range TPH, SVOCs including low-level PAHs, dissolved metals (arsenic, cadmium, total chromium, copper, lead, mercury, nickel, selenium, silver, and zinc), TDS, and TSS. Groundwater field parameters were also measured in the field.

Assessment Findings

Within the wood chip storage area, a veneer of residual wood chips (2 to 4 feet thick) overlies fill soil consisting of silt and silty sand with gravel, concrete, and minor wood debris. No evidence of contamination was observed in the six borings, including PID

---

[9] Metals that have a marine water quality standard under state or federal laws.

screening for VOCs. Below the surficial wood chips, wood debris was observed only in boring DP-20 (at depth of about 7 feet below grade). A thin layer of wood debris was also observed at a depth of about 17.5 feet in shoreline boring DP-17; this depth is within the screened interval for monitoring well MW-6 completed in that boring. Hydrogen sulfide odor was noted in boring DP-19. A thin layer of concrete rubble was observed at depths between about 5 and 7 feet in borings DP-20, DP-21, and DP-22 on the eastern portion of the log pond fill.

For borings DP-18 through DP-22, within the wood chip storage area, the soil sample collected for chemical analysis was collected just below the wood chips. The nearshore exploration (DP-17/MW-6) was completed on an access road at an elevation estimated at 15 or more feet higher than the rest of the wood chip storage area. The DP-17 soil sample submitted for chemical analysis was collected from a depth of about 22 feet below road grade, below the water table, to provide data for fill soil generally consistent with samples from beneath the wood chip storage area (borings DP-18 through DP-22).

Soil Quality Data

The six samples of fill soil within the former log pond contained constituent concentrations below soil screening levels based on direct contact for unrestricted land use. TPH, BTEX, SVOCs (including phthalates, phenols, benzoic acid, and benzyl alcohol), and PCBs were not detected in any soil sample. Select non-carcinogenic PAHs and cPAHs were detected at concentrations below 0.1 mg/kg and below respective soil screening levels.

Select metals were detected at moderate to low concentrations in the six samples: arsenic up to 9.2 mg/kg, chromium up to 76 mg/kg, copper up to 63 mg/kg, lead up to 128 mg/kg, mercury to 0.2 mg/kg, nickel to 47 mg/kg, and zinc to 280 mg/kg. Given the reducing geochemical conditions within the uplands, it is highly likely that the detected chromium is the reduced (trivalent) form, not the highly oxidized (hexavalent) form. Cadmium, selenium, and silver were not detected in the six samples. The detected metals concentrations are below soil screening levels based on direct contact for unrestricted land use.

However, detected concentrations of copper, lead, mercury, and zinc in one or more soil samples exceed soil screening levels based on leaching to groundwater protective of the marine environment. As described in Section 3.1.2, the MTCA-default soil screening levels for the soil-leaching-to-groundwater pathway are intentionally conservative, and are intended for preliminary screening only. In fact, because the marine-based groundwater screening levels for metals are so low, the corresponding calculated soil screening levels for this pathway, particularly for saturated soil, are commonly below natural background soil concentrations defined by Ecology (1994) and/or below analytical PQLs.

As noted in Section 3.1.2, MTCA provides a range of options to more rigorously evaluate site-specific soil concentrations protective of groundwater (WAC 173-340-747). This includes use of leaching tests on site-specific soil (e.g., Synthetic Precipitation Leaching Procedure [SPLP], EPA Method 1312), and empirical groundwater quality data.

Of the metals detected above MTCA-default soil screening levels based on groundwater protection (copper, lead, mercury, and zinc), only copper was detected in downgradient groundwater (MW-6) above respective groundwater screening levels. Copper was detected in the fill soil at concentrations above the 36 mg/kg background-based soil screening level at borings DP-18 (39 mg/kg) and DP-21 (63 mg/kg). While above the 36 mg/kg screening level, the concentrations are likely within the range of area background. For example, a maximum copper concentration of 243 mg/kg was detected in the background soil data set for the Puget Sound basin (Ecology, 1994). In addition, copper concentrations detected in “street dirt” and catch basin sediment sampled in Seattle commonly exceed 100 mg/kg (Ecology, 2012).

Arsenic was also detected above its groundwater screening level in MW-6, as described below, but the detected arsenic soil concentrations (1.9 to 9.2 mg/kg) in the log pond fill are below the 20 mg/kg background-based screening level. A 20 mg/kg arsenic soil cleanup level was also selected for the Everett Smelter site, likewise located within the Port Gardner watershed.

Groundwater Quality Data

The groundwater sample from MW-6 contained concentrations of TPH, BTEX, PAHs, other SVOCs (including phthalates, phenols, benzoic acid, and benzyl alcohol) below respective groundwater screening levels. The groundwater is brackish, even on an outgoing tide, with a measured TDS of 2,726 mg/L.

The concentrations of dissolved arsenic (5.2 µg/L) and copper (4.1 µg/L) detected in the groundwater sample from shoreline well MW-6 exceeded respective groundwater screening levels based on marine protection[10]; however, the 5.2 µg/L arsenic concentration is essentially equal to the 5 µg/L background-based screening level. Concentrations of the other dissolved metals were below respective screening levels.

As described above, copper concentrations detected in two of six samples of log pond fill soil are above the conservative MTCA-default soil screening level for groundwater protection; however, it is anticipated that soil copper concentrations below 64 mg/kg are not indicative of a significant source to groundwater. Arsenic soil concentrations are below its soil screening level.

As observed elsewhere at the mill property, groundwater at MW-6 is reducing (ORP of -140 mv; Table 3), which is attributable to groundwater within an organic-rich fill unit (e.g., dredge fill with wood). In these geochemical conditions, dissolved metals can be naturally present at concentrations above the stringent MTCA-default groundwater screening levels applied for this environmental assessment. For example, similar low-level concentrations of dissolved arsenic (to 15 µg/L) and copper (to 11 µg/L) are commonly detected in fill unit groundwater at the GP West Site in Bellingham, which has similar nearshore, organic-rich fill conditions without site-related sources for those metals (Aspect, 2010). The detected groundwater copper concentration at MW-6 is also well below copper concentrations commonly observed in urban stormwater runoff (Ecology, 2012).

---

[10] For arsenic, the most stringent marine water quality standard is below the analytical PQL for groundwater, so the groundwater screening level defaults to the PQL.

Conclusion Regarding Log Pond Current Conditions

The chemical quality of soil used to fill the former log pond meets conservative soil screening levels for unrestricted use, with the exception of copper concentrations at two of six sampled locations. Dissolved arsenic and copper concentrations in the shoreline monitoring well at the downgradient edge of the fill exceed groundwater screening levels based on marine protection. Further understanding of the source for the detected dissolved metals concentrations, and further assessment of them relative to area background conditions, is considered a data gap for this area.

4.2.3 Shoreline Downgradient of Former Naval Reserve Parcel (HREC 2)

As described in Section 4.1.6, as a condition of the land exchange with K-C, the Naval Reserve parcel was reportedly cleaned up to meet MTCA cleanup levels, presumably for industrial use; however, documentation regarding the cleanup outcome is currently lacking. The Phase 2 ESA included collection of nearshore groundwater quality data to assess the area as a potential source of contaminants to the Waterway.

Assessment Data Collection

The 2012 data collection for this area included the following activities (exploration location shown on Figure 3):

- Advanced direct push soil boring DP-16 located proximate to the Waterway shoreline for the purposes of field screening for presence/absence of VOCs and soil sampling for chemical analysis;
- From the boring, collected one soil sample for laboratory analysis of total metals (arsenic, cadmium, total chromium, copper, lead, mercury, nickel, selenium, silver, and zinc), gasoline-, diesel-, and oil-range TPH, PCBs, and the full suite of SVOCs;
- Completed the boring as a groundwater monitoring well (MW-5); and
- Collected a groundwater sample from MW-5 during an outgoing tide, and analyzed it for gasoline-range TPH with BTEX, diesel- and oil-range TPH, SVOCs including low-level PAHs, dissolved metals (arsenic, cadmium, total chromium, copper, lead, mercury, nickel, selenium, silver, and zinc), TDS, and TSS. Groundwater field parameters were also measured in the field.

Assessment Findings

Subsurface conditions observed in shoreline boring DP-16 included approximately 11 feet of sandy gravelly silt (presumed fill), overlying 2 feet of organic silt with wood, overlying presumed-native sand with shells and organic matter to the 15-foot depth of exploration. No evidence of contamination was observed in the boring, including PID screening for VOCs.

Soil Quality Data

The soil sample from shoreline boring DP-16, collected at a depth of 6 to 7 feet (at water table observed during drilling), had a detected total cPAH concentration (0.25 mg/kg) slightly above the stringent 0.14 mg/kg soil screening level based on direct contact for unrestricted site use; the detection is below a soil screening level for groundwater protection.

The low-level total cPAH detection is below a background concentration (90th percentile) of 0.39 mg/kg total cPAH calculated by Ecology from 120 soil samples collected throughout Seattle residential neighborhoods in 2011(Ecology, 2011). As such, the 0.25 mg/kg cPAH detection is likely representative of area background (urban background) conditions. More detailed assessment of area background can be conducted in subsequent phases of the assessment or RI/FS.

TPH, BTEX, PCBs. and SVOCs including phenolics, benzoic acid, and benzyl alcohol were not detected in any soil sample. Select non-carcinogenic PAHs were detected at concentrations below 0.4 mg/kg and below respective spoil screening levels.

Groundwater Quality Data

The groundwater sample from MW-5 contained concentrations of TPH, BTEX, SVOCs (including phthalates, phenolics, benzoic acid, and benzyl alcohol) below respective groundwater screening levels. Only one PAH, the non-carcinogenic acenaphthene, was detected at a concentration (0.28 µg/L) below its screening level. The groundwater TDS measured during outgoing tide was 2,775 mg/L, indicative of brackish groundwater quality at the mill property.

As observed at MW-6, the concentration of dissolved copper (7.1 µg/L) detected in the groundwater sample from shoreline well MW-5 exceeded its groundwater screening levels based on marine protection. Concentrations of the other dissolved metals were below respective screening levels. No soil copper data reported from the Naval Reserve parcel (refer to Section 4.1.6). However, the detected dissolved copper concentration in MW-5 is very similar to those detected in MW-6, and may be solely the result of the reducing groundwater conditions (refer to Section 4.2.2).

Conclusion Regarding Current Conditions for Naval Reserve Parcel

As stated in Section 4.1.6, information regarding cleanup of TPH- and metals-contaminated soil within the Naval Reserve parcel is lacking. The data from the Phase 2 ESA suggest that groundwater discharging from the area does not represent a current source of contamination to the Waterway. However, the nature and extent of contamination further inland within the Naval Reserve parcel is considered a data gap for the mill property.

5 Data Gaps and Proposed Data Collection during Round 2 of the Phase 2 ESA

This section presents the data gaps for the mill property identified during the process of developing this Work Plan. For each data gap identified, additional data collection is also proposed to address it during a second round of investigation as part of the independent Phase 2 ESA.

Section 4 describes data gaps based on existing information from the prior remedial actions. Additional data gaps are also identified in this section to proactively address potential environmental issues not addressed by remedial actions to date, and assess whether the mill property may represent a current source of contamination to the East Waterway. Some data gaps will be best addressed during mill demolition, and they are described as such. Figure 4 shows an overview of the proposed explorations described in this section, while Figures 5 through 12 provide more detailed exploration plans for specific areas. Tables 4 and 5 respectively tabulate the soil and groundwater sampling and analyses proposed in the following subsections.

It is expected that a third round of investigation, as part of the independent Phase 2 ESA, may be conducted in late summer 2012 to more accurately define nature and extent of contamination. If so, the proposed additional investigation would be documented in an addendum to this Work Plan.

For Round 2 of the assessment, in addition to using visual, olfactory, and photoionization detector (PID) indicators, field screening for soil samples collected from areas of potential petroleum contamination will include a sheen test. The sheen test involves placing a small aliquot of soil into a small cup containing water, gently shaking, and watching for presence of petroleum sheen. Care will be taken to differentiate sheen created by petroleum (iridescent swirl of colors, coalesces after being disturbed) versus other organic matter (angular “waxy” sheets, does not coalesce after being disturbed), and recording the information appropriately. In areas with potential petroleum contamination, if field screening does not indicate the presence of contamination, one soil sample will always be collected in a depth interval to straddle the water table observed at time of drilling.

As part of the Phase 2 ESA, groundwater samples will be collected from the upland monitoring wells during a wet season and dry season event (higher and lower water table, respectively). The Round 2 sampling in May-June 2012 will represent the wet season event. A dry season event is expected to be completed in late August-early September 2012, as part of the planned Round 3 assessment activities. For the Round 2 sampling, groundwater samples designated for metals analyses will be collected for dissolved priority pollutant metals (field filtered using 0.45 um filter), and a subset of ten samples distributed across the uplands will also be collected for total priority pollutant metals (not field filtered) to assess influence of sample turbidity. In addition, groundwater samples that are to be analyzed for hydrophobic compounds (e.g., PAHs, PCBs, dioxins/furans) and have field-measured turbidities greater than 25 NTU may be centrifuged in the laboratory prior to analysis for those constituent groups.

Based on review of the groundwater quality data from the Round 2 sampling, we will propose for discussion with Ecology the area-specific constituent groups to be analyzed for during the Round 3 groundwater sampling (e.g., total metals or not).

The monitoring wells proposed below, and those installed during the February 2012 Phase 2 ESA, will be surveyed (x, y, z) to a common datum to allow assessment of groundwater elevations and thus groundwater flow directions in the fill unit.

5.1 REC 1: ExxonMobil ADC Site

Additional investigation of REC 1 will be conducted during the subsequent investigation rounds, following review of the findings from the recent source removal activities completed south of K-C’s Distribution Warehouse by ExxonMobil/ADC. Note that a new shoreline monitoring well (REC7-MW-4) will be installed during the Round 2 assessment at the head of the slip, downgradient of the REC 1 area, as described in Section 5.7.

5.2 REC 2: Former Oil House and Fuel ASTs

Based on the PEG (1998) investigation and Aspect’s Round 1 assessment work (Section 4.1.7 and 4.2.1), Bunker C-contaminated soil warranting remediation is identified within the area of an inferred former Bunker C storage tank. Further delineation of the extent of contaminated soil, including sampling beneath the footprint of the shipping warehouse, is warranted to design and estimate cost for a prospective cleanup action. In addition, groundwater quality downgradient of K-C’s existing diesel AST[11], located immediately north of the Distribution Warehouse, warrants assessment.

The data collection proposed for this area as part of the environmental assessment Round 2 is as follows (and shown on Figure 5):

- Advance and sample soil from up to 12 additional soil borings (REC2-B-1 through REC2-B-12) in and around the inferred area of Bunker C-contaminated soil. Five borings (REC2-B-1, -2, -3, -6, -10) will be advanced within the Warehouse footprint, requiring concrete coring through the floor slab. Based on field screening information, analyze up to 3 soil samples from each boring for diesel- and oil-range TPH and low-level PAHs;
- Install and sample soil from a new monitoring well boring (REC2-MW-5) located downgradient of the existing diesel AST immediately north of the distribution warehouse. Based on field screening information, analyze up to 3 soil samples from each boring for diesel- and oil-range TPH and low-level PAHs; and
- Collect groundwater samples from the five REC 2 area monitoring wells (existing wells MW-1 through MW-4 and new well REC2-MW-5) and analyze them for gasoline-range TPH, VOCs, diesel- and oil-range TPH, low-level PAHs, and

---

[11] The smaller northeastern of the two ASTs immediately north of the Warehouse; it reportedly has been used for diesel storage for the past 15 years or so. The larger southwestern AST at that location is used for storage of spent sulfite liquor (TREX).

TSS. Also analyze the groundwater sample from well MW-4 for total and dissolved lead, in replicate, to verify the anomalous result from the February 2012 sampling. The groundwater samples from shoreline wells MW-1 and MW-2 will also be analyzed for the full suite of SVOCs, priority pollutant metals[12], ammonia, and dissolved sulfide (refer to Section 5.7). The groundwater sample from well MW-2 will also be analyzed for total priority pollutant metals (unfiltered sample) to assess influence of sample turbidity on metals results.

5.3 REC 3: Heavy Duty Shop Sump

AECOM (2011) defined REC 3 based on visible petroleum staining in and around the sump within the Heavy Duty Shop, and on the Shop’s western exterior wall below the sump pumps former discharge. No prior investigation of the environmental conditions associated with the sump itself has been conducted. However, the soil cleanup conducted north of the Heavy Duty Shop, as a result of oily water discharge from the sump, is described in Section 4.1.2.

The west side of the Heavy Duty Shop adjoins the Pulp Mill dock, which is over the Waterway shoreline, i.e., it is at the downgradient edge of the mill property. Soil sampling and analysis for TPH beneath the sump area will be conducted during demolition of the Shop structure; no sampling will be conducted prior to demolition as part of the environmental assessment. However, soil and groundwater in the area of the 1991 soil cleanup will be sampled to evaluate whether contamination remains that represents an ongoing source of contaminants to the Waterway.

The data collection proposed for this area as part of the environmental assessment is as follows (and shown on Figure 6):

- Advance and sample soil from one soil boring (REC3-MW-1) at the shoreline due west of the 1991 soil cleanup. Based on field screening information, analyze up to 2 soil samples from the boring for diesel- and oil-range TPH, VOCs, low-level PAHs, total lead, and PCBs; and
- Complete the boring as a monitoring well, and collect a groundwater sample from it for analysis of diesel- and oil-range TPH, low-level PAHs, and TSS. Because it is a shoreline well, the REC3-MW-1 groundwater sample will also be analyzed for the full suite of VOCs, priority pollutant metals, SVOCs, ammonia, and dissolved sulfide.

5.4 REC 4: Rail Dumper Hydraulic System Building

AECOM (2011) defined REC 4 based on petroleum staining on the ground surface south of the Hydraulic System Building, and on the Building’s interior walls and southern exterior wall. A pipe through the lower part of the Building’s southern wall exists but is reportedly plugged to maintain the structure’s secondary containment function (AECOM, 2011).

The Building appears to be constructed on top of the Pulp Mill dock, which is over the Waterway shoreline. Sampling and analysis for TPH beneath the Building will be

---

[12] Priority pollutant metals include Ag, As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Tl, Zn.

conducted as appropriate during its demolition; no sampling will be conducted prior to demolition.

5.5 REC 5: Dutch Ovens 1-5

AECOM (2011) defined REC 5 based on concentrations of arsenic and cadmium in soil removed to allow construction of a foundation for equipment within the No. 7, 8, & 9 Old Boiler House (refer to Section 4.1.12). Because groundwater at the mill property is not a drinking water source, the detected cadmium concentration is below soil screening levels applied for this assessment. However, since marine protection is considered for this environmental assessment, the soil mercury concentration detected in the removed soil is above the unrestricted soil screening level based on groundwater protection.

As part of the environmental assessment, downgradient groundwater quality data will be collected to evaluate whether metals concentrations in soil are leaching to groundwater at concentrations of concern.

The data collection proposed for this area as part of the environmental assessment is as follows (and shown on Figure 7):

- Advance one soil boring (REC5-MW-1) on the west (downgradient) end of the Old Boiler House. Collect one sample of soil from just below the water table observed during drilling and submit it for analysis of priority pollutant metals. Because waste solvents were reportedly disposed of in the hog fuel pile, which REC5-MW-1 is on the edge of, the soil sample will also be analyzed for VOCs; and
- Complete the boring as a monitoring well, and collect a groundwater sample from it for analysis of total and dissolved priority pollutant metals, VOCs, and TSS.

In addition, soil sampling and analysis for metals beneath the Old Boiler House will be conducted during its demolition; no soil sampling beneath the structure will be conducted prior to demolition as part of the environmental assessment.

5.6 REC 6: Latex Spill Area

AECOM (2011) defined REC 6 based on the latex product containing formaldehyde. The product also contained trace concentrations of VOCs including vinyl acetate and 1,4-dioxane[13] (refer to Section 4.1.21).

As part of the assessment, downgradient groundwater quality data will be collected to evaluate whether the latex release has leached contaminants to groundwater at concentrations of concern.

The data collection proposed for this area as part of the environmental assessment is as follows (and shown on Figure 8):

- Complete one new monitoring well, REC6-MW-1, on the west (downgradient) end of the REC 6 location, and a second well, REC6-MW-2, along the shoreline generally due west of REC 6. This second well will also serve as a shoreline

---

[13] 1,4-dioxane can be considered a SVOC or VOC.

monitoring location downgradient of two HREC 1 UST locations being evaluated in the assessment (described in Section 5.8); and

- Collect a groundwater sample from the two new monitoring wells for analysis of formaldehyde, VOCs, 1,4-dioxane, and TSS. The shoreline well REC6-MW-2 will also be analyzed for additional analyses as described in Section 5.7.

If the groundwater monitoring data indicate that the latex release has adversely impacted groundwater, removal of residual latex product with confirmation soil sampling and analysis for contaminants of concern (based on groundwater data) will be conducted beneath the Tissue Mill and loading dock during their demolition. No soil sampling beneath structures will be conducted prior to demolition as part of the environmental assessment.

5.7 REC 7: East Waterway

Although the proposed environmental assessment addresses the upland landward of MHHW, the data collection proposed in this Work Plan addresses groundwater migration from the various areas of the mill in order to evaluate its potential as a pathway for contaminants to the Waterway marine environment.

In addition to monitoring wells installed along the Waterway shoreline to address groundwater quality for specific areas, described elsewhere in Section 5, four monitoring wells (REC7-MW-1, REC7-MW-2, REC7-MW-3, and REC7-MW-4) will be installed adjacent to the East Waterway shoreline in locations between shoreline wells monitoring other areas.

The fourteen shoreline wells include (from north to south; Figure 4): REC7-MW-1, NRP-MW-3, MW-5 (existing), NRP-MW-2, REC7-MW-2, REC6-MW-2, MW-6 (existing), UST70-MW-2, REC3-MW-1, REC7-MW-3, OMS-MW-1, MW-1 (existing), MW-2 (existing), and REC7-MW-4.

Groundwater samples from each shoreline well will be analyzed for the full suite of VOCs and priority pollutant metals in addition to the analytes proposed for shoreline well groundwater sampling in other upland areas, as described elsewhere in Section 5.

In addition, as a result of historical mill operations, wood and other organic matter is present on site, both on the surface in wood chip and hog fuel storage locations and within the fill upon which the mill was constructed. Under some conditions, organic matter such as this can generate compounds, including phenols and methylated phenols, benzoic acid and benzyl alcohol, hydrogen sulfide, and ammonia. To assess upland groundwater at the mill property as an ongoing source of these compounds to the Waterway, groundwater samples collected from each of the shoreline monitoring wells (existing + proposed) will also be analyzed for the full suite of SVOCs (which includes phthalates, phenols and methylated phenols, benzoic acid and benzyl alcohol, and PAHs), dissolved sulfide, and ammonia.

5.8 HREC 1: UST Removals

This HREC includes former UST numbers 29, 67, 68, 68R, 69, 70, 70R, 71, 72, and 73. Prior investigation activities for this HREC are described in Sections 4.1.1, 4.1.3, 4.1.5

and 4.1.9. In 2002, Ecology listed the Facilities Leaking Underground Storage Tank (LUST) ID No. 1624 as inactive. The ten former USTs are generally clustered into the three areas of the mill property, each of which have data gaps identified and data collection proposed, as described below.

5.8.1 Former USTs No. 29, 67, 69

Former USTs No, 29 (12,500-gallon xylene), No. 67 (12,500-gallon kerosene), and No. 69 (260-gallon leaded gasoline) were located near the southwest corner of the Tissue Mill (Figure 3). Contaminated soil associated with a xylene release from UST No. 29 was reportedly cleaned up in 1994, but no groundwater quality data were reported. There was no release of kerosene reported from UST No. 67, but the location was impacted by the adjacent xylene release. During removal of former gasoline UST No. 69, BTEX was not detected in groundwater from the tank pit, but no groundwater quality data were collected downgradient of the UST. The lack of soil compliance along with data to verify groundwater quality downgradient of the collective former USTs are considered a data gaps.

The data collection proposed for this area as part of the environmental assessment is as follows (and shown on Figure 8):

- Complete a new soil boring/monitoring well on the west (downgradient) side of former UST No. 29 (UST29-MW-1). Based on field screening information, analyze one soil sample from the boring for gasoline-range TPH, diesel- and oil-range TPH, VOCs, and low-level PAHs. Collect a groundwater sample from well UST29-MW-1 for analysis of gasoline-range TPH, diesel- and oil-range TPH, VOCs, low-level PAHs, and TSS.
- Complete a new soil boring/monitoring well on the west (downgradient) side of former UST No. 69 (UST69-MW-1). Based on field screening information, analyze one soil sample from the boring for gasoline-range TPH, VOCs, and total lead. Collect a groundwater sample from well UST69-MW-1 for analysis of gasoline-range TPH, VOCs, low-level EDB, total and dissolved lead, and TSS; and
- Add gasoline-range TPH analysis for the groundwater sample collected from the new shoreline monitoring well installed downgradient of this area (and downgradient of REC 6), as described in Section 5.6.

5.8.2 Former USTs No. 68, 68R

Following removal of former UST No, 68 (250-gallon unleaded gasoline) in 1991, concentrations of BTEX in groundwater at the tank pit and generally downgradient were below groundwater screening levels for protection of the Waterway; however, xylenes and benzene concentrations in downgradient groundwater exceeded VI-based groundwater screening levels for unrestricted use, as described in Section 4.1.3.

During removal of the 500-gallon unleaded gasoline UST No. 68R in 1999, a slight petroleum sheen was observed in pea gravel at the bottom of tank pit (above water table), soil could not be sampled beneath the gravel to avoid disrupting active utilities, and no groundwater data were collected, as described in Section 4.1.9.

The Phase 2 ESA's monitoring wells MW-1 and MW-2 documented non-detectable gasoline-range TPH and BTEX in groundwater along the off-loading dock slip shoreline (Section 4.2.1), generally downgradient of former USTs No. 68 and 68R. Nevertheless, the lack of data to confidently characterize current groundwater quality downgradient of the former USTs is considered a data gap.

The data collection proposed for this area as part of the environmental assessment is as follows (and shown on Figure 9):

- Complete one new soil boring/monitoring well adjacent to each of the former USTs on the north side of the South Office Building, and three downgradient borings/monitoring wells along the south and southwest sides of the South Office Building;
- Based on field screening information, analyze one soil sample from each of the five borings for gasoline-range TPH and VOCs; and
- Collect a groundwater sample from the five new monitoring wells for analysis of gasoline-range TPH, VOCs, low-level EDB, and TSS. The nearby existing shoreline wells MW-1 and MW-2 are already being analyzed for gasoline-range TPH, VOCs including field additives, and priority pollutant metals as part of the REC 2 assessment (see Section 5.2).

