Final Work Plan
Remedial Investigation/Feasibility Study
Boeing Isaacson-Thompson Site
Tukwila, Washington

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Prepared for

The Boeing Company

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LIST OF ACRONYMS

µg/kg	Micrograms per Kilogram
µg/L	Micrograms per Liter
1,1-DCE	1,1-Dichloroethene
APS	Applied Professional Services
ARAR	Applicable or Relevant and Appropriate Requirement
AST	Aboveground Storage Tank
BAS	Abatement Services
BEHP	Bis(2-ethylhexyl)phthalate
BGS	Below Ground Surface
BMPs	Best Management Practices
CB	Catch Basin
cis-1,2-DCE	Cis-1,2-dichloroethene
CLARC	Cleanup Levels and Risk Calculations
cm	Centimeters
cm/s	Centimeters per Second
COC	Contaminant of Concern
CSL	Cleanup Screening Level
DAHP	Department of Archaeology and Historic Preservation
DCA	Disproportionate Cost Analysis
EAA	Early Action Area
Ecology	Washington State Department of Ecology
EHS	Environment, Health and Safety
EOF	Emergency Overflow
EP	Extraction Procedure
EPA	U.S. Environmental Protection Agency
ERM	Environmental Resources Management
ESA	Environmental Site Assessment
FS	Feasibility Study
ft	Feet
ft^2	Square Feet
HASP	Health and Safety Plan
HVOCs	Halogenated Volatile Organic Compounds
IH	Industrial Hygiene
KCIA	King County International Airport
KCSWDM	King County Surface Water Design Manual
LAET	Lowest Apparent Effects Threshold
LDW	Lower Duwamish Waterway
m^2	Square Meters
MDL	Method Detection Limit
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per liter
MIC/H	Manufacturing Industrial Center/Heavy Industrial
MSL	Mean Sea Level
MTCA	Model Toxics Control Act

LIST OF ACRONYMS Continued

NFA	No Further Action
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PCOC	Potential Contaminant of Concern
PCE	Tetrachloroethene
PID	Photoionization Detector
PLP	Potentially Liable Party
Port	Port of Seattle
ppm	Parts per Million
pptr	Parts per Trillion
PQL	Practical Quantitation Limit
QAPP	Quality Assurance Project Plan
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RHP	Radiation Health Protection
RI	Remedial Investigation
RL	Reporting Limit
SAP	Sampling and Analysis Plan
Site	Boeing Isaacson-Thompson Site
SMS	Sediment Management Standards
SQS	Sediment Quality Standards
SSL	Site Screening Level
SVOCs	Semivolatile Organic Compounds
TCE	Trichloroethene
TCLP	Toxicity Characteristic Leachate Procedure
TEQ	Toxicity Equivalency Quotient
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
TSCA	Toxic Substances Control Act
USGS	U.S. Geologic Survey
UST	Underground Storage Tank
VOCs	Volatile Organic Compounds
WAC	Washington Administrative Code
WISHA	Washington Industrial Safety and Health Act
yd^3	Cubic Yard

1.0 INTRODUCTION

This document presents a work plan to conduct a Remedial Investigation and Feasibility Study (RI/FS) at the Boeing Isaacson-Thompson Site (Site) located in the city of Tukwila, King County, Washington (Figure 1). The Washington State Department of Ecology (Ecology) and the U.S. Environmental Protection Agency (EPA) are evaluating sources of contamination to the Lower Duwamish Waterway (LDW), source control actions, and cleanup options. An RI of the LDW, including the portion offshore of the Site, has been completed and a draft final FS of the LDW has been submitted to EPA and Ecology. Ecology and EPA have determined that the Site is a potential source of contamination to the LDW. Investigations and cleanups are being, or will soon be, conducted by upland property owners under Ecology Agreed Orders at several properties along the LDW near the Site. These properties include the former Kenworth Truck Company (PACCAR)/8801 East Marginal Way South property (8801 Site) adjacent to the Thompson property, and the Jorgensen Forge property adjacent to the Isaacson property. The investigations or cleanup actions conducted at these adjacent sites may provide information regarding contaminant concentrations that is useful for planning and implementation of the RI/FS at the Site. Ecology has identified The Boeing Company (Boeing), as current owner of the Site, as a potentially liable party (PLP) for contamination at the Site.

The RI/FS at the Site will be performed under Agreed Order No. DE 7088 between Boeing and Ecology. This work plan was prepared for submittal to Ecology in accordance with the provisions of the Agreed Order, and was developed to meet the general requirements for an RI and FS as defined by the Washington Model Toxics Control Act (MTCA) Cleanup Regulation [Washington Administrative Code (WAC) 173-340-350]. This work plan describes the RI activities to be performed; the FS to be developed; and the planned schedule for data collection, evaluation, and reporting. As required by the Agreed Order, this Work Plan includes an Uplands Sampling and Analysis Plan (SAP; Appendix A); a Sediment SAP (including QAPP, Appendix B); an Uplands Quality Assurance Project Plan (QAPP; Appendix C); and the Site Health and Safety Plans (HASPs; Appendix D).

2.0 SITE DESCRIPTION AND BACKGROUND

This section describes current Site features and land use, the history of development of the Site, and historical Site uses.

2.1 CURRENT SITE FEATURES AND LAND USE

The Site is comprised of two parcels of land. Parcel #0001600014 is a 9.84-acre parcel of land located near the east side of the LDW, at approximately river miles 3.7 to 3.8, as measured from the southern tip of Harbor Island. This parcel is known as the Boeing Isaacson property because it was purchased by Boeing from the Isaacson Corporation in 1984. The property was apparently owned or operated at various times by Isaacson Iron Works, Isaacson Steel Company, Isaacson Steel Works, and Isaacson Corporation. For this work plan, all of these entities will be identified as Isaacson. Parcel #0007400033 is a 19.35-acre parcel of land located on the eastern bank of the LDW, directly south of the Boeing Isaacson property. This parcel is known as the Boeing Thompson property because the property was purchased from Charles Thompson in 1956. The parcels are referred to collectively as the Boeing Isaacson-Thompson Site. The total size of the Site is 29.19 acres. The Boeing Isaacson property and north part of the Boeing Thompson property do not extend all the way to the LDW; a strip of land consisting of the shoreline bulkhead (wooden) and approximately 20 to 30 feet (ft) landward of the bulkhead is under Port of Seattle (Port) ownership and control. A Site plan that shows the property boundaries is provided as Figure 2.

The Site is located in an area of industrial properties and is bordered on the north by the Jorgensen Forge Corporation property; on the east by East Marginal Way South and King County International Airport (KCIA); and on the south by the 8801 Site, currently owned by Merrill Creek Holdings and leased by Insurance Auto Auctions. As noted above, the west Site boundary along the Boeing Isaacson property and the north part of the Boeing Thompson property is bordered by a strip of land owned by the Port and then the LDW, and along the remainder of the Boeing Thompson property by the LDW.

The Site slopes slightly to the west and is at an average elevation of approximately 10 ft above mean sea level (MSL). Surface topography in the vicinity of the Site is generally level and slopes slightly to the west/southwest toward the LDW [U.S. Geologic Survey (USGS) 1983].

2.1.1 BOEING ISAACSON PROPERTY

The Boeing Isaacson property is the northern portion of the Site. The current Boeing Isaacson property boundaries are shown on Figure 2; however, prior to October 2001, the southern property boundary was about 75 ft south of its current location. This portion of the Site consists of asphalt-paved land that is surrounded by a security fence. There are no buildings on this portion of the Site. A 48-inch-diameter King County storm sewer drain line conveys stormwater from approximately 237 acres of the central portion of the KCIA along the northern Boeing Isaacson property boundary to an outfall (KCIA Outfall) located on the Boeing Thompson property (Figure 3). The KCIA Outfall also serves as an emergency overflow (EOF) for the city of Seattle. There are five storm drain manholes connected to the King County storm drain on the Boeing Isaacson property; stormwater from the Boeing Isaacson property does not enter this drain line. Nine stormwater catch basins (CBs) are present on the Boeing Isaacson property. These CBs are connected to a Boeing-owned storm drain line that conveys stormwater to the LDW via an outfall (Outfall A; also referred to as TS-2), which is located on the Boeing Thompson portion of the Site (Figure 3). The Boeing storm drain system on the Isaacson portion of the Site includes two CONTECH® Vortechs® (Vortechs) treatment vaults that treat stormwater by allowing suspended solids to settle out prior to discharge to the LDW. The vaults were installed in 2008 during excavation activities (Section 3.1.22). These excavation activities were classified by the city of Tukwila as a "redevelopment" project because the project involved altering existing site grades; therefore, upgrades to the stormwater treatment and conveyance system were required per the King County Surface Water Design Manual [KCSWDM; KCDNRP 2005a]. The Vortechs system at the Boeing Isaacson property is sized to accommodate daily storms, as well as peak storm events. The locations of the King County storm drain system and outfall, Vortechs treatment vaults, and the Boeing-owned storm drain system and outfalls are shown on Figure 3. The Boeing Isaacson property is occasionally used by Boeing for temporary trailer and container storage and vehicle parking.

2.1.2 BOEING THOMPSON PROPERTY

The Boeing Thompson property is the southern portion of the Site. This portion of the Site is developed with several structures that include: a 316,000 square foot (ft^2) industrial building (Building 14-01) and several support structures including a boiler house (Building 14-02); two mechanical buildings (Buildings 14-03 and 14-14); a fire pump house (Building 14-13) and water tank; an electrical substation (Building 14-22); and two guard shacks (one unnumbered structure in-use and Building 14-11 not in use). Two pedestrian tunnels are located on the north side of Building 14-01 (Figure 2); the tunnels are approximately 100 ft long and extend 11 ft below ground surface (BGS) (above the groundwater table, which is generally encountered at about 11 to 12 ft BGS).

Existing structures on the Site are shown on Figure 2. Four storage tanks are currently located on the Site: a 20,000-gallon boiler fuel underground storage tank (UST; TS-01) located on the west side of Building 14-02, which was abandoned in-place in 2003; a 500-gallon diesel aboveground storage tank

(AST; TS-57) located on the west side Building 14-02; a 200-gallon diesel AST (TS-25) located on the northwest of Building 14-13; and an inactive 5,000-gallon aqueous wastewater AST (TSA-21) located west of Building 14-01. Each AST is located within secondary containment. The approximate locations of these ASTs and UST are shown on Figure 4.

In addition to the ASTs and UST, six sumps exist at the Site. One of the sumps is located in the southeast corner of Building 14-02 (this has not been assigned a numerical designation) and two are located in Building 14-01 (TS-26 and BMA046), as shown on Figure 4. The sump located in Building 14-02 is approximately 3 ft^2 and is located in a 10 ft^2 by 6 ft deep mechanical pit that houses underground utility pipes. The sump does not appear to be connected to the existing storm drain based on the presence of a pump in the sump. The depth of the sump has not been determined. Sump TS-26 was formerly located in the western portion of Building 14-01 and was associated with the aqueous degreaser that was recently removed from the Site. Sump BMA046 is located in the northern portion of Building 14-01, in an area that has historically been used for office space. Sump BMA046 is associated with a sanitary sewer lift station. The other three existing sumps are located outside of Building 14-01, as shown on Figure 4. Two of these sumps are associated with tunnels located north of Building 14-01. These sumps are 2 ft by 2 ft and 3 ft high concrete structures located 11 ft BGS at the base of the stairs used to exit the tunnels. The sumps collect rainwater that occasionally collects at the base of the stairs. The third sump is located at the base of the stairs and the northeast corner of Building 14-01 that lead to a room that houses piping and valves associated with the main water line. This sump also collects rainwater that occasionally collects at the base of the stairs. Construction details for this sump are not known, but are likely similar to the sumps associated with the tunnels. Rainwater collected in each of these three sumps is discharged, as needed, to the Site storm drain system. Other ASTs, USTs, and sumps shown on Figure 4 have either been removed or status is unknown.

Forty-two CBs, 15 storm drain manholes, and 2 oil/water separators (TS-92 and TS-93) are also present on the Boeing Thompson property. Stormwater collected in these structures is discharged to the LDW via Boeing storm drain lines and two outfalls. The storm drain system is shown on Figure 3. One of the outfalls is located at the northwestern portion of the Boeing Thompson property boundary, as described in Section 2.1.1, and is identified as Outfall A (also referred to as TS-2) on Figure 3. The second outfall is located at the southwest corner of the Boeing Thompson property near the 8801 Site boundary and is identified as Outfall B (also referred to as TS-1) on Figure 3. There are also two KCIA storm drain manholes on the Boeing Thompson property that are connected to the KCIA storm drain that runs beneath the Isaacson and Thompson properties and discharges to the LDW. Stormwater from the Boeing Thompson property does not enter the KCIA drain line. The outfall for the KCIA storm drain is located just north of Boeing Outfall A, near the Boeing Thompson and Boeing Isaacson property lines, as shown on Figure 3.

A steel bulkhead is located along the LDW shoreline in the northern portion of the Boeing Thompson property and a wooden bulkhead is located along the southern portion of the shoreline, as shown on Figure 2.

Boeing ceased active operations at the Thompson property in December of 2008 and the property was used only for storage for several years. Currently, Boeing's P-8 program operates at the Thompson property, and building modifications to expand operations there are being completed. Boeing is currently evaluating operations for use of the vacant portions of the Site.

2.2 SITE DEVELOPMENT

Meanders of the Duwamish River were formerly present in the area of the Site including a segment of the river that flowed west to east through the approximate center of the Site (Figure 5). Between 1910 and 1917, extensive dredge and fill operations were conducted in the lower Duwamish River valley and the river was channelized and placed in its current location to the west of the Site. The river channel modifications resulted in the creation of Slip 5 through part of the Site. Slip 5 was oriented east to west near the current center of the Site and extended from the waterway across approximately two-thirds of the Site (Figure 6). In 1936, filling of the slip began to allow development of the Site. Filling occurred in phases and was completed in about 1966. Based on aerial photographs, much of the filling occurred prior to the mid-1960s. The fill history of Slip 5 is shown on Figure 7.

The first known development of the Site occurred in 1917 after the river channelization. The Bissell Lumber Company constructed a sawmill on the land south of Slip 5. Shortly thereafter, in 1920, the Duwamish Lumber Company operated a sawmill on the western portion of the Site, north of Slip 5, and a planing mill was operated by the Tyee Lumber Company at the eastern end of Slip 5. The approximate locations of these operations are shown on Figure 6. Structures related to the operations are also visible in a 1936 aerial photograph (Figure 8). In 1943, the Isaacson parcel was purchased by Isaacson and was developed between 1943 and 1966. The Isaacson building was expanded from east to west in phases to cover nearly the entire land surface north of the former Slip 5 (Figure 6). Boeing purchased the Isaacson property from Isaacson in 1984. In 1988, Boeing proposed to redevelop the Boeing Isaacson property by demolishing the Isaacson building (referred to by Boeing as Building 14-05) and constructing a new building (referred to as Building 14-09). The Isaacson building was dismantled prior to 1990, but Building 14-09 was never constructed. With the exception of various earthwork projects, which are discussed later in this document, the layout of the northern portion of the Site has remained relatively unchanged since 1990. The Boeing Thompson facility was developed in the southern portion of the Site beginning in 1966. The layout of the Thompson facility has remained relatively unchanged since 1967. Historical aerial photographs are provided in the Phase I Environmental Site Assessment (ESA) reports (Landau Associates 2008a,b), which are further discussed in Section 3.0.

2.3 HISTORICAL SITE USE AND FEATURES

This section identifies and describes the historical uses of the Site, based on information developed by previous Phase I ESAs (Landau Associates 2008a,b). These documents should be reviewed for a more thorough description of historical Site uses. Historical uses of the Boeing Isaacson property (northern portion of the Site) include:

- **Duwamish Lumber Company.** The Duwamish Lumber Company operated a sawmill in the western portion of the Isaacson property, north of Slip 5, from approximately 1920 until sometime prior to 1946. Structures associated with the Duwamish Lumber Company included a sawmill, lunch room, engine room, blacksmith, lumber storage, wood bin, block bin, sawdust bin, and waste burner.
- **Tyee Lumber Company.** The Tyee Lumber Company operated a planing mill at the eastern end of Slip 5 during the approximate same time period as the Duwamish Lumber Company. Structures associated with the Tyee Lumber Company included garages, office, a planing mill, dry kilns, and a shavings bin. A storage tank was located north of the dry kilns building.
- **Mineralized Cell Wood Preserving Company.** The Mineralized Cell Wood Preserving Company operated on the northern side of Slip 5 for an unknown period of time beginning prior to 1945. The operations of this company involved heating a solution of arsenic and sulfate salts of copper and zinc and applying the solution under pressure to the base of logs. Storage tanks associated with this operation were reportedly cleaned twice per day and sludge and remaining chemicals in the tanks were reportedly drained directly to the ground surface.
- **Isaacson/US Navy.** In 1941, the United States Navy constructed steel melting, forging, and fabricating facilities north of the Site. The facilities were known as the Isaacson Iron Works Plant No. 2. Portions of the Isaacson property were used for activities associated with the plant, which included storage of scrap metal prior to it being melted down. Between 1943 and 1945, a galvanizing plant was constructed in the northeast corner of the Isaacson property; it was dismantled in 1967.
- **Isaacson.** The Isaacson property was purchased by Isaacson in 1943. In the 1950's, Isaacson purchased Isaacson Iron Works Plant No. 2 and expanded facilities from east to west in phases to cover nearly the entire land surface of the Isaacson property north of Slip 5. Structures associated with the facility included tractor repair, welding, tractor sheds, storage shed, tractor parts warehouse, offices, a scrap iron yard, galvanizing plant, general warehouse, paint shop, and paint storage. A transformer yard was located to the north of the galvanizing plant; however, it is not clear if the yard was located on the Isaacson property or on the adjacent property to the north. Sections of the main building were used for storage of scrap metal and fabricating shops.
- **Boeing Isaacson Property Operations**. Boeing purchased the Isaacson property from Isaacson in 1984. Boeing used the large steel fabrication building (referred to as Building 14-05) located on the Boeing Isaacson property for storage until it was demolished in 1989/1990,

including temporary storage of gasoline- and Jet A fuel-contaminated soil excavated in the mid to late 1980s from other nearby Boeing properties during UST removal.

Historical uses of the Boeing Thompson property (southern portion of the Site) include:

- **Bissell Lumber Company.** The Bissell Lumber Company operated a sawmill from approximately 1917 until 1952. The sawmill operations largely existed on the western portion of the Thompson property, adjacent to Slip 5. The structures associated with Bissell Lumber Company included a sawmill, wood bin, steam pump building, waste burner, transformer yard, blacksmith, and a building containing four storage tanks. Additionally, modifications to Slip 5, including piling installation, construction of log chutes, and dredging, were made to accommodate the sawmill operations. Title records and aerial photographs indicate that the sawmill was demolished in 1955.
- **Pre-Boeing Thompson Site Lessees.** Between approximately 1953 and 1956, the southern portion of the Site was leased to St. Johns Moto Express and Consolidated Freightways. Available information indicates that a rail spur and office building were located in this portion of the Site at the time of the leases.
- **Boeing Thompson Property Operations.** Boeing purchased the Thompson property from Charles Thompson in 1956. Boeing developed the Thompson facility in 1967. The facility was originally used to assemble one 737 aircraft, and to conduct fatigue testing of the 757 aircraft. The facility was later used for assembly of a United States' B-2 bomber fuselage section, and, most recently, by Boeing's Propulsion Systems Division for jet engine build-up. The facility currently consists of an industrial building (Building 14-01) where airplane assembly, washing, and painting was conducted, and several support structures including a boiler house (Building 14-02), two mechanical buildings (Buildings 14-03 and 14-14), a fire pump house (Building 14-13) and a water tank, an electrical substation (14-22), two guard shacks (one out of use unnumbered structure and Building 14-11). Former buildings that have been removed include a cafeteria (Building 14-15), a restroom/shower facility (Building 14-12), an office (Building 14-07), and hazardous waste/hazardous materials storage sheds (unnumbered). The hazardous waste/hazardous materials storage sheds were used to temporarily store hazardous materials and accumulated waste material from facility operations (e.g., paint sludge, spent solvents, spent copper brush plating solutions, soiled rags, etc.).

A statement of hazardous waste disposal provided in the *Report of Evaluation of Site Contamination* (Dames & Moore 1983) and included in Appendix E of this work plan indicates that petroleum distillates and solvents were stored and/or used on the property by Isaacson during Isaacson ownership. This statement also suggests that polychlorinated biphenyls (PCBs) may not have been used during Isaacson property ownership or present in the transformers at the time. A list of chemicals potentially used and/or stored by Boeing at the Boeing Thompson property is also provided in Appendix E.

Other features of significance include bulkheads constructed along the LDW. A wooden bulkhead was constructed along the LDW west of the northern portion of the Site during filling of Slip 5, on property currently owned by the Port. Construction details for this bulkhead are not known. A steel bulkhead was constructed along the central portion of the Site in the 1960s. This bulkhead consists of a sheet pile wall that extends 60 ft BGS. The sheet pile is supported with tiebacks and timber fender piles spaced on 9-ft centers. The tieback anchor rods are located about 6 ft BGS, extend 40 ft east behind the wall, and are supported by timber pile groups connected by a continuous concrete pile cap. A timber pile-supported concrete apron extends behind the bulkhead a distance of approximately 20 ft. A wooden bulkhead is also present along the southern portion of the Site, but the date of construction is unknown. A review of historical aerial photos indicates that a wooden bulkhead may have been present along this portion of the property since at least 1936. No other information for this bulkhead was available. The locations of these bulkheads are shown on Figure 2.

Prior to the filling of Slip 5 a 48-inch-diameter storm sewer conveyance line that conveyed stormwater from the east side of East Marginal Way South discharged at the east end of Slip 5 (referred to as the former Slip 5 Outfall and shown on Figure 9). In approximately 1966, and prior to the filling of Slip 5, the King County storm drain line was extended west to the LDW.

From 1966 to 1990, stormwater from the Isaacson property collected in 17 CBs that drained to the King County storm drain line. The configuration of the storm drain systems at the Isaacson property in 1983 and at the Thompson property in 1999 are shown on Figure 9. This figure shows a 6-inch storm drain line west of Building 14-02 that may have discharged non-contact cooling water from Building 14-02 (formerly used as a boiler house) to the LDW. According to a report titled *Environmental Risk Assessment of the Boeing Field Division, Boeing Commercial Airplane Company* (Risk Science International 1985), about 4 million gallons of non-contact cooling water were discharged annually to the LDW. The report also suggests about 5.5 million gallons of washdown water may have been discharged annually to the LDW via an oil/water separator.

In 1990, the King County storm drain line was rerouted from along the northern Boeing Isaacson property boundary to its current location, shown on Figure 3. After the storm drain line was rerouted, only Site stormwater collected by CB-39, which is located in the western portion of the Boeing Isaacson property, continued to drain to the 48-inch King County storm drain line. In 2008, upgrades to the Site stormwater treatment and conveyance system were completed. As described in Section 2.1.1, these upgrades included the installation of two Vortechs treatment vaults on the Boeing Isaacson property for the collection of stormwater and the settling of suspended material from the stormwater prior to discharge via Outfall A, located near the northern Boeing Thompson property boundary. Following these upgrades, Boeing completed a project to re-route the stormwater collected by CB-39 to the south into the existing Boeing Site stormwater system to eliminate all discharges of Site stormwater to the King County stormwater system. There are currently no connections between the Site stormwater system and the King County storm drain line. The Site stormwater system investigations and improvements are discussed further in Section 3.3.

3.0 PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

Environmental investigations at the Site to date have been conducted to characterize and evaluate the chemical quality and physical condition of soil, groundwater, sediment, and storm drain solids. In 2002, Environmental Resources Management (ERM) summarized the investigations and remedial actions completed at the Boeing Isaacson property through 2000 in a Comprehensive Data Summary Report (ERM 2002). Investigations and remedial actions completed at the Site after 2000 have been documented in various reports, including a Data Summary Report (Landau Associates 2009a), which provides a comprehensive overview of the investigations conducted in 2008 and the first half of 2009. This section briefly describes the environmental investigations and the remedial actions previously conducted at the Site.

In addition to these investigations, Phase I ESAs were conducted for the Boeing Isaacson property and the Boeing Thompson property to evaluate the environmental liabilities associated with the properties based on reasonably available documentation (both oral and written) and to support Boeing planning for future Site use. These Phase I ESAs included a review of records from Boeing's Environment, Health and Safety (EHS); Industrial Hygiene (IH); Radiation Health Protection (RHP); and Abatement Services (BAS); a review of historical information including aerial photographs, fire insurance maps, and historical tax records; and a site reconnaissance of the properties and adjacent properties to assess land use activities and environmental conditions. The results of the Phase I ESAs are documented in reports prepared by Landau Associates (Landau Associates 2008a,b). The 2008 Phase I ESA site reconnaissance results are provided in Appendix F.

3.1 SOIL AND GROUNDWATER

Available records indicate that soil and groundwater investigations and a remedial action were initiated at the Site in 1983, prior to Boeing's purchase of the Isaacson property in 1984. Since then, several investigations and additional remedial actions have occurred at the Site with the most recent soil investigation occurring in the latter half of 2009. All of the soil and groundwater investigations and remedial actions are discussed below in chronological order. Analytical data for soil and groundwater samples collected during these investigations are provided in Appendix G (soil) and Appendix H (groundwater), respectively.

3.1.1 AUGUST 1983 SOIL INVESTIGATIONS (DAMES & MOORE)

This initial environmental site investigation was conducted by Dames & Moore for Boeing in 1983 to identify possible contaminants in the soil and groundwater at the Isaacson property. The investigation was completed in two phases (Phase I and Phase II) and consisted of 22 soil borings (#1 through #22), shown on Figures 10 and 11, and installation of three monitoring wells in three of the borings. These wells and the associated boreholes are identified as B-7, B-12, and B-20 in previous reports and are discussed in Section 3.1.3. Soil samples were collected at each location and analyzed for PCBs; metals (arsenic, barium, cadmium, chromium, lead, mercury, nickel, selenium, silver, zinc); total cyanide; oil and grease; and total organic carbon (TOC). The scope of the investigation and the results are presented in *The Report of the Evaluation of Site Contamination, Isaacson Steel Property* (Dames & Moore 1983). The soil characterization portion of this investigation is discussed below. The groundwater characterization portion is discussed in Section 3.1.3.

Part of the soil characterization focused on potential contaminant source areas as follows:

- **Former Diesel and Gasoline Tanks.** Four diesel and gasoline tanks were located in the eastern portion of the Isaacson property, as shown on Figure 4. Boring #1 was located in this area and one soil sample collected at 5.5 ft BGS was analyzed for PCBs, metals, and total cyanide. PCBs, total cyanide, mercury, and silver were not detected. Concentrations of other metals detected in the soil sample were low [e.g., arsenic and lead were detected at 3.4 milligrams per kilogram (mg/kg) and 1.3 mg/kg, respectively]. This soil sample may be representative of current soil conditions at this location since no known information is available to confirm that the tanks and soil surrounding the tanks were removed.

- **Former Paint Storage Areas.** Two paint storage areas were previously located in the eastern portion of the Isaacson property, as shown on Figure 4. Boring #2 was located in this area and one soil sample collected at 2.5 ft BGS was analyzed for metals and cyanide. Total cyanide and silver were not detected in the soil sample and the concentrations of other metals that were detected in the sample were low (e.g., arsenic and lead were detected at 8.7 mg/kg and 11 mg/kg, respectively). This soil sample may be representative of current soil conditions at this location because no known soil removal has occurred at this location.

- **Former Steam Cleaning Rack and Sump.** A steam cleaning rack and associated sump was formerly located in the northern portion of the Isaacson property as shown on Figure 4. The steam cleaning rack was used by Isaacson to clean equipment. Water, waste sludge, and solvents from the cleaning filtered into a 5-ft deep sand and gravel unlined sump. In about 1979 or 1980, a catch pan was placed above the sand and gravel in the sump to facilitate collection and disposal of waste sludge and solvent, but the sump was never connected to the sewer (Dames & Moore 1983). A sample of the sludge within the sump/CB contained arsenic, zinc, and oil and grease at concentrations of 39.0 mg/kg, 94,950 mg/kg, and 350,000 mg/kg, respectively. Boring #3 was located adjacent to the sump and borings #11 and #B-12 were located east and south of the sump, respectively. Three soil samples were collected at boring #3 at depths ranging between 2.5 ft BGS and 10.5 ft BGS; two soil samples were collected at boring #11 at depths of 6.5 ft BGS and 11.5 ft BGS; and three soil samples were collected at boring #B-12 at depths ranging between 6.5 ft BGS and 14 ft BGS. The soil samples were analyzed for metals, total cyanide, and oil and grease. One sample at boring #3, the deepest, was also analyzed for PCBs. Arsenic was detected in the soil at concentrations up to 2,880 mg/kg, zinc at concentrations up to 2,030 mg/kg, and oil and grease at a concentration of 1,850 mg/kg. PCBs were not detected above a reporting limit of 0.2 mg/kg. The sump and associated soil were later removed as described in Section 3.1.4. Only the soil sample collected at boring #B-12 at a depth of 14 ft BGS may represent current soil conditions in this area because no subsequent soil removal is known to have occurred at this location.

- **Former Transformer Bank.** A former transformer bank was located in the northern portion of the Isaacson property, as shown on Figure 4. Boring #4 was located adjacent to the transformer bank. Three soil samples were collected (2.5 ft BGS, 6.5 ft BGS, and 10.5 ft BGS) and analyzed for metals, and one sample (6.5 ft BGS) was analyzed for PCBs. PCBs were not detected above the reporting limit of 0.2 mg/kg. These soil samples may represent current soil conditions at this location because no subsequent soil removal is known to have occurred at this location.
- **Fill Material Along Southern Property Boundary.** Seven soil borings (#5, #7-1, #7-5, #15, #16, #17, and #19) were completed in the fill material located along the southern Isaacson property boundary, as shown on Figure 10. This area was the location of the northern portion of Slip 5 that was filled in the 1960s. Soil samples were generally collected at shallow depths ranging between 1.5 ft and 3.5 ft BGS at these locations, except at boring #7-5, where soil samples were also collected at depths of 8.5 ft BGS, 13.5 ft BGS, and 18.5 ft BGS, and at borings #16 and #17 where soil samples were also collected at 6.5 ft BGS. All of the soil samples were analyzed for metals and some of the soil samples were analyzed for PCBs, total cyanide, and oil and grease. Total cyanide was not detected in any soil samples. Arsenic was detected at concentrations up to 36 mg/kg. Elevated concentrations of zinc (440 mg/kg to 3,640 mg/kg) were detected at borings #5, #7-1, #7-5, #15, #16, and #17, and elevated concentrations of cadmium, chromium, and lead were detected at one or more of the soil borings. The highest oil and grease concentration detected in the soil was 2,020 mg/kg at boring #15. PCB concentrations were less than 1 mg/kg or not detected in soil samples collected at each soil boring except at boring #5 where PCB Aroclor 1254 was detected at a concentration of 9.7 mg/kg. Soil samples collected at soil borings #5, #7-1, #7-5, #15, #16, #17, and #19 may represent current soil conditions in this area because no subsequent soil removal is known to have occurred at this location.

The remaining soil borings were located along the western and northern property boundaries (borings #6-3 and #10, respectively); within the former Isaacson building (borings #8, #9, #13, and #14); and at the Thompson property (borings #20, #21, #22). No samples were collected at boring #8 for laboratory analysis. Except at boring #6-3, no elevated concentrations of metals or PCBs were detected in the soil samples at these locations. At boring #6-3, elevated concentrations of cadmium (7.7 mg/kg), chromium (466 mg/kg), lead (580 mg/kg), and zinc (2,320 mg/kg) were detected in the soil and PCB Aroclor 1260 was detected at 1.2 mg/kg. Except for boring #9, these explorations are in areas where soil removal has not occurred; therefore, analytical results for these soil samples may represent soil remaining in this area because no subsequent soil removal is known to have occurred at this location.

One slag sample was collected from fill material located along the Isaacson southern property boundary. The sample was analyzed for major and trace components. Barium and chromium were detected at concentrations of 1,350 mg/kg and 4,330 mg/kg, respectively; arsenic was not detected above the reporting limit of 30 mg/kg. The results are summarized in tabular format in Appendix I.

3.1.2 OCTOBER 1983 SOIL INVESTIGATIONS (WICKS)

In October 1983, soil samples were collected from boreholes associated with the installation of seven monitoring wells [I-1(s) through I-7(s)] at the locations shown on Figures 10 and 11. The soil samples were analyzed for arsenic, total chromium, copper, lead, and zinc. Only one soil sample [I-7(s)] was analyzed for barium and cadmium. Elevated concentrations of arsenic (up to 3,800 mg/kg), copper (up to 2,400 mg/kg), lead (up to 440 mg/kg), and zinc (up to 380 mg/kg) were detected at I-1(s), which was located in the area of the former steam cleaning rack, and/or at I-2(s), which was located inside the former Isaacson building just south of the former transformer bank area (Figure 10). However, subsequent remedial actions removed most of the soil associated with elevated concentrations of arsenic, copper, lead, and zinc at these locations. Elevated concentrations of chromium (up to 740 mg/kg), copper (up to 360 mg/kg), lead (up to 3,900 mg/kg), and zinc (up to 1,500 mg/kg) were also detected in soil samples collected at I-7(s), which is located in the fill material along the southern Isaacson property boundary adjacent to boring #5. Soil at this location has not been removed.

Soil samples collected at locations I-1(s), I-2(s), and I-7(s) were also tested to determine the leachability of the metals to groundwater to determine if the soil would be classified as a hazardous waste using the Extraction Procedure (EP) Toxicity test. Metals analyzed using this procedure included those metals analyzed in the soil samples (arsenic, total chromium, copper, lead, and zinc) and additional metals including barium, cadmium, hexavalent chromium, mercury, selenium, and silver. Barium, hexavalent chromium, mercury, selenium, and silver were not detected using this procedure. The concentrations of those metals that were detected using this procedure are as follows: arsenic at 7,800 micrograms per liter (µg/L) and 7,300 µg/L [two depth intervals at I-1(s)]; cadmium at 20 µg/L [I-7(s)], total chromium at 100 µg/L [I-7(s)], and lead at 6,100 µg/L [I-7(s)].

In addition to the above soil samples, four samples of slag were collected and analyzed for arsenic, total chromium, copper, lead, and zinc. The slag samples were collected at I-4(s), I-6(s), and I-7(s), which were all located in fill material west and south of the former Isaacson building. One sample was collected from each location and one sample was a composite of slag collected at I-4(s) and I-6(s). The composite sample was also analyzed for barium. The results of the slag samples indicate relatively low concentrations of arsenic (18 mg/kg to 20 mg/kg) and elevated concentrations of total chromium (920 mg/kg to 2,200 mg/kg); copper (160 mg/kg to 1,200 mg/kg); and lead (120 mg/kg to 1,400 mg/kg). Barium and cadmium were detected in the composite sample at concentrations of 440 mg/kg and 2.2 mg/kg, respectively. EP Toxicity tests were also performed on the slag samples, but none of the metals were detected using this procedure.

The analytical results for the soil and slag samples are presented in the *Project Description for Remedial Work* report (Wicks 1984a).

3.1.3 1983 GROUNDWATER MONITORING

In August 1983, three groundwater samples were collected from monitoring wells B-7, B-12, and B-20 (Figure 12) and analyzed for metals (antimony, arsenic, barium, cadmium, chromium, lead, mercury, nickel, selenium, silver, and zinc); fluoride; total cyanide; phenol; and TOC (Dames & Moore 1983). It is not documented whether the metals results are total or dissolved. Only mercury was not detected in the groundwater samples. Arsenic was detected at concentrations up to 310 µg/L, barium was detected at concentrations up to 390 µg/L, cadmium was detected at concentrations up to 3.6 µg/L, chromium was detected at concentrations up to 130 µg/L, lead was detected at concentrations up to 95 µg/L, selenium was detected at concentrations up to 4 µg/L, and silver was detected at concentrations up to 8.1 µg/L. Nickel was only analyzed in one sample, from well B-7, and was detected at a concentration of 110 µg/L. Total cyanide was also detected at well B-7 at a concentration of 13 µg/L. Fluoride and phenol were detected at concentrations up to 500 µg/L and 81 µg/L, respectively.

In October 1983, six monitoring wells [I-1(s), I-2(s), I-4(s), I-5(s), I-6(s), and I-7(s)] were installed on the Isaacson property and one monitoring well [I-3(s)] was installed off-property at the locations shown on Figure 12. Groundwater samples were collected from these wells and wells B-12 and B-20 in October and December 1983 and analyzed for dissolved metals (arsenic, chromium, copper, nickel, lead, zinc). Arsenic, chromium, copper, nickel, and zinc were detected in groundwater samples from each location, including the well located off-property and hydraulically upgradient of the Site [I-3(s)]. Lead was detected in less than half the samples analyzed and the concentrations detected were generally below 5.0 µg/L, except at well B-20 where lead was detected at a concentration of 30 µg/L. Elevated concentrations of dissolved zinc (14,000 µg/L and 8,000 µg/L) were detected at well B-12 in October 1983 and December 1983, respectively. Elevated concentrations of zinc were also detected in the soil at well B-12. Arsenic concentrations ranged from 8.5 µg/L to 590 µg/L, except at well I-2(s) where dissolved arsenic was detected at 9,200 µg/L and 4,400 µg/L in October and December 1983, respectively. The maximum chromium concentration (10.9 µg/L) also occurred at well I-2(s) during the December event. As described below in Section 3.1.4, remedial activities were later conducted in the area of wells B-12 and I-2(s).

The results for the October and December 1983 groundwater samples are reported in the *Project Description for Remedial Work* report (Wicks 1984a).

3.1.4 1984 SOIL REMEDIATION

In 1984, Isaacson implemented a remedial action that consisted of excavating arsenic- and zinc-contaminated soil from three areas located in the northern portion of the Site. These areas, identified as

A, B, and C, are shown on Figure 13. The extent of contamination identified and excavation within each area are described below. Further detail on the basis and scope of the remedial action is provided in two reports: *Project Description for Remedial Work* (Wicks 1984a) and the *Report on Remedial Project and Recommendation for Project Completion at Isaacson Corporation Property* (Wicks 1984b).

The Area A excavation was located around well I-2(s) where elevated concentrations of arsenic were present in the soil and groundwater. Based on the analytical results for soil samples collected at this location, soil was excavated from an area about 13 ft by 25 ft, centered on this well. The excavation extended vertically to a depth of 11 ft BGS. Soil samples were collected from the base and sidewalls of the excavation and analyzed for arsenic. The concentration of arsenic in the soil sample collected from the base of the excavation, PZFA, was 530 mg/kg. This result may represent soil remaining at this location; however, the results for the sidewall samples may not represent remaining soil as the soil represented by the samples was removed during subsequent remedial actions.

The excavation at Area B occurred at the location of the former steam cleaning rack and a 5-ft deep sand and gravel sump where the previous investigations had identified elevated concentrations of arsenic and zinc in the soil. The excavation removed the sump and some soil surrounding the sump to a depth of 4.7 ft BGS. Soil samples were collected from the base and sidewalls of the excavation and analyzed for zinc; however, the results for these samples may not represent soil remaining at this location, as the soil represented by these samples was removed during subsequent remedial actions.

The excavation in Area C was conducted to address arsenic-contaminated soil at I-1(s) and boring #11. The excavation was about 23 ft by 23 ft and extended to a depth of 12 ft BGS. Soil samples were collected from the base and sidewalls of the excavation and analyzed for arsenic. The concentration of arsenic in the soil sample collected from the base of the excavation, PZFC, was 290 mg/kg. This result may represent soil conditions remaining at this location; however, the results for the sidewall samples may not represent current soil conditions because the soil represented by those samples was removed during subsequent remedial actions.

During this remedial action, arsenic EP toxicity tests were performed on 11 soil samples. Arsenic concentrations ranged from less than 0.2 milligrams per liter (mg/L) to 8.9 mg/L. The dry weight concentrations for these samples ranged from 67 mg/kg to 5,000 mg/kg.

After completion of the remedial action, Ecology issued a letter indicating that no further action (NFA) would be required unless groundwater monitoring indicated that arsenic was present in groundwater at concentrations greater than the identified cleanup level (Ecology 1985). As a result, a program for monitoring arsenic in groundwater was developed and implemented in 1985 and 1986. The groundwater monitoring program is described in Section 3.1.6.

3.1.5 1984 WICKS SOIL INVESTIGATION AND INSTALLATION OF WELL I-8(S)

In 1984, following excavation of soil in Areas A, B, and C, 12 soil samples were collected outside of the limits of the Area C excavation. All of the soil samples were collected from a depth of 8 ft BGS and analyzed for arsenic (Wicks 1984b). The soil samples are identified as PZTCS 7', PZTCS 14', PZTCS 20', PZTCW 5', PZTCW 10', PZTCE 7', PZTCE 14', PZTCE 20', T-1, T-2, T-3, and T-4. The locations of these soil samples are shown on Figures 10 and 11. Only the results for samples T-1 and T-4 (26 mg/kg and 10 mg/kg arsenic, respectively) and PZTCE 7', PZTCE 14', PZTCE 20' (1,800 mg/kg, 940 mg/kg, and 1,700 mg/kg) may represent current soil conditions at this location because no subsequent soil removal is known to have occurred at this location. Soil represented by the other samples was removed by subsequent excavations. The analytical results for the post-excavation soil investigation samples are reported in the *Report on Remedial Project and Recommendation for Project Completion at Isaacson Corporation Property* (Wicks 1984b).

In November 1984, monitoring well I-8(s) and observation well I-8M were installed and hydraulic conductivity testing was performed at wells I-3(s), I-4(s), I-6(s), I-7(s), I-8(s), and I-8M (Sweet Edwards 1984).

3.1.6 1985 GROUNDWATER MONITORING

Following remediation of arsenic-contaminated soil at the Isaacson property, Ecology requested that groundwater monitoring at the property be continued and annual reports be submitted to Ecology for 2 years (Ecology 1985). To comply with Ecology's request, groundwater samples were collected from wells I-2(s), I-7(s), and B-12 in June 1985 and analyzed for total and dissolved arsenic (Landau Associates 1986). According to the groundwater monitoring plan prepared by Landau Associates for Boeing in 1985 (Landau Associates 1985), wells I-1(s), I-2(s), I-4(s), and I-5(s) were damaged or inaccessible and, in October 1985, Boeing installed two new monitoring wells [I-104(s) and I-105(s)] to replace damaged wells I-4(s) and I-5(s). The locations of monitoring wells I-104(s) and I-105(s) are shown on Figure 12. In December 1985, groundwater samples were collected from wells I-3(s), I-6(s), I-7(s), I-8(s), I-104(s), I-105(s), and B-12 and analyzed for total and dissolved arsenic.

For samples collected at the wells located on the property [I-6(s), I-7(s), I-8(s), I-104(s), I-105(s), and B-12], dissolved arsenic concentrations ranged from less than 5 µg/L [I-104(s) and I-6(s)] to 1,200 µg/L [I-105(s)] and total arsenic concentrations ranged from 18 µg/L [I-104(s)] to 2,400 µg/L [I-105(s)] during these two events. At the off-property well [I-3(s)], dissolved arsenic was not detected above the reporting limit of 5 µg/L, and total arsenic was detected during both sampling events at concentrations of 12 µg/L and 15 µg/L.

The 1985 groundwater monitoring results are reported in the *First Annual Report Groundwater Monitoring Program Boeing Isaacson Property,* 8541 *East Marginal Way South, Seattle, Washington* report (Landau Associates 1986).

3.1.7 1986 AND 1987 GROUNDWATER MONITORING

In 1986 and 1987, groundwater samples were collected annually from wells I-3(s), I-6(s), I-7(s), I-8(s), I-104(s), I-105(s), and B-12(s) and analyzed for total and dissolved arsenic. In 1986, for those samples collected at the wells located on the property [I-6(s), I-7(s), I-8(s), I-104(s), I-105(s), and B-12], dissolved arsenic concentrations ranged from less than 5 µg/L [I-104(s)] to 510 µg/L (B-12), and total arsenic concentrations ranged from less than 5 µg/L [I-104(s)] to 1,500 µg/L [I-105(s)]. In 1987, dissolved arsenic concentrations ranged from less than 5 µg/L [I-104(s)] to 4,300 µg/L [I-105(s)], and total arsenic concentrations ranged from 6 µg/L [I-104(s)] to 4,300 µg/L [I-105(s)]. At the off-property well [I-3(s)], dissolved arsenic was not detected above the reporting limit of 5 µg/L, and total arsenic was detected during both sampling events at concentrations of 14 µg/L and 27 µg/L.

The 1986 and 1987 groundwater sample results are reported in Appendix D of the *Building 14-09 Thompson-Isaacson Site Investigation Data Report* (Landau Associates 1988).

3.1.8 1988 SOIL INVESTIGATION

In 1988, Boeing planned to demolish the Isaacson building (also referred to by Boeing as Building 14-05) and construct a new building (referred to as Building 14-09) along the north side of Building 14-01. Prior to the planned construction, Boeing conducted a soil and groundwater investigation to further evaluate soil and groundwater quality. Initially, the investigation consisted of collecting soil samples from 46 explorations [210-244, 250, 251, 252, 260, 290, I-8(i), I-200(s), I-202(s), I-203(i), I-205(s), and I-206(s)] and installing 8 wells [I-8(i), I-200(s), I-201(s), I-202(s), I-203(s), I-203(i), I-205(s), and I-206(s)]. Boeing identified the wells as shallow wells (s) if the wells extended to depths of 30 ft BGS or less and as intermediate wells (i) if the wells extended to depths greater than 30 ft BGS.

All of the soil samples were analyzed for arsenic. Additionally, all of the soil samples collected from the Slip 5 fill material were analyzed for chromium, copper, lead, nickel, and zinc, and a subset of these were also analyzed for cadmium, mercury, silver, total cyanide, polycyclic aromatic hydrocarbons (PAHs), PCBs, and volatile organic compounds (VOCs). Soil samples from three explorations located in the areas of previous excavation areas A, B, and C, and one exploration located near the northern Boeing Isaacson property boundary, were also analyzed for PCBs and VOCs.

Based on the results of the soil investigation, two areas of elevated arsenic concentrations were identified: Bay 13 of the former Isaacson building and in the courtyard between Bays 11, 12, and 14 of the former Isaacson building. Low concentrations of VOCs were also detected in the soil in this area. As recommended by Ecology, additional investigations were conducted in 1988 to better delineate the distribution of arsenic concentrations in soil in these areas. Soil samples were collected from 0 to2.5 ft BGS, 2.5 to 6.5 ft BGS, and 6.5 to 9.5 BGS at seven borings (identified as 313, 317, 318, 328, 330, 416, and 417) and analyzed for arsenic. Four of the samples, 317, 318, 416, and 417 were located north of the courtyard and Bays 11, 12, and 14, and the others were located south of the courtyard and Bays 11, 12, and 14, as shown on Figures 10 and 11. Based on the results of the 1988 investigations, a work plan for excavating soil within the two areas was prepared by Landau Associates for Boeing (Landau Associates 1989a).

Elevated concentrations of chromium (up to 4,180 mg/kg); lead (up to 1,690 mg/kg); nickel (up to 2,460 mg/kg); and zinc (up to 5,770 mg/kg) were detected in soil samples collected from the Slip 5 fill material. EP toxicity test results for those samples containing the maximum dry weight concentrations of these metals were non-detect for chromium, 90 µg/L for lead, 7,070 µg/L for nickel, and 132,000 µg/L for zinc. Other constituents detected in the Slip 5 fill included arsenic, cadmium, copper, silver, PAHs, toluene, and xylenes. Low concentrations of PCBs (0.06 mg/kg to 0.51 mg/kg) were also detected in the Slip 5 fill material.

All of the soil samples collected in 1988 may represent current soil conditions, except at explorations 210, 214, 220, 222, 226, 227, 231,238, and 242, where only the deepest soil samples (greater than 10.0 ft BGS) may represent soil remaining at the Site; soil shallower than 10 ft BGS at these locations was removed during subsequent remediation activities as described in Sections 3.1.10 and 3.1.12.

The results for the initial 46 soil samples are reported in Appendix C of the *Building 14-09 Thompson-Isaacson Site Investigation Data Report* (Landau Associates 1988). The results for the remaining soil samples are reported in Appendix B of the *Comprehensive Data Summary Report Boeing Isaacson Site*, ERM 2002)

3.1.9 1988 GROUNDWATER INVESTIGATION

In 1988, eight wells [I-8(i), I-200(s), I-201(s), I-202(s), I-203(s), I-203(i), I-205(s), and I-206(s)] were installed and, in February of 1988, groundwater samples were collected from the new wells and existing wells [B-12, B-20, I-6(s), I-7(s), I-8(s), I-104(s), and I-105(s); Landau Associates 1988]. All of the groundwater samples were analyzed for the following dissolved metals: arsenic, chromium, copper, lead, nickel, and zinc. Groundwater samples from B-20, I-6(s), I-7(s), I-202(s), I-203(s), I-203(i), I-205(s), and I-206(s) were also analyzed for dissolved cadmium, mercury, dissolved silver, VOCs, semivolatile organic compounds (SVOCs), and pesticides. Groundwater samples from I-6(s) and I-105(s) were also analyzed for dissolved barium, dissolved iron, dissolved manganese, dissolved selenium, oil and grease, dissolved oxygen, and TOC. Elevated concentrations of arsenic (100 µg/L to 15,000 µg/L) were detected at wells B-12, B-20, I-105(s) I-201(s), I-202(s), I-203(i), and I-106(s). Elevated concentrations of copper (500 µg/L) and zinc (9,090 µg/L) were also detected at well B-12. Silver and selenium were not detected in any of the samples, and mercury and copper were detected in only one sample at or slightly above the reporting limit. Barium was detected in the samples, but at low concentrations (6 µg/L and 22 µg/L). VOCs were detected at wells B-12, I-105(s), and I-202(s). Low concentrations of SVOCs were also detected in most of the groundwater samples analyzed for SVOCs. Pesticides were not detected in any of the samples.

The results for the 1988 groundwater samples are reported in Appendix D of the *Building 14-09 Thompson-Isaacson Site Investigation Data Report* (Landau Associates 1988).

3.1.10 1989 Soil Excavation

In 1989, prior to Boeing's planned removal of the Isaacson building and paving of the Isaacson property, Ecology requested that soil containing elevated arsenic concentrations be removed from Bay 13 and the courtyard between Bays 11, 12, and 14 of the former Isaacson building (Ecology 1988). In each area, soil was excavated to the groundwater table (approximately 10 to 12 ft BGS). The lateral extent of the excavations is shown on Figure 13. Excavations were backfilled with pea gravel, imported fill, and excavated soil. During the excavations, field screening tests and laboratory tests were performed on samples collected from the soil stockpiles to determine appropriate disposition of the excavated soil. Soil containing arsenic concentrations greater than or equal to 500 mg/kg arsenic was disposed of offsite. Soil containing less than 500 mg/kg arsenic was used as backfill for the excavations. Sidewall samples were collected from each excavation. If a sidewall sample contained arsenic at a concentration of 500 mg/kg or greater, additional excavation was conducted and additional sidewall samples were collected. For the courtyard excavation, five samples were collected from each of the north and south sidewalls, three from the east sidewall, and two from the west sidewall. Due to further remediation in this area in 1991, only the samples collected from the north and south sidewalls may represent soil remaining in this area. These samples are identified as N-01 through N-04, N-05-A1, S-01-B1, and S-02 through S-05 on Figure 11. For the Bay 13 excavation, three samples were collected from each of the north and south sidewalls and one sample was collected from each of the west and east sidewalls. For the same reason, only the samples collected from the north and south sidewalls of the Bay 13 excavation may represent remaining soil. These samples are identified as N-01 through N-03, S-01, S-02, and S-03-A1 on Figure 10 The specific location of each sample along the sidewalls of each excavation is unknown; therefore, the locations shown on Figures 10 and 11 are approximate. The maximum arsenic concentration detected in the sidewall samples for soil remaining at the Site was 420 mg/kg.

Further details of the soil excavations are provided in the *Draft Thompson-Isaacson Site Soil Excavation Summary Report* (Landau Associates 1989b).

3.1.11 1989/1990 Storm Drain Line Sampling

In late 1989 and early 1990, the former Isaacson building (Building 14-05) was demolished and the storm drain line that transversed the Boeing Isaacson property near the southern property boundary was rerouted along the northern property boundary as part of the planned development of the site by Boeing. The new storm drain line was installed to an average depth of 13 ft BGS (Technical Dryer 1991). To evaluate proper disposition of the soil excavated along the alignment of the new storm drain, soil removed from each 10 to 12 ft length of the storm drain alignment was stockpiled separately (126 stockpiles total) and sampled. The stockpile samples were analyzed for arsenic. Soil stockpiles containing arsenic concentrations greater than or equal to 500 mg/kg arsenic were disposed of offsite. Soil stockpiles containing less than 500 mg/kg arsenic were used as backfill for the new storm drain line. The analytical results for the stockpile samples and the locations along the storm drain trench that they represent are shown on Figures 14A and 14B.

In general, soil excavated from the western half of the north portion of the trench contained arsenic at concentrations equal to or greater than 500 mg/kg. If a soil stockpile sample contained arsenic concentrations greater than or equal to 500 mg/kg arsenic, soil samples were collected from each sidewall corresponding to that portion of the trench where the soil was removed. The results of the sidewall samples are presented on Figures 14A and 14B. Based on the results of the sidewall samples, further excavation was conducted on both sides of the storm drain line in some areas. The lateral extent of these excavations is shown on Figure 13. The vertical extent of the excavations was approximately 11 ft BGS, at which depth groundwater was encountered. Sidewall samples were also collected from the additional excavations; however, achieving removal of all soil containing arsenic concentrations equal to or greater than 500 mg/kg was determined to be impracticable. Three sidewall samples collected from an excavation north of the trench contained arsenic concentrations up to 3,500 mg/kg; however, further excavation was not conducted due to the excavation's proximity to the northern property line. Additionally, following removal of additional soil on the opposite side of the storm drain line from these northern sidewall samples, elevated arsenic concentrations continued to be present in samples collected from the western sidewall of this excavation. Soil excavation ceased and 96 test pits were completed to evaluate the extent of arsenic-contaminated soil. At each test pit, soil samples were collected from the following depth intervals: 1 to 3 ft BGS, 3 to 5 ft BGS, and 5 to 9 ft BGS. The depth intervals were designated as AA, A, and B in the sample identifications; with AA being the shallowest and B being the deepest. The test pits were identified as 1A, 1B, 1C, 1D, 2A, 2B, 2C, and so on. The locations of the test pits are shown on Figure 15.

Soil samples collected from the sidewall samples that may represent current soil conditions along the storm drain line include SW1 through SW-28, SW-33 through SW-40, SW-44 through SW-46, SW-50, and SW-54 through SW-60. Test pits where soil samples were collected that may represent current soil conditions north of former Slip 5 because no subsequent soil removal is known to have occurred at these locations include 6J, 6K, 8J, 10J, 18N, 18E, 22N, 24B, 25N, 25A through 25D, 26B, 27B. 28A, 28B, 28D, 29B, 30B, 31A, 31B, and 31D.

Details of the storm drain line sampling are provided in the *Thompson-Isaacson Site Storm Drain Line and Soil Core Sampling* report (Technical Dryer, Inc. 1991).

3.1.12 1991 SOIL STABILIZATION

The results of the 1989/1990 storm drain line sampling identified an area of approximately 35 ft by 175 ft that required remediation due to elevated concentrations of arsenic in soil. The selected remediation method consisted of excavation of soil within the area to the depth of the groundwater table (approximately 12 ft BGS) and chemical treatment and stabilization of the excavated soil using soluble silicate solutions and cementatious materials. Because previous sampling results indicated arsenic concentrations in shallow soil were below the remediation cleanup level of 200 mg/kg, most of the soil removed from the upper 2 to 3 ft of the excavation was not treated or stabilized and was used as backfill. The remediation activities occurred between August and November 1991. Excavation sidewall samples were collected as shown on Figures 16A and 16B. Excavation continued until all sidewall sample arsenic concentrations were below 200 mg/kg, except along the northern boundary of the excavation. Additional excavation to the north was not feasible due to the King County storm drain line located approximately 15 ft north of the excavation. Concentrations of arsenic greater than 200 mg/kg primarily occurred along the portion of the northern sidewall between Manhole 5 and Manhole 4, shown on Figures 16A and 16B. At several locations, the arsenic concentrations were greater than 1,000 mg/kg.

Following stabilization, the material was returned to the excavated area; however, the volume of treated material was greater than the excavated area and a mound of surplus material was created. The stabilized material, including the mound, was covered with asphalt pavement.

Soil samples that may represent current soil conditions north of Slip 5 because no subsequent soil removal is known to have occurred at this location include storm drain lines sidewall samples SW-1 through SW-60.

Further detail on the basis and scope of the remedial action and analytical results is provided in the *Thompson-Isaacson Site Soil Excavation Work Plan Final Report* (Landau Associates 1989b).

3.1.13 1991 GROUNDWATER MONITORING

During treatment and stabilization of arsenic-contaminated soil in 1991, groundwater samples were collected four times at five monitoring wells [I-104(s), I-200(s), I-203(i), I-205(s), and I-206(s)] and analyzed for dissolved arsenic. The results indicated that the groundwater samples collected from wells located immediately downgradient from the soil remedial action area [wells I-104(s) and I-203(s)] had dissolved arsenic concentrations ranging from 15 µg/L to 576 µg/L. Dissolved arsenic concentrations at the wells located on the Thompson property [I-205(s), and I-206(s)] ranged from 6 µg/L at well I-205(s) to 1,790 µg/L at well I-206(s).

The results for the 1991 groundwater samples are reported in the *Evaluation of Groundwater Compliance Monitoring Program, Boeing Thompson-Isaacson Site, Seattle, Washington* report (GeoEngineers 1997).