5.8.3 Former USTs No. 70/70R and 71, 72, and 73

During the Landau (1991) investigation, elevated diesel- and/or oil-range TPH was detected in two of four monitoring wells adjacent to former diesel UST No. 70. No PAH data were collected for groundwater. Former UST No. 70R was a 2,000-gallon diesel UST installed in the same location as former UST No. 70 in 1989, and decommissioned by removal in 1995; it was double-walled with cathodic protection and electronic overflow sensor (AECOM, 2011). Bunker C product was observed in a recovery sump within the tank pit for former Bunker C USTs No. 71/72/73, but no groundwater quality data were collected proximate to the tank pit (refer to Section 4.1.3). The lack of data to characterize current groundwater quality adjacent and downgradient of both sets of former USTs in this area is considered a data gap.

The data collection proposed for this area as part of the environmental assessment is as follows (and shown on Figure 6):

USTs 70/70R Area

- Advance and sample soil from four soil borings (UST70-B-1 through UST70-B-4) within the area of former USTs No. 70/70R,as well as one boring/monitoring well (UST70-MW-2) along the shoreline due west of the former USTs location. Based on field screening information, analyze up to 2 soil samples from each of the five borings for diesel- and oil-range TPH and low-level PAHs. Because the former USTs occur within the hog fuel area, where solvents were reportedly disposed of, VOCs will be added for the soil samples collected;
- Based on the field screening during drilling of the four borings adjacent to the former USTs No. 70/70R, complete a monitoring well UST70-MW-1 at the location with highest apparent TPH soil concentrations. Also complete the shoreline boring UST70-MW-2 as a monitoring well; and

- Collect a groundwater sample from both new wells for analysis of diesel- and oil-range TPH, VOCs, low-level PAHs, and TSS. The shoreline well UST70-MW-2 will also be analyzed for additional constituents as described in Section 5.7.

USTs 71, 72, and 73 Area

- Advance and sample soil from four soil borings (UST71-B-1 through UST71-B-4) within the area of former USTs No. 71/72/73. Based on field screening information, analyze up to 2 soil samples from each of the four borings for diesel- and oil-range TPH and low-level PAHs. Because the former USTs occur within the hog fuel area, where solvents were reportedly disposed of, VOCs will be added for the soil samples collected;
- Based on the field screening during drilling of the four borings adjacent to the former tanks, complete a monitoring well REC71-MW-1 at the location with highest apparent TPH soil concentrations, and collect a groundwater sample from it for analysis of diesel- and oil-range TPH, VOCs, low-level PAHs, and TSS; and
- In addition to monitoring wells UST70-MW-1 and UST70-MW-2 generally downgradient of the USTs 71/72/73, shoreline monitoring well REC3-MW-1, located just north of the Heavy Duty Shop for characterization of REC 3 (Section 5.3), provides a shoreline groundwater monitoring location generally downgradient of the USTs 71/72/73 area (Figure 6).

5.9 HREC 2: Naval Reserve Parcel

The Naval Reserve Parcel includes two distinct areas of contamination where the Navy reportedly completed cleanup: an area of petroleum contamination (both gasoline and diesel/heavy oil) near the shoreline, and an area of metals contamination in shallow soil farther inland, as described in Section 4.1.6. However, elevated soil mercury was also detected in one boring just north of the petroleum-contaminated area. The lack of information regarding the Navy’s cleanup and potential residual contamination is considered a data gap for the mill property.

The data collection proposed for the two subareas as part of the environmental assessment is as follows (and shown on Figure 10):

Area of Petroleum and Mercury Contamination Adjacent Shoreline

- Advance to 15 feet and sample soil from ten soil borings (NRP-B-1 through NRP-B-8, NRP-MW-2 and NRP-MW-3). Based on field screening information, analyze up to 2 soil samples from each boring for gasoline-, diesel- and oil-range TPH, VOCs, low-level PAHs, and total priority pollutant metals;
- Based on the field screening during drilling of the borings adjacent to the former, complete monitoring well NRP-MW-1 at the location with highest apparent TPH soil concentrations;
- Complete two monitoring wells NRP-MW-2 and NRP-MW-3 along the shoreline – one downgradient (west) of the highest apparent TPH soil concentrations, and one downgradient of the location where the elevated soil mercury was reported on the north end of the reported petroleum contamination; and

- Collect a groundwater sample from the three new monitoring wells plus existing well MW-5 for analysis of gasoline-, diesel- and oil-range TPH, VOCs, low-level PAHs, dissolved priority pollutant metals, and TSS. The three shoreline wells MW-5, NRP-MW-2 and NRP-MW-3 will be analyzed for additional constituents as described in Section 5.7.

Area of Metals Contamination Farther Inland

- Advance to 10 feet and sample soil from eight soil borings (NRP-B-9 through NRP-B-16). Collect two soil samples, from depths of approximately 0 to 1 foot, and 3 to 4 feet unless otherwise indicated by field observations, for analysis of total priority pollutant metals;
- Soil samples with evidence of petroleum contamination based on field screening will be analyzed for gasoline-range TPH, diesel/oil-range TPH, VOCs, and low-level PAHs; and
- Complete as monitoring wells NRP-MW-4 and NRP-MW-5 two of the borings located along the downgradient (western) edge of the inferred metals-contaminated area based on the field screening information; and
- Collect a groundwater sample from the two new monitoring wells for analysis of dissolved priority pollutant metals. If there is field screening evidence of petroleum during drilling in this area, the groundwater samples will be analyzed for gasoline-range TPH, diesel-/oil-range TPH, VOCs, low-level PAHs, and TSS.

5.10 HREC 3: Bleaching Tower Area

Bunker C-contaminated soil was reportedly removed from this area, which we infer is now beneath Screen/Bleach Unit 2. Bunker C is not readily leachable, and, if residual soil contamination exists at this location, it is contained beneath a structure. Soil sampling and analysis for TPH and PAHs beneath the structure will be conducted during its demolition; no sampling will be conducted prior to demolition as part of the environmental assessment.

5.11 HREC 4: PCB Transformers

PCBs were detected at concentrations above the 1 mg/kg unrestricted soil screening level in soil beneath Substation 5/6. PCBs are not readily leachable, and residual soil contamination at this location is contained by a structure. Soil sampling and analysis for TPH, PAHs, and PCBs in this area will be conducted during mill demolition; no sampling will be conducted prior to demolition as part of the environmental assessment.

5.12 HREC 5: Former Paint Shop

As described in Section 4.1.4, the 1994 investigation results indicate a highly localized historical release of paint thinner adjacent to the former Paint Shop, with no evidence for migration of contaminated groundwater. We identify no data gaps warranting further exploration for this area.

5.13 HREC 6: Rail Car Dumper Containment Vault Valve

This HREC was defined based on a release of two gallons of hydraulic fluid to the Waterway in 1995. The spill was contained, cleaned up, inspected by Ecology, and the matter closed (ERNS No. 547098). We identify no data gaps warranting further exploration for this area.

5.14 Additional Areas Warranting Exploration

The following areas of the mill had existing environmental data and/or historical operations that warrant limited assessment to evaluate presence/absence of contamination.

5.14.1 Log Pond Fill Area

Dissolved arsenic and copper groundwater concentrations detected in the shoreline monitoring well MW-6 (Figure 4; Figure 8) exceed groundwater screening levels based on marine protection. To verify groundwater quality discharging to the Waterway, a second groundwater sample will be collected from well MW-6 and analyzed for gasoline-range TPH, diesel- and oil-range TPH, VOCs, SVOCs, low-level PAHs, total and dissolved priority pollutant metals, SVOCs, ammonia, dissolved sulfide and TSS. Further assessment of background arsenic and copper groundwater concentrations, considering regional information from the USGS and/or Snohomish County, will also be conducted as a point of comparison against the measured concentrations.

Pending outcome of the additional groundwater data collection, we propose no further assessment (e.g., leachability testing) of the soil copper concentrations exceeding the MTCA-default soil screening level based on protection of groundwater.

5.14.2 Acid Plant

If acidic material was released historically, it may have leached metals from equipment, piping, etc., and potentially leach naturally occurring metals from soils. The potential for low pH and dissolved metals in groundwater downgradient of the Acid Plant and its tank farm is a data gap. Assessing downgradient quality will inform whether a potential acidic source of metals is present in the area.

The data collection proposed for this area as part of the environmental assessment is as follows (and shown on Figure 7):

- Advance to 15 feet and sample soil from a boring (AP-MW-1) in an accessible location on the downgradient (west) side of the Acid Plant. A sample of soil from 1 to 2 feet below grade and just below the water table at time of drilling will be analyzed for priority pollutant metals and soil pH. If there is field screening evidence of petroleum contamination, soil samples with such indications will also be analyzed for gasoline-range TPH, diesel/oil-range TPH, VOCs, and low-level PAHs, and VOCs.
- Collect a groundwater sample from the new monitoring well for analysis of total and dissolved priority pollutant metals and TSS. If there is field screening evidence of petroleum in the monitoring well boring, the groundwater sample

collected from it will be analyzed for gasoline-range TPH, diesel/oil-range TPH, VOCs, and low-level PAHs.

5.14.3 Central Maintenance Shop/Old Auto Shop

A variety of hazardous materials may have historically been used in the Central Maintenance Shop/Old Auto Shop. The data collection proposed for this area as part of the environmental assessment is as follows (and shown on Figure 11):

- Advance by hand auger to 3 feet and sample soil from three soil borings (CMS-B-1 through CMS-B-3) within the shop building. From each boring, analyze soil samples from depths of 0 to 1 and 2 to 3 feet for gasoline-range TPH, diesel- and oil-range TPH, VOCs, low-level PAHs, total priority pollutant metals, and PCBs; and
- Complete monitoring well CMS-MW-1 on the downgradient (west) side of the Shop. Collect a groundwater sample from the new monitoring well for analysis of gasoline-range TPH, diesel- and oil-range TPH, low-level PAHs, VOCs, total and dissolved priority pollutant metals, and TSS.

5.14.4 MIS/Old Machine Shop

A variety of hazardous materials may have historically been used in the Old Machine Shop. Assessing downgradient quality will inform whether a potential contaminant source is present in the area.

The data collection proposed for this area as part of the environmental assessment is as follows (and shown on Figure 12):

- Advance by hand auger to 3 feet and sample soil from three soil borings (OMS-B-1 through OMS-B-3) within the shop building. From each boring, analyze soil samples from depths of 0 to 1 and 2 to 3 feet for gasoline-range TPH, diesel- and oil-range TPH, VOCs, low-level PAHs, total priority pollutant metals, and PCBs; and
- Complete monitoring well OMS-MW-1 on the downgradient (west) side of the Shop. Collect a groundwater sample from the new monitoring well for analysis of gasoline-range TPH, diesel- and oil-range TPH, low-level PAHs, VOCs, dissolved priority pollutant metals, and TSS.

5.14.5 Boiler, Fly Ash, and Baghouse Area

Combustion of biomass including wood chips and hog fuel, particularly if containing salt, can generate dioxins/furans. Wood chips and hog fuel were used to fire the mill’s boilers. While dioxins/furans are ubiquitous in the urban soils (e.g., Ecology, 2011), assessing dioxins/furans concentrations in soils around the mill’s boilers and ancillary facilities is considered a data gap. In addition, other materials including scrap rubber and solvents were reportedly burned in the boilers at times, suggesting the potential presence of SVOC and VOC compounds in the area.

The data collection proposed for this area as part of the environmental assessment is as follows (and shown on Figure 7):

- Advance and sample soil from five shallow soil borings (Boiler-B-1 through Boiler-B-5) positioned around the collective perimeter of the Boiler No. 10, Boiler No. 14, No. 7, 8, 9 Old Boiler, Fly Ash Clarifier, and Baghouse structures. From each boring, collect one soil samples from a depth of 1 to 2 feet below grade, and analyze it for VOCs, SVOCs, priority pollutant metals, and dioxins/furans.

5.14.6 General Fill Soil Quality

The composition and source of the fill upon which the mill facility is constructed is uncertain. Given that uncertainty, and the long-term industrial operations at the mill property, a general assessment of the fill soil quality is warranted.

The data collection proposed for this area as part of the environmental assessment is as follows:

- Advance and sample soil from 15 soil borings (GF-B-1 through GF-B-15; Figure 4) providing spatial coverage across the mill property, without consideration of operational areas, in locations that are accessible prior to demolition. The general fill soil borings, excluding the four easternmost ones (GF-B-1, GF-B-3, GF-B-7, and GF-B-13), will be drilled to 25 feet using hollow stem auger to collect geotechnical information (blow counts) in addition to the environmental sampling. The easternmost ones occur in the area of shallowest water table, where concern for borehole heave within the auger is greatest; these four will therefore be drilled to 10 –foot depths using direct push (Geoprobe) methods. If borehole heaving conditions in the other 11 general fill borings limit collection of representative blow counts or soil samples for chemical analysis, they may also be drilled using geoprobe instead of auger.

  From each boring, collect soil samples from two depth intervals, 1 to 2.5 and 7.5 to 9.0 feet below grade. Analyze each of the 30 soil samples for total organic carbon, gasoline-range TPH, diesel- and oil-range TPH, VOCs, SVOCs, low-level PAHs, total priority pollutant metals, and PCBs. In addition, analyze the 1- to 2.5-foot soil sample from each of the 15 borings for dioxins/furans.

5.14.7 Groundwater Quality Along Upgradient Edge of Property

Given the stringent groundwater screening levels applied in the environmental assessment, background groundwater quality in the fill – unaffected by conditions at the mill property – may potentially exceed the screening levels. This is particularly true for trace-level dissolved metals.

The background groundwater data collection proposed as part of the uplands environmental assessment is as follows:

- Complete two fill monitoring wells (UG-MW-1 and UG-MW-2; Figure 4) in accessible locations along the upgradient (eastern) edge of the mill property;
- If there is field screening evidence of petroleum contamination during drilling the monitoring wells, soil sample(s) with such indications will be analyzed for gasoline-range TPH, diesel/oil-range TPH, low-level PAHs, and VOCs;

- Collect groundwater samples from the two background wells for analysis of dissolved priority pollutant metals and TSS. The groundwater sample from well UG-MW-1 will also be analyzed for total priority pollutant metals. Samples from the wells can be analyzed for additional analytes if useful for comparison, based on data collected during the environmental assessment; and
- If there is field screening evidence of petroleum contamination during drilling, groundwater samples collected from monitoring wells with field screening evidence of petroleum will be analyzed for gasoline-range TPH, diesel/oil-range TPH, VOCs, and low-level PAHs.

5.15 Hydrogeologic Data Collection

5.15.1 Site-Wide Water Level Measurements

During the wet and dry season groundwater sampling events, concurrent depth-to-water measurements will be collected from all site monitoring wells in as short a time period as possible, particularly for the shoreline wells. All wells will be professionally surveyed to a common datum, and groundwater elevations determined. Dry and wet season groundwater elevation contour maps will be developed to determine groundwater flow directions across the Site.

5.15.2 Tidal Study

Following completion of the Round 2 groundwater sampling, a 72-hour tidal study will also be conducted to evaluate effects of tidal fluctuations on nearshore groundwater levels, and thus flow directions, throughout the tidal cycle. In addition, the tidal study provides data for estimating hydraulic conductivity of the fill unit. The tidal study will involve collecting continuous water level measurements throughout a 72-hour period at 12 upland monitoring wells: shoreline wells REC7-MW-1, REC7-MW-2, existing MW-6, UST70-MW2, REC7-MW-3, and REC1-MW-8 where tidal fluctuations will be greatest, and inland wells NRP-MW-5, UST69-MW-1, AP-MW-1, REC5-MW-1, UST68-MW-3, and REC1-MW-5 where tidal fluctuations should be muted.

Each of the wells will be equipped with a downhole pressure transducer/data logger to allow automated collection of water level data at 5-minute intervals. A data logger will also be placed in the East Waterway to directly record tidal fluctuations. A barometric pressure data logger will also be installed on site to allow water level data to be corrected for changes in atmospheric pressure throughout the study. During installation of the data loggers, a manual depth-to-water measurement will be collected in each well when the data logger takes its first reading, and again at the end of the test prior to removing the logger. The depth-to-water measurements (below surveyed top of well casing) provide groundwater elevations which will be used to convert the data logger readings into groundwater elevations. A round of concurrent water level measurements will also be collected in all upland wells during the tidal study.

The tidal data from each well will be analyzed using the method of Serfes (1991) to derive a tidally-averaged groundwater elevation for the study period. The data from the wells will be used to assess the net (tidally averaged) groundwater flow direction and hydraulic gradients. Aquifer hydraulic conductivity will be estimated from the tidal study data using the stage ratio and time lag methods of Ferris (1963).

6 References

AECOM, 2011, Phase I Environmental Site Assessment, Everett Pulp and Paper Mill, Everett Washington, April 2011.

AMEC, 2010, Focused Feasibility Study Work Plan, ExxonMobil/ADC Property, Ecology Site ID 2728, 2717/2731 Federal Avenue, Everett, Washington, February 26, 2010.

Aspect, 2010, Draft Remedial Investigation, Georgia-Pacific West Site, Bellingham, Washington, Ecology Review Draft, September 29, 2010.

BEK McDonnell Engineering, 1999, Report – Underground Storage Tank Removal Site Check/Site Assessment, Kimberly Clark Corporation Mill Site, UST ID #5351, November 23, 1999.

City of Everett, Washington (City of Everett), 2012, Public Works Department, Accessed March 19, 2012, <http://www.everettwa.org/default.aspx?ID=2>.

Ecology, 1994, Natural Background Soil Metals Concentrations in Washington State, Ecology Publication No. 94-115, October 1994.

Ecology, 2009, Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action, Review Draft, October 2009. Ecology Publication No. 09-09-047.

Ecology, 2012, Control of Toxic Chemicals in Puget Sound: Assessment of Toxic Chemicals in the Puget Sound Basin, 2007-2011, Addendum No. 1: Evaluation of Fate and Transport Mechanisms for Primary Releases of Copper, PCBs, and PBDEs, Ecology Publication No. 11-03-055-Addendum 1, January 2012.

K-C, 1989, Internal Memorandum regarding Removal of UST No. 69, December 6, 1989.

K-C, 1997, Memorandum regarding Naval Reserve Site Remediation, To Cindy Jernigan, From Dick Abrams, October 29, 1992.

K-C, 1999, Letter, To Mark Dirkx, Department of Ecology, From Dick Abrams. December 13, 1999.

Landau Associates, 1991, Soil and Groundwater Investigation, Former Underground Petroleum Storage Tanks, Everett Pulp and Paper Mill, Everett, Washington, April 18, 1991.

Landau Associates, 1994, Groundwater and Soil Environmental Investigation, Vicinity of Former Paint Shop Scott Paper Company, Everett, Washington, September 20, 1994.

Pacific Environmental Group, Inc. (PEG), 1998, Environmental Investigation Report, Former Bulk Fuel Facilities, 2600 Federal Avenue, Everett, Washington, April 14, 1998.

Scott Paper, 1994, Internal memorandum regarding Site Cleanup Actions, August 3, 1994.

Safety-Kleen, 1998, Kimberly Clark, Everett Mill PCB Decontamination Project: Substation 3 & 4 and 5 & 6 Supplemental Sampling Results, October 24, 1998.

Snohomish County, Washington (Snohomish County), 2012, Assessor's Office, Property Info, eRealProperty System Parcel Search, Accessed March 13, 2012, <https://www.snoco.org/proptax/(3m3wb4invh1fuojwiyxhag55)/search.aspx>.

U.S. Environmental Protection Agency (EPA), 2002, OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance), EPA Publication No. EPA530-D-02-004, November.

Washington State Department of Ecology (Ecology), 1994, Natural Background Soil Metals Concentrations in Washington State, Ecology Publication No. 94-115, October.

Washington State Department of Ecology (Ecology), 2009, Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action, Ecology Publication No. 09-09-047, October 2009.

Washington State Department of Ecology (Ecology), 2011, Urban Seattle Area Soil Dioxin and PAH Concentrations, Initial Summary Report, Publication No. 11-09-049, September 2011.

Western Regional Climate Center, 2012, Seattle University of Washington (457478), Period of Record Monthly Climate Summary, 1971 to 2000 Monthly Climate Summary, Accessed March 19, 2012, <http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?waever>.

Table 1 - Summary of Parcel Data

Snohomish County Tax Parcel No.	Area (Acres)
00437461700200	2.24
00597761800102	0.10
00597761800600	0.27
00597761801000	0.23
00597761803000	0.62
00597761803901	1.59
29051900200900	2.63
29051900201000	4.26
29051900201100	0.06
29051900201300	19.81
29051900201500	4.37
29051900300100	25.95
29051900300200	5.35
29051900300201	5.35
Total	**72.81**

Table 2 - Soil Quality Data from Phase 2 ESA Round 1 (Feb. 2012)

Everett Mill 110207

Chemical Name	DP-1 2/14/2012 (2.5-3 ft.)	DP-1 2/14/2012 (5.5-6 ft.)	DP-2 2/14/2012 (1.5-2.5 ft.)	DP-2 2/14/2012 (6-7 ft.)	DP-3 2/14/2012 (4-5 ft.)	DP-3 2/14/2012 (6-7 ft.)	DP-4 2/14/2012 (1-2 ft.)	DP-4 2/14/2012 (9-10 ft.)	DP-5 2/14/2012 (7-8 ft.)	DP-5 2/14/2012 (13-14 ft.)	DP-6 2/14/2012 (3-4 ft.)	DP-6 2/14/2012 (7-8 ft.)	DP-7 2/14/2012 (4-5 ft.)	DP-7 2/14/2012 (7-8 ft.)	DP-8 2/14/2012 (6-7 ft.)	DP-8 2/14/2012 (12-13 ft.)	DP-9 2/15/2012 (7.5-8.5 ft.)	DP-9 2/15/2012 (13-14 ft.)
Total Petroleum Hydrocarbons																		
Gasoline Range Hydrocarbons in mg/kg	2 U	2 U	2 U	2 U	46	2 U	2 U	2 U	21	2 U	2 U	2 U	2 U	2 U	2 U	7	2 U	4.9
Diesel Range Hydrocarbons in mg/kg	7,400	50 U	50 U	50 U	21,000	50 U	50 U	50 U	250	50 U	50 U	50 U	50 U	50 U	78	50 U	50 U	50 U
Lube Oil Range Hydrocarbons in mg/kg	9,000	250 U	250 U	250 U	10,000	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U
Volatile Organic Compounds																		
Benzene in mg/kg	0.02 U	0.02 U	0.02 U	0.02 U	0.055	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Ethylbenzene in mg/kg	0.02 U	0.02 U	0.02 U	0.02 U	0.52	0.02 U	0.02 U	0.02 U	0.11	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.084	0.02 U	0.042
Toluene in mg/kg	0.02 U	0.02 U	0.02 U	0.02 U	0.1	0.02 U	0.02 U	0.02 U	0.03	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Xylenes (total) in mg/kg	0.06 U	0.06 U	0.06 U	0.06 U	1.5	0.06 U	0.06 U	0.06 U	0.26	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.072	0.06 U	0.06 U
1,2-Dibromoethane (EDB) in mg/kg					0.05 U													
1,2-Dichloroethane (EDC) in mg/kg					0.05 U													
Diisopropyl ether (DIPE) in mg/kg					0.05 U													
Ethanol in mg/kg					50 J													
Ethyl t-butyl ether (ETBE) in mg/kg					0.05 U													
Methyl tert-butyl ether (MTBE) in mg/kg					0.05 U													
t-Amyl methyl ether (TAME) in mg/kg					0.05 U													
t-Butyl alcohol (TBA) in mg/kg					2.5 U													
Metals																		
Arsenic in mg/kg																		
Cadmium in mg/kg																		
Chromium in mg/kg																		
Copper in mg/kg																		
Lead in mg/kg					2.37													
Mercury in mg/kg																		
Nickel in mg/kg																		
Selenium in mg/kg																		
Silver in mg/kg																		
Zinc in mg/kg																		
Polycyclic Aromatic Hydrocarbons (PAHs)																		
Acenaphthene in mg/kg	3.1	0.01 U			7	0.01 U												
Acenaphthylene in mg/kg	2 U	0.01 U			2 U	0.01 U												
Anthracene in mg/kg	5.2	0.01 U			8.7	0.01 U												
Benzo(g,h,i)perylene in mg/kg	3.2	0.01 U			2.2	0.01 U												
Fluoranthene in mg/kg	3.1	0.01 U			2.7	0.01 U												
Fluorene in mg/kg	4.3	0.01 U			8.5	0.01 U												
Phenanthrene in mg/kg	13	0.035			32	0.01 U												
Pyrene in mg/kg	23	0.02			17	0.01 U												
Naphthalene in mg/kg	2 U	0.01 U			2 U	0.01 U												
Benz(a)anthracene in mg/kg	8.6	0.012			8.8	0.01 U												
Benzo(a)pyrene in mg/kg	5.7	0.01 U			4.7	0.01 U												
Benzo(b)fluoranthene in mg/kg	2	0.01 U			2 U	0.01 U												
Benzo(k)fluoranthene in mg/kg	2 U	0.01 U			2 U	0.01 U												
Chrysene in mg/kg	17	0.022			14	0.01 U												
Dibenzo(a,h)anthracene in mg/kg	2 U	0.01 U			2 U	0.01 U												
Indeno(1,2,3-cd)pyrene in mg/kg	2 U	0.01 U			2 U	0.01 U												
Total cPAH (TEQ) in mg/kg	7.2	0.008			6.1	ND												
Other Semivolatile Organics																		
1,2,4-Trichlorobenzene in mg/kg																		
1,2-Dichlorobenzene in mg/kg																		
1,3-Dichlorobenzene in mg/kg																		
1,4-Dichlorobenzene in mg/kg																		
2,4,5-Trichlorophenol in mg/kg																		
2,4,6-Trichlorophenol in mg/kg																		
2,4-Dichlorophenol in mg/kg																		
2,4-Dimethylphenol in mg/kg																		
2,4-Dinitrophenol in mg/kg																		
2-Chloronaphthalene in mg/kg																		
2-Chlorophenol in mg/kg																		
2-Methylphenol in mg/kg																		
2-Nitroaniline in mg/kg																		
2-Nitrophenol in mg/kg																		
3 & 4 Methylphenol in mg/kg																		
3-Nitroaniline in mg/kg																		
4,6-Dinitro-2-methylphenol in mg/kg																		

Table 2 - Soil Quality Data from Phase 2 ESA Round 1 (Feb. 2012)