3.1.14 1992-1996 POST-SOIL STABILIZATION GROUNDWATER MONITORING

Following treatment and stabilization of arsenic-contaminated soil at the Boeing Isaacson property in November 1991, voluntary compliance groundwater monitoring was conducted to establish a baseline for post-remediation groundwater conditions and to evaluate long-term effectiveness of site remedial activities (GeoEngineers 1997). The monitoring was conducted biannually at five monitoring wells [I-104(s), I-200(s), I-203(i), I-205(s), and I-206(s)] between 1992 and 1994 for a total of five post-remediation sampling events and annually at the same wells in 1995 and 1996. Each biannual event consisted of collecting groundwater samples at low tide weekly for 4 weeks and analyzing the samples for dissolved arsenic. Each annual event consisted of collecting a single sample at each location and analyzing the sample for total and dissolved arsenic. The results of the post-remediation monitoring are compiled in a report titled *Evaluation of Groundwater Compliance Monitoring Program, Boeing Thompson-Isaacson Site* (GeoEngineers 1997). The results indicated that the groundwater samples collected from wells located downgradient from the soil remedial action area [i.e., wells I-104(s), I-203(i), and I-205(s)] had concentrations of dissolved arsenic up to 640 µg/L. The samples from monitoring well I-206(s) had dissolved arsenic concentrations ranging from 1,360 µg/L to 2,000 µg/L.

3.1.15 1996 STRATAPROBE SOIL AND GROUNDWATER SAMPLING

In April 1996, six strataprobe borings (HP-1 through HP-6) were installed in the vicinity of monitoring well I-206(s), as shown on Figure 10, in an effort to identify a source for the arsenic previously detected in groundwater at well I-206(s) (GeoEngineers 1997). Sixty-three soil samples were collected from depths ranging between 1 to 20 ft BGS at each boring and analyzed for arsenic. Arsenic concentrations ranged from 0.7 to 43.0 mg/kg. One grab sample of the groundwater at each boring was also collected and analyzed for dissolved and total arsenic. Dissolved arsenic concentrations in the groundwater samples ranged from 66 µg/L to 660 µg/L, and total arsenic was detected at concentrations ranging from 110 µg/L to 570 µg/L. The investigation did not identify a source for the arsenic in groundwater at well I-206(s) (GeoEngineers 1997).

The results for the 1996 soil and groundwater samples are reported in the *Evaluation of Groundwater Compliance Monitoring Program, Boeing Thompson-Isaacson Site, Seattle, Washington* report (GeoEngineers 1997).

3.1.16 1993 – 1995 Hydraulic Test Pad Area Excavations

In late 1993, approximately 10 ft of petroleum product was observed in a monitoring well near an oil/water separator located in the hydraulic test pad area east of Building 14-03. Twelve soil borings (B-1 through B-12) were completed in the area of the well and a nearby oil/water separator. The boring locations are shown on Figure 10. Heavy sheens were observed in the borings nearest the oil/water separator (B-4, B-5, B-6, and B-7). Soil samples were collected from each boring and analyzed for diesel-range, oil-range, and/or gasoline-range petroleum hydrocarbons. Elevated concentrations of petroleum hydrocarbons were detected in borings B-4, B-6, and B-9. The analytical results for the soil borings are summarized in Appendix G. Based on the results of the soil investigation, the estimated volume of soil to be excavated was 825 cubic yards (yd^3). Documentation showing the lateral and vertical extent of the excavation has not been identified; however, a figure showing planned excavation limits (GeoEngineers 1994) suggests that soil at borings B-4 through B-9 may have been removed. The results of the 1994 subsurface investigation are reported in *Report of Geotechnical Services, Subsurface Investigation Oil/Water Separator Area, Building 14-03, Thompson-Isaacson Facility* (GeoEngineers 1994).

The oil/water separator system consisted of a 5,000-gallon steel oil/water separator and an associated 4,000-gallon fiberglass holding tank (TS-04) (GeoEngineers 1994). A sample of the sludge present in the oil/water separator was collected and analyzed for VOCs; SVOCs; metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver); and PCBs. Several VOCs were detected in the sludge sample including acetone (1.4 mg/kg), 2-butanone (0.39 mg/kg), toluene (0.23 mg/kg), ethylbenzene (0.36 mg/kg), and xylenes (up to 0.16 mg/kg). PCB Aroclors 1254 and 1260 were detected in the sludge sample at concentrations of 1.3 mg/kg and 0.65 mg/kg, respectively. SVOC BEHP was detected in the sludge sample at a concentration of 16 mg/kg. All of the metals analyzed for were detected in the sludge sample, except selenium. Arsenic was detected at a concentration of 10 mg/kg and lead was detected at a concentration of 6 mg/kg. The concentrations of the other detected metals were 1 mg/kg or less.

In August 1995, the oil/water separator system was removed. According to an undated internal Boeing memorandum, approximately 900 tons of petroleum-contaminated soil were excavated from the area surrounding the oil/water separator and holding tank. The soil was transported to a treatment facility in Oregon operated by TPS Technologies. Eleven soil samples (NW-2, NW-3, WW-2, EW-2, EW-3, EW-4, EW-5, EW-6, EW-7, EW-8, and SW-3-11.5) were collected from the excavation sidewalls and submitted to a laboratory for diesel-range and oil-range petroleum hydrocarbons analysis. However, only laboratory reports for NW-2, NW-3, WW-2, EW-2, EW-3, and SW-3-11.5 were available for review. The locations of these samples are shown on Figure 10. Except for SW-3-11.5, the depth of the samples has not been determined. Based on the results of the sidewall samples, diesel-range and hydraulic oil-range petroleum hydrocarbons remained in the soil at concentrations up to 7,400 mg/kg and 59,000 mg/kg, respectively. Subsurface soil and groundwater conditions in this area were investigated during the Phase II ESA investigation (Landau Associates 2009c).

3.1.17 2000 Groundwater and Seep Sampling and Hydrogeologic Characterization

Beginning in August 2000, eight piezometers (PZ-1 through PZ-8; shown on Figure 12) were installed at the Site. Groundwater samples were collected for laboratory analysis for dissolved arsenic, TOC, total iron, and ferrous iron from two of the piezometers (PZ-7 and PZ-8) and five existing monitoring wells [I-104(s), I-200(s), I-203(i), I-205(s), and I-206(s)]. Dissolved arsenic concentrations ranged from 2.0 µg/L at well I-200(s) located on the eastern property boundary to 1,600 µg/L at well I-104(s) located near the LDW. One seep sample was collected from a shoreline seep at the location shown on Figure 12. The seep emanated from rock and rubble material beneath the northern wooden bulkhead at an elevation of approximately -4 ft NGVD (29). The seep sample was analyzed for dissolved arsenic, which was detected at a concentration of 7 µg/L.

Also in August 2000, hydrogeologic characterization was completed that included a study of tidal effects on Site groundwater conditions. The results of the hydrogeologic characterization form the basis for the current understanding of the Site hydrogeology, which is described in Section 4.2.

The analytical results for the 2000 groundwater monitoring samples and seep samples, and the results of the hydrogeologic characterization, are reported in the *Request for Groundwater NFA Determination, Hydrogeologic Investigation and Site-Specific Action Level For Arsenic in Groundwater, Boeing Isaacson Site*, report (ERM and Exponent 2000).

3.1.18 2004 - 20,000-GALLON HEATING TANK CLOSURE

In 2004, a 20,000-gallon heating oil UST located on the west side of Building 14-02 was abandoned in-place. A soil sample was collected from stockpiled soil resulting from the excavation associated with the tank abandonment, and a groundwater sample was collected from a partial excavation at the north end of the tank. Both the soil and the groundwater samples were analyzed for diesel-range and motor oil-range petroleum hydrocarbons. Analytical results indicated the presence of diesel- and motor oil-range petroleum hydrocarbons in the groundwater sample at concentrations of 1.0 mg/L and 1.2 mg/L, respectively. The detected concentrations in the excavation groundwater sample were attributed to stormwater flowing into the excavation that was temporarily impacted by residual petroleum hydrocarbons on the excavation equipment.

The tank closure was documented in technical memorandum *Tank Closure Confirmation and Sampling, Former 20,000 Gallon Heating Oil Tank, Thompson Site* (Landau Associates 2004).

3.1.19 2004 GROUNDWATER CONFIRMATION SAMPLING

In 2004, two wells (TH-MW-1 and TH-MW-2) were installed downgradient of the 20,000-gallon heating oil UST located west of Building 14-02. The well locations are shown on Figure 12. The wells were installed after the tank was abandoned in-place, as described in Section 3.1.18. Groundwater samples were collected from each well during two sampling events (January 19, 2004 and February 26, 2004) and were analyzed for diesel-range and motor oil-range petroleum hydrocarbons. Motor oil-range petroleum hydrocarbons were detected in the January 2004 sample collected from well TH-MW-2 at a concentration of 0.7 mg/L. Motor oil-range-petroleum hydrocarbons were not detected in the February 2004 sample collected from this well. Diesel-range petroleum hydrocarbons were not detected in the samples collected from well TH-MW-2, and motor oil-range and diesel-range petroleum hydrocarbons were not detected in the samples collected from well TH-MW-1. Subsequent attempts were made to re-sample these wells during the Phase II ESA investigations; however, no groundwater was present in the wells during the sampling attempts.

The results for the 2004 groundwater monitoring samples at wells TH-MW-1 and TH-MW-2 are reported in technical memorandum *Tank Closure Confirmation and Sampling, Former 20,000 Gallon Heating Oil Tank, Thompson Site* (Landau Associates 2004).

3.1.20 2006 SUMP REMOVAL

In November 2006, Boeing removed a sump located in the northeastern corner of the property (Figure 4). The sump was a below-grade, open-to-the-surface 55-gallon drum that was discovered under a steel plate. The sump reportedly had an inlet pipe and an outlet pipe (Landau Associates 2007). Prior to removal of the sump, two samples of soil in the sump were collected and analyzed for diesel-range and motor oil-range petroleum hydrocarbons; VOCs; SVOCs; and metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) to determine appropriate disposal of the sump and its contents. The excavation associated with the sump removal extended about 2 ft beyond the exterior of the sump and to about 5 ft in depth. One soil sample (IsaacEX-01-5) was collected from the base of the excavation (5 ft BGS) and two soil samples (IsaacEX-02-1.5 and IsaacEX-03-2) were collected from the excavation sidewalls at depths of 1.5 ft and 2 ft BGS. The sample locations are shown on Figure 10. These samples were analyzed for diesel-range and motor oil-range petroleum hydrocarbons; VOCs; SVOCs; PCBs; and metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver). Diesel-range and motor oil-range petroleum hydrocarbons, acetone, PAHs, and bis(2-ethylhexyl)phthalate (BEHP), and metals were detected in one or more of the samples collected from the excavation. Aroclor 1260 was detected in one sidewall sample at a concentration of 0.041 mg/kg.

Further details of the sump removal and the results for the 2006 post-excavation soil samples are reported in technical memorandum *Sump Removal and Soil Excavation Boeing Isaacson Property, Seattle, Washington* (Landau Associates 2007).

3.1.21 2007 – 2008 GROUNDWATER AND SEEP SAMPLING

In September 2007 and June 2008, groundwater samples were collected from five existing monitoring wells [I-104(s), I-200(s), I-203(s), I-205(s), and I-206(s)]; two existing piezometers (PZ-7 and PZ-8); and one seep (I Seep) located at the Site and analyzed for dissolved arsenic. During the 2007 sampling event, dissolved arsenic was detected at concentrations ranging from 0.9 µg/L at I-200(s) to 3,600 µg/L at I-104(s). The detected concentration of dissolved arsenic in the seep sample was 5 µg/L (Landau Associates 2009a). During the 2008 sampling event, dissolved arsenic was detected at concentrations ranging from 0.7 µg/L at I-200(s) to 3,640 µg/L at I-104(s). The detected concentration of dissolved arsenic in the seep sample in 2008 was 3.4 µg/L (Landau Associates 2009a).

3.1.22 2008 REMOVAL OF STABILIZED SOIL MOUND

In late 2008, an independent action was conducted to remove the mound of stabilized soil in the northern portion of the property. The project consisted of the removal and disposal of the stabilized soil mound and non-stabilized surface soil surrounding the mound to reduce the grade, as necessary, for planned development at the property. After the mound of stabilized material and the surrounding non-stabilized surface soil were removed, the area was recapped with asphalt. New stormwater treatment and conveyance system improvements (Vortechs vaults) were also installed as part of this project in compliance with the *King County Surface Water Design Manual* (KCDNRP 2005). The basis and scope of the independent action is discussed in detail in the *Redevelopment Activities: Stabilized Soil Mound Removal and Stormwater System Upgrades, Boeing Isaacson Property, Tukwila, Washington* report (Landau Associates 2008c).

To determine the appropriate disposal options for the stabilized soil designated for removal, samples of the stabilized soil were collected from seven test pits completed within the mound (Landau Associates 2008d). The samples, identified ISS-TP-1 through ISS-TP-7, were analyzed for total Resource Conservation and Recovery Act (RCRA) metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver, and zinc); Toxicity Characteristic Leachate Procedure (TCLP) RCRA metals; and gasoline-range, diesel-range, and oil-range petroleum hydrocarbons. Elevated concentrations of arsenic (up to 1,700 mg/kg) were detected in the samples, but the TCLP results were low (non-detect to 1.7 µg/L). Barium, cadmium, chromium, and lead were also detected in the samples, but only barium was detected by TCLP. Barium concentrations ranged from 0.051 µg/L to 0.56 µg/L. Low concentrations (380 mg/kg or less) of diesel-range and motor oil-range petroleum hydrocarbons were also detected.

To determine appropriate disposal options for the non-stabilized soil that was removed, 20 samples of the surface soil were collected and analyzed for total arsenic and TCLP arsenic. The samples were identified as ISC-A through ISC-T.

Following removal of the mound of stabilized soil and surrounding non-stabilized soil, 18 samples were collected at 16 locations evenly distributed throughout the removal area (IMR-2 through IMR-8, IMR-10 through IMR-16, IMR-18, and IMR-19, locations shown on Figure 10). The samples consisted of stabilized soil and non-stabilized soil and were collected to document soil conditions at the surface of the finished grade. All of the soil samples were analyzed for total RCRA metals. Arsenic was detected in 16 of the 18 samples at concentrations ranging from 8 mg/kg to 2,440 mg/kg. In addition, although no field indications of petroleum contamination were observed during removal of the stabilized soil mound, sample IMR-6 was analyzed for diesel-range and motor oil-range petroleum hydrocarbons because these petroleum hydrocarbons were detected at concentrations up to 380 mg/kg in the samples collected from the stabilized soil mound that were used to evaluate disposal options. Diesel-range and motor oil-range petroleum hydrocarbons were detected in the post-mound removal sample (IMR-6) at concentrations of 17 mg/kg and 61 mg/kg, respectively.

During the project, a vein of tar-like substance was discovered outside of the stabilized soil perimeter on the northern side of the excavation for the eastern Vortechs vault (shown on Figure 3), at a depth of approximately 1.5 ft BGS. The extent of the tar-like substance is not known, as excavation of the material was completed before the substance was identified; however, the vein appeared to be approximately 6 inches thick and approximately 3 ft wide. A sample of the tar-like substance

(IMR-1-081003) was collected and analyzed for VOCs, SVOCs, and diesel-range and motor oil-range petroleum hydrocarbons. Diesel-range and motor oil-range petroleum hydrocarbons were detected at concentrations of 7,400 mg/kg and 25,000 mg/kg, respectively. The following PAHs were detected in the sample: phenanthrene (2,400 mg/kg), pyrene (4,200 mg/kg), chrysene (8,800 mg/kg), and benzo(a)pyrene (2,400 mg/kg).

Samples IMR-2 through IMR-8, IMR-10 through IMR-16, IMR-18, and IMR-19 may represent current soil conditions in the northern portion of the Site because no subsequent soil removal is known to have occurred at this location.

3.1.23 2008/2009 PHASE II ESA SOIL SAMPLING

In 2008 and 2009, focused Phase II ESA investigations were conducted at the Site. During these investigations, 60 soil samples were collected from 49 soil borings located throughout the Site (borings IDP-1 through IDP-15, IDP-1a, IDP-6a, and TDP-1 through TDP-32). The Phase II ESA soil sampling locations are shown on Figure 10. The soil samples were selectively analyzed for metals (arsenic, cadmium, chromium, copper lead, mercury, and zinc); VOCs; SVOCs; petroleum hydrocarbons; PCBs; and PAHs. The sampling locations and analyses for the Phase II ESA investigations were selected based on the findings from the Phase I ESAs conducted in 2008.

The highest concentrations of arsenic (333 mg/kg at IDP-5-8'), copper (624 mg/kg at IDP-14-11'), lead (420 at IDP-7-3'), and zinc (estimated 1,390 mg/kg at IDP-7-3') in soil were detected in samples collected from along the northern Slip 5 boundary and along the northern Site boundary. Mercury was detected at concentrations ranging from 0.05 mg/kg to an estimated 0.52 mg/kg in samples collected from across the Site.

Thirty-eight soil samples were analyzed for VOCs. TCE was detected at a concentration of 66 µg/kg in one soil sample (TDP-26-8') located along the southern property boundary, and benzene was detected at a concentration of 9.8 µg/kg in one soil sample (IDP-9-3') located on the Boeing Isaacson property. Concentrations of VOCs were not detected in the remaining 36 soil samples analyzed for VOCs. Twenty-two soil samples were analyzed for PCBs during the Phase II investigations. PCBs were not detected in any of the soil samples collected from the Site at concentrations greater than the laboratory reporting limits. Eighteen soil samples were analyzed for SVOCs. With the exception of 4-methylphenol, which was detected in soil at TDP-8-8' at a low concentration, SVOCs were not detected in soil at concentrations greater than the laboratory reporting limits. Two PAHs, chrysene and benzo(b)fluoranthene, were detected in one soil sample (TDP-18-4') at slightly elevated concentrations (91 mg/kg and 76 mg/kg, respectively).

All of the soil samples collected during the Phase II ESA are representative of current soil conditions in the areas in which the samples were collected because no subsequent soil removal is known to have occurred at these locations.

The results of the Phase II ESA soil investigations are reported in the *Phase II Environmental Site Assessment, Boeing Isaacson Property, 8625 East Marginal Way South*, *Tukwila, Washington* report (Landau Associates 2009b) and the *Phase II Environmental Site Assessment, Boeing Thompson Property, 8625 East Marginal Way South*, *Tukwila, Washington* report (Landau Associates 2009c).

3.1.24 2008/2009 PHASE II ESA GROUNDWATER SAMPLING

In November 2008, groundwater samples were collected for laboratory analysis from 8 direct-push borings (TDP-1, TDP-7, TDP-8, TDP-11, TDP-16, TDP-18, TDP-25, TDP-26) located in the southern portion of the Site and from 3 direct-push borings (TDP-28, TDP-29, and TDP-31) located in the west-central portion of the Site (Figure 10). In February 2009, groundwater samples were collected for laboratory analysis from 10 direct-push borings (IDP-1a, IDP-2 through IDP-6, IDP-8, IDP-9, IDP-12, and IDP-14) located in the northwest corner of the Site, as shown on Figure 10. Additionally, groundwater samples were collected from 12 existing monitoring wells and piezometers. The groundwater samples were selectively analyzed for dissolved metals (arsenic, cadmium, chromium, copper, lead, mercury, and zinc); VOCs; SVOCs; petroleum hydrocarbons; PCBs; and PAHs.

Arsenic and chromium were the only metals detected in the groundwater samples collected in the southern portion of the Site. Detected arsenic concentrations ranged from 1.3 µg/L to 575 µg/L and detected chromium concentrations ranged from 6 µg/L to 14 µg/L. Arsenic, copper, and lead were detected in the groundwater samples collected from the northern portion of the Site. Arsenic concentrations ranged from 0.8 µg/L to 2,360 µg/L, except at IDP-8 and IDP-14 where arsenic concentrations were 13,600 µg/L and 16, 000 µg/L, respectively. Copper concentrations ranged from 6 µg/L to 20 µg/L, and lead was detected in one sample (IDP-8) at a concentration of 1 µg/L. VOCs, SVOCs, and PAHs were also detected in groundwater from some wells. The VOC vinyl chloride was detected in five of eight groundwater samples collected from the area south of the former washdown system near the Boeing Thompson property/8801 Site boundary (TDP-7, TDP-8, TDP-16, TDP-25, and TDP-26) and in groundwater samples collected from three locations in the western portion of the Site [IDP-8, I-104(s), and I-206(s)] at concentrations up to 140 µg/L. Other VOCs [cis-1,2-dichloroethene (cis-1,2-DCE); 1,1-dichloroethene (1,1-DCE); PCE; and TCE] were detected in the groundwater samples collected from TDP-25 and TDP-26.

SVOCs, carbazole, and BEHP were detected in groundwater during the Phase II ESA investigations at elevated concentrations. Carbazole was only detected in one groundwater sample

(TDP1-GW) at a concentration of 6.9 µg/L and BEHP was detected in seven groundwater samples (TDP-7, TDP-8, TDP-11, TDP-18, TDP-25, TDP-28, and TDP-31) at concentrations up to 3.8 µg/L. Neither carbazole nor BEHP was detected in soil at the Site. PAHs were detected in seven groundwater samples (TDP-1, TDP-16, TDP-18, TDP-25, TDP-28, TDP-29, and TDP-31) at concentrations up to 15 µg/L.

Diesel-range and motor oil-range petroleum hydrocarbons were detected in one direct-push groundwater sample (TDP31-GW) located in the former hydraulic test pad area. PCBs were not detected in any of the groundwater samples.

The results of the Phase II ESA groundwater monitoring are reported in the *Phase II Environmental Site Assessment, Boeing Isaacson Property, 8625 East Marginal Way South, Tukwila, Washington* report (Landau Associates 2009b) and the *Phase II Environmental Site Assessment, Boeing Thompson Property, 8625 East Marginal Way South, Tukwila, Washington* report (Landau Associates 2009c).

3.1.25 2009 Property Boundary Soil Investigation

The property boundary investigation was conducted in late July 2009 to evaluate soil conditions at locations along the west property boundary adjacent to the Port property and at the south property boundary adjacent to the 8801 Site. Soil samples were collected at 10 locations (PBI-1 through PBI-10) along the Boeing Isaacson/Port property boundary and the Boeing Thompson/Port property boundary (Figure 10). These samples were analyzed for the constituents of concern in this portion of the site at that time. These included arsenic, cadmium, chromium, copper, lead, mercury, and zinc. Arsenic concentrations for the soil samples ranged from 0.5 mg/kg to 754 mg/kg. The highest concentrations, 329 mg/kg and 754 mg/kg, were detected in the 5-ft to 6-ft BGS interval at locations PBI-2 and PBI-3. Other metals detected included cadmium (0.6 to 11.1 mg/kg); chromium (14 to 940 mg/kg); copper (21 to 1,300 mg/kg); lead (3 to 4,200 mg/kg); mercury (0.03 to 2 mg/kg); and zinc (56 to 3,290 mg/kg).

Soil samples were also collected at five locations (PBI-11, PBI-12, PBI-13, PBI-14, and PBI-15) along the Boeing Thompson/8801 Site boundary and analyzed for the constituents of concern in this portion of the Site at that time. These included the following halogenated volatile organic compounds (HVOCs): vinyl chloride; 1,1-DCE; cis-1,2-DCE; TCE; PCE; and 1,1,2,2-tetrachloroethane). The property boundary soil sampling locations are shown on Figure 10. The results of the investigation indicate the presence of TCE and PCE in soil along the property boundary. The highest concentrations were detected at PBI-13, which is the most central of the boring locations in this investigation. The concentrations of TCE detected in the soil at PBI-13 were 20 µg/kg at the 2- to 3-ft depth interval, 28 µg/kg at the 5- to 6-ft depth interval, and 35 µg/kg at the 8- to 9 -ft depth interval. PCE concentrations at this location at these intervals were 1.7 µg/kg, 2.3 µg/kg, and 5.3 µg/kg, respectively, with concentrations increasing with depth. Because groundwater was encountered at depths of about 15 to 16 ft BGS, all of the soil samples were collected from the vadose zone.

The results of the Property Boundary soil investigation are reported in the *Property Boundary Investigation Thompson-Isaacson Property, Tukwila, Washington* report (Landau Associates 2009d).

3.1.26 2009 PROPERTY BOUNDARY GROUNDWATER INVESTIGATION

Groundwater samples were collected from four locations along the Boeing Thompson/8801 Site boundary (PBI-11, PBI-12, PBI-13, and PBI-15) during the 2009 property boundary investigation. No groundwater sample was collected from location PBI-14 due to an apparent buried concrete slab that did not allow drilling deep enough to encounter groundwater. The groundwater sample locations are shown on Figure 12. The groundwater samples were analyzed for HVOCs.

Vinyl chloride was detected at three locations (PBI-11, PBI-12, and PBI-13) at concentrations of 1.3 µg/L, 0.18 µg/L, and 0.051 µg/L, respectively. DCE was detected at PBI-13 and PBI-15 at concentrations of 0.58 µg/L and 0.14 µg/L, respectively, and cis-1,2-DCE was detected at PBI-11 and PBI-13 at concentrations of 100 µg/L and 190 µg/L, respectively. TCE and PCE were detected only in the groundwater sample collected at PBI-13 at concentrations of 1,000 µg/L and 78 µg/L, respectively.

The results of the Property Boundary groundwater investigation are reported in the *Property Boundary Investigation Thompson-Isaacson Property, Tukwila, Washington* report (Landau Associates 2009d).

3.2 SEDIMENT QUALITY INVESTIGATIONS

The LDW FS Baseline Dataset (AECOM 2010) was reviewed for sediment chemistry collected within the project site boundaries. Sediments in the vicinity of the Boeing Isaacson-Thompson property (including EAA-6) were sampled at 41 surface (0 to 0.33 ft) grab locations and at 9 core locations (Figure 17).

The results of the chemical analysis for surface grab samples and core samples are presented in Appendix J.

3.2.1 SURFACE SAMPLES

Surface sediments were analyzed for the Sediment Management Standards (SMS) list of chemicals at 23 of the surface grab locations (Table 1, Figure 17). A second grab sample was collected at sample location AN-046 as a field duplicate (Sample ID—AN-096-SS-080211). Sediments from an additional 16 locations were analyzed for PCBs and TOC (Table 1, Figure 17). There were detected exceedances of the SMS Sediment Quality Standards (SQS) for 1 or more of the SMS metals (including arsenic, lead, mercury, and zinc) at 6 locations. Five of the locations also had 1 or more metals that exceeded the SMS Cleanup Screening Level (CSL). There were detected exceedances of the SQS for one or more of the SMS list of PAHs at 5 locations. Although undetected, the reporting limits for the chlorinated benzenes were above the SQS at multiple locations. There were detected exceedances of the SQS for butyl benzyl phthalate at 10 locations; one of the locations also exceeded the CSL. Four locations had detected exceedances of the SQS for BEHP, with 2 of the 4 locations exceeding the CSL. Dibenzofuran exceeded the SQS at a single location. Although not detected, the reporting limit for hexachlorobutadiene was above the SQS at 2 locations. Total PCBs exceeded the SQS at 21 locations, with 1 location also exceeding the CSL. Benzoic acid also exceeded the CSL at 2 locations. Although not detected, the reporting limits for benzyl alcohol and several phenols exceeded the SQS at 4 locations.

Surface samples from three locations were analyzed for dioxins/furans (Figure 17). Calculated dioxin Toxicity Equivalency Quotients (TEQs) ranged from 2.53 parts per trillion (pptr) to 11 pptr (Appendix J). Surface samples from three locations were also analyzed for selected organochlorine pesticides, but none were detected (Appendix J). Congener PCB analysis was also performed at 15 sample locations (Appendix J).

3.2.2 CORE SAMPLES

Samples were collected using a coring device at nine locations (Figure 17). Core sample intervals submitted for chemical analyses were 2 ft or less at eight of the locations (Appendix J). The remaining sample location (core location DU9120XX) composited sediments from the surface to 3 ft below mudline within the navigation channel (Table 2, Figure 17); that sample was used to characterize sediments for dredged material disposal. The deepest sample interval collected at any coring location in the vicinity of the Site was from 7.0 to 7.7 ft below mudline (at location SD-216, Table 2, Figure 17).

Eight of the core samples were analyzed for the complete SMS list of chemicals. The remaining samples were analyzed for a limited list of chemicals. General trends in sediment concentrations for the SMS list of chemicals showed decreasing concentrations with depth. Sediment concentrations for metals and a majority of the organic compounds that exceeded the SQS or CSL criteria in shallow sediments (generally less than 4 ft below mudline, Table 2) dropped below the SQS criteria in sample intervals collected deeper than 4 ft below mudline (Table 2 and Table 3).

Total PCB concentrations at location SD-216 (located north and downstream of the project site, Figure 17) were above the CSL criteria in the deepest sample interval collected (7 to 7.7 ft below mudline, Table 2). However, samples SD-217 and SD-315C, which were immediately upstream of SD-216 and adjacent to the project site (Figure 17), had detected total PCB concentrations that were either below the SQS in the 4.0- to 4.5-ft sample or PCBs were undetected at 4 ft below mudline and deeper (Table 2 and Table 3).

The TOC content in some of the deeper sample intervals was less than 0.5 percent (Table 3). These lower TOC values may be an indication of older native delta deposits that have low organic content. These older deposits are expected to show low levels of contamination. In addition, comparison of the analytical results against the SMS criteria that are carbon normalized may not be appropriate if the TOC values are less than 0.5 percent. Comparison against the dry weight lowest apparent effects threshold value (LAET) is more appropriate and is consistent with Ecology guidance (Table 3). There were no exceedances of the LAET for sediment core samples with TOC values of less than 0.5 percent.

3.3 STORM DRAIN INVESTIGATIONS

This section describes investigations that have been conducted to date to assess the storm drain system present at the Site.

3.3.1 2007 Catch Basin Rerouting Project

Prior to 2007, two CBs (CB-81 and CB-82) located in the southwest portion of the Thompson property bypassed the oil/water separator located in that portion of the property. In 2007, the storm drain lines from these CBs were rerouted to connect the CBs to the oil/water separator.

3.3.2 2008 Drain Line Investigation

On February 25, 2008, Landau Associates and Applied Professional Services (APS) investigated a 12-inch corrugated metal pipe located within a retaining wall along the southern boundary of the Site, approximately 35 ft south of the southwest corner of Building 14-01 (Figure 18). Based on the results of this investigation, the 12-inch corrugated metal pipe appears to extend east to west parallel to the north side of the retaining wall along the southern Property boundary. No inlets to the pipe were identified along its course. The pipe appears to serve as a drain to prevent buildup of groundwater behind the retaining wall. No connections between the pipe and the stormwater drains or sewer lines located on the Site in the vicinity of the pipe were identified during the investigation. There was no evidence of water draining from the pipe onto the property adjacent to the south of the Site. It is assumed that the pipe extends the full length of the retaining wall (approximately 460 ft); however, only 158 ft of the western portion of the pipe was investigated due to a three-prong, industrial-sized electrical plug that was present in the pipe during videotaping. This plug prohibited advancement of the camera farther eastward.

3.3.3 2008 Catch Basin Solids Sampling

In December 2008, an investigation was conducted of the solids present in the CBs and oil/water separators at the Site. The purpose of this investigation was to collect and analyze samples of solid material from the CBs and oil/water separators at the Site prior to planned cleaning of the storm drain system. The solid samples were analyzed for PCBs; SVOCs; total metals (arsenic, cadmium, chromium, copper, lead, mercury, and zinc); TOC; and total solids. Samples from nearby CBs were composited prior to analysis. Twenty-two solids samples were analyzed for PCBs, SVOCs, total metals, TOC, and total solids.

PCBs were detected above the laboratory reporting limits in 19 of the 22 samples analyzed. One or more SVOCs were detected in 19 of the 22 samples collected. One or more metals were detected in all 22 samples collected. The analytical results for total metals are presented on Figure 19, and the results for total PCBs and the SVOC BEHP are presented on Figure 20.

3.3.4 2009 Catch Basin Rerouting Project

In 2009, Boeing completed a project to re-route stormwater collected by CB-39 so that no stormwater from the Site would enter the 48-inch King County storm drain line. CB-39 is located in the western portion of the Site, near the outfall of the King County storm drain line (Figure 3). Stormwater collected by CB-39 previously was conveyed to the 48-inch King County storm drain line. The King County storm drain line conveys stormwater from a portion of the KCIA to the LDW. Two pipes were previously connected to CB-39. One of the pipes was the outlet for CB-39 that connected to the King County storm drain. The purpose of the second pipe has not been determined. Both of the existing pipes were plugged with grout. The CB was inspected and found to be in good condition with a solid concrete bottom; therefore, the existing structure was retained and a new pipe was installed to route stormwater from the CB to the south into the existing Site stormwater system. There are currently no connections between the Site stormwater system and the King County storm drain line.

3.3.5 Ongoing Stormwater Outfall Sampling

The Site operates under Industrial Stormwater General Permit #WAR000148. The permit requires quarterly sampling from the two stormwater outfalls (Outfalls A and B) located along the western Site boundary (Figure 3). Copper was detected in stormwater at concentrations exceeding the permit benchmark of 14 µg/L during one sampling event at Outfall A and three sampling events at Outfall B during 2010. Zinc was detected in stormwater at concentrations exceeding the permit benchmark of 117 µg/L during four sampling events at Outfall B during 2010. There were no exceedances of the zinc benchmark in samples from Outfall A during 2010. Boeing is implementing Best

Management Practices (BMPs) to address the copper and zinc benchmark exceedances, including sweeping, roof cleaning, and CB cleaning to remove solids. A summary of previous stormwater sampling results is provided in Table 4.

4.0 ENVIRONMENTAL SETTING

This section describes the geology and hydrogeology of the Site based on information developed during previous Site investigations. Further information regarding Site geology and hydrogeology will be obtained during the RI and described in the RI report.

4.1 GEOLOGY

Based on subsurface explorations completed at and in the area of the Site, soil conditions at the Site consist of approximately 6.5 to 17.5 ft of fill overlying native tideflat and river deposits with the thickest layers of fill occurring in the former Slip 5 area. The fill generally consists of silty sand to sandy gravel. Fill materials within the former Slip 5 area include bricks, wood debris, and slag material. The native deposits typically consist of fine sand and silty fine sand with silt lenses. The native surficial deposits are characterized by the presence of small in-place roots, wood fragments, and peat, which are indicators of the original ground surface elevation prior to filling. Underlying the silt and silty fine sand is a series of interbedded alluvial sand and silt layers that were deposited within the floodplain of the LDW River. Beneath the interbedded alluvial silt and fine sand is a layer of very dark to black, fine to medium sand. This naturally deposited sand is found throughout the LDW River Valley and was likely deposited from flood waters. Three north-south trending cross-sections across the Site and extending into the 8801 Site, and two east-west trending cross-sections across the Site at the locations shown on Figure 21, are presented on Figures 22, 23, 24, 25, and 26.

4.2 HYDROGEOLOGY

The near-surface groundwater regime within the LDW River Valley is generally characterized as a shallow, single-aquifer system. The Site is located at and near the east bank of the LDW, at approximately 10 ft above mean sea level (MSL) (USGS 1983). Shallow groundwater (generally less than 15 ft BGS) is present throughout the area of the Site. Based on topography and groundwater investigations conducted in the area of the Site by Landau Associates and others, the direction of groundwater flow is generally to the west toward the LDW; however, there is also localized groundwater flow toward the former Slip 5 area. Mean groundwater elevations calculated based on water levels measured in August 2000 were contoured and the contours are shown on Figure 27. Because few wells exist in the southern portion of the Site near the 8801 Site, groundwater flow direction has not been defined for this portion of the Site. The presence of a steel bulkhead, which extends 60 ft BGS, along a portion of the Boeing Thompson property shoreline likely influences groundwater flow in this portion of the Site.

Some mounding is expected to occur behind the bulkhead and, locally, groundwater is likely being forced to the north and south. The mounding is suggested by the high groundwater level observed in August 2008 at well I-205(s), which is located just east of the bulkhead. The wooden bulkheads along the shoreline to the north and south are less impervious than the steel bulkhead and, therefore, are expected to have less impact on groundwater flow direction, due to leakage through gaps in the wooden bulkheads.

There are two pedestrian tunnels located on the north side of Building 14-01 (Figure 2). These tunnels are approximately 100 ft long and extend 11 ft BGS (above the groundwater table, which is generally encountered at about 11 to 12 ft BGS) and, therefore, do not likely influence groundwater flow beneath the Site.

Single-well hydraulic conductivity tests, performed by ERM in August 2000 (ERM and Exponent 2000) at piezometers PZ-1 through PZ-8, indicate that hydraulic conductivity values for the shallow water-bearing zone range between 1.52×10^{-4} centimeters per second (cm/s) to 1.89×10^{-3} cm/s, with an average hydraulic conductivity of 8.84×10^{-4} cm/s. Also in August 2000, ERM completed a tidal study at the Boeing Isaacson property (ERM and Exponent 2000). Tidal effects on groundwater elevations were observed at each of the wells and piezometers; however, the most significant tidal fluctuations were observed at locations within 400 ft of the LDW. Tidal efficiencies near the LDW were extremely variable, ranging from 0.93 percent at well I-205(s) to 37.84 percent at well I-203(s). The low tidal efficiency at well I-205(s) was considered an anomaly possibly due to equipment malfunction or aquifer heterogeneity, but this may also be related to the presence of the steel bulkhead. Near the shoreline where the tidal fluctuations result in surface water entering the groundwater flow system, a hydrodynamic dispersion zone is created by the intermixing of surface water with groundwater, which results in dispersion of contaminants migrating in groundwater prior to discharge to surface water.

The LDW is comprised of both marine and fresh surface water. Following the initial dredging and realignment of the LDW, saltwater from the Puget Sound extended back into the waterway and infiltrated the upland groundwater (ERM and Exponent 2000). As a result of the saltwater intrusion into the LDW, a saltwater wedge has formed in the waterway. The saltwater has also intruded from the LDW to properties along its shoreline. The presence of brackish or saline water in the aquifer can affect groundwater flow because the less dense fresh groundwater tends to move above the higher density saline water. The density difference between the freshwater aquifer system and the saltwater of the LDW tends to concentrate the outflow of the surficial aquifer into the intertidal areas.

5.0 PRELIMINARY CONCEPTUAL SITE MODEL

This section presents a preliminary conceptual site model that identifies potential contaminants of concern (PCOCs) within the LDW, PCOCs within the Site, areas within the Site that have the greatest potential to be sources of contaminants, and the potential contaminant migration pathways and receptors. A schematic of the conceptual Site model discussed below is provided on Figure 28.

5.1 LDW EARLY ACTION AREA 6 COCS

COCs (contaminants of concern) identified by Ecology's contractor, SAIC, for sediments in the *LDW RM 3.7-3.9 East Early Action Area (EAA) 6, Summary of Existing Information and Identification of Data Gaps* (SAIC 2008) consist of arsenic, PAHs, phthalates [BEHP and butylbenzylphthalate], benzoic acid, benzyl alcohol, dibenzofuran, and total PCBs. SAIC defined a COC for the EAA-6 sediments as a chemical that is present at concentrations above the Washington State SMS (Chapter 173-204 WAC) marine SQS or CSL values. For the Site, COCs will be identified for the RI based on comparison of all available data with screening levels for the Site.

5.2 SITE PCOCS

Site PCOCs are identified based on contaminants typically associated with the potential sources identified in Section 2.0 and contaminants detected during previous Site investigations. These contaminants are as follows:

- **Metals -** Metals have been detected in soil, groundwater, and/or CB solids at the Site.
- **SVOCs -** SVOCs have been detected in soil and CB solids at the Site.
- **VOCs -** VOCs have been detected in groundwater and soil at the Site (primarily at the Boeing Thompson property, near the Boeing Thompson/8801 Site property boundary).
- **Petroleum Hydrocarbons -** Petroleum hydrocarbons have been detected in soil due to hydraulic oil from a holding tank associated with an oil/water separator located in the hydraulic test pad area (eastern yard of Building 14-03). The oil/water separator and holding tank have since been removed and approximately 900 tons of petroleum-contaminated soil were excavated from the area and disposed off site.
- **PCBS -** PCBs have been detected in soil and CB solids.

Until the investigations described in this work plan have been completed and all available data have been screened against screening levels, the above classes of chemicals will be considered PCOCs and included for analysis.

5.3 POTENTIAL CONTAMINANT SOURCES

Seven primary potential sources have been identified for the contaminants detected at the Site: 1) historical Site operations, 2) ASTs/USTs and sumps, 3) contaminated fill material, 4) stabilized soil material, 5) existing building materials, 6) former Slip 5 Outfall, and 7) offsite sources. Each of these potential contaminant sources are described below. Some of these potential contaminant sources no longer exist at the Site, either because activities have ceased or the impacted media (e.g., contaminated soil) has been removed.

- **Historical Site Operations.** The Site was previously occupied by several sawmills, a wood treatment operation, Isaacson, and, most recently, by Boeing. Sawmill features that may have contributed to the release of contaminants at the Site include the former boiler house and associated fuel storage, a transformer yard, and a former waste burner. Historical records indicate that the wood treatment operation used a solution of arsenic and sulfate salts of copper and zinc to preserve wood. Facility storage tanks associated with this operation were reportedly cleaned twice per day and sludge and remaining chemicals in the tanks were drained directly to the ground surface. The Isaacson facility was used primarily for structural steel fabrication and supply. Historical records indicate that petroleum distillates and solvents were stored on the property. A transformer yard was located to the north of the building and paint storage areas to the east of the building (Figure 6). Most recently, Boeing used the southern portion of the Site for aircraft assembly, painting, plating, and system testing. Historical hazardous waste streams for the Thompson and Isaacson properties are described in Section 2.3.

- **ASTs/USTs and Sumps.** ASTs and USTs containing diesel, gasoline, heating oil, and/or wastewater were located at the Site. The approximate locations of the tanks are shown on Figure 4. A list of known existing or former ASTs, USTs, and sumps is provided in Table 5.

- **Fill Material.** Material containing elevated concentrations of metals may have been used to fill the former river meander, and, later, the former Slip 5 area. The fill has been identified as containing bricks, wood debris, and slag material. Soil samples collected from the fill material contain elevated concentrations of metals. The fill material is also a potential source of the metals detected in Site groundwater. Non-stabilized fill material located north of Slip 5 that was not stabilized, or is present at depths greater than the stabilized material, also contains elevated concentrations of metals that may be a potential source of metals detected in Site groundwater.

- **Stabilized Soil Fill Material.** Soil containing elevated concentrations of arsenic that was excavated, stabilized, and used as excavation backfill may be a potential contaminant source to groundwater, although TCLP results indicate little impact to groundwater by this material.

- **Existing Building Materials.** Building materials currently present at the Site may be a source of PCOCs. These include building siding material (e.g., Galbestos), paint from building or equipment surfaces, roofing materials, and caulking.

- **Off-Site Sources:** Both Jorgensen Forge, located to the north of the Site, and the 8801 Site, located to the south of the Site, are currently conducting investigations under Agreed Orders with Ecology due to COCs that have been detected in soil and/or groundwater at concentrations greater than the applicable cleanup or screening levels. Releases at either of these facilities could have impacted the Site. COCs at the Jorgensen Forge site include PCBs, total petroleum hydrocarbons (TPH), and metals in soil, and TPH and metals in groundwater.

COCs at the 8801 Site include TPH, PAHs, VOCs, SVOCs, PCBs, and metals. A property boundary investigation conducted by Boeing in 2009 identified the 8801 Site as a potential source of the VOCs detected in soil and groundwater along the southern boundary of the Site.

- **Former Slip 5 Outfall.** The 48-inch-diameter storm sewer conveyance line that conveyed stormwater from the east side of East Marginal Way South and formerly discharged at the east end of Slip 5 may have been a source of PCOCs.

5.4 CONTAMINANT MIGRATION PATHWAYS AND MEDIA OF POTENTIAL CONCERN

As described in Section 4.1, the upper 6.5 to 17.5 ft of soil below the Site is fill overlying native tideflat and river deposits with the thickest layers of fill occurring in the former Slip 5 area. Groundwater is typically encountered at depths between 10 and 15 ft BGS. Groundwater in the shallow water-bearing zone discharges to the LDW. Other discharges to the LDW include stormwater runoff from the Site that is collected in CBs and discharged via two outfalls (Outfalls A and B on Figure 3).

Based on the occurrence of groundwater discharge to the LDW, discharge of upland stormwater to the LDW, the shallow nature of groundwater below the Site, and the presence of an unsaturated soil zone, the potential pathways for contaminant migration at the Site include:

- Leaching of contaminants from soil to groundwater.
- Transport of contaminants in groundwater to adjacent surface water and sediment.
- Transport of contaminants to adjacent surface water and sediment via stormwater runoff.
- Transport of contaminants in soil to sediment via bank erosion.
- Volatilization of contaminants from soil and groundwater to indoor air.

Based on potential migration pathways, the Site media of potential concern consist of soil, groundwater, stormwater, storm drain system solids, and sediments.

5.5 CURRENT AND FUTURE LAND USE

The Site is currently zoned Manufacturing Industrial Center/Heavy Industrial (MIC/H). Currently, Boeing's P-8 program operates at the Thompson property, and is completing building modifications to expand operations there. Boeing is currently evaluating operations for use for the vacant portions of the Site.

5.6 CURRENT AND FUTURE WATER USE

Groundwater at or potentially affected by the Site is not currently used for drinking water. The groundwater in the Site area is not considered to be a reasonable future source of drinking water due to proximity to the LDW (which is not classified as a drinking water source), limited productivity, and the likelihood of a high salinity content following extended periods of groundwater extraction that would make the groundwater unsuitable as a domestic water supply. Nonetheless, for this work plan, the highest beneficial use of shallow groundwater at the Site will be considered to include potential use as drinking water. A demonstration that the Site groundwater is not potable may be made in the RI.

5.7 POTENTIAL RECEPTORS AND EXPOSURE PATHWAYS

The potential receptors that may be exposed to the contaminants present at the Site and the potential exposure pathways depend primarily on the current and likely future uses for the Site. This section identifies potential receptors and the potential exposure pathways for the receptors based on the current and future land uses described in Section 5.5.

5.7.1 POTENTIAL RECEPTORS

Potential receptors for Site contaminants including humans; terrestrial ecological receptors (i.e., wildlife, soil biota, and plants); and benthic and aquatic organisms were evaluated based on the current and potential future land uses of the Site, as follows:

- **Humans -** Because people may work at the Site (either as construction workers or for industrial operations), humans are considered to be potential receptors. Although the current Site use is industrial, for this work plan, unrestricted potential property uses are considered, which may include residential or commercial uses; however, a demonstration may be included in the RI that Site use should be limited to industrial. Although the groundwater is not considered to be a reasonable future source of drinking water, this work plan nevertheless assumes that humans may ingest groundwater. Humans may also ingest marine organisms from the adjacent LDW.
- **Terrestrial Ecological Receptors -** Although the Site is entirely covered with buildings and pavement, terrestrial ecological receptors (wildlife, soil biota, and plants) are considered in this work plan to be potential receptors. The RI may include a demonstration that the Site meets the exclusion for a terrestrial ecological evaluation.
- **Benthic and Aquatic Organisms -** Due to the Site's proximity to the LDW, benthic organisms in sediment and aquatic organisms in the LDW are considered to be potential receptors.

Based on the above evaluation, potential receptors for Site contaminants include humans, terrestrial ecological receptors, and benthic and aquatic organisms.

5.7.2 POTENTIAL EXPOSURE PATHWAYS

Potential exposure pathways for the receptors identified in Section 5.7.1 are discussed by medium below.

5.7.2.1 Soil

The potential exposure pathways for Site soil are:

- Incidental ingestion or dermal contact by humans with hazardous substances that are present in Site soil
- Exposure by humans through inhalation of hazardous substances that are present in Site soil that have migrated as windblown or fugitive dust
- Exposure by humans through inhalation of hazardous substances that are present in indoor air from volatilization from Site soil
- Contact by terrestrial plants and soil biota with hazardous substances that are present in Site soil
- Contact (dermal, incidental ingestion, or inhalation) by terrestrial wildlife with hazardous substances that are present in Site soil.

5.7.2.2 Groundwater

The potential exposure pathways for Site groundwater are:

- Ingestion by humans of hazardous substances that are present in Site groundwater
- Exposure by humans through inhalation of hazardous substances that are present in indoor air from volatilization from Site groundwater.
- The shallow hydrostratigraphic unit discharges to the adjacent surface water; exposure pathways associated with sediment and surface water are discussed in Sections 5.7.2.3 and 5.7.2.4, respectively.

5.7.2.3 Sediment

The potential exposure pathways for sediment, if contaminants from the Site reach the sediments of the LDW (e.g., through groundwater to surface water discharge, stormwater runoff, etc.), include:

- Exposure of benthic organisms to hazardous substances present in the biologically active zone of sediment [the upper 10 centimeters (cm) below the mudline]. This may result in the uptake and bioaccumulation of contaminants in these organisms.
- Ingestion of contaminated benthic organisms as prey, as well as incidental ingestion of contaminated sediment, by higher trophic level organisms (e.g., foraging fish, aquatic birds, marine mammals, etc.).
- Human ingestion of aquatic organisms contaminated by hazardous substances in sediment.
- Incidental human dermal contact with sediments contaminated by hazardous substances.

5.7.2.4 Surface Water

The potential exposure pathways for surface water, if contaminants from the Site reach the surface water of the LDW (e.g., through groundwater to surface water discharge, storm runoff, etc.), include:

- Exposure of aquatic organisms to hazardous substances in surface water. This may result in the uptake and bioaccumulation of contaminants in these organisms.
- Ingestion of aquatic organisms contaminated by hazardous substances as prey by higher trophic level organisms in the food chain (e.g., foraging fish, aquatic birds, marine mammals, etc.).
- Human ingestion of aquatic organisms contaminated by hazardous substances.

Because the LDW is neither a current nor future drinking water source, human ingestion of surface water is not considered a potential pathway.

6.0 SITE PRELIMINARY SCREENING LEVELS

Site preliminary screening levels (preliminary SSLs) were developed for the media of potential concern identified in Section 5.4 (soil, groundwater, and sediment) to allow for evaluation of the method detection limits (MDLs) and reporting limits (RLs) for analytical data to be collected as part of this investigation. Preliminary SSLs for soil and groundwater that are adequately protective of human health and the environment were developed in accordance with MTCA requirements. MTCA provides three approaches for establishing cleanup levels: Method A, Method B, and Method C. The Method A approach is appropriate for sites that have few hazardous constituents or for contaminants such as TPH and lead for which toxicity information is not available to calculate Method B or Method C cleanup levels. The Method B approach is applicable to all sites. The Method C approach is applicable for specific site uses and conditions. The Method B and Method C approaches use applicable state and federal laws and risk equations to establish cleanup levels. However, the Method B approach establishes cleanup levels using exposure assumptions and risk levels for unrestricted land uses, whereas the Method C approach uses exposure assumptions and risk levels for restricted land uses, including industrial land uses. MTCA also requires that cleanup levels developed using the MTCA Method B and Method C approaches not be set at levels below the practical quantitation limit (PQL) or natural background.

Preliminary SSLs for groundwater, based on potential use of the groundwater as drinking water and protection of fresh surface water and marine surface water, were developed using MTCA Method B. Soil preliminary SSLs, based on direct human contact and protection of terrestrial ecological receptors, ground water, surface water, and sediment, were developed using MTCA Method B.

The Ecology draft preliminary screening level spreadsheet identifying potential pathways and possible applicable or relevant and appropriate requirements (ARARs) (Ecology 2011) was used for development of preliminary screening levels. The spreadsheet is provided in Appendix K. Tables K-1 (groundwater), K-2 (soil), and K-3 (surface water) in Appendix K identify pathways and ARARs retained for development of preliminary screening levels for the Site and, for those not retained, the rationale for not retaining them. Tables 6 and 7 provide MDLs, RLs, and preliminary screening levels for groundwater and soil, respectively.

6.1 GROUNDWATER

Groundwater preliminary SSLs were developed for metals, VOCs, SVOCs, PCBs, and petroleum hydrocarbons. Because the LDW consists of fresh water and marine water, and because site groundwater discharges directly to the LDW, preliminary SSLs protective of aquatic organisms and human ingestion of aquatic organisms in fresh and marine surface water were developed. To develop a single groundwater

SSL for each constituent, the lowest protective criterion identified by Ecology (Ecology 2011) for retained pathways was selected as the SSL, as shown in Table K-4. SSLs protective of human ingestion of surface water were not developed because the LDW is not a drinking water source. WAC 173-340-720(7)(c) provides for adjustments to cleanup levels, as needed, so that cleanup levels are not less than the PQL and are not less than natural background. The preliminary screening levels have not yet been adjusted for PQL or for natural background. Those adjustments will be made in the RI. Groundwater preliminary SSLs, along with MDLs and RLs, are shown in Table 6.

6.2 SOIL

Soil preliminary SSLs protective of human health and the environment were developed for metals, VOCs, SVOCs, PCBs, petroleum hydrocarbons, and dioxins/furans. Soil preliminary SSLs protective of human health were developed using applicable human health risk assessment procedures specified in WAC 173-340-708 and WAC 173-340-740. Development of soil preliminary screening levels is shown in Table K-5 in Appendix K. These procedures include development of preliminary SSLs based on the reasonable maximum exposure expected to occur at the Site. Under WAC 173-340-740, Method B soil cleanup levels must be as stringent as:

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

These criteria were considered during development of the soil SSLs.

The only ARAR for soil is the Toxic Substances Control Act (TSCA); there are no other soil concentrations established under applicable federal laws. Except for TPH and lead, standard MTCA Method B preliminary soil SSLs protective of direct human contact were determined in accordance with WAC 173-340-740(3) using Ecology's Cleanup Levels and Risk Calculations (CLARC) database. MTCA Method A soil cleanup levels for unrestricted land uses were used for TPH and lead.

Soil preliminary SSLs protective of groundwater were determined using the fixed parameter three-phase partitioning model in accordance with WAC 173-340-747(4). The three-phase model provides a conservative estimate of the concentration of a contaminant in soil that is protective of groundwater.

To develop a single soil SSL for each constituent, the lowest protective criterion identified by Ecology (Ecology 2011) for retained pathways was selected as the SSL. WAC 173-340-740(5)(c) provides for adjustments to cleanup levels, as needed, so that cleanup levels are not less than the PQL and are not less than natural background. The preliminary screening levels have not yet been adjusted for PQL or for natural background. Those adjustments will be made in the RI. For those constituents where the lowest criterion is protection of groundwater, the criterion may not be applicable if it can be demonstrated empirically using the procedures specified in WAC 173-340-747 that soil concentrations do not cause an exceedance of the applicable groundwater preliminary SSLs. An empirical demonstration may be made in the RI.

6.3 SEDIMENTS

Preliminary SSLs protective of marine sediment were developed for preliminary evaluation of sediments. These preliminary SSLs were developed according to MTCA and SMS (WAC-173-204) requirements.

Two SMS criteria are promulgated by Ecology as follows:

- The marine SQS (WAC 173-204-320), the concentration below which effects to biological resources are unlikely
- The marine sediment CSL criteria (WAC 173-204-520), the concentration above which more than minor adverse biological effects may be expected.

The SQS and CSL values have been developed for a suite of analytes that includes metals, PAHs and other SVOCs, PCBs, and polar organic compounds. The SQS are the most stringent SMS numeric criteria and represent the goal for sediment cleanups. The SQS and CSL are listed in Table 1. Criteria for metals and polar organic compounds are expressed on a dry weight basis; criteria for non-polar organic compounds are expressed on an organic carbon-normalized basis.

7.0 CURRENT ENVIRONMENTAL SITE CONDITIONS

Previous environmental investigations have identified potential areas of contamination at the Site. The following sections identify the current environmental conditions for the media of concern identified in Section 5.4 and specific areas of concern identified based on historical Site operations.

7.1 GENERAL SOIL CONDITIONS

This section describes soil conditions in general terms for three areas: north of the former Slip 5, former Slip 5, and south of former Slip 5. Soil conditions are described in more specific terms for areas of concern associated with historical operations.

7.2 NORTH OF SLIP 5

Several remedial actions consisting of removal or stabilization of arsenic-contaminated soil have been completed north of Slip 5. Therefore, the assessment of current soil conditions is based on the analytical results for the soil remaining at the Site outside of the areas where remedial actions have occurred or in some cases deeper than the remedial actions were conducted. However, analytical results for the stabilized soil material still present in this portion of the Site are included in this discussion.

Analytical results are available for soil samples collected from 394 locations that may be representative of soil remaining at the Boeing Isaacson property north of former Slip 5, including 130 soil borings and test pit exploration locations (Figure 29), 47 sidewall samples associated with the 1989/1990 storm drain line excavation (Figures 14A and 14B), and 217 sidewall samples associated with the 1991 soil stabilization excavation (Figures 16A and 16B). The analytical results for these samples are provided in Tables G-1(arsenic analytical results only) and G-2 (all other metals and organic analytical results) of Appendix G. The analytical results for these samples indicate the following:

- Several metals are present in soil throughout the Boeing Isaacson property at concentrations above the laboratory reporting limits that were used at the time of analysis. These metals include: arsenic, barium, cadmium, chromium, copper, lead, mercury, nickel, and zinc. Elevated concentrations of arsenic remain in soil north of the King County storm drain (up to 3,500 mg/kg at boring #239) and south of the King County storm drain (up to 4,000 mg/kg at test pit 6J located near the Isaacson/Thompson property boundary). Up to 2,440 mg/kg arsenic was detected in samples of the stabilized material.
- PCBs were analyzed for in 12 soil samples and detected in 1 sample. The detection consisted of Aroclor 1260 in one sample located in the northeast corner of the property. The concentration was low (0.041 mg/kg).
- Diesel-range and motor-oil range petroleum hydrocarbons were analyzed for in 12 soil samples and detected in 3 samples. Two of the samples with detected concentrations were located in the northeast corner of the property and one is a sample of the stabilized material. Concentrations detected in the 3 samples were less than 100 mg/kg.