Everett Mill 110207

Chemical Name	DP-1 2/14/2012 (2.5-3 ft.)	DP-1 2/14/2012 (5.5-6 ft.)	DP-2 2/14/2012 (1.5-2.5 ft.)	DP-2 2/14/2012 (6-7 ft.)	DP-3 2/14/2012 (4-5 ft.)	DP-3 2/14/2012 (6-7 ft.)	DP-4 2/14/2012 (1-2 ft.)	DP-4 2/14/2012 (9-10 ft.)	DP-5 2/14/2012 (7-8 ft.)	DP-5 2/14/2012 (13-14 ft.)	DP-6 2/14/2012 (3-4 ft.)	DP-6 2/14/2012 (7-8 ft.)	DP-7 2/14/2012 (4-5 ft.)	DP-7 2/14/2012 (7-8 ft.)	DP-8 2/14/2012 (6-7 ft.)	DP-8 2/14/2012 (12-13 ft.)	DP-9 2/15/2012 (7.5-8.5 ft.)	DP-9 2/15/2012 (13-14 ft.)
4-Bromophenyl phenyl ether in mg/kg																		
4-Chloro-3-methylphenol in mg/kg																		
4-Chloroaniline in mg/kg																		
4-Chlorophenyl phenyl ether in mg/kg																		
4-Nitroaniline in mg/kg																		
4-Nitrophenol in mg/kg																		
Acenaphthene in mg/kg																		
Acenaphthylene in mg/kg																		
Anthracene in mg/kg																		
Benzo(g,h,i)perylene in mg/kg																		
Benzoic acid in mg/kg																		
Benzyl alcohol in mg/kg																		
Benzyl butyl phthalate in mg/kg																		
Bis(2-chloro-1-methylethyl) ether in mg/kg																		
Bis(2-chloroethoxy)methane in mg/kg																		
Bis(2-chloroethyl) ether in mg/kg																		
Bis(2-ethylhexyl) phthalate in mg/kg																		
Carbazole in mg/kg																		
Dibenzofuran in mg/kg																		
Diethyl phthalate in mg/kg																		
Dimethyl phthalate in mg/kg																		
Di-n-butyl phthalate in mg/kg																		
Di-n-octyl phthalate in mg/kg																		
Fluoranthene in mg/kg																		
Fluorene in mg/kg																		
Hexachlorobenzene in mg/kg																		
Hexachlorobutadiene in mg/kg																		
Hexachlorocyclopentadiene in mg/kg																		
Hexachloroethane in mg/kg																		
Isophorone in mg/kg																		
Nitrobenzene in mg/kg																		
N-Nitroso-di-n-propylamine in mg/kg																		
N-Nitrosodiphenylamine in mg/kg																		
Pentachlorophenol in mg/kg																		
Phenanthrene in mg/kg																		
Phenol in mg/kg																		
Pyrene in mg/kg																		
Benz(a)anthracene in mg/kg																		
Benzo(a)pyrene in mg/kg																		
Benzo(b)fluoranthene in mg/kg																		
Benzo(k)fluoranthene in mg/kg																		
Chrysene in mg/kg																		
Dibenzo(a,h)anthracene in mg/kg																		
Indeno(1,2,3-cd)pyrene in mg/kg																		
2,4-Dinitrotoluene in mg/kg																		
2,6-Dinitrotoluene in mg/kg																		
2-Methylnaphthalene in mg/kg																		
Naphthalene in mg/kg																		
Total cPAH (TEQ) in mg/kg																		
Polychlorinated Biphenyls (PCBs)																		
Aroclor 1016 in mg/kg																		
Aroclor 1221 in mg/kg																		
Aroclor 1232 in mg/kg																		
Aroclor 1242 in mg/kg																		
Aroclor 1248 in mg/kg																		
Aroclor 1254 in mg/kg																		
Aroclor 1260 in mg/kg																		

Notes

U - Analyte was not detected at or above the reported result.
x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

Table 2 - Soil Quality Data from Phase 2 ESA Round 1 (Feb. 2012)

Everett Mill 110207

Chemical Name	DP-10 2/14/2012 (3-4 ft.)	DP-10 2/14/2012 (9-10 ft.)	DP-11 2/15/2012 (8.5-9.5 ft.)	DP-11 2/15/2012 (14-15 ft.)	DP-12 2/15/2012 (6.5-7.5 ft.)	DP-12 2/15/2012 (9-10 ft.)	DP-13 2/15/2012 (3-4 ft.)	DP-13 2/15/2012 (12-13 ft.)	DP-14 2/15/2012 (3-4 ft.)	DP-14 2/15/2012 (9-10 ft.)	DP-15 2/15/2012 (3-4 ft.)	DP-15 2/15/2012 (6.5-7.5 ft.)	DP-16 2/16/2012 (6-7 ft.)	DP-17 2/16/2012 (22-23 ft.)	DP-18 2/16/2012 (2.5-3.5 ft.)	DP-19 2/16/2012 (2.5-3.5 ft.)	DP-20 2/16/2012 (2.5-3.5 ft.)	DP-21 2/16/2012 (4-5 ft.)	DP-22 2/16/2012 (3-4 ft.)
Total Petroleum Hydrocarbons																			
Gasoline Range Hydrocarbons in mg/kg	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Diesel Range Hydrocarbons in mg/kg	50 U	50 U	50 U	50 U	50 U	50 U	67 x	50 U	50 U	50 U	120 x	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Lube Oil Range Hydrocarbons in mg/kg	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U
Volatile Organic Compounds																			
Benzene in mg/kg	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Ethylbenzene in mg/kg	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Toluene in mg/kg	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Xylenes (total) in mg/kg	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
1,2-Dibromoethane (EDB) in mg/kg																			
1,2-Dichloroethane (EDC) in mg/kg																			
Diisopropyl ether (DIPE) in mg/kg																			
Ethanol in mg/kg																			
Ethyl t-butyl ether (ETBE) in mg/kg																			
Methyl tert-butyl ether (MTBE) in mg/kg																			
t-Amyl methyl ether (TAME) in mg/kg																			
t-Butyl alcohol (TBA) in mg/kg																			
Metals																			
Arsenic in mg/kg													8.47	2.96	2.81	1.89	3.18	9.19	4.81
Cadmium in mg/kg													1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chromium in mg/kg													16.7	17.2	18.9	13.3	12.3	75.8	12
Copper in mg/kg													24.3	23.2	38.8	13.2	27.1	63.4	15.1
Lead in mg/kg													15.6	17.5	11.5	3.94	128	22.8	3.8
Mercury in mg/kg													0.1 U	0.1 U	0.1 U	0.1 U	0.2	0.1 U	0.1 U
Nickel in mg/kg													21.9	28	34.1	41.4	24.2	47.4	16
Selenium in mg/kg													1 U	1 U	1 U	1 U	1 U	1 U	1 U
Silver in mg/kg													1 U	1 U	1 U	1 U	1 U	1 U	1 U
Zinc in mg/kg													63.2	280	189	21.9	106	75	26.7
Polycyclic Aromatic Hydrocarbons (PAHs)																			
Acenaphthene in mg/kg																			
Acenaphthylene in mg/kg																			
Anthracene in mg/kg																			
Benzo(g,h,i)perylene in mg/kg																			
Fluoranthene in mg/kg																			
Fluorene in mg/kg																			
Phenanthrene in mg/kg																			
Pyrene in mg/kg																			
Naphthalene in mg/kg																			
Benz(a)anthracene in mg/kg																			
Benzo(a)pyrene in mg/kg																			
Benzo(b)fluoranthene in mg/kg																			
Benzo(k)fluoranthene in mg/kg																			
Chrysene in mg/kg																			
Dibenzo(a,h)anthracene in mg/kg																			
Indeno(1,2,3-cd)pyrene in mg/kg																			
Total cPAH (TEQ) in mg/kg																			
Other Semivolatile Organics																			
1,2,4-Trichlorobenzene in mg/kg													0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
1,2-Dichlorobenzene in mg/kg													0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
1,3-Dichlorobenzene in mg/kg													0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
1,4-Dichlorobenzene in mg/kg													0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
2,4,5-Trichlorophenol in mg/kg													0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
2,4,6-Trichlorophenol in mg/kg													0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
2,4-Dichlorophenol in mg/kg													0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
2,4-Dimethylphenol in mg/kg													0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
2,4-Dinitrophenol in mg/kg													0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U
2-Chloronaphthalene in mg/kg													0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
2-Chlorophenol in mg/kg													0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
2-Methylphenol in mg/kg													0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
2-Nitroaniline in mg/kg													0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
2-Nitrophenol in mg/kg													0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
3 & 4 Methylphenol in mg/kg													0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U	0.6 U
3-Nitroaniline in mg/kg													3 U	3 U	3 U	3 U	3 U	3 U	3 U
4,6-Dinitro-2-methylphenol in mg/kg													0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U

Table 2 - Soil Quality Data from Phase 2 ESA Round 1 (Feb. 2012)

Everett Mill 110207

Chemical Name	DP-10 2/14/2012 (3-4 ft.)	DP-10 2/14/2012 (9-10 ft.)	DP-11 2/15/2012 (8.5-9.5 ft.)	DP-11 2/15/2012 (14-15 ft.)	DP-12 2/15/2012 (6.5-7.5 ft.)	DP-12 2/15/2012 (9-10 ft.)	DP-13 2/15/2012 (3-4 ft.)	DP-13 2/15/2012 (12-13 ft.)	DP-14 2/15/2012 (3-4 ft.)	DP-14 2/15/2012 (9-10 ft.)	DP-15 2/15/2012 (3-4 ft.)	DP-15 2/15/2012 (6.5-7.5 ft.)	DP-16 2/16/2012 (6-7 ft.)	DP-17 2/16/2012 (22-23 ft.)	DP-18 2/16/2012 (2.5-3.5 ft.)	DP-19 2/16/2012 (2.5-3.5 ft.)	DP-20 2/16/2012 (2.5-3.5 ft.)	DP-21 2/16/2012 (4-5 ft.)	DP-22 2/16/2012 (3-4 ft.)
4-Bromophenyl phenyl ether in mg/kg													0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
4-Chloro-3-methylphenol in mg/kg													0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
4-Chloroaniline in mg/kg													3 U	3 U	3 U	3 U	3 U	3 U	3 U
4-Chlorophenyl phenyl ether in mg/kg													0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
4-Nitroaniline in mg/kg													3 U	3 U	3 U	3 U	3 U	3 U	3 U
4-Nitrophenol in mg/kg													0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U
Acenaphthene in mg/kg													0.17	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Acenaphthylene in mg/kg													0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Anthracene in mg/kg													0.036	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Benzo(g,h,i)perylene in mg/kg													0.14	0.03 U	0.03 U	0.03 U	0.051	0.033	0.03 U
Benzoic acid in mg/kg													1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U	1.5 U
Benzyl alcohol in mg/kg													0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Benzyl butyl phthalate in mg/kg													0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Bis(2-chloro-1-methylethyl) ether in mg/kg													0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Bis(2-chloroethoxy)methane in mg/kg													0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Bis(2-chloroethyl) ether in mg/kg													0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Bis(2-ethylhexyl) phthalate in mg/kg													0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Carbazole in mg/kg													0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Dibenzofuran in mg/kg													0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Diethyl phthalate in mg/kg													0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Dimethyl phthalate in mg/kg													0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Di-n-butyl phthalate in mg/kg													0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Di-n-octyl phthalate in mg/kg													0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Fluoranthene in mg/kg													0.33	0.049	0.03 U	0.03 U	0.06	0.049	0.03 U
Fluorene in mg/kg													0.087	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Hexachlorobenzene in mg/kg													0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Hexachlorobutadiene in mg/kg													0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Hexachlorocyclopentadiene in mg/kg													0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U	0.09 U
Hexachloroethane in mg/kg													0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Isophorone in mg/kg													0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Nitrobenzene in mg/kg													0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
N-Nitroso-di-n-propylamine in mg/kg													0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
N-Nitrosodiphenylamine in mg/kg													0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Pentachlorophenol in mg/kg													0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Phenanthrene in mg/kg													0.093	0.044	0.03 U	0.03 U	0.032	0.03 U	0.03 U
Phenol in mg/kg													0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Pyrene in mg/kg													0.33	0.056	0.03 U	0.03 U	0.068	0.052	0.03 U
Benz(a)anthracene in mg/kg													0.14	0.03 U	0.03 U	0.03 U	0.031	0.03 U	0.03 U
Benzo(a)pyrene in mg/kg													0.19	0.03 U	0.03 U	0.03 U	0.047	0.033	0.03 U
Benzo(b)fluoranthene in mg/kg													0.19	0.03 U	0.03 U	0.03 U	0.051	0.051	0.03 U
Benzo(k)fluoranthene in mg/kg													0.076	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Chrysene in mg/kg													0.16	0.03 U	0.03 U	0.03 U	0.041	0.036	0.03 U
Dibenzo(a,h)anthracene in mg/kg													0.037	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Indeno(1,2,3-cd)pyrene in mg/kg													0.12	0.03 U	0.03 U	0.03 U	0.038	0.03 U	0.03 U
2,4-Dinitrotoluene in mg/kg													0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
2,6-Dinitrotoluene in mg/kg													0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
2-Methylnaphthalene in mg/kg													0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Naphthalene in mg/kg													0.057	0.063	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U
Total cPAH (TEQ) in mg/kg													0.25	ND	ND	ND	0.062	0.044	ND
Polychlorinated Biphenyls (PCBs)																			
Aroclor 1016 in mg/kg													0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Aroclor 1221 in mg/kg													0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Aroclor 1232 in mg/kg													0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Aroclor 1242 in mg/kg													0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Aroclor 1248 in mg/kg													0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Aroclor 1254 in mg/kg													0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Aroclor 1260 in mg/kg													0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U

Notes

U - Analyte was not detected at or above the reported result.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

Table 3 - Groundwater Quality Data from Phase 2 ESA Round 1 (Feb. 2012)

Everett Mill 110207

Chemical Name	MW-1 02/17/12		MW-2 02/17/12		MW-3 02/17/12		MW-4 02/17/12		MW-5 02/17/12		MW-6 02/17/12	
Total Petroleum Hydrocarbons												
Gasoline Range Hydrocarbons in ug/L	100	U	100	U	350		100	U	100	U	100	U
Diesel Range Hydrocarbons in ug/L	50	U	50	U	80		130		50	U	50	U
Lube Oil Range Hydrocarbons in ug/L	250	U	250	U	250	U	250	U	250	U	250	U
Volatile Organic Compounds												
Benzene in ug/L	1	U	1	U	1	U	1	U	1	U	1	U
Ethylbenzene in ug/L	1	U	1	U	1.4		1	U	1	U	1	U
Toluene in ug/L	1	U	1	U	6.8		1	U	1	U	1	U
Xylenes (total) in ug/L	3	U	3	U	3.2		3	U	3	U	3	U
1,2-Dibromoethane (EDB) in ug/L					1	U	1	U				
1,2-Dichloroethane (EDC) in ug/L					1	U	1	U				
Methyl tert-butyl ether (MTBE) in ug/L					1	U	1	U				
Metals												
Dissolved Arsenic in ug/L									4.68		5.2	
Dissolved Cadmium in ug/L									1	U	1	U
Dissolved Chromium in ug/L									1.92		4.28	
Dissolved Copper in ug/L									7.09		4.14	
Dissolved Lead in ug/L	5	U	1	U	1	U	26.8		1	U	1	U
Dissolved Mercury in ug/L									0.1	U	0.1	U
Dissolved Nickel in ug/L									3.48		5.95	
Dissolved Selenium in ug/L									15.3		12.4	
Dissolved Silver in ug/L									1	U	1	U
Dissolved Zinc in ug/L									1.61		1.49	
Polycyclic Aromatic Hydrocarbons (PAHs)												
Acenaphthene in ug/L	0.1	U	0.1	U	1.7		4.3		0.28		0.1	U
Acenaphthylene in ug/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Anthracene in ug/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Benzo(g,h,i)perylene in ug/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Fluoranthene in ug/L	0.1	U	0.1	U	0.1	U	0.1		0.1	U	0.1	U
Fluorene in ug/L	0.1	U	0.1	U	2.1		2.7		0.1	U	0.1	U
Phenanthrene in ug/L	0.1	U	0.1	U	0.2		2.1		0.1	U	0.1	U
Pyrene in ug/L	0.1	U	0.1	U	0.1	U	0.18		0.1	U	0.1	U
Naphthalene in ug/L	0.1	U	0.1	U	0.92		8		0.1	U	0.1	U
Benz(a)anthracene in ug/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Benzo(a)pyrene in ug/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Benzo(b)fluoranthene in ug/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Benzo(k)fluoranthene in ug/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Chrysene in ug/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Dibenzo(a,h)anthracene in ug/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Indeno(1,2,3-cd)pyrene in ug/L	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Total cPAH (TEQ) in ug/L	ND		ND		ND		ND		ND		ND	
Other Semivolatile Organics												
1,2,4-Trichlorobenzene in ug/L									1	U	1	U
1,2-Dichlorobenzene in ug/L									1	U	1	U
1,3-Dichlorobenzene in ug/L									1	U	1	U
1,4-Dichlorobenzene in ug/L									1	U	1	U
2,4,5-Trichlorophenol in ug/L									10	U	10	U
2,4,6-Trichlorophenol in ug/L									10	U	10	U
2,4-Dichlorophenol in ug/L									10	U	10	U
2,4-Dimethylphenol in ug/L									10	U	10	U
2,4-Dinitrophenol in ug/L									30	U	30	U
2-Chloronaphthalene in ug/L									1	U	1	U
2-Chlorophenol in ug/L									10	U	10	U
2-Methylphenol in ug/L									10	U	10	U
2-Nitroaniline in ug/L									1	U	1	U
2-Nitrophenol in ug/L									10	U	10	U
3 & 4 Methylphenol in ug/L									20	U	20	U

Table 3 - Groundwater Quality Data from Phase 2 ESA Round 1 (Feb. 2012)

Everett Mill 110207

Chemical Name	MW-1 02/17/12	MW-2 02/17/12	MW-3 02/17/12	MW-4 02/17/12	MW-5 02/17/12	MW-6 02/17/12
3-Nitroaniline in ug/L					3 U	3 U
4,6-Dinitro-2-methylphenol in ug/L					30 U	30 U
4-Bromophenyl phenyl ether in ug/L					1 U	1 U
4-Chloro-3-methylphenol in ug/L					10 U	10 U
4-Chloroaniline in ug/L					3 U	3 U
4-Chlorophenyl phenyl ether in ug/L					1 U	1 U
4-Nitroaniline in ug/L					10 U	10 U
4-Nitrophenol in ug/L					10 U	10 U
Benzoic acid in ug/L					50 U	50 U
Benzyl alcohol in ug/L					10 U	10 U
Benzyl butyl phthalate in ug/L					1 U	1 U
Bis(2-chloro-1-methylethyl) ether in ug/L					10 U	10 U
Bis(2-chloroethoxy)methane in ug/L					1 U	1 U
Bis(2-chloroethyl) ether in ug/L					10 U	10 U
Bis(2-ethylhexyl) phthalate in ug/L					10 U	10 U
Carbazole in ug/L					1 U	1 U
Dibenzofuran in ug/L					1 U	1 U
Diethyl phthalate in ug/L					1 U	1 U
Dimethyl phthalate in ug/L					1 U	1 U
Di-n-butyl phthalate in ug/L					1 U	1 U
Di-n-octyl phthalate in ug/L					1 U	1 U
Hexachlorobenzene in ug/L					1 U	1 U
Hexachlorobutadiene in ug/L					1 U	1 U
Hexachlorocyclopentadiene in ug/L					3 U	3 U
Hexachloroethane in ug/L					1 U	1 U
Isophorone in ug/L					1 U	1 U
Nitrobenzene in ug/L					1 U	1 U
N-Nitroso-di-n-propylamine in ug/L					10 U	10 U
N-Nitrosodiphenylamine in ug/L					1 U	1 U
Pentachlorophenol in ug/L					10 U	10 U
Phenol in ug/L					10 U	10 U
2,4-Dinitrotoluene in ug/L					1 U	1 U
2,6-Dinitrotoluene in ug/L					1 U	1 U
2-Methylnaphthalene in ug/L					1 U	1 U
Conventional Chemistry Parameters						
Total Dissolved Solids in mg/L	22,632	4,771	297	2,132	2,775	2,726
Total Suspended Solids in mg/L	10 U	20	10 U	170	100	41
Field Parmeters						
Conductivity in umhos/cm	36,646	9,109	6,263	2,587	5,773	3,809
Dissolved Oxygen in mg/L	6.3	6.6	0.2	1.4	1.5	5.0
Eh (ORP) in mVolts	118	-102	-70	-302	-222	-141
pH in pH units	7.4	8.9	7.1	10.5	6.7	7.4
Temperature in deg C	8.3	10.4	10.9	10.9	11.0	17.2

Notes

U - Analyte was not detected at or above the reported result.

Table 4 - Soil Sampling Field Guide

Kimberly-Clark Everett Mill Uplands Phase 2 Environmental Assessment

Site Area	Exploration Location	Exploration Identification	Soil Sample Depth Interval^1 (feet bgs)	Soil Sample Analyses										Sample Location Notes
				Gasoline-Range TPH	Diesel- and Oil-Range TPH	VOCs	Low-level PAHs	PP Metals^2	Total Lead	SVOCs	PCBs	Dioxins/ Furans	Total Organic Carbon	
REC 2: Former Oil House and Fuel ASTs		REC2-B-1			✓		✓							Borings REC2-B-1, -2, -3, -6, and -10 are located within the Warehouse; specific locations will be access dependent.
			at water table		✓		✓							
					✓		✓							
		REC2-B-2			✓		✓							
			at water table		✓		✓							
					✓		✓							
		REC2-B-3			✓		✓							
			at water table		✓		✓							
					✓		✓							
		REC2-B-4			✓		✓							
			at water table		✓		✓							
					✓		✓							
		REC2-B-5			✓		✓							
			at water table		✓		✓							
					✓		✓							
		REC2-B-6			✓		✓							
			at water table		✓		✓							
					✓		✓							
		REC2-B-7			✓		✓							
			at water table		✓		✓							
					✓		✓							
		REC2-B-8			✓		✓							
			at water table		✓		✓							
					✓		✓							
		REC2-B-9			✓		✓							
			at water table		✓		✓							
					✓		✓							
		REC2-B-10			✓		✓							
			at water table		✓		✓							
					✓		✓							
		REC2-B-11			✓		✓							
			at water table		✓		✓							
					✓		✓							
		REC2-B-12			✓		✓							
			at water table		✓		✓							
					✓		✓							
		REC2-MW-5			✓		✓							
			at water table		✓		✓							
					✓		✓							

Table 4 - Soil Sampling Field Guide

Kimberly-Clark Everett Mill Uplands Phase 2 Environmental Assessment

Site Area	Exploration Location	Exploration Identification	Soil Sample Depth Interval[1] (feet bgs)	Soil Sample Analyses Gasoline-Range TPH	Diesel- and Oil-Range TPH	VOCs	Low-level PAHs	PP Metals[2]	Total Lead	SVOCs	PCBs	Dioxins/ Furans	Total Organic Carbon	Sample Location Notes
REC 3: Heavy Duty Shop Sump		REC3-MW-1			✓	✓	✓		✓		✓			
REC 5: Dutch Ovens 1-5		REC5-MW-1	just below water table			✓		✓						
REC 6: Latex Spill Area		REC6-MW-1												
		REC6-MW-2												
REC 7: East Waterway	Upland Shoreline	REC7-MW-1												
		REC7-MW-2												
		REC7-MW-3												
		REC7-MW-4												
HREC 1: UST Removals	USTs 29, 67, 69	UST29-MW-1		✓	✓	✓	✓							
		UST69-MW-1		✓		✓			✓					
	USTs 68, 68R	UST68-MW-1		✓		✓								
		UST68-MW-2		✓		✓								
		UST68-MW-3		✓		✓								
		UST68-MW-4		✓		✓								
		UST68-MW-5		✓		✓								
	USTs 70, 70R	UST70-B-1			✓	✓	✓							- Install UST70-MW-1 adjacent to the boring location with the highest apparent TPH soil concentrations based on field screening.
					✓	✓	✓							
		UST70-B-2			✓	✓	✓							
					✓	✓	✓							
		UST70-B-3			✓	✓	✓							
					✓	✓	✓							
		UST70-B-2			✓	✓	✓							
					✓	✓	✓							
		UST70-MW-1*												
		UST70-MW-2			✓	✓	✓							
					✓	✓	✓							
	USTs 71, 72, 73	UST71-B-1			✓	✓	✓							- Install UST71-MW-1 adjacent to the boring location with the highest apparent TPH soil concentrations
					✓	✓	✓							
		UST71-B-2			✓	✓	✓							
					✓	✓	✓							
		UST71-B-3			✓	✓	✓							
					✓	✓	✓							
		UST71-B-4			✓	✓	✓							
					✓	✓	✓							
		UST71-MW-1*												

Table 4 - Soil Sampling Field Guide

Kimberly-Clark Everett Mill Uplands Phase 2 Environmental Assessment

Site Area	Exploration Location	Exploration Identification	Soil Sample Depth Interval[1] (feet bgs)	Soil Sample Analyses										Sample Location Notes
				Gasoline-Range TPH	Diesel- and Oil-Range TPH	VOCs	Low-level PAHs	PP Metals[2]	Total Lead	SVOCs	PCBs	Dioxins/ Furans	Total Organic Carbon	
HREC 2: Naval Reserve Parcel	Area of Petroleum and Mercury Contamination Adjacent to Shoreline	NRP-B-1		✓	✓	✓	✓	✓						- NRP-MW-1 to be located adjacent to the boring location with the highest apparent TPH soil concentrations based on field screening.
				✓	✓	✓	✓	✓						
		NRP-B-2		✓	✓	✓	✓	✓						
				✓	✓	✓	✓	✓						
		NRP-B-3		✓	✓	✓	✓	✓						
				✓	✓	✓	✓	✓						
		NRP-B-4		✓	✓	✓	✓	✓						
				✓	✓	✓	✓	✓						
		NRP-B-5		✓	✓	✓	✓	✓						
				✓	✓	✓	✓	✓						
		NRP-B-6		✓	✓	✓	✓	✓						
				✓	✓	✓	✓	✓						
		NRP-B-7		✓	✓	✓	✓	✓						
				✓	✓	✓	✓	✓						
		NRP-B-8		✓	✓	✓	✓	✓						
				✓	✓	✓	✓	✓						
		NRP-MW-1*												
		NRP-MW-2		✓	✓	✓	✓	✓						
		NRP-MW-3		✓	✓	✓	✓	✓						
	Area of Metals Contamination Farther Inland	NRP-B-9	0 to 1	✓	✓	✓	✓	✓						- Borings B-9 through B-16 drilled to 10 feet. Monitoring well borings may be deeper. - Install two monitoring wells along the downgradient (west) edge of the inferred metals-contaminated area as NRP-MW-4 and NRP-MW-5. - TPH/VOC/PAH analyses if field evidence of TPH at each location.
			3 to 4	✓	✓	✓	✓	✓						
		NRP-B-10	0 to 1	✓	✓	✓	✓	✓						
			3 to 4	✓	✓	✓	✓	✓						
		NRP-B-11	0 to 1	✓	✓	✓	✓	✓						
			3 to 4	✓	✓	✓	✓	✓						
		NRP-B-12	0 to 1	✓	✓	✓	✓	✓						
			3 to 4	✓	✓	✓	✓	✓						
		NRP-B-13	0 to 1	✓	✓	✓	✓	✓						
			3 to 4	✓	✓	✓	✓	✓						
		NRP-B-14	0 to 1	✓	✓	✓	✓	✓						
			3 to 4	✓	✓	✓	✓	✓						
		NRP-B-15	0 to 1	✓	✓	✓	✓	✓						
			3 to 4	✓	✓	✓	✓	✓						
		NRP-B-16	0 to 1	✓	✓	✓	✓	✓						
			3 to 4	✓	✓	✓	✓	✓						
		NRP-MW-4												
		NRP-MW-5												

Table 4 - Soil Sampling Field Guide

Kimberly-Clark Everett Mill Uplands Phase 2 Environmental Assessment

Site Area	Exploration Location	Exploration Identification	Soil Sample Depth Interval^{1} (feet bgs)	Soil Sample Analyses										Sample Location Notes
				Gasoline-Range TPH	Diesel- and Oil-Range TPH	VOCs	Low-level PAHs	PP Metals^{2}	Total Lead	SVOCs	PCBs	Dioxins/ Furans	Total Organic Carbon	
Acid Plant		AP-MW-1	1 to 2	✓	✓	✓	✓	✓						Also include **soil pH** for both soil samples. TPH/VOC/PAH analyses if field evidence of TPH.
			just below water table	✓	✓	✓	✓	✓						
Central Maintenance Shop		CMS-B-1	0 to 1	✓	✓	✓	✓	✓			✓			CMS-B-1 through CMS-B-3 are hand-augered borings to be located within building (access dependent)
			2 to 3	✓	✓	✓	✓	✓			✓			
		CMS-B-2	0 to 1	✓	✓	✓	✓	✓			✓			
			2 to 3	✓	✓	✓	✓	✓			✓			
		CMS-B-3	0 to 1	✓	✓	✓	✓	✓			✓			
			2 to 3	✓	✓	✓	✓	✓			✓			
		CMS-MW-1												
MIS/Old Machine Shop		OMS-B-1	0 to 1	✓	✓	✓	✓	✓			✓			OMS-B-1 through OMS-B-3 are hand-augered borings to be located within building (access dependent)
			2 to 3	✓	✓	✓	✓	✓			✓			
		OMS-B-2	0 to 1	✓	✓	✓	✓	✓			✓			
			2 to 3	✓	✓	✓	✓	✓			✓			
		OMS-B-3	0 to 1	✓	✓	✓	✓	✓			✓			
			2 to 3	✓	✓	✓	✓	✓			✓			
		OMS-MW-1*												
Boiler, Fly Ash, and Baghouse Area		Boiler-B-1	1 to 2			✓		✓		✓		✓	✓	
		Boiler-B-2	1 to 2			✓		✓		✓		✓	✓	
		Boiler-B-3	1 to 2			✓		✓		✓		✓	✓	
		Boiler-B-4	1 to 2			✓		✓		✓		✓	✓	
		Boiler-B-5	1 to 2			✓		✓		✓		✓	✓	

Table 4 - Soil Sampling Field Guide

Kimberly-Clark Everett Mill Uplands Phase 2 Environmental Assessment

Site Area	Exploration Location	Exploration Identification	Soil Sample Depth Interval[1] (feet bgs)	Soil Sample Analyses										Sample Location Notes
				Gasoline-Range TPH	Diesel- and Oil-Range TPH	VOCs	Low-level PAHs	PP Metals[2]	Total Lead	SVOCs	PCBs	Dioxins/ Furans	Total Organic Carbon	
General Fill Soil Quality	Across the Site	GF-B-1	1 to 2.5	✓	✓	✓	✓	✓		✓	✓	✓	✓	- Drill to 25 feet by hollow stem auger the general fill soil borings excluding GF-B-1, GF-B-3, GF-B-7, GF-B-13 on easternmost side of property. However, if borehole heave is signficant in the other auger borings, they may also be completed using geoprobe. '- Borings GF-B-1, GF-B-3, GF-B-7, GF-B-13 will be drilled to 10 feet using Geoprobe.
			7.5 to 9	✓	✓	✓	✓	✓		✓	✓		✓	
		GF-B-2	1 to 2.5	✓	✓	✓	✓	✓		✓	✓	✓	✓	
			7.5 to 9	✓	✓	✓	✓	✓		✓	✓		✓	
		GF-B-3	1 to 2.5	✓	✓	✓	✓	✓		✓	✓	✓	✓	
			7.5 to 9	✓	✓	✓	✓	✓		✓	✓		✓	
		GF-B-4	1 to 2.5	✓	✓	✓	✓	✓		✓	✓	✓	✓	
			7.5 to 9	✓	✓	✓	✓	✓		✓	✓		✓	
		GF-B-5	1 to 2.5	✓	✓	✓	✓	✓		✓	✓	✓	✓	
			7.5 to 9	✓	✓	✓	✓	✓		✓	✓		✓	
		GF-B-6	1 to 2.5	✓	✓	✓	✓	✓		✓	✓	✓	✓	
			7.5 to 9	✓	✓	✓	✓	✓		✓	✓		✓	
		GF-B-7	1 to 2.5	✓	✓	✓	✓	✓		✓	✓	✓	✓	
			7.5 to 9	✓	✓	✓	✓	✓		✓	✓		✓	
		GF-B-8	1 to 2.5	✓	✓	✓	✓	✓		✓	✓	✓	✓	
			7.5 to 9	✓	✓	✓	✓	✓		✓	✓		✓	
		GF-B-9	1 to 2.5	✓	✓	✓	✓	✓		✓	✓	✓	✓	
			7.5 to 9	✓	✓	✓	✓	✓		✓	✓		✓	
		GF-B-10	1 to 2.5	✓	✓	✓	✓	✓		✓	✓	✓	✓	
			7.5 to 9	✓	✓	✓	✓	✓		✓	✓		✓	
		GF-B-11	1 to 2.5	✓	✓	✓	✓	✓		✓	✓	✓	✓	
			7.5 to 9	✓	✓	✓	✓	✓		✓	✓		✓	
		GF-B-12	1 to 2.5	✓	✓	✓	✓	✓		✓	✓	✓	✓	
			7.5 to 9	✓	✓	✓	✓	✓		✓	✓		✓	
		GF-B-13	1 to 2.5	✓	✓	✓	✓	✓		✓	✓	✓	✓	
			7.5 to 9	✓	✓	✓	✓	✓		✓	✓		✓	
		GF-B-14	1 to 2.5	✓	✓	✓	✓	✓		✓	✓	✓	✓	
			7.5 to 9	✓	✓	✓	✓	✓		✓	✓		✓	
		GF-B-15	1 to 2.5	✓	✓	✓	✓	✓		✓	✓	✓	✓	
			7.5 to 9	✓	✓	✓	✓	✓		✓	✓		✓	
Upgradient Groundwater Quality		UG-MW-1		✓	✓	✓	✓							TPH/VOC/PAH analyses if field evidence of TPH.
		UG-MW-2		✓	✓	✓	✓							
			Soil Sample Analysis Count:	***87***	***139***	***112***	***139***	***84***	***2***	***35***	***43***	***20***	***35***	***plus 2 soil pH***

Notes:

[1] Where soil sample depth is not specified, soil sample depth intervals to be determined in the field based on field screening. In absence of contamination evidence from field screening, one soil sample to be collected from depth interval straddling water table observed during drilling.

[2] Metals = 13 priority pollutant metals (As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Ag, Tl, Zn) except as specified in Notes.

*: Monitoring well location based on field screening during drilling of soil borings.

Table 5 - Groundwater Sampling Field Guide

Kimberly-Clark Everett Mill Uplands Phase 2 Environmental Assessment

Focus Area	Exploration Location	Exploration Identification	Groundwater Sample Analyses														Sample Location Notes
			Gasoline-Range TPH	Diesel- and Oil-Range TPH	VOCs	Low-Level EDB	Low-level PAHs	Lead[1]	Dissolved PP Metals[2]	Total PP Metals[2]	SVOCs	1,4-Dioxane	Ammonia + Dissolved Sulfide	Formaldehyde	TSS	Field Parameters[3]	
REC 2: Former Oil House and Fomer Fuel ASTs		**MW-1 (existing)**	✓	✓	✓		✓		✓		✓		✓		✓	✓	
		MW-2 (existing)	✓	✓	✓		✓		✓	✓	✓		✓		✓	✓	
		MW-3 (existing)	✓	✓	✓		✓								✓	✓	
		MW-4 (existing)	✓	✓	✓		✓	✓							✓	✓	Field dup lead analyses
		REC2-MW-5	✓	✓	✓		✓								✓	✓	
REC 3: Heavy Duty Shop		**REC3-MW-1**		✓	✓		✓		✓		✓		✓		✓	✓	
REC 5: Dutch Ovens 1-5		REC5-MW-1			✓				✓	✓					✓	✓	
REC 6: Latex Spill Area		REC6-MW-1			✓							✓		✓	✓	✓	
		REC6-MW-2	✓		✓				✓		✓	✓	✓	✓	✓	✓	VOC analysis to include vinyl acetate.
REC 7: East Wateray	Upland Shoreline	**REC7-MW-1**			✓				✓		✓		✓		✓	✓	
		REC7-MW-2			✓				✓	✓	✓		✓		✓	✓	
		REC7-MW-3			✓				✓		✓		✓		✓	✓	
		REC7-MW-4			✓				✓	✓	✓		✓		✓	✓	
HREC 1: UST Removals	USTs 29, 67, 69	UST29-MW-1	✓	✓	✓		✓								✓	✓	
		UST69-MW-1	✓		✓	✓		✓							✓	✓	
	USTs 68/68R	UST68-MW-1	✓		✓	✓									✓	✓	
		UST68-MW-2	✓		✓	✓									✓	✓	
		UST68-MW-3	✓		✓	✓									✓	✓	
		UST68-MW-4	✓		✓	✓									✓	✓	
		UST68-MW-5	✓		✓	✓									✓	✓	
	USTs 70/70R	UST70-MW-1*		✓	✓		✓								✓	✓	
		UST70-MW-2		✓	✓		✓		✓		✓		✓		✓	✓	
	USTs 71/72/73	UST71-MW-1*		✓	✓		✓								✓	✓	
HREC 2: Naval Reserve Parcel	Area of Petroleum and Mercury Contamination Adjacent to Shoreline	NRP-MW-1*	✓	✓	✓		✓		✓						✓	✓	
		NRP-MW-2	✓	✓	✓		✓		✓		✓		✓		✓	✓	
		NRP-MW-3	✓	✓	✓		✓		✓		✓		✓		✓	✓	
		MW-5 (existing)	✓	✓	✓		✓		✓		✓		✓		✓	✓	
	Area of Metals Contamination Inland	NRP-MW-4*	✓	✓	✓		✓		✓	✓					✓	✓	TPH/VOC/PAH analyses if field evidence of TPH.
		NRP-MW-5*	✓	✓	✓		✓		✓	✓					✓	✓	
Log Pond Fill Area		**MW-6 (existing)**	✓	✓	✓		✓		✓	✓	✓		✓		✓	✓	
Acid Plant		AP-MW-1	✓	✓	✓		✓		✓	✓					✓	✓	TPH/VOC/PAH analyses if field evidence of TPH.
Central Maintenance Shop		CMS-MW-1	✓	✓	✓		✓		✓	✓					✓	✓	
MIS/Old Machine Shop		**OMS-MW-1**	✓	✓	✓		✓		✓		✓		✓		✓	✓	
Upgradient Groundwater Quality		UG-MW-1	✓	✓	✓		✓		✓	✓					✓	✓	TPH/VOC/PAH analyses if field evidence of TPH.
		UG-MW-2	✓	✓	✓		✓		✓						✓	✓	
	Groundwater Sample Analysis Count:		*25*	*22*	*35*	*6*	*22*	*2*	*22*	*10*	*14*		*14*	*2*	*35*	*35*	

Notes:

[1] Total and dissolved lead.

[2] Metals include the 13 priority pollutant metals (As, Be, Cd, Cr, Cu, Hg, Ni, Pb, Sb, Se, Ag, Tl, Zn)

[3] Groundwater field parameters include temperature, elctrical conductance, pH, dissolved oxygen, oxidation-reduction potential, and turbidity.

Shoreline wells are in **bold**.

*: Monitoring well location based on field screening during soil borings.

Site Vicinity Map

Kimberly-Clark Everett Pulp and Paper Mill
Everett, Washington

Aspect CONSULTING

MAY-2012	BY: BTC / EAH	FIGURE NO.	
PROJECT NO. 110207	REV BY: - - -	1	

GIS Path: T:\projects_8\KimberlyClark\Env_Support_110207\Delivered\MapMemo\Fig1_SiteVicinity.mxd || Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere || Date Saved: 5/18/2012 || User: ehealy || Print Date: 5/18/2012

▬ ▬ Site Boundary

▭ Site Parcel

005977618030000 ← Snohomish County Tax Parcel Number

Site Plan

Kimberly-Clark Everett Pulp and Paper Mill
Everett, Washington

Aspect CONSULTING

MAY-2012	BY: BTC / EAH	FIGURE NO. 2
PROJECT NO. 110207	REV BY: - - -	

GIS Path: T:\projects_8\KimberlyClark\Env_Support_110207\Delivered\MayMemo\Fig2_SitePlan.mxd || Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere || Date Saved: 5/18/2012 || User: ehealy || Print Date: 5/18/2012

GIS Path: T:\projects_8\KimberlyClark\Env_Support_110207\Delivered\MayMemo\Fig3_SitePlanExpLocs.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 5/18/2012 || User: ehealy || Print Date: 5/18/201

Exploration Type

⌖ Monitoring Well

⊡ Soil Boring

△ Surface Soil Sample

Source of Existing Exploration

🟩 Aspect Consulting (2012)

🟧 Landau Associates (1991)

🟦 Landau Associates (1994)

🟨 Pacific Environmental Group (1998)

🟦 Navy (1997)

HREC Number and Name → **HREC 5** (Former Paint Shop)

REC Number and Name → **REC 3** (Heavy Duty Shop Sump)

▨ Approximate Location of Former Chevron Facilities

▨ Approximate Location of Former Associated Oil Company Facilities

☐ Historical Recognized Environmental Condition (HREC) (AECOM, 2011)

🟥 Recognized Environmental Condition (REC) (AECOM, 2011)

— Wood Chips/Hog Fuel

—+— Railway

— Combined Sewer Overflow LIne

▭ Kimberly-Clark Mill Property Boundary

* Location Uncertain

Existing Exploration Locations, RECs, and HRECs

Kimberly-Clark Everett Pulp and Paper Mill
Everett, Washington

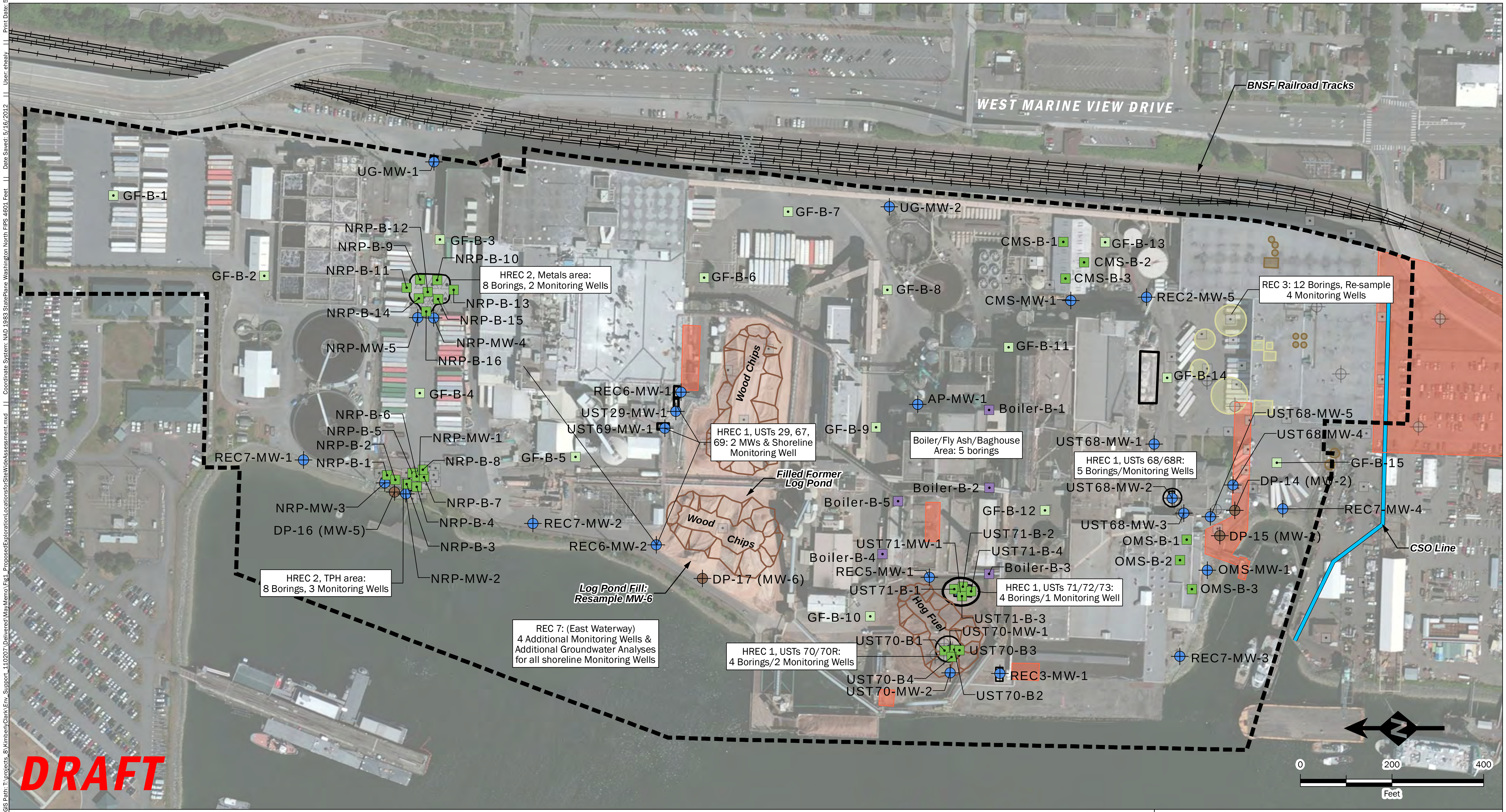
Aspect CONSULTING

MAY-2012
PROJECT NO. 110207

BY: SJG / EAH
REV BY: - - -

FIGURE NO. 3

GIS Path: T:\projects_8\KimberlyClark\Env_Support_110207\Delivered\MayMemo\Fig1_ProposedExplorationLocationsforSiteWideAssessment.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 5/16/2012 || User: ehealy || Print Date: 5/16/201



Proposed Exploration

- ⊕ Proposed Monitoring Well
- 🟩 Proposed Soil Boring
- ▣ Proposed Boring for General Fill Soil Quality (Sect. 5.14.6)
- 🟪 Proposed Soil Boring for Boilder Area

Existing Exploration

- ⊕ Monitoring Well
- ▣ Soil Boring
- △ Surface Soil Sample
- ⊕ Accessible Existing Monitoring Well

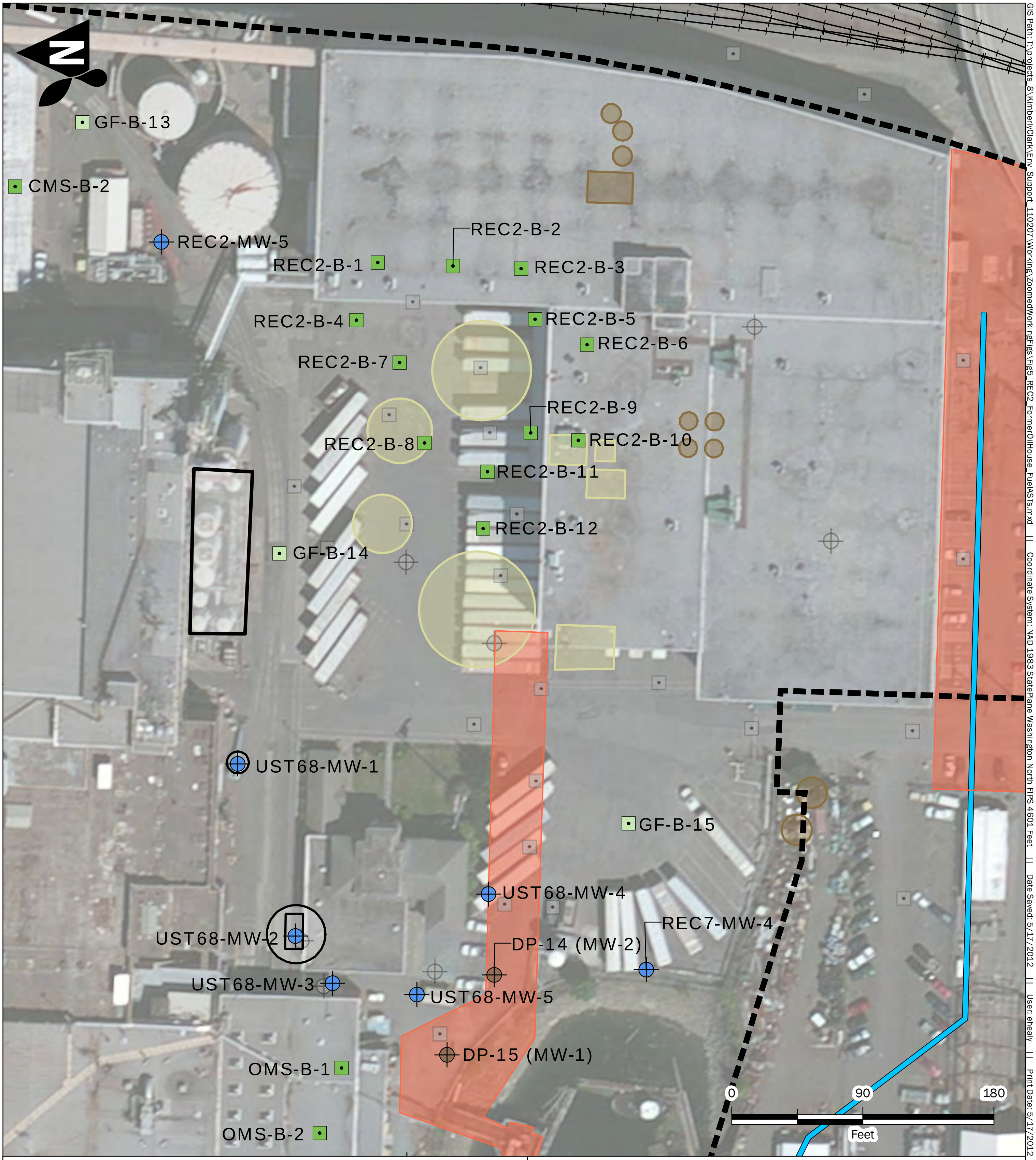
- ▨ Approximate Location of Former Chevron Facilities
- ▨ Approximate Location of Former Associated Oil Company Facilities
- ☐ Historical Recognized Environmental Condition (HREC) (AECOM, 2011)
- 🟥 Recognized Environmental Condition (REC) (AECOM, 2011)

- — Wood Chips/Hog Fuel
- —+— Railway
- — Combined Sewer Overflow LIne
- ⬚ Kimberly-Clark Mill Property Boundary

Overview of Proposed Explorations

Kimberly-Clark Everett Pulp and Paper Mill
Everett, Washington

Aspect CONSULTING	MAY-2012 PROJECT NO. 110207	BY: SJG / EAH REV BY: - - -	FIGURE NO. 4



GIS Path: T:\projects_8\KimberlyClark\Env_Support_110207\Working\ZoomedWorkingFigs\Fig5_REC2_FormerOilHouse_FuelASTs.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 5/17/2012 || User: ehealy || Print Date: 5/17/2012

Proposed Exploration

- ⊕ Proposed Monitoring Well
- 🟩 Proposed Soil Boring
- ▫ Proposed Boring for General Fill Soil Quality (Sect. 5.14.6)

Existing Exploration

- ⊕ Monitoring Well
- ▫ Soil Boring
- △ Surface Soil Sample
- ⊕ Accessible Existing Monitoring Well

Proposed Explorations for REC 2 (Former Oil House and Fuel ASTs)

Kimberly-Clark Everett Pulp and Paper Mill
Everett, Washington

Aspect CONSULTING

MAY-2012	BY: SJG / EAH	FIGURE NO. 5
PROJECT NO. 110207	REV BY: - - -	

GIS Path: T:\projects_8\KimberlyClark\Env_Support_110207\Working\ZoomedWorkingFigs\Fig6_REC3_HREC1UST70_71_72_73.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 5/16/2012 || User: ehealy || Print Date: 5/16/2012

Proposed Exploration

- ⊕ Proposed Monitoring Well
- 🟩 Proposed Soil Boring

Existing Exploration

- ⊕ Monitoring Well
- ▣ Soil Boring
- ▲ Surface Soil Sample
- ⊕ Accessible Existing Monitoring Well

Proposed Explorations for HREC 3 (Heavy Duty Shop Sump) and HREC 1 (USTs 70/70R and 71/72/73)

Kimberly-Clark Everett Pulp and Paper Mill
Everett, Washington

Aspect CONSULTING	MAY-2012	BY: SJG / EAH	FIGURE NO. 6
	PROJECT NO. 110207	REV BY: - - -	

GIS Path: T:\projects_8\KimberlyClark\Env_Support_110207\Working\ZoomedWorkingFigs\Fig7_REC5_AcidPlant_BoilerAreas.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 5/16/2012 || User: ehealy || Print Date: 5/16/2012

Proposed Exploration

- Proposed Monitoring Well
- Proposed Boring for General Fill Soil Quality (Sect. 5.14.6)
- Proposed Soil Boring for Boiler Area

Existing Exploration

- Monitoring Well
- Soil Boring
- Surface Soil Sample
- Accessible Existing Monitoring Well