- Gasoline-range petroleum hydrocarbons were analyzed for in nine soil samples, but were not detected above the laboratory reporting limit (20 mg/kg).
- SVOCs were analyzed for in 11 soil samples and VOCs were analyzed for in 12 soil samples. Only acetone and methylene chloride, which are common laboratory contaminants, were consistently detected in the soil samples. Benzene was detected in 5 samples at concentrations ranging from 0.0007 mg/kg to 0.0098 mg/kg. TCE was detected in 1 sample at a concentration of 0.0016 mg/kg. A few SVOCs were detected, but at low concentrations (less than 0.1 mg/kg, except BEHP, which was detected at 0.52 mg/kg).

7.3 FORMER SLIP 5 MATERIAL

Previous investigations have identified bricks, wood debris, and slag material in the Slip 5 fill material. Analytical results are available for soil samples collected from 40 locations within the former Slip 5 (Figure 29). The analytical results for these samples are provided in Tables G-3 (arsenic analytical results only) and G-4 (all other metals and organic analytical results) of Appendix G. The analytical results for these samples indicate the following:

- Several metals are present in the fill material at concentrations above the laboratory reporting limits that were used at the time of analysis. These metals include: arsenic, barium, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc. Detected concentrations of arsenic in the fill material are less than 100 mg/kg, except at PBI-6, I-202(s), and I-205(s) where arsenic was detected at 186 mg/kg, 191 mg/kg, and 393 mg/kg, respectively. Elevated concentrations of chromium (up to 4,180 mg/kg at boring #236) and zinc (up to 5,770 mg/kg at boring #228) were detected at several locations. Lead concentrations greater than 1,000 mg/kg were detected at five locations (borings #5, #233, #236, I-7, and PBI-10). Barium, cadmium, and silver were primarily only analyzed for in 1983. The maximum concentrations detected for these metals were 650 mg/kg (barium), 16 mg/kg (cadmium), and 3.0 mg/kg (silver).
- PCBs were analyzed for in 26 soil samples; PCBs were detected in 7 of the samples. The maximum detected concentration for total PCBs was 9.7 mg/kg at boring #5. One soil sample (boring #6-3) contained total PCBs at a concentration of 1.2 mg/kg; all of the remaining detected total PCB concentrations were less than 1.0 mg/kg.
- Diesel-range, motor oil-range, and gasoline-range petroleum hydrocarbons were analyzed for in twelve soil samples from twelve locations. Diesel-range and motor oil-range petroleum hydrocarbons were detected in two samples at concentrations up to of 91 mg/kg and 400 mg/kg, respectively. Gasoline-range petroleum hydrocarbons were not detected. Oil and grease were analyzed for in two samples and were not detected.
- VOCs were analyzed for in nine soil samples collected from nine locations and SVOCs were analyzed for in four soil samples collected from four locations. Only low concentrations of each were detected.

In addition to the above soil samples, five samples of slag were collected and analyzed. One of the samples was analyzed for major and trace components and the other four samples were analyzed for arsenic, total chromium, copper, lead, and zinc. The results of the slag samples indicated relatively low concentrations of arsenic (18 mg/kg to 20 mg/kg) and elevated concentrations of total chromium

(920 mg/kg to 2,200 mg/kg), copper (160 mg/kg to 1,200 mg/kg), and lead (120 mg/kg to 1,400 mg/kg). Barium and cadmium were detected in composite samples at concentrations of 440 mg/kg and 2.2 mg/kg, respectively. EP Toxicity tests were also performed on the slag samples, but none of the metals were detected using this procedure.

7.4 SOUTH OF FORMER SLIP 5

Analytical results are available for soil samples collected from 33 locations south of former Slip 5 (Figure 29). The analytical results for these samples are provided in Tables G-5 (arsenic analytical results only) and G-6 (all other metals and organic analytical results) of Appendix G. The analytical results for these samples indicate the following:

- Several metals are present in the soil at the Thompson property south of former Slip 5 at concentrations above the laboratory reporting limits that were used at the time of analysis. These metals include: arsenic, barium, cadmium, chromium, copper, lead, mercury, nickel, and zinc. Barium, cadmium, selenium, and silver were analyzed for in two samples collected from boring #21. Only barium and cadmium were detected; the maximum detected concentrations were 31 mg/kg and 0.41 mg/kg, respectively. The maximum arsenic concentration was 43 mg/kg at HP-3. Elevated concentrations of chromium (1,003 mg/kg) and nickel (600 mg/kg) were detected at boring #212.
- PCBs were analyzed for in eleven soil samples at eleven locations and were not detected
- Diesel-range, motor oil-range, and gasoline-range petroleum hydrocarbons were analyzed for in soil samples collected at 22 locations. Diesel-range and oil-range petroleum hydrocarbons were detected in some samples, but at concentrations less than 1,000 mg/kg. Gasoline-range petroleum hydrocarbons were detected in samples at concentrations at the reporting limit (20 mg/kg).
- VOCs were analyzed for in soil samples collected from 22 locations. Elevated concentrations of TCE and PCE were detected in soil along the Site southern boundary. For several reasons, including the fact that sources for HVOCs have been identified on the 8801 Site, the Property Boundary Sampling Report (Landau Associates 2009d) concluded that the detected HVOCs in soil on the Boeing property are likely the result of HVOCs migrating from the 8801 Site to the Boeing Thompson property. The PCE and TCE concentrations in soil at the 8801 Site are 3 orders of magnitude greater than the highest concentrations detected at the Boeing Thompson property. PCE and TCE concentrations along the southern Site boundary and the northern 8801 Site boundary are shown on Figure 30. TCE and PCE concentrations for soil samples collected along both sides of the property line are also shown on cross-sections B-B’ and C-C’ (Figures 23 and 24).

7.5 GENERAL GROUNDWATER CONDITIONS

Current groundwater conditions at the Site are based on the most recent analytical results (2009 Phase II ESA monitoring event) for monitoring wells I-104(s), I-200(s), I-203(s), I-205(s), and I-206(s); intermediate monitoring well I-203(i); and piezometers (PZ-1 through PZ-8). The most recent dissolved arsenic concentrations for all existing and former groundwater monitoring locations are shown on Figure 31. A summary of previous groundwater analytical results is provided in Appendix H.

7.5.1 BOEING ISAACSON PROPERTY

Two monitoring wells [I-200(s) and I-104(s)] and two piezometers (PZ-1 and PZ-3) are present on the Boeing Isaacson property. Piezometers PZ-6 and PZ-7 are located on the Boeing Isaacson and Boeing Thompson property boundary and are discussed in the Boeing Thompson property groundwater section. During the most recent groundwater monitoring event (the 2009 Phase II ESA), dissolved arsenic was detected in groundwater at concentrations ranging from 0.8 μg/L in the sample from well I-200(s), which is located along the eastern property boundary, to 2,270 μg/L in the sample from well I-104(s), which is located near the western property boundary. The concentrations of dissolved arsenic in groundwater samples collected from direct-push borings during the 2009 Phase II ESA ranged from less than the laboratory reporting limit at the southern-most sample location (IDP-9) to 16,600 μg/L at the northern-most sample location, IDP-14. Dissolved arsenic at a concentration of 13,600 μg/L was detected in the sample from location IDP-8, which is located south and west of IDP-14. Dissolved copper was also detected in groundwater samples collected from three of the direct-push borings (IDP-9, IDP-12, and IDP-14) and from monitoring well I-104(s) at concentrations ranging from 6 μg/L to 20 μg/L, and dissolved lead was detected in the groundwater sample collected at IDP-8 at a concentration of 1 μg/L. Vinyl chloride was also detected in the samples from IDP-8 and I-104(s) at a concentration of 0.2 μg/L. The Phase II ESA groundwater analytical results are provided in Appendix H. The dissolved arsenic results for groundwater samples collected at all Site monitoring wells and piezometers since 1988 are summarized in Table 8.

7.5.2 BOEING THOMPSON PROPERTY

Five monitoring wells [I-203(s), I-205(s), I-206(s), TH-MW-1, and TH-MW-2] and five piezometers (PZ-2, PZ-4, PZ-6, PZ-7, and PZ-8) are present on the Boeing Thompson property. During the 2009 Phase II ESA (the most recent groundwater sampling event that included sample collection from the existing wells and piezometers), dissolved arsenic was detected at these locations (except monitoring wells TH-MW-1 and TH-MW-2, which were not sampled). The arsenic concentrations ranged from 5.0 μg/L in the sample from PZ-7, which is located near the shoreline on the north Boeing Thompson property boundary, to 575 μg/L in the sample from well I-206(s), which is located in the southwest corner of the Site. Concentrations of dissolved arsenic in the groundwater samples collected from direct-push borings during the 2009 Phase II ESA investigation ranged from 1.3 μg/L at TDP-26, located at the southern Site boundary, to 35 μg/L at TDP-16, located just west of Building 14-01 and upgradient of well

I-206(s). The dissolved arsenic results for groundwater samples collected at all the monitoring wells and piezometers since 1988 are summarized in Table 8. Dissolved chromium was also detected at direct-push borings TDP-1, TDP-7, and TDP-11 at concentrations ranging from 6 µg/L to 14 µg/L. The Phase II ESA groundwater analytical results are provided in Appendix H.

During the 2009 Phase II ESA and Property Boundary investigations, vinyl chloride; 1,1-DCE; cis-1,2-DCE; TCE; PCE; and 1,1,2,2-tetrachloroethane were detected in the groundwater. Vinyl chloride was detected at six locations [TDP-7, TDP-8, TDP-16, TDP-25, PBI-11, I-206(s)] at concentrations ranging from 0.2 µg/L to 1.8 µg/L, and at one location, TDP-26, at a concentration of 140 µg/L. TCE and PCE were detected at five locations (TDP-25, TDP-26, PBI-11, PBI-12, and PBI-13). The highest concentrations of TCE and PCE (1,000 µg/L and 78 µg/L, respectively) occurred at PBI-13. The highest concentrations of vinyl chloride, TCE, and PCE were detected at locations along the southern Site boundary. VOC results for the 2009 Phase II ESA and Property Boundary investigations are presented on Figure 32 and provided in Appendix H.

7.6 SPECIFIC AREAS OF CONCERN

Specific areas of concern have been identified based on historical operations. These areas and the results of previous investigations within these areas are described below. Results for the previous investigations are summarized in tabular format in Appendix G (soil) and Appendix H (groundwater).

7.6.1 FORMER PAINT STORAGE AREAS AND SUMPS

Two paint storage areas were previously located in the eastern portion of the Boeing Isaacson property, as shown on Figures 4 and 10. Analytical results for one soil sample collected at 2.5 ft BGS indicate low concentrations of metals are present in the soil (e.g., arsenic and lead were detected at 8.7 mg/kg and 11 mg/kg, respectively).

7.6.2 FORMER DIESEL AND GASOLINE TANKS

USTs containing diesel and gasoline were formerly located on or near the northeastern Boeing Thompson property boundary, as shown on Figures 4 and 10. One soil sample collected at 5.5 ft BGS was analyzed for PCBs, metals, and total cyanide. PCBs, total cyanide, mercury, and silver were not detected. Concentrations of other metals detected in the soil sample were low (e.g., arsenic and lead were detected at 3.4 mg/kg and 1.3 mg/kg, respectively). Analysis for petroleum-related compounds was not performed. This soil sample may be representative of soil remaining because no known information is available to confirm that the tanks and soil surrounding the tanks were removed.

7.6.3 FORMER WASHDOWN AREA AND DEGREASER

A large area of the western portion of Building 14-01 was formerly used for washing and painting of airplane sections (Figure 2). Workers in this area washed various airplane sections with a solution containing methyl isobutyl ketone to prepare the sections for painting. Wastewater and overspray were washed into one of three concrete trenches, which ran north to south through the painting area. The trenches conveyed the solution to sumps located on the exterior of the south side of Building 14-01, near the southwest corner of the building. The wastewater was pumped from the sumps to two ASTs located in the west yard of Building 14-01 via underground piping. An aqueous degreaser was also located in the southwest portion of Building 14-01; it was recently removed. During the Phase II ESA, 11 soil borings were advanced in the area of the former washdown system and aqueous degreaser inside Building 14-01. Soil samples were collected from each of the direct-push borings in this area and groundwater samples were collected from three of the borings. Indications of impact were not observed during field screening. Soil and groundwater samples collected from the borings were analyzed for VOCs, TPH, and metals, and selected samples were analyzed for SVOCs, PAHs (groundwater samples only), and PCBs. The analytical results for this area are summarized as follows:

- Low concentrations of VOCs were detected in soil and only vinyl chloride was detected in groundwater at an elevated concentration.
- Elevated concentrations of arsenic, copper, lead, and mercury were detected in soil. Groundwater samples were analyzed for arsenic and chromium. Only arsenic was detected in the groundwater at an elevated concentration.
- Low concentrations of SVOCs (including PAHs) were detected in soil. Only BEHP was detected in groundwater in this area at an elevated concentration.
- Diesel-range and motor oil-range petroleum hydrocarbons were detected in soil at two locations. The detected concentrations were less than 1,000 mg/kg.

7.6.4 FORMER WASHDOWN SYSTEM COLLECTION TANKS

Two 10,000-gallon ASTs (TSA-14 and TSA-15) that contained wastewater from the painting operations were formerly located in the yard west of Building 14-01 (Figure 4). Three sumps (TS-67, TS-68, TS-69), located south of Building 14-01 (Figure 4), collected the wastewater, which was pumped into the ASTs via underground conveyance lines. A third 5,000-gallon AST (TSA-21), located in the western yard of Building 14-01 (Figure 4), was originally used to contain waste copper plating solution. This tank was later used for overflow containment for the aqueous degreaser. Six soil borings (TDP14, TDP15, TDP16, TDP17, TDP18, and TDP 19) were previously advanced in the area of the former ASTs. No indications of impact were observed during field screening; therefore, soil samples were collected from between 3 and 5 ft BGS. Groundwater samples were collected from two of the borings (TDP 16 and

TDP 18). Soil and groundwater samples were analyzed for VOCs; SVOCs; diesel-range and petroleum-range hydrocarbons; and metals (arsenic, cadmium, chromium, copper, lead, mercury). The analytical results for this area are summarized as follows:

- VOCs were detected in the soil and groundwater. Acetone was detected in each soil sample. Only vinyl chloride was detected in groundwater (0.3 µg/L). Vinyl chloride was not detected in soil.
- SVOCs were detected in soil in one of the two samples analyzed. Elevated concentrations of cPAHs were detected in the soil, but cPAHs were not detected in groundwater.
- Elevated concentrations of arsenic, copper, and mercury were detected in the soil. Groundwater samples were analyzed for arsenic, cadmium, chromium, copper, lead, and mercury. Only arsenic was detected in the groundwater.
- Diesel-range and oil-range petroleum hydrocarbons were detected in one soil sample at concentrations of 23 mg/kg and 110 mg/kg, respectively, but neither was detected in groundwater.

7.6.5 FORMER WASHDOWN SYSTEM COLLECTION SUMPS

Three sumps (TS-67, TS-68, TS-69), located south of Building 14-01 (Figure 4), collected the wastewater from the paint system operations, which was pumped into the ASTs west of Building 14-01 via underground conveyance lines. Six soil borings (TDP1, TDP2, TDP3, TDP4, TDP25, and TDP 26) were previously advanced in the vicinity of the sumps. No indications of impact were observed during field screening; therefore, soil samples were collected from between 4 and 9 ft BGS. Groundwater samples were collected from three of the borings (TDP 1, TDP25, and TDP26). Soil and groundwater samples were analyzed for VOCs; SVOCs; diesel-range and oil-range petroleum hydrocarbons; and metals (arsenic, cadmium, chromium, copper, lead, and mercury).

The analytical results for this area are summarized as follows:

- VOCs were detected in the soil and groundwater. Acetone was detected in each soil sample. Only TCE was detected in soil at an elevated concentration (66 mg/kg). Several VOCs were detected in groundwater at elevated concentrations, including TCE, vinyl chloride, and cis-1,2-dichloroethene.
- SVOCs were not detected in soil, but were detected in groundwater. Carbazole and BEHP were detected in the groundwater at elevated concentrations.
- Elevated concentrations of arsenic, copper, lead, and mercury were detected in the soil. Groundwater samples were analyzed for arsenic and chromium. Only arsenic was detected in the groundwater at an elevated concentration.
- Diesel-range and oil-range petroleum hydrocarbons were detected in all of the soil samples at concentrations up to 740 mg/kg, but neither was detected in groundwater.

7.6.6 HYDRAULIC TEST PAD AREA

A release of hydraulic oil from a holding tank associated with an oil/water separator located in the hydraulic test pad area (east yard of Building 14-03) was reported in 1992. The oil/water separator, holding tank and associated piping were removed in 1995. The impacted area is shown on Figure 4. Approximately 900 tons of petroleum-contaminated soil were excavated from the area surrounding the oil/water separator and holding tank. During the 2009 Phase II ESA investigation, two soil borings (TDP-31 and TDP-32) were advanced in the hydraulic test pad area on the east side of Building 14-03. Soil samples were collected from both of the direct-push borings in this area and a groundwater sample was collected from TDP-31. Soil and groundwater samples collected from borings in this area were analyzed for VOCs, TPH, and metals. In addition, the soil and groundwater samples collected from TDP-31 were analyzed for SVOCs, PAHs (groundwater sample only), and PCBs.

The analytical results for this area are summarized as follows:

- Arsenic was detected in one soil sample (TDP-31) at a concentration of 9 mg/kg.
- No other constituents were detected in soil at elevated concentrations.
- BEHP (3.0 µg/L) and motor oil-range petroleum hydrocarbons (estimated at 3.2 mg/L) were detected in the groundwater sample collected from this area.
- No other constituents were detected in groundwater at elevated concentrations.

7.6.7 HAZARDOUS WASTE/HAZARDOUS MATERIALS SHEDS

Four soil borings (TDP-27 through TDP-30) were advanced in the area of the hazardous waste/hazardous materials sheds, south and southeast of Building 14-03, during the 2009 Phase II ESA investigation. Soil samples were collected from each of the direct-push borings in this area from the capillary fringe zone, approximately 6 inches above the top of the water table, and groundwater samples were collected from two locations (TDP-28 and TDP-29).

Soil and groundwater samples collected from borings in this area were analyzed for VOCs, TPH, and metals. In addition, the soil and groundwater samples collected from TDP-28 and TDP-29 were analyzed for SVOCs, PAHs (groundwater samples only), and PCBs.

The analytical results for this area are summarized as follows:

- VOCs were not detected in soil or groundwater in this area at elevated concentrations.
- Mercury was detected in two soil samples (TDP-29 and TDP-30) at concentrations of 0.1 mg/kg and 0.17 mg/kg, respectively. Arsenic was detected in one groundwater sample (TDP-28) at a concentration of 13.0 µg/L.
- SVOCs were not detected in soil at concentrations greater than the laboratory reporting limits. No elevated concentrations of SVOCs were detected in groundwater samples from this area.

- TPH and PCBs were not detected at concentrations greater than the laboratory reporting limits in soil or groundwater samples collected from this area.

7.6.8 FORMER 500-GALLON STORAGE TANK

A 500-gallon diesel UST was removed from the west side of Building 14-02 (Figure 4); however, no data representing the subsurface conditions have been located in Boeing files. Therefore, one soil boring (TDP-24) was advanced in the area of the 20,000-gallon boiler fuel UST on the western side of Building 14-02 during the 2009 Phase II ESA investigation. A soil sample was collected from the capillary fringe and analyzed for TPH. TPH was not detected in the sample at concentrations greater than the laboratory reporting limits.

7.6.9 TRANSFORMERS

During the 2009 Phase II ESA investigation, two soil borings (TDP-22 and TDP-23) were advanced in the area of the transformers on the north side of Building 14-02. Soil samples collected in this area were collected from the upper 4 ft and analyzed for TPH, metals, and PCBs. Groundwater samples were not collected from this area.

The analytical results for this area are summarized as follows:

- TPH and PCBs were not detected in soil at concentrations greater than the laboratory reporting limits.
- Mercury was detected in the soil sample collected from TDP-23 at a concentration of 0.11 mg/kg.

7.6.10 SUBSTATION – BUILDING 14-22

During the Phase I ESA, dark staining was observed on the gravel surface along the northern wall of the electrical substation (Building 14-22) located at the southeastern corner of the Site. Two soil borings (TDP-20 and TDP-21) were advanced in the area of the electrical substation during the 2009 Phase II ESA investigation. The soil samples collected from this area were analyzed for TPH, metals, and PCBs. Groundwater samples were not collected from this area.

Analytical results for this area are summarized as follows:

- TPH and PCBs were not detected in soil at concentrations greater than the laboratory reporting limits.
- Metals (cadmium, chromium, copper, and lead) were detected at low concentrations greater than the laboratory reporting limits.

7.7 SITE-WIDE STORM DRAIN SYSTEM

As described in Section 3.1.4.2, an investigation of CBs and oil/water separator solids was conducted at the Site in 2008 to collect and analyze samples of solid material from CBs and oil/water separators within the Site storm drainage system prior to planned CBs cleaning. Twenty-two solids samples collected from the CBs and oil/water separators were analyzed for PCBs; SVOCs; total metals (arsenic, cadmium, chromium, copper, lead, mercury, and zinc); TOC; and total solids. PCBs were detected in 19 of the 22 samples analyzed. One or more SVOCs were also detected in 19 of the 22 samples analyzed. One or more metals were detected in all 22 samples analyzed.

Stormwater discharging to the LDW from the Site via the two outfalls is currently regulated under Industrial Stormwater General Permit #WAR000148. As described in Section 3.3.5, copper has was detected in stormwater from Outfalls A and B and zinc was detected in stormwater from Outfall B at concentrations exceeding the permit benchmarks during 2010.

7.8 SEDIMENT

Previous investigations of the sediments in the LDW in the vicinity of the Site indicate that metals (including arsenic, lead, mercury and zinc), PCBs, PAHs, and SVOCs are present in the surface and subsurface sediment at concentrations above the SMS SQS at several locations. Dioxins/furans and carbazole have also been detected in the sediment. In general, the detected concentrations of these chemicals decrease with depth.

7.9 AIR

Air monitoring at the Site has not been conducted; therefore, the current air quality is not known.

8.0 DATA GAPS

This section identifies the areas and media within the Site that require further investigation to determine if cleanup at the Site is warranted, to evaluate cleanup action alternatives, and to select the appropriate cleanup action.

8.1 LDW EAA-6 SOURCE CONTROL DATA GAPS

Ecology has identified data gaps to be addressed to assess the potential for recontamination of LDW sediments and the need for source control (SAIC 2008). One of these data gaps is that no information had been provided regarding current Site activities. This data gap was partially addressed by the Phase I ESAs conducted in 2008 for the Boeing Isaacson and the Boeing Thompson properties. These ESAs included a Site reconnaissance to assess current land use activities and environmental conditions. The results of the Phase I Site assessments are provided in Appendix F. Additional information regarding current Site activities will be included in the RI.

The remaining data gaps are identified as stormwater, soil and groundwater, and bank erosion pathways to EAA-6 sediments. The sections below discuss the extent to which each of these data gaps has been addressed by the recent activities conducted at the Site. Additional activities planned in the RI to address these data gaps are discussed in Section 9.0.

8.1.1 STORMWATER

The Site stormwater data gap identified by Ecology is the lack of information regarding contaminant concentrations that are present in storm drain system solids. This data gap was partially addressed by the December 2008 CB and oil/water separator solids investigation. As described in Section 3.3.1, the investigation consisted of collecting and analyzing samples of solid material from the CBs and oil/water separators of the Site storm drainage system prior to the planned CB cleaning. Because PCBs and PAHs were detected in the CB and oil/water separator solids present in 2008, an investigation of the solids accumulated in the storm drain system since the last cleaning is needed to evaluate whether the Site storm drain system is a potential source for recontamination of the EAA-6 sediment.

Another stormwater data gap identified by Ecology is the lack of information on zinc concentrations in stormwater since 2007. Total zinc concentrations exceeded benchmark levels prior to 2007 and follow-up information was requested to determine whether zinc concentrations are now below the benchmark values. Stormwater sampling is conducted on a quarterly basis in accordance with NPDES permit requirements. As described in Section 3.3.5, copper was detected in stormwater from Outfalls A and B and zinc was detected in stormwater from Outfall B at concentrations exceeding the permit benchmarks during 2010. Boeing is implementing BMPs to address the zinc and copper exceedances including sweeping, roof cleaning, and CB cleaning to remove solids. Further investigation of the source of PCOCs to the stormwater system may be necessary if storm drain system solids or whole water results exceed preliminary screening levels.

Other stormwater data gaps identified by Ecology are related to the King County 48-inch storm drain, several edge drains along the Port property shoreline, and the source or status of an outfall located on Port property near the Port and Jorgenson Forge property boundary. Because Boeing does not own or operate these structures and/or property, these data gaps will not be addressed in the RI.

8.1.2 SOIL AND GROUNDWATER

The data gaps identified by Ecology to assess groundwater discharge from the Site as a potential source for recontamination of the EAA-6 sediments include the following:

- A comprehensive soil and groundwater investigation at the Boeing Thompson property to determine the source of arsenic in groundwater at wells I-205(s) and I-206(s) and to evaluate the potential for other COCs to be present at the Site.
- An explanation for the tidal efficiency anomaly observed in well I-205(s) during the tidal study conducted in 2000.
- Soil and groundwater data for metals, other than arsenic, and other COCs (SVOCs). Ecology notes that lead, silver, and zinc were detected in 1983 and 1988 groundwater investigations at concentrations above preliminary groundwater to sediment SSLs developed in 2004 by SAIC for Ecology for Slip 4 of the LDW, and that metals, other than arsenic, may be present in fill material used at the Site.
- The extent of contaminated soil and groundwater to the north of the King County 48-inch storm drain line, which, if present, could enter the storm drain line through gaps or holes in the piping, if any, and subsequently be transported to the LDW.
- Soil quality near the former location of the Slip 5 Outfall; Ecology is concerned that contamination present in soil would have the potential to leach to groundwater.

The most recent comprehensive groundwater investigation at the Site, when all existing wells were sampled, was the 2009 Phase II ESA investigation. In addition to the groundwater samples collected at the monitoring wells, groundwater samples were also collected from 21 direct-push soil borings. Following the 2009 Phase II ESA investigation, groundwater samples were collected from 5 direct-push borings along the southern property. The primary focus of each investigation was arsenic and VOCs; however, investigation for other constituents (SVOCs and TPH) was conducted at selected locations. Neither of these investigations addressed the source of arsenic contamination in groundwater at wells I-205(s) and I-206(s); therefore, further investigations are needed in the area of these two wells. Also, a comprehensive groundwater sampling event has not been conducted with all groundwater samples analyzed for the EAA-6 COCs [arsenic, PAHs, phthalates (BEHP and butylbenzylphthalate]), benzoic acid, benzyl alcohol, dibenzofuran, and total PCBs] and the results compared to SSLs.

Soil and groundwater samples collected during recent investigations, including the 2009 Phase II ESA investigation, have been analyzed for metals other than arsenic. Cadmium, copper, lead, mercury, and zinc have been routinely analyzed for in soil and groundwater samples collected since 1988. However, the analysis of silver has not been included in these investigations, except in some instances for disposal characterization. No known Site operations would have provided a source of silver.

Sixty-nine soil samples have been collected from 30 locations along the north side of the King County 48-inch storm drain line and analyzed for arsenic. Samples from 15 of the locations were also analyzed for other metals. At 5 locations, samples were analyzed for VOCs and at 4 locations soil samples were analyzed for PCBs. Only 1 sample was analyzed for diesel-range and motor oil-range petroleum hydrocarbons. Additionally, several soil samples were collected from the northern sidewall of the trench during installation of the King County storm drain. No further investigation of the soil is needed in this area. One monitoring well [I-104(s)] is located along the Boeing Isaacson/Port property boundary; therefore, an additional groundwater monitoring location is needed to adequately evaluate the quality of groundwater potentially migrating from the Boeing Isaacson property.

The remaining data gap identified for evaluating groundwater discharge to LDW EAA-6 sediments is a lack of information for the area in the vicinity of the former Slip 5 Outfall. This area has not been addressed during previous investigations.

8.1.3 BANK EROSION

Ecology identifies the lack of available information regarding contaminant concentrations in bank soil as a data gap. The portion of the Site that is directly adjacent to the LDW is the Boeing Thompson property. The northern shoreline along the Boeing Thompson property is armored with a steel bulkhead that prevents bank erosion to the LDW. The southern portion of the Boeing Thompson property is armored with a wooden bulkhead, which significantly reduces the potential for bank erosion. The Boeing Isaacson property is separated from the LDW by the Port property.

8.2 OTHER DATA GAPS

Data gaps, other than those identified by Ecology, that need to be addressed to determine if cleanup at the Site is warranted and, if so, to evaluate cleanup action alternatives are discussed below.

8.2.1 FORMER PAINT STORAGE AREAS AND SUMPS

Only one shallow soil sample was previously collected near the two paint storage areas formerly located on the Boeing Isaacson property and no soil samples have been collected in the area of the sumps that were used to collect paint sludge. The northern-most storage area (Figure 4) may have also been used by Boeing for hazardous waste storage. Further investigation of this area is necessary.

8.2.2 FORMER DIESEL AND GASOLINE UST AREAS

Only one soil sample was previously collected in the area of the former USTs on the Boeing Thompson property that contained diesel and gasoline. The sample was analyzed for PCBs, metals, and total cyanide, but not petroleum-related compounds. Also, no documentation is available to determine if these USTs were removed from the property. Further investigation of this area is necessary.

8.2.3 FORMER HYDRAULIC TEST PAD AREA

Motor-oil-range petroleum hydrocarbons were detected in a groundwater sample collected from the former hydraulic test pad area at an elevated concentration. Additional investigation in this area and downgradient of this location is needed to evaluate the petroleum hydrocarbons in groundwater.

8.2.4 OBSERVED TAR-LIKE SUBSTANCE AREA

The extent of a tar-like substance discovered outside of the stabilized soil perimeter at the Boeing Isaacson property during removal of the stabilized mound needs to be determined. The tar-like substance was discovered on the northern side of the excavation for the eastern Vortechs vault (shown on Figure 3), at a depth of approximately 1.5 ft BGS.

8.2.5 FORMER SLIP 5 FILL MATERIAL

Additional investigation is needed within the former Slip 5 fill material to characterize the different fill material placed during different periods and potentially imported from different sources.

8.2.6 MONITORING WELL I-104(S) GROUNDWATER ARSENIC SOURCE

Elevated concentrations of dissolved arsenic continue to be detected in the samples from monitoring well I-104(s). A potential source, other than the use of arsenic and other metals by the Mineralized Cell Wood Preserving Company (which operated circa 1945), has not been identified. Much of the soil assumed to be impacted by the former wood treatment operation has been previously removed and/or stabilized to reduce the potential for leaching of arsenic from the soil to groundwater. During the 2009 Phase II ESA investigation, elevated concentrations of dissolved arsenic were detected in groundwater at locations upgradient of monitoring well I-104(s) (13,600 μg/L at IDP-14 and 13,600 μg/L at IDP-8.) Further investigation is needed to determine the source of elevated dissolved arsenic concentrations in the vicinity of monitoring well I-104(s).

8.2.7 MONITORING WELLS I-205(S) AND I-206(S) GROUNDWATER ARSENIC SOURCE

Elevated concentrations of dissolved arsenic continue to be detected in the samples from monitoring wells I-205(s) and I-206(s). No potential source for arsenic in groundwater at these locations has been identified. Further investigation in the vicinity of these two wells is necessary to identify a potential source.

8.2.8 MONITORING WELL DISTRIBUTION

Additional wells are needed along the western Thompson property boundary. Currently, four monitoring wells are located along the western Thompson property boundary: PZ-7, PZ-8, TH-MW-1, and TH-MW-2. At two of the wells, TH-MW-1 and TH-MW-2, groundwater has not been present during recent groundwater monitoring events. A monitoring well constructed with a deeper well screen is needed to evaluate groundwater quality along this portion of the western Site boundary. Additional wells are also needed along the southern portion of the western property boundary to evaluate groundwater quality downgradient and upgradient of monitoring well I-206(s), where arsenic was most recently detected at a concentration of 575 μg/L, and to evaluate groundwater quality near the 8801 Site boundary. Groundwater quality information is also limited in the eastern portion of the Boeing Thompson property.

Groundwater level measurements using the existing well locations are adequate for determining groundwater flow along the northern half of the Site, but do not provide adequate information to determine groundwater flow direction in the southern half of the Site. Understanding the groundwater flow along the southern half of the Site is necessary to evaluate the quality of groundwater migrating to and from the Site.

8.2.9 SEEP MONITORING

Two seep samples have been collected previously and analyzed for dissolved arsenic. Additional seep samples need to be collected and analyzed for the Site PCOCs.

8.2.10 SOIL AND GROUNDWATER ANALYSES

Constituents analyzed for in soil and groundwater have not been consistent over time nor have analyses included all constituents previously detected in soil and/or groundwater. Previous groundwater analyses have typically included dissolved metals and only occasionally total metals. A more comprehensive list of analytes is needed to fully characterize Site soil and groundwater.

8.2.11 STORM DRAIN SYSTEM

As previously mentioned, stormwater sampling is conducted on a quarterly basis in accordance with NPDES permit requirements; however, these requirements do not include analysis for all of the Site PCOCs. Additional sampling is necessary to fully characterize the stormwater discharged from Outfalls A and B.

Only a portion of the 12-inch corrugated metal pipe located within a retaining wall along the southern boundary of the Site was investigated in 2008. Further investigation is needed to confirm this pipe is not connected with other pipes.

8.2.12 SOIL TO VAPOR PATHWAY

VOCs have been detected in soil at the Site at concentrations significantly higher than typical SSLs protective of groundwater for drinking water; therefore, in accordance with WAC 1730340-745(4)(C)(III), the soil to vapor pathway needs to be evaluated.

8.2.13 SEDIMENT

Surface sediment samples (0 to 0.33 ft) were collected and analyzed in the vicinity of the Site between September 1997 and December 2009 (Table 9). The usability of chemistry data from surface samples collected prior to 2004 is questionable. Reworking of surface sediments by organisms, additional sedimentation, and localized scour events limit the usefulness of the older data sets in evaluating the current horizontal distribution of chemicals that exceed the SQS in the surface sediments. The recent historical data do not provide sufficient coverage of the project area to determine if there are trends in concentrations across the project area related to possible upstream/downstream transport or nearshore/offshore transport mechanisms. In addition, several of the sample locations were analyzed only for PCBs and TOC. The patchy distribution of samples analyzed for the SMS list of chemicals limits the usefulness of the existing data set for determining the horizontal distribution of SMS chemicals in the surface sediments.

Seven of the nine cores collected in the vicinity of the Site were collected in 2004 or later. The cores were not evenly distributed across the project area. Core locations were clustered together or positioned near previously identified hot spots. The core sample data are of limited use for determining the vertical distribution of contaminants across a majority of the project area. In addition, deeper samples collected at a core location were frequently analyzed for a limited list of analytes. Analysis of deeper samples collected at a hot spot focused on contaminants that exceeded the SQS in shallower samples. PCBs or metals were the primary constituents analyzed for in deeper samples collected within the project area.

Overall, the existing historical sediment data in the vicinity of the Site are limited in distribution both horizontally and vertically. The SMS list of chemicals was not analyzed at all locations or at consistent depths. Core sample intervals analyzed were not consistent among surveys or core locations. Additional sampling is needed to provide data for areas that were not previously sampled or that were sparsely sampled. The additional samples collected near previously sampled locations need to be analyzed for a consistent analytes list (i.e., SMS list). Sampling intervals also need to be consistent among sample locations (if possible) to simplify the interpretation of patterns relating to changes in concentration with depth or sediment horizons across the project area.

9.0 REMEDIAL INVESTIGATION

As described in Section 8.0, further investigation of Site groundwater, soil, storm drain solids, stormwater, and sediment is needed to evaluate the potential for recontamination of LDW sediments and to determine if cleanup is warranted, and, if warranted, to develop and evaluate cleanup action alternatives and select a final cleanup action. This section presents the proposed scope of the RI. More detail for each proposed RI activity is presented in the Uplands SAP provided in Appendix A.

During the RI activities, if any archaeological resources are discovered, work will be stopped immediately and Ecology, the Department of Archaeology and Historic Preservation (DAHP), the city of Tukwila, and the appropriate Tribes' Cultural Resources Department will be notified by the close of business on the day of discovery. A licensed archaeologist will inspect the Site and document the discovery, provide a professionally documented site form, and report to the above-listed parties. In the event of an inadvertent discovery of human remains, work will be immediately halted in the discovery area, the remains will be covered and secured against further disturbance, and the Tukwila Police Department and King County Medical Examiner will be immediately contacted, along with the DAHP Physical Anthropologist and authorized Tribal representatives. A treatment plan by a licensed archaeologist would then be developed in consultation with the above-listed parties consistent with RCW 27.44 and RCW 27.53 and implemented according to WAC 25-48.

9.1 GROUNDWATER INVESTIGATION

The groundwater investigation will consist of installing 25 additional monitoring wells, collecting groundwater samples from each of the new and existing monitoring wells and from 1 soil boring, laboratory analysis of the groundwater samples, groundwater level monitoring, abandonment of 2 existing wells, and re-evaluation of tidal influences on Site groundwater. The data gaps identified in Section 8.0 that will be filled by the planned groundwater investigation scope include: 1) determining groundwater quality north of the King County storm drain, 2) evaluating groundwater quality near the former Slip 5 Outfall, 3) evaluating the source of elevated dissolved arsenic concentrations in the vicinity of monitoring well I-104(s), 4) evaluating groundwater quality in the former hydraulic test pad area, 5) better distribution of groundwater monitoring locations in the western and southern portions of the Site, 6) extended laboratory analysis of groundwater and seep samples, and 7) evaluating the tidal efficiency anomaly observed in well I-205(s). Hollow-stem auger drilling methods will be used to install the new monitoring wells. The monitoring wells will be constructed with 2-inch-diameter PVC casing and well screen. Well construction and installation is discussed in more detail in the Uplands SAP (provided in Appendix A).

9.1.1 MONITORING WELL AND GROUNDWATER GRAB SAMPLING LOCATIONS

The proposed locations for the new monitoring wells and for collecting a groundwater grab sample from a temporary well are shown on Figure 33 and discussed below.

9.1.1.1 Northern Site Boundary

One well will be located along the northern Site boundary to determine the groundwater quality north of the King County storm drain. The well will be located in the area where arsenic was detected in a groundwater sample collected from a direct-push boring (IDP-14) during the 2009 Phase II ESA investigation at a concentration of 16,600 µg/L.

9.1.1.2 Stabilized Arsenic-Contaminated Soil Area

Three wells will be located within the stabilized arsenic-contaminated soil area to evaluate groundwater quality in this area.

9.1.1.3 Former Paint Storage Areas

One well will be installed immediately downgradient of the paint storage areas formerly located in the eastern portion of the Isaacson property. Another well will be installed approximately 500 ft west (downgradient) of these former paint storage areas.

9.1.1.4 Former Slip 5 Outfall

One monitoring well will be located near the former Slip 5 Outfall. Also, one groundwater grab sample will be collected from a boring located near the former Slip 5 Outfall. The groundwater sample will be collected from a temporary well installed in the boring. Once the sample has been collected, the temporary well will be removed and the boring abandoned.

9.1.1.5 Upgradient of Monitoring Well I-104(s)

Two wells will be installed upgradient (east) of well I-104(s) to evaluate potential sources for the elevated arsenic concentrations detected in groundwater at well I-104(s). One well will be located between the area of stabilized soil and well I-104(s). The second monitoring well will be located adjacent to direct-push boring IDP-8. Arsenic was detected in groundwater at location IDP-8 at a concentration 13,000 µg/L.

9.1.1.6 Former Slip 5

Three wells will be installed within the limits of the former Slip 5 to evaluate groundwater quality.

9.1.1.7 Former Hydraulic Test Pad Area

One well will be installed in the former hydraulic test pad area where motor-oil-range petroleum hydrocarbons were previously detected in a groundwater sample. As described in Section 9.1.1.7, another well will be located downgradient of the hydraulic test pad area along the western Site boundary. This well will be installed between the current locations of wells TH-MW-1 and TH-MW-2.

9.1.1.8 Western Site Boundary

Five monitoring wells will be installed along the western Site boundary. Two of the wells will be installed along the Boeing Isaacson property boundary adjacent to the Port property. One of these wells will be installed west of existing monitoring well I-104(s) to evaluate groundwater quality downgradient of well I-104(s). The second monitoring well will be located half-way between monitoring well I-104(s) and existing piezometer PZ-7 to better characterize groundwater quality spatially along the western Site boundary.

Three of the monitoring wells, including the well west of the hydraulic test pad area, will be installed along the Boeing Thompson property boundary. In addition to the well located west of the hydraulic test pad area, one well will be installed between wells I-205(s) and I-206(s), and another well will be installed at the southwest corner of the Site.

9.1.1.9 Boeing Thompson Property

In addition to the five monitoring wells that are proposed to be installed along the Boeing Thompson western property boundary and in the former hydraulic test pad area, and the three wells proposed to be installed within the former Slip 5, seven monitoring wells will be installed at other locations at the property to better determine groundwater flow direction and evaluate groundwater quality over time in this portion of the Site. Three wells will be installed along the southern property boundary adjacent to the VOC plume identified on the 8801 Site, and one well will be installed east of Building 14-01. Three monitoring wells, located in the southwest corner of the existing 14-01 building, were installed in April 2011. Boeing is currently in the process of re-occupying the building, which may significantly restrict the extent of the investigation that can be conducted in the building. A work plan was prepared for the investigation inside the building and approved by Ecology on March 30, 2011 (Landau Associates 2011)

9.1.2 SEEP SAMPLING

Groundwater samples will be collected from seep(s) along the LDW shoreline and submitted for laboratory analysis. At least one seep has been identified and sampled during previous investigations. The approximate location of the previously sampled seep is shown on Figure 13.

9.1.3 FREQUENCY OF SAMPLING

Groundwater samples will be collected from the monitoring wells during four consecutive quarters. During each event, groundwater samples will be collected from monitoring wells located in the western half of the Site within 1 hour before and 2 hours after low tide at a time when groundwater should be flowing from the Site to the LDW. Seep samples will be collected concurrent with the groundwater samples collected from the monitoring wells.

9.1.4 LABORATORY ANALYSIS

All groundwater samples, including the grab sample collected from the temporary well and seep samples, will be analyzed for the PCOCs identified in Section 5.3: VOCs; SVOCS; metals (antimony, arsenic, barium, beryllium, cadmium, total chromium, hexavalent chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc); PCBs; and diesel-range, motor oil-range, and gasoline-range petroleum hydrocarbons. A specific list of analytes is provided in Table C-1 of Appendix C.

Groundwater samples collected at each new and existing monitoring well will also be analyzed for sulfate and nitrate, and ferrous iron will be measured by either using field test kits or laboratory analysis to assist in evaluating the extent to which arsenic groundwater contamination is the result of reducing groundwater conditions.

Methods for all analyses are described in the Uplands SAP.

9.1.5 GROUNDWATER FLOW MONITORING

To evaluate groundwater flow direction, depth to groundwater will be measured from a surveyed reference point on each well casing and the depths converted to elevations for each groundwater monitoring event. Elevations will be plotted on a map and contoured. Additionally, to evaluate the tidal anomaly observed at well I-205(s), transducers will be placed in approximately six wells, including I-205(s), and water level fluctuation will be logged on a continuous basis for 24 to 48 hours. The tidal study will be conducted during a higher high tide and a lower low tide, if possible. In addition to monitoring water levels at selected wells, a transducer will be placed in the LDW during the tidal study. Tidal fluctuation information for the LDW will be used to calculate hydraulic conductivity at the Site.

Detailed procedures for monitoring groundwater flow and evaluating tidal influence are provided in the Uplands SAP (Appendix A). .

9.1.6 WELL ABANDONMENT

Due to poor recovery of groundwater at wells TH-MW-1 and TH-MW-2, located on the western Site boundary (Figure 12), these wells will be abandoned during the RI. Well abandonment will be conducted in accordance with the requirements set forth in WAC 173-160-420 and WAC 173-160-460.

9.2 SOIL INVESTIGATION

The soil investigation will consist of collecting and analyzing soil samples from 49 explorations at the locations shown on Figure 34. The data gaps identified in Section 8.0 that will be filled by the planned soil investigation scope include: 1) characterization of soil in the paint storage areas formerly located on the Isaacson property, 2) characterization of soil in the former diesel and gasoline tank areas located east of the former Isaacson building, 3) determination of the extent of the tar-like substance previously observed in the soil north of the eastern Vortechs vault, 4) evaluation of soil quality near the former Slip 5 Outfall, 5) determination of the source of arsenic in groundwater at monitoring wells I-205(s) and I-206(s), 6) evaluation of subsurface conditions downgradient of the former hydraulic test pad area, 7) evaluation of the potential for bank erosion to impact sediments, 8) characterization of the different fill material used to fill former Slip 5, and 9) analysis for an extended list of analytes for soil samples.

The following explorations will be conducted and soil samples collected from each exploration location for laboratory analysis:

- Three soil borings will be located in the paint storage area: one in each of the paint storage areas and one located where the former paint sludge sumps were located.
- One test pit will be excavated in the former Isaacson diesel and gasoline UST area to determine if the tanks are still present and to collect soil samples for laboratory analysis.
- Two test pits will be excavated north of the eastern Vortechs vault to locate the tar-like substance previously observed in this area. Additional test pits may be excavated, as necessary, to determine the extent of the tar-like substance.
- Four soil borings will be located in the vicinity of the former Slip 5 Outfall. At one location, a monitoring well will be installed and at another location a groundwater grab sample will be collected.
- Five test pits will be excavated in the vicinity of monitoring wells I-205(s) and I-206(s). The test pit explorations will be excavated to evaluate the potential source of arsenic in wells I-205(s) and I-206(s).
- One test pit will be excavated downgradient of the former hydraulic test pad area to evaluate whether free product may have migrated prior to the remedial action in this area.

- One soil boring located inside the southwest corner of Building 14-01 was completed in April 2011 in accordance with the Building 14-01 work plan (Landau Associates 2011).
- Five soil borings will be completed within the limits of the former Slip 5. The locations were selected to characterize fill material during each different period that fill was imported to fill the Slip 5.
- Soil samples will be collected at three locations along the LDW side of the wooden bulkhead located at the southern portion of the Boeing Thompson property, if possible. The samples will be collected from cracks within the bulkhead using hand implements if soil is present and accessible between the cracks.
- All soil samples will be analyzed for the PCOCs identified in Section 5.2: VOCs; SVOCS; metals (antimony, arsenic, barium, beryllium, cadmium, total chromium, hexavalent chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc); PCBs; and gasoline-range, diesel-range, and motor oil-range petroleum hydrocarbons. A specific list of analytes is provided in Table C-1 of Appendix C.

Additionally, soil samples will be collected at each of the proposed new monitoring well locations. Three of the proposed monitoring wells, located in the southwest corner of Building 14-01, were installed in April 2011 and soil samples collected from the soil borings associated with the wells, in accordance with the Building 14-01 work plan (Landau Associates 2011). The proposed exploration locations are shown on Figure 34.

At each proposed exploration location, except the test pits, soil samples will be collected from soil borings. The borings will be accomplished using a truck-mounted, hollow-stem auger rig. Each boring will be advanced to 25 ft BGS to fully characterize fill material in the subsurface at the Site. At each location, soil samples will be collected from 2 to 3 ft BGS, 5 to 6 ft BGS, 8 to 9 ft BGS, and 13 to 14 ft BGS for laboratory analysis. If the 13- to 14-ft depth interval is not at least 1 ft below the groundwater table at the time of drilling, the 13- to 14-ft depth interval sample will be replaced with a sample from a depth interval starting at 1 ft below the groundwater table at the time of drilling. Also, additional samples will be collected from the depth interval where field-screening [i.e., visual presence of potential contamination and/or a photoionization detector (PID) measurement greater than 50 parts per million (ppm)] indicates the likelihood for potential contamination, if any, and from the depth interval below the zone of potential contamination to evaluate the vertical extent of potential impact. If field-screening does not indicate a potential for contamination, a sample will also be collected from 13 to 14 ft BGS and archived at the laboratory for potential future analysis, pending the results of the samples submitted for analysis.

The test pit explorations will be excavated prior to the soil borings. The test pits will be excavated at or near low tide to reduce the potential for water seepage into the excavation. Each test pit will extend to the water table. Soil samples will be collected from depth intervals where field-screening (i.e., visual presence of potential contamination and/or a PID measurement greater than 50 ppm) indicates the likelihood for potential contamination, from the base of the excavation, and from each side wall. If no zones of potential contamination are identified, a soil sample will be collected from the capillary fringe approximately 1 ft above the groundwater table.

9.3 STORM DRAIN SYSTEM INVESTIGATION

The storm drain investigation will be conducted to fill the following data gaps: 1) information on the Site storm drain system solids that have accumulated since the last cleaning, 2) characterization of stormwater discharged from Outfalls A and B for Site PCOCs, 3) information on the source of PCOCs in storm drain system solids, if found, and 4) information on the full length of the 12-inch-diameter corrugated pipe located south of Building 14-01, if possible.

9.3.1 STORM DRAIN SYSTEM SOLIDS

Samples of solids present in each of the CBs, oil/water separators, Vortechs vaults, and manholes connected to the Site's storm drain system at the time that the RI is implemented will be collected and analyzed for the Site PCOCs: VOCs; SVOCS; metals (antimony, arsenic, barium beryllium, cadmium, total chromium, hexavalent chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc); PCBs; and gasoline-range, diesel-range, and motor oil-range petroleum hydrocarbons. In addition to the PCOCs, the storm drain solids will be analyzed for TOC and solids at three locations will be analyzed for dioxins/furans. If insufficient solids are present for completion of all analyses, priority will be given to PCBs, TOC, and metals. A specific list of analytes is provided in Table C-2 of Appendix C.

The results of the investigation will be compared to SMS criteria to determine the potential for impacts to LDW sediments. Although the SMS criteria are not applicable to solids contained within storm drain system structures, these criteria will provide a conservative approach for evaluation of potential sources to EAA-6. If the results of the investigation indicate exceedances of the SMS criteria, the source of the contaminants will be investigated, as described in Section 9.3.3.

9.3.2 STORMWATER

Grab samples of the stormwater discharged from Outfalls A and B will be collected during two storm events. The samples will be collected when river water is absent from the storm drain pipes and, if practicable, within the first hour of a storm event. The stormwater samples will be analyzed for the Site PCOCs: VOCs; SVOCS; metals (antimony, arsenic, barium beryllium, cadmium, total chromium, hexavalent chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc); PCBs; and gasoline-range, diesel-range, and motor oil-range petroleum hydrocarbons.

9.3.3 CONTINGENT SOURCE EVALUATION

Building materials currently present at the Site include building siding material, paint from building or equipment surfaces, roofing materials, and caulking. If exceedances of the SMS criteria are found in the storm drain system solids, samples of building materials present at the Site near the locations of the exceedances will be collected and analyzed for the constituents that exceeded in the storm drain system solids. Detailed procedures for testing building and structure materials are provided in the Uplands SAP (Appendix A).

If exceedances of preliminary screening levels for PCOCs that are detected at elevated concentrations in Site soil are found in outfall stormwater samples, a video survey will be conducted of storm drain piping connected to that outfall.

9.3.4 12-INCH METAL CORRUGATED PIPE

A video survey of the remaining portion of the 12-inch metal corrugated pipe located south of Building 14-01 that was not surveyed in 2008 will be attempted. Due to the presence of underground utilities (including fiber optics), nearby excavation to expose the pipe is not practicable; therefore, attempts to dislodge the three-pronged electrical plug blocking the western portion of the pipe and pushing it to the eastern end of the pipe will be made using a high-pressure water hose and nozzle (jetting). If successful, this will allow for videotaping of more of the inside of the pipe, if not the full-length of the pipe.

9.4 VAPOR INVESTIGATION

In April 2011, five vapor samples were collected beneath the Building 14-01 floor slab in the southwest corner of the building and analyzed for VOCs. As previously mentioned, Boeing plans to re-occupy Building 14-01 in the near future; therefore, the investigation inside the building was expedited. The vapor samples were collected in accordance with the Ecology-approved work plan (Landau Associates 2011). Samples of the indoor air within Building 14-01 may also be collected, depending on the results of the sub slab sampling. The vapor samples and indoor air samples, if collected, will be analyzed for VOCs. Soil vapor sampling and indoor air sampling procedures and analytical method are described in the Uplands SAP (Appendix A).

9.5 SEDIMENT INVESTIGATION

The sediment investigation will consist of collecting and analyzing surface and subsurface sediment samples from fifteen sampling locations adjacent to the Site (Figure 35). The sample locations are arranged in a triangular grid between the uplands and the eastern edge of the authorized navigation channel. Surface grab samples (0 to 10 cm) will be collected with a 0.2 meters squared (m^2) powered grab sampler at each location and analyzed for the SMS standard list of analytes, carbazole, and TOC. Five grab sample locations in the vicinity of two outfalls on the project site will also be analyzed for dioxins/furans. Core samples will also be collected at each sample location using a pneumatically operated impact corer. Core samples representing 1-foot *in situ* segments will be collected beginning at 1 ft below the sediment surface and continuing to the deepest recovered sediment or to a maximum depth of 20 ft below the sediment surface. Sediments representing the sample interval 0.33 ft (10 cm) to 1 ft will not be collected because of limited sample volume. Core samples representing the 2- to 3-ft interval, the 4- to 5-ft interval, the 6- to 7-ft interval, and the 8- to 9-ft interval will initially be scheduled for analysis of the SMS standard list of analytes, carbazole, and TOC. The initial analysis schedule may be modified at the direction of the field geologist. The remaining core samples (1 to 2 ft, 3 to 4 ft, 5 to 6 ft, 7 to 8 ft, and all core samples collected below 9 ft will be frozen and archived. Additional archived samples may be analyzed to further define the depth of sediments exceeding the SMS criteria or to characterize older native sediments. The analytical results will be used to define the horizontal and vertical distribution of sediments that exceed the SMS SQS criteria and to investigate possible sources of contamination. The data will also be used to determine if a cleanup action is warranted and to develop and evaluate cleanup action alternatives, if needed.

Surface sediments from areas where the available data (historical and from the RI) indicates that a cleanup action is not warranted may be screened for additional compounds. The potential list of compounds may include those identified Lower Duwamish Waterway Human Health Risk Assessment Analysis. Analysis of archived samples for compounds not covered in this Work Plan will be covered in an addendum.

10.0 DEVELOPMENT OF THE FEASIBILITY STUDY

The purpose of the FS is to develop and evaluate cleanup action alternatives for the Site. The FS will:

- Identify ARARs for Site cleanup
- Identify media and locations where remedial action is needed
- Develop remedial action objectives (RAOs)
- Develop, screen, and evaluate cleanup alternatives
- Identify a preferred alternative.

The following sections provide additional discussion of details for each of the above bullets.

10.1 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

In accordance with MTCA, all cleanup actions must comply with applicable state and federal laws [WAC 173-340-710(1)]. MTCA defines applicable state and federal laws to include legally applicable requirements and those requirements that are relevant and appropriate. Collectively, these requirements are referred to as ARARs. The starting point for ARARs is the MTCA cleanup levels and regulations that address implementation of a cleanup under MTCA (Chapter 173.105D RCW; Chapter 173-340 WAC). Other potential ARARs may include the following:

- Washington State SMS [Chapter 173-204 WAC)
- State Water Pollution Control Act (Chapter 90.48 RCW)
- EPA National Recommended Water Quality Criteria – Section 304 Clean Water Act
- EPA Water Quality Standards (National Toxics Rule) – 40 CFR 131
- Minimum Standards for Construction and Maintenance of Wells (Chapter 173-160 RCW)
- Washington Pollution Control Act and the implementing regulations, Water Quality Standards for Surface Waters of the State of Washington (Chapter 173-201A WAC)
- Washington Hazardous Waste Management Act and the implementing regulations, Dangerous Waste Regulations (Chapter 173-303 WAC), to the extent that any dangerous wastes are discovered or generated during the cleanup action
- Washington's Shoreline Management Act, with respect to construction activities conducted near the shoreline during the cleanup action.
- Washington Clean Air Act (Chapter 70.94 WAC)
- Occupational Safety and Health Act (OSHA), 29 CFR Subpart 1910.120
- Washington Industrial Safety and Health Act (WISHA).

The FS will identify ARARs if a cleanup action is needed. In addition, the FS will identify likely permits required for implementation of the cleanup action.

10.2 DELINEATION OF MEDIA REQUIRING REMEDIAL ACTION

The RI process will determine if groundwater, soil, storm drain system solids, and soil vapor results exceed preliminary cleanup levels and, if so, identify the locations of the exceedances. Based on any exceedances and the established points of compliance, the FS will identify the areas that require remedial action.

10.3 DEVELOPMENT OF REMEDIAL ACTION OBJECTIVES

The RAOs identify the goals that must be achieved by a cleanup alternative in order to achieve cleanup standards and provide adequate protection of human health and the environment. The RAOs will address all affected media and a cleanup alternative will achieve all RAOs to be considered a viable cleanup action. RAOs will be developed for portions of the Site requiring remedial action.

The RAOs will be action-specific and/or media-specific. Action-specific RAOs are based on actions required for environmental protection that are not intended to achieve a specific chemical criterion. Media-specific RAOs are based on the cleanup levels. The RAOs will specify the COCs, the potential exposure pathways and receptors, and acceptable contaminant levels or range of levels for each exposure pathway, as appropriate.