Proposed Explorations for REC 5 (Dutch Ovens), Acid Plant, and Boiler Area

Kimberly-Clark Everett Pulp and Paper Mill
Everett, Washington

Aspect CONSULTING

MAY-2012	BY: SJG / EAH	FIGURE NO. 7
PROJECT NO. 110207	REV BY: - - -	

GIS Path: T:\projects_8\KimberlyClark\Env_Support_110207\Working\ZoomedWorkingFigs\Fig8_REC6_UST29_67_69.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 5/16/2012 || User: ehealy || Print Date: 5/16/2012

Proposed Exploration

- ⊕ Proposed Monitoring Well

Existing Exploration

- ⊕ Monitoring Well
- ⊡ Soil Boring
- ◬ Surface Soil Sample
- ⊕ Accessible Existing Monitoring Well

Proposed Explorations for REC 6 (Latex Spill Area) and HREC 1 (USTs 29/67/69)

Kimberly-Clark Everett Pulp and Paper Mill
Everett, Washington

Aspect
CONSULTING

MAY-2012	BY: SJG / EAH	FIGURE NO.
PROJECT NO. 110207	REV BY: - - -	8

GIS Path: T:\projects_8\KimberlyClark\Env_Support_110207\Delivered\ZoomedWorkingFigs\Fig9_HREC1_USTs68_68R.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 5/21/2012 || User: ehealy || Print Date: 5/21/2012

Proposed Exploration

- ⊕ Proposed Monitoring Well

Existing Exploration

- ⊕ Monitoring Well
- ⊡ Soil Boring
- △ Surface Soil Sample
- ⊕ Accessible Existing Monitoring Well

Proposed Explorations for HREC-1 (USTs 68/68R)

Kimberly-Clark Everett Pulp and Paper Mill
Everett, Washington

Aspect CONSULTING

MAY-2012	BY: SJG / EAH	FIGURE NO. 9
PROJECT NO. 110207	REV BY: - - -	

GIS Path: T:\projects_8\KimberlyClark\Env_Support_110207\Working\ZoomedWorkingFigs\Fig10_HREC2_NavalReserve.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 5/16/2012 || User: ehealy || Print Date: 5/16/2012

Proposed Exploration

- ⊕ Proposed Monitoring Well
- 🟩 Proposed Soil Boring
- ▪ Proposed Boring for General Fill Soil Quality (Sect. 5.14.6)

Existing Exploration

- ⊕ Monitoring Well
- ▪ Soil Boring
- △ Surface Soil Sample
- ⊕ Accessible Existing Monitoring Well

Proposed Explorations for HREC 2 (Naval Reserve Parcel)

Kimberly-Clark Everett Pulp and Paper Mill
Everett, Washington

Aspect CONSULTING

MAY-2012	BY: SJG / EAH	FIGURE NO. **10**
PROJECT NO. 110207	REV BY: - - -	

GIS Path: T:\projects_8\KimberlyClark\Env_Support_110207\Working\ZoomedWorkingFigs\Fig11_CentralMaintenanceShop.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 5/17/2012 || User: eheaty || Print Date: 5/17/2012

Proposed Exploration

- ⊕ Proposed Monitoring Well
- 🟩 Proposed Soil Boring

Existing Exploration

- ⊕ Monitoring Well
- ▣ Soil Boring
- ▲ Surface Soil Sample
- ⊕ Accessible Existing Monitoring Well

Proposed Explorations for Central Maintenance Shop

Kimberly-Clark Everett Pulp and Paper Mill
Everett, Washington

Aspect CONSULTING	MAY-2012	BY: SJG / EAH	FIGURE NO. **11**
	PROJECT NO. 110207	REV BY: - - -	

GIS Path: T:\projects_8\KimberlyClark\Env_Support_110207\Working\ZoomedWorkingFigs\Fig12_MIS_OldMachineShop.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 5/17/2012 || User: ehealy || Print Date: 5/17/2012

Proposed Exploration

⊕ Proposed Monitoring Well

🟩 Proposed Soil Boring

Existing Exploration

⊕ Monitoring Well

▣ Soil Boring

△ Surface Soil Sample

● Accessible Existing Monitoring Well

Proposed Explorations for MIS/ Old Machine Shop

Kimberly-Clark Everett Pulp and Paper Mill
Everett, Washington

Aspect CONSULTING	MAY-2012	BY: SJG / EAH	FIGURE NO.
	PROJECT NO. 110207	REV BY: - - -	12

APPENDIX A

Sampling and Analysis Plan

1 Introduction

This Sampling and Analysis Plan (SAP) describes field sampling and Quality Control (QC) procedures to be followed during the RI/FS data collection. Section 5 of the Work Plan describes the locations and rationale for the proposed sampling and analyses. Additional information on laboratory analytical methods and QC are provided in the Quality Assurance Project Plan (QAPP), included as Appendix B of this Work Plan. It is the responsibility of the project personnel performing or overseeing the sampling and analysis activities to adhere to the requirements of the SAP and QAPP.

1.1 Purpose of SAP

The purpose of this SAP is to ensure that field sample collection, handling, and analysis conducted during the environmental assessment will generate data to meet project-specific data quality objectives (DQOs) in accordance with MTCA requirements (WAC 173-340-350). The SAP includes requirements for sampling activities such as sampling frequency and location, analytical testing, documentation, and quality assurance/quality control (QA/QC) for compliance monitoring and waste characterization.

2 Soil Borings and Soil Sampling

Soil sampling will be conducted during execution of the environmental assessment to assess the nature and extent of soil contamination at the Site. Soil samples will be obtained using direct-push and/or hollow-stem auger drilling methods. The specific soil sample locations, depths, and chemical analyses are provided in Section 5 of the Work Plan. The following subsections detail the procedures for soil sample collection, handling, identification, and sample QA/QC.

Aspect Consulting will subcontract with a Washington-licensed resource protection well driller to complete soil borings in accordance with requirements of Chapter 173-160 WAC. Soil borings may be advanced using either direct push (i.e., Geoprobe) or, where geotechnical data (blow counts) are to be obtained in addition to environmental samples, hollow stem auger.

Soil borings advanced using a direct push rig and will be sampled on a continuous basis. Each boring will be advanced to collect samples at depth intervals specified in the Work Plan or as determined by field screening. The direct push drilling method provides continuous cores of soil, depending on soil recovery, returned within disposable 1.5-inch-diameter plastic liners (4-foot or 5-foot lengths). The liners are sliced longitudinally and opened to access the soil core.

Soil samples advanced using hollow stem auger will be collected using the Standard Penetration Test at 2.5-foot depth intervals to the total depth of exploration. Additional samples can also be collected for environmental soil sampling purposes. The Standard Penetration Test uses a 2-inch-outside-diameter split-spoon sample tube driven into the ground at the bottom of a borehole by blows from a 140-pound slide hammer falling through a distance of 30 inches. The sample tube is driven 18 inches into the ground and the number of blows needed for the tube to penetrate each 6-inch increment is recorded. The sum of the number of blows required for the second plus third 6 inch increments of penetration is termed the "standard penetration resistance" or the "N-value". If 50 blows are insufficient to advance it through a 6-inch interval, the penetration after 50 blows is recorded. The split spoon sampler is decontaminated after each sample is collected.

2.1 Soil Sample Collection and Handling Procedures

Irrespective of drilling method, a geologist from Aspect Consulting will oversee the drilling activities and preparation of a geologic log for each of the explorations completed. The field representative will visually classify the soils in accordance with ASTM Method D 2488 and record soil descriptions, field screening results, and other relevant details (e.g., staining, debris, odors, etc.) on the boring log form. If samples are collected for chemical analysis, the sample ID and depth will also be recorded on the log.

In addition to soil classification, the field representative will screen each soil sample using a PID to monitor for the presence of volatile organic compounds (VOCs). In areas of known or suspected petroleum contamination, soil samples will also be field-screened for presence of petroleum using a sheen test: placing a small aliquot of soil into a cup containing water, gently shaking, and watching for presence of petroleum sheen. Care will be taken to differentiate sheen created by petroleum (iridescent swirl of colors, does coalesce after being disturbed) versus other organic matter (angular “waxy” sheets”, do not coalesce after being disturbed), and recording the information appropriately.

All soil samples to be submitted for VOC analyses will be collected in accordance with EPA Method 5035A. The soil aliquot for VOC analysis will be collected from the undisturbed soil sample core using a laboratory-supplied modified disposable plastic syringe as required by the 5035A method, and placed in pre-weighed laboratory supplied vials.

For all other analyses, the soil samples will be removed from the sampler using a stainless steel spoon and placed in a stainless steel bowl for homogenization with the stainless steel spoon. Gravel-sized material greater than approximately 0.5 inch will be removed from the sample during mixing. A representative aliquot of the homogenized soil will be placed into certified-clean jars supplied by the analytical laboratory.

QC soil samples (e.g., field duplicates, rinsate blanks, and trip blanks) will be collected at the respective frequencies prescribed in Section 8.1 of the QAPP (Appendix B).

Each soil boring not completed as a monitoring well will be decommissioned with hydrated granular bentonite in accordance with requirements of Chapter 173-160 WAC.

2.2 Soil Sample Identification

Each soil sample collected for chemical analysis will be assigned a unique sample identification number including the boring number and the depth from which the sample was collected. For example, the soil sample collected from boring B-20 at a depth of 7 to 8 feet below ground surface (bgs) would be identified as B-20-7-8.

3 Monitoring Well Installation and Development

3.1 Monitoring Well Installation

Selected soil borings will be completed as groundwater monitoring wells. The monitoring wells will be constructed by a state-licensed resource protection well driller and in accordance with Chapter 173-160 WAC. An Aspect field geologist will oversee and document installation of each monitoring well, including completion of an As-Built Well Completion Diagram.

New monitoring wells will be constructed with 1-inch or 2-inch-diameter, threaded Schedule 40 PVC slotted screen and blank casing. Well screens will be 0.010-inch (10 slot) or 0.020-inch slot (20-slot) slotted screen either 5 feet of 10 feet in length, depending on field conditions; however, where there is potential for light non-aqueous phase liquid petroleum, a 10-foot screen will be placed to straddle the water table observed at time of drilling and spanning the expected depth range of water table fluctuation (expected less than 3 feet at shoreline wells, and less than 0.5 feet more than 200 feet or so inland of the shoreline). An artificial filter pack consisting of 10/20 silica sand will be placed around the well screen, and an annular seal consisting of bentonite chips will be placed above the filter pack. A concrete surface seal will be set at grade for each new monitoring well. Each well cap will be vented with a small hole. The finished monitoring wells will be protected with a steel flush-mount monument embedded in the concrete surface seal.

3.2 Monitoring Well Development

Following installation, each new monitoring well will be developed to remove fine-grained material from inside the well casing and filter pack to the extent practical, and to improve hydraulic communication between the well screen and the surrounding water-bearing formation. The new 1-inch-diameter wells will be developed using a peristaltic pump and downhole 1/4-inch tubing surged gently along the length of the well screen; a downhole submersible well development pump can be used for new 2-inch diameter wells. Each well will be developed until visual turbidity is reduced to minimal levels or until a maximum of 15 casing volumes of water has been removed.

4 Groundwater Sampling

Groundwater samples will be collected and handled in accordance with the procedures described below:

- The locking well cap will be removed and the depth-to-groundwater will be measured from the surveyed location to the nearest 0.01 foot using an electronic water level measuring device. The depth to the bottom of the monitoring well will also be measured to evaluate siltation of the monitoring. The water level indicator will be decontaminated between wells.
- Each monitoring well will be purged at a low-flow rate less than 0.5 liter per minute using a peristaltic pump and dedicated tubing (polyethylene tubing with a short length of silicon tubing through the pump head). The tubing intake will be placed just below the center of the saturated section of well screen. The well will then be purged at flow rates less than 0.5 liter per minute, and the field parameters temperature, pH, electrical conductance, dissolved oxygen, and oxidation-reduction potential (ORP) will be monitored using a YSI meter and flow-through cell, or equivalent. These field parameters will be recorded at 2 to 4 minute intervals throughout well purging until they stabilize. Stabilization is defined as three successive readings where the parameter values vary by less than 10% (or 0.5 mg/L dissolved oxygen if the readings are below 1 mg/L). However, no more than three well casing volumes will be purged prior to groundwater sample collection. At least one turbidity measurement will be made before collecting the sample.
- If the monitoring well is completely dewatered during purging, samples will be collected when sufficient recharge has occurred to allow filling of all sample containers.
- Once purging is complete, the groundwater samples will be collected using the same low flow rate directly into laboratory-supplied sample containers. Samples for dissolved metals analyses will be filtered using an in-line 0.45 µm filter; at least one-half liter of water will be purged through the filter prior to sample collection.
- QC groundwater samples (e.g., field duplicates and trip blanks) will be collected at the respective frequencies prescribed in Section 8.1 of the QAPP (Appendix B).
- Following sampling, the wells cap and monument cap will be secured. Each well's dedicated tubing will be retained in a labeled Ziploc bag for subsequent sampling events. Any damaged or defective well caps or monuments will be noted, and scheduled for replacement, if necessary.

4.1 Groundwater Sample Identification

Each groundwater sample will be assigned a unique sample identification number include the well number and the 8-digit date on which the sample was collected. For example, a groundwater sample collected from monitoring well MW-10 on May 30, 2012, would be identified as MW-10-053012.

5 Sample Custody and Field Documentation

5.1 Sample Custody

Upon collection, samples will be placed upright in a cooler. Ice of blue ice will be placed in each cooler to meet sample preservation requirements. Inert cushioning material will be placed in the remaining space of the cooler as needed to limit movement of the sample containers. If the sample coolers are being shipped, not hand carried, to the laboratory, the chain of custody (COC) form will be placed in waterproof bag taped to the inside lid of the cooler for shipment.

After collection, samples will be maintained in Aspect's custody until formally transferred to the analytical laboratory. For purposes of this work, custody of the samples will be defined as follows.

- In plain view of the field representatives;
- Inside a cooler that is in plain view of the field representative; or
- Inside any locked space such as a cooler, locker, car, or truck to which the field representative has the only immediately available key(s).

A COC record provided by the laboratory will be initiated at the time of sampling for all samples collected. The record will be signed by the field representative and others who subsequently take custody of the sample. Couriers or other professional shipping representatives are not required to sign the COC form; however, shipping receipts will be collected and maintained as a part of custody documentation in project files. A copy of the COC form with appropriate signatures will be kept by Aspect's project manager.

Upon sample receipt, the laboratory will fill out a cooler receipt form to document sample delivery conditions. A designated sample custodian will accept custody of the shipped samples and will verify that the chain of custody form matches the samples received. The laboratory will notify as soon as possible the Aspect project manager of any issues noted with the sample shipment or custody.

5.2 Field Documentation

While conducting field work, the field representative will document pertinent observations and events on field forms specific to each activity (e.g., boring log form, as-built well completion form, well development form, groundwater sampling form, etc.) and/or in a field notebook, and, when warranted, provide photographic documentation of specific sampling efforts. Field notes will include a description of the field activity, sample descriptions, and associated details such as the date, time, and field conditions.

6 Hydrogeologic Data Collection

6.1 Groundwater and NAPL Level Monitoring

Depth-to-groundwater measurements will be conducted in the wells using an electric well sounder, graduated to 0.01 foot. Where there is potential for light or dense non-aqueous phase liquid (NAPL), an oil-water interface probe will be used to measure water levels and evaluate the presence of free-phase product – either floating or at the bottom of the well.

6.2 Tidal Study Instrumentation

Each well to be monitored in the tidal study will be equipped with a downhole pressure transducer/data logger to allow automated collection of water level data at 5-minute intervals. A data logger will also be placed in the East Waterway to directly record tidal fluctuations. A barometric pressure data logger will also be installed on site to allow water level data to be corrected for changes in atmospheric pressure throughout the study. Data loggers will be suspended securely to avoid movement during the test, and will be set to measure synchronously at the same time (within a minute).

During installation of the data loggers, a manual depth-to-water measurement will be collected in each well approximately when the data logger takes its first reading, and again at the end of the test prior to removing the logger. The depth-to-water measurements (below surveyed top of well casing) provide groundwater elevations which will be used to convert the data logger readings into groundwater elevations.

7 Exploration Surveying

Horizontal coordinates for each soil sampling location will be recorded using hand-held GPS with real-time differential correction. The horizontal coordinates and elevations of monitoring wells included in the assessment will be surveyed by a licensed surveyor relative to a common horizontal and vertical datum. Monitoring well top-of-casing elevations will be surveyed to the nearest 0.01 foot, and horizontal coordinates to the nearest 0.1 foot, or better. Each well will be surveyed at the marked spot on the top of the PVC well casing from which depth-to-water measurements are collected.

8 Decontamination and Investigative-Derived Waste Management

All non-disposable sampling equipment (stainless steel spoons and bowls) will be decontaminated before collection of each sample. The decontamination sequence consists of a scrub with a detergent (Alconox) solution, followed by tap water (potable) rinse, and finished with thorough spraying with deionized or distilled water.

Investigation-derived waste (IDW) water generated during equipment decontamination and monitoring well development and sampling will be containerized and transferred to K-C’s on-site wastewater treatment plant for permitted treatment and discharge. If the treatment plant is not operating, the IDW water will be placed in labeled DOT-approved drums and disposed of appropriately at a permitted off-site disposal facility.

Soil cuttings from borings and disposable personal protective equipment (PPE) will be placed in labeled DOT-approved drums pending the analytical results to determine appropriate disposal. The drums will be temporarily consolidated in the on-site, profiled based on available analytical data, and disposed of appropriately at a permitted off-site disposal facility.

Documentation for off-site disposal of IDW will be maintained in the project file.

APPENDIX B

Quality Assurance Project Plan

1 Introduction

This Quality Assurance Project Plan (QAPP) identifies quality control (QC) procedures and criteria required to ensure that data collected in this assessment are of known quality and acceptable to achieve project objectives. Specific protocols and criteria are also set forth in this QAPP for data quality evaluation, upon the completion of data collection, to determine the level of completeness and usability of the data. It is the responsibility of the project personnel performing or overseeing the sampling and analysis activities to adhere to the requirements of the Sampling and Analysis Plan (SAP; Appendix A) and this QAPP.

1.1 Purpose of the QAPP

As stated in Ecology's Guidelines for Preparation of Quality Assurance Project Plans for Environmental Studies (Ecology Publication No. 04-03-030, July 2004), specific goals of this QAPP is to:

- Focus project manager and project team to factors affecting data quality during the planning stage of the project;
- Facilitate communication among field, laboratory, and management staff as the project progresses;
- Document the planning, implementation, and assessment procedures for QA/QC activities for the investigation;
- Ensure that the data quality objectives (DQOs) are achieved; and
- Provide a record of the project to facilitate final report preparation.

DQOs dictate sampling and analysis designs and sample collection procedures are presented in the Work Plan and SAP. The DQOs for the project include both qualitative and quantitative objectives, which define the appropriate type of data, and specify the tolerable levels of potential decision errors that will be used as a basis for establishing the quality and quantity of data needed to support the environmental assessment. To ensure that the DQOs are achieved, this QAPP details aspects of data collection including analytical methods, QA/QC procedures, and data quality reviews. This QAPP describes both quantitative and qualitative measures of data to ensure that the DQOs are achieved. DQOs dictate data collection rationale, sampling and analysis designs that are presented in Section 5 of the Work Plan, and sample collection procedures that are presented in the Sampling and Analysis Plan (SAP) which is Appendix A to this Work Plan.

2 Project Organization and Responsibilities

The project consultant team involved with data generation includes representatives from Aspect Consulting, LLC (Aspect), Pyron Environmental, Inc. (Pyron), and Friedman and Bruya Inc. (FBI). Key individuals and their roles on this project are as follows:

Aspect Project Manager – Steve Germiat, Aspect Consulting. The project manager is responsible for the successful completion of all aspects of this project, including day-to-day management, production of plans and reports, field operations oversight, liaison with Kimberly-Clark and regulatory agencies, and coordination with the project team members. The Aspect project manager is also responsible for resolution of non-conformance issues, is the lead author on project plans and reports, and will provide regular, up-to-date progress reports and other requested project information to Kimberly-Clark and Ecology.

Field Manager – Molly Ravits, Aspect Consulting. The Field Manager is responsible for implementing the sampling program outlined in this plan, including collecting samples that are representative of site conditions and ensuring that they are handled properly prior to transfer of custody to the project laboratory. The field manager will manage procurement of necessary field supplies, assure that all monitoring equipment is operational and calibrated in accordance with the specifications provided herein, and act as the Site Health and Safety Officer.

Data Quality Manager – Mingta Lin, Pyron Environmental. The Data Quality Manager is responsible for developing data quality objectives, selecting analytical methods, coordinating with the analytical laboratory, overseeing laboratory performance, and approving quality assurance/quality control (QA/QC) procedures. The data quality manager is also responsible for conducting QA validation of the analytical data reports received from the project laboratory.

Laboratory Project Manager – Mike Erdahl, Friedman and Bruya. The laboratory project manager is responsible for ensuring that all laboratory analytical work for soil and water media complies with project requirements, and acting as a liaison with the project manager, field manager, and data quality manager to fulfill project needs on the analytical laboratory work.

3 Analytical Methods and Reporting Limits

Analytical methodologies applied to the analyses of all project samples are in accordance with the following documents:

- USEPA SW Methods - *USEPA Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, SW-846, Third Edition, December 1996.
- *USEPA Method 1631, Revision E: Mercury in Water by Oxidation, Purge and Trap, and Cold Vapor Atomic Fluorescence Spectrometry,* Office of Water, U.S. Environmental Protection Agency, August 2002, EPA-821-R-02-019.

- *USEPA Methods for Chemical Analysis of Water and Wastes*, EPA-600/4-79-020, March 1983 and updates.
- *Standard Methods for the Examination of Water and Wastewater*, American Public Health Association, 20th Edition, 1995.
- Ecology (Washington State Department of). 1997. *Analytical Methods for Petroleum Hydrocarbons.* Publication No. ECY 97-602. June 1997.

Table B-1 lists the laboratory analytical methods for soil and groundwater analyses to be performed during this environmental characterization, along with samples containers, preservation, and analytical holding times for each analysis.

The analytical method detection limit (MDL) is the minimum concentration of a compound that can be measured and reported with a 99% confidence that the analyte concentration is greater than zero; MDLs are established by the laboratory using prepared samples, not samples of environmental media. The analytical reporting limit (RL) is defined as the lowest concentration at which a chemical can be accurately and reproducibly quantified, within specified limits of precision and accuracy, for a given environmental sample. The RL can vary from sample to sample depending on sample size, sample dilution, matrix interferences, moisture content, and other sample-specific conditions. Operationally, it is equivalent to the concentration of the lowest calibration standard (at a minimum) in the initial calibration curve. In accordance with MTCA, the RL is equivalent to a practical quantitation limit (PQL) which cannot be greater than 10 times the MDL. The laboratories analytical RLs and MDLs for the individual constituents identified above are summarized in Attachment B-1

3.1 Sample Preparation for Brackish Groundwater Samples

Saline groundwater may create analytical interferences for trace metals analyses. Additional sample preparation/analysis techniques, including reductive precipitation, hydrided atomic absorption spectrometry, and/or direct dilution, may be applied in cases of brackish water samples, as indicated by elevated specific electrical conductance of the samples. To assist the laboratory in identifying saline groundwater samples, the field-measured specific conductance for each groundwater sample will be recorded on the corresponding chain-of-custody document.

4 Data Quality Objectives

Data quality objectives (DQOs), including indicators for precision, accuracy, representativeness, comparability, and completeness (PARCC parameters), and data RLs are dictated by the data quality objectives, project requirements, and intended uses of the data. For this project, the analytical data must be of sufficient technical quality to determine whether contaminants are present and, if present, whether their concentrations are above or below applicable screening criteria based on protection of human health and the environment.

An assessment of data quality is based upon quantitative (precision, accuracy, and completeness) and qualitative (representativeness and comparability) data quality indicators. Definitions of these parameters and the applicable QC procedures are presented below.

4.1 Precision

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of a group of measurements compared with their average values. Analytical precision is measured through matrix spike/matrix spike duplicate (MS/MSD) samples and laboratory control samples/laboratory control sample duplicate (LCS/LCSD) for organic analysis and through laboratory duplicate samples for inorganic analyses.

Analytical precision is quantitatively expressed as the relative percent difference (RPD) between the LCS/LCSD, MS/MSD, or lab duplicate pairs and is calculated with the following formula:

$$RPD\ (\%) = 100 \times \frac{\left|S - D\right|}{\left(S + D\right)/2}$$

where:
S = analyte concentration in sample
D = analyte concentration in duplicate sample

Analytical precision measurements will be carried out at a minimum frequency of 1 per 20 samples or one per laboratory analysis group. Laboratory precision will be evaluated against laboratory quantitative RPD performance criteria provided with the lab’s analytical data report. If the control criteria are not met, the laboratory will supply a justification of why the limits were exceeded and implement the appropriate corrective actions. The RPD will be evaluated during data review and validation. The data reviewer will note deviations from the specified limits and will comment on the effect of the deviations on reported data.

4.2 Accuracy

Accuracy measures the closeness of the measured value to the true value. The accuracy of chemical test results is assessed by “spiking” samples with known standards (surrogates, blank spikes, or matrix spikes) and establishing the average recovery. Accuracy is quantified as the percent recovery (%R). The closer the %R is to 100%, the more accurate the data.

Surrogate recovery will be calculated as follows:

$$\text{Recovery}\ (\%) = \frac{MC}{SC} \times 100$$

where:

SC = spiked concentration
MC = measured concentration

MS percent recovery will be calculated as follows:

$$\text{Recovery (\%)} = \frac{MC - USC}{SC} \times 100$$

where:

SC = spiked concentration
MC = measured concentration
USC = unspiked sample concentration

Accuracy measurements on MS samples will be carried out at a minimum frequency of one in 20 samples per matrix analyzed. Blank spikes will also be analyzed at a minimum frequency of one in 20 samples per matrix analyzed. Surrogate recoveries for organic compounds will be determined for each sample analyzed for respective compounds. Laboratory accuracy will be evaluated against the lab's quantitative matrix spike and surrogate spike recovery performance criteria as provided with the lab's analytical data report. If the control criteria are not met, the laboratory will supply a justification of why the limits were exceeded and implement the appropriate corrective actions. Percent recoveries will be evaluated during data review and validation, and the data reviewer will comment on the effect of the deviations on the reported data.

4.3 Representativeness

Representativeness measures how closely the measured results reflect the actual concentration or distribution of the chemical compounds in the matrix sampled. The Work Plan sampling plan design, sampling techniques, and sample handling protocols (e.g., homogenizing, storage, preservation, and use of duplicates and blanks) have been developed to ensure representative samples. Site sampling locations for this investigation are placed using a biased approach to maximize the likelihood of locating and identifying site contamination; however, samples are also placed in generally random locations to assess presence of contamination in areas outside of known historical operations. The rationale for sample locations is provided in the Section 5 of the Work Plan, and field sampling procedures are described in the SAP included as Appendix A of the Work Plan.

4.4 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. This goal will be achieved through the use of standard techniques to collect samples, USEPA-approved standard methods to analyze samples, and consistent units to report analytical results. Data comparability also depends on data quality. Data of unknown quality cannot be compared.

4.5 Completeness

Completeness is defined as the percentage of measurements made that are judged to be valid. Results will be considered valid if the precision, accuracy, and representativeness objectives are met and if RLs are sufficient for the intended uses of the data. Completeness is calculated as follows:

$$Completeness\ (\%) = \frac{V}{P} \times 100$$

where:

V = number of valid measurements
P = number of measurements taken

Valid and invalid data (i.e., data qualified with the R flag [rejected]) will be identified during data validation. The target completeness goal for this project is 95 percent.

5 Quality Control Procedures

Field and laboratory QC procedures are outlined below.

5.1 Field Quality Control

Beyond use of standard sampling protocols defined in the SAP, field QC procedures include maintaining the field instrumentation used. Field instruments (e.g., PID for evaluating presence of VOCs in soil samples, and the YSI meter for measuring field parameters during groundwater sampling) are maintained and calibrated regularly in accordance with manufacturer recommendations prior to use.

In addition, field QC is accomplished through the analysis of controlled samples that are introduced to the laboratory from the field. Field duplicates and trip blanks will be collected and submitted for analysis as described below.

Field Duplicates

Field duplicate samples are used to check for sampling and analysis reproducibility; however, the field duplicate sample results included variability introduced during both field sampling and laboratory preparation and analysis, and EPA data validation guidance provides no RPD control limits for field duplicate samples. **Field duplicate samples will be collected at a frequency of 5 percent (1 per 20 samples) of the field samples for each matrix and analytical method.** Field duplicate samples will include a “D” in the sample ID.

Trip Blank

Trip blank samples will be used to monitor possible VOC cross contamination occurring during sample transport. Trip blank samples are prepared and supplied by the laboratory using organic-free reagent-grade water into a VOC vial prior to the collection of field samples. The trip blank sample vials are placed with and accompany the VOC samples through the entire transporting process. Trip blank samples will be prepared and analyzed for the full suite of VOCs. **One trip blank will be collected for each soil sampling round and each groundwater sampling round where VOC analysis is conducted.**

Equipment Rinsate Blank

Equipment rinsate blanks are collected to determine the potential of cross-contamination introduced by soil sampling equipment that is used between samples. Groundwater sampling is conducted using dedicated equipment, so rinsate blanks are not needed for groundwater sampling QC. The deionized water used for soil sampling equipment decontamination is rinsed through the decontaminated sampling equipment and collected into adequate sample containers for analysis of VOCs, low-level PAHs, and priority pollutant metals. The blank is then processed, analyzed, and reported as a regular field sample. **One rinsate blank will be conducted for each round of soil sampling.** The rinsate blank sampled will be labeled with a “RB-“ prefix and the date it is collected (e.g., RB-5-29-12).

5.2 Laboratory Quality Control

The laboratories’ analytical procedures must meet requirements specified in the respective analytical methods or approved laboratory standard operating procedures (SOPs), e.g., instrument performance check, initial calibration, calibration check, blanks, surrogate spikes, internal standards, and/or labeled compound spikes. The laboratory QC procedures used for this project will consist of the following at a minimum:

- Instrument calibration and standards as defined in the laboratory standard operating procedures (SOPs);
- Laboratory method blank measurements at a minimum frequency of 5% or one per 20 samples; and
- Accuracy and precision measurements as defined above, at a minimum frequency of 5% or one per 20 samples per matrix.

The laboratory’s QA officers are responsible for ensuring that the laboratory implements the internal QC and QA procedures detailed in Friedman and Bruya’s Quality Assurance Manual.

6 Corrective Actions

If routine QC audits by the laboratory result in detection of unacceptable conditions or data, actions specified in the laboratory standard operating procedures (SOPs) will be taken. Specific corrective actions are outlined in each SOP used and can include the following:

- Identifying the source of the violation;
- Reanalyzing samples if holding time criteria permit;
- Resampling and analyzing;
- Evaluating and amending sampling and analytical procedures; and/or
- Accepting but qualifying data to indicate the level of uncertainty.

If unacceptable conditions occur, the laboratory will contact Aspect’s project manager to discuss the issues and determine the appropriate corrective action. Corrective actions taken by the laboratory during analysis of samples for this project will be documented by the laboratory in the case narrative associated with the affected samples.

In addition, the project data quality manager will review the laboratory data generated for this investigation to ensure that project DQOs are met. If the review indicates that non-conformances in the data have resulted from field sampling or documentation procedures or laboratory analytical or documentation procedures, the impact of those non-conformances on the overall project data usability will be assessed. Appropriate actions, including re-sampling and/or re-analysis of samples may be recommended to the project manager to achieve project objectives.

7 Data Reduction, Quality Review, and Reporting

All data will undergo a QA/QC evaluation at the laboratory which will then be reviewed by the Aspect database manager. Initial data reduction, evaluation, and reporting at the laboratory will be carried out as described in the appropriate analytical protocols. Quality control data resulting from methods and procedures described in this document will also be reported.

7.1 Minimum Data Reporting Requirements

The following sections describe the minimum data reporting requirements necessary to allow proper data quality review (as described in Section 7.2) and analytical data documentation.

Sample Receipt. Cooler receipt forms will be filled out for all sample shipments to document problems in sample packaging, chain of custody, and sample preservation.

Reporting. For each analytical method run, analytes for each sample will be reported as a detected concentration or as less than the specific RL. Solid data will be reported on a dry weight basis except that from gas chromatograph-mass spectrometry (GC-MS) methods (EPA Method 8260 and EPA Method 8270). The laboratories will report dilution factors for each sample as well as date of extraction (if applicable), date of analysis, extraction method, any cleanup methods performed, and confirmation results where required. The laboratory will also report any corrective actions taken if unacceptable conditions or data are detected.

Internal Quality Control Reporting. Internal quality control samples will be analyzed at the rates specified in the applicable analytical method.

- **Laboratory Method Blanks**. Analytes will be reported for each laboratory blank. Non-blank sample results shall be designated as corresponding to a particular laboratory blank in terms of analytical batch processing.
- **Surrogate Spike Samples**. Surrogate spike recoveries will be reported with organic reports where appropriate. The report shall also specify the control limits for surrogate spike results as well as the spiking concentration. Spike recoveries outside of specified control limits (as defined in the laboratory SOP) will result in the sample being rerun.
- **Laboratory Duplicate and/or Matrix Spike Duplicate Pairs**. Relative percent differences will be reported for duplicate pairs relative to analyte/matrix-specific control limits defined in the laboratory SOP.
- **Laboratory Control Samples (LCS**). LCS recoveries will be reported for organic analyses. LCS results and control limits will be reported with the corresponding sample data.

7.2 Data Quality Review

Reported analytical results will be qualified by the laboratory to identify QC concerns in accordance with the specifications of the analytical methods. Additional laboratory data qualifiers may be defined and reported by the laboratory to more completely explain QC concerns regarding a particular sample result. All data qualifiers will be defined in the laboratory’s narrative reports associated with each case.

The project data quality manager will conduct an independent data quality review for the analytical data generated for this project. A Stage III data quality review will be performed in accordance with EPA National Functional Guidelines for dioxins/furans, organics, and inorganic analyses (EPA 2011, 2008, and 2012, respectively), and laboratory-defined QC limits, with regard to the following, as appropriate to the particular analysis:

- Sample preservation, receipt, and custody documentation;
- Sample preparation and analytical methods;
- Holding times;
- Instrument tuning and calibration

- Method blanks (representativeness);
- Reporting limits;
- Ion ratios and labeled compound recovery (dioxins/furans only)
- Internal standard, blank spike, matrix spike, and surrogate percent recoveries (accuracy);
- Laboratory duplicate pair RPDs (precision);
- Field QC sample results;
- Comparability; and
- Completeness.

Data qualifiers that may be applied to analytical data based on data quality review are as follows:

- U - The analyte was analyzed for but was determined to be non-detect above the reported sample quantitation limit, or the quantitation limit was raised to the concentration found in the sample due to blank contamination.
- J - 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 above the reported quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
- R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified.

One hundred percent of the laboratory data will be reviewed for compliance with the pre-established project goals and limits defined by the analytical methods (if applicable) and the QC criteria established in this QAPP. A Data Review Report will be prepared for each sample delivery group (SDG) to discuss and present findings of the review.

8 Preventative Maintenance Procedures and Schedules

Preventative maintenance in the laboratory will be the responsibility of the laboratory personnel and analysts. This maintenance includes routine care and cleaning of instruments, and inspection and monitoring of carrier gases, solvents, and glassware used in analyses. Details of the maintenance procedures are addressed in the respective laboratory SOPs.

Precision and accuracy data are examined for trends and excursions beyond control limits to determine evidence of instrument malfunction. Maintenance will be performed when an instrument begins to change as indicated by the degradation of peak resolution, shift in calibration curves, decrease in sensitivity, or failure to meet one or another of the method-specific QC criteria.

Maintenance and calibration of instruments used in the field for sampling (e.g., PID for evaluating presence of VOCs in soil samples, and the YSI meter for measuring field parameters during groundwater sampling) will be conducted regularly in accordance with manufacturer recommendations prior to use.

9 Performance and System Audits

The Aspect project manager has responsibility for reviewing the performance of the laboratory QA program. This will be achieved through regular contact with the analytical laboratory's project manager. To ensure comparable data, all samples of a given matrix to be analyzed by each specified analytical method will be processed consistently by the same analytical laboratory.

10 Data and Records Management

Records will be maintained documenting all activities and data related to field sampling and chemical analyses.

10.1 Field Documentation

The Aspect project manager will ensure that the field team receives the final approved version of this QAPP, the site health and safety plan, and the SAP prior to the initiation of field activities. Field records that will be maintained are discussed in Appendix A, Sampling and Analysis Plan, of the Work Plan, and include:

- Daily Report forms.
- Boring and well completion logs.
- Field data and sample collection information forms.
- Sample tracking/chain of custody forms.
- Photo documentation (as necessary).

Field documents will be maintained in the project file.

10.2 Analytical Data Management

Raw data received from the analytical laboratory will be reviewed, entered into a computerized database, and verified for consistency and correctness. The database will be updated based on data review and independent validation if necessary.

The following field data will be included in the database:

- Sample location coordinates.
- Sample type (i.e., groundwater or soil).
- Soil or groundwater sampling depth interval.
- Sampler's name.

Data may be submitted to Ecology's Environmental Information Management database once all data have been reviewed and validated.

11 References for Appendix B

USEPA, 2008, Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, Office of Superfund Remediation and Technical Innovation, U.S. Environmental Protection Agency, June 2008, USEPA-540-R-08-01.

USEPA, 2010, Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review, Office of Superfund Remediation and Technical Innovation, U.S. Environmental Protection Agency, January 2010, USEPA 540/R-10/011.

USEPA, 2011, Contract Laboratory Program National Functional Guidelines for Chlorinated Dibenzo-p-Dioxins (CDDs) and Chlorinated Dibenzofurans (CDFs) Data Review, Office of Superfund Remediation and Technical Innovation, U.S. Environmental Protection Agency, September 2011, USEPA 540/R-11/016.

Table B-1 - Analytical Methods, Sample Containers, Preservation, and Holding Times

Sample Matrix	Analytical Parameter	Analytical Method	Sample Container	No. Containers	Preservation Requirements	Holding Time
Soil	Gasoline Range TPH	NWTPH-Gx	Method 5035A, 40-ml vials	4	4°C ±2°C, Freeze within 48 hours to <-7°C	14 days
	Diesel & Motor Oil Range TPH	NWTPH-Dx/SW846 Method 3630 (Silica Gel Cleanup)	4 ounce jar	1	4°C ±2°C	14 days for extraction; 40 days for analysis
	VOCs	Method 8260C	Method 5035A, 40-ml vials	4	4°C ±2°C, Freeze within 48 hours to <-7°C	14 days
	Low-level PAHs	Method 8270D-SIM	4 ounce jar	1	4°C ±2°C	14 days for extraction; 40 days for analysis
	Total Metals other than Hg	Method 200.8	4 ounce jar	1	4°C ±2°C	6 months
	Total Mercury	Method 1631E	4 ounce jar	1	4°C ±2°C	28 days
	SVOCs	Method 8270D	4 ounce jar	1	4°C ±2°C	14 days for extraction; 40 days for analysis
	PCBs	Method 8082A	4 ounce jar	1	4°C ±2°C	NA
	Total Organic Carbon	ASTM D4129-05 Single Replicate	4 ounce jar	1	4°C ±2°C	14 days
	pH	Method 9045C	4 ounce jar	1	4°C ±2°C	28 days
	Dioxins/Furans	Method 8290	4 ounce jar	1	4°C ±2°C, Freeze within 14 days to <-7°C	1 year for extraction, 40 days for analysis
Ground water	Gasoline Range TPH	Method NWTPH-Gx	40-mL VOA Vials	3	4°C ±2°C, HCl pH < 2	14 days
	Diesel & Motor Oil Range TPH	NWTPH-Dx/SW846 Method 3630 (Silica Gel Cleanup)	500-mL Amber Glass	1	4°C ±2°C	7 days for extraction, 40 days for analysis
	VOCs	Method 8260C	40-mL VOA Vials	4	4°C ±2°C, 2 with HCl pH < 2, 2 without HCl	14 days for analysis
	Low-level PAHs	Method 8270D-SIM	1-L Amber Glass	1	4°C ±2°C	7 days for extraction, 40 days for analysis
	SVOCs	Method 8270D	1-L Amber Glass	1	4°C ±2°C	7 days for extraction, 40 days for analysis
	Dissolved Metals other than Hg	Method 200.8 (non-brackish),	500-mL HDPE	5 (for potential brackish water)	4°C ±2°C, HNO3 pH < 2 (after filtration)	180 days
	Dissolved Mercury	Method 1631 (non-brackish)	500-mL HDPE	5 (for potential brackish water)	4°C ±2°C, HNO3 pH < 2 (after filtration)	28 days
	Total Metals other than Hg	Method 200.8 (non-brackish)	500-mL HDPE	5 (for potential brackish water)	4°C ±2°C, HNO3 pH < 2	180 days
	Total Mercury	Method 1631 (non-brackish)	500-mL HDPE	5 (for potential brackish water)	4°C ±2°C, HNO3 pH < 2	28 days
	Dissolved Metals other than Hg (Brackish)	200.7/ 7742 (Se)	500-mL HDPE	4	4°C ±2°C, HNO3 pH < 2 (after filtration)	180 days
	Dissolved Mercury (Brackish)	7740A	500-mL HDPE	4	4°C ±2°C, HNO3 pH < 2 (after filtration)	28 days
	Total Metals other than Hg (Brackish)	200.7/ 7742 (Se)	500-mL HDPE	4	4°C ±2°C, HNO3 pH < 2	180 days
	Total Mercury (Brackish)	7740A	500-mL HDPE	4	4°C ±2°C, HNO3 pH < 2	28 days
	Ammonia	Method 350.1	500-mL HDPE	1	4°C ±2°C, H2SO4 pH < 2	28 days
	Dissolved Sulfide	Method 376.2	500-mL HDPE	1	4°C ±2°C, Zinc Acetate and NaOH pH > 9 (after filtration)	7 days
	Formaldehyde	Method 8315A	1 Liter Amber	1	4°C ±2°C	3 days
	TSS	SM2540D	500-mL HDPE	1	4°C ±2°	7 days
	TDS	SM2540C	500-mL HDPE	1	4°C ±2°	7 days

Attachment B-1

Analytical Method Detection Limits and Reporting Limits

NWTPH-Dx Analysis

MDL Results GC1 SUMMARY

SOIL mg/kg

2 grams of soil extracted into 10 mL solvent no concentration

	(StdDev*3.14)	(2*MDL)	(5*MDL)	**Std**		**Spike**	**%**	**Date**	**Reporting**
Analyte	**MDL**	**PQL**	**PQL**	**Dev**	**Mean**	**Level**	**Rec.**	**Calculated**	**Limit**
Diesel	4.13	8.3	20.6	1.31	12.7	25	51	01/27/12	50
Diesel extended	5.47	10.9	27.4	1.74	15.1	25	60	01/27/12	50
Motor Oil	13.0	26.1	65.2	4.15	125.3	125	100	02/02/12	250
Heavy Oil	12.0	24.0	60.0	3.82	123.6	125	99	02/02/12	250
Stoddard solvent	1.42	2.8	7.1	0.45	16.9	25	68	02/02/12	50

WATER	ug/L								
	(StdDev*3.14)	**(2*MDL)**	**(5*MDL)**	**Std**		**Spike**	**%**	**Date**	**Reporting**
Analyte	**MDL**	**PQL**	**PQL**	**Dev**	**Mean**	**Level**	**Rec.**	**Calculated**	**Limit**
Diesel	8.80	17.59	43.98	2.80	14.53	25.0	58	01/27/12	50
Diesel extended	9.77	19.54	48.86	3.11	18.5	25.0	74	01/27/12	250
Motor Oil	22.82	45.64	114.09	7.27	112.9	100.0	113	02/02/12	250
Heavy Oil	20.00	40.00	100.00	6.37	108.7	100	109	02/02/12	250
Stoddard solvent	1.975	3.950	9.876	0.6291	18.029	25.0	72	02/02/12	50

NWTPH-Gx/8021 Analysis
MDL Data and Calculations

SOIL **mg/kg**

Analyte	MDL	(2*MDL) PQL	(5*MDL) PQL	Std Dev	Mean	Spike Level	% Rec.
Benzene	0.00094	0.00189	0.00472	0.00030	0.007	0.01	68
Toluene	0.00044	0.00089	0.00222	0.00014	0.011	0.01	105
Ethylbenzene	0.00041	0.00082	0.00206	0.00013	0.010	0.01	97
Total Xylenes	0.00139	0.00278	0.00695	0.00044	0.031	0.03	102
MTBE	0.00372	0.00743	0.01858	0.00118	0.006	0.01	65
NW Gas	0.24168	0.48336	1.20840	0.07697	0.617	0.5	123
8015 Gas	0.22350	0.44699	1.11749	0.07118	0.588	0.5	118

WATER **ug/L**

Analyte	MDL	(2*MDL) PQL	(5*MDL) PQL	Std Dev	Mean	Spike Level	% Rec.
Benzene	0.0258	0.0516	0.1290	0.0082	0.527	0.5	105
Toluene	0.0153	0.0305	0.0763	0.0049	0.532	0.5	106
Ethylbenzene	0.0113	0.0226	0.0566	0.0036	0.505	0.5	101
Total Xylenes	0.0650	0.1300	0.3249	0.0207	1.553	1.5	104
MTBE	0.0979	0.1958	0.4896	0.0312	0.812	0.5	162
NW Gas	11.1189	22.2378	55.5945	3.5411	52.929	50.0	106
8015 Gas	8.6406	17.2813	43.2032	2.7518	52.329	50.0	105

EPA Method 8260

MDL Data and Calculations

Analysis:	8260	Standard(s) spiked:	1 ppm 8260 cal std 34-194b; 50 ppm 8260 cal std 34-194a
Matrix:	**Water**	Volume spiked:	21.5 uL (above); 43 uL (above); 4.3 uL (above)
Instrument ID:	GCMS #4	Date(s) Extracted:	4/27/2011, 05/03/11(0.5)
Reporting Units:	ug/L	Date(s) Analyzed:	4/27/2011, 05/03/11 (0.5)
		Date Calculated:	5/2/2011, 05/05/11
		Calculation Analyst:	YA

	(StdDev*3.14)	(2*MDL)	(5*MDL)	**Std**		**Spike**	**%**
Analyte	**MDL**	**PQL**	**PQL**	**Dev**	**Mean**	**Level**	**Rec.**
Ethanol	62.4	125	312	19.9	292.456	250.0	117
Dichlorodifluoromethane	0.385	0.770	1.924	0.1225	1.363	1.0	136
Chloromethane	0.157	0.313	0.783	0.0499	1.041	1.0	104
Vinyl chloride	0.071	0.143	0.356	0.0227	0.453	0.5	91
Bromomethane	0.851	1.702	4.254	0.2710	1.339	1.0	134
Chloroethane	0.222	0.444	1.109	0.0706	1.100	1.0	110
Trichlorofluoromethane	0.186	0.372	0.930	0.0592	0.993	1.0	99
2-Propanol	2.1	4.2	10.5	0.67	26.073	25.0	104
Acetone	1.096	2.192	5.480	0.349	6.737	5.0	135
1,1-Dichloroethene	0.183	0.366	0.916	0.0583	1.161	1.0	116
Hexane	0.194	0.388	0.970	0.0618	1.150	1.0	115
Methylene chloride	0.945	1.89	4.73	0.301	2.680	5.0	54
t-Butyl alcohol (TBA)	2.90	5.81	14.5	0.92	51.193	50.0	102
Methyl t-butyl ether (MTBE	0.244	0.487	1.219	0.0776	1.101	1.0	110
trans-1,2-Dichloroethene	0.402	0.804	2.009	0.1280	1.156	1.0	116
Diisopropyl ether (DIPE)	0.262	0.525	1.312	0.0836	1.128	1.0	113
1,1-Dichloroethane	0.123	0.246	0.616	0.0392	1.051	1.0	105
Ethyl t-butyl ether (ETBE)	0.151	0.302	0.755	0.0481	1.079	1.0	108
2,2-Dichloropropane	0.471	0.943	2.357	0.1502	1.178	1.0	118
cis-1,2-Dichloroethene	0.190	0.379	0.949	0.0604	1.115	1.0	112
Chloroform	0.084	0.167	0.418	0.0266	1.086	1.0	109
2-Butanone (MEK)	1.171	2.342	5.856	0.3730	5.100	5.0	102
t-Amyl methyl ether (TAME)	0.110	0.219	0.548	0.0349	1.073	1.0	107
1,2-Dichloroethane (EDC)	0.108	0.215	0.538	0.0343	1.119	1.0	112
1,1,1-Trichloroethane	0.116	0.232	0.580	0.0370	1.039	1.0	104
1,1-Dichloropropene	0.080	0.159	0.398	0.0253	1.143	1.0	114
Carbon Tetrachloride	0.148	0.296	0.741	0.0472	1.114	1.0	111
Benzene	0.080	0.160	0.401	0.0256	0.510	0.5	102
Trichloroethene	0.116	0.232	0.580	0.0369	1.097	1.0	110
1,2-Dichloropropane	0.130	0.260	0.65	0.0415	1.132	1.0	113
Bromodichloromethane	0.096	0.192	0.48	0.0305	1.027	1.0	103

EPA Method 8260

MDL Data and Calculations

Analyte	(StdDev*3.14) MDL	(2*MDL) PQL	(5*MDL) PQL	Std Dev	Mean	Spike Level	% Rec.
Dibromomethane	0.155	0.310	0.775	0.0494	0.941	1.0	94
4-Methyl-2-pentanone	0.293	0.586	1.46	0.0933	5.144	5.0	103
cis-1,3-Dichloropropene	0.133	0.267	0.666	0.0424	1.034	1.0	103
Toluene	0.070	0.141	0.351	0.0224	1.120	1.0	112
trans-1,3-Dichloropropene	0.114	0.228	0.57	0.0363	1.014	1.0	101
1,1,2-Trichloroethane	0.113	0.226	0.57	0.0360	1.129	1.0	113
2-Hexanone	0.332	0.664	1.66	0.1057	5.026	5.0	101
1,3-Dichloropropane	0.060	0.120	0.30	0.0192	1.101	1.0	110
Tetrachloroethene	0.115	0.231	0.577	0.0367	1.110	1.0	111
Dibromochloromethane	0.058	0.115	0.29	0.0183	1.084	1.0	108
1,2-Dibromoethane (EDB)	0.156	0.311	0.78	0.0496	1.101	1.0	110
Chlorobenzene	0.054	0.107	0.27	0.0171	1.108	1.0	111
Ethylbenzene	0.039	0.078	0.196	0.0125	1.129	1.0	113
1,1,1,2-Tetrachloroethane	0.128	0.255	0.64	0.0406	1.082	1.0	108
m,p-Xylene	0.127	0.253	0.63	0.0403	2.217	2.0	111
o-Xylene	0.067	0.134	0.34	0.0214	1.102	1.0	110
Styrene	0.063	0.127	0.32	0.0202	1.090	1.0	109
Isopropylbenzene	0.042	0.085	0.21	0.0135	1.098	1.0	110
Bromoform	0.091	0.182	0.45	0.0289	1.016	1.0	102
n-Propylbenzene	0.066	0.132	0.329	0.0210	1.164	1.0	116
Bromobenzene	0.041	0.082	0.20	0.0130	1.158	1.0	116
1,3,5-Trimethylbenzene	0.094	0.188	0.47	0.0299	1.084	1.0	108
1,1,2,2-Tetrachloroethane	0.114	0.228	0.57	0.0363	1.078	1.0	108
1,2,3-Trichloropropane	0.131	0.262	0.66	0.0418	1.112	1.0	111
2-Chlorotoluene	0.082	0.165	0.41	0.0262	1.132	1.0	113
4-Chlorotoluene	0.065	0.130	0.32	0.0206	1.108	1.0	111
tert-Butylbenzene	0.097	0.195	0.49	0.0310	1.110	1.0	111
1,2,4-Trimethylbenzene	0.081	0.162	0.40	0.0257	1.073	1.0	107
sec-Butylbenzene	0.052	0.104	0.26	0.0165	1.096	1.0	110
p-Isopropyltoluene	0.048	0.095	0.24	0.0152	1.090	1.0	109
1,3-Dichlorobenzene	0.102	0.204	0.51	0.0325	1.109	1.0	111
1,4-Dichlorobenzene	0.091	0.182	0.46	0.0290	1.121	1.0	112
1,2-Dichlorobenzene	0.078	0.156	0.39	0.0249	1.097	1.0	110
1,2-Dibromo-3-chloropropane	0.549	1.097	2.74	0.1747	1.089	1.0	109
1,2,4-Trichlorobenzene	0.180	0.360	0.899	0.0573	0.896	1.0	90
Hexachlorobutadiene	0.181	0.362	0.90	0.0576	1.142	1.0	114
Naphthalene	0.196	0.392	0.98	0.0625	0.910	1.0	91
1,2,3-Trichlorobenzene	0.251	0.502	1.25	0.0799	0.972	1.0	97
2-Chloroethyl vinyl ether	0.069	0.137	0.34	0.0219	1.117	1.0	112

EPA Method 8260
MDL Data and Calculations

MDL Data and Calculations

Analysis: 8260
Matrix: **Soil**
Instrument ID: GCMS #4
Reporting Units: mg/kg

Analyst fill in all below (attach extraction worksheet(s))