The extent to which each alternative meets the RAOs will be determined by applying the specific evaluation criteria identified in the MTCA regulations.

10.4 SCREENING OF CLEANUP ALTERNATIVES

Cleanup action alternatives will be developed for portions of the Site that require cleanup action. Initially, general remediation actions will be identified for the purpose of meeting RAOs. General remediation actions consist of specific remedial technologies and process options. General remediation actions will be considered and evaluated based on the properties of identified contaminant(s) and may include institutional controls, containment or other engineering controls, removal, *in situ* treatment, and monitored natural attenuation.

Specific remedial action technologies are the engineering components of a general remediation technology and process options are those specific processes within each specific technology. Specific remedial action technologies and representative process options will be selected for evaluation based on documented development of the technology or documented successful use at a site with similar conditions. Cleanup alternatives will be developed from the general and specific remedial technologies and process options consistent with Ecology’s expectations identified in WAC 173-340-370 using best professional judgment and guidance documents as appropriate [e.g., *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (EPA 1988)].

During the development of cleanup action alternatives, both the current and planned future land use will be considered.

10.5 EVALUATION OF CLEANUP ALTERNATIVES

MTCA requires that cleanup action alternatives be compared to a number of criteria as set forth in WAC 173-340-360 to evaluate the adequacy of each alternative in achieving the intent of the regulations, and as a basis for comparing the relative merits of the developed cleanup alternatives. Consistent with MTCA, the alternatives will be evaluated with respect to compliance with threshold requirements, permanence, and restoration timeframe, and the results of the evaluation will be documented in the RI/FS reports.

10.5.1 THRESHOLD REQUIREMENTS

As specified in WAC 173-340-360(2)(a), all cleanup actions are required to:

- Protect human health and the environment
- Comply with cleanup standards specified under MTCA
- Comply with applicable state and federal laws
- Provide for compliance monitoring.

10.5.2 REQUIREMENT FOR PERMANENT SOLUTION TO THE MAXIMUM EXTENT PRACTICABLE

WAC 173-340-200 defines a permanent solution as one in which cleanup standards can be met without further action being required at the original site or any other site involved with the cleanup action, other than the approved disposal site for any residue from the treatment of hazardous substances. Ecology recognizes that permanent solutions may not be practicable for all sites. To determine whether a cleanup action is permanent to the "maximum extent practicable," MTCA requires that disproportionate cost analysis (DCA), according to WAC 173-340-360(3)(b), be used. In accordance with WAC 173-340-360(3)(f), the following criteria are used to evaluate and compare each cleanup action alternative when conducting a disproportionate cost analysis:

- ***Overall protectiveness*** of human health and the environment, including the degree to which Site risks are reduced, the risks during implementation, and the improvement of overall environmental quality

- L***ong-term effectiveness***, including the degree of certainty that the alternative will be successful, the long-term reliability, the magnitude of residual risk, and the effectiveness of controls required to manage treatment residues and remaining waste
- ***Management of short-term risks***, including the protection of human health and the environment during construction and implementation
- ***Permanent reduction in toxicity, mobility, and volume of hazardous substances***, including the reduction or elimination of hazardous substance releases and sources of releases
- ***Implementability***, including consideration of whether the alternative is technically possible; the availability of necessary offsite facilities, services, and materials; administrative and regulatory requirements; scheduling, size, and complexity of construction; monitoring requirements; access for construction, operations, and monitoring; and integration with existing facility operations
- ***Cleanup costs,*** including capital costs and operation and maintenance costs
- ***Consideration of public concerns,*** which will be addressed through public comment on the final RI report and the draft final FS report.

Procedures that will be used for conducting a DCA are described later in Section 10.6.

10.5.3 REQUIREMENTS FOR A REASONABLE RESTORATION TIMEFRAME

WAC 173-340-360(4)(b) specifies that the following factors be considered in establishing a "reasonable" timeframe:

- Potential risks to human health and the environment
- Practicability of achieving a shorter restoration timeframe
- Current use of the Site, surrounding areas, and associated resources that are, or may be, affected by releases, if any, from the Site
- Potential future use of the Site, surrounding areas, and associated resources that are, or may be, affected by releases, if any, from the Site
- Availability of alternate water supplies
- Likely effectiveness and reliability of institutional controls
- Ability to control and monitor migration of hazardous substances, if any, from the Site
- Toxicity of the hazardous substances at the Site
- Natural processes that reduce concentrations of hazardous substances and have been documented to occur at the Site or under similar Site conditions.

10.5.4 REQUIREMENT FOR CONSIDERATION OF PUBLIC CONCERNS

The final RI report and the draft final FS report will be issued for public comment, which will provide the public an opportunity to express any concerns. Those concerns may be addressed in a responsiveness summary and, if appropriate, the reports will be modified in response to the public concerns.

10.6 DISPROPORTIONATE COST ANALYSIS PROCEDURES

As described above (Section 10.5.2), MTCA requires that cleanup actions be permanent to the maximum extent practicable and requires that a DCA be used to determine whether the cleanup alternatives being considered are permanent to the maximum extent practicable as defined under WAC 173-340-200. Evaluation of the practicability of a given alternative is a comparative evaluation of whether the incremental increase in cost associated with increasingly protective cleanup actions is substantial and disproportionate to the incremental increase in environmental benefit. In the DCA, cleanup alternatives are arranged from most to least permanent based on the criteria specified in WAC 173-340-360(f) and described in Section 10.5.2. Costs are disproportionate to benefits if the incremental costs of the more permanent alternative exceed the incremental benefits achieved, compared to the lower cost alternative [WAC 173-340-360(3)(e)(i)]. Alternatives that exhibit disproportionate costs are considered "impracticable." Where the benefits of two alternatives are equivalent, MTCA specifies that Ecology select the least costly alternative [WAC 173-340-360(e)(ii)(C)].

10.7 RECOMMENDATION OF REMEDIAL ACTION ALTERNATIVE

This section of the FS will recommend a cleanup action alternative based on the results of the comparative evaluation. The recommended alternative will meet the minimum requirements for cleanup actions: protect human health and the environment, comply with cleanup standards, comply with applicable state and federal laws, provide for compliance monitoring, use permanent solutions to the maximum extent practicable, provide for a reasonable timeframe, and consider public concerns.

11.0 PUBLIC INVOLVEMENT

As required by WAC 173-340-600, Ecology and Boeing will promote public involvement throughout the RI/FS and cleanup stages at the Site. Ecology has prepared a Public Participation Plan and will be responsible for public participation at the Site; however, responsibilities by Boeing may include development of mailing lists, preparation of drafts of public notices and fact sheets, and participation in public presentations.

12.0 SCHEDULE AND REPORTING

The Agreed Order establishes the RI/FS schedule and reporting requirements, which are summarized below.

- RI field activities will be completed within 180 days of Ecology approval of this work plan. The final quarter of groundwater monitoring may be conducted after submittal of the draft RI report.
- A draft RI report will be submitted to Ecology within 90 calendar days following receipt of all analytical data associated with the RI/FS.
- The final RI report will be submitted to Ecology within 30 days of Ecology's comments on the draft RI report.
- A draft FS report will be submitted to Ecology within 90 calendar days following Ecology's approval of the Final RI report.
- A draft final FS report will be submitted to Ecology within 30 days of Ecology's comments on the draft FS report.
- A second draft final FS report will be submitted to Ecology within 60 days following completion of the public comment period.
- The final FS report will be submitted to Ecology within 30 days of Ecology's comments on the second draft final FS report.
- A draft cleanup action plan will be submitted to Ecology within 60 calendar days following Ecology's approval of the final FS report.

Additionally, progress reports will be submitted to Ecology on the 15th day of the month following the reporting month. Progress reports will be submitted in electronic format and will include a description of actions taken to comply with the Agreed Order, summaries of sampling and testing reports, deviations from approved work plans, summaries of problems or anticipated problems with meeting schedules and objectives, solutions developed and implemented to address actual anticipated problems or delays, changes in key personnel, and a description of work planned for the next reporting period.

All recent and new sampling data will be submitted to Ecology in both printed and electronic formats in accordance with Ecology's Toxics Cleanup Program Policy 840. Data will be supplied to Ecology in electronic format within 30 days following the completion of the draft final RI report.

If additional field RI activities are needed to adequately delineate the extent and magnitude of contamination at the Site, the scope, schedule, and submittal requirements for this additional work will be developed and submitted to Ecology for review and concurrence.

This document has been prepared under the supervision and direction of the following key staff.

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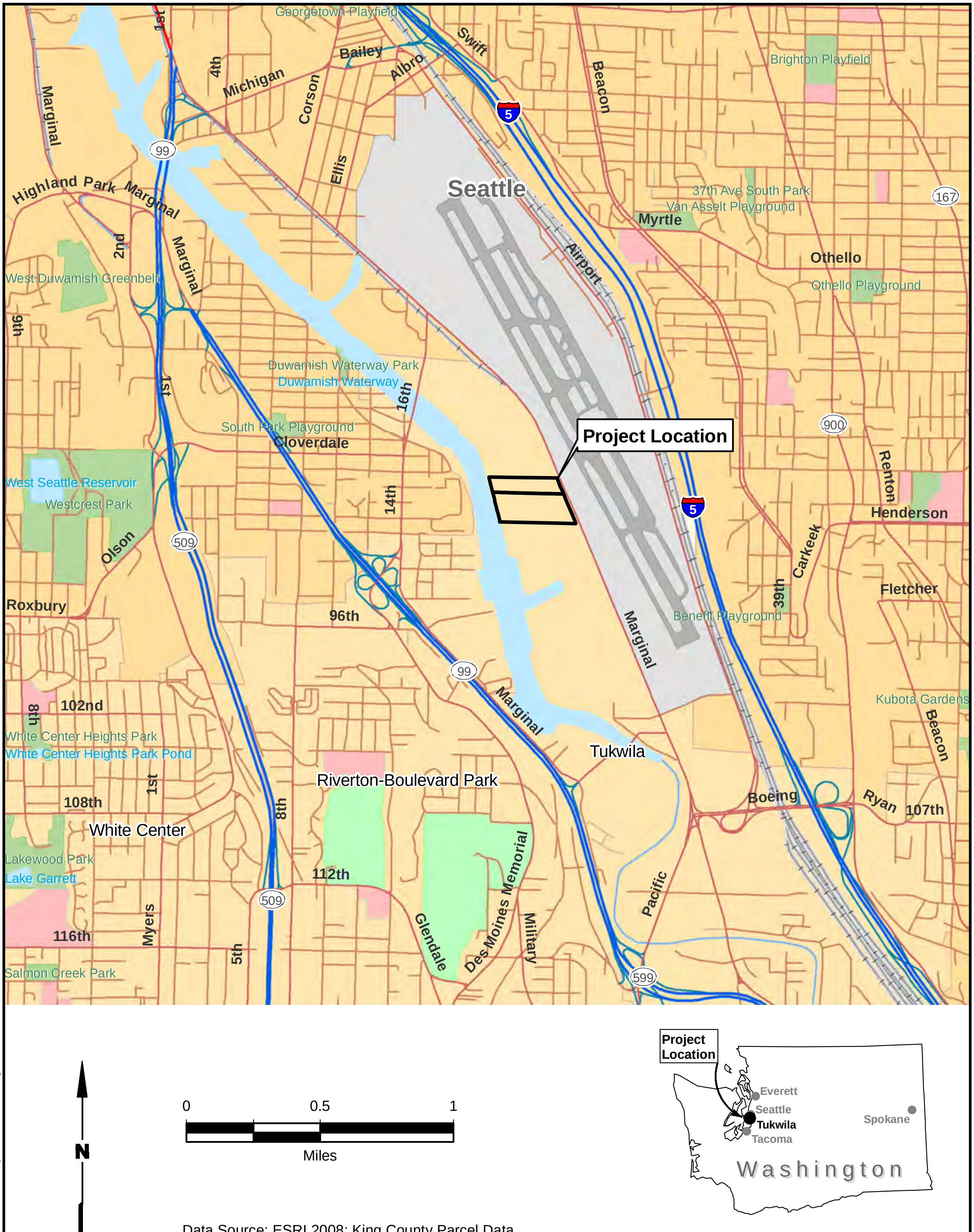

Data Source: ESRI 2008; King County Parcel Data

Y:\Projects\025190\MapDocs\111\012\Fig1.mxd 3/9/2011

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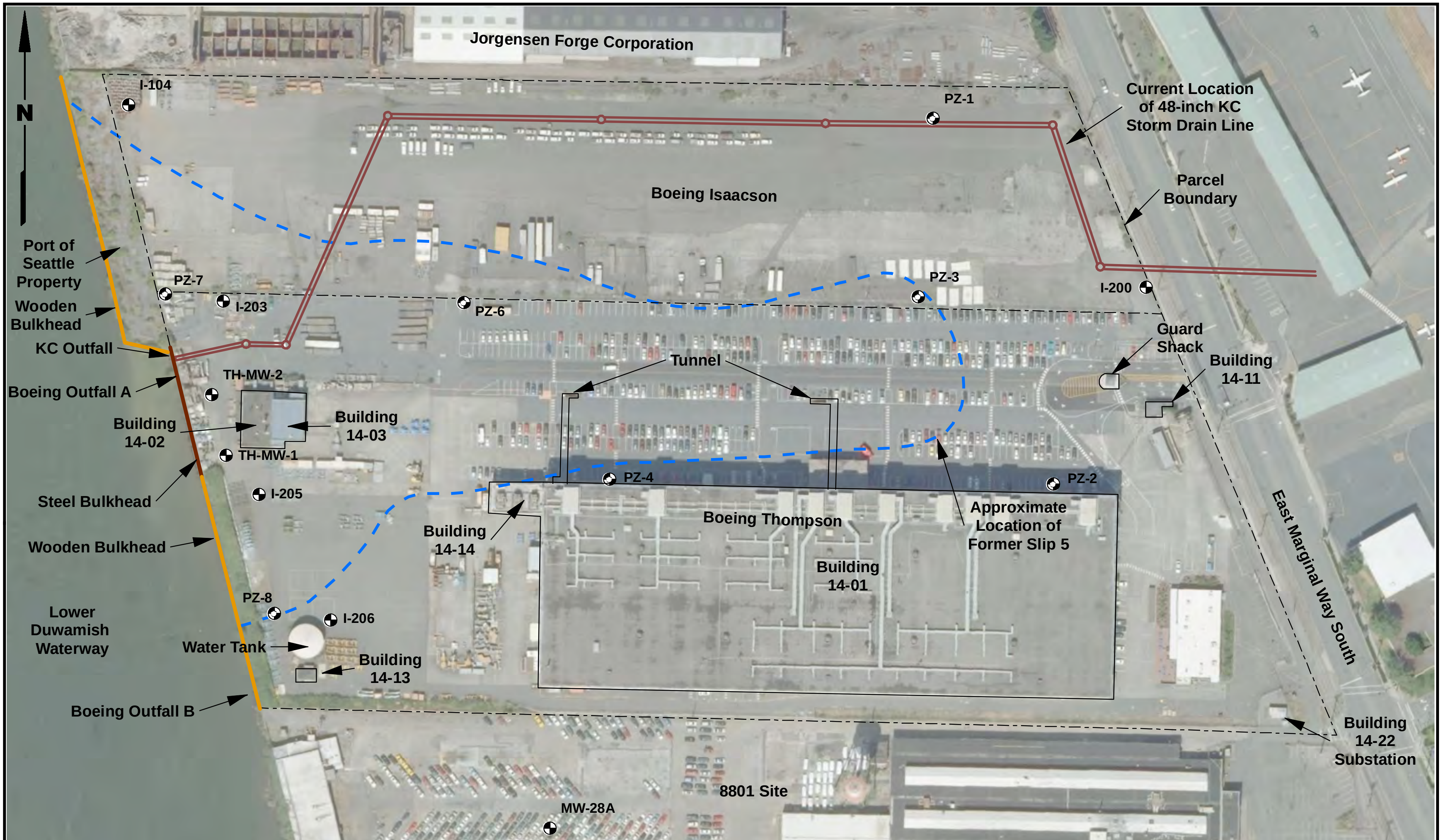
Boeing Isaacson-Thompson Site Tukwila, Washington	**Vicinity Map**	Figure 1

Y:\Projects\025190\MapDocs\I-T RIFS Workplan\Revised\Ecology\Fig2_SitePlan.mxd 5/12/2011 NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet



Data Source: Bing Aerial Image; King County Parcel Data

0 200 400

Scale in Feet

LANDAU ASSOCIATES

Boeing Isaacson-Thompson Site Tukwila, Washington	**Current Site Features**	Figure 2

Legend

CB 16	Catch Basin
CG 74	Catch Basin with Curb/Gutter Inlet
CB 15	Removed or Abandoned Catch Basin
MH 45	Storm Drain Manhole
	Storm Drain
	Abandoned Storm Drain
	Property Line

0 200 400

Scale in Feet

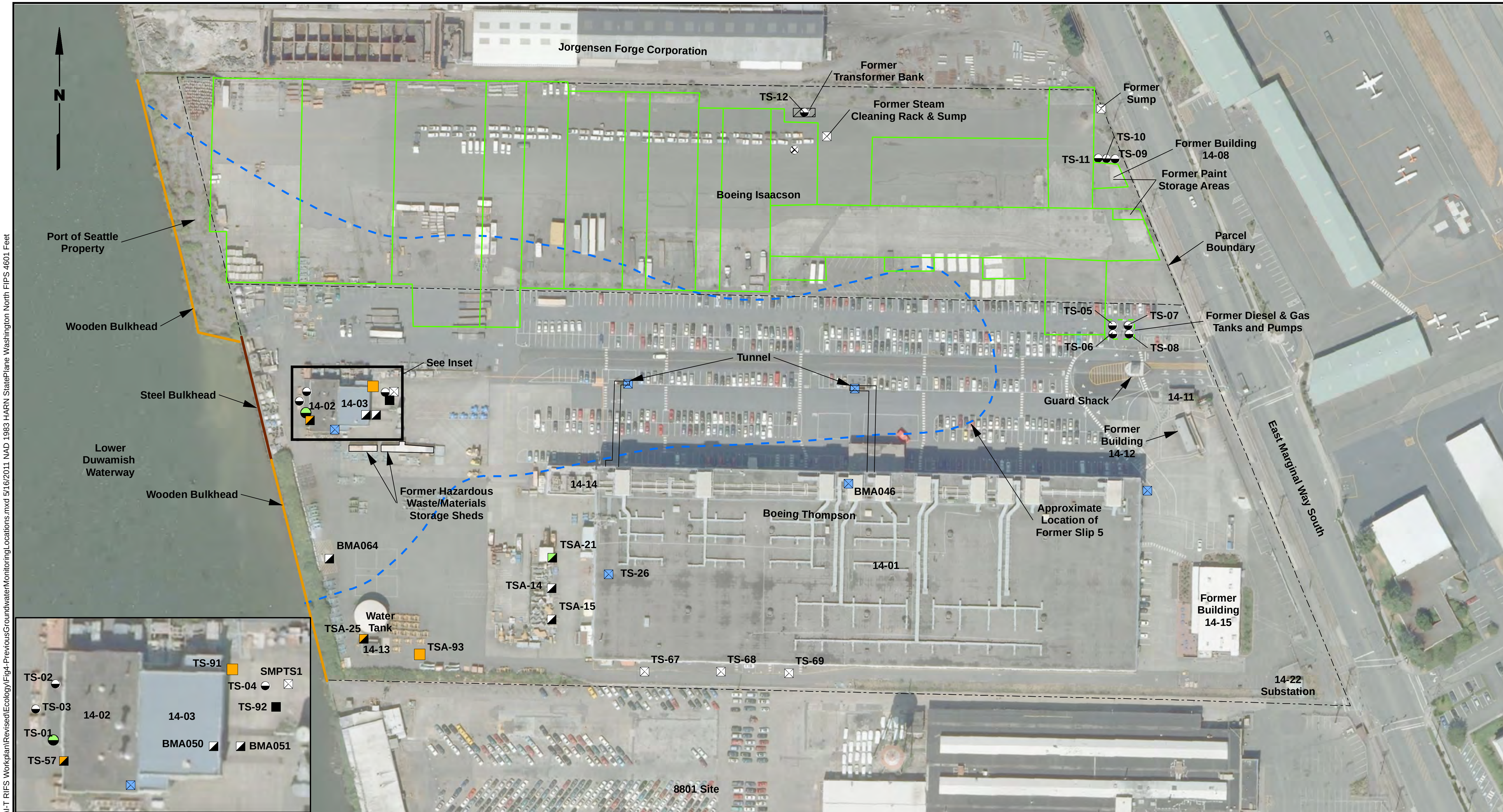
Boeing Isaacson - Thompson Site
Tukwila, Washington

Current Storm Drain System

Figure
3

LANDAU ASSOCIATES

Draft Summary Report | V:\025\190\110.012\Fig 03.dwg (A) "Figure 3" 5/16/2011



Legend

- Former Above Ground Storage Tank (AST) Location
- Former Oil Water Separator (OWS) Location
- Former Sump Location
- Existing Sump Location
- Former Underground Storage Tank (UST) Location
- Former Boiler Tank Location
- Indicates UST Exists But Not Used
- Indicates OWS Exists and is Used
- Indicates AST Exists and is Not Used
- Former Isaacson Building /Building 14-05

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: Bing Aerial Image; King County Parcel Data

0 140 280
Scale in Feet

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Boeing Isaacson-Thompson Site
Tukwila, Washington

Approximate Former and Existing UST, AST, OWS and Sump Locations

Figure 4

Y:\Projects\025190\MapDocs\I-T RIFS Workplan\Revised\Ecology\Fig5-Historic River.mxd 5/12/2011 NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

Legend

Current Duwamish Waterway Shoreline

Pre-1900 Duwamish River Shoreline

0 700 1,400

Scale in Feet

Data Source: Bing Aerial Image; King County Parcel Data

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

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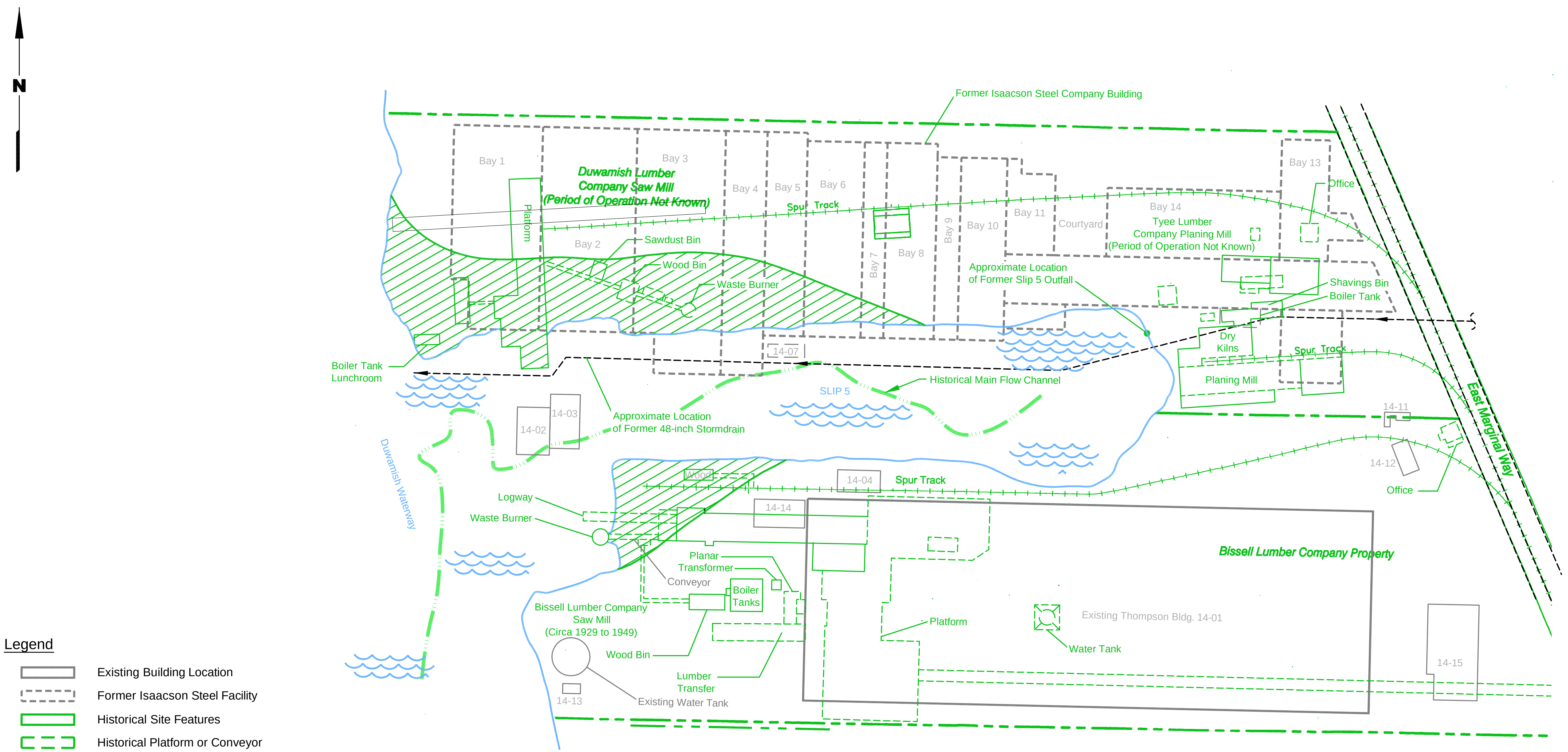
Boeing Isaacson-Thompson Site
Tukwila, Washington

Historical Duwamish River Shoreline

Figure 5



Legend

- Existing Building Location
- Former Isaacson Steel Facility
- Historical Site Features
- Historical Platform or Conveyor
- Original Slip 5 Shoreline Based on 1936 Aerial Photo
- Historical Stream Channel
- Historical Storm Drain Alignment
- Historical Site Features
- Property Boundary

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 150 300

Scale in Feet

Source: 1929 and 1949 Sanborn® Maps

Draft Summary Report | V:\025\190\110.012\Figure 6.dwg (A) "Figure 6" 5/16/2011

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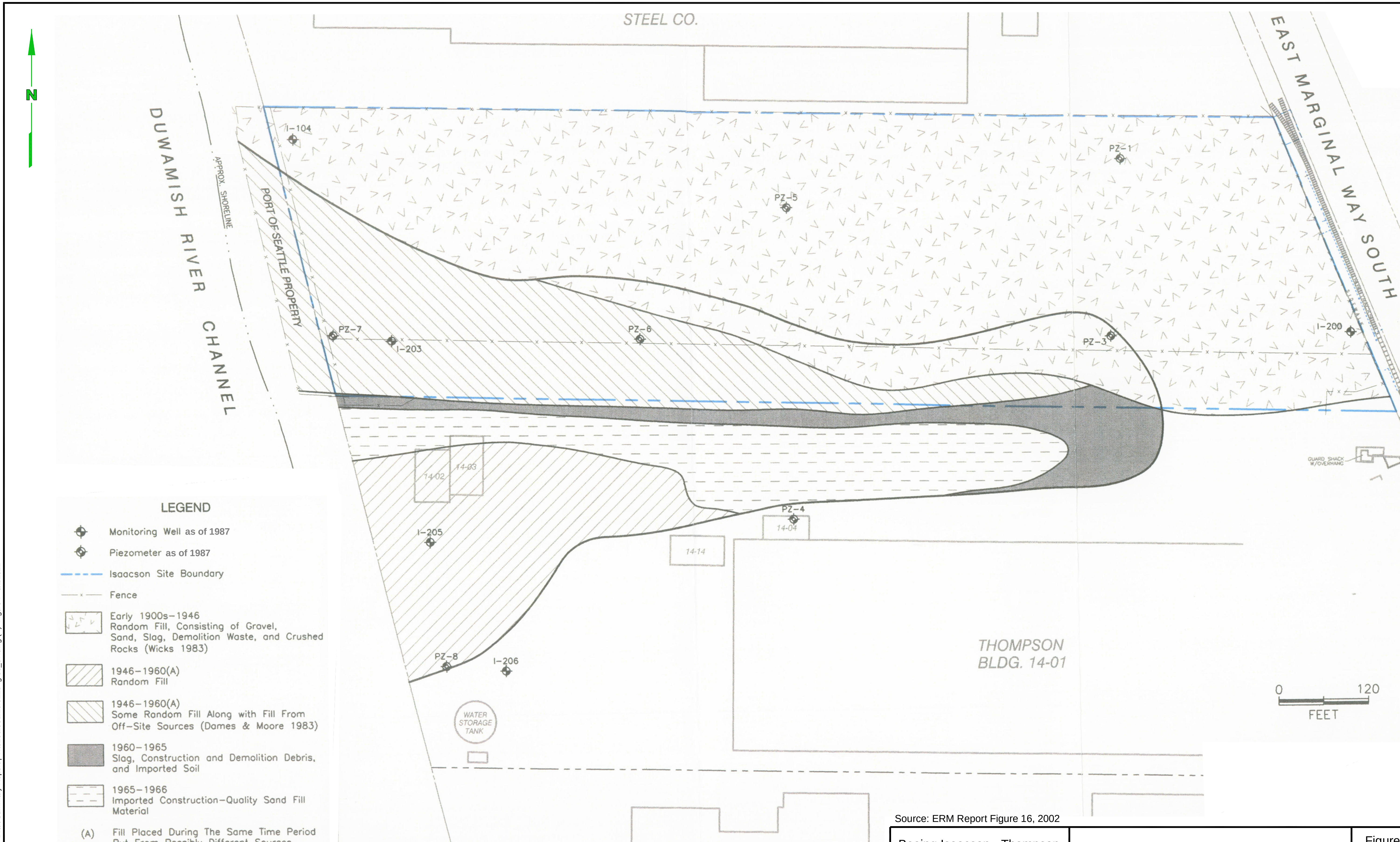
Boeing Isaacson - Thompson Site Tukwila, Washington	**Historical Site Features**	Figure 6



Source: ERM Report Figure 16, 2002

Draft Summary Report | V:\025\190\110.012\Fig 06_07.dwg (A) "Figure 7" 5/2/2011

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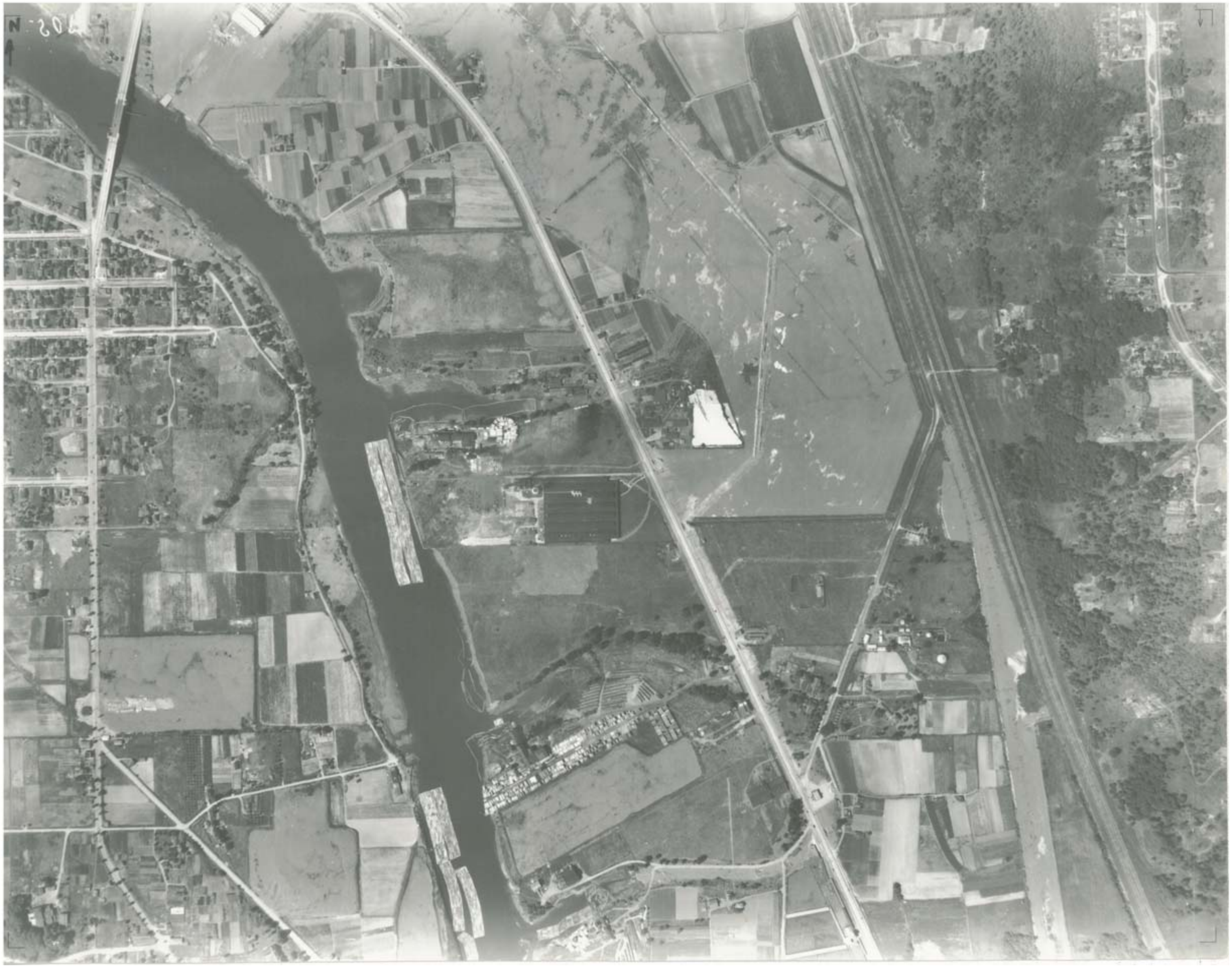
Boeing Isaacson - Thompson Site Tukwila, Washington	**Slip 5 Fill History**	Figure 7



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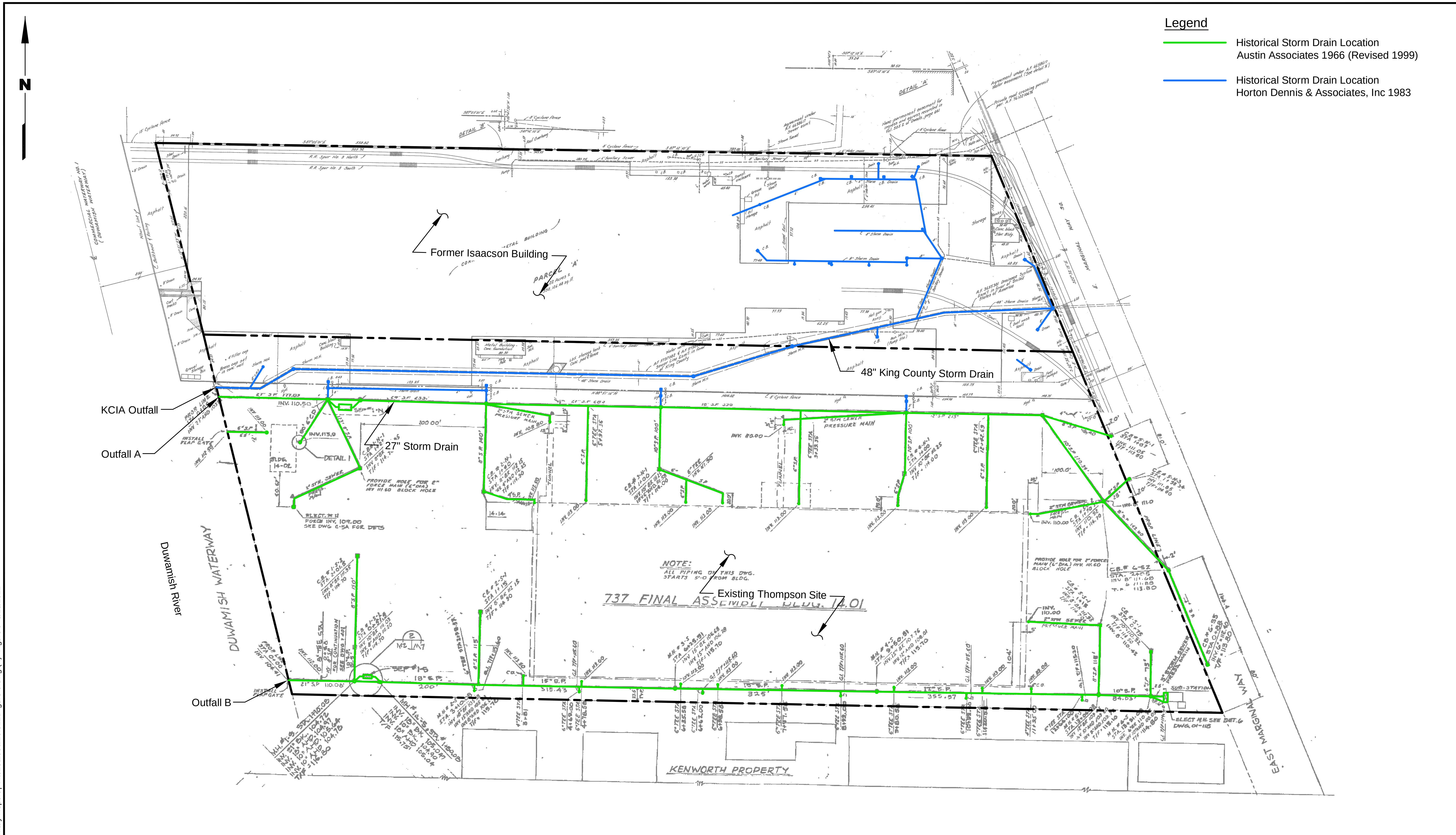
Boeing Isaacson-Thompson Site
Tukwila, Washington

1936 Aerial Photograph

Figure
8



Source: Austin Associates 1966 (Revised 1999), Horton Dennis & Associates, Inc 1983

Boeing Isaacson - Thompson Site
Tukwila, Washington

Historical Storm Drain Configuration

Figure 9

Legend

- Soil Boring
- Test Pit
- 1983 Excavation
- 1989 Excavation
- 1990 Excavation
- 1991 Excavation
- Existing 48" King County Storm Drain Line
- Approximate Location of Former Slip 5
- Former Isaacson Building (Building 14-05)
- Current Extent of Stabilized Soil Material
- Dames and Moore 1983 Soil Sample Location
- Wicks 1983 Soil Sample Location
- Wicks 1984 Soil Sample Location
- Landau Associates 1988 Soil Sample Location
- Landau Associates 1989 Soil Sample Location
- GeoEngineers 1994 Soil Sample Location
- GeoEngineers 1996 Soil Sample Location
- Landau Associates 2006 Soil Sample Location
- Landau Associates 2009 Post-Excavation Soil Sample Location
- Landau Associates 2008/2009 Phase II ESA Soil Sample Location
- Landau Associates 2009 Property Boundary Soil Sample Location

Note
1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: Bing Aerial Image; King County Parcel Data

0 150 300
Scale in Feet

Y:\Projects\025190\MapDocs\I-T RIFS Workplan\Revised\Ecology\Fig10-PreviousSoilSampleLocations.mxd 5/13/2011 NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

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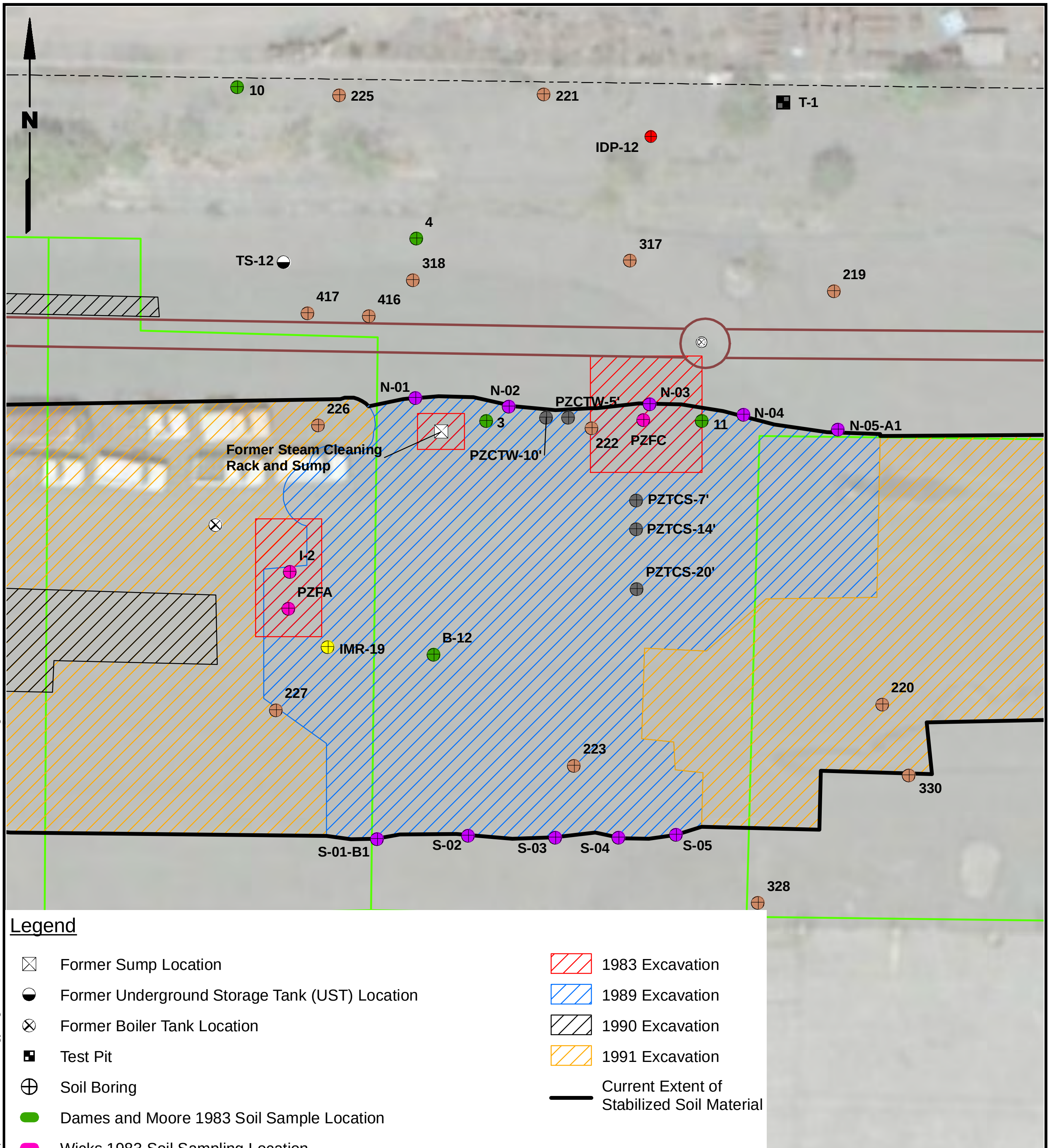
Boeing Isaacson-Thompson Site Tukwila, Washington	Previous Soil Sampling Locations	Figure 10



Legend

- Former Sump Location
- Former Underground Storage Tank (UST) Location
- Former Boiler Tank Location
- Test Pit
- Soil Boring
- Dames and Moore 1983 Soil Sample Location
- Wicks 1983 Soil Sampling Location
- Wicks 1984 Soil Sampling Location
- Landau Associates 1988 Soil Sampling Location
- Landau Associates 1989 Soil Sample Location
- Landau Associates 2009 Post-Excavation Soil Sampling Location
- Landau Associates 2008/2009 Phase II ESA Soil Sampling Location
- 1983 Excavation
- 1989 Excavation
- 1990 Excavation
- 1991 Excavation
- Current Extent of Stabilized Soil Material

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 30 60

Scale in Feet

Data Source: Bing Aerial Image; King County Parcel Data

Y:\Projects\025190\MapDocs\I-T RIFS Workplan\Revised\Ecology\Fig11-Inset.mxd 5/16/2011 NAD 1983 StatePlane Washington North FIPS 4601 Feet

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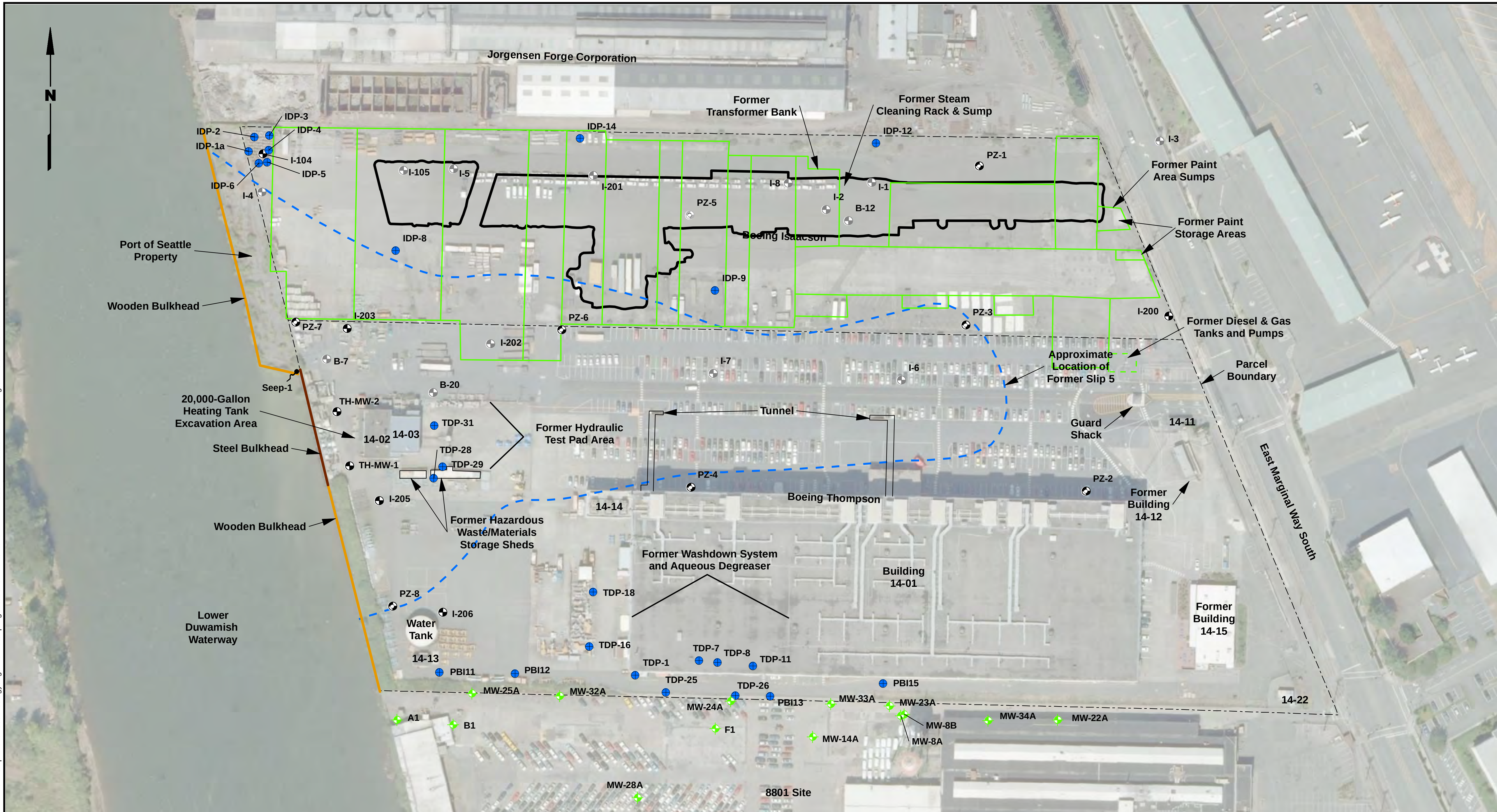
Boeing Isaacson-Thompson Site Tukwila, Washington	**Previous Soil Sampling Locations Detail**	Figure 11



Legend

- Direct-Push Groundwater Sample Location
- Existing Monitoring Well Location
- Existing Piezometer Location
- Abandoned or Destroyed Monitoring Well
- 8801 Site Groundwater Sampling Locations
- Seep
- Approximate Location of Former Slip 5
- Current Extent of Stabilized Soil Material

0 150 300
Scale in Feet

Data Source: Bing Aerial Image; King County Parcel Data

Note
1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Y:\Projects\025190\MapDocs\I-T RIFS Workplan\Revised\Ecology\Fig12-GWSamplingLocations.mxd 5/16/2011 NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

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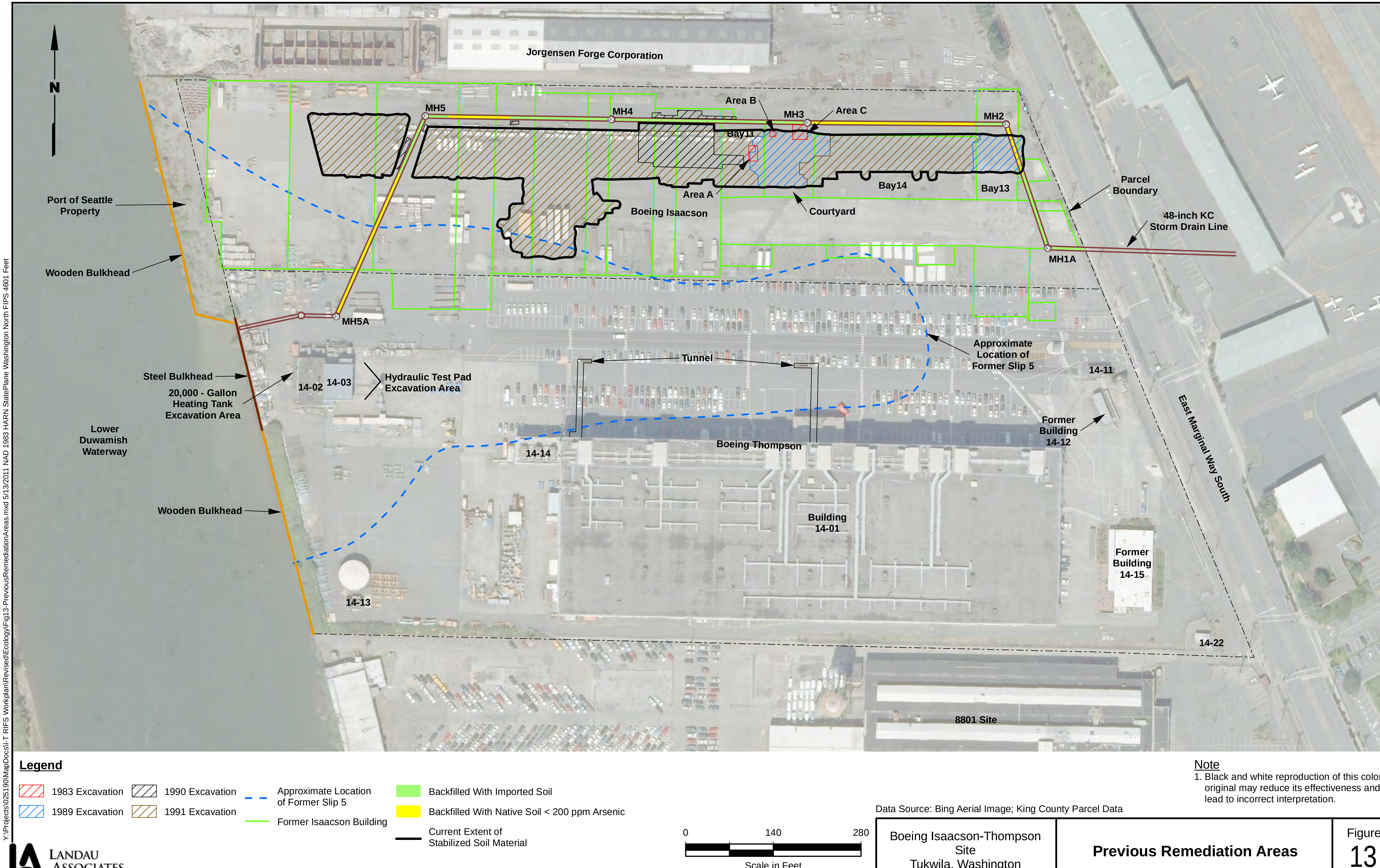
Boeing Isaacson-Thompson Site Tukwila, Washington	Previous Groundwater Monitoring Locations	Figure 12



Y:\Projects\025190\MapDocs\I-T RIFS WorkplanRevised\Ecology\Fig13-PreviousRemediationAreas.mxd 5/13/2011 NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

Legend

- 1983 Excavation
- 1989 Excavation
- 1990 Excavation
- 1991 Excavation
- Approximate Location of Former Slip 5
- Former Isaacson Building
- Backfilled With Imported Soil
- Backfilled With Native Soil < 200 ppm Arsenic
- Current Extent of Stabilized Soil Material

Note
1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: Bing Aerial Image; King County Parcel Data

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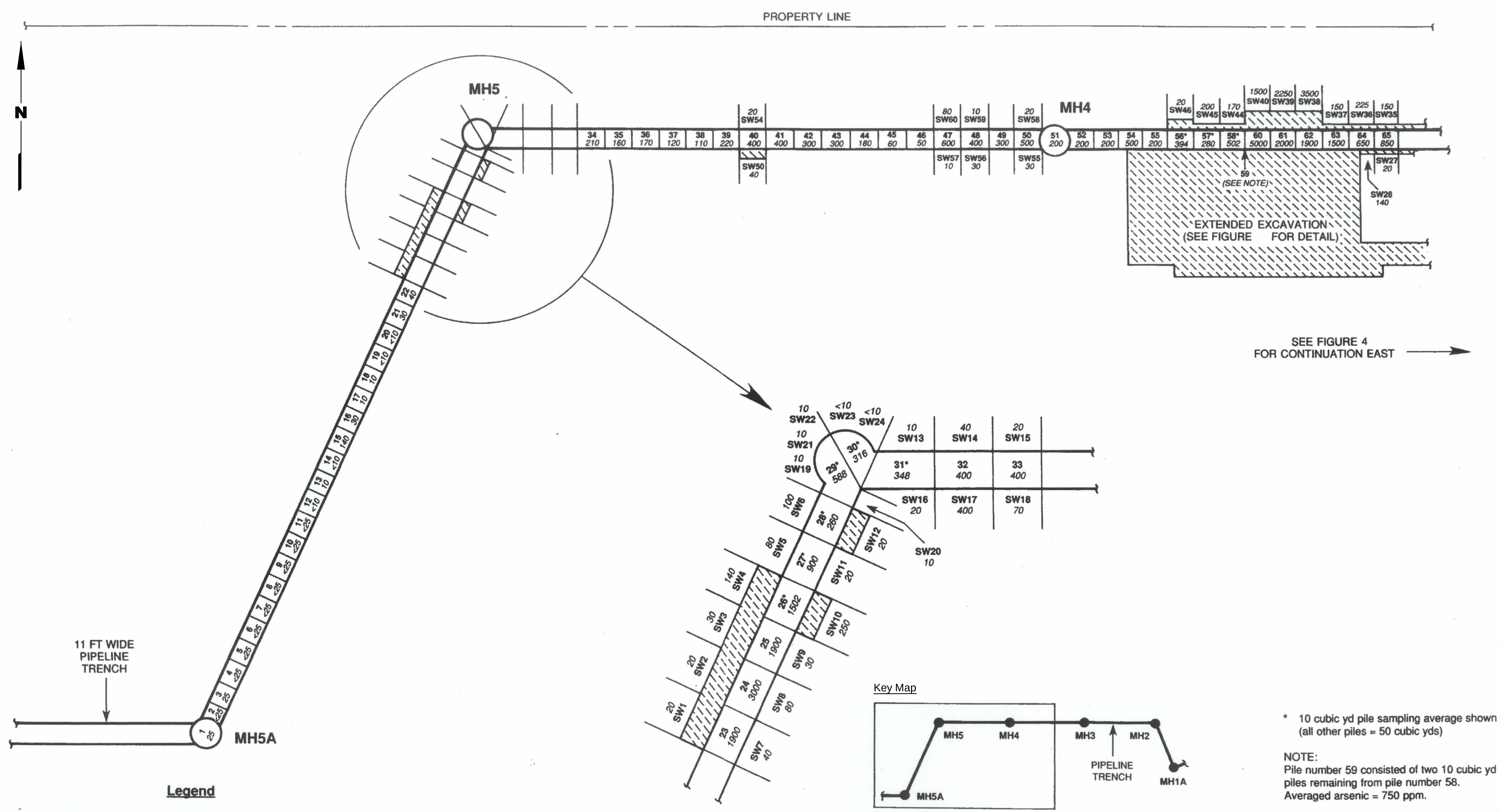
Boeing Isaacson-Thompson Site
Tukwila, Washington

Previous Remediation Areas

Figure 13



* 10 cubic yd pile sampling average shown (all other piles = 50 cubic yds)

NOTE:
Pile number 59 consisted of two 10 cubic yd piles remaining from pile number 58. Averaged arsenic = 750 ppm.