Standard(s) spiked: 50/250/2500 ug/mL 8260 Cal std 35-133a
Volume spiked: 8.6uL (above); 43uL (above)
Date(s) Extracted: 05/17/11, 05/18/11
Date(s) Analyzed: 05/17/11, 05/18/11
Date Calculated: 05/17/11, 05/18/11
Calculation Analyst: JS

	(StdDev*3.14)	(2*MDL)	(5*MDL)	Std		Spike	%
Analyte	**MDL**	**PQL**	**PQL**	**Dev**	**Mean**	**Level**	**Rec.**
Ethanol	3.343872	6.687744	16.71936	1.064927	12.58541	12.5	100.6833
Dichlorodifluoromethane	0.009416	0.018833	0.047082	0.002999	0.029764	0.05	59.52857
Chloromethane	0.00615	0.012301	0.030752	0.001959	0.043779	0.05	87.55714
Vinyl chloride	0.006422	0.012843	0.032108	0.002045	0.020829	0.025	83.31429
Bromomethane	0.023008	0.046016	0.11504	0.007327	0.053807	0.05	107.6143
Chloroethane	0.012675	0.025351	0.063377	0.004037	0.030607	0.05	61.21429
Trichlorofluoromethane	0.004604	0.009208	0.023021	0.001466	0.02225	0.05	44.5
Acetone	0.067854	0.135709	0.339272	0.02161	0.27435	0.25	109.74
1,1-Dichloroethene	0.012881	0.025762	0.064406	0.004102	0.054764	0.05	109.5286
Hexane	0.012795	0.025591	0.063977	0.004075	0.056164	0.05	112.3286
Methylene chloride	0.052764	0.105528	0.26382	0.016804	0.264571	0.25	105.8286
t-Butyl alcohol (TBA)	0.182336	0.364672	0.91168	0.058069	2.315929	2.5	92.63714
Methyl t-butyl ether (MTBE	0.002824	0.005647	0.014119	0.000899	0.025107	0.025	100.4286
trans-1,2-Dichloroethene	0.005015	0.010029	0.025073	0.001597	0.026657	0.025	106.6286
Diisopropyl ether (DIPE)	0.005611	0.011223	0.028057	0.001787	0.024043	0.025	96.17143
1,1-Dichloroethane	0.011745	0.02349	0.058725	0.00374	0.0445	0.05	89
Ethyl t-butyl ether (ETBE)	0.003813	0.007626	0.019065	0.001214	0.024107	0.025	96.42857
2,2-Dichloropropane	0.013395	0.026789	0.066973	0.004266	0.053057	0.05	106.1143
cis-1,2-Dichloroethene	0.006004	0.012008	0.03002	0.001912	0.045643	0.05	91.28571
Chloroform	0.003685	0.007369	0.018423	0.001173	0.045693	0.05	91.38571
2-Butanone (MEK)	0.039347	0.078694	0.196735	0.012531	0.236086	0.25	94.43429
t-Amyl methyl ether (TAME)	0.004828	0.009656	0.024139	0.001538	0.023264	0.025	93.05714
1,2-Dichloroethane (EDC)	0.004872	0.009743	0.024358	0.001551	0.023543	0.025	94.17143
1,1,1-Trichloroethane	0.005103	0.010206	0.025515	0.001625	0.022607	0.025	90.42857
1,1-Dichloropropene	0.001791	0.003582	0.008955	0.00057	0.023543	0.025	94.17143
Carbon Tetrachloride	0.005076	0.010153	0.025382	0.001617	0.022707	0.025	90.82857
Benzene	0.001097	0.002194	0.005484	0.000349	0.023307	0.025	93.22857
Trichloroethene	0.006286	0.012573	0.031432	0.002002	0.024564	0.025	98.25714
1,2-Dichloropropane	0.005515	0.01103	0.027575	0.001756	0.023314	0.025	93.25714

EPA Method 8260

MDL Data and Calculations

	(StdDev*3.14)	(2*MDL)	(5*MDL)	Std		Spike	%
Analyte	**MDL**	**PQL**	**PQL**	**Dev**	**Mean**	**Level**	**Rec.**
Bromodichloromethane	0.003593	0.007185	0.017963	0.001144	0.021971	0.025	87.88571
Dibromomethane	0.004	0.008001	0.020002	0.001274	0.023836	0.025	95.34286
4-Methyl-2-pentanone	0.022774	0.045548	0.113869	0.007253	0.236221	0.25	94.48857
cis-1,3-Dichloropropene	0.001796	0.003591	0.008978	0.000572	0.022457	0.025	89.82857
Toluene	0.00209	0.004181	0.010452	0.000666	0.026179	0.025	104.7143
trans-1,3-Dichloropropene	0.001931	0.003862	0.009655	0.000615	0.021829	0.025	87.31429
1,1,2-Trichloroethane	0.003102	0.006205	0.015512	0.000988	0.023757	0.025	95.02857
2-Hexanone	0.012187	0.024374	0.060935	0.003881	0.220686	0.25	88.27429
1,3-Dichloropropane	0.002087	0.004174	0.010434	0.000665	0.0229	0.025	91.6
Tetrachloroethene	0.00433	0.00866	0.02165	0.001379	0.024479	0.025	97.91429
Dibromochloromethane	0.003655	0.00731	0.018274	0.001164	0.020836	0.025	83.34286
1,2-Dibromoethane (EDB)	0.002497	0.004994	0.012485	0.000795	0.023429	0.025	93.71429
Chlorobenzene	0.002856	0.005713	0.014282	0.00091	0.0239	0.025	95.6
Ethylbenzene	0.003116	0.006232	0.015581	0.000992	0.023621	0.025	94.48571
1,1,1,2-Tetrachloroethane	0.003226	0.006453	0.016131	0.001027	0.022279	0.025	89.11429
m,p-Xylene	0.004449	0.008899	0.022247	0.001417	0.047943	0.05	95.88571
o-Xylene	0.002326	0.004653	0.011632	0.000741	0.023764	0.025	95.05714
Styrene	0.001811	0.003621	0.009053	0.000577	0.02285	0.025	91.4
Isopropylbenzene	0.001802	0.003605	0.009012	0.000574	0.024093	0.025	96.37143
Bromoform	0.004043	0.008085	0.020213	0.001287	0.02085	0.025	83.4
n-Propylbenzene	0.003459	0.006917	0.017293	0.001101	0.023429	0.025	93.71429
Bromobenzene	0.005618	0.011237	0.028092	0.001789	0.02365	0.025	94.6
1,3,5-Trimethylbenzene	0.00388	0.007759	0.019399	0.001236	0.02365	0.025	94.6
1,1,2,2-Tetrachloroethane	0.003177	0.006354	0.015885	0.001012	0.022007	0.025	88.02857
1,2,3-Trichloropropane	0.002674	0.005349	0.013371	0.000852	0.022357	0.025	89.42857
2-Chlorotoluene	0.003529	0.007058	0.017645	0.001124	0.023614	0.025	94.45714
4-Chlorotoluene	0.003502	0.007005	0.017511	0.001115	0.023621	0.025	94.48571
tert-Butylbenzene	0.00278	0.00556	0.013901	0.000885	0.024286	0.025	97.14286
1,2,4-Trimethylbenzene	0.001918	0.003836	0.00959	0.000611	0.024464	0.025	97.85714
sec-Butylbenzene	0.003348	0.006695	0.016738	0.001066	0.024621	0.025	98.48571
p-Isopropyltoluene	0.002512	0.005024	0.012559	0.0008	0.024779	0.025	99.11429
1,3-Dichlorobenzene	0.00502	0.01004	0.025099	0.001599	0.024729	0.025	98.91429
1,4-Dichlorobenzene	0.005105	0.01021	0.025525	0.001626	0.025271	0.025	101.0857
1,2-Dichlorobenzene	0.003215	0.00643	0.016074	0.001024	0.023671	0.025	94.68571
1,2-Dibromo-3-chloropropane	0.01213	0.024261	0.060652	0.003863	0.022171	0.025	88.68571
1,2,4-Trichlorobenzene	0.005535	0.01107	0.027676	0.001763	0.02345	0.025	93.8
Hexachlorobutadiene	0.009489	0.018979	0.047446	0.003022	0.025093	0.025	100.3714
Naphthalene	0.004059	0.008118	0.020296	0.001293	0.020757	0.025	83.02857
1,2,3-Trichlorobenzene	0.008228	0.016456	0.04114	0.00262	0.022021	0.025	88.08571

EPA Method 8270

MDL Data and Calculations

Analysis: 8270 BNAs
Matrix: **Water**
Instrument ID: GCMS #8
Reporting Units: ug/L

Standard(s) spiked: 20/100/200 ug/ml BNA mdl stock 34-172; 2000 ug/ml Benzoic Acid stock 31-169
Volume spiked: 50 uL (above); 40 uL (above)
Date(s) Extracted: 04/12/11
Date(s) Analyzed: 04/12/11
Date Calculated: 04/22/11
Calculation Analyst: YA

	(StdDev*3.14)	(2*MDL)	(5*MDL)	**Std**		**Spike**	**%**
Analyte	**MDL**	**PQL**	**PQL**	**Dev**	**Mean**	**Level**	**Rec.**
N-Nitrosodimethylamine	0.135	0.271	0.677	0.0431	0.613	1.0	61
Phenol	0.420	0.841	2.102	0.1339	2.137	5.0	43
Bis(2-chloroethyl) ether	0.198	0.397	0.992	0.0632	1.017	1.0	102
2-Chlorophenol	0.941	1.882	4.704	0.2996	4.819	5.0	96
1,3-Dichlorobenzene	0.182	0.364	0.910	0.0580	1.054	1.0	105
1,4-Dichlorobenzene	0.170	0.341	0.852	0.0543	1.059	1.0	106
1,2-Dichlorobenzene	0.217	0.435	1.087	0.0692	1.063	1.0	106
Benzyl alcohol	0.249	0.498	1.246	0.0793	0.704	1.0	70
Bis(2-chloroisopropyl) ether	0.257	0.514	1.284	0.0818	1.063	1.0	106
2-Methylphenol	0.787	1.574	3.936	0.2507	4.171	5.0	83
Hexachloroethane	0.217	0.433	1.083	0.0690	0.957	1.0	96
N-Nitroso-di-n-propylamine	0.296	0.591	1.478	0.0941	0.927	1.0	93
3-Methylphenol +4 -Methylphenol	1.603	3.205	8.013	0.5104	7.154	10.0	72
Nitrobenzene	0.225	0.450	1.124	0.0716	1.206	1.0	121
Isophorone	0.253	0.507	1.267	0.0807	0.959	1.0	96
2-Nitrophenol	1.223	2.446	6.114	0.3894	4.926	5.0	99
2,4-Dimethylphenol	0.560	1.120	2.800	0.1783	4.114	5.0	82
Benzoic acid	18.908	37.816	94.539	6.0216	25.164	90.0	28
Bis(2-chloroethoxy)methane	0.246	0.493	1.232	0.0785	1.074	1.0	107
2,4-Dichlorophenol	1.151	2.302	5.754	0.3665	4.903	5.0	98
1,2,4-Trichlorobenzene	0.183	0.366	0.915	0.0583	1.014	1.0	101
Naphthalene	0.168	0.336	0.841	0.0535	1.080	1.0	108
Hexachlorobutadiene	0.198	0.396	0.991	0.0631	1.079	1.0	108
4-Chloroaniline	0.092	0.185	0.462	0.0294	0.620	1.0	62
4-Chloro-3-methylphenol	1.229	2.458	6.146	0.3915	4.477	5.0	90
2-Methylnaphthalene	0.195	0.390	0.975	0.0621	0.997	1.0	100
Hexachlorocyclopentadiene	0.166	0.331	0.828	0.0527	0.599	1.0	60
2,4,6-Trichlorophenol	1.237	2.473	6.183	0.3938	4.734	5.0	95
2,4,5-Trichlorophenol	1.232	2.464	6.160	0.3924	4.474	5.0	89
2-Nitroaniline	0.354	0.707	1.768	0.1126	0.759	1.0	76

EPA Method 8270

MDL Data and Calculations

	(StdDev*3.14)	(2*MDL)	(5*MDL)	**Std**		**Spike**	**%**
Analyte	**MDL**	**PQL**	**PQL**	**Dev**	**Mean**	**Level**	**Rec.**
Dimethyl phthalate	0.265	0.530	1.325	0.0844	1.077	1.0	108
Acenaphthylene	0.259	0.517	1.293	0.0823	1.111	1.0	111
2,6-Dinitrotoluene	0.321	0.643	1.607	0.1024	0.821	1.0	82
3-Nitroaniline	0.192	0.385	0.962	0.0613	0.473	1.0	47
Acenaphthene	0.213	0.426	1.064	0.0678	1.114	1.0	111
2,4-Dinitrophenol	1.867	3.733	9.333	0.5944	1.892	5.0	38
Dibenzofuran	0.230	0.460	1.150	0.0732	1.106	1.0	111
2,4-Dinitrotoluene	0.365	0.731	1.826	0.1163	0.960	1.0	96
4-Nitrophenol	0.536	1.071	2.678	0.1706	0.955	5.0	19
Diethyl phthalate	0.270	0.540	1.350	0.0860	1.137	1.0	114
Fluorene	0.246	0.491	1.228	0.0782	1.141	1.0	114
4-Chlorophenyl phenyl ether	0.218	0.437	1.091	0.0695	1.150	1.0	115
1,2-Diphenylhydrazine	0.247	0.494	1.234	0.0786	0.959	1.0	96
2-Chloronaphthalene	0.183	0.367	0.917	0.0584	1.101	1.0	110
N-Nitrosodiphenylamine	0.181	0.362	0.906	0.0577	0.874	1.0	87
4-Nitroaniline	0.364	0.727	1.818	0.1158	0.604	1.0	60
4,6-Dinitro-2-methylphenol	1.704	3.408	8.519	0.5426	3.523	5.0	70
4-Bromophenyl phenyl ether	0.240	0.480	1.201	0.0765	1.069	1.0	107
Hexachlorobenzene	0.167	0.334	0.834	0.0531	1.093	1.0	109
Pentachlorophenol	1.301	2.603	6.507	0.4145	3.987	5.0	80
Phenanthrene	0.156	0.312	0.780	0.0497	1.160	1.0	116
Anthracene	0.192	0.384	0.961	0.0612	1.111	1.0	111
Carbazole	0.240	0.480	1.201	0.0765	0.991	1.0	99
Di-n-butyl phthalate	0.322	0.644	1.611	0.1026	1.024	1.0	102
Fluoranthene	0.276	0.553	1.382	0.0880	1.021	1.0	102
Benzidine	0.711	1.422	3.555	0.2264	0.560	10.0	6
Pyrene	0.154	0.307	0.768	0.0489	1.006	1.0	101
Benzyl butyl phthalate	0.272	0.543	1.358	0.0865	0.769	1.0	77
Benz(a)anthracene	0.165	0.330	0.824	0.0525	0.953	1.0	95
3,3'-Dichlorobenzidine	0.785	1.570	3.925	0.2500	7.416	10.0	74
Chrysene	0.158	0.317	0.792	0.0505	0.981	1.0	98
Bis(2-ethylhexyl) phthalate	0.287	0.574	1.435	0.0914	0.974	1.0	97
Di-n-octyl phthalate	0.265	0.530	1.324	0.0843	0.589	1.0	59
Benzo(a)pyrene	0.204	0.409	1.022	0.0651	0.690	1.0	69
Benzo(b)fluoranthene	0.182	0.364	0.910	0.0580	0.836	1.0	84
Benzo(k)fluoranthene	0.099	0.199	0.496	0.0316	0.900	1.0	90
Indeno(1,2,3-cd)pyrene	0.246	0.491	1.229	0.0783	0.727	1.0	73
Dibenzo(a,h)anthracene	0.325	0.650	1.626	0.1036	0.704	1.0	70
Benzo(g,h,i)perylene	0.267	0.535	1.337	0.0852	0.853	1.0	85

EPA Method 8270

MDL Data and Calculations

MDL Data and Calculations

Analysis: 8270 BNA
Matrix: **Soil**
Instrument ID: GCMS #6
Reporting Units: mg/kg

Analyst fill in all below
(attach extraction worksheet(s))
Standard(s) spiked: 20/100/200 ug/ml BNA mdl stock 34-172; 2,000 ug/ml 4-chloroaniline, m and p-nitroaniline
Volume spiked: 50 uL (above); 100 uL (above)
Date(s) Extracted: 40589
Date(s) Analyzed: 02/22/11, 02/23/11, 02/28/11, 03/08/11
Date Calculated: 40645
Calculation Analyst: YA

Analyte	(StdDev*3. MDL	(2*MDL) PQL	(5*MDL) PQL	Std Dev	Mean	Spike Level	% Rec.
N-Nitrosodimethylamine	0.020324	0.040648	0.10162	0.006473	0.034917	0.033	105.8104
Phenol	0.026984	0.053969	0.134921	0.008594	0.153846	0.167	92.12335
Bis(2-chloroethyl) ether	0.011728	0.023456	0.058641	0.003735	0.036345	0.033	110.1351
2-Chlorophenol	0.023294	0.046588	0.116469	0.007418	0.149327	0.167	89.41719
1,3-Dichlorobenzene	0.009803	0.019607	0.049017	0.003122	0.032396	0.033	98.17013
1,4-Dichlorobenzene	0.012778	0.025555	0.063888	0.004069	0.038628	0.033	117.0545
1,2-Dichlorobenzene	0.007911	0.015821	0.039554	0.002519	0.043195	0.033	130.8935
Benzyl alcohol	0.016129	0.032259	0.080647	0.005137	0.021455	0.033	65.01429
Bis(2-chloroisopropyl) ether	0.009583	0.019167	0.047916	0.003052	0.037629	0.033	114.0273
2-Methylphenol	0.044369	0.088738	0.221845	0.01413	0.1616	0.167	96.76655
Hexachloroethane	0.010739	0.021477	0.053693	0.00342	0.033585	0.033	101.774
N-Nitroso-di-n-propylamine	0.009933	0.019865	0.049664	0.003163	0.034061	0.033	103.2156
3-Methylphenol +4 -Methylphenol	0.086255	0.17251	0.431276	0.02747	0.326768	0.334	97.83477
Nitrobenzene	0.01409	0.028179	0.070448	0.004487	0.043528	0.033	131.9026
Isophorone	0.006303	0.012605	0.031513	0.002007	0.032967	0.033	99.9
2-Nitrophenol	0.033804	0.067607	0.169018	0.010765	0.139908	0.167	83.77699
2,4-Dimethylphenol	0.020093	0.040187	0.100467	0.006399	0.127729	0.167	76.4846
Benzoic acid	0.326987	0.653974	1.634936	0.104136	0.255221	0.333	76.64286
Bis(2-chloroethoxy)methane	0.007741	0.015482	0.038705	0.002465	0.033585	0.033	101.774
2,4-Dichlorophenol	0.034664	0.069327	0.173318	0.011039	0.150516	0.167	90.12934
1,2,4-Trichlorobenzene	0.005117	0.010235	0.025587	0.00163	0.034489	0.033	104.513
Naphthalene	0.00816	0.01632	0.040801	0.002599	0.036868	0.033	111.7208
Hexachlorobutadiene	0.006494	0.012988	0.03247	0.002068	0.034394	0.033	104.2247
4-Chloroaniline	1.044026	2.088052	5.22013	0.332492	3.064694	6.7	45.7417
4-Chloro-3-methylphenol	0.043242	0.086484	0.216211	0.013771	0.143999	0.167	86.22678
2-Methylnaphthalene	0.006356	0.012712	0.031781	0.002024	0.031778	0.033	96.2961
Hexachlorocyclopentadiene	0.014487	0.028973	0.072434	0.004614	0.02312	0.033	70.05974
2,4,6-Trichlorophenol	0.027111	0.054223	0.135557	0.008634	0.146663	0.167	87.82198
2,4,5-Trichlorophenol	0.029299	0.058597	0.146493	0.009331	0.1518	0.167	90.89846
2-Nitroaniline	0.015218	0.030435	0.076088	0.004846	0.02802	0.033	84.90779
Dimethyl phthalate	0.004471	0.008943	0.022356	0.001424	0.030826	0.033	93.41299

EPA Method 8270

MDL Data and Calculations

Acenaphthylene	0.006002	0.012005	0.030011	0.001912	0.033157	0.033	100.4766
2,6-Dinitrotoluene	0.008616	0.017233	0.043082	0.002744	0.022739	0.033	68.90649
3-Nitroaniline	1.024383	2.048765	5.121913	0.326237	4.135337	6.7	61.72144
Acenaphthene	0.005223	0.010446	0.026116	0.001663	0.033776	0.033	102.3506
2,4-Dinitrophenol	0.131486	0.262972	0.65743	0.041875	0.06202	0.167	37.13772
Dibenzofuran	0.006841	0.013683	0.034207	0.002179	0.034347	0.333	10.31429
2,4-Dinitrotoluene	0.010181	0.020362	0.050906	0.003242	0.030588	0.033	92.69221
4-Nitrophenol	0.438203	0.876406	2.191016	0.139555	0.388992	0.033	1178.762
Diethyl phthalate	0.005366	0.010731	0.026829	0.001709	0.033966	0.333	10.2
Fluorene	0.006286	0.012572	0.031431	0.002002	0.032253	0.033	97.73766
4-Chlorophenyl phenyl ether	0.006127	0.012254	0.030634	0.001951	0.033966	0.033	102.9273
1,2-Diphenylhydrazine	0.010978	0.021957	0.054892	0.003496	0.029542	0.033	89.52078
2-Chloronaphthalene	0.006178	0.012355	0.030888	0.001967	0.034061	0.033	103.2156
N-Nitrosodiphenylamine	0.004213	0.008427	0.021067	0.001342	0.025879	0.033	78.42078
4-Nitroaniline	0.738269	1.476538	3.691344	0.235117	6.285232	6.7	93.80944
4,6-Dinitro-2-methylphenol	0.082177	0.164354	0.410884	0.026171	0.096173	0.167	57.58845
4-Bromophenyl phenyl ether	0.005772	0.011545	0.028862	0.001838	0.030018	0.033	90.96234
Hexachlorobenzene	0.007007	0.014014	0.035034	0.002231	0.031397	0.033	95.14286
Pentachlorophenol	0.145384	0.290767	0.726918	0.046301	0.135674	0.167	81.24175
Phenanthrene	0.006028	0.012057	0.030141	0.00192	0.033728	0.033	102.2065
Anthracene	0.007011	0.014021	0.035053	0.002233	0.031445	0.033	95.28701
Carbazole	0.008093	0.016186	0.040465	0.002577	0.030065	0.033	91.10649
Di-n-butyl phthalate	0.007033	0.014066	0.035164	0.00224	0.032206	0.033	97.59351
Fluoranthene	0.007478	0.014955	0.037388	0.002381	0.031254	0.033	94.71039
Benzidine	ND	ND	ND	ND	ND	0.333	ND
Pyrene	0.003852	0.007704	0.01926	0.001227	0.029066	0.033	88.07922
Benzyl butyl phthalate	0.007516	0.015032	0.037579	0.002394	0.025308	0.033	76.69091
Benz(a)anthracene	0.00477	0.00954	0.023849	0.001519	0.030255	0.333	9.085714
3,3'-Dichlorobenzidine	0.099194	0.198388	0.495969	0.03159	0.137291	0.333	41.22857
Chrysene	0.005691	0.011381	0.028453	0.001812	0.030779	0.033	93.26883
Bis(2-ethylhexyl) phthalate	0.01265	0.0253	0.063251	0.004029	0.031115	0.033	94.28701
Di-n-octyl phthalate	0.010765	0.021531	0.053827	0.003428	0.025974	0.033	78.70909
Benzo(a)pyrene	0.007904	0.015808	0.039521	0.002517	0.023595	0.033	71.5013
Benzo(b)fluoranthene	0.006413	0.012826	0.032066	0.002042	0.027116	0.033	82.16883
Benzo(k)fluoranthene	0.012456	0.024912	0.062279	0.003967	0.034394	0.033	104.2247
Indeno(1,2,3-cd)pyrene	0.010133	0.020265	0.050663	0.003227	0.026545	0.033	80.43896
Dibenzo(a,h)anthracene	0.009951	0.019902	0.049755	0.003169	0.02821	0.033	85.48442
Benzo(g,h,i)perylene	0.011452	0.022904	0.05726	0.003647	0.028781	0.033	87.21429

EPA Method 8270-SIM

MDL Data and Calculations

WATER ug/L

	(StdDev*3.14)	(2*MDL)	(5*MDL)	**Std**		**Spike**	**%**
Analyte	**MDL**	**PQL**	**PQL**	**Dev**	**Mean**	**Level**	**Rec.**
Naphthalene	0.00222	0.00444	0.01110	0.000707	0.03139	0.030	105
2-Methylnaphthalene	0.00184	0.00368	0.00921	0.000587	0.02695	0.030	90
1-Methylnaphthalene	0.00336	0.00673	0.01681	0.001071	0.02674	0.030	89
Acenaphthylene	0.00639	0.01278	0.03194	0.002035	0.02368	0.030	79
Acenaphthene	0.00307	0.00615	0.01537	0.000979	0.02783	0.030	93
Fluorene	0.01485	0.02970	0.07424	0.004729	0.02754	0.030	92
Phenanthrene	0.00283	0.00565	0.01414	0.000900	0.02874	0.030	96
Anthracene	0.00594	0.01188	0.02971	0.001893	0.02611	0.030	87
Fluoranthene	0.00339	0.00679	0.01696	0.001081	0.02318	0.030	77
Pyrene	0.00363	0.00727	0.01817	0.001157	0.02271	0.030	76
Benz(a)anthracene	0.00379	0.00758	0.01894	0.001207	0.03256	0.030	109
Chrysene	0.00244	0.00489	0.01221	0.000778	0.02479	0.030	83
Benzo(b)fluoranthene	0.00379	0.00759	0.01896	0.001208	0.01850	0.030	62
Benzo(k)fluoranthene	0.00515	0.01029	0.02573	0.001639	0.01991	0.030	66
Benzo(a)pyrene	0.00404	0.00808	0.02021	0.001287	0.01584	0.030	53
Indeno(1,2,3-cd)pyrene	0.00625	0.01250	0.03125	0.001990	0.01485	0.030	50
Dibenz(a,h)anthracene	0.00720	0.01440	0.03600	0.002293	0.01686	0.030	56
Benzo(g,h,i)perylene	0.00733	0.01467	0.03667	0.002335	0.02136	0.030	71