Legend

126 Trench Sample Number and Location

SW60 Sidewall Sample Number and Location

2250 Arsenic Value (ppm) Screen Test Values

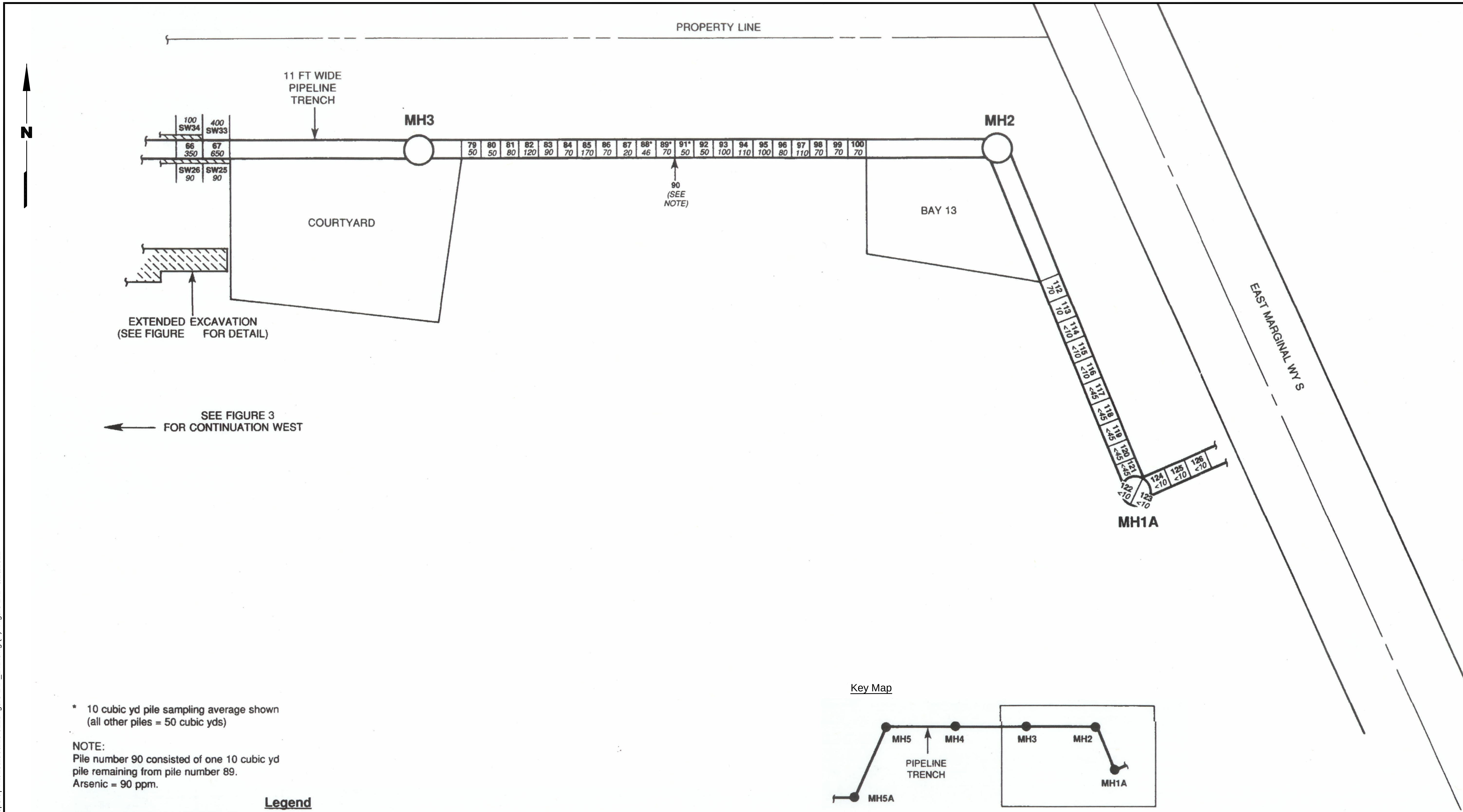
Excavated area

0 50 100
Scale in Feet

Source: Technical Dryer Inc. 1991

Boeing Isaacson - Thompson Site Tukwila, Washington	**1989/1990 Storm Drain Line Excavation Sample Locations and Results - West**	Figure 14A

LANDAU ASSOCIATES



* 10 cubic yd pile sampling average shown (all other piles = 50 cubic yds)

NOTE:
Pile number 90 consisted of one 10 cubic yd pile remaining from pile number 89.
Arsenic = 90 ppm.

Legend

26	Trench Sample Number and Location	*2250*	Arsenic Value (ppm) Screen Test Values
SW33	Sidewall Sample Number and Location		Excavated area

0 50 100
Scale in Feet

Source: Technical Dryer Inc. 1991

Boeing Isaacson - Thompson Site Tukwila, Washington	**1989/1990 Storm Drain Line Excavation Sample Locations and Results - East**	Figure 14B

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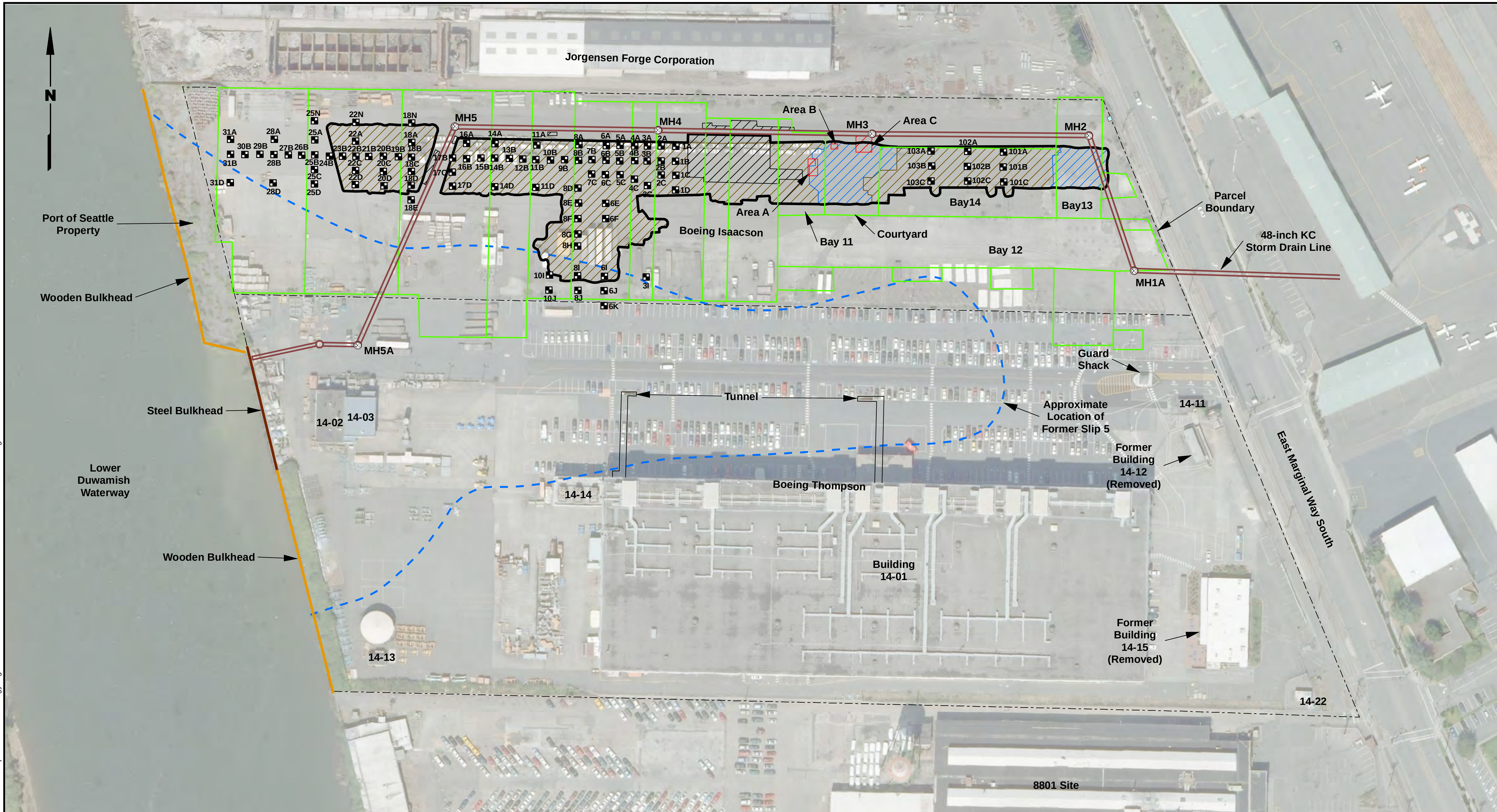
Draft Summary Report | V:\025\190\110.012\Figure 14A_14B.dwg (A) "Figure 14B" 5/16/2011



Legend

- 1983 Excavation
- 1989 Excavation
- 1990 Excavation
- 1991 Excavation
- Approximate Location of Former Slip 5
- Former Isaacson Building
- 1989 Test Pit
- Current Extent of Stabilized Soil Material

Data Source: Bing Aerial Image; King County Parcel Data

Note
1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 150 300
Scale in Feet

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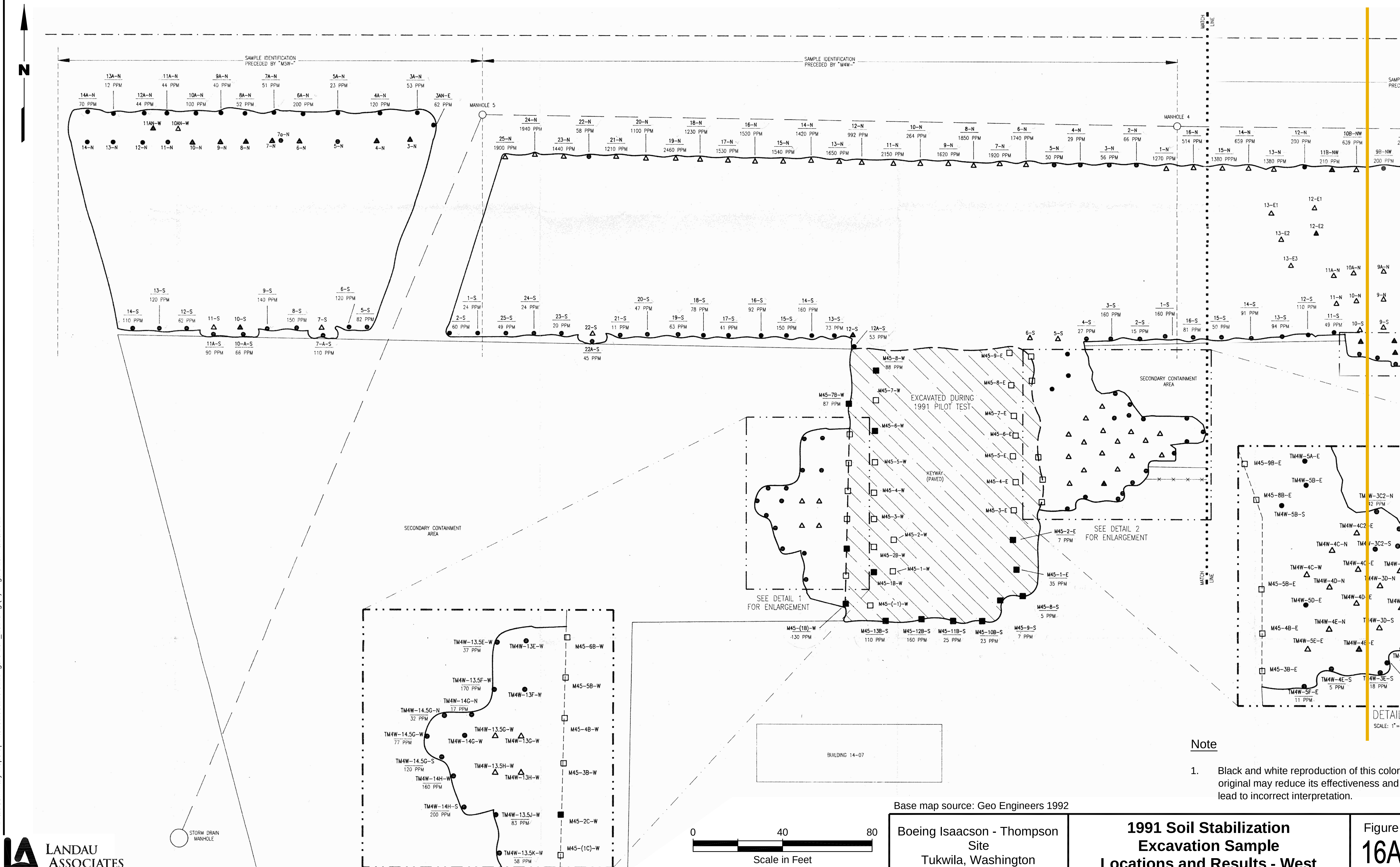
Boeing Isaacson-Thompson Site Tukwila, Washington	1989/1990 Test Pit Locations	Figure 15

Y:\Projects\025190\MapDocs\I-T RIFS Work\PlanRevised\Ecology\Fig15-TestPits.mxd 5/16/2011 NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet



Base map source: Geo Engineers 1992

0 40 80
Scale in Feet

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

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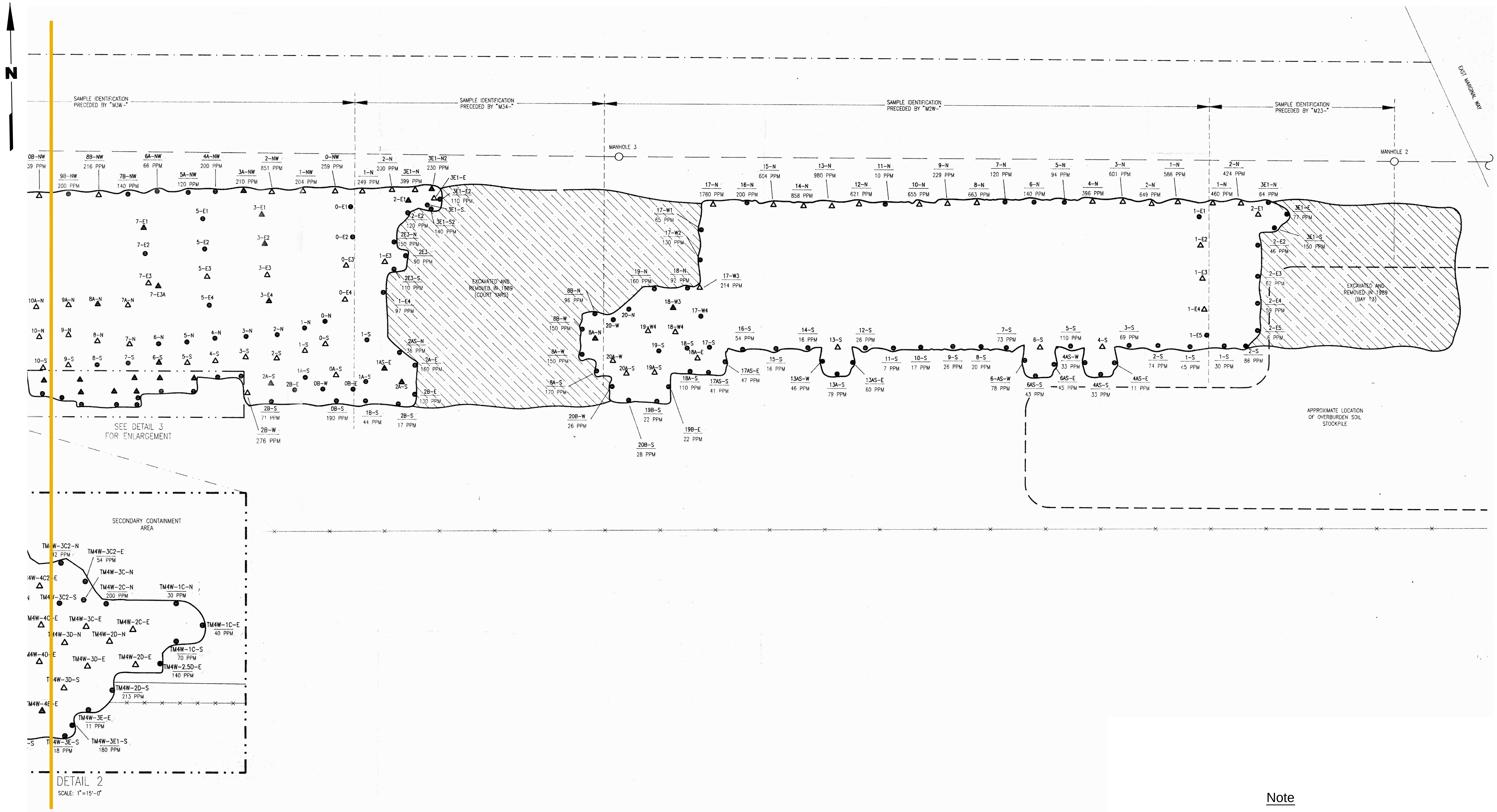
Boeing Isaacson - Thompson Site
Tukwila, Washington

1991 Soil Stabilization Excavation Sample Locations and Results - West

Figure
16A

Draft Summary Report | V:\025\190\110.012\Figure 16A_16B.dwg (A) "Figure 16A" 5/13/2011



Base map source: Geo Engineers 1992

0 40 80

Scale in Feet

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

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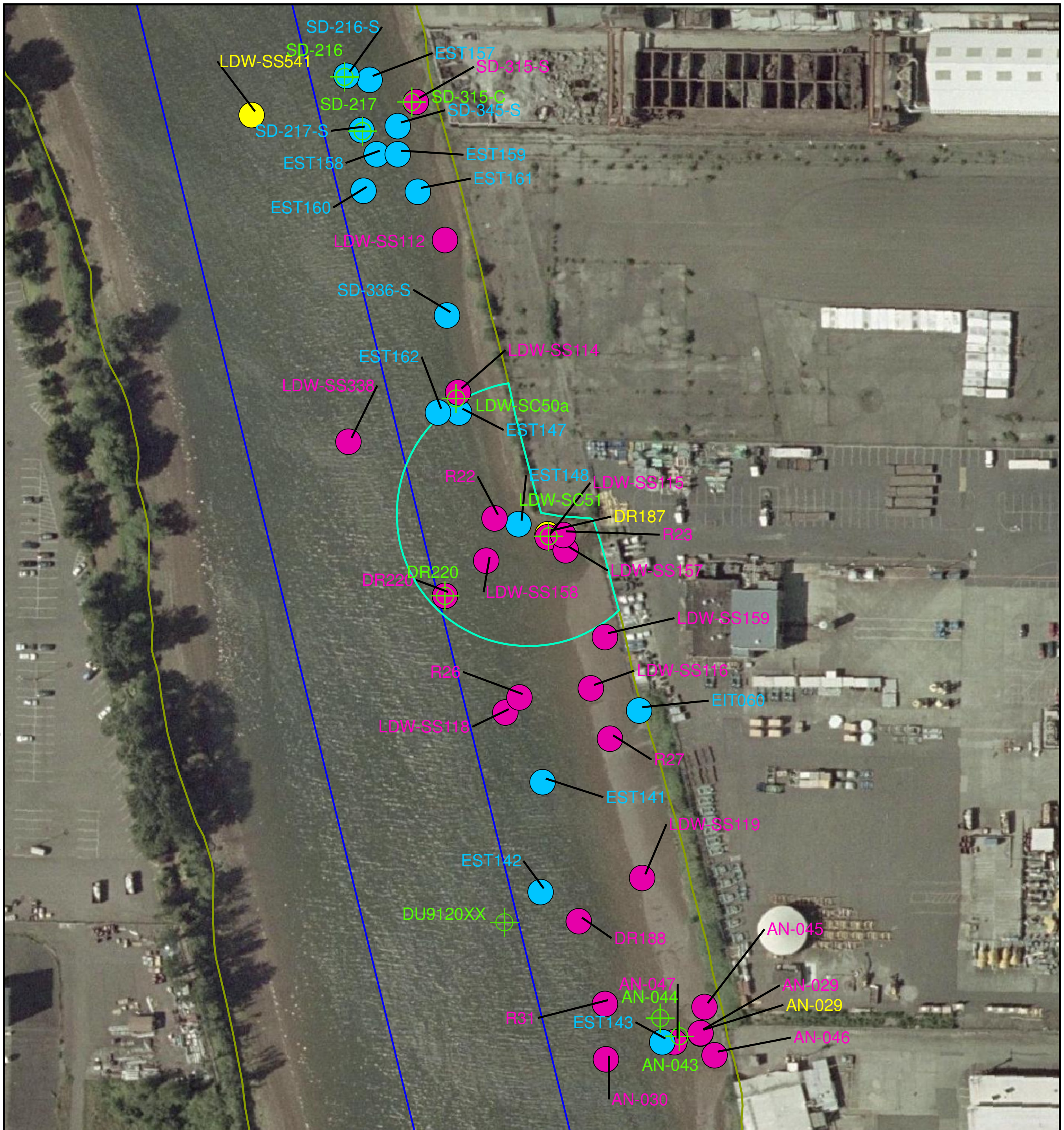
Boeing Isaacson - Thompson Site
Tukwila, Washington

1991 Soil Stabilization Excavation Sample Locations and Results - East

Figure
16B

Draft Summary Report | V:\025\190\110.012\Figure 16A_16B.dwg (A) "Figure 16B" 5/13/2011



Surface Stations (by analysis group)

Dioxins

PCB Aroclors only

SMS List of COCs

Sediment Core Samples

Early Action Area (EAA) 6

N

0 100 200 Feet

Previous Sediment Sampling Locations

Boeing Isaacson–Thompson Site
Tukwila, Washington

By: rhg	Date: 5/12/2011	Project No. LY11160060
AMEC Geomatrix		Figure 17

File path: P:\Boeing IT\LY11160060 Isaacson-Thompson 2011\Data\Historic and new sample locations\Figure 17Ver4.mxd

Y:\Projects\025190\MapDocs\I-T RIFS Workplan\Revised\Ecology\Fig18-Corrugated Pipe Investigation.mxd 5/12/2011 NAD 1983 StatePlane Washington North FIPS 4601 Feet

Note

1. The 12-inch corrugated pipe is a footing drain for the retaining wall.
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

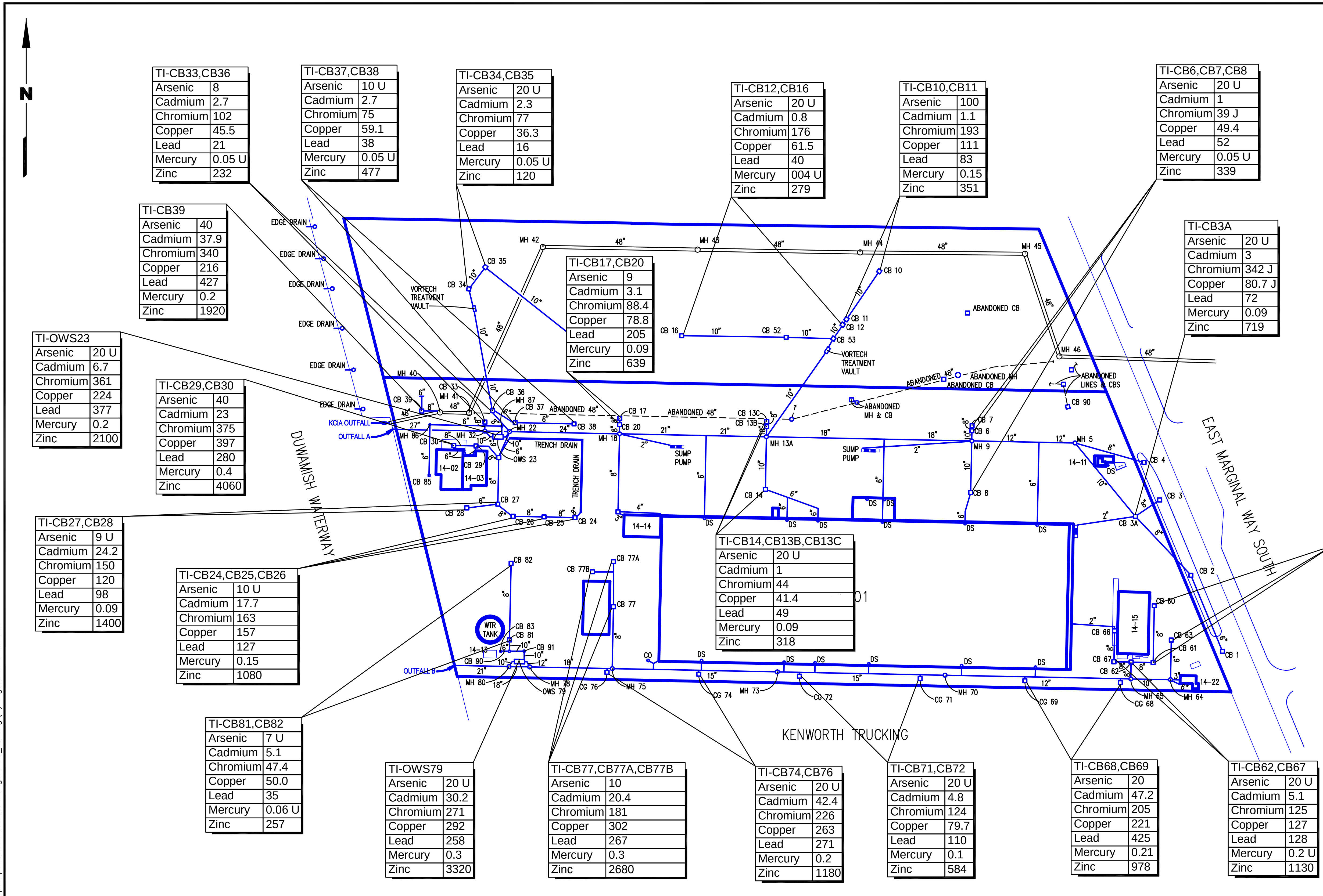
0 200 400

Scale in Feet

Data Source: Bing Aerial Image

LANDAU ASSOCIATES

Boeing Isaacson-Thompson Site Tukwila, Washington	**Corrugated Pipe Location**	Figure 18



TI-CB33,CB36	
Arsenic	8
Cadmium	2.7
Chromium	102
Copper	45.5
Lead	21
Mercury	0.05 U
Zinc	232

TI-CB37,CB38	
Arsenic	10 U
Cadmium	2.7
Chromium	75
Copper	59.1
Lead	38
Mercury	0.05 U
Zinc	477

TI-CB34,CB35	
Arsenic	20 U
Cadmium	2.3
Chromium	77
Copper	36.3
Lead	16
Mercury	0.05 U
Zinc	120

TI-CB12,CB16	
Arsenic	20 U
Cadmium	0.8
Chromium	176
Copper	61.5
Lead	40
Mercury	004 U
Zinc	279

TI-CB10,CB11	
Arsenic	100
Cadmium	1.1
Chromium	193
Copper	111
Lead	83
Mercury	0.15
Zinc	351

TI-CB6,CB7,CB8	
Arsenic	20 U
Cadmium	1
Chromium	39 J
Copper	49.4
Lead	52
Mercury	0.05 U
Zinc	339

TI-CB39	
Arsenic	40
Cadmium	37.9
Chromium	340
Copper	216
Lead	427
Mercury	0.2
Zinc	1920

TI-CB17,CB20	
Arsenic	9
Cadmium	3.1
Chromium	88.4
Copper	78.8
Lead	205
Mercury	0.09
Zinc	639

TI-CB3A	
Arsenic	20 U
Cadmium	3
Chromium	342 J
Copper	80.7 J
Lead	72
Mercury	0.09
Zinc	719

TI-OWS23	
Arsenic	20 U
Cadmium	6.7
Chromium	361
Copper	224
Lead	377
Mercury	0.2
Zinc	2100

TI-CB29,CB30	
Arsenic	40
Cadmium	23
Chromium	375
Copper	397
Lead	280
Mercury	0.4
Zinc	4060

TI-CB27,CB28	
Arsenic	9 U
Cadmium	24.2
Chromium	150
Copper	120
Lead	98
Mercury	0.09
Zinc	1400

TI-CB24,CB25,CB26	
Arsenic	10 U
Cadmium	17.7
Chromium	163
Copper	157
Lead	127
Mercury	0.15
Zinc	1080

TI-CB14,CB13B,CB13C	
Arsenic	20 U
Cadmium	1
Chromium	44
Copper	41.4
Lead	49
Mercury	0.09
Zinc	318

TI-CB60,CB61,CB63	
Arsenic	10 U
Cadmium	3.2
Chromium	125
Copper	125
Lead	150
Mercury	0.1 U
Zinc	1160

TI-CB81,CB82	
Arsenic	7 U
Cadmium	5.1
Chromium	47.4
Copper	50.0
Lead	35
Mercury	0.06 U
Zinc	257

TI-OWS79	
Arsenic	20 U
Cadmium	30.2
Chromium	271
Copper	292
Lead	258
Mercury	0.3
Zinc	3320

TI-CB77,CB77A,CB77B	
Arsenic	10
Cadmium	20.4
Chromium	181
Copper	302
Lead	267
Mercury	0.3
Zinc	2680

TI-CB74,CB76	
Arsenic	20 U
Cadmium	42.4
Chromium	226
Copper	263
Lead	271
Mercury	0.2
Zinc	1180

TI-CB71,CB72	
Arsenic	20 U
Cadmium	4.8
Chromium	124
Copper	79.7
Lead	110
Mercury	0.1
Zinc	584

TI-CB68,CB69	
Arsenic	20
Cadmium	47.2
Chromium	205
Copper	221
Lead	425
Mercury	0.21
Zinc	978

TI-CB62,CB67	
Arsenic	20 U
Cadmium	5.1
Chromium	125
Copper	127
Lead	128
Mercury	0.2 U
Zinc	1130

Legend

- Catch Basin
- Catch Basin with Curb/Gutter Inlet
- Removed or Abandoned Catch Basin
- Storm Drain
- Abandoned Storm Drain

TI-CB10,CB-11	
Arsenic	100

Sample ID
Total Metals (concentration in mg/kg)

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

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

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

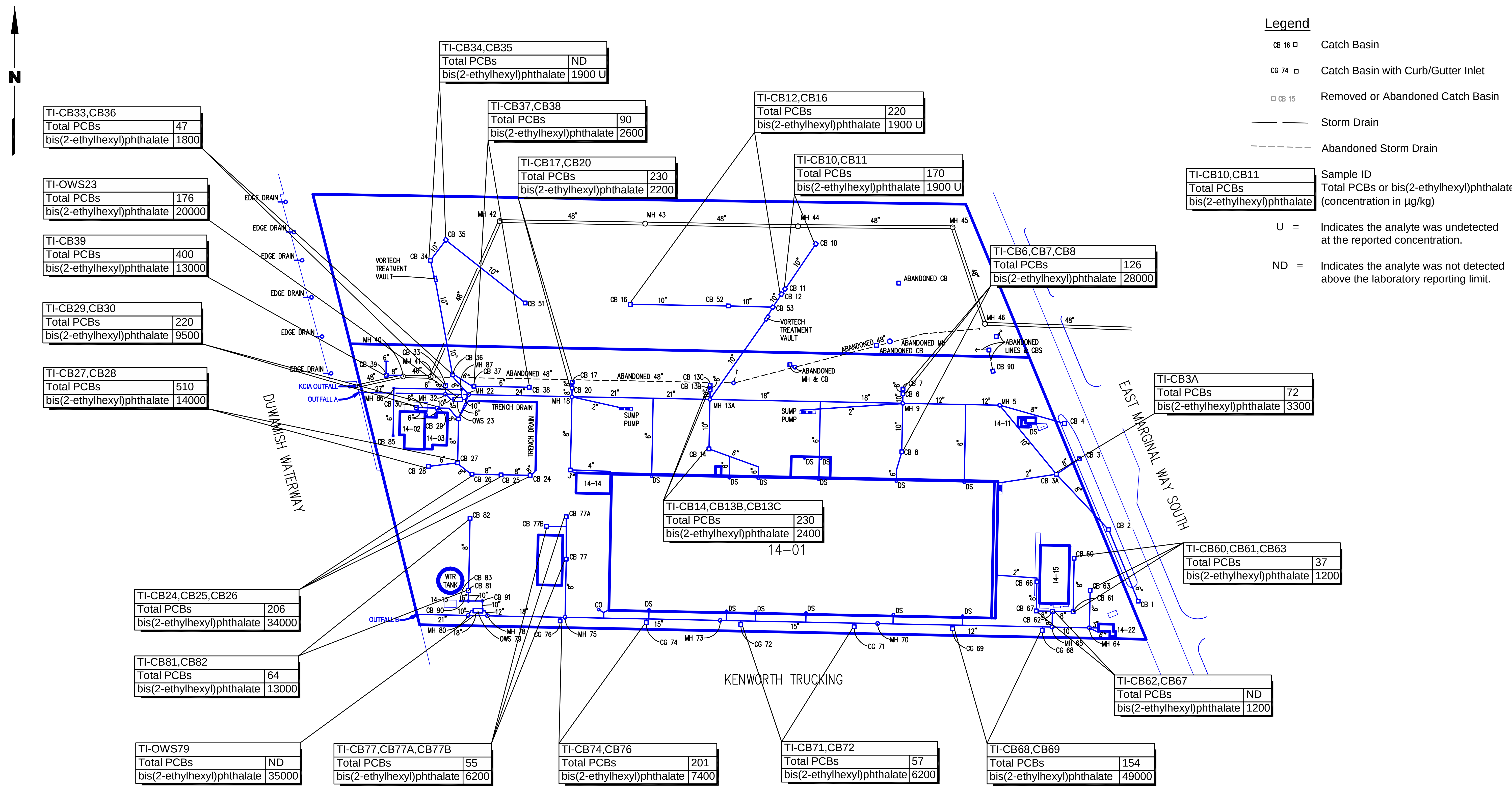
Draft Summary Report | V:\025\190\110.012\Figure 19_20.dwg (A) "Figure 19" 5/16/2011

LANDAU ASSOCIATES

Boeing Thompson - Isaacson Property
Tukwila, Washington

Detected Concentrations of Metals in Catch Basin Solids

Figure 19



Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 200 400

Scale in Feet

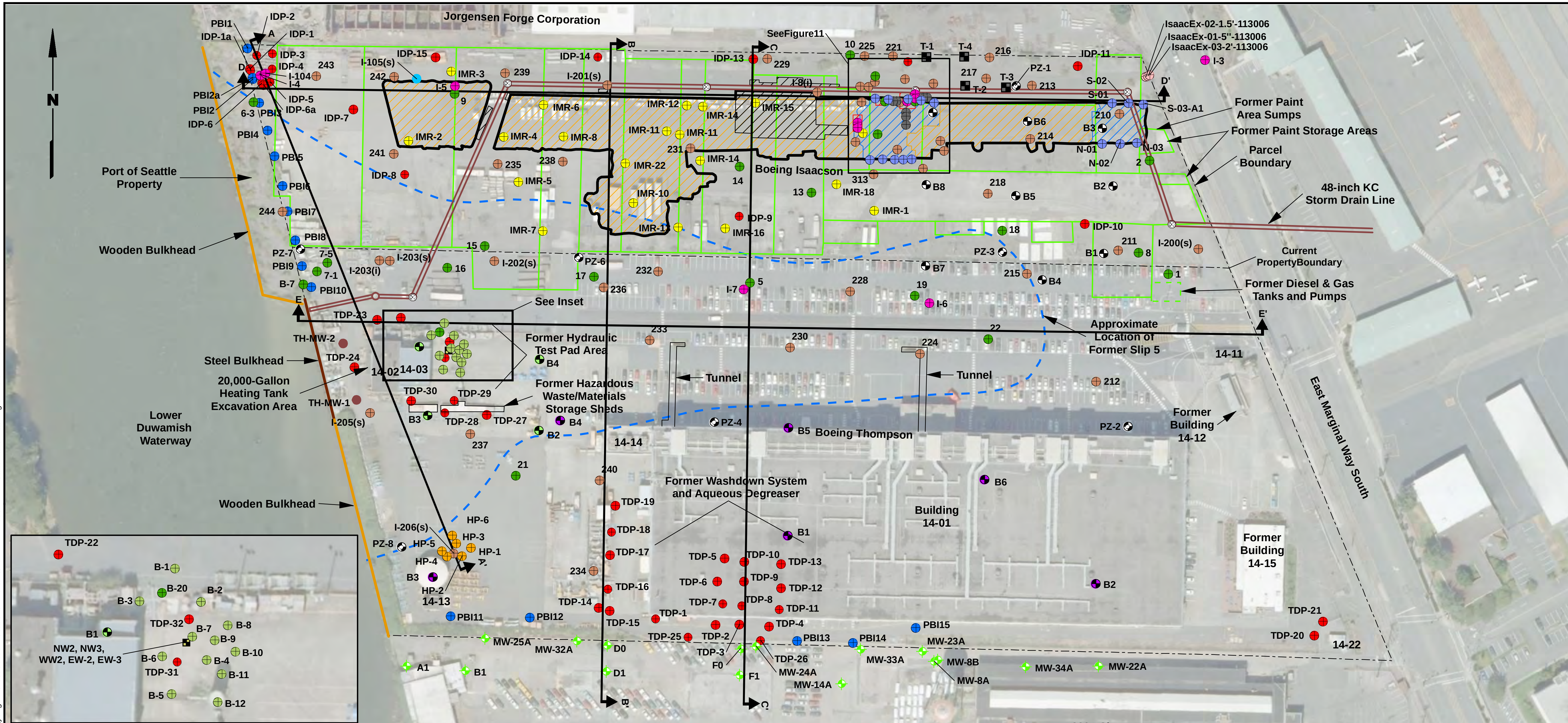
Draft Summary Report | V:\025\190\110.012\Figure 19_20.dwg (A) "Figure 20" 5/16/2011

LANDAU ASSOCIATES

Boeing Thompson - Isaacson Property
Tukwila, Washington

Detected Concentrations of BEHP and PCBs in Catch Basin Solids

Figure 20



Y:\Projects\025190\MapDocs\I-T RIFS Workplan\Revised\Ecology\Fig21-CrossSectionLocations.mxd 5/13/2011 NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

Legend

- Geotechnical Boring
- Soil Boring
- Test Pit
- Piezometer
- 8801 Site Soil Boring Locations
- 1983 Excavation
- 1989 Excavation
- 1990 Excavation
- 1991 Excavation
- Austin Associates 1965 Geotechnical Boring
- GeoEngineers 1980 Geotechnical Boring
- Dames and Moore 1983 Soil Sample Location
- Wicks 1983 Soil Sample Location
- GeoEngineers 1984 Geotechnical Boring
- Wicks 1984 Soil Sample Location
- Landau Associates 1985 Monitoring Well
- Landau Associates 1988 Soil Sample Location
- Cross Section Location
- Existing 48" King County Storm Drain Line
- Landau Associates 1989 Soil Samples
- GeoEngineers 1994 Soil Sample Location
- Geoengineers 1996 Soil Sample Location
- Landau Associates 2004 Monitoring Well
- Landau Associates 2006 Soil Sample Location
- Landau Associates 2009 Post Excavation Soil Sample Location
- Landau Associates 2008/2009 Phase II ESA Soil Sample Location
- Landau Associates 2009 Property Boundary Soil Sample Location
- Former Isaacson Building (Building 14-05)
- Approximate Location of Former Slip 5
- Current Extent of Stabilized Soil Material

0 150 300
Scale in Feet

Data Source: Bing Aerial Image; King County Parcel Data

Note
1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

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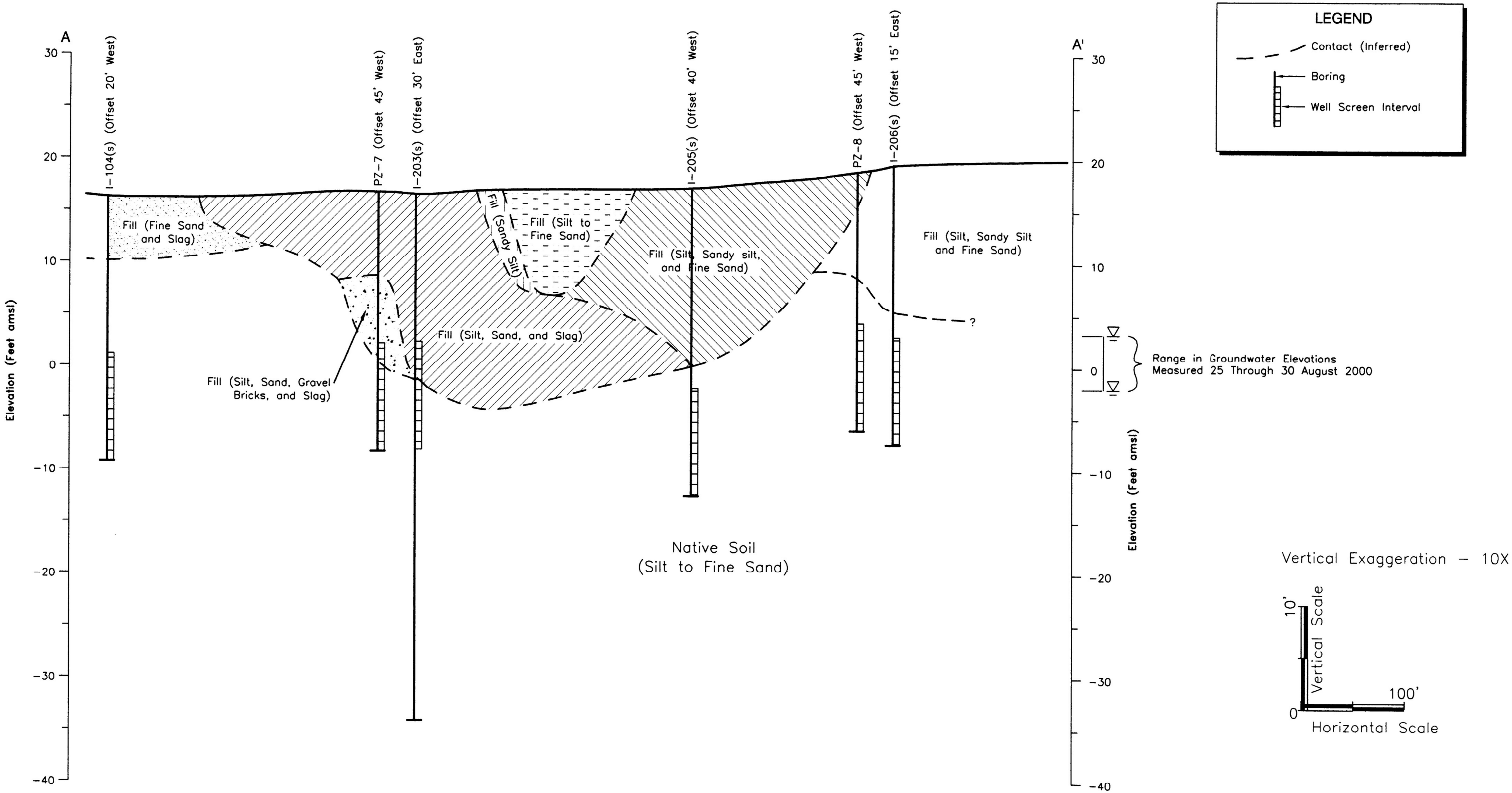
Boeing Isaacson-Thompson Site
Tukwila, Washington

Cross-Section Locations

Figure 21



Source: ERM Report Figure 19, 2002

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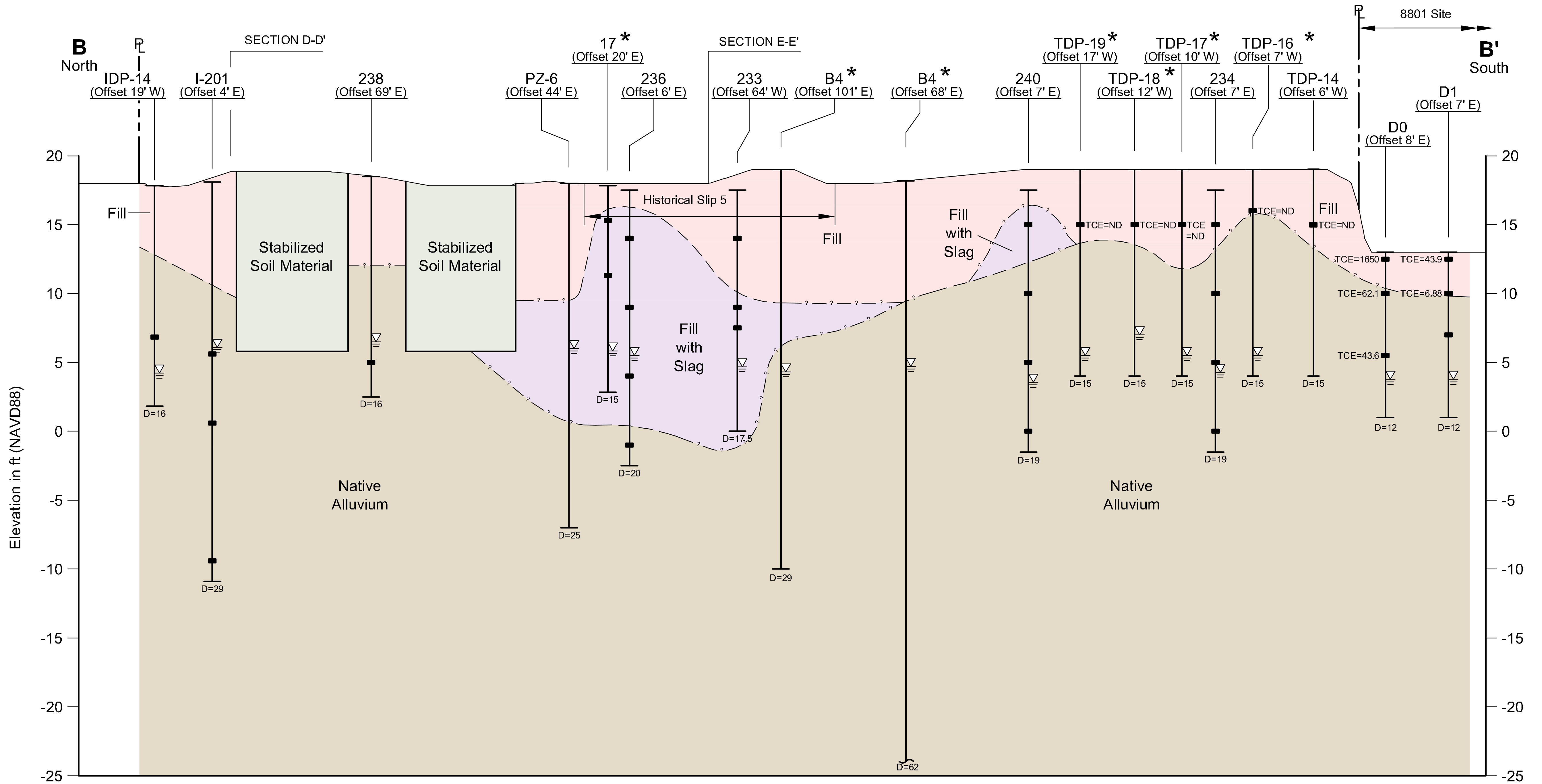
Boeing Isaacson - Thompson Site Tukwila, Washington	**Geologic Cross-Section A-A'**	Figure 22



Legend

XX — Project Exploration Designation

(Offset 16' W) — Offset Distance in Feet and Direction

Top of Exploration

TCE=301 — Soil Sample Location

Trichloroethene Result (µg/kg)
ND= Not Detected

Groundwater Level (at time of drilling)

Inferred Geologic Contact

Well Screen Interval (If Installed)

Bottom of Exploration

D=14 — Depth of Exploration (BGS)

Fill: Brown to light gray fine to coarse sand, silty sand, sandy gravel, and debris (brick, concrete, glass, crushed rock)

Fill with Slag: Brown to light gray fine to coarse sand, silty sand, sandy gravel, and debris with slag, brick, and wood debris

Stabilized Soil Material: Soil mixed with cementitious material

Native Alluvium: Brown to dark gray silty fine to medium sand, sandy silt, with occasional gravel and organic material

Notes

1. Soil descriptions are generalized, based on interpretation of field and laboratory data. Stratigraphic contacts are interpolated between borings and based on topographic features; actual conditions may vary.
2. See report text for descriptions of geologic units.
3. For cross-section profile location, see the Site and Exploration Plan, Figure 2.
4. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

* 2010 ground surface elevation used as top of boring locations where elevation was missing or could not be resolved.

0 80 160

Horizontal Scale: 1" = 80'
Vertical Scale: 1" = 8'

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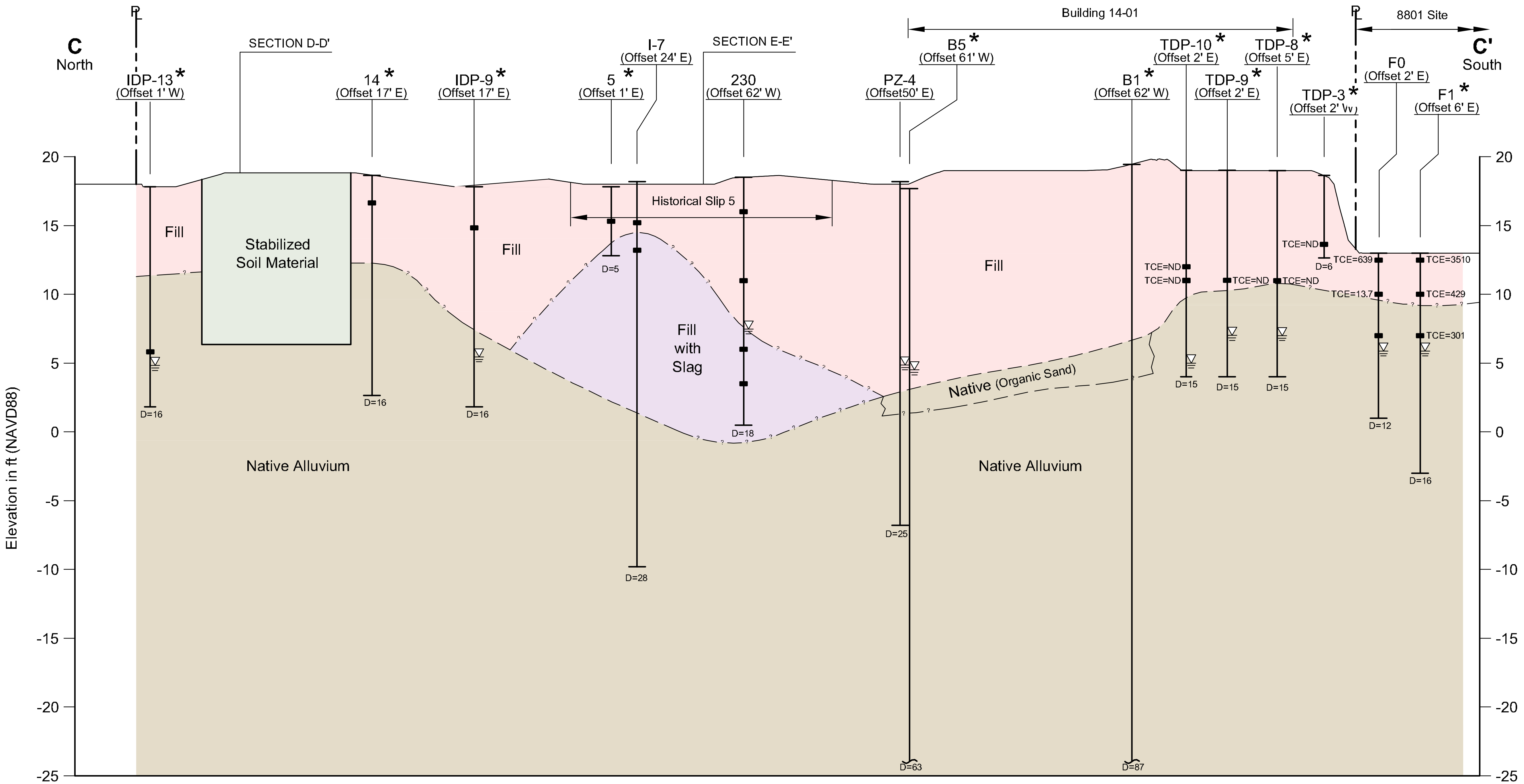
Boeing Isaacson-Thompson Site
Tukwila, Washington

Cross Section B-B'

Figure 23



Legend

XX — Project Exploration Designation

(Offset 16' W) — Offset Distance in Feet and Direction

Top of Exploration

TCE=301 Soil Sample Location

Trichloroethene Result (µg/kg)

ND= Not Detected

Groundwater Level (at time of drilling)

Inferred Geologic Contact

Well Screen Interval (If Installed)

Bottom of Exploration

D=14 Depth of Exploration (BGS)

Fill: Brown to light gray fine to coarse sand, silty sand, sandy gravel, and debris (brick, concrete, glass, crushed rock)

Fill with Slag: Brown to light gray fine to coarse sand, silty sand, sandy gravel, and debris with slag, brick, and wood debris

Stabilized Soil Material: Soil mixed with cementitious material

Native Alluvium: Brown to dark gray silty fine to medium sand, sandy silt, with occasional gravel and organic material

Notes

1. Soil descriptions are generalized, based on interpretation of field and laboratory data. Stratigraphic contacts are interpolated between borings and based on topographic features; actual conditions may vary.
2. See report text for descriptions of geologic units.
3. For cross-section profile location, see the Site and Exploration Plan, Figure 2.
4. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

* 2010 ground surface elevation used as top of boring locations where elevation was missing or could not be resolved.

0 80 160

Horizontal Scale: 1" = 80'
Vertical Scale: 1" = 8'

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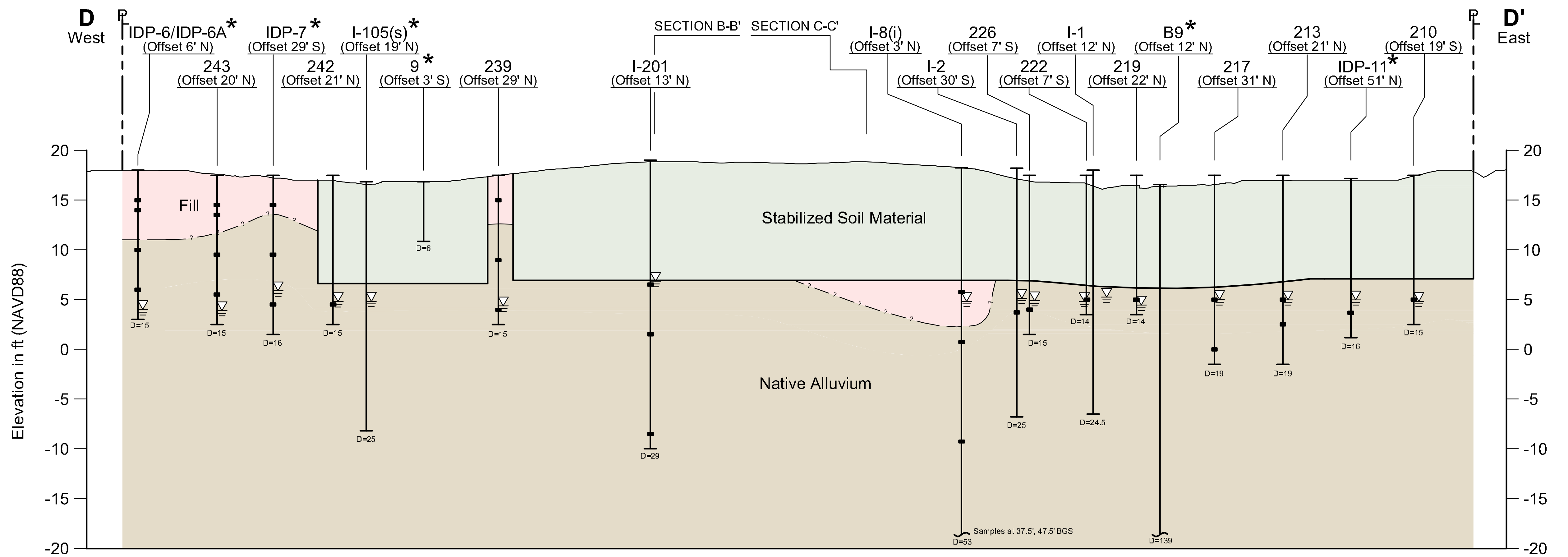
Boeing Isaacson-Thompson Site
Tukwila, Washington

Cross Section C-C'

Figure 24

LANDAU ASSOCIATES, INC. | V:\025\190\111.012\Sections B-C-D & E.dwg (A) "Figure CC" 5/13/2011



Legend

XX — Project Exploration Designation

(Offset 16' W) — Offset Distance in Feet and Direction

Top of Exploration

Soil Sample Location

Groundwater Level (at time of drilling)

Inferred Geologic Contact

Well Screen Interval (If Installed)

Bottom of Exploration

D=14 — Depth of Exploration (BGS)

Fill: Brown to light gray fine to coarse sand, silty sand, sandy gravel, and debris (brick, concrete, glass, crushed rock)

Fill with Slag: Brown to light gray fine to coarse sand, silty sand, sandy gravel, and debris with slag, brick, and wood debris

Stabilized Soil Material: Soil mixed with cementitious material

Native Alluvium: Brown to dark gray silty fine to medium sand, sandy silt, with occasional gravel and organic material

Notes

1. Soil descriptions are generalized, based on interpretation of field and laboratory data. Stratigraphic contacts are interpolated between borings and based on topographic features; actual conditions may vary.
2. See report text for descriptions of geologic units.
3. For cross-section profile location, see the Site and Exploration Plan, Figure 2.
4. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

* 2010 ground surface elevation used as top of boring locations where elevation was missing or could not be resolved.

0 120 240

Horizontal Scale: 1" = 120'
Vertical Scale: 1" = 12'

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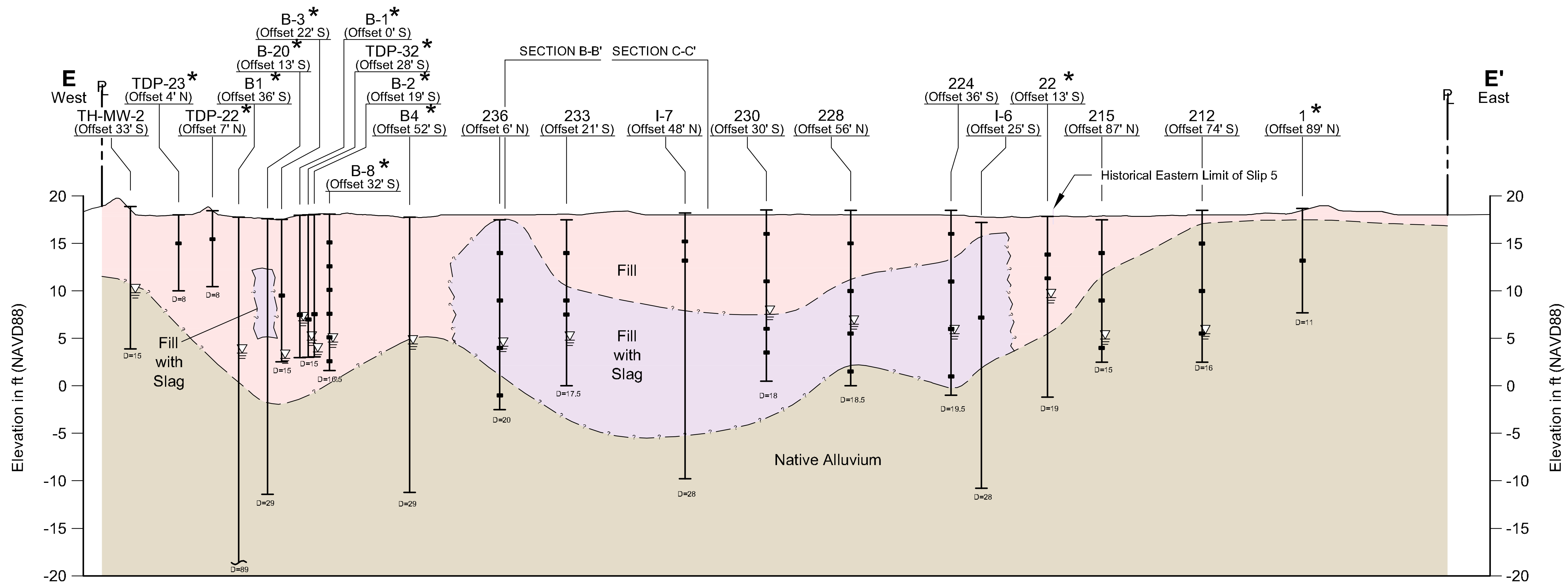
Boeing Isaacson-Thompson Site
Tukwila, Washington

Cross Section D-D'

Figure 25



Legend

XX — Project Exploration Designation
(Offset 16' W) — Offset Distance in Feet and Direction
— Top of Exploration
— Soil Sample Location
— Groundwater Level (at time of drilling)
— Inferred Geologic Contact
— Well Screen Interval (If Installed)
— Bottom of Exploration
D=14 — Depth of Exploration (BGS)

Fill: Brown to light gray fine to coarse sand, silty sand, sandy gravel, and debris (brick, concrete, glass, crushed rock)

Fill with Slag: Brown to light gray fine to coarse sand, silty sand, sandy gravel, and debris with slag, brick, and wood debris

Stabilized Soil Material: Soil mixed with cementitious material

Native Alluvium: Brown to dark gray silty fine to medium sand, sandy silt, with occasional gravel and organic material

Notes

1. Soil descriptions are generalized, based on interpretation of field and laboratory data. Stratigraphic contacts are interpolated between borings and based on topographic features; actual conditions may vary.
2. See report text for descriptions of geologic units.
3. For cross-section profile location, see the Site and Exploration Plan, Figure 2.
4. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

* 2010 ground surface elevation used as top of boring locations where elevation was missing or could not be resolved.

0 120 240
Horizontal Scale: 1" = 120'
Vertical Scale: 1" = 12'

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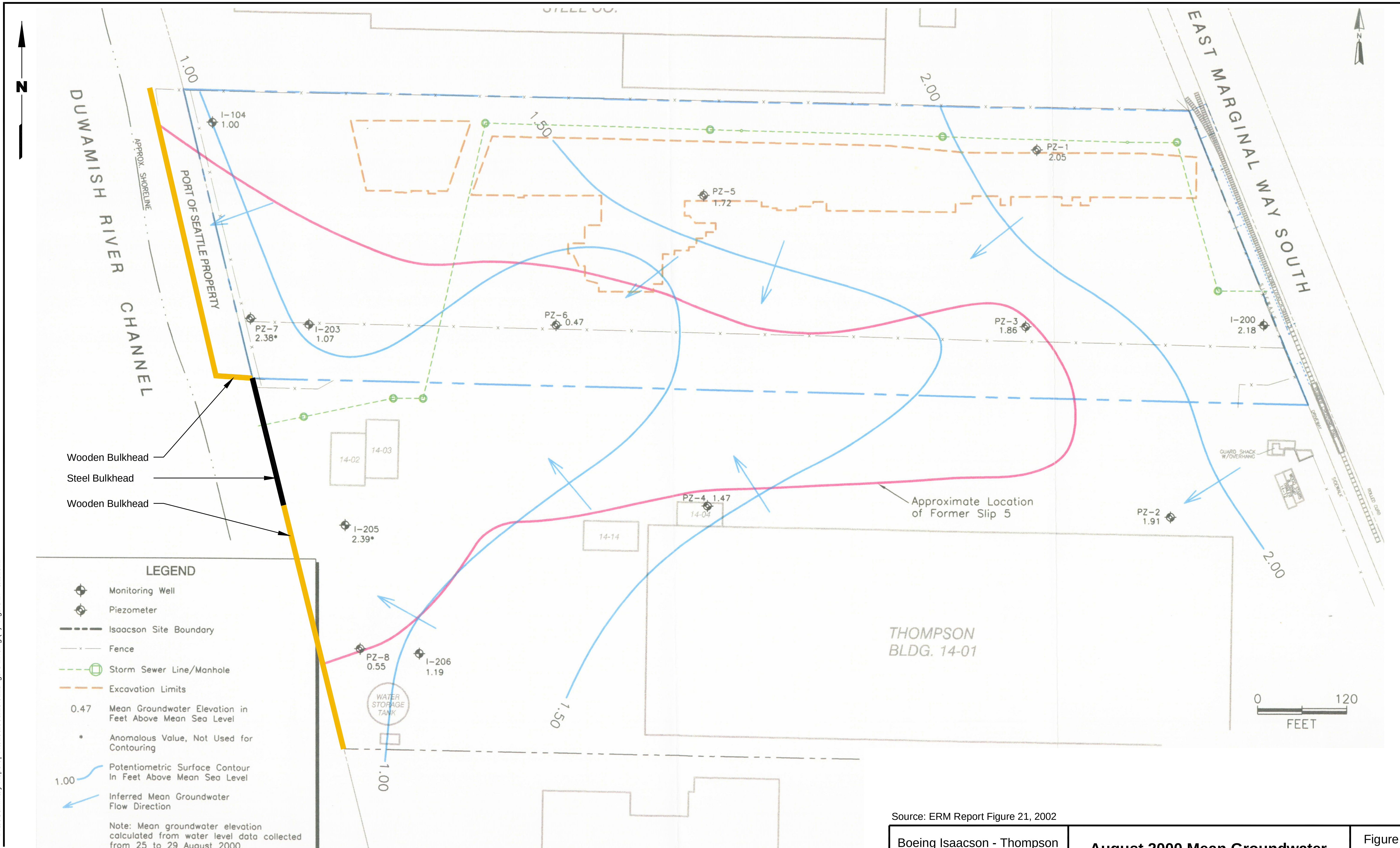
Boeing Isaacson-Thompson Site Tukwila, Washington	**Cross Section E-E'**	Figure 26

LANDAU ASSOCIATES, INC. | V:\025\190\111.012\Sections B-C-D & E.dwg (A) "Figure EE" 5/13/2011



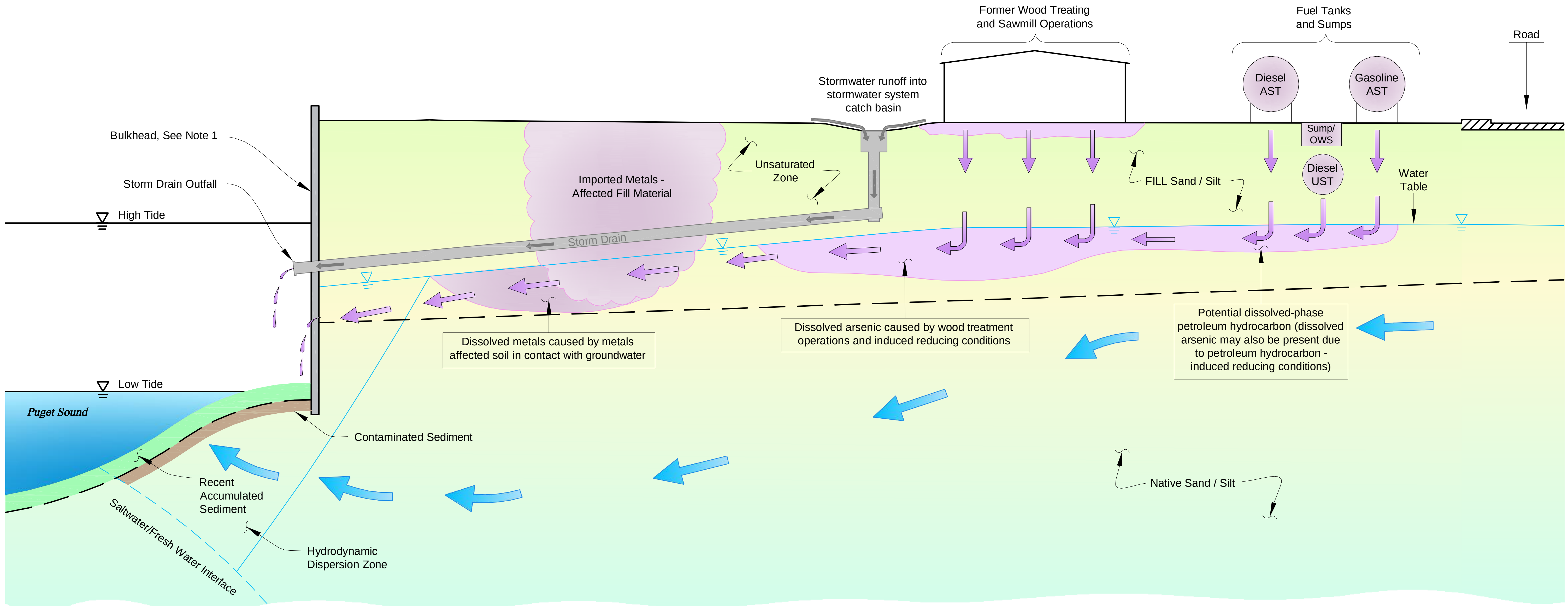
Source: ERM Report Figure 21, 2002

LANDAU ASSOCIATES

Boeing Isaacson - Thompson Site
Tukwila, Washington

August 2000 Mean Groundwater Elevation Contours

Figure 27



Legend

- Water Table
- Tidally Influenced Water Level
- Potential Transport of Dissolved Contaminants
- Potential Transport of Dissolved Metals and Petroleum Fuel Product

Notes

1. Gaps in portions of the wooden bulkhead are not solid structures that may allow groundwater seepage through holes.
2. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Draft Summary Report | V:\025\190\110.012\Figure 28.dwg (A) "Figure 28" 6/2/2011

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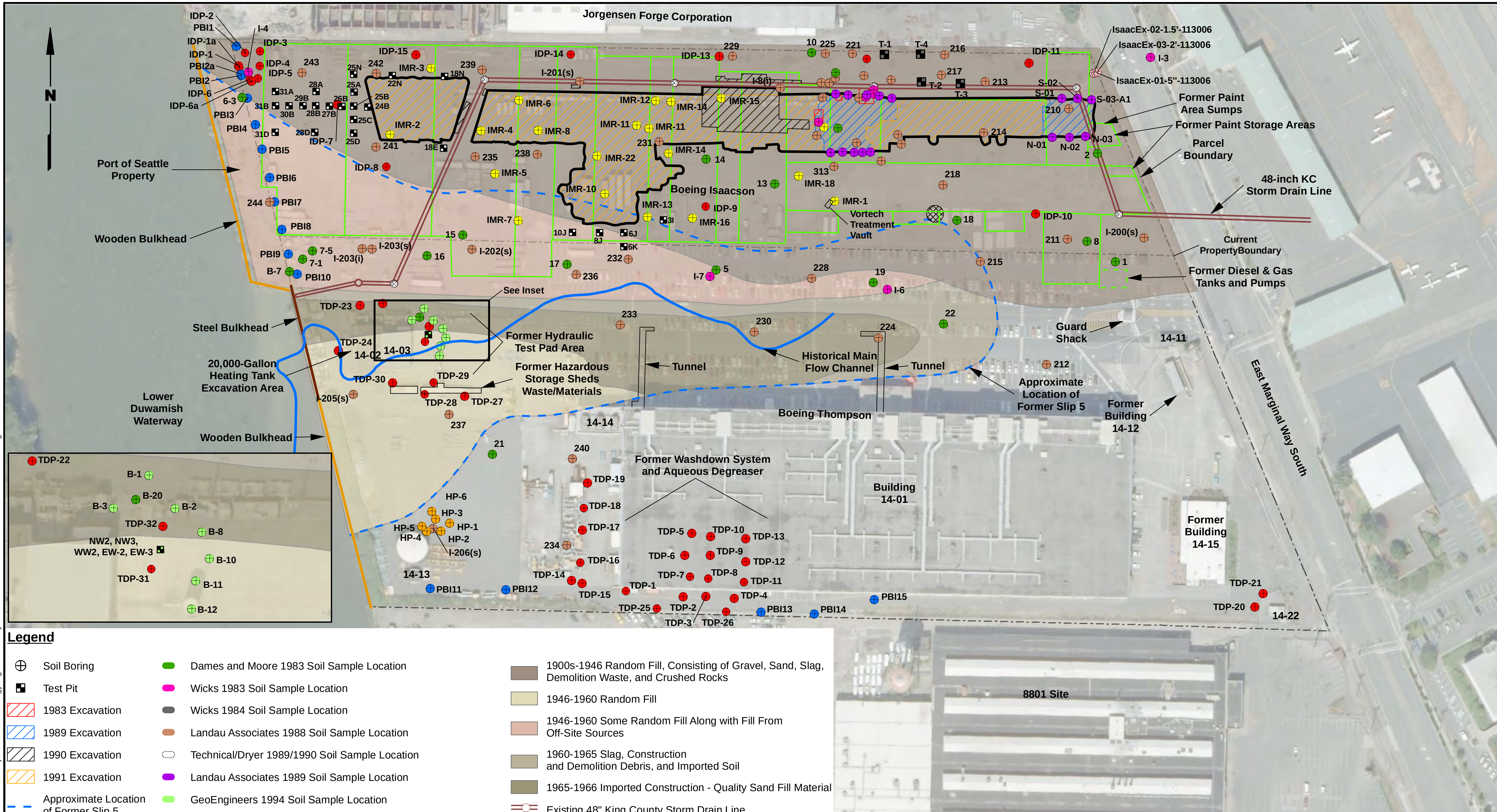
Boeing Isaacson - Thompson Site Tukwila, Washington	**Conceptual Site Model**	Figure 28



Legend

Soil Boring	Dames and Moore 1983 Soil Sample Location
Test Pit	Wicks 1983 Soil Sample Location
1983 Excavation	Wicks 1984 Soil Sample Location
1989 Excavation	Landau Associates 1988 Soil Sample Location
1990 Excavation	Technical/Dryer 1989/1990 Soil Sample Location
1991 Excavation	Landau Associates 1989 Soil Sample Location
Approximate Location of Former Slip 5	GeoEngineers 1994 Soil Sample Location
	GeoEngineers 1996 Soil Sample Location
	Landau Associates 2006 Soil Sample Location
	Landau Associates 2009 Post-Excavation Soil Sample Location
	Landau Associates 2008/2009 Phase II ESA Soil Sample Location
	Landau Associates 2009 Property Boundary Soil Sample Location

- 1900s-1946 Random Fill, Consisting of Gravel, Sand, Slag, Demolition Waste, and Crushed Rocks
- 1946-1960 Random Fill
- 1946-1960 Some Random Fill Along with Fill From Off-Site Sources
- 1960-1965 Slag, Construction and Demolition Debris, and Imported Soil
- 1965-1966 Imported Construction - Quality Sand Fill Material
- Existing 48" King County Storm Drain Line
- Former Isaacson Building (Building 14-05)
- Current Extent of Stabilized Soil Material

Note
1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: Bing Aerial Image; King County Parcel Data

0 150 300
Scale in Feet

Y:\Projects\025190\MapDocs\I-T RIFS Workplan\Revised\Ecology\Fig29-FillHistory.mxd 5/16/2011 NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

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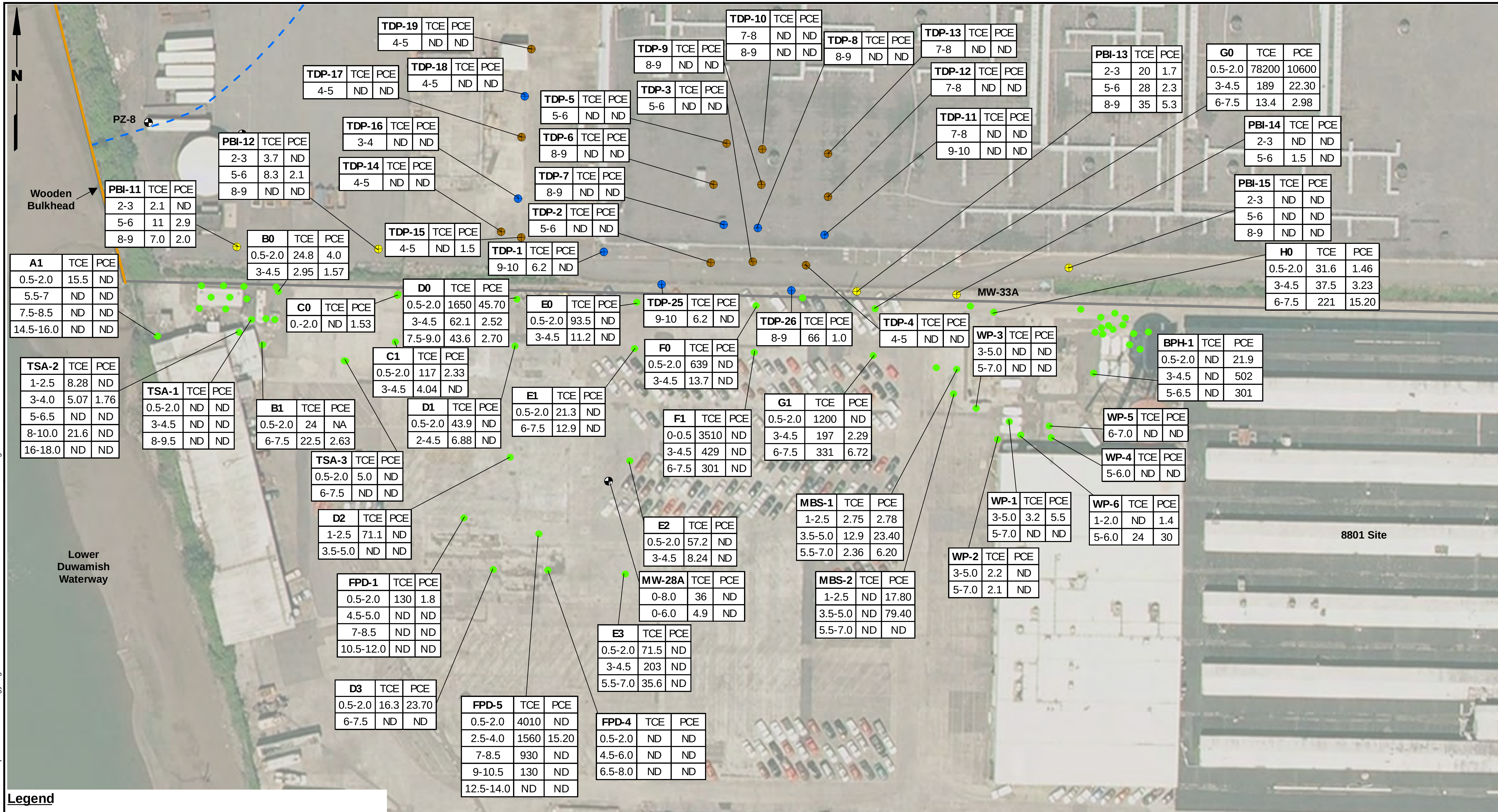
Boeing Isaacson-Thompson Site
Tukwila, Washington

Soil Sample Locations of Soil Remaining

Figure 29



Legend

- Phase II 2008 Soil Sample Location
- Phase II 2008 Soil and Groundwater Sample Location
- 2009 Soil and Groundwater Sampling Location
- Existing Monitoring Well
- PACCAR Soil Sampling Location
- Approximate Location of Former Slip 5

Sample Location	TCE (Trichloroethene)	PCE (Tetrachloroethene)
Sample Depth Interval (ft)	Result µg/kg	Result µg/kg

ND = Not Detected.

0 80 160
Scale in Feet

Data Source: Bing Aerial Image, King County Parcel Data

Note
1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

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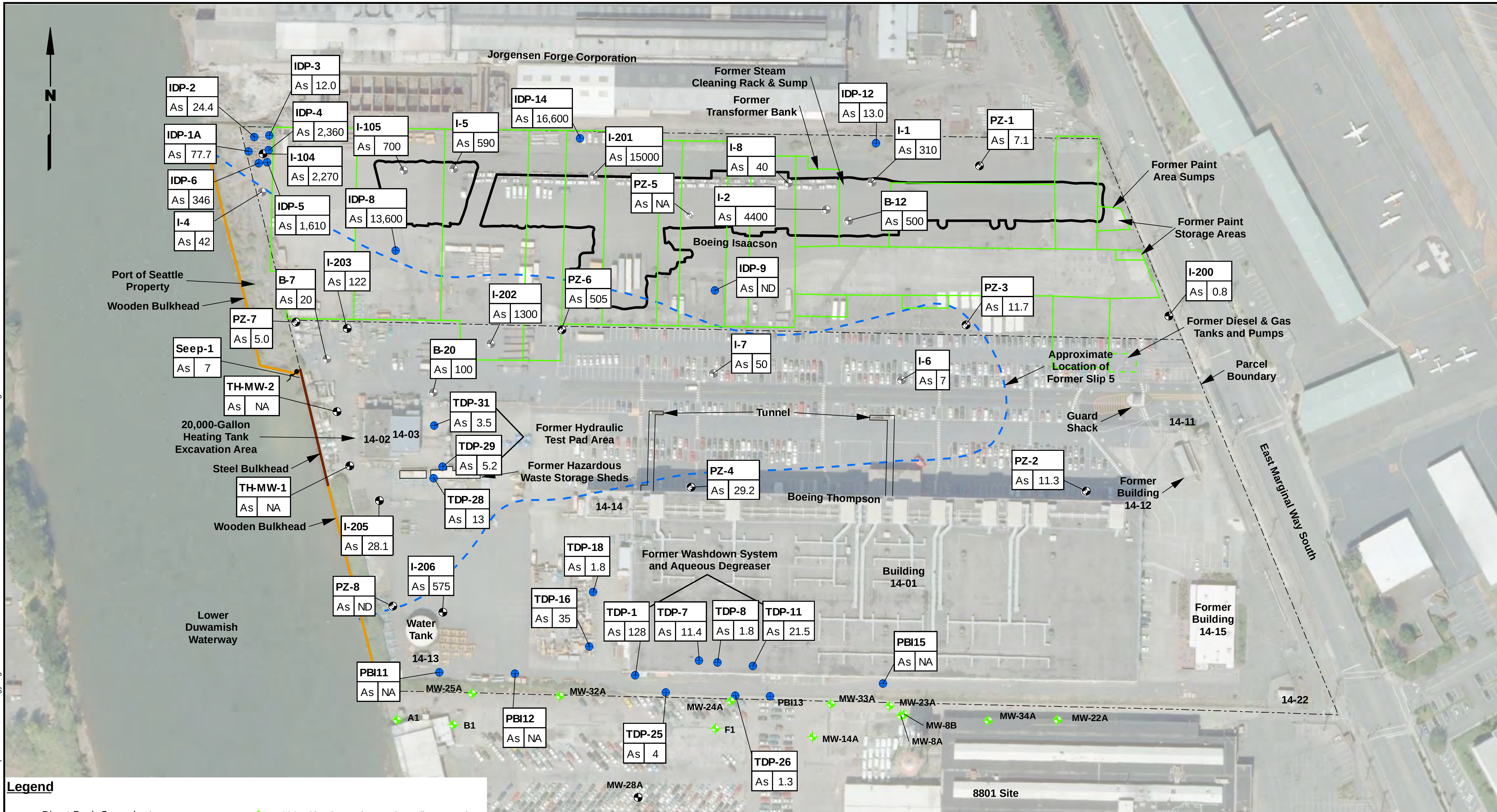
Boeing Isaacson-Thompson Site
Tukwila, Washington

Boeing Thompson/8801 Site Property Boundary TCE and PCE Soil Concentrations

Figure 30

Y:\Projects\025190\MapDocs\I-T RIFS Workplan\Revised\Ecology\Fig30-TCE.mxd 5/16/2011 NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet



Legend

- Direct-Push Groundwater Sample Location
- Existing Monitoring Well Location
- Existing Piezometer Location
- Abandoned or Destroyed Monitoring Well
- 8801 Site Groundwater Sampling Locations
- Seep
- Approximate Location of Former Slip 5
- Current Extent of Stabilized Soil Material

Sample Location	
Arsenic	Most Recent Dissolved Arsenic Concentration in Groundwater (µg/L)

Note
1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.
2. NA = Not Analyzed

Data Source: Bing Aerial Image; King County Parcel Data

0 150 300
Scale in Feet

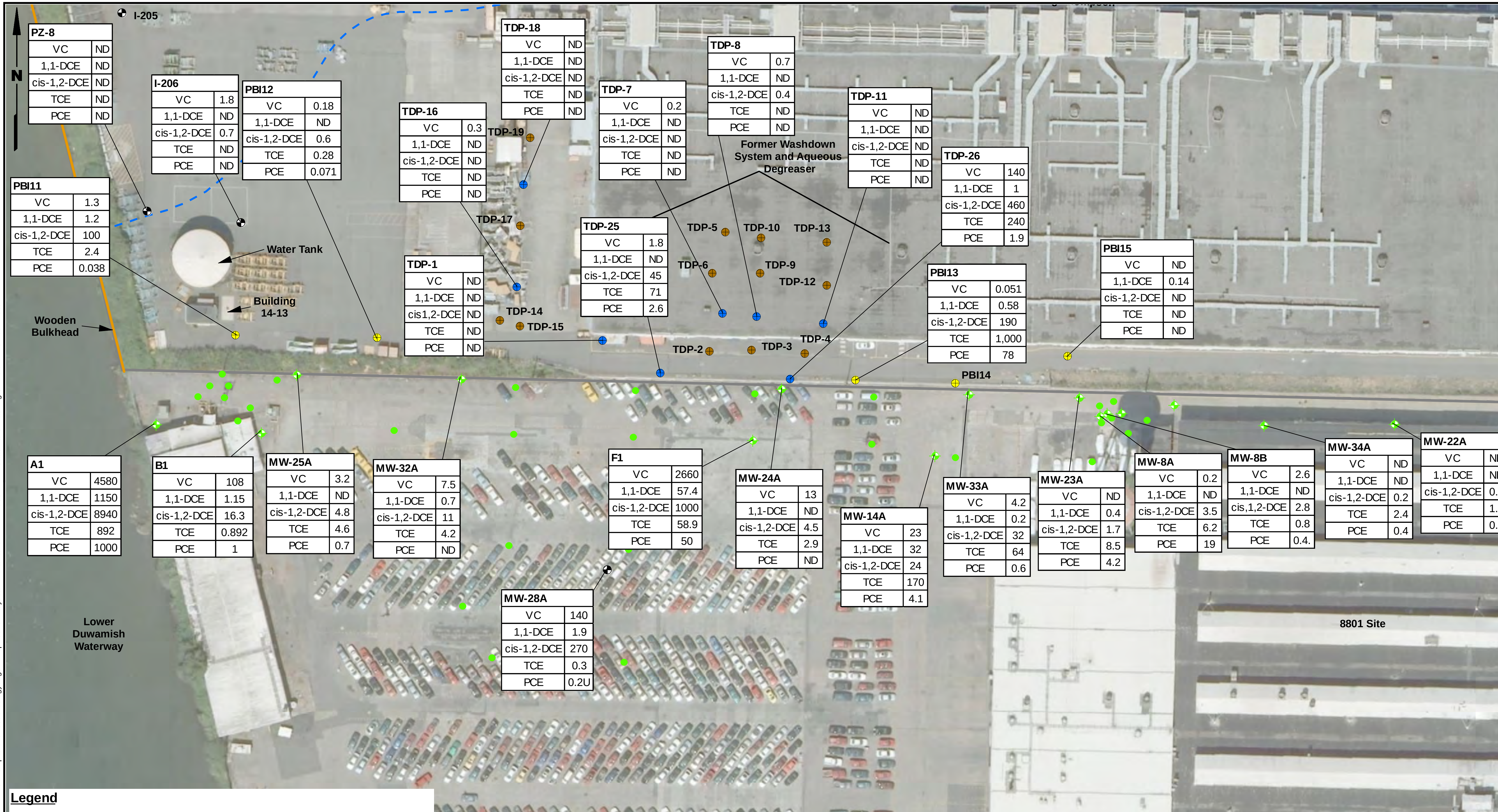
Landau Associates

Boeing Isaacson-Thompson Site
Tukwila, Washington

Dissolved Arsenic Concentrations in Groundwater

Figure 31

Y:\Projects\025190\MapDocs\I-T RIFS WorkplanRevised\Ecology\Fig31-DissolvedArsenicGW.mxd 5/16/2011 NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet



PZ-8	
VC	ND
1,1-DCE	ND
cis-1,2-DCE	ND
TCE	ND
PCE	ND

I-206	
VC	1.8
1,1-DCE	ND
cis-1,2-DCE	0.7
TCE	ND
PCE	ND

PBI12	
VC	0.18
1,1-DCE	ND
cis-1,2-DCE	0.6
TCE	0.28
PCE	0.071

TDP-16	
VC	0.3
1,1-DCE	ND
cis-1,2-DCE	ND
TCE	ND
PCE	ND

TDP-18	
VC	ND
1,1-DCE	ND
cis-1,2-DCE	ND
TCE	ND
PCE	ND

TDP-7	
VC	0.2
1,1-DCE	ND
cis-1,2-DCE	ND
TCE	ND
PCE	ND

TDP-8	
VC	0.7
1,1-DCE	ND
cis-1,2-DCE	0.4
TCE	ND
PCE	ND

TDP-11	
VC	ND
1,1-DCE	ND
cis-1,2-DCE	ND
TCE	ND
PCE	ND

TDP-26	
VC	140
1,1-DCE	1
cis-1,2-DCE	460
TCE	240
PCE	1.9

PBI11	
VC	1.3
1,1-DCE	1.2
cis-1,2-DCE	100
TCE	2.4
PCE	0.038

TDP-25	
VC	1.8
1,1-DCE	ND
cis-1,2-DCE	45
TCE	71
PCE	2.6

TDP-1	
VC	ND
1,1-DCE	ND
cis1,2-DCE	ND
TCE	ND
PCE	ND

PBI15	
VC	ND
1,1-DCE	0.14
cis-1,2-DCE	ND
TCE	ND
PCE	ND

PBI13	
VC	0.051
1,1-DCE	0.58
cis-1,2-DCE	190
TCE	1,000
PCE	78

A1	
VC	4580
1,1-DCE	1150
cis-1,2-DCE	8940
TCE	892
PCE	1000

B1	
VC	108
1,1-DCE	1.15
cis-1,2-DCE	16.3
TCE	0.892
PCE	1

MW-25A	
VC	3.2
1,1-DCE	ND
cis-1,2-DCE	4.8
TCE	4.6
PCE	0.7

MW-32A	
VC	7.5
1,1-DCE	0.7
cis-1,2-DCE	11
TCE	4.2
PCE	ND

F1	
VC	2660
1,1-DCE	57.4
cis-1,2-DCE	1000
TCE	58.9
PCE	50

MW-24A	
VC	13
1,1-DCE	ND
cis-1,2-DCE	4.5
TCE	2.9
PCE	ND

MW-14A	
VC	23
1,1-DCE	32
cis-1,2-DCE	24
TCE	170
PCE	4.1

MW-33A	
VC	4.2
1,1-DCE	0.2
cis-1,2-DCE	32
TCE	64
PCE	0.6

MW-23A	
VC	ND
1,1-DCE	0.4
cis-1,2-DCE	1.7
TCE	8.5
PCE	4.2

MW-8A	
VC	0.2
1,1-DCE	ND
cis-1,2-DCE	3.5
TCE	6.2
PCE	19

MW-8B	
VC	2.6
1,1-DCE	ND
cis,1,2-DCE	2.8
TCE	0.8
PCE	0.4.

MW-34A	
VC	ND
1,1-DCE	ND
cis-1,2-DCE	0.2
TCE	2.4
PCE	0.4

MW-22A	
VC	ND
1,1-DCE	ND
cis-1,2-DCE	0.6
TCE	1.2
PCE	0.3

MW-28A	
VC	140
1,1-DCE	1.9
cis-1,2-DCE	270
TCE	0.3
PCE	0.2U

Y:\Projects\025190\MapDocs\I-T RIFS WorkplanRevised\Ecology\Fig32-PropBoundAnalytical.mxd 5/16/2011 NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

Legend

- Phase II (2008) Soil Sample Location
- Phase II (2008) Soil and Groundwater Sample Location
- 2009 Soil and Groundwater Sampling Location
- Existing Monitoring Well
- PACCAR Soil Sampling Location
- PACCAR Groundwater Sampling Location
- Approximate Location of Former Slip 5

Sample Location	
VC (Vinyl Chloride)	Result µg/L
1,1-DCE (1,1-Dichloroethene)	
cis-1,2-DCE (cis-1,2-Dichloroethene)	
TCE (Trichloroethene)	
PCE (Tetrachloroethene)	

ND = Not Detected.

0 80 160

Scale in Feet

Data Source: Bing Aerial Image, King County Parcel Data

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

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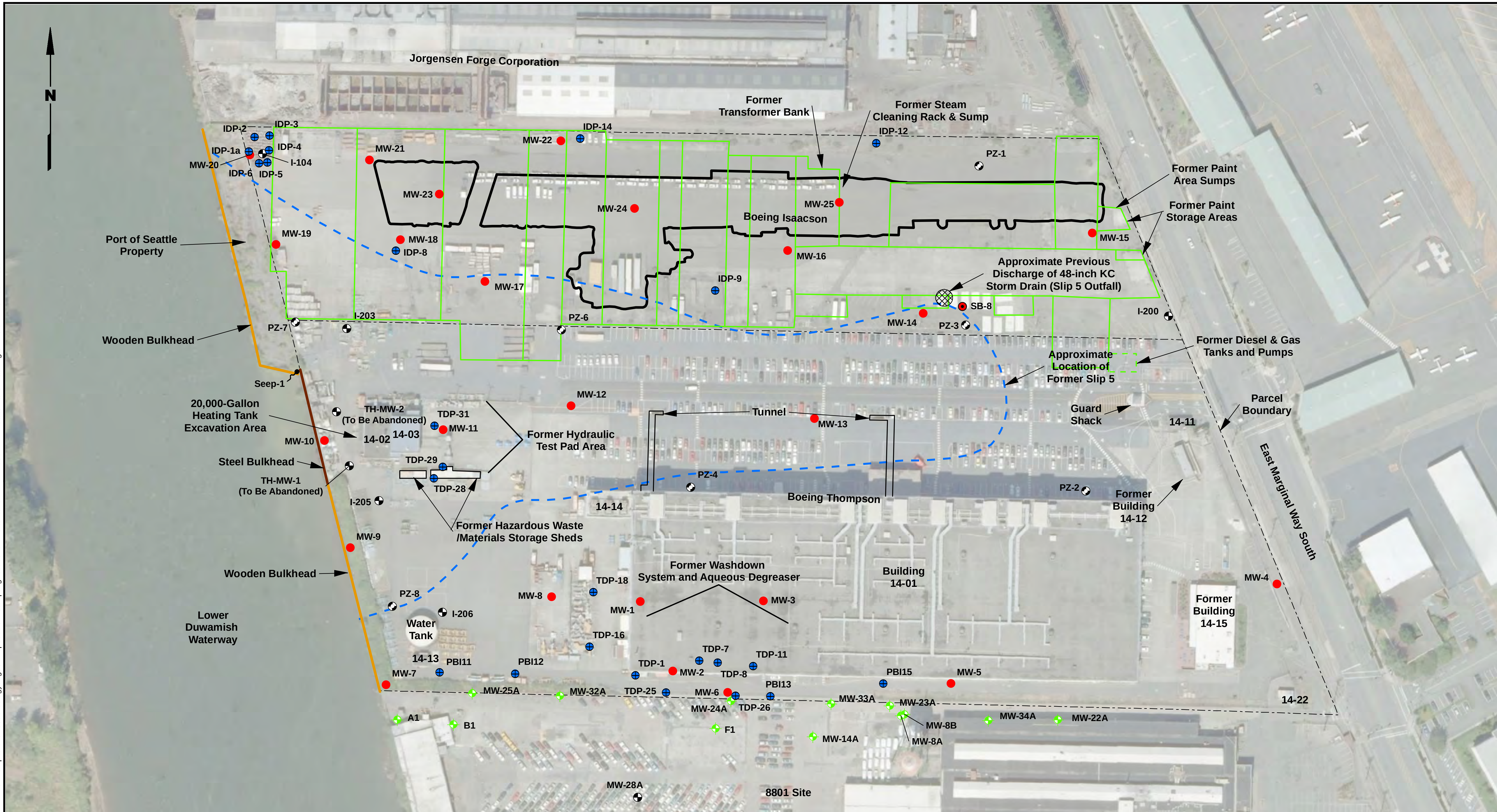
Boeing Isaacson-Thompson Site
Tukwila, Washington

Boeing Thompson/8801 Site Boundary Groundwater VOC Analytical Results

Figure 32



Legend

- Proposed Monitoring Well Location
- Proposed Groundwater Grab Sample Location
- Seep
- Existing Monitoring Well Location
- Existing Piezometer Location
- Previous Direct Push Groundwater Sample Location
- PACCAR Groundwater Sampling Location
- Approximate Location of Former Slip 5
- Current Extent of Stabilized Soil Material
- Former Isaacson Building (Building 14-05)

0 150 300

Scale in Feet

Data Source: Bing Aerial Image; King County Parcel Data

Note
1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

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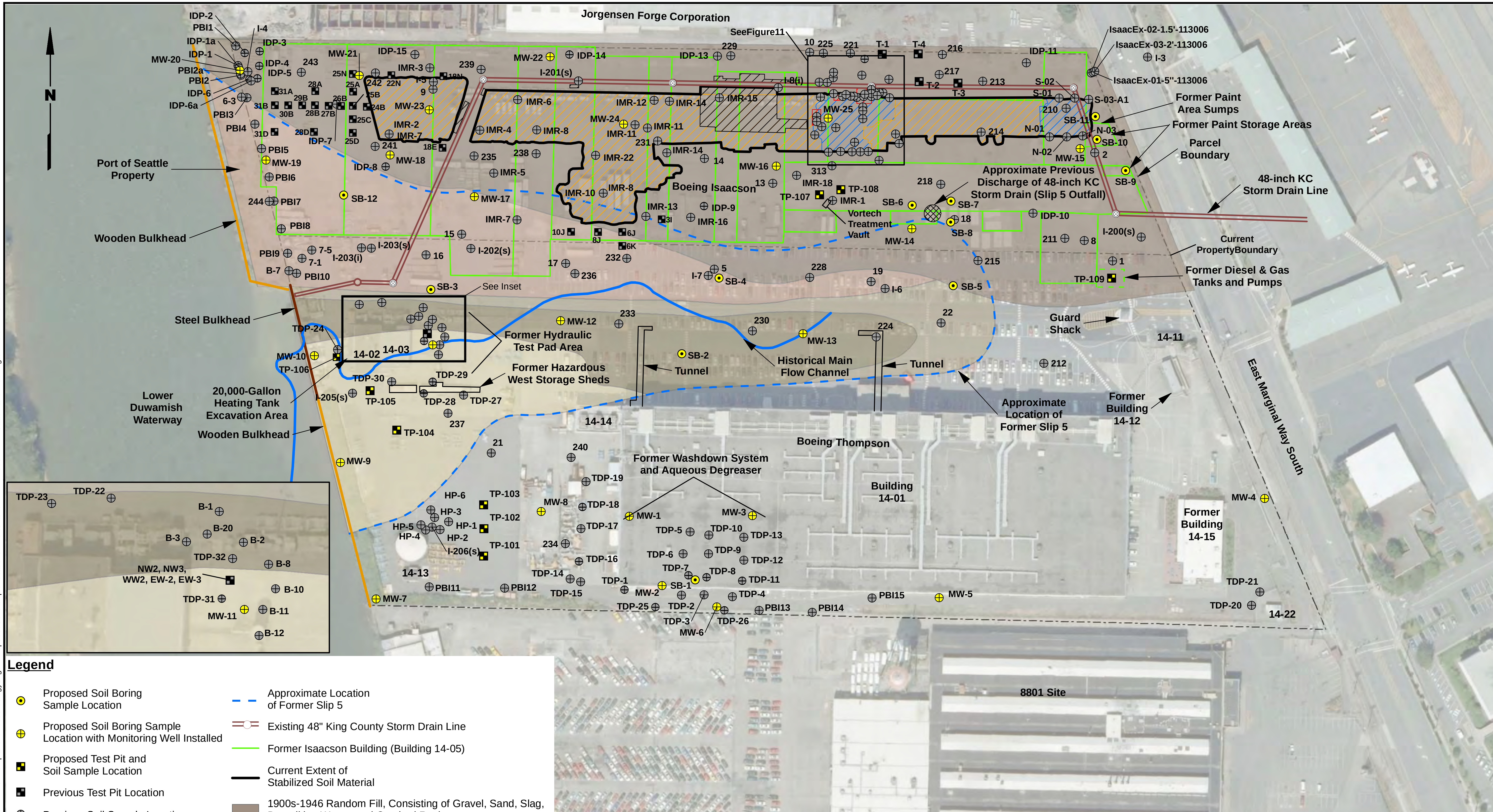
Boeing Isaacson-Thompson Site
Tukwila, Washington

Proposed Groundwater Sample and Monitoring Locations

Figure 33

Y:\Projects\025190\MapDocs\I-T RIFS Workplan\Revised\Ecology\Fig33-ProposedGWSamplingLocations.mxd 9/16/2011 NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet



Legend

- Proposed Soil Boring Sample Location
- Proposed Soil Boring Sample Location with Monitoring Well Installed
- Proposed Test Pit and Soil Sample Location
- Previous Test Pit Location
- Previous Soil Sample Location
- 1983 Excavation
- 1989 Excavation
- 1990 Excavation
- 1991 Excavation
- Approximate Location of Former Slip 5
- Existing 48" King County Storm Drain Line
- Former Isaacson Building (Building 14-05)
- Current Extent of Stabilized Soil Material
- 1900s-1946 Random Fill, Consisting of Gravel, Sand, Slag, Demolition Waste, and Crushed Rocks
- 1946-1960 Random Fill
- 1946-1960 Some Random Fill Along with Fill From Off-Site Sources
- 1960-1965 Slag, Construction and Demolition Debris, and Imported Soil
- 1965-1966 Imported Construction - Quality Sand Fill Material

0 150 300

Scale in Feet

Data Source: Bing Aerial Image; King County Parcel Data

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Landau Associates

Boeing Isaacson-Thompson Site
Tukwila, Washington

Proposed Soil Sample Locations

Figure 34

Y:\Projects\025190\MapDocs\I-T RIFS Workplan\Revised\Ecology\Fig34-ProposedSoilSampleLocations.mxd 9/16/2011 NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet

Proposed Sampling Locations

Previous Surface Locations

Previous Sediment Core Locations

N

0 100 200 Feet

Proposed Sediment Sampling Locations

Boeing Isaacson–Thompson Site
Tukwila, Washington

By: rhg	Date: 5/11/2011	Project No. LY11160060

AMEC Geomatrix

Figure **35**

File path: P:\Boeing IT\LY11160060 Isaacson-Thompson 2011\Data\Historic and new sample locations\Figure 35Ver2.mxd

TABLE 1
PREVIOUS SURFACE SEDIMENT SAMPLE ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

		Location	AN-029	AN-030	AN-045	AN-046	AN-046	AN-047	DR188	DR220	EIT060
		Sample ID	AN029-SS-061025	AN030-SS-061025	AN045-SS-080211	AN046-SS-080211	AN096-SS-080211	AN047-SS-080211	SD-DR188-0000	SD-DR220-0000	EIT06-01
		Sample Date	10/25/06	10/25/06	02/11/08	02/11/08	02/11/08	02/11/08	08/25/98	08/25/98	09/26/97
		Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33
	Sediment Management Standards										
	SQS	CSL									
Conventionals (% dw)											
Total Organic Carbon			1.51	1.88	1.5	3.16	2.28	2.65	1.75	2.76	0.88
Metals (mg/Kg dw)											
Arsenic	57	93	11.3	8.9	8.2	25.5	40.6	15	12.5	15.3	
Cadmium	5.1	6.7	0.5	0.4 U	0.4	2.9	3.6	2.4	0.29	0.38	
Chromium	260	270	33.7	26	27.1 J	240 J	165 J	178 J	25	28	
Copper	390	390	54.8	42	35.3 J	228 J	268 J	87.6 J	37	47	
Lead	450	530	128	28	152 J	2930 J	21700 J	370 J	20.7	22.3	
Mercury	0.41	0.59	6.8	0.13	0.06 U	0.14	0.19	0.29	0.13	0.14	
Silver	6.1	6.1	0.7	0.4 U	0.3 U	1.2	2.8	2	0.19	0.3	
Zinc	410	960	154 J	96 J	75	950	1050	280	81	98	
Nonionizable Organic Compounds (mg/Kg OC)											
Aromatic Hydrocarbons											
Total LPAHs	370	780	17 J	6.65	1.6 J	9.8 J	9.6 J	6.8 J	9.1	4.7	
Naphthalene	99	170	1 U	1 U	1.3 UJ	0.63 UJ	0.88 UJ	3.7 UJ	1.1 U	0.72 U	
Acenaphthylene	66	66	1 U	1 U	1.3 UJ	0.63 UJ	0.88 UJ	3.7 UJ	1.1 U	0.72 U	
Acenaphthene	16	57	0.7 J	1 U	1.3 U	0.38 J	0.88 UJ	3.7 U	1.1 U	0.72 U	
Fluorene	23	79	0.93 J	1 U	1.3 U	0.51 J	0.48 J	3.7 U	1.1 U	0.72 U	
Phenanthrene	100	480	13	5.3	1.6 J	7.6 J	7.9 J	6.8 J	8	4	
Anthracene	220	1,200	3	1.4	1.3 UJ	1.4 J	1.3 J	3.7 UJ	1.1	0.72	
2-Methylnaphthalene	38	64	1 U	1 U	1.3 UJ	0.63 UJ	0.88 UJ	3.7 UJ	1.1 U	0.72 U	
Total HPAHs	960	5,300	140	74 J	25.5 J	75.9 J	89 J	66 J	93.1	57.2	
Fluoranthene	160	1,200	27	12	4.5	17	20	18	19	12	
Pyrene	1,000	1,400	24	13	3.1 J	12 J	14 J	16	17	9.8	
Benzo(a)anthracene	110	270	9.9	5	2 J	5.7 J	6.1 J	4.2 J	6.9	4	
Chrysene	110	460	17	8.5	3 J	8.9 J	11 J	6.4 J	10	6.5	
Total Benzofluoranthenes	230	450	28	17	6.8	18	22	12	18	12	
Benzo(a)pyrene	99	210	10	6.9	2.9	7.9	9.2	4.2	8	4.7	
Indeno(1,2,3-cd)pyrene	34	88	7.3	4.5	1.5	3.2	3.5 J	2.7 J	6.3	3.6	
Dibenzo(a,h)anthracene	12	33	3.2	0.96 J	0.45	0.7	0.79 J	0.68 U	1.7	0.72	
Benzo(g,h,i)perylene	31	78	7.3	5	1.3	2.8	3.1	2.8 J	5.7	3.6	
Chlorinated Benzenes											
1,2-Dichlorobenzene	2.3	2.3	1 U	1 U	0.41 UJ	0.6 UJ	0.27 UJ	0.68 UJ	1.1 U	0.72 U	
1,4-Dichlorobenzene	3.1	9	1 U	1 U	0.41 U	0.6 U	0.27 U	0.68 U	1.1 U	0.72 U	
1,2,4-Trichlorobenzene	0.81	1.8	1 U	1 U	0.41 U	0.6 U	0.27 U	0.68 U	1.1 U	0.72 U	
Hexachlorobenzene	0.38	2.3	1 U	1 U	0.41 U	0.6 U	0.27 U	0.68 U	1.1 U	0.72 U	
Phthalates											
Dimethyl phthalate	53	53	2.5	0.8 J	0.8 J	1.5 U	1.7 J	12 J	2.3	0.72 U	
Diethyl phthalate	61	110	1 U	1 U	1.3 UJ	0.63 UJ	0.88 UJ	3.7 UJ	1.1 U	0.72 U	
Di-n-butyl phthalate	220	1,700	6.4 U	1.7 U	6.7 J	1 J	1.2 J	11 J	1.1 U	0.72 U	
Butyl benzyl phthalate	4.9	64	5.5	1.5	2.4	1.7	3.1 J	83	3.4	1.1	
Bis(2-ethylhexyl)phthalate	47	78	38	10	2.2 UJ	7.9 J	14 J	36 J	15	14	
Di-n-octyl phthalate	58	4,500	1 U	1 U	1.3 UJ	0.63 UJ	0.66 J	3.7 UJ	1.1 U	0.72 U	

TABLE 1
PREVIOUS SURFACE SEDIMENT SAMPLE ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

		Location	AN-029	AN-030	AN-045	AN-046	AN-046	AN-047	DR188	DR220	EIT060
		Sample ID	AN029-SS-061025	AN030-SS-061025	AN045-SS-080211	AN046-SS-080211	AN096-SS-080211	AN047-SS-080211	SD-DR188-0000	SD-DR220-0000	EIT06-01
		Sample Date	10/25/06	10/25/06	02/11/08	02/11/08	02/11/08	02/11/08	08/25/98	08/25/98	09/26/97
		Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33
	Sediment Management Standards										
	SQS	CSL									
Miscellaneous											
Dibenzofuran	15	58	1 U	1 U	1.3 UJ	0.63 UJ	0.88 UJ	3.7 UJ	1.1 U	0.72 U	
Hexachlorobutadiene	3.9	6.2	1 U	1 U	0.41 U	0.6 U	0.27 U	0.68 U	1.1 U	0.72 U	
n-Nitrosodiphenylamine	11	11	1 UJ	1 UJ	0.41 UJ	0.6 UJ	0.27 UJ	0.68 UJ	2.3 U	1.4 U	
Pesticides/PCBs											
Total PCBs	12	65	15	7.18 J	8	4.18	3.9	110	5.94	2.8	19
Ionizable Organic Compounds (ug/Kg dw)											
Phenol	420	1,200	20 U	20 U	20 U	30	28	98 U	20 UJ	20 UJ	
2-Methylphenol	63	63	20 U	20 U	6.1 UJ	19 UJ	6.1 UJ	18 UJ	20 UJ	20 UJ	
4-Methylphenol	670	670	20 U	20 U	20 UJ	20 UJ	20 UJ	98 UJ	20 UJ	20 UJ	
2,4-Dimethylphenol	29	29	20 U	20 U	6.1 UJ	19 UJ	6.1 UJ	18 UJ	20 UJ	20 UJ	
Pentachlorophenol	360	690	98 U	99 U	30 UJ	93 UJ	31 UJ	92 UJ	100 UJ	100 UJ	
Benzyl alcohol	57	73	20 U	20 U	20 UJ	20 UJ	20 UJ	98 U	50 U	50 U	
Benzoic acid	650	650	200 U	200 U	200 U	200 U	200 U	790 J	200 U	200 U	

TABLE 1
PREVIOUS SURFACE SEDIMENT SAMPLE ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

	Location		EST141	EST142	EST143	EST147	EST148	EST157	EST158	EST159	EST160
	Sample ID		EST09-01	EST09-02	EST09-03	EST10-01	EST10-02	EST11-07	EST11-08	EST11-09	EST11-10
	Sample Date		09/25/97	10/24/97	09/25/97	09/25/97	11/12/97	09/24/97	09/24/97	09/24/97	09/25/97
	Depth (ft bgs)		0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33
	Sediment Management Standards SQS	CSL									
Conventionals (% dw)											
Total Organic Carbon			1.52	1.64	1.38	1.3	2.23	1.79	1.52	1.19	1.59
Metals (mg/Kg dw)											
Arsenic	57	93									
Cadmium	5.1	6.7									
Chromium	260	270									
Copper	390	390									
Lead	450	530									
Mercury	0.41	0.59									
Silver	6.1	6.1									
Zinc	410	960									
Nonionizable Organic Compounds (mg/Kg OC)											
Aromatic Hydrocarbons											
Total LPAHs	370	780									
Naphthalene	99	170									
Acenaphthylene	66	66									
Acenaphthene	16	57									
Fluorene	23	79									
Phenanthrene	100	480									
Anthracene	220	1,200									
2-Methylnaphthalene	38	64									
Total HPAHs	960	5,300									
Fluoranthene	160	1,200									
Pyrene	1,000	1,400									
Benzo(a)anthracene	110	270									
Chrysene	110	460									
Total Benzofluoranthenes	230	450									
Benzo(a)pyrene	99	210									
Indeno(1,2,3-cd)pyrene	34	88									
Dibenzo(a,h)anthracene	12	33									
Benzo(g,h,i)perylene	31	78									
Chlorinated Benzenes											
1,2-Dichlorobenzene	2.3	2.3									
1,4-Dichlorobenzene	3.1	9									
1,2,4-Trichlorobenzene	0.81	1.8									
Hexachlorobenzene	0.38	2.3									
Phthalates											
Dimethyl phthalate	53	53									
Diethyl phthalate	61	110									
Di-n-butyl phthalate	220	1,700									
Butyl benzyl phthalate	4.9	64									
Bis(2-ethylhexyl)phthalate	47	78									
Di-n-octyl phthalate	58	4,500									

TABLE 1
PREVIOUS SURFACE SEDIMENT SAMPLE ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

		Location	EST141	EST142	EST143	EST147	EST148	EST157	EST158	EST159	EST160
		Sample ID	EST09-01	EST09-02	EST09-03	EST10-01	EST10-02	EST11-07	EST11-08	EST11-09	EST11-10
		Sample Date	09/25/97	10/24/97	09/25/97	09/25/97	11/12/97	09/24/97	09/24/97	09/24/97	09/25/97
		Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33
	Sediment Management Standards										
	SQS	CSL									
Miscellaneous											
Dibenzofuran	15	58									
Hexachlorobutadiene	3.9	6.2									
n-Nitrosodiphenylamine	11	11									
Pesticides/PCBs											
Total PCBs	12	65	7.2	5.3 J	28	53 J	30 J	2.3 J	4.9 J	6.6 J	2 J
Ionizable Organic Compounds (ug/Kg dw)											
Phenol	420	1,200									
2-Methylphenol	63	63									
4-Methylphenol	670	670									
2,4-Dimethylphenol	29	29									
Pentachlorophenol	360	690									
Benzyl alcohol	57	73									
Benzoic acid	650	650									

TABLE 1
PREVIOUS SURFACE SEDIMENT SAMPLE ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