SOIL mg/kg

	(StdDev*3.14)	**(2*MDL)**	**(5*MDL)**	**Std**		**Spike**	**%**
Analyte	**MDL**	**PQL**	**PQL**	**Dev**	**Mean**	**Level**	**Rec.**
Naphthalene	0.00021	0.000419	0.001048	6.68E-05	0.000963	0.001	96.25603
2-Methylnaphthalene	0.000433	0.000866	0.002165	0.000138	0.00094	0.001	93.98687
1-Methylnaphthalene	0.000244	0.000487	0.001218	7.76E-05	0.000863	0.001	86.3469
Acenaphthylene	0.000501	0.001003	0.002507	0.00016	0.000906	0.001	90.62833
Acenaphthene	0.000229	0.000457	0.001143	7.28E-05	0.000922	0.001	92.18391
Fluorene	0.00058	0.00116	0.002901	0.000185	0.001017	0.001	101.6982
Phenanthrene	0.000482	0.000964	0.00241	0.000153	0.00106	0.001	106.0034
Anthracene	0.000358	0.000717	0.001791	0.000114	0.0009	0.001	90.02417
Fluoranthene	0.000277	0.000554	0.001385	8.82E-05	0.000799	0.001	79.91524
Pyrene	0.000268	0.000536	0.00134	8.54E-05	0.000766	0.001	76.59951
Benz(a)anthracene	0.000187	0.000373	0.000933	5.94E-05	0.001091	0.001	109.1336
Chrysene	0.000171	0.000343	0.000857	5.46E-05	0.000837	0.001	83.74474
Benzo(b)fluoranthene	0.000282	0.000565	0.001411	8.99E-05	0.000717	0.001	71.68063
Benzo(k)fluoranthene	0.000282	0.000565	0.001412	8.99E-05	0.000746	0.001	74.64433
Benzo(a)pyrene	0.000257	0.000513	0.001283	8.17E-05	0.000548	0.001	54.84034
Indeno(1,2,3-cd)pyrene	0.000129	0.000258	0.000646	4.11E-05	0.000557	0.001	55.69187
Dibenz(a,h)anthracene	0.000228	0.000456	0.00114	7.26E-05	0.000637	0.001	63.65533
Benzo(g,h,i)perylene	0.000177	0.000354	0.000885	5.64E-05	0.000798	0.001	79.76777

Method 200.8 Soil
Method Detection Limit (MDL) Study

Location: g:\fbi\mdls\icp_ms\icpmsmdl2011.xls
Date Analyzed: 02/25/11
Analyst: AP
Units: mg/Kg (ppm)
Spike Level: 0.5 mg/Kg (ppm)   Samples were diluted 1000x for analysis

Parts per Million

Analyte	Ion	MDL (3.14*STD)	PQL (2*MDL)	PQL (5*MDL)	mdl1	mdl2	mdl3	mdl4	mdl5	mdl6	mdl7	STD
Antimony	Sb 121	0.0270	0.054	0.135	0.500	0.506	0.514	0.518	0.503	0.495	0.515	0.009
	Sb 123	**0.0326**	0.065	0.163	0.525	0.527	0.539	0.530	0.509	0.518	0.513	0.010
Arsenic	**As 75**	**0.4615**	0.923	2.308	0.238	0.297	0.407	0.360	0.385	0.084	0.553	0.147
Berylium	**Be 9**	**0.0556**	0.111	0.278	0.716	0.716	0.708	0.709	0.696	0.666	0.711	0.018
Cadmium	Cd 106	0.1396	0.279	0.698	0.066	0.102	0.000	0.012	0.118	0.035	0.037	0.044
	Cd 108	0.0841	0.168	0.420	0.397	0.464	0.414	0.405	0.377	0.412	0.401	0.027
	Cd 111	**0.0289**	0.058	0.145	0.378	0.381	0.382	0.385	0.362	0.377	0.363	0.009
	Cd 114	0.0585	0.117	0.293	0.366	0.390	0.411	0.412	0.369	0.377	0.391	0.019
Chromium	**Cr 52**	**0.2075**	0.415	1.038	0.799	0.853	0.999	0.873	0.820	0.832	0.836	0.066
	Cr 53	8.2615	16.523	41.307	13.347	18.170	20.173	20.215	19.914	19.415	21.251	2.631
Copper	**Cu 63**	**0.0684**	0.137	0.342	0.438	0.461	0.487	0.479	0.445	0.437	0.483	0.022
	Cu 65	0.0837	0.167	0.419	0.428	0.428	0.460	0.457	0.485	0.436	0.494	0.027
Lead	**Pb 208**	**0.0359**	0.072	0.179	0.495	0.487	0.481	0.479	0.502	0.468	0.493	0.011
Nickel	**Ni 60**	**0.0876**	0.175	0.438	0.485	0.509	0.561	0.511	0.521	0.485	0.541	0.028
	Ni 62	0.0622	0.124	0.311	0.479	0.521	0.526	0.529	0.528	0.491	0.512	0.020
Selenium	Se 77	2.2147	4.429	11.073	13.852	14.834	14.930	15.896	14.210	15.187	15.476	0.705
	Se 82	**0.1695**	0.339	0.848	0.464	0.508	0.571	0.468	0.432	0.468	0.567	0.054
Silver	**Ag 107**	**0.0535**	0.107	0.267	0.559	0.566	0.548	0.557	0.521	0.551	0.526	0.017
	Ag 109	0.0224	0.045	0.112	0.525	0.515	0.514	0.524	0.508	0.510	0.508	0.007
Thallium	Tl 203	0.0141	0.028	0.071	0.426	0.432	0.431	0.426	0.437	0.431	0.424	0.005
	Tl 205	**0.0268**	0.054	0.134	0.471	0.463	0.455	0.459	0.469	0.467	0.447	0.009
Zinc	**Zn 66**	**0.1278**	0.256	0.639	0.109	0.111	0.111	0.093	0.157	0.119	0.211	0.041
	Zn 67	2.6211	5.242	13.105	0.968	2.048	2.718	2.975	3.210	2.966	3.343	0.835
	Zn 68	0.2016	0.403	1.008	0.039	0.037	0.051	0.085	0.177	0.087	0.192	0.064

Method 200.8 Water
Method Detection Limit (MDL) Study

Location: g:\fbi\MDLs\icp_ms\icpmsmdl2011.xls
Date Analyzed: 01/21/11 Linear range analyzed 03/09/11
Analyst: AP
Units: ug/L (ppb)
Spike Level: 0.5 ug/L (ppb)

Parts per Billion

Analyte	Ion	MDL (3.14*STD)	PQL (2*MDL)	PQL (5*MDL)	mdl1	mdl2	mdl3	mdl4	mdl5	mdl6	mdl7	STD	Linear range mg/L
Antimony	Sb 121	0.0452	0.090	0.226	0.549	0.550	0.561	0.530	0.549	0.559	0.577	0.014	10
	Sb 123	**0.0351**	0.070	0.176	0.557	0.540	0.560	0.540	0.536	0.535	0.558	0.011	10
Arsenic	**As 75**	**0.1560**	0.312	0.780	0.348	0.354	0.435	0.351	0.364	0.457	0.446	0.050	10
Berylium	**Be 9**	**0.0571**	0.114	0.286	0.547	0.572	0.527	0.539	0.527	0.543	0.569	0.018	0.5
Cadmium	Cd 106	0.1717	0.343	0.858	0.880	0.962	0.907	0.861	1.010	0.982	0.923	0.055	10
	Cd 108	0.0928	0.186	0.464	1.052	1.024	1.045	1.027	1.044	1.103	1.086	0.030	10
	Cd 111	**0.0505**	0.101	0.253	0.552	0.539	0.581	0.540	0.532	0.541	0.548	0.016	10
	Cd 114	0.0624	0.125	0.312	0.517	0.534	0.545	0.510	0.523	0.540	0.569	0.020	10
Chromium	**Cr 52**	**0.2007**	0.401	1.003	0.756	0.579	0.612	0.586	0.572	0.590	0.612	0.064	10
	Cr 53	0.3248	0.650	1.624	0.432	0.275	0.251	0.191	0.157	0.121	0.183	0.103	10
Copper	**Cu 63**	**0.1495**	0.299	0.748	0.693	0.725	0.625	0.596	0.604	0.626	0.653	0.048	1
	Cu 65	0.1499	0.300	0.749	0.685	0.710	0.601	0.589	0.592	0.626	0.654	0.048	10
Lead	**Pb 208**	**0.0685**	0.137	0.343	0.550	0.565	0.546	0.524	0.510	0.507	0.544	0.022	10
Nickel	**Ni 60**	**0.0710**	0.142	0.355	0.601	0.599	0.551	0.551	0.557	0.571	0.593	0.023	10
	Ni 62	0.0681	0.136	0.340	0.588	0.577	0.543	0.572	0.552	0.525	0.554	0.022	1
Selenium	Se 77	0.5053	1.011	2.526	1.207	1.369	1.016	1.266	1.227	1.096	0.897	0.161	10
	Se 82	**0.2209**	0.442	1.104	0.406	0.479	0.455	0.352	0.301	0.414	0.304	0.070	10
Silver	**Ag 107**	**0.0432**	0.086	0.216	0.556	0.536	0.576	0.553	0.544	0.564	0.567	0.014	2
	Ag 109	0.0357	0.071	0.178	0.566	0.550	0.569	0.561	0.556	0.571	0.585	0.011	5
Thallium	Tl 203	0.0368	0.074	0.184	0.549	0.553	0.552	0.538	0.547	0.548	0.576	0.012	10
	Tl 205	**0.0422**	0.084	0.211	0.539	0.529	0.529	0.525	0.531	0.506	0.550	0.013	10
Zinc	**Zn 66**	**0.3316**	0.663	1.658	0.830	0.819	0.593	0.671	0.561	0.623	0.673	0.106	10
	Zn 67	0.3103	0.621	1.552	0.643	0.661	0.556	0.519	0.385	0.450	0.563	0.099	10
	Zn 68	0.3185	0.637	1.592	0.792	0.812	0.578	0.676	0.554	0.603	0.686	0.101	10

MDL for Hg in Soil (EPA 1631)

	MDL (StdDev*3.14)	PQL (2*MDL)	PQL (5*MDL)		MDL #1	MDL#2	MDL#3	MDL#4	MDL#5	MDL#6	MDL#7	Std Dev
Hg mg/kg (ppm	0.001821	0.003641	0.00910		0.0157	0.0155	0.0145	0.0146	0.0156	0.0143	0.0152	0.000580

Spike:	25 uL of 1 ppm made from 10 ppm I2-07A
Init digestion:	2g to 50 mL
Final dilution:	100 ul to 50 ml (12,500x dilution)
Analyst:	AP
Date Digested:	01/26/12
Date Analyzed:	01/31/12

Location : SWCOMP Off:\FBI\MDLs\Hg.xls
Sequence HG 01-31-12

MDL for Hg in Water (EPA 1631)

	MDL (StdDev*3.14)	PQL (2*MDL)	PQL (5*MDL)		MDL #1	MDL#2	MDL#3	MDL#4	MDL#5	MDL#6	MDL#7	Std Dev
Hg ug/L (ppb)	0.000323	0.000647	0.001616		0.00148	0.00147	0.00141	0.00136	0.00169	0.00147	0.00148	0.000103

Spike:	5.0 uL of 10 ppb I2-07C
Initial Vol:	50mL
Final Vol:	50 ml
Analyst:	AP
Date Digested:	01/13/12
Date Analysed:	01/20/12

Location : SWCOMP Off:\FBI\MDLs\Hg.xls
Sequence HG 01-20-12

Metals in Brackish Water (CAS Kelso, subcontracted)

ICPMS for Waters

Element	Method	Matrix	Digestion	MRL	MDL	Units
Antimony	200.8 / 6020	Water	CLP (ILM04.0)	0.05	0.02	ug/L
Arsenic	200.8 / 6020	Water	CLP (ILM04.0)	0.5	0.1	ug/L
Beryllium	200.8 / 6020	Water	CLP (ILM04.0)	0.02	0.006	ug/L
Cadmium	200.8 / 6020	Water	CLP (ILM04.0)	0.02	0.005	ug/L
Chromium	200.8 / 6020	Water	CLP (ILM04.0)	0.2	0.04	ug/L
Copper	200.8 / 6020	Water	CLP (ILM04.0)	0.1	0.02	ug/L
Lead	200.8 / 6020	Water	CLP (ILM04.0)	0.02	0.005	ug/L
Nickel	200.8 / 6020	Water	CLP (ILM04.0)	0.2	0.03	ug/L
Selenium	200.8 / 6020	Water	CLP (ILM04.0)	1.0	0.3	ug/L
Silver	200.8 / 6020	Water	CLP (ILM04.0)	0.02	0.004	ug/L
Thallium	200.8 / 6020	Water	CLP (ILM04.0)	0.02	0.005	ug/L
Zinc	200.8 / 6020	Water	CLP (ILM04.0)	0.5	0.2	ug/L

ICP for Waters

Element	Method	Matrix	Digestion	MRL	MDL	Units
Antimony	200.7 / 6010	Water	CLP (ILM04.0)	10	3.0	ug/L
Arsenic	200.7 / 6010	Water	CLP (ILM04.0)	10	4.0	ug/L
Beryllium	200.7 / 6010	Water	CLP (ILM04.0)	0.2	0.09	ug/L
Cadmium	200.7 / 6010	Water	CLP (ILM04.0)	0.5	0.3	ug/L
Chromium	200.7 / 6010	Water	CLP (ILM04.0)	2.0	0.4	ug/L
Copper	200.7 / 6010	Water	CLP (ILM04.0)	2.0	0.8	ug/L
Lead	200.7 / 6010	Water	CLP (ILM04.0)	10	4.0	ug/L
Nickel	200.7 / 6010	Water	CLP (ILM04.0)	2.0	0.7	ug/L
Selenium	200.7 / 6010	Water	CLP (ILM04.0)	20	5.0	ug/L
Silver	200.7 / 6010	Water	CLP (ILM04.0)	2.0	0.7	ug/L
Thallium	200.7 / 6010	Water	CLP (ILM04.0)	10	2.0	ug/L
Zinc	200.7 / 6010	Water	CLP (ILM04.0)	2.0	0.7	ug/L

Mercury in Water

Element	Method	Matrix	MRL	MDL	Units
Mercury	7470A	Water	0.2	0.02	ug/L
Mercury	1631E	Water	1.0	0.06	ng/L

Priority Pollutant Metal by ICP / ICP-MS / AA in Seawater

		MRL	MDL	Units
Antimony	20x dil./ICP-MS	1.0	0.4	ug/L
Arsenic	Red. Ppt./ICP-MS	0.5	0.04	ug/L
Beryllium	Red. Ppt./ICP-MS	0.02	0.0007	ug/L
Cadmium	Red. Ppt./ICP-MS	0.02	0.002	ug/L
Chromium	Red. Ppt./ICP-MS	0.2	0.03	ug/L
Copper	Red. Ppt./ICP-MS	0.1	0.004	ug/L
Lead	Red. Ppt./ICP-MS	0.02	0.009	ug/L
Nickel	Red. Ppt./ICP-MS	0.2	0.04	ug/L
Silver	Red. Ppt./ICP-MS	0.02	0.004	ug/L
Thallium	Red. Ppt./ICP-MS	0.02	0.004	ug/L
Zinc	Red. Ppt./ICP-MS	0.5	0.06	ug/L
Selenium	BRAAS (7742)	1.0	0.05	ug/L
Mercury	CVAAS (7740A)	0.2	0.02	ug/L
	P&T AFS (1631)	0.001	0.00006	ug/L

EPA Method 8082 PCBs

units : mg/kg

	MDL (Stddev*3.:	**PQL** (2*MDL)	**PQL** (5*MDL)	**MDL#1**	**MDL#2**	**MDL#3**	**MDL#4**	**MDL#5**	**MDL#6**	**MDL#7**	**Std Dev**
AR 1016	0.017059	0.034119	0.085297	0.08053	0.08467	0.09533	0.08617	0.08747	0.08097	0.09187	0.005433
AR 1260	0.017369	0.034737	0.086843	0.08297	0.08853	0.097	0.0888	0.08967	0.08353	0.0964	0.005531

Spike Level = 25 ulof 100 ppm Ar 1016/1260 #34-159

EPA Method 8290 Dioxins/Furans

DATA QUALITY OBJECTIVES FOR CAS/HOUSTON (subcontracted)

ANALYTE	CAS No.	MATRIX	EDL	MRL	DOD LOD	DOD LOQ	UNITS	Accuracy (LCS %Rec.)	Matrix Spike (%Rec.)	Precision (% RPD)	DOD QSM (LCS %Rec.)	DOD QSM (% RPD)	Precision (DUP % RPD)
2378-TCDD	1746-01-6	Solid	0.0588	1	0.3	1	ng/Kg	50-150	50-150	20	50-150	20	25
12378-PeCDD	40321-76-4	Solid	0.0482	2.5	0.75	2.5	ng/Kg	50-150	50-150	20	50-150	20	25
123478-HxCDD	57653-85-7	Solid	0.0466	2.5	0.75	2.5	ng/Kg	50-150	50-150	20	50-150	20	25
123678-HxCDD	39227-28-6	Solid	0.0425	2.5	0.75	2.5	ng/Kg	50-150	50-150	20	50-150	20	25
123789-HxCDD	19408-74-3	Solid	0.0447	2.5	0.75	2.5	ng/Kg	50-150	50-150	20	50-150	20	25
1234678-HpCDD	35822-46-9	Solid	0.0479	2.5	0.75	2.5	ng/Kg	50-150	50-150	20	50-150	20	25
OCDD	3268-87-9	Solid	0.0695	5	1.5	5	ng/Kg	50-150	50-150	20	50-150	20	25
2378-TCDF	51207-31-9	Solid	0.0562	1	0.3	1	ng/Kg	50-150	50-150	20	50-150	20	25
12378-PeCDF	57117-41-6	Solid	0.0396	2.5	0.75	2.5	ng/Kg	50-150	50-150	20	50-150	20	25
23478-PeCDF	57117-31-4	Solid	0.0388	2.5	0.75	2.5	ng/Kg	50-150	50-150	20	50-150	20	25
123478-HxCDF	57117-44-9	Solid	0.0340	2.5	0.75	2.5	ng/Kg	50-150	50-150	20	50-150	20	25
123678-HxCDF	72918-21-9	Solid	0.0335	2.5	0.75	2.5	ng/Kg	50-150	50-150	20	50-150	20	25
123789-HxCDF	70648-26-9	Solid	0.0418	2.5	0.75	2.5	ng/Kg	50-150	50-150	20	50-150	20	25
234678-HxCDF	60851-34-5	Solid	0.0367	2.5	0.75	2.5	ng/Kg	50-150	50-150	20	50-150	20	25
1234678-HpCDF	67562-39-4	Solid	0.0377	2.5	0.75	2.5	ng/Kg	50-150	50-150	20	50-150	20	25
1234789-HpCDF	55673-89-7	Solid	0.0500	2.5	0.75	2.5	ng/Kg	50-150	50-150	20	50-150	20	25
OCDF	39001-02-0	Solid	0.0644	5	1.5	5	ng/Kg	50-150	50-150	20	50-150	20	25
Total TCDD	41903-57-5	Solid	NA	1	NA	NA	ng/Kg	NA	NA	NA	NA	NA	NA
Total PeCDD	36088-22-9	Solid	NA	2.5	NA	NA	ng/Kg	NA	NA	NA	NA	NA	NA
Total HxCDD	34465-46-8	Solid	NA	2.5	NA	NA	ng/Kg	NA	NA	NA	NA	NA	NA
Total HpCDD	37871-00-4	Solid	NA	2.5	NA	NA	ng/Kg	NA	NA	NA	NA	NA	NA
Total TCDF	30402-14-3	Solid	NA	1	NA	NA	ng/Kg	NA	NA	NA	NA	NA	NA
Total PeCDF	30402-15-4	Solid	NA	2.5	NA	NA	ng/Kg	NA	NA	NA	NA	NA	NA
Total HxCDF	55684-94-1	Solid	NA	2.5	NA	NA	ng/Kg	NA	NA	NA	NA	NA	NA
Total HpCDF	38998-75-3	Solid	NA	2.5	NA	NA	ng/Kg	NA	NA	NA	NA	NA	NA
13C-2378-TCDD		Solid	NA	NA	NA	NA	Percent	40-135	40-135	NA	40-135	NA	NA
13C-12378-PeCDD		Solid	NA	NA	NA	NA	Percent	40-135	40-135	NA	40-135	NA	NA
13C-123678-HxCDD		Solid	NA	NA	NA	NA	Percent	40-135	40-135	NA	40-135	NA	NA
13C-1234678-HpCDD		Solid	NA	NA	NA	NA	Percent	40-135	40-135	NA	40-135	NA	NA
13C-OCDD		Solid	NA	NA	NA	NA	Percent	40-135	40-135	NA	40-135	NA	NA
13C-2378-TCDF		Solid	NA	NA	NA	NA	Percent	40-135	40-135	NA	40-135	NA	NA
13C-12378-PeCDF		Solid	NA	NA	NA	NA	Percent	40-135	40-135	NA	40-135	NA	NA
13C-123478-HxCDF		Solid	NA	NA	NA	NA	Percent	40-135	40-135	NA	40-135	NA	NA
13C-1234678-HpCDF		Solid	NA	NA	NA	NA	Percent	40-135	40-135	NA	40-135	NA	NA
37Cl-2378-TCDD		Solid	NA	NA	NA	NA	Percent	40-135	40-135	NA	40-135	NA	NA

EPA Method 8290 Dioxins/Furans

DATA QUALITY OBJECTIVES FOR CAS/HOUSTON (subcontracted)

ANALYTE	CAS No.	MATRIX	EDL	MRL	DOD LOD	DOD LOQ	UNITS	Accuracy (LCS %Rec.)	Matrix Spike (%Rec.)	Precision (% RPD)	DOD QSM (LCS %Rec.)	DOD QSM (% RPD)	Precision (DUP % RPD)
2378-TCDD	1746-01-6	Aqueous	0.566	10	3	10	pg/L	50-150	50-150	20	50-150	20	25
12378-PeCDD	40321-76-4	Aqueous	0.877	25	7.5	25	pg/L	50-150	50-150	20	50-150	20	25
123478-HxCDD	57653-85-7	Aqueous	0.740	25	7.5	25	pg/L	50-150	50-150	20	50-150	20	25
123678-HxCDD	39227-28-6	Aqueous	0.669	25	7.5	25	pg/L	50-150	50-150	20	50-150	20	25
123789-HxCDD	19408-74-3	Aqueous	0.714	25	7.5	25	pg/L	50-150	50-150	20	50-150	20	25
1234678-HpCDD	35822-46-9	Aqueous	0.772	25	7.5	25	pg/L	50-150	50-150	20	50-150	20	25
OCDD	3268-87-9	Aqueous	1.168	50	15	50	pg/L	50-150	50-150	20	50-150	20	25
2378-TCDF	51207-31-9	Aqueous	0.656	10	3	10	pg/L	50-150	50-150	20	50-150	20	25
12378-PeCDF	57117-41-6	Aqueous	0.635	25	7.5	25	pg/L	50-150	50-150	20	50-150	20	25
23478-PeCDF	57117-31-4	Aqueous	0.623	25	7.5	25	pg/L	50-150	50-150	20	50-150	20	25
123478-HxCDF	57117-44-9	Aqueous	0.568	25	7.5	25	pg/L	50-150	50-150	20	50-150	20	25
123678-HxCDF	72918-21-9	Aqueous	0.551	25	7.5	25	pg/L	50-150	50-150	20	50-150	20	25
123789-HxCDF	70648-26-9	Aqueous	0.707	25	7.5	25	pg/L	50-150	50-150	20	50-150	20	25
234678-HxCDF	60851-34-5	Aqueous	0.611	25	7.5	25	pg/L	50-150	50-150	20	50-150	20	25
1234678-HpCDF	67562-39-4	Aqueous	0.764	25	7.5	25	pg/L	50-150	50-150	20	50-150	20	25
1234789-HpCDF	55673-89-7	Aqueous	1.032	25	7.5	25	pg/L	50-150	50-150	20	50-150	20	25
OCDF	39001-02-0	Aqueous	1.202	50	15	50	pg/L	50-150	50-150	20	50-150	20	25
Total TCDD	41903-57-5	Aqueous	NA	10	NA	NA	pg/L	NA	NA	NA	NA	NA	NA
Total PeCDD	36088-22-9	Aqueous	NA	25	NA	NA	pg/L	NA	NA	NA	NA	NA	NA
Total HxCDD	34465-46-8	Aqueous	NA	25	NA	NA	pg/L	NA	NA	NA	NA	NA	NA
Total HpCDD	37871-00-4	Aqueous	NA	25	NA	NA	pg/L	NA	NA	NA	NA	NA	NA
Total TCDF	30402-14-3	Aqueous	NA	10	NA	NA	pg/L	NA	NA	NA	NA	NA	NA
Total PeCDF	30402-15-4	Aqueous	NA	25	NA	NA	pg/L	NA	NA	NA	NA	NA	NA
Total HxCDF	55684-94-1	Aqueous	NA	25	NA	NA	pg/L	NA	NA	NA	NA	NA	NA
Total HpCDF	38998-75-3	Aqueous	NA	25	NA	NA	pg/L	NA	NA	NA	NA	NA	NA
13C-2378-TCDD		Aqueous	NA	NA	NA	NA	Percent	40-135	40-135	NA	40-135	NA	NA
13C-12378-PeCDD		Aqueous	NA	NA	NA	NA	Percent	40-135	40-135	NA	40-135	NA	NA
13C-123678-HxCDD		Aqueous	NA	NA	NA	NA	Percent	40-135	40-135	NA	40-135	NA	NA
13C-1234678-HpCDD		Aqueous	NA	NA	NA	NA	Percent	40-135	40-135	NA	40-135	NA	NA
13C-OCDD		Aqueous	NA	NA	NA	NA	Percent	40-135	40-135	NA	40-135	NA	NA
13C-2378-TCDF		Aqueous	NA	NA	NA	NA	Percent	40-135	40-135	NA	40-135	NA	NA
13C-12378-PeCDF		Aqueous	NA	NA	NA	NA	Percent	40-135	40-135	NA	40-135	NA	NA
13C-123478-HxCDF		Aqueous	NA	NA	NA	NA	Percent	40-135	40-135	NA	40-135	NA	NA
13C-1234678-HpCDF		Aqueous	NA	NA	NA	NA	Percent	40-135	40-135	NA	40-135	NA	NA
37Cl-2378-TCDD		Aqueous	NA	NA	NA	NA	Percent	40-135	40-135	NA	40-135	NA	NA

Selected Conventionals Parameters (Aquatic Research Inc., subcontracted)

Analyte	Method	MDL	MRL	Units
Sulfide	EPA 376.1	0.02	0.05	mg/L
Ammonia	EPA 350.1	0.005	0.01	mg/L
TSS	SM2540D	0.2	0.5	mg/L
TDS	SM2540C	1	5	mg/L
TOC	EPA 415.1	0.005	0.01	%