		Location	EST161	EST162	LDW-SS112	LDW-SS114	LDW-SS115	LDW-SS116	LDW-SS118	LDW-SS119
		Sample ID	EST11-11	EST11-12	LDW-SS112-010	LDW-SS114-010	LDW-SS115-010	LDW-SS116-010	LDW-SS118-010	LDW-SS119-010
		Sample Date	11/13/97	09/25/97	01/19/05	01/20/05	01/25/05	01/20/05	01/20/05	01/19/05
		Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33
	Sediment Management Standards SQS	CSL								
Conventionals (% dw)										
Total Organic Carbon			0.85	1.46	1.82	1.53	1.92	1.34	1.84	1.5
Metals (mg/Kg dw)										
Arsenic	57	93			481	1100	44.4	9.6	13	10.9
Cadmium	5.1	6.7			0.7	1.6 J	1.1	0.3 UJ	0.4	0.6
Chromium	260	270			62.4	72.8 J	55	26.2 J	29	37.6
Copper	390	390			77.7	58.5	99.7	38.5	47.4	46.8
Lead	450	530			82	110	98	30	28	71
Mercury	0.41	0.59			0.08 U	0.12	0.07	0.07	0.12	0.16
Silver	6.1	6.1			0.5	0.8	1	0.5 UJ	0.6	0.7
Zinc	410	960			206	230	343	92.8	103	115
Nonionizable Organic Compounds (mg/Kg OC)										
Aromatic Hydrocarbons										
Total LPAHs	370	780			77	140	160 J	25 J	7.6	11
Naphthalene	99	170			5.4 U	8.5 U	10 U	7.4 U	5.4 U	6.4 U
Acenaphthylene	66	66			5.4 U	8.5 U	10 U	7.4 U	5.4 U	6.4 U
Acenaphthene	16	57			5.4 U	9.2	7.8 J	7.4 U	5.4 U	6.4 U
Fluorene	23	79			5.4 U	8.5	9.4 J	7.4 U	5.4 U	6.4 U
Phenanthrene	100	480			66	100	130	21	7.6	11
Anthracene	220	1,200			11	16	20	3.8 J	5.4 U	6.4 U
2-Methylnaphthalene	38	64			5.4 U	8.5 U	10 U	7.4 U	5.4 U	6.4 U
Total HPAHs	960	5,300			681	882 J	990	320 J	100 J	135
Fluoranthene	160	1,200			190	200	270	75	27	34
Pyrene	1,000	1,400			110	160	170	58 J	20	25
Benzo(a)anthracene	110	270			51	72	78	23	7.1	11
Chrysene	110	460			88	120	130	49	15	23
Total Benzofluoranthenes	230	450			140	160	190	69	18	26
Benzo(a)pyrene	99	210			60	85	89	29	7.6	12
Indeno(1,2,3-cd)pyrene	34	88			23	37	31	11	2.5	4.2
Dibenzo(a,h)anthracene	12	33			5.4 U	5.6 J	13	7.4 U	5.4 U	6.4 U
Benzo(g,h,i)perylene	31	78			20	30	26	9	3.9 J	6.4 U
Chlorinated Benzenes										
1,2-Dichlorobenzene	2.3	2.3			5.4 U	8.5 U	10 U	0.49 U	0.36 U	0.44 U
1,4-Dichlorobenzene	3.1	9			5.4 U	8.5 U	10 U	0.49 U	0.36 U	0.44 U
1,2,4-Trichlorobenzene	0.81	1.8			5.4 U	8.5 U	10 U	0.49 U	0.36 U	0.44 U
Hexachlorobenzene	0.38	2.3			5.4 U	8.5 U	0.051 U	0.073 U	0.36 U	0.44 U
Phthalates										
Dimethyl phthalate	53	53			5.4 U	8.5 U	10 U	0.64	0.4	2.5
Diethyl phthalate	61	110			6	8.5 U	10 U	0.54 U	0.47	7.3
Di-n-butyl phthalate	220	1,700			5.4 U	5.4 J	10 U	7.4 U	5.4 U	6.4 U
Butyl benzyl phthalate	4.9	64			12	8.5 U	10 U	4.7 J	1.4	9.3
Bis(2-ethylhexyl)phthalate	47	78			18	78	17	18	13	19
Di-n-octyl phthalate	58	4,500			5.4 U	8.5 U	10 U	7.4 U	5.4 U	6.4 U

TABLE 1
PREVIOUS SURFACE SEDIMENT SAMPLE ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

		Location	EST161	EST162	LDW-SS112	LDW-SS114	LDW-SS115	LDW-SS116	LDW-SS118	LDW-SS119
		Sample ID	EST11-11	EST11-12	LDW-SS112-010	LDW-SS114-010	LDW-SS115-010	LDW-SS116-010	LDW-SS118-010	LDW-SS119-010
		Sample Date	11/13/97	09/25/97	01/19/05	01/20/05	01/25/05	01/20/05	01/20/05	01/19/05
		Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33
	Sediment Management Standards SQS	CSL								
Miscellaneous										
Dibenzofuran	15	58			5.4 U	8.5 U	10 U	7.4 U	5.4 U	6.4 U
Hexachlorobutadiene	3.9	6.2			5.4 U	8.5 U	0.051 U	0.073 U	0.36 U	0.44 U
n-Nitrosodiphenylamine	11	11			5.4 U	8.5 U	10 U	0.49 U	0.36 U	0.44 U
Pesticides/PCBs										
Total PCBs	12	65	19	16	26	54	11	8.81 J	1.3	59 J
Ionizable Organic Compounds (ug/Kg dw)										
Phenol	420	1,200			98 U	130 U	200 U	99 U	99 U	96 U
2-Methylphenol	63	63			98 U	130 U	200 U	6.6 U	6.6 U	6.6 U
4-Methylphenol	670	670			98 U	130 U	200 U	99 U	99 U	96 U
2,4-Dimethylphenol	29	29			98 U	130 U	200 U	6.6 U	6.6 U	6.6 U
Pentachlorophenol	360	690			490 U	640 U	980 U	33 UJ	33 U	33 U
Benzyl alcohol	57	73			98 U	130 U	200 U	33 U	33 U	33 U
Benzoic acid	650	650			980 U	1300 U	2000 U	66 U	84	130 U

TABLE 1
PREVIOUS SURFACE SEDIMENT SAMPLE ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

	Sediment Management Standards SQS	Sediment Management Standards CSL	LDW-SS157	LDW-SS158	LDW-SS159	LDW-SS338	R22SD	R23SD	R26SD	R27SD	R31SD
Location / Sample ID			LDW-SS157-010	LDW-SS158-010	LDW-SS159-010	LDW-SS338-010	SD0001	SD0020	SD0002	SD0022	SD0003
Sample Date			03/16/05	03/16/05	03/16/05	10/03/06	10/08/97	10/11/97	10/09/97	10/11/97	10/09/97
Depth (ft bgs)			0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33
Conventionals (% dw)											
Total Organic Carbon			3.1	1.96	2.78	1.99	1.4	1.7	1.1	1.5	1.2
Metals (mg/Kg dw)											
Arsenic	57	93	21.1	20.5	10	8.7	79.4	36.2	15.8	14.1	26.7
Cadmium	5.1	6.7	1.6	0.7	0.4	0.4 U	1.4 J	1.7 J	0.4 UJ	0.4 UJ	0.5 J
Chromium	260	270	69	174	29.3	26	76 J	53 J	28 J	31 J	36 J
Copper	390	390	74.7 J	52.1 J	37 J	43	53	56	40	40	53
Lead	450	530	148	51	36	22	78	221	28	31	94
Mercury	0.41	0.59	0.12 J	0.1 J	0.1 J	0.13	0.11	0.1	0.1	0.17	0.1
Silver	6.1	6.1	2	0.6	0.5 U	0.4 U	1.8	2.3	0.7	0.4 UJ	0.4 U
Zinc	410	960	248	151	99	95	293	188	91	93	128
Nonionizable Organic Compounds (mg/Kg OC)											
Aromatic Hydrocarbons											
Total LPAHs	370	780	61 J	19	25 J	2.7 J	290	510	37	32	50
Naphthalene	99	170	1.3 J	3 U	2.1 U	3.1 U	3.1	5.9	1.8 U	1.3 U	1.6 U
Acenaphthylene	66	66	1.1 J	3 U	2.1 U	3.1 U	1.4 U	1.3	1.8 U	1.3 U	1.6 U
Acenaphthene	16	57	2.8	3 U	2.1 U	3.1 U	15	23	1.8 U	2	1.7
Fluorene	23	79	3.2	3 U	1.4 J	3.1 U	19	29	2.3	2.3	2.8
Phenanthrene	100	480	45	16	21	2.7 J	210	390	30	24	33
Anthracene	220	1,200	8.7	3.2	3.2	3.1 U	45	59	4.7	3.7	13
2-Methylnaphthalene	38	64	1.9 U	3 U	2.1 U	3.1 U	2.6	6.5	1.8 U	1.3 U	1.6 U
Total HPAHs	960	5,300	458	116 J	250	47 J	1800	3000	300	210	330
Fluoranthene	160	1,200	110	31	76	8.5	400	650	54	36	48
Pyrene	1,000	1,400	71	26	58	8	340	560	60	43	69
Benzo(a)anthracene	110	270	35	2.7	15	4.1	150	230	21	15	25
Chrysene	110	460	48	16	28	6	200	310	34	23	40
Total Benzofluoranthenes	230	450	110	19	48.2	10	330	520	58	38	64
Benzo(a)pyrene	99	210	42	3	13	4	170	260	26	17	30
Indeno(1,2,3-cd)pyrene	34	88	22	8.7	6.5	2.6 J	110	190	18	15	21
Dibenzo(a,h)anthracene	12	33	2.5	2.8 J	2.1 U	0.4	36	71	7.5	6.3	8.3
Benzo(g,h,i)perylene	31	78	16	7.1	4.3	2.9 J	100	180	17	14	23
Chlorinated Benzenes											
1,2-Dichlorobenzene	2.3	2.3	0.21 U	0.33 U	0.24 U	0.31 U	1.4 U	1.2 U	1.8 U	1.3 U	1.6 U
1,4-Dichlorobenzene	3.1	9	0.21 U	0.33 U	0.24 U	0.31 U	1.4 UJ	1.2 UJ	1.8 UJ	1.3 UJ	1.6 UJ
1,2,4-Trichlorobenzene	0.81	1.8	0.21 U	0.33 U	0.24 U	0.31 U	1.4 U	1.2 U	1.8 U	1.3 U	1.6 U
Hexachlorobenzene	0.38	2.3	0.21 U	0.33 U	0.24 U	0.31 U	0.071 U	0.076	0.11	0.067 U	0.1
Phthalates											
Dimethyl phthalate	53	53	0.21 U	0.33 U	1.1	0.47	1.9	12	2.3	1.3 U	8.1
Diethyl phthalate	61	110	0.25 U	0.33 U	0.24 U	3.1 U	1.4 U	1.2 U	1.8 U	1.3 U	1.6 U
Di-n-butyl phthalate	220	1,700	2.9	3 U	2.1 U	1.6 J	1.5	2.5	5.8	1.3 U	2.6
Butyl benzyl phthalate	4.9	64	6.5	4	0.86	0.85	10 UJ	12	10 J	6.1 J	18
Bis(2-ethylhexyl)phthalate	47	78	39	26	6.8	9	49	82	34	19	60
Di-n-octyl phthalate	58	4,500	1.9 U	3 U	2.1 U	3.1 U	1.4 U	1.2 U	1.8 U	1.3 U	4.3 J

TABLE 1
PREVIOUS SURFACE SEDIMENT SAMPLE ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

		Location	LDW-SS157	LDW-SS158	LDW-SS159	LDW-SS338	R22SD	R23SD	R26SD	R27SD	R31SD
		Sample ID	LDW-SS157-010	LDW-SS158-010	LDW-SS159-010	LDW-SS338-010	SD0001	SD0020	SD0002	SD0022	SD0003
		Sample Date	03/16/05	03/16/05	03/16/05	10/03/06	10/08/97	10/11/97	10/09/97	10/11/97	10/09/97
		Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33
	Sediment Management Standards SQS	Sediment Management Standards CSL									
Miscellaneous											
Dibenzofuran	15	58	1.9	3 U	2.1 U	3.1 U	10	18	1.8 U	1.5	2
Hexachlorobutadiene	3.9	6.2	0.21 U	0.33 U	0.24 U	0.31 U	1.4 U	1.2 U	1.8 U	1.3 U	1.6 U
n-Nitrosodiphenylamine	11	11	0.23	0.33 U	0.29	0.31 U	1.4 U	1.2 U	1.8 U	1.3 U	1.6 U
Pesticides/PCBs											
Total PCBs	12	65	8.4	20 J	6.22	4.4	13	51	15	23	9.9 J
Ionizable Organic Compounds (ug/Kg dw)											
Phenol	420	1,200	110	59 U	58 U	62 U	40	64	48	19 U	19 UJ
2-Methylphenol	63	63	6.4 U	6.4 U	6.6 U	6.2 U	20 UJ	20 U	20 UJ	19 U	19 UJ
4-Methylphenol	670	670	58 U	59 U	58 U	62 U	20 UJ	51	47	19 U	19 UJ
2,4-Dimethylphenol	29	29	6.4 U	6.4 U	6.6 U	6.2 U	20 UJ	20 U	20 UJ	19 U	19 UJ
Pentachlorophenol	360	690	32 U	32 U	33 U	31 U					
Benzyl alcohol	57	73	32 U	32 U	33 U	31 UJ	27 J	20 UJ	20 UJ	19 UJ	19 UJ
Benzoic acid	650	650	770	64 U	66 U	620 U	200 UJ	200 UJ	200 UJ	190 UJ	190 UJ

TABLE 1
PREVIOUS SURFACE SEDIMENT SAMPLE ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

	Location Sample ID Sample Date Depth (ft bgs)		SD-216 SD-216-0000 08/26/04 0 to 0.33	SD-217 SD-217-0000 08/27/04 0 to 0.33	SD-315 SD-315-0000 08/17/04 0 to 0.33	SD-336 SD-336-0000 08/27/04 0 to 0.33	SD-345 SD-345-0000 08/26/04 0 to 0.33
	Sediment Management Standards SQS	CSL					
Conventionals (% dw)							
Total Organic Carbon			2.02	1.84	1.57	1.55	1.24
Metals (mg/Kg dw)							
Arsenic	57	93			12		
Cadmium	5.1	6.7			0.54		
Chromium	260	270			77.7		
Copper	390	390			68.8		
Lead	450	530			67.6		
Mercury	0.41	0.59			0.09 J		
Silver	6.1	6.1			0.99 U		
Zinc	410	960			133		
Nonionizable Organic Compounds (mg/Kg OC)							
Aromatic Hydrocarbons							
Total LPAHs	370	780			59		
Naphthalene	99	170			1 U		
Acenaphthylene	66	66			1.5		
Acenaphthene	16	57			2.8		
Fluorene	23	79			3.2		
Phenanthrene	100	480			43		
Anthracene	220	1,200			8.3		
2-Methylnaphthalene	38	64			1 U		
Total HPAHs	960	5,300			600		
Fluoranthene	160	1,200			150		
Pyrene	1,000	1,400			110		
Benzo(a)anthracene	110	270			42		
Chrysene	110	460			61		
Total Benzofluoranthenes	230	450			130		
Benzo(a)pyrene	99	210			50		
Indeno(1,2,3-cd)pyrene	34	88			25		
Dibenzo(a,h)anthracene	12	33			9.6		
Benzo(g,h,i)perylene	31	78			20		
Chlorinated Benzenes							
1,2-Dichlorobenzene	2.3	2.3			1 U		
1,4-Dichlorobenzene	3.1	9			1 U		
1,2,4-Trichlorobenzene	0.81	1.8			1 U		
Hexachlorobenzene	0.38	2.3			1 U		
Phthalates							
Dimethyl phthalate	53	53			2.2		
Diethyl phthalate	61	110			1 U		
Di-n-butyl phthalate	220	1,700			1 U		
Butyl benzyl phthalate	4.9	64			8.9		
Bis(2-ethylhexyl)phthalate	47	78			39		
Di-n-octyl phthalate	58	4,500			1 U		

TABLE 1
PREVIOUS SURFACE SEDIMENT SAMPLE ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

	Sediment Management Standards SQS	CSL	SD-216	SD-217	SD-315	SD-336	SD-345
Sample ID			SD-216-0000	SD-217-0000	SD-315-0000	SD-336-0000	SD-345-0000
Sample Date			08/26/04	08/27/04	08/17/04	08/27/04	08/26/04
Depth (ft bgs)			0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33
Miscellaneous							
Dibenzofuran	15	58			2		
Hexachlorobutadiene	3.9	6.2			1 U		
n-Nitrosodiphenylamine	11	11			1 U		
Pesticides/PCBs							
Total PCBs	12	65	18 J	15.9 J	17 J	16 J	14.7 J
Ionizable Organic Compounds (ug/Kg dw)							
Phenol	420	1,200			28		
2-Methylphenol	63	63			20 U		
4-Methylphenol	670	670			20 U		
2,4-Dimethylphenol	29	29			20 U		
Pentachlorophenol	360	690			100 U		
Benzyl alcohol	57	73			20 U		
Benzoic acid	650	650			200 U		

Notes:

1. Data qualifiers are as follows.
   J = Analyte was positively identified and detected; however, concentration is an estimated value because the result is less than the quantitation limit or quality control criteria were not met.
   U = Analyte not detected at quantitation limit indicated.
   UJ = Analyte not detected at the indicated quantitation limit, which is estimated.
2. ***Cell shading*** indicates a value that exceeds the Sediment Management Standards (SMS).
   Value exceeds the SMS Sediment Quality Standard
   Value exceeds the SMS Cleanup Screening Level
3. Organic carbon normalization is performed on samples with TOC between 0.5% and 4%.

Abbreviations:

CSL = Cleanup Screening Level
mg/kg = milligrams per kilogram
OC = organic carbon
PCBs = polychlorinated biphenyls
SQS = Sediment Quality Standard
TOC = total organic carbon
µg/kg = micrograms per kilogram
dw = dry weight
ft bgs = feet below ground or sediment surface

TABLE 2
PREVIOUS SEDIMENT CORE SAMPLE ANALYTICAL RESULTS-ORGANIC CARBON NORMALIZED
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

		Location	AN-043	AN-043	AN-043	AN-044	AN-044	AN-044	AN-044	DR220	DR220	DU9120XX	LDW-SC50a
		Sample ID	AN043-SC-080211-A	AN043-SC-080211-B	AN043-SC-080211-C	AN044-SC-080211-A	AN044-SC-080211-B	AN044-SC-080211-C	AN094-SC-080211-B	SD-DR220-0000A	SD-DR220-0020	DUWO&M91S012	LDW-SC50-0-1
		Sample Date	2/11/2008	2/11/2008	2/11/2008	2/11/2008	2/11/2008	2/11/2008	2/12/2008	9/23/1998	9/23/1998	8/6/1991	2/24/2006
		Depth (ft bgs)	0 to 1	1 to 2	2 to 3	0 to 1	1 to 2	2 to 3.5	1 to 2	0 to 2	2 to 4	0 to 3	0 to 1
	Sediment Management Standards SQS	CSL											
Conventionals (% dw)													
Total Organic Carbon			1.06	2.86	3.03	2.30	2.79	1.05	2.17	2.42	2.37	1.5	0.63
Metals (mg/Kg dw)													
Arsenic	57	93	7.2	10.9	10.2	14.3	23.2	4.3	21.6	10	10	9.8	707
Cadmium	5.1	6.7	0.6	16.9	0.4	1.6	1.5	0.3 U	1.6	0.35	0.48	0.46	0.3 U
Chromium	260	270	30 J	514 J	19 J	67.9	37.4	13.1	40.4	30	28		28.5
Copper	390	390	36 J	0.8 J	0.6 J	68.8	46.9	18.3	51.5	47	46	47	36.1
Lead	450	530	1 J	2530 J	1 J	161	52	7	63	25	33	23	47
Mercury	0.41	0.59	0.09	1.51	0.09	0.34	0.24	0.06	0.27	0.2 J	0.2 J	0.1	0.2
Silver	6.1	6.1	0.3 U	2.3	0.8	1.4 J	1.7 J	0.3 UJ	1.8 J	0.22	0.41	0.43	0.4 U
Zinc	410	960	112	1250	54	167	100	37	108	100	110	130	161
Nonionizable Organic Compounds (mg/Kg OC)													
Aromatic Hydrocarbons													
Total LPAHs	370	780	19 J	26 J	3.4 J	4.65 J	2 J	1.9 J	5.39 J	2.5	8.9	19	95 J
Naphthalene	99	170	1.9 J	3.5 J	0.66 J	0.43 J	0.43 J		1.1 J	0.83 U	0.84 U	1.9 U	9.5 U
Acenaphthylene	66	66		3.5 UJ	0.66 J				0.55 J	0.83 U	0.84 U	1.9 U	9.5 U
Acenaphthene	16	57	1.9 J	11	0.4 J					0.83 U	0.84 U	1.9 U	6.5 J
Fluorene	23	79	1.3 J	4.2	0.46 J	0.43 J			0.55 J	0.83 U	0.84 U	1.9 U	6.5 J
Phenanthrene	100	480	11 J	3.5 J	0.66 J	2.6	1.2	1.9 J	2.3	2.5	7.6	9.3	67
Anthracene	220	1,200	2.6 J	3.5 J	0.56 J	1.2	0.36 J		0.92 J	0.83 U	1.3	1.9 U	16
2-Methylnaphthalene	38	64	1 J	3.5 J	0.33 J	0.57 J			0.6 J	0.83 U	0.84 U	1.9 U	8.9 J
Total HPAHs	960	5,300	92 J	381 J	11 J	40	11.1 J	4.3	19 J	33	89	200	450
Fluoranthene	160	1,200	29	160	4.3	11	3.2	2.4	5.5	5.8	15	17	120
Pyrene	1,000	1,400	1.9 J	98	2.8	8.3	2.5	1.9	4.4	7	19	25	79
Benzo(a)anthracene	110	270	1.9 J	3.5 J	0.66 J	3.1	0.82 J		0.92 J	2.5	7.2	8	44
Chrysene	110	460	12 J	49 J	0.92 J	4.3	1.1		1.9	3.7	9.7	11	52
Total Benzofluoranthenes	230	450	26	42.3	1.6 J	7.83	1.7		3.1	6.6	17	19	78
Benzo(a)pyrene	99	210	10	18	0.66 J	3	0.72 J		1.3	2.9	8	8.7	41
Indeno(1,2,3-cd)pyrene	34	88	3.9	4.2		1.2	0.5 J		0.92 J	2.5	7.2	5.5	16
Dibenzo(a,h)anthracene	12	33	1.9 J	1.4						0.83 U	1.7	1.9 U	9.5 U
Benzo(g,h,i)perylene	31	78	3.2	3.8		1.2	0.61 J		1.2	2.1	5.5	4.9	12
Chlorinated Benzenes													
1,2-Dichlorobenzene	2.3	2.3								0.83 U	0.84 U	0.27 U	0.95 U
1,4-Dichlorobenzene	3.1	9								0.83 U	0.84 U	0.27 U	0.95 U
1,2,4-Trichlorobenzene	0.81	1.8								0.83 U	0.84 U	0.56 U	0.57 J
Hexachlorobenzene	0.38	2.3								0.83 U	0.84 U	1.1 U	0.95 U
Phthalates													
Dimethyl phthalate	53	53	2.3		0.53 U	2.1			0.74 U	0.83 U	1.3	1.9 U	9.5 U
Diethyl phthalate	61	110		3.5 UJ						0.83 U	0.84 U	1.9 U	9.5 U
Di-n-butyl phthalate	220	1,700	1.9 J	3.5 J		3.1				0.83 U	0.84	1.9 U	9.5 U
Butyl benzyl phthalate	4.9	64	5.4		0.53 U	10			0.74 U	0.83	2.1	1.9 U	3.8
Bis(2-ethylhexyl)phthalate	47	78	31 J	38 J		13	0.75		1.1	6.6	20	39	110
Di-n-octyl phthalate	58	4,500		3.5 UJ						0.83 U	0.84 U	1.9 U	9.5 U

TABLE 2
PREVIOUS SEDIMENT CORE SAMPLE ANALYTICAL RESULTS-ORGANIC CARBON NORMALIZED
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

	Sediment Management Standards SQS	Sediment Management Standards CSL	AN-043 AN043-SC-080211-A 2/11/2008 0 to 1	AN-043 AN043-SC-080211-B 2/11/2008 1 to 2	AN-043 AN043-SC-080211-C 2/11/2008 2 to 3	AN-044 AN044-SC-080211-A 2/11/2008 0 to 1	AN-044 AN044-SC-080211-B 2/11/2008 1 to 2	AN-044 AN044-SC-080211-C 2/11/2008 2 to 3.5	AN-044 AN094-SC-080211-B 2/12/2008 1 to 2	DR220 SD-DR220-0000A 9/23/1998 0 to 2	DR220 SD-DR220-0020 9/23/1998 2 to 4	DU9120XX DUWO&M91S012 8/6/1991 0 to 3	LDW-SC50a LDW-SC50-0-1 2/24/2006 0 to 1
(Location / Sample ID / Sample Date / Depth (ft bgs))													
Miscellaneous													
Dibenzofuran	15	58	1.2 J	3.4 J	0.33 J					0.83 U	0.84 U	1.9 U	9.5 U
Hexachlorobutadiene	3.9	6.2								0.83 U	0.84 U	1.9 U	0.95 UJ
n-Nitrosodiphenylamine	11	11	0.94 UJ							1.7 U	1.7 U	1.1 U	16 U
Pesticides/PCBs													
Total PCBs	12	65	25	63	1.8	130	17		17	34	9.7	6.4	81
Ionizable Organic Compounds (ug/Kg dw)													
Phenol	420	1,200		99 U		28		25	21	20 U	80	28 U	42 J
2-Methylphenol	63	63								20 U	20 U	14 U	3 J
4-Methylphenol	670	670		67 J					17 J	20 U	20 U	28 U	60 U
2,4-Dimethylphenol	29	29		54 J						20 U	20 U	14 U	6 UJ
Pentachlorophenol	360	690		93 UJ						100 UJ	100 UJ	84 U	30 U
Benzyl alcohol	57	73		99 U						50 U	50 U	17 U	30 U
Benzoic acid	650	650		990 U		130 J				200 U	200 U	140 U	330 J

TABLE 2
PREVIOUS SEDIMENT CORE SAMPLE ANALYTICAL RESULTS-ORGANIC CARBON NORMALIZED
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

	Sediment Management Standards SQS	CSL	LDW-SC50a	LDW-SC50a	LDW-SC51	LDW-SC51	LDW-SC51	LDW-SC51	LDW-SC51	LDW-SC51	SD-216
Sample ID			LDW-SC50-1-2	LDW-SC50-2-2_8	LDW-SC51-0-2	LDW-SC51-0-0_5	LDW-SC51-0_5-1	LDW-SC51-1_5-2	LDW-SC51-2-3_8	LDW-SC51-3_8-5_8	SD-216-0000
Sample Date			2/24/2006	2/24/2006	2/22/2006	2/22/2006	2/22/2006	2/22/2006	2/22/2006	2/22/2006	4/21/2004
Depth (ft bgs)			1 to 2	2 to 2.8	0 to 2	0 to 0.5	0.5 to 1	1.5 to 2	2 to 3.8	3.8 to 5.8	0 to 1
Conventionals (% dw)											
Total Organic Carbon			0.816	1.18	1.47	1.61	1.64	0.643	1.73	0.615	1.61
Metals (mg/Kg dw)											
Arsenic	57	93	281	161	25				55		
Cadmium	5.1	6.7	0.3 U	0.2 U	0.7				1		0.6
Chromium	260	270	24.3	21.6	67.4				34.8		33.3
Copper	390	390	24.4	24.9	44.5				38.2		51.8
Lead	450	530	22	11	76 J				41 J		33
Mercury	0.41	0.59	0.06 U	0.07	0.1 J				0.12 J		0.12
Silver	6.1	6.1	0.4 U	0.4 U	1.1				0.4 U		0.6 U
Zinc	410	960	124	108	203				269		108
Nonionizable Organic Compounds (mg/Kg OC)											
Aromatic Hydrocarbons											
Total LPAHs	370	780	17 J	1.7	120 J	230	82 J	35 J	37 J		
Naphthalene	99	170	7.2 U	1.7 U	3.8 J	14	3.3 J	9.6 U	3.4 U		
Acenaphthylene	66	66	7.2 U	1.7 U	4.1 U	3.8 U	3.7 U	9.6 U	3.4 U		
Acenaphthene	16	57	7.2 U	1.7 U	26	22	11	13	3.6		
Fluorene	23	79	7.2 U	1.7 U	10	20	6.7	9.6 U	3.1 J		
Phenanthrene	100	480	12	1.7	62	140	51	15	25		
Anthracene	220	1,200	5.6 J	1.7 U	14	34	9.8	6.5 J	4.7		
2-Methylnaphthalene	38	64	7.2 U	1.7 U	4.1 U	4.9	3.7 U	9.6 U	3.4 U		
Total HPAHs	960	5,300	120 J	9.7 J	430 J	1000	270	210 J	170		
Fluoranthene	160	1,200	25	3.4	140	250	73	110	47		
Pyrene	1,000	1,400	17	2.4	82	160	55	56	34		
Benzo(a)anthracene	110	270	17	1 J	37	99	25	11	16		
Chrysene	110	460	20	1.2 J	40	120	30	10	18		
Total Benzofluoranthenes	230	450	25	1.8 J	68	190	47	16 J	28		
Benzo(a)pyrene	99	210	11	1.7 U	33	99	24	6.5 J	15		
Indeno(1,2,3-cd)pyrene	34	88	4.3 J	1.7 UJ	15	43	9.8	9.6 U	6.4		
Dibenzo(a,h)anthracene	12	33	7.2 U	1.7 U	3.3 J	9.9	2.3	0.58 J	3.4 U		
Benzo(g,h,i)perylene	31	78	7.2 U	1.7 U	11	37	7.9	9.6 U	4.5		
Chlorinated Benzenes											
1,2-Dichlorobenzene	2.3	2.3	0.72 U	0.51 U	0.33 J	0.38 U	0.29 J	0.96	1.2		
1,4-Dichlorobenzene	3.1	9	0.72 U	0.51 U	0.37 J	0.38 U	0.37 U	1.4	0.64		
1,2,4-Trichlorobenzene	0.81	1.8	0.5 J	0.51 UJ	0.41 U	0.38 UJ	0.37 UJ	0.96 UJ	0.34 U		
Hexachlorobenzene	0.38	2.3	0.72 U	0.51 U	0.41 U	0.38 U	0.37 U	0.96 U	0.34 U		
Phthalates											
Dimethyl phthalate	53	53	7.2 U	1.7 U	4.1 U	3.8 U	3.7 U	9.6 U	3.4 U		
Diethyl phthalate	61	110	7.2 U	1.7 U	4.1 U	3.8 U	3.7 U	9.6 U	3.4 U		
Di-n-butyl phthalate	220	1,700	7.2 U	1.9 U	4.7 U	2.7 J	3.1 J	9.6 U	3.4 U		
Butyl benzyl phthalate	4.9	64	1.7	0.56	2.4	2.7	2.1	2.6	1.7		
Bis(2-ethylhexyl)phthalate	47	78	7.8	5.3	33	60	110	12	4.4		
Di-n-octyl phthalate	58	4,500	7.2 U	1.7 U	4.1 U	3.8 U	3.7 U	9.6 U	3.4 U		

TABLE 2
PREVIOUS SEDIMENT CORE SAMPLE ANALYTICAL RESULTS-ORGANIC CARBON NORMALIZED
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

	Sediment Management Standards SQS	CSL	LDW-SC50a LDW-SC50-1-2 2/24/2006 1 to 2	LDW-SC50a LDW-SC50-2-2_8 2/24/2006 2 to 2.8	LDW-SC51 LDW-SC51-0-2 2/22/2006 0 to 2	LDW-SC51 LDW-SC51-0-0_5 2/22/2006 0 to 0.5	LDW-SC51 LDW-SC51-0_5-1 2/22/2006 0.5 to 1	LDW-SC51 LDW-SC51-1_5-2 2/22/2006 1.5 to 2	LDW-SC51 LDW-SC51-2-3_8 2/22/2006 2 to 3.8	LDW-SC51 LDW-SC51-3_8-5_8 2/22/2006 3.8 to 5.8	SD-216 SD-216-0000 4/21/2004 0 to 1
Location / Sample ID / Sample Date / Depth (ft bgs)											
Miscellaneous											
Dibenzofuran	15	58	7.2 U	1.7 U	16	14	5.4	14	3.4 U		
Hexachlorobutadiene	3.9	6.2	0.72 U	0.51 U	0.41 U	0.38 U	0.37 U	0.96 U	0.34 U		
n-Nitrosodiphenylamine	11	11	3.7 U	1.8 U	4.6 U	0.38 U	0.37 U	0.96 U	3.9 U		
Pesticides/PCBs											
Total PCBs	12	65	96	6.4 J	88				40	0.63 U	3.9 J
Ionizable Organic Compounds (ug/Kg dw)											
Phenol	420	1,200	59 U	13 J	60 U	96 U	60 U	62 U	59 U		
2-Methylphenol	63	63	5.9 U	6 U	6 UJ	21 J	6 UJ	6.2 UJ	5.9 UJ		
4-Methylphenol	670	670	59 U	20 U	60 U	61 U	60 U	62 U	59 U		
2,4-Dimethylphenol	29	29	5.9 UJ	6 UJ	6 UJ	6.1 UJ	6 UJ	6.2 UJ	9.5 J		
Pentachlorophenol	360	690	30 U	30 U	30 U	30 U	30 U	31 U	30 U		
Benzyl alcohol	57	73	30 U	30 U	18 J	180	30 U	31 U	21 J		
Benzoic acid	650	650	130 UJ	100 UJ	90	610 U	600 U	620 U	68		

TABLE 2
PREVIOUS SEDIMENT CORE SAMPLE ANALYTICAL RESULTS-ORGANIC CARBON NORMALIZED
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

		Location	SD-216	SD-216	SD-216	SD-216	SD-216	SD-216	SD-216	SD-217	SD-217	SD-217	SD-217
		Sample ID	SD-216-0010	SD-216-0020	SD-216-0030	SD-216-0040	SD-216-0050	SD-216-0060	SD-216-0070	SD-217-0000	SD-217-0010	SD-217-0020	SD-217-0030
		Sample Date	4/21/2004	4/21/2004	4/21/2004	4/21/2004	4/21/2004	4/21/2004	4/21/2004	4/22/2004	4/22/2004	4/22/2004	4/22/2004
		Depth (ft bgs)	1 to 2	2 to 3	3 to 4	4 to 5	5 to 5.9	6 to 7	7 to 7.7	0 to 0.9	1 to 1.9	2 to 2.9	3 to 3.7
	Sediment Management Standards												
	SQS	CSL											
Conventionals (% dw)													
Total Organic Carbon			1.58	1.43	1.33	1.13	1.02	1.09	0.96	1.73	1.51	1.15	1.09
Metals (mg/Kg dw)													
Arsenic	57	93											
Cadmium	5.1	6.7	1.5							0.7	0.6		
Chromium	260	270	49.1							143 J	37.4 J		
Copper	390	390	80.8							69.5	72.4		
Lead	450	530	119							97	106		
Mercury	0.41	0.59	0.16							0.16	0.13		
Silver	6.1	6.1	1.6							1.3	1.5		
Zinc	410	960	172							150	141		
Nonionizable Organic Compounds (mg/Kg OC)													
Aromatic Hydrocarbons													
Total LPAHs	370	780											
Naphthalene	99	170											
Acenaphthylene	66	66											
Acenaphthene	16	57											
Fluorene	23	79											
Phenanthrene	100	480											
Anthracene	220	1,200											
2-Methylnaphthalene	38	64											
Total HPAHs	960	5,300											
Fluoranthene	160	1,200											
Pyrene	1,000	1,400											
Benzo(a)anthracene	110	270											
Chrysene	110	460											
Total Benzofluoranthenes	230	450											
Benzo(a)pyrene	99	210											
Indeno(1,2,3-cd)pyrene	34	88											
Dibenzo(a,h)anthracene	12	33											
Benzo(g,h,i)perylene	31	78											
Chlorinated Benzenes													
1,2-Dichlorobenzene	2.3	2.3											
1,4-Dichlorobenzene	3.1	9											
1,2,4-Trichlorobenzene	0.81	1.8											
Hexachlorobenzene	0.38	2.3											
Phthalates													
Dimethyl phthalate	53	53											
Diethyl phthalate	61	110											
Di-n-butyl phthalate	220	1,700											
Butyl benzyl phthalate	4.9	64											
Bis(2-ethylhexyl)phthalate	47	78											
Di-n-octyl phthalate	58	4,500											

TABLE 2
PREVIOUS SEDIMENT CORE SAMPLE ANALYTICAL RESULTS-ORGANIC CARBON NORMALIZED
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

	Sediment Management Standards SQS	CSL	SD-216 SD-216-0010 4/21/2004 1 to 2	SD-216 SD-216-0020 4/21/2004 2 to 3	SD-216 SD-216-0030 4/21/2004 3 to 4	SD-216 SD-216-0040 4/21/2004 4 to 5	SD-216 SD-216-0050 4/21/2004 5 to 5.9	SD-216 SD-216-0060 4/21/2004 6 to 7	SD-216 SD-216-0070 4/21/2004 7 to 7.7	SD-217 SD-217-0000 4/22/2004 0 to 0.9	SD-217 SD-217-0010 4/22/2004 1 to 1.9	SD-217 SD-217-0020 4/22/2004 2 to 2.9	SD-217 SD-217-0030 4/22/2004 3 to 3.7
Miscellaneous													
Dibenzofuran	15	58											
Hexachlorobutadiene	3.9	6.2											
n-Nitrosodiphenylamine	11	11											
Pesticides/PCBs													
Total PCBs	12	65	15	37 J	74	42	24	120	95	23	46	24	42
Ionizable Organic Compounds (ug/Kg dw)													
Phenol	420	1,200											
2-Methylphenol	63	63											
4-Methylphenol	670	670											
2,4-Dimethylphenol	29	29											
Pentachlorophenol	360	690											
Benzyl alcohol	57	73											
Benzoic acid	650	650											

Notes:
1. Data qualifiers are as follows.
   J = Analyte was positively identified and detected; however, concentration is an estimated value because the result is less than the quantitation limit or quality control criteria were not met.
   U = Analyte not detected at quantitation limit indicated.
   UJ = Analyte not detected at the indicated quantitation limit, which is estimated.
2. ***Cell shading*** indicates a value that exceeds the Sediment Management Standards (SMS).
   Value exceeds the SMS Sediment Quality Standard
   Value exceeds the SMS Cleanup Screening Level
3. Organic carbon normalization is performed on samples with TOC between 0.5% and 4%.
4. Organic carbon normalization is performed on samples with TOC between 0.5% and 4%. If TOC is less than 0.5% or greater than 4% then the result is compared to the dry weight equivalent values for the SQS and CSL (typically the Lowest Apparent Effects Threshold (LAET) and the 2nd Lowest Apparent Effects Threshold (2LAET), respectively).

Abbreviations:
CSL = Cleanup Screening Level
mg/kg = milligrams per kilogram
OC = organic carbon
PCBs = polychlorinated biphenyls
SQS = Sediment Quality Standard
TOC = total organic carbon
µg/kg = micrograms per kilogram
dw = dry weight
ft bgs = feet below ground or sediment surface
LAET=Lowest Apparent Effects Threshold

TABLE 3
PREVIOUS SEDIMENT CORE SAMPLE ANALYTICAL RESULTS- DRY WEIGHT
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

	Sediment Management Standards (dry wt equivalent) SQS	CSL	AN-043	AN-043	AN-043	AN-044	AN-044	AN-044	LDW-SC50a	LDW-SC51
Sample ID			AN043-SC-080211-D	AN043-SC-080211-E	AN043-SC-080211-F	AN044-SC-080211-D	AN044-SC-080211-E	AN044-SC-080211-F	LDW-SC50-2_8-4	LDW-SC51-1-1_5
Sample Date			2/11/08	2/11/08	2/11/08	2/11/08	2/11/08	2/11/08	2/24/06	2/22/06
Depth (ft bgs)			3 to 4	4 to 5	5 to 6	3.5 to 4.5	4.5 to 5.5	5.5 to 6.5	2.8 to 4	1 to 1.5
Conventionals (%dw)										
Total Organic Carbon			0.061	0.069	0.076	0.291	0.125	0.348	0.129	0.473
Metals (mg/Kgdw)										
Arsenic	57	93	1.2	1.2	1.3	2	2.1	1.9	21	
Cadmium	5.1	6.7	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	
Chromium	260	270	7.5 J	10.7 J	12.2 J	9.2	9.1	11.9	11.8	
Copper	390	390	0.6 J	0.5 J	0.6 J	9.9	10.1	9.3	9.4	
Lead	450	530	1 J	1 J	1 J	1	1	1	2 U	
Mercury	0.41	0.59	0.05 U	0.04 U	0.05 U	0.04 U	0.05 U	0.04 U	0.06 U	
Silver	6.1	6.1	0.2 U	0.2 U	0.2 U	0.2 UJ	0.2 UJ	0.2 UJ	0.3 U	
Zinc	410	960	21	23	24	22	23	24	47.7	
Nonionizable Organic Compounds (ug/Kgdw)										
Aromatic Hydrocarbons										
Total LPAHs	5200	5200							20 U	430 J
Naphthalene	2100	2100							20 U	62 U
Acenaphthylene	1300	1300							20 U	62 U
Acenaphthene	500	500							20 U	250
Fluorene	540	540							20 U	62 U
Phenanthrene	1500	1500							20 U	120
Anthracene	960	960							20 U	59 J
2-Methylnaphthalene	670	670							20 U	62 U
Total HPAHs	12000	17000							25 J	1570 J
Fluoranthene	1700	2500							14 J	720
Pyrene	2600	3300							11 J	400
Benzo(a)anthracene	1300	1600							20 U	130
Chrysene	1400	2800							20 U	120
Total Benzofluoranthenes	3200	3600							20 U	141 J
Benzo(a)pyrene	1600	1600							20 U	50 J
Indeno(1,2,3-cd)pyrene	600	690							20 U	62 U
Dibenzo(a,h)anthracene	230	230							20 U	4.3 J
Benzo(g,h,i)perylene	670	720							20 U	62 U

TABLE 3
PREVIOUS SEDIMENT CORE SAMPLE ANALYTICAL RESULTS- DRY WEIGHT
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

		Location	AN-043	AN-043	AN-043	AN-044	AN-044	AN-044	LDW-SC50a	LDW-SC51
		Sample ID	AN043-SC-080211-D	AN043-SC-080211-E	AN043-SC-080211-F	AN044-SC-080211-D	AN044-SC-080211-E	AN044-SC-080211-F	LDW-SC50-2_8-4	LDW-SC51-1-1_5
		Sample Date	2/11/08	2/11/08	2/11/08	2/11/08	2/11/08	2/11/08	2/24/06	2/22/06
		Depth (ft bgs)	3 to 4	4 to 5	5 to 6	3.5 to 4.5	4.5 to 5.5	5.5 to 6.5	2.8 to 4	1 to 1.5
	Sediment Management Standards (dry wt equivalent)									
	SQS	CSL								
Chlorinated Benzenes										
1,2-Dichlorobenzene	35	50						5.9 UJ	6 U	6.2 U
1,4-Dichlorobenzene	110	110							6 U	6.2 U
1,2,4-Trichlorobenzene	31	51						5.9 UJ	6 UJ	6.2 UJ
Hexachlorobenzene	22	70							6 U	6.2 U
Phthalates										
Dimethylphthalate	71	160		16 U					20 U	62 U
Diethylphthalate	200	1200							20 U	62 U
Di-n-butylphthalate	1400	5100							20 U	62 U
Butylbenzylphthalate	63	900		16 U					6 U	10
Bis(2-ethylhexyl)phthalate	1300	3100							20 U	62 U
Di-n-octylphthalate	6200	6200							20 U	62 U
Miscellaneous										
Dibenzofuran	540	540							20 U	130
Hexachlorobutadiene	11	120						5.9 UJ	6 U	6.2 U
n-Nitrosodiphenylamine	28	40						5.9 UJ	6 U	6.2 U
Pesticides/PCBs										
Total PCBs	130	1000				10 U			3.8 UJ	
Ionizable Organic Compounds (ug/Kgdw)										
Phenol	420	1200				83	20 J	170	13 J	62 U
2-Methylphenol	63	63						5.9 UJ	6 U	6.2 UJ
4-Methylphenol	670	670							20 U	62 U
2,4-Dimethylphenol	29	29						5.9 UJ	6 UJ	6.2 UJ
Pentachlorophenol	360	690							30 U	31 U
Benzyl alcohol	57	73							30 U	31 U
Benzoic acid	650	650							64 UJ	620 U

TABLE 3
PREVIOUS SEDIMENT CORE SAMPLE ANALYTICAL RESULTS- DRY WEIGHT
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

	Location		SD-217	SD-217	SD-315-C	SD-315-C	SD-315-C
	Sample ID		SD-217-0040	SD-217-0050	SD-315-0001	SD-315-0002	SD-315-0003
	Sample Date		4/22/04	4/22/04	8/19/04	8/19/04	8/19/04
	Depth (ft bgs)		4 to 4.5	5 to 5.6	1 to 2	2 to 3	3 to 4
	Sediment Management Standards (dry wt equivalent)						
	SQS	CSL					
Conventionals (%dw)							
Total Organic Carbon			0.28	0.07	0.21	0.3	0.18
Metals (mg/Kgdw)							
Arsenic	57	93			4.5 U		
Cadmium	5.1	6.7			0.5 U		
Chromium	260	270			9.96		
Copper	390	390			7.32		
Lead	450	530			2.5 U		
Mercury	0.41	0.59					
Silver	6.1	6.1			0.99 U		
Zinc	410	960			20.2		
Nonionizable Organic Compounds (ug/Kgdw)							
Aromatic Hydrocarbons							
Total LPAHs	5200	5200					
Naphthalene	2100	2100					
Acenaphthylene	1300	1300					
Acenaphthene	500	500					
Fluorene	540	540					
Phenanthrene	1500	1500					
Anthracene	960	960					
2-Methylnaphthalene	670	670					
Total HPAHs	12000	17000					
Fluoranthene	1700	2500					
Pyrene	2600	3300					
Benzo(a)anthracene	1300	1600					
Chrysene	1400	2800					
Total Benzofluoranthenes	3200	3600					
Benzo(a)pyrene	1600	1600					
Indeno(1,2,3-cd)pyrene	600	690					
Dibenzo(a,h)anthracene	230	230					
Benzo(g,h,i)perylene	670	720					

TABLE 3
PREVIOUS SEDIMENT CORE SAMPLE ANALYTICAL RESULTS- DRY WEIGHT
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

	Sediment Management Standards (dry wt equivalent) SQS	CSL	SD-217	SD-217	SD-315-C	SD-315-C	SD-315-C
Sample ID			SD-217-0040	SD-217-0050	SD-315-0001	SD-315-0002	SD-315-0003
Sample Date			4/22/04	4/22/04	8/19/04	8/19/04	8/19/04
Depth (ft bgs)			4 to 4.5	5 to 5.6	1 to 2	2 to 3	3 to 4
Chlorinated Benzenes							
1,2-Dichlorobenzene	35	50					
1,4-Dichlorobenzene	110	110					
1,2,4-Trichlorobenzene	31	51					
Hexachlorobenzene	22	70					
Phthalates							
Dimethylphthalate	71	160					
Diethylphthalate	200	1200					
Di-n-butylphthalate	1400	5100					
Butylbenzylphthalate	63	900					
Bis(2-ethylhexyl)phthalate	1300	3100					
Di-n-octylphthalate	6200	6200					
Miscellaneous							
Dibenzofuran	540	540					
Hexachlorobutadiene	11	120					
n-Nitrosodiphenylamine	28	40					
Pesticides/PCBs							
Total PCBs	130	1000	34	19 U	22.6 U	91 U	67 U
Ionizable Organic Compounds (ug/Kgdw)							
Phenol	420	1200					
2-Methylphenol	63	63					
4-Methylphenol	670	670					
2,4-Dimethylphenol	29	29					
Pentachlorophenol	360	690					
Benzyl alcohol	57	73					
Benzoic acid	650	650					

Abbreviations:
CSL = Cleanup Screening Level
mg/kg = milligrams per kilogram
OC = organic carbon
PCBs = polychlorinated biphenyls
SQS = Sediment Quality Standard
TOC = total organic carbon
µg/kg = micrograms per kilogram
dw = dry weight
ft bgs = feet below ground or sediment surface
LAET=Lowest Apparent Effects Threshold

Notes:
1. Data qualifiers are as follows.
   J = Analyte was positively identified and detected; however, concentration is an estimated value because the result is less than the quantitation limit or quality control criteria were not met.
   U = Analyte not detected at quantitation limit indicated.
   UJ = Analyte not detected at the indicated quantitation limit, which is estimated.
2. ***Cell shading*** indicates a value that exceeds the Sediment Management Standards (SMS).
   Value exceeds the SMS Sediment Quality Standard
   Value exceeds the SMS Cleanup Screening Level
3. Organic carbon normalization is performed on samples with TOC between 0.5% and 4%.
4. Organic carbon normalization is performed on samples with TOC between 0.5% and 4%. If TOC is less than 0.5% or greater than 4% then the result is compared to the dry weight equivalent values for the SQS and CSL (typically the Lowest Apparent Effects Threshold (LAET) and the 2nd Lowest Apparent Effects Threshold (2LAET), respectively).

TABLE 4
SUMMARY OF STORMWATER ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON
TUKWILA, WASHINGTON

TS-1 (Outfall B)	Previous ISGP Action Level (µg/L)	Previous ISGP Benchmark (µg/L)	Current ISGP Benchmark (01/01/2010) (µg/L)	2ND "03"	3RD "03"	4TH "03"	1ST "04"	2ND "04"	3RD "04"	4TH "04"	1ST "05"	2ND "05"	3RD "05"	4TH "05"	1ST "06"	2ND "06"	3RD "06"	4TH "06"	1ST "07"	2ND "07"	3RD "07"
POG/Sheen	30	15	No Visible Sheen	<1	<1	<1	<1	nqse	<1	<1	<1	<1	nqse	1	<1	nqse	ca	ca	ca	ca	ca
hardness				na	na	10	5.7	nqse	11	8	8	5	nqse	120	3.9	nqse	38	30	14	56	20
Copper	149	63	14	na	na	21	19	nqse	34	24	35	24	nqse	34.9	20	nqse	29.9	ca	ca	ca	ca
Lead	159	81	n/a	na	na	2.6	4	nqse	<1	<1	2	<1	nqse	3.4	<1.73	nqse	<1.41	ca	ca	ca	ca
Zinc	372	117	117	2500	600	80	75	nqse	79	67	108	66	nqse	564	60.7	nqse	436	265	251	502	330
pH	5 - 10	6 - 9	5 - 9	6.5	7.3	7	6.7	nqse	6.7	6.7	6.4	6.6	nqse	6.6	7.1	nqse	7.2	ca	ca	ca	ca
turbidity	50	25	25	7.9	7.8	6.9	12	nqse	3	7	6	3	nqse	12.8	9.9	nqse	0.77	ca	ca	ca	ca

0

TS-2 (Outfall A)				2ND "03"	3RD "03"	4TH "03"	1ST "04"	2ND "04"	3RD "04"	4TH "04"	1ST "05"	2ND "05"	3RD "05"	4TH "05"	1ST "06"	2ND "06"	3RD "06"	4TH "06"	1ST "07"	2ND "07"	3RD "07"
POG	30	15	No Visible Sheen	<1	<1	<1	<1	nqse	<1	<1	<1	<1	nqse	<1	<1	nqse	ca	ca	ca	ca	ca
hardness				na	na	17	13	nqse	25	13	13	13	nqse	19	7	nqse	43	18	12	58	16
Copper	149	63	14	na	na	21	37	nqse	15	22	23	23	nqse	17.8	15.9	nqse	ca	ca	ca	ca	ca
Lead	159	81	n/a	na	na	3.8	4	nqse	2	4	4	1	nqse	2.2	1.73	nqse	ca	ca	ca	ca	ca
Zinc	372	117	117	1100	230	200	55	nqse	19	215	143	179	nqse	33.7	37.1	nqse	1860	68.4	214	53	221
pH	5 - 10	6 - 9	5 - 10	6.5	7.6	6.9	6.8	nqse	8.8	6.8	6.8	6.6	nqse	7	7	nqse	ca	ca	ca	ca	ca
turbidity	50	25	25	8	12.4	8.8	12	nqse	4	13	17	10	nqse	5.1	7.5	nqse	ca	ca	ca	ca	ca

TABLE 4
SUMMARY OF STORMWATER ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON
TUKWILA, WASHINGTON

TS-1 (Outfall B)	Previous ISGP Action Level (µg/L)	Previous ISGP Benchmark (µg/L)	Current ISGP Benchmark (01/01/2010) (µg/L)	4TH "07"	1ST "08"	2ND "08"	3RD "08"	4TH "08"	1ST "09"	2ND "09"	3RD "09"	4TH "09"	1ST "10"	2ND "10"	3RD "10"	4TH "10"
POG/Sheen	30	15	No Visible Sheen	ca	ca	ca	ca	ca	ca	ca	ca	ca				
hardness				8	53	14	ns	12	8.5	12	ns	82				
Copper	149	63	14	ca	ca	ca	ca	ca	ca	ca	ca	ca	18.1	15.2	37.4	9.6
Lead	159	81	n/a	ca	ca	ca	ca	ca	ca	ca	ca	ca				
Zinc	372	117	117	100	244	530	ns	253	326	599	ns	255	580.5	252	710	231.3
pH	5 - 10	6 - 9	5 - 9	ca	ca	ca	ca	ca	ca	ca	ns	ca	6.5	6.4	7.2	6.9
turbidity	50	25	25	ca	ca	ca	ca	ca	ca	ca	ns	ca	1.83	1.14	14.4	2.9

TS-2 (Outfall A)				4TH "07"	1ST "08"	2ND "08"	3RD "08"	4TH "08"	1ST "09"	2ND "09"	3RD "09"	4TH "09"	1ST "10"	2ND "10"	3RD "10"	4TH "10"
POG	30	15	No Visible Sheen	ca	ca	ca	ca	ca	ca	ca	ca	ca				
hardness				6	22	13	ns	27	8.4	15	ns	16				
Copper	149	63	14	ca	ca	ca	ca	ca	ca	ca	ca	ca	10.8	9.7	16.3	11.3
Lead	159	81	n/a	ca	ca	ca	ca	ca	ca	ca	ca	ca				
Zinc	372	117	117	26	34	36	ns	26.8	340	35.6	ns	259	19.1	25.5	16.5	83.7
pH	5 - 10	6 - 9	5 - 10	ca	ca	ca	ca	ca	ca	ca	ns	ca	6.6	6.4	7.1	6
turbidity	50	25	25	ca	ca	ca	ca	ca	ca	ca	ns	ca	1.67	1.25	16.3	1.77

ca = consistent attainment
nqse = non-qualifying storm event
ns = no sample
POG = petroleum oil and grease

Notes:
Metals are total concentrations, not dissolved.

Benchmarks are not effluent limits. Exceedance of benchmarks require the Permittee to implement a Level 1, Level 2, or Level 3 corrective action, depending on the number of times a benchmark is exceeded during a calendar year.

TABLE 5
STORAGE TANK AND SUMP INVENTORY
BOEING ISAACSON-THOMPSON PROPERTY
TUKWILA, WASHINGTON

Tank Number	Alternate ID	Type	Building	Location	Purpose	Contents	Size (gallons)	Status	Release
TS-01	TS 01	UST	14-02	West Yard	Reserve boiler fuel	Fuel oil #2	20,000	Closed-in-place	Previously investigated and results will be evaluated against screening levels in the RI
TS-02		UST	14-02	West Yard	Storage for dispensing	Gasoline	1,000	Removed	Previously investigated and results will be evaluated against screening levels in the RI
TS-03		UST	14-02	West Yard	Emergency generator fuel	Diesel	500 (a)	Removed	Previously investigated and results will be evaluated against screening levels in the RI
TS-04		UST	14-03	East Yard	Hold tank for OWS TS-92	Stormwater/oil	4000 (b)	Removed	Petroleum impacted soil removed in 1994. Post-remedial action investigation conducted and results will be evaluated against screening levels in the RI
TSA-14	BMA 014 / Tank A	AST	14-01	West Yard	Accumulation for disposal	Paint booth waste	10,000	Removed	Previously investigated and results will be evaluated against screening levels in the RI
TSA-15	BMA 015 / Tank B	AST	14-01	West Yard	Accumulation for disposal	Paint booth waste	10,000	Removed	Previously investigated and results will be evaluated against screening levels in the RI
TSA-21	BMA 021 / Tank C / BP-1	AST	14-01	West Yard	Accumulation for disposal	Copper plating / acid / aqueous degreaser overflow	5,000	Inactive	Previously investigated and results will be evaluated against screening levels in the RI
TSA-25	BMA 025	AST	14-13	North Side	Emergency generator fuel	Diesel	200	Active	None observed
TS-26	BMA 026 / BP-2	Sump	14-01	Column D1-6	Temporary holding sump	Copper plating / aqueous degreaser	400	Inactive	Removal or abandonment of the sump is planned
BMA046		Sump	14-01	Column B-12	Lift station sump	Sewage		Unknown	Unknown; No investigation is planned since this is a sanitary sewer sump
BMA050		AST	14-03	Inside Building	Fatigue test	Hydraulic oil	3,100	Removed	Unknown; No investigation is planned since this tank was located inside an existing building
BMA051		AST	14-03	Inside Building	Fatigue test	Hydraulic oil	3,100	Removed	Unknown; No investigation is planned since this tank was located inside an existing building
TS-57	BMA 057	AST	14-02	West Side	Emergency generator fuel	Diesel	500	Active	None observed
BMA064		AST	14-01	West Side	Fueling vehicles	Propane	500	Removed / relocated	None observed
TS-67	BMA 067	Sump	14-01	E7 (Outside)	Wastewater collection	Paint booth waste	100	Removed	Previously investigated and results will be evaluated against screening levels in the RI

TABLE 5
STORAGE TANK AND SUMP INVENTORY
BOEING ISAACSON-THOMPSON PROPERTY
TUKWILA, WASHINGTON

Tank Number	Alternate ID	Type	Building	Location	Purpose	Contents	Size (gallons)	Status	Release
TS-68	BMA 068	Sump	14-01	E8 (Outside)	Wastewater collection	Paint booth waste	100	Removed	Previously investigated and results will be evaluated against screening levels in the RI
TS-69	BMA 069	Sump	14-01	E9 (Outside)	Wastewater collection	Paint booth waste	100	Removed	Previously investigated and results will be evaluated against screening levels in the RI
TS-92	SEP 04	OWS	14-03	East Yard	Hydraulics and parking lot	Stormwater/oil		Removed	Petroleum impacted soil removed in 1994. Post-remedial action investigation conducted and results will be evaluated against screening levels in the RI
TS-93	SEP N	OWS	14-01	Southwest Yard	Oil trap for parking lot	Stormwater/oil		Active	Unknown; no investigation planned
TS-91	SEP S	OWS	14-03	North End	Oil trap for parking lot	Stormwater/oil		Active	Unknown; no investigation planned
SMPTS1		Sump	14-03	737 Fatigue Test Pad	Hydraulic fluid leaks	Hydraulic fluid		Removed	Petroleum impacted soil removed in 1994. Post-remedial action investigation conducted and results will be evaluated against screening levels in the RI
TS-05		UST	14-05	Southeast Yard	Storage for dispensing	Diesel	6,000	Removed	Unknown; Investigation planned as part of the RI
TS-06		UST	14-05	Southeast Yard	Storage for dispensing	Diesel	6,000	Removed	Unknown; Investigation planned as part of the RI
TS-07		UST	14-05	Southeast Yard	Storage for dispensing	Diesel	6,000	Removed	Unknown; Investigation planned as part of the RI
TS-08		UST	14-05	Southeast Yard	Storage for dispensing	Diesel	6,000	Removed	Unknown; Investigation planned as part of the RI
TS-09		Sump	14-08	North Yard	Unknown	Paint Sludge	10,000	Removed	Unknown; Investigation planned as part of the RI
TS-10		Sump	14-08	North Yard	Unknown	Paint Sludge	10,000	Removed	Unknown; Investigation planned as part of the RI
TS-11		Sump	14-08	North Yard	Unknown	Paint Sludge	10,000	Removed	Unknown; Investigation planned as part of the RI
TS-12		UST	14-05	North Yard	Reserve Boiler Fuel	Fuel Oil	two 1,000	Removed	Previously investigated and results will be evaluated against screening levels in the RI
14-02 Indoor Sump		Sump	14-02	Inside at SE Corner	Mechanical Pit	Pipes	60	Active	Unknown; a reconnaissance of the pump will be conducted as part of the RI
Tunnel Sump		Sump	14-01	North (outside)	Rainwater Collection	Rainwater	Approx 60	Active	None
Tunnel Sump		Sump	14-01	North (outside)	Rainwater Collection	Rainwater	Approx 60	Active	None
Stair Sump		Sump	14-01	Northeast (outside)	Rainwater Collection	Rainwater	Approx 60	Active	None

TABLE 5
STORAGE TANK AND SUMP INVENTORY
BOEING ISAACSON-THOMPSON PROPERTY
TUKWILA, WASHINGTON

Tank Number	Alternate ID	Type	Building	Location	Purpose	Contents	Size (gallons)	Status	Release
NE Former Sump		Sump	14-05	East Side	Unknown	Unknown	Approx 50	Removed	Previously investigated and results will be evaluated against screening levels in the RI
Former Steam Cleaning Rack and Sump		Sump	14-05	Courtyard	Wastewater collection	Steam Cleaning Waste		Removed	Previously investigated and results will be evaluated against screening levels in the RI

UST = Underground storage tank
AST = Aboveground storage tank
OWS = Oil/water separator

(a) Some historical records indicate that this was a 500 gallon tank and others indicate that it may have been a 2,000 gallon tank.
(b) Some historical records indicate that this was a 4,000 gallon tank and others indicate that it may have been a 5,000 gallon tank.

TABLE 6
SITE GROUNDWATER ANALYTICAL METHODS, TARGET REPORTING LIMITS,
METHOD DETECTION LIMITS, AND PRELIMINARY SCREENING LEVELS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Analyte	Analytical Method (a)	Target Reporting Limits (b)		Method Detection Limits		Preliminary Screening Level (c)	
SEMIVOLATILES							
1,2,4-Trichlorobenzene	EPA Method 8270D	1.0	µg/L	0.383	µg/L	1.13	µg/L
1,2-Dichlorobenzene	EPA Method 8270D	1.0	µg/L	0.365	µg/L	5.2	µg/L
1,3-Dichlorobenzene	EPA Method 8270D	1.0	µg/L	0.358	µg/L	0	µg/L
1,4-Dichlorobenzene	EPA Method 8270D	1.0	µg/L	0.397	µg/L	7.1	µg/L
1-Methylnaphthalene	EPA Method 8270D	1.0	µg/L	0.479	µg/L		
2,2'-Oxybis(1-Chloropropane)	EPA Method 8270D	1.0	µg/L	0.623	µg/L		
2,4,5-Trichlorophenol	EPA Method 8270D	5.0	µg/L	2.220	µg/L		
2,4,6-Trichlorophenol	EPA Method 8270D	5.0	µg/L	2.408	µg/L	4	µg/L
2,4-Dichlorophenol	EPA Method 8270D	5.0	µg/L	2.597	µg/L		
2,4-Dimethylphenol	EPA Method 8270D	1.0	µg/L	0.359	µg/L	2.02	µg/L
2,4-Dinitrophenol	EPA Method 8270D	10.0	µg/L	3.480	µg/L		
2,4-Dinitrotoluene	EPA Method 8270D	5.0	µg/L	2.520	µg/L		
2,6-Dinitrotoluene	EPA Method 8270D	5.0	µg/L	2.393	µg/L		
2-Chloronaphthalene	EPA Method 8270D	1.0	µg/L	0.477	µg/L		
2-Chlorophenol	EPA Method 8270D	1.0	µg/L	0.529	µg/L		
2-Methylnaphthalene	EPA Method 8270D	1.0	µg/L	0.475	µg/L	18	µg/L
2-Methylphenol	EPA Method 8270D	1.0	µg/L	0.531	µg/L	7.1	µg/L
2-Nitroaniline	EPA Method 8270D	5.0	µg/L	2.627	µg/L		
2-Nitrophenol	EPA Method 8270D	5.0	µg/L	1.968	µg/L		
3,3'-Dichlorobenzidine	EPA Method 8270D	5.0	µg/L	1.510	µg/L		
3-Nitroaniline	EPA Method 8270D	5.0	µg/L	2.314	µg/L		
4,6-Dinitro-2-Methylphenol	EPA Method 8270D	10.0	µg/L	3.087	µg/L		
4-Bromophenyl-phenylether	EPA Method 8270D	1.0	µg/L	0.423	µg/L		
4-Chloro-3-methylphenol	EPA Method 8270D	5.0	µg/L	2.417	µg/L		
4-Chloroaniline	EPA Method 8270D	5.0	µg/L	2.599	µg/L		
4-Chlorophenyl-phenylether	EPA Method 8270D	1.0	µg/L	0.451	µg/L		
4-Methylphenol	EPA Method 8270D	1.0	µg/L	0.523	µg/L	77	µg/L
4-Nitroaniline	EPA Method 8270D	5.0	µg/L	2.249	µg/L		
4-Nitrophenol	EPA Method 8270D	5.0	µg/L	2.573	µg/L		
Acenaphthene	EPA Method 8270D	1.0	µg/L	0.546	µg/L	2.61	µg/L
Acenaphthylene	EPA Method 8270D	1.0	µg/L	0.480	µg/L	11	µg/L
Anthracene	EPA Method 8270D	1.0	µg/L	0.531	µg/L	11	µg/L
Benzo(a)anthracene	EPA Method 8270D SIM	0.01	µg/L	0.00320	µg/L	0.12	µg/L
Benzo(a)pyrene	EPA Method 8270D SIM	0.01	µg/L	0.00505	µg/L	0.012	µg/L
Benzo(g,h,i)perylene	EPA Method 8270D	1.0	µg/L	0.546	µg/L	0.012	µg/L
Benzoic Acid	EPA Method 8270D	1.0	µg/L	5.111	µg/L	2243	µg/L
Benzyl Alcohol	EPA Method 8270D	5.0	µg/L	2.008	µg/L	182	µg/L
bis(2-Chloroethoxy) Methane	EPA Method 8270D	1.0	µg/L	0.565	µg/L		
Bis-(2-Chloroethyl) Ether	EPA Method 8270D	1.0	µg/L	0.583	µg/L		
bis(2-Ethylhexyl)phthalate	EPA Method 8270D	1.0	µg/L	1.877	µg/L	0.28	µg/L
Butylbenzylphthalate	EPA Method 8270D	1.0	µg/L	0.557	µg/L	0.52	µg/L
Carbazole	EPA Method 8270D	1.0	µg/L	0.306	µg/L		
Chrysene	EPA Method 8270D SIM	0.01	µg/L	0.00374	µg/L	0.4661	µg/L
Dibenz(a,h)anthracene	EPA Method 8270D SIM	0.01	µg/L	0.00159	µg/L	0.0046	µg/L
Dibenzofuran	EPA Method 8270D	1.0	µg/L	0.479	µg/L	1.3	µg/L
Diethylphthalate	EPA Method 8270D	1.0	µg/L	0.582	µg/L	484	µg/L
Dimethylphthalate	EPA Method 8270D	1.0	µg/L	0.528	µg/L	143	µg/L
Di-n-Butylphthalate	EPA Method 8270D	1.0	µg/L	0.537	µg/L	151	µg/L
Di-n-Octyl phthalate	EPA Method 8270D	1.0	µg/L	0.508	µg/L	0.30	µg/L
Fluoranthene	EPA Method 8270D	1.0	µg/L	0.515	µg/L	2.3	µg/L
Fluorene	EPA Method 8270D	1.0	µg/L	0.558	µg/L	2.04	µg/L
Hexachlorobenzene	EPA Method 8270D	1.0	µg/L	0.470	µg/L	0.112426	µg/L
Hexachlorobutadiene	EPA Method 8270D	1.0	µg/L	0.306	µg/L	3.9	µg/L
Hexachlorocyclopentadiene	EPA Method 8270D	5.0	µg/L	1.181	µg/L		
Hexachloroethane	EPA Method 8270D	1.0	µg/L	0.350	µg/L		
Indeno(1,2,3-cd)pyrene	EPA Method 8270D SIM	0.01	µg/L	0.00341	µg/L	0.0127	µg/L

TABLE 6
SITE GROUNDWATER ANALYTICAL METHODS, TARGET REPORTING LIMITS, METHOD DETECTION LIMITS, AND PRELIMINARY SCREENING LEVELS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Analyte	Analytical Method (a)	Target Reporting Limits (b)	Method Detection Limits		Preliminary Screening Level (c)	
SEMIVOLATILES (continued)						
Isophorone	EPA Method 8270D	1.0 µg/L	0.481	µg/L		
Naphthalene	EPA Method 8270D	1.0 µg/L	0.522	µg/L	54	µg/L
Nitrobenzene	EPA Method 8270D	1.0 µg/L	0.575	µg/L		
N-Nitroso-Di-N-Propylamine	EPA Method 8270D	1.0 µg/L	0.560	µg/L		
N-Nitrosodiphenylamine	EPA Method 8270D	1.0 µg/L	0.460	µg/L	2.0	µg/L
Pentachlorophenol	EPA Method 8270D	5.0 µg/L	2.411	µg/L	0.22	µg/L
Phenanthrene	EPA Method 8270D	1.0 µg/L	0.557	µg/L		
Phenol	EPA Method 8270D	1.0 µg/L	0.519	µg/L	78	µg/L
Pyrene	EPA Method 8270D SIM	0.01 µg/L	0.00894	µg/L	14	µg/L
Total Benzofluoranthenes	EPA Method 8270D SIM	0.02 µg/L	0.00496	µg/L	0.012	µg/L
VOLATILES						
1,1,1,2-Tetrachloroethane	EPA Method 8260C	0.2 µg/L	0.068	µg/L		
1,1,1-Trichloroethane	EPA Method 8260C	0.2 µg/L	0.089	µg/L	200	µg/L
1,1,2,2-Tetrachloroethane	EPA Method 8260C	0.2 µg/L	0.067	µg/L		
1,1,2-Trichloroethane	EPA Method 8260C	0.2 µg/L	0.035	µg/L	0.77	µg/L
1,1,2-Trichlorotrifluoroethane	EPA Method 8260C	0.2 µg/L	0.107	µg/L		
1,1-Dichloroethane	EPA Method 8260C	0.2 µg/L	0.053	µg/L	800	µg/L
1,1-Dichloroethene	EPA Method 8260C	0.2 µg/L	0.091	µg/L	7	µg/L
1,1-Dichloropropene	EPA Method 8260C	0.2 µg/L	0.092	µg/L		
1,2,3-Trichlorobenzene	EPA Method 8260C	0.5 µg/L	0.087	µg/L		
1,2,3-Trichloropropane	EPA Method 8260C	0.5 µg/L	0.226	µg/L		
1,2,4-Trichlorobenzene	EPA Method 8260C	0.5 µg/L	0.100	µg/L	1.13	µg/L
1,2,4-Trimethylbenzene	EPA Method 8260C	0.2 µg/L	0.058	µg/L		
1,2-Dibromo-3-chloropropane	EPA Method 8260C	0.5 µg/L	0.212	µg/L		
1,2-Dichlorobenzene	EPA Method 8260C	0.2 µg/L	0.055	µg/L	5.2	µg/L
1,2-Dichloroethane	EPA Method 8260C	0.2 µg/L	0.075	µg/L	0.48	µg/L
1,2-Dichloropropane	EPA Method 8260C	0.2 µg/L	0.093	µg/L		
1,3,5-Trimethylbenzene	EPA Method 8260C	0.2 µg/L	0.063	µg/L	80	µg/L
1,3-Dichlorobenzene	EPA Method 8260C	0.2 µg/L	0.040	µg/L	0	µg/L
1,3-Dichloropropane	EPA Method 8260C	0.2 µg/L	0.020	µg/L		
1,4-Dichlorobenzene	EPA Method 8260C	0.2 µg/L	0.057	µg/L	7.1	µg/L
2,2-Dichloropropane	EPA Method 8260C	0.2 µg/L	0.083	µg/L		
2-Butanone	EPA Method 8260C	5.0 µg/L	0.808	µg/L	4800	µg/L
2-Chloroethylvinylether	EPA Method 8260C	1.0 µg/L	0.086	µg/L		
2-Chlorotoluene	EPA Method 8260C	0.2 µg/L	0.042	µg/L		
2-Hexanone	EPA Method 8260C	5.0 µg/L	0.310	µg/L		
4-Chlorotoluene	EPA Method 8260C	0.2 µg/L	0.073	µg/L		
4-Isopropyltoluene	EPA Method 8260C	0.2 µg/L	0.075	µg/L		
4-Methyl-2-Pentanone (MIBK)	EPA Method 8260C	5.0 µg/L	0.384	µg/L	640	µg/L
Acetone	EPA Method 8260C	5.0 µg/L	0.720	µg/L	7200	µg/L
Acrolein	EPA Method 8260C	5.0 µg/L	0.292	µg/L		
Acrylonitrile	EPA Method 8260C-SIM	0.05 µg/L	0.0158	µg/L		
Benzene	EPA Method 8260C	0.2 µg/L	0.056	µg/L	0.8	µg/L
Bromobenzene	EPA Method 8260C	0.2 µg/L	0.051	µg/L		
Bromochloromethane	EPA Method 8260C	0.2 µg/L	0.067	µg/L		
Bromodichloromethane	EPA Method 8260C	0.2 µg/L	0.053	µg/L		
Bromoethane	EPA Method 8260C	0.2 µg/L	0.090	µg/L		
Bromoform	EPA Method 8260C	0.2 µg/L	0.070	µg/L		
Bromomethane	EPA Method 8260C	1.0 µg/L	0.043	µg/L		
Carbon Disulfide	EPA Method 8260C	0.2 µg/L	0.087	µg/L		
Carbon Tetrachloride	EPA Method 8260C	0.2 µg/L	0.075	µg/L	0.63	µg/L

TABLE 6
SITE GROUNDWATER ANALYTICAL METHODS, TARGET REPORTING LIMITS, METHOD DETECTION LIMITS, AND PRELIMINARY SCREENING LEVELS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Analyte	Analytical Method (a)	Target Reporting Limits (b)		Method Detection Limits		Preliminary Screening Level (c)	
VOLATILES (continued)							
Chlorobenzene	EPA Method 8260C	0.2	µg/L	0.042	µg/L	100	µg/L
Chloroethane	EPA Method 8260C	0.2	µg/L	0.152	µg/L	0	µg/L
Chloroform	EPA Method 8260C	0.2	µg/L	0.081	µg/L	80	µg/L
Chloromethane	EPA Method 8260C	0.5	µg/L	0.098	µg/L	0	µg/L
cis-1,2-Dichloroethene	EPA Method 8260C	0.02	µg/L	0.100	µg/L		
cis-1,3-Dichloropropene	EPA Method 8260C	0.2	µg/L	0.058	µg/L		
Dibromochloromethane	EPA Method 8260C	0.2	µg/L	0.090	µg/L		
Dibromomethane	EPA Method 8260C	0.2	µg/L	0.081	µg/L		
Ethylbenzene	EPA Method 8260C	0.2	µg/L	0.094	µg/L	700	µg/L
Ethylene Dibromide	EPA Method 8260C	0.2	µg/L	0.075	µg/L		
Hexachlorobutadiene	EPA Method 8260C	0.5	µg/L	0.112	µg/L	3.92	µg/L
Isopropylbenzene	EPA Method 8260C	0.2	µg/L	0.062	µg/L		
m,p-Xylene	EPA Method 8260C	0.4	µg/L	0.144	µg/L	1600 (d)	µg/L
Methyl Iodide	EPA Method 8260C	1.0	µg/L	0.040	µg/L		
Methylene Chloride	EPA Method 8260C	0.5	µg/L	0.391	µg/L	5	µg/L
Naphthalene	EPA Method 8260C	0.5	µg/L	0.070	µg/L	54	µg/L
n-Butylbenzene	EPA Method 8260C	0.2	µg/L	0.108	µg/L		
n-Propylbenzene	EPA Method 8260C	0.2	µg/L	0.081	µg/L		
o-Xylene	EPA Method 8260C	0.2	µg/L	0.057	µg/L	1600 (d)	µg/L
sec-Butylbenzene	EPA Method 8260C	0.2	µg/L	0.077	µg/L		
Styrene	EPA Method 8260C	0.2	µg/L	0.066	µg/L	100	µg/L
tert-Butylbenzene	EPA Method 8260C	0.2	µg/L	0.061	µg/L		
Tetrachloroethene	EPA Method 8260C-SIM	0.02	µg/L	0.00364	µg/L	5	µg/L
Toluene	EPA Method 8260C	0.2	µg/L	0.056	µg/L	1000	µg/L
trans-1,2-Dichloroethene	EPA Method 8260C	0.2	µg/L	0.085	µg/L		
trans-1,3-Dichloropropene	EPA Method 8260C	0.2	µg/L	0.059	µg/L		
trans-1,4-Dichloro-2-butene	EPA Method 8260C	1.0	µg/L	0.243	µg/L		
Trichloroethene	EPA Method 8260C	0.2	µg/L	0.076	µg/L	0.49	µg/L
Trichlorofluoromethane	EPA Method 8260C	0.2	µg/L	0.092	µg/L		
Vinyl Acetate	EPA Method 8260C	1.0	µg/L	0.068	µg/L		
Vinyl Chloride	EPA Method 8260C-SIM	0.02	µg/L	0.00225	µg/L	0.029	µg/L
METALS							
Antimony	EPA Method 200.8	0.2	µg/L	0.010	µg/L	6	µg/L
Arsenic	EPA Method 200.8	0.2	µg/L	0.048	µg/L	0.058	µg/L
Barium	EPA Method 200.8	0.5	µg/L	0.020	µg/L	2	µg/L
Beryillium	EPA Method 200.8	0.2	µg/L	0.021	µg/L	4	µg/L
Cadmium	EPA Method 200.8	0.1	µg/L	0.010	µg/L	2.56	µg/L
Chromium	EPA Method 200.8	0.5	µg/L	0.045	µg/L	100	µg/L
Chromium VI	ARI SOP 614S	10	µg/L	3	µg/L	48	µg/L
Copper	EPA Method 200.8	0.5	µg/L	0.158	µg/L	7.3	µg/L
Lead	EPA Method 200.8	0.1	µg/L	0.046	µg/L	11.30	µg/L
Mercury	EPA Method 7470A	0.02	µg/L	0.0026	µg/L	0.0052	µg/L
Nickel	EPA Method 200.8	0.5	µg/L	0.079	µg/L	100	µg/L
Selenium	EPA Method 200.8	0.5	µg/L	0.127	µg/L	50	µg/L
Silver	EPA Method 200.8	0.2	µg/L	0.008	µg/L	1.53	µg/L
Thallium	EPA Method 200.8	0.2	µg/L	0.004	µg/L	0.5	µg/L
Zinc	EPA Method 200.8	4.0	µg/L	0.497	µg/L	32.6	µg/L
PCBs							
Aroclor 1016	EPA Method 8082B	0.01	µg/L	0.00248	µg/L	0.44280	µg/L
Aroclor 1242	EPA Method 8082B	0.01	µg/L			0	µg/L
Aroclor 1248	EPA Method 8082B	0.01	µg/L			0.27	µg/L
Aroclor 1254	EPA Method 8082B	0.01	µg/L			0.15873	µg/L
Aroclor 1260	EPA Method 8082B	0.01	µg/L	0.00276	µg/L	0.058	µg/L
Aroclor 1221	EPA Method 8082B	0.01	µg/L			0	µg/L
Aroclor 1232	EPA Method 8082B	0.01	µg/L				

TABLE 6
SITE GROUNDWATER ANALYTICAL METHODS, TARGET REPORTING LIMITS, METHOD DETECTION LIMITS, AND PRELIMINARY SCREENING LEVELS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Analyte	Analytical Method (a)	Target Reporting Limits (b)	Method Detection Limits	Preliminary Screening Level (c)
Total Petroleum Hydrocarbons				
Gasoline-Range Petroleum Hydrocarbons	NWTPH-G (e)	250 µg/L	60 µg/L	800/1000(f) µg/L
Diesel-Range Petroleum Hydrocarbons	NWTPH-Dx (e)	100 µg/L	16 µg/L	500 µg/L
Motor Oil-Range Petroleum Hydrocarbons	NWTPH-Dx (e)	200 µg/L	49 µg/L	500 µg/L

SIM = Selected Ion Monitoring

(a) Analytical methods are from SW-846 (EPA 1986) and updates.
(b) Target reporting limits are based on current laboratory data and may be modified during the investigation process as methodology is refined. Laboratory reporting will be based on the lowest standard on the calibration curve. Instances may arise where high sample concentrations, nonhomogeneity of samples, or matrix interferences preclude achieving the target reporting limits.
(c) Based on Ecology Spreadsheet Draft Preliminary Screening Levels & ARARs v14R1 in accordance with Ecology comments.
(d) Preliminary screening level is for xylenes.
(e) Methods NWTPH-G and NWTPH-Dx as described in *Analytical Methods for Petroleum Hydrocarbons,* Washington State Department of Ecology, Publication ECY97-602, June 1997 (Ecology 1997)
(f) Preliminary screening level when benzene is detected is 800 ug/L; when no benzene is detected, preliminary screening level is 1000 ug/L.

TABLE 7
SITE SOIL ANALYTICAL METHODS, TARGET REPORTING LIMITS,
METHOD DETECTION LIMITS, AND PRELIMINARY SCREENING LEVELS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Analyte	Analytical Method (a)	Target Reporting Limits (b)	Method Detection Limits		Preliminary Screening Level (c)	
SEMIVOLATILES						
1,2,4-Trichlorobenzene	EPA Method 8270 (Low Level)	0.02 mg/kg	0.004	mg/kg	0.00054	mg/kg
1,2-Dichlorobenzene	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003	mg/kg	0.004	mg/kg
1,3-Dichlorobenzene	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003	mg/kg	0.28	mg/kg
1,4-Dichlorobenzene	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003	mg/kg	0.0051	mg/kg
1-Methylnaphthalene	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003	mg/kg		
2,2'-Oxybis(1-Chloropropane)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003	mg/kg		
2,4,5-Trichlorophenol	EPA Method 8270 (Low Level)	0.1 mg/kg	0.021	mg/kg		
2,4,6-Trichlorophenol	EPA Method 8270 (Low Level)	0.1 mg/kg	0.011	mg/kg	0.00295	mg/kg
2,4-Dichlorophenol	EPA Method 8270 (Low Level)	0.1 mg/kg	0.018	mg/kg		
2,4-Dimethylphenol	EPA Method 8270 (Low Level)	0.02 mg/kg	0.008	mg/kg	0.00203	mg/kg
2,4-Dinitrophenol	EPA Method 8270 (Low Level)	0.2 mg/kg	0.05	mg/kg		
2,4-Dinitrotoluene	EPA Method 8270 (Low Level)	0.1 mg/kg	0.019	mg/kg		
2,6-Dinitrotoluene	EPA Method 8270 (Low Level)	0.1 mg/kg	0.015	mg/kg		
2-Chloronaphthalene	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003	mg/kg		
2-Chlorophenol	EPA Method 8270 (Low Level)	0.02 mg/kg	0.005	mg/kg		
2-Methylnaphthalene	EPA Method 8270 SIM	0.005 mg/kg	0.001	mg/kg	0.04321	mg/kg
2-Methylphenol	EPA Method 8270 (Low Level)	0.02 mg/kg	0.005	mg/kg	0.0052	mg/kg
2-Nitroaniline	EPA Method 8270 (Low Level)	0.1 mg/kg	0.019	mg/kg		
2-Nitrophenol	EPA Method 8270 (Low Level)	0.02 mg/kg	0.009	mg/kg		
3,3'-Dichlorobenzidine	EPA Method 8270 (Low Level)	0.1 mg/kg	0.054	mg/kg		
3-Nitroaniline	EPA Method 8270 (Low Level)	0.1 mg/kg	0.025	mg/kg		
4,6-Dinitro-2-Methylphenol	EPA Method 8270 (Low Level)	0.2 mg/kg	0.041	mg/kg		
4-Bromophenyl-phenylether	EPA Method 8270 (Low Level)	0.02 mg/kg	0.004	mg/kg		
4-Chloro-3-methylphenol	EPA Method 8270 (Low Level)	0.1 mg/kg	0.015	mg/kg		
4-Chloroaniline	EPA Method 8270 (Low Level)	0.1 mg/kg	0.024	mg/kg		
4-Chlorophenyl-phenylether	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003	mg/kg		
4-Methylphenol	EPA Method 8270 (Low Level)	0.02 mg/kg	0.005	mg/kg	0.0556	mg/kg
4-Nitroaniline	EPA Method 8270 (Low Level)	0.1 mg/kg	0.023	mg/kg		
4-Nitrophenol	EPA Method 8270 (Low Level)	0.1 mg/kg	0.028	mg/kg		
Acenaphthene	EPA Method 8270 SIM	0.005 mg/kg	0.002	mg/kg	0.017	mg/kg
Acenaphthylene	EPA Method 8270 SIM	0.005 mg/kg	0.001	mg/kg	0.0691	mg/kg
Anthracene	EPA Method 8270 SIM	0.005 mg/kg	0.001	mg/kg	0.22	mg/kg
Benzo(a)anthracene	EPA Method 8270 SIM	0.005 mg/kg	0.001	mg/kg	0.0051	mg/kg
Benzo(a)pyrene	EPA Method 8270 SIM	0.005 mg/kg	0.001	mg/kg	0.0094	mg/kg
Benzo(b)fluoranthene	EPA Method 8270 SIM	0.005 mg/kg	0.002	mg/kg	0.0096	mg/kg
Benzo(g,h,i)perylene	EPA Method 8270 SIM	0.005 mg/kg	0.001	mg/kg	0.0310	mg/kg
Benzo(k)fluoranthene	EPA Method 8270 SIM	0.005 mg/kg	0.002	mg/kg	0.0094	mg/kg
Benzoic Acid	EPA Method 8270 (Low Level)	0.2 mg/kg	0.043	mg/kg	0.68	mg/kg
Benzyl Alcohol	EPA Method 8270 (Low Level)	0.02 mg/kg	0.046	mg/kg	0.055	mg/kg
bis(2-Chloroethoxy) Methane	EPA Method 8270 (Low Level)	0.02 mg/kg	0.002	mg/kg		
Bis-(2-Chloroethyl) Ether	EPA Method 8270 (Low Level)	0.02 mg/kg	0.005	mg/kg		
bis(2-Ethylhexyl)phthalate	EPA Method 8270 (Low Level)	0.02 mg/kg	0.009	mg/kg	0.047	mg/kg
Butylbenzylphthalate	EPA Method 8270 (Low Level)	0.02 mg/kg	0.004	mg/kg	0.0051	mg/kg
Carbazole	EPA Method 8270 (Low Level)	0.02 mg/kg	0.002	mg/kg		
Chrysene	EPA Method 8270 SIM	0.005 mg/kg	0.002	mg/kg	0.0028	mg/kg
Dibenz(a,h)anthracene	EPA Method 8270 SIM	0.005 mg/kg	0.001	mg/kg	0.0120	mg/kg
Dibenzofuran	EPA Method 8270 SIM	0.005 mg/kg	0.001	mg/kg	0.02	mg/kg
Diethylphthalate	EPA Method 8270 (Low Level)	0.02 mg/kg	0.004	mg/kg	0.20	mg/kg
Dimethylphthalate	EPA Method 8270 (Low Level)	0.02 mg/kg	0.004	mg/kg	0.094	mg/kg
Di-n-Butylphthalate	EPA Method 8270 (Low Level)	0.02 mg/kg	0.005	mg/kg	0.26	mg/kg
Di-n-Octyl phthalate	EPA Method 8270 (Low Level)	0.02 mg/kg	0.005	mg/kg	0.06	mg/kg
Fluoranthene	EPA Method 8270 SIM	0.005 mg/kg	0.002	mg/kg	0.16	mg/kg
Fluorene	EPA Method 8270 SIM	0.005 mg/kg	0.001	mg/kg	0.024	mg/kg
Hexachlorobenzene	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003	mg/kg	1.06333E-06	mg/kg
Hexachlorobutadiene	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003	mg/kg	0.0050	mg/kg
Hexachlorocyclopentadiene	EPA Method 8270 (Low Level)	0.1 mg/kg	0.012	mg/kg		
Hexachloroethane	EPA Method 8270 (Low Level)	0.02 mg/kg	0.005	mg/kg		
Indeno(1,2,3-cd)pyrene	EPA Method 8270 SIM	0.005 mg/kg	0.002	mg/kg	0.032	mg/kg
Isophorone	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003	mg/kg		
Naphthalene	EPA Method 8270 SIM	0.005 mg/kg	0.002	mg/kg	0.114	mg/kg
Nitrobenzene	EPA Method 8270 (Low Level)	0.02 mg/kg	0.004	mg/kg		
N-Nitroso-Di-N-Propylamine	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003	mg/kg		
N-Nitrosodiphenylamine	EPA Method 8270 (Low Level)	0.1 mg/kg	0.013	mg/kg	0.0116	mg/kg
Pentachlorophenol	EPA Method 8270 (Low Level)	0.1 mg/kg	0.027	mg/kg	0.00080	mg/kg
Phenanthrene	EPA Method 8270 SIM	0.005 mg/kg	0.002	mg/kg	0.1014	mg/kg
Phenol	EPA Method 8270 (Low Level)	0.02 mg/kg	0.004	mg/kg	0.043	mg/kg
Pyrene	EPA Method 8270 SIM	0.005 mg/kg	0.001	mg/kg	1.00	mg/kg

TABLE 7
SITE SOIL ANALYTICAL METHODS, TARGET REPORTING LIMITS,
METHOD DETECTION LIMITS, AND PRELIMINARY SCREENING LEVELS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Analyte	Analytical Method (a)	Target Reporting Limits (b)	Method Detection Limits		Preliminary Screening Level (c)	
VOLATILES						
1,1,1,2-Tetrachloroethane	EPA Method 8260	0.001 mg/kg	0.0002	mg/kg		
1,1,1-Trichloroethane	EPA Method 8260	0.001 mg/kg	0.0002	mg/kg	2.414	mg/kg
1,1,2,2-Tetrachloroethane	EPA Method 8260	0.001 mg/kg	0.0003	mg/kg		
1,1,2-Trichloroethane	EPA Method 8260	0.001 mg/kg	0.0003	mg/kg	0.0003	mg/kg
1,1,2-Trichlorotrifluoroethane	EPA Method 8260	0.002 mg/kg	0.0003	mg/kg		
1,1-Dichloroethane	EPA Method 8260	0.001 mg/kg	0.0002	mg/kg	0.26	mg/kg
1,1-Dichloroethene	EPA Method 8260	0.001 mg/kg	0.0003	mg/kg	0.0010	mg/kg
1,1-Dichloropropene	EPA Method 8260	0.001 mg/kg	0.0003	mg/kg		
1,2,3-Trichlorobenzene	EPA Method 8260	0.005 mg/kg	0.0003	mg/kg		
1,2,3-Trichloropropane	EPA Method 8260	0.002 mg/kg	0.0005	mg/kg		
1,2,4-Trichlorobenzene	EPA Method 8260	0.005 mg/kg	0.0003	mg/kg	0.00054	mg/kg
1,2,4-Trimethylbenzene	EPA Method 8260	0.001 mg/kg	0.0002	mg/kg		
1,2-Dibromo-3-chloropropane	EPA Method 8260	0.005 mg/kg	0.0005	mg/kg		
1,2-Dichlorobenzene	EPA Method 8260	0.001 mg/kg	0.0003	mg/kg	0.004	mg/kg
1,2-Dichloroethane	EPA Method 8260	0.001 mg/kg	0.0002	mg/kg	0.00016	mg/kg
1,2-Dichloropropane	EPA Method 8260	0.001 mg/kg	0.0002	mg/kg		
1,3,5-Trimethylbenzene	EPA Method 8260	0.001 mg/kg	0.0003	mg/kg	0.0792	mg/kg
1,3-Dichlorobenzene	EPA Method 8260	0.001 mg/kg	0.0002	mg/kg	0.28	mg/kg
1,3-Dichloropropane	EPA Method 8260	0.001 mg/kg	0.0002	mg/kg		
1,4-Dichlorobenzene	EPA Method 8260	0.001 mg/kg	0.0002	mg/kg	0.0051	mg/kg
2,2-Dichloropropane	EPA Method 8260	0.001 mg/kg	0.0003	mg/kg		
2-Butanone	EPA Method 8260	0.005 mg/kg	0.0005	mg/kg	1.38	mg/kg
2-Chloroethylvinylether	EPA Method 8260	0.005 mg/kg	0.0003	mg/kg		
2-Chlorotoluene	EPA Method 8260	0.001 mg/kg	0.0003	mg/kg		
2-Hexanone	EPA Method 8260	0.005 mg/kg	0.0004	mg/kg		
4-Chlorotoluene	EPA Method 8260	0.001 mg/kg	0.0003	mg/kg		
4-Isopropyltoluene	EPA Method 8260	0.001 mg/kg	0.0002	mg/kg		
4-Methyl-2-Pentanone (MIBK)	EPA Method 8260	0.005 mg/kg	0.0004	mg/kg	0.18	mg/kg
Acetone	EPA Method 8260	0.005 mg/kg	0.0005	mg/kg	2.1	mg/kg
Acrolein	EPA Method 8260	0.05 mg/kg	0.038	mg/kg		
Acrylonitrile	EPA Method 8260	0.005 mg/kg	0.001	mg/kg		
Benzene	EPA Method 8260	0.001 mg/kg	0.0003	mg/kg	0.00036	mg/kg
Bromobenzene	EPA Method 8260	0.001 mg/kg	0.0001	mg/kg		
Bromochloromethane	EPA Method 8260	0.001 mg/kg	0.0003	mg/kg		
Bromodichloromethane	EPA Method 8260	0.001 mg/kg	0.0003	mg/kg		
Bromoethane	EPA Method 8260	0.002 mg/kg	0.0004	mg/kg		
Bromoform	EPA Method 8260	0.001 mg/kg	0.0003	mg/kg		
Bromomethane	EPA Method 8260	0.001 mg/kg	0.0002	mg/kg		
Carbon Disulfide	EPA Method 8260	0.001 mg/kg	0.0006	mg/kg		
Carbon Tetrachloride	EPA Method 8260	0.001 mg/kg	0.0002	mg/kg	0.00021	mg/kg
Chlorobenzene	EPA Method 8260	0.001 mg/kg	0.0002	mg/kg	0.0111	mg/kg
Chloroethane	EPA Method 8260	0.001 mg/kg	0.0005	mg/kg	0.0106	mg/kg
Chloroform	EPA Method 8260	0.001 mg/kg	0.0002	mg/kg	0.151	mg/kg
Chloromethane	EPA Method 8260	0.001 mg/kg	0.0003	mg/kg	0	mg/kg
cis-1,2-Dichloroethene	EPA Method 8260	0.001 mg/kg	0.0002	mg/kg		
cis-1,3-Dichloropropene	EPA Method 8260	0.001 mg/kg	0.0002	mg/kg		
Dibromochloromethane	EPA Method 8260	0.001 mg/kg	0.0003	mg/kg		
Dibromomethane	EPA Method 8260	0.001 mg/kg	0.0001	mg/kg		
Ethylbenzene	EPA Method 8260	0.001 mg/kg	0.0002	mg/kg	0.6	mg/kg
Ethylene Dibromide	EPA Method 8260	0.001 mg/kg	0.0001	mg/kg		
Hexachlorobutadiene	EPA Method 8260	0.001 mg/kg	0.0004	mg/kg	0.0050	mg/kg
Isopropylbenzene	EPA Method 8260	0.001 mg/kg	0.0002	mg/kg		
m,p-Xylene	EPA Method 8260	0.001 mg/kg	0.0004	mg/kg	1.2 (d)	mg/kg
Methyl Iodide	EPA Method 8260	0.001 mg/kg	0.0002	mg/kg		
Methylene Chloride	EPA Method 8260	0.002 mg/kg	0.0006	mg/kg	0.0018	mg/kg
Naphthalene	EPA Method 8260	0.005 mg/kg	0.0004	mg/kg	0.114	mg/kg
n-Butylbenzene	EPA Method 8260	0.001 mg/kg	0.0003	mg/kg		
n-Propylbenzene	EPA Method 8260	0.001 mg/kg	0.0003	mg/kg		
o-Xylene	EPA Method 8260	0.001 mg/kg	0.0002	mg/kg	1.2 (d)	mg/kg
sec-Butylbenzene	EPA Method 8260	0.001 mg/kg	0.0002	mg/kg		
Styrene	EPA Method 8260	0.001 mg/kg	0.0001	mg/kg	1.29	mg/kg

TABLE 7
SITE SOIL ANALYTICAL METHODS, TARGET REPORTING LIMITS,
METHOD DETECTION LIMITS, AND PRELIMINARY SCREENING LEVELS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Analyte	Analytical Method (a)	Target Reporting Limits (b)	Method Detection Limits	Preliminary Screening Level (c)
VOLATILES (continued)				
tert-Butylbenzene	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg	
Tetrachloroethene	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg	0.00129844 mg/kg
Toluene	EPA Method 8260	0.001 mg/kg	0.0001 mg/kg	0.89 mg/kg
trans-1,2-Dichloroethene	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg	
trans-1,3-Dichloropropene	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg	
trans-1,4-Dichloro-2-butene	EPA Method 8260	0.005 mg/kg	0.0004 mg/kg	
Trichloroethene	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg	0.00019 mg/kg
Trichlorofluoromethane	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg	
Vinyl Acetate	EPA Method 8260	0.005 mg/kg	0.0004 mg/kg	
Vinyl Chloride	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg	8.86433E-06 mg/kg
METALS				
Antimony	EPA Method 6020	0.2 mg/kg	0.013 mg/kg	28.98 mg/kg
Arsenic	EPA Method 6020	0.2 mg/kg	0.087 mg/kg	0.002 mg/kg
Barium	EPA Method 6020	0.5 mg/kg	0.056 mg/kg	23 mg/kg
Beryillium	EPA Method 6020	0.2 mg/kg	0.018 mg/kg	25.0 mg/kg
Cadmium	EPA Method 6020	0.1 mg/kg	0.012 mg/kg	0.002 mg/kg
Chromium III	EPA Method 6020	0.5 mg/kg	0.038 mg/kg	42 mg/kg
Chromium VI	EPA Method 7196	0.1 mg/kg	0.003 mg/kg	0.19 mg/kg
Copper	EPA Method 6020	0.5 mg/kg	0.036 mg/kg	0.05 mg/kg
Lead	EPA Method 6020	0.1 mg/kg	0.047 mg/kg	25 mg/kg
Mercury	EPA Method 7471	0.025 mg/kg	0.002 mg/kg	0.001 mg/kg
Nickel	EPA Method 6020	0.5 mg/kg	0.049 mg/kg	0.33 mg/kg
Selenium	EPA Method 6020	0.5 mg/kg	0.099 mg/kg	0.026 mg/kg
Silver	EPA Method 6020	0.2 mg/kg	0.008 mg/kg	0.0163 mg/kg
Thallium	EPA Method 6020	0.2 mg/kg	0.003 mg/kg	0.034 mg/kg
Zinc	EPA Method 6020	4.0 mg/kg	0.339 mg/kg	5.0 mg/kg
PCBs				
Aroclor 1016	EPA Method 8082	0.033 mg/kg	0.009 mg/kg	0.000384 mg/kg
Aroclor 1242	EPA Method 8082	0.033 mg/kg		1.02881E-05 mg/kg
Aroclor 1248	EPA Method 8082	0.033 mg/kg		0.000619 mg/kg
Aroclor 1254	EPA Method 8082	0.033 mg/kg		0.001063 mg/kg
Aroclor 1260	EPA Method 8082	0.033 mg/kg	0.007 mg/kg	0.002902 mg/kg
Aroclor 1221	EPA Method 8082	0.033 mg/kg		0.000149 mg/kg
Aroclor 1232	EPA Method 8082	0.033 mg/kg		0.000149 mg/kg
TOTAL PETROLEUM HYDROCARBONS				
Gasoline-Range Petroleum Hydrocarbons	NWTPH-G (e)	5 mg/kg	0.002 mg/kg	30/100 (f) mg/kg
Diesel-Range Petroleum Hydrocarbons	NWTPH-Dx (e,g)	5 mg/kg	0.007 mg/kg	460 mg/kg
Motor Oil-Range Petroleum Hydrocarbons	NWTPH-Dx (e,g)	10 mg/kg	0.001 mg/kg	2000 mg/kg
DIOXINS/FURANS				
2,3,7,8-TCDF	EPA Method 1613B	0.00000019 mg/kg	0.000001 mg/kg	
2,3,7,8-TCDD	EPA Method 1613B	0.00000034 mg/kg	0.000001 mg/kg	7.47592E-10 mg/kg
1,2,3,7,8-PeCDF	EPA Method 1613B	0.00000080 mg/kg	0.000005 mg/kg	
2,3,4,7,8-PeCDF	EPA Method 1613B	0.00000079 mg/kg	0.000005 mg/kg	
1,2,3,7,8-PeCDD	EPA Method 1613B	0.00000095 mg/kg	0.000005 mg/kg	
1,2,3,4,7,8-HxCDF	EPA Method 1613B	0.00000064 mg/kg	0.000005 mg/kg	
1,2,3,6,7,8-HxCDF	EPA Method 1613B	0.00000098 mg/kg	0.000005 mg/kg	
2,3,4,6,7,8-HxCDF	EPA Method 1613B	0.00000096 mg/kg	0.000005 mg/kg	
1,2,3,7,8,9-HxCDF	EPA Method 1613B	0.00000090 mg/kg	0.000005 mg/kg	
1,2,3,4,7,8-HxCDD	EPA Method 1613B	0.00000101 mg/kg	0.000005 mg/kg	
1,2,3,6,7,8-HxCDD	EPA Method 1613B	0.00000059 mg/kg	0.000005 mg/kg	
1,2,3,7,8,9-HxCDD	EPA Method 1613B	0.00000038 mg/kg	0.000005 mg/kg	
1,2,3,4,6,7,8-HpCDF	EPA Method 1613B	0.00000065 mg/kg	0.000005 mg/kg	
1,2,3,4,7,8,9-HpCDF	EPA Method 1613B	0.00000099 mg/kg	0.000005 mg/kg	
1,2,3,4,6,7,8-HpCDD	EPA Method 1613B	0.00000115 mg/kg	0.000005 mg/kg	
OCDF	EPA Method 1613B	0.00000139 mg/kg	0.00001 mg/kg	
OCDD	EPA Method 1613B	0.00000179 mg/kg	0.00001 mg/kg	

SIM = Selected Ion Monitoring

(a) Analytical methods are from SW-846 (EPA 1986) and updates.
(b) Target reporting limits are based on current laboratory data and may be modified during the investigation process as methodology is refined. Laboratory reporting will be based on the lowest standard on the calibration curve. Instances may arise where high sample concentrations, nonhomogeneity of samples, or matrix interferences preclude achieving the target reporting limits.
(c) Based on Ecology Spreadsheet Draft Preliminary Screening Levels & ARARs v14R1 in accordance with Ecology comments.
(d) Preliminary screening level is for xylenes.
(e) Methods NWTPH-G and NWTPH-Dx as described in *Analytical Methods for Petroleum Hydrocarbons,* Washington State Department of Ecology, Publication ECY97-602, June 1997 (Ecology 1997)
(f) Preliminary screening level when benzene is detected is 30 ug/L; when no benzene is detected, preliminary screening level is 100 ug/L.
(g) An acid silica gel cleanup will be performed for all NWTPH-Dx analyses.

TABLE 8
GROUNDWATER ARSENIC ANALYTICAL DATA
BOEING ISAACSON-THOMPSON SITE

		Dissolved Arsenic (µg/L)		Total Arsenic (µg/L)
Upgradient Well				
I-200	12/28/1995	2		15
I-200	4/19/1996	2		13
I-200	12/1/1999	2		
I-200	8/24/2000	3		
I-200	10/25/2000	2.7		
I-200	9/4/2007	<50/0.9	(a)	
I-200	6/17/2008	0.7		
I-200	2/4/2009	0.8		
Northern Property Boundary Well				
PZ-1	2/2/2009	7.1		
Western Property Boundary Wells				
I-203	12/28/1995	160		140
I-203	4/19/1996	70		68
I-203	12/1/1999	150		
I-203	8/24/2000	1,200		
I-203	10/25/2000	98		
I-203	9/4/2007	140		
I-203	6/16/2008	182		
I-203	2/4/2009	122		
I-104	12/28/1995	380		360
I-104	4/19/1996	330		330
I-104	12/1/1999	160		
I-104	8/24/2000	1,600		
I-104	10/25/2000	810		
I-104	9/5/2007	3600		
I-104	6/16/2008	3640		
I-104	2/2/2009	2,270		
I-205	Feb-1988	30		
I-205	9/12/1991	129		
I-205	9/19/1991	36		
I-205	9/26/1991	23		
I-205	10/3/1991	126		
I-205	4/16/1992	2		
I-205	4/23/1992	2		
I-205	4/30/1992	7		
I-205	5/7/1992	<1		
I-205	9/24/1992	57		
I-205	10/1/1992	2		
I-205	10/8/1992	1		
I-205	10/15/1992	9		
I-205	4/8/1993	24		
I-205	4/15/1993	46		
I-205	4/22/1993	25		
I-205	4/29/1993	56		
I-205	10/15/1993	11		
I-205	10/22/1993	11		
I-205	10/29/1993	19		
I-205	11/5/1993	310		
I-205	4/14/1994	<1		
I-205	4/21/1994	1		
I-205	4/28/1994	7		
I-205	5/5/1994	1		

TABLE 8
GROUNDWATER ARSENIC ANALYTICAL DATA
BOEING ISAACSON-THOMPSON SITE

		Dissolved Arsenic (µg/L)		Total Arsenic (µg/L)
I-205	12/28/1995	640		580
I-205	4/19/1996	320		26
I-205	Dec-99	10		
I-205	8/24/2000	27		
I-205	10/25/2000	112		
I-205	3/2/2006	13		
I-205	8/8/2006	9.8		
I-205	9/4/2007	<50/28	(a)	
I-205	**6/16/2008**	**45.9**		
I-205	2/4/2009	28.1		
I-206	Feb-88	1,700		
I-206	9/12/1991	1,470		
I-206	9/19/1991	1,790		
I-206	9/26/1991	1,580		
I-206	10/3/1991	1,610		
I-206	4/16/1992	1,610		
I-206	4/23/1992	1,770		
I-206	4/30/1992	1,670		
I-206	5/7/1992	1,600		
I-206	9/24/1992	1,680	J	
I-206	10/1/1992	1,580		
I-206	10/8/1992	1,550		
I-206	10/15/1992	1,700		
I-206	4/8/1993	1,710		
I-206	4/15/1993	1,580		
I-206	4/22/1993	1,510		
I-206	4/29/1993	1,700		
I-206	10/15/1993	1,680		
I-206	10/22/1993	1,590		
I-206	10/29/1993	1,810		
I-206	11/5/1993	1,510		
I-206	4/14/1994	1,360		
I-206	4/21/1994	1,480		
I-206	4/28/1994	1,370		
I-206	5/5/1994	1,430		
I-206	12/28/1995	2,000		1,600
I-206	4/19/1996	1,800		2,270
I-206	Dec-99	1,600		
I-206	8/24/2000	1,100		
I-206	10/25/2000	1,350		
I-206	3/2/2006	213		
I-206	8/8/2006	235		
I-206	9/4/2007	720		
I-206	**6/16/2008**	**690**		
I-206	2/4/2009	575		
PZ-7	8/24/2000	9		
PZ-7	10/25/2000	3.70		
PZ-7	9/4/2007	<50/4	(a)	
PZ-7	**6/16/2008**	**18.4**		
PZ-7	2/2/2009	5.0		
PZ-8	8/24/2000	2		
PZ-8	10/25/2000	2.80		
PZ-8	9/4/2007	<50/5	(a)	
PZ-8	**6/16/2008**	**3.6**		
PZ-8	2/4/2009	<1.0		

TABLE 8
GROUNDWATER ARSENIC ANALYTICAL DATA
BOEING ISAACSON-THOMPSON SITE

		Dissolved Arsenic (µg/L)		Total Arsenic (µg/L)
Boeing Thompson Property - North Side of Building 14-01				
PZ-2	2/4/2009	11.3		
PZ-4	2/4/2009	29.2		
Boeing Isaacson/Thompson Property Boundary				
PZ-3	2/4/2009	11.7		
PZ-6	2/4/2009	505		
Seep				
Seep 1	8/24/2000	7		
I-Seep (a)	9/5/2007	<50/5	(a)	
I-SEEP	6/17/2008	3.4		

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

Bold indicates June 2008 analytical results.

(a) Sample analyzed by Methods 6010B and 200.8.

TABLE 9
HISTORICAL SEDIMENT SAMPLES AND ANALYSIS SCHEDULE
BOEING ISAACSON-THOMPSON SITE

Surface samples

Location	Sample ID	Sample Date	Depth Sampled (feet bgs)	Max Sample Interval	Usable (Y/N)	Analytes
AN-029	AN029-SS-061025	10/25/06	0 to 0.33	0.33 ft	Y	Dioxin
AN-029	AN029-SS-061025	10/25/06	0 to 0.33	0.33 ft	Y	SMS
AN-030	AN030-SS-061025	10/25/06	0 to 0.33	0.33 ft	Y	SMS
AN-045	AN045-SS-080211	02/11/08	0 to 0.33	0.33 ft	Y	SMS
AN-046	AN046-SS-080211	02/11/08	0 to 0.33	0.33 ft	Y	SMS
AN-047	AN047-SS-080211	02/11/08	0 to 0.33	0.33 ft	Y	SMS
DR187	SD-DR187-0000	08/27/98	0 to 0.33	0.33 ft	N	Dioxin
DR188	SD-DR188-0000	08/25/98	0 to 0.33	0.33 ft	N	SMS
DR220	SD-DR220-0000	08/25/98	0 to 0.33	0.33 ft	N	SMS
EIT060	EIT06-01	09/26/97	0 to 0.33	0.33 ft	N	PCBs only
EST141	EST09-01	09/25/97	0 to 0.33	0.33 ft	N	PCBs only
EST142	EST09-02	10/24/97	0 to 0.33	0.33 ft	N	PCBs only
EST143	EST09-03	09/25/97	0 to 0.33	0.33 ft	N	PCBs only
EST147	EST10-01	09/25/97	0 to 0.33	0.33 ft	N	PCBs only
EST148	EST10-02	11/12/97	0 to 0.33	0.33 ft	N	PCBs only
EST157	EST11-07	09/24/97	0 to 0.33	0.33 ft	N	PCBs only
EST158	EST11-08	09/24/97	0 to 0.33	0.33 ft	N	PCBs only
EST159	EST11-09	09/24/97	0 to 0.33	0.33 ft	N	PCBs only
EST160	EST11-10	09/25/97	0 to 0.33	0.33 ft	N	PCBs only
EST161	EST11-11	11/13/97	0 to 0.33	0.33 ft	N	PCBs only
EST162	EST11-12	09/25/97	0 to 0.33	0.33 ft	N	PCBs only
LDW-SS112	LDW-SS112-010	01/19/05	0 to 0.33	0.33 ft	Y	SMS
LDW-SS114	LDW-SS114-010	01/20/05	0 to 0.33	0.33 ft	Y	SMS
LDW-SS225	LDW-SS115-010	01/25/05	0 to 0.33	0.33 ft	Y	SMS
LDW-SS226	LDW-SS116-010	01/20/05	0 to 0.33	0.33 ft	Y	SMS
LDW-SS118	LDW-SS118-010	01/20/05	0 to 0.33	0.33 ft	Y	SMS
LDW-SS119	LDW-SS119-010	01/19/05	0 to 0.33	0.33 ft	Y	SMS
LDW-SS157	LDW-SS157-010	03/16/05	0 to 0.33	0.33 ft	Y	SMS
LDW-SS158	LDW-SS158-010	03/16/05	0 to 0.33	0.33 ft	Y	SMS
LDW-SS159	LDW-SS159-010	03/16/05	0 to 0.33	0.33 ft	Y	SMS
LDW-SS338	LDW-SS338-010	10/03/06	0 to 0.33	0.33 ft	Y	SMS
LDW-SS541	LDW-SS541-010	12/17/09	0 to 0.33	0.33 ft	Y	Dioxin
R22SD	SD0001	10/08/97	0 to 0.33	0.33 ft	N	SMS
R23SD	SD0020	10/11/97	0 to 0.33	0.33 ft	N	SMS
R26SD	SD0002	10/09/97	0 to 0.33	0.33 ft	N	SMS
R27SD	SD0022	10/11/97	0 to 0.33	0.33 ft	N	SMS
R31SD	SD0003	10/09/97	0 to 0.33	0.33 ft	N	SMS
SD-216	SD-216-0000	08/26/04	0 to 0.33	0.33 ft	Y	PCBs only
SD-217	SD-217-0000	08/27/04	0 to 0.33	0.33 ft	Y	PCBs only
SD-315	SD-315-0000	08/17/04	0 to 0.33	0.33 ft	Y	SMS
SD-336	SD-336-0000	08/27/04	0 to 0.33	0.33 ft	Y	PCBs only
SD-345	SD-345-0000	08/26/04	0 to 0.33	0.33 ft	Y	PCBs only

Core samples

Location	Sample ID	Sample Date	Depth Sampled (feet bgs)	Max Sample Interval	Usable (Y/N)	Analytes
AN-043		2/11/08	0 to 6	1 ft	Y	
AN-043	AN043-SC-080211-A	2/11/08	0 to 1			SMS (partial)
AN-043	AN043-SC-080211-B	2/11/08	1 to 2			SMS (partial)
AN-043	AN043-SC-080211-C	2/11/08	2 to 3			SMS (partial)
AN-043	AN043-SC-080211-D	2/11/08	3 to 4			Metals
AN-043	AN043-SC-080211-E	2/11/08	4 to 5			Metals
AN-043	AN043-SC-080211-F	2/11/08	5 to 6			Metals
AN-044		2/11/08	0 to 6.5	1.5 ft	Y	
AN-044	AN044-SC-080211-A	2/11/08	0 to 1			SMS (partial)
AN-044	AN044-SC-080211-B	2/11/08	1 to 2			SMS (partial)

TABLE 9
HISTORICAL SEDIMENT SAMPLES AND ANALYSIS SCHEDULE
BOEING ISAACSON-THOMPSON SITE

Location	Sample ID	Sample Date	Depth Sampled (feet bgs)	Max Sample Interval	Usable (Y/N)	Analytes
AN-044	AN044-SC-080211-C	2/11/08	2 to 3.5			SMS (partial)
AN-044	AN044-SC-080211-D	2/11/08	3.5 to 4.5			Metals
AN-044	AN044-SC-080211-E	2/11/08	4.5 to 5.5			Metals
AN-044	AN044-SC-080211-F	2/11/08	5.5 to 6.5			Metals
AN-044	AN094-SC-080211-B	2/12/08	1 to 2			
DR220		9/23/98	0 to 4	2.0 ft	N	
DR220	SD-DR220-0000A	9/23/98	0 to 2			SMS
DR220	SD-DR220-0020	9/23/98	2 to 4			SMS
DU9120XX		8/6/91	0 to 3	3.0 ft	N	
DU9120XX	DUWO&M91S012	8/6/91	0 to 3			DMMP
LDW-SC50a		2/24/06	0 to 4	1.2 ft	Y	
LDW-SC50a	LDW-SC50-0-1	2/24/06	0 to 1			SMS
LDW-SC50a	LDW-SC50-1-2	2/24/06	1 to 2			SMS
LDW-SC50a	LDW-SC50-2-2_8	2/24/06	2 to 2.8			SMS
LDW-SC50a	LDW-SC50-2_8-4	2/24/06	2.8 to 4			SMS
LDW-SC51		2/22/06	0 to 5.8	2.0 ft	Y	
LDW-SC51	LDW-SC51-0-0_5	2/22/06	0 to 0.5			SVOCs
LDW-SC51	LDW-SC51-0_5-1	2/22/06	0.5 to 1			SVOCs
LDW-SC51	LDW-SC51-1-1_5	2/22/06	1 to 1.5			SVOCs
LDW-SC51	LDW-SC51-1_5-2	2/22/06	1.5 to 2			SVOCs
LDW-SC51	LDW-SC51-2-3_8	2/22/06	2 to 3.8			SMS
LDW-SC51	LDW-SC51-3_8-5_8	2/22/06	3.8 to 5.8			PCBs only
LDW-SC51	LDW-SC51-0-2	2/22/06	0 to 2			SMS
SD-216		4/21/04	0 to 7.7	1.0 ft	Y	
SD-216	SD-216-0000	4/21/04	0 to 1			Metals, PCBs
SD-216	SD-216-0010	4/21/04	1 to 2			Metals, PCBs
SD-216	SD-216-0020	4/21/04	2 to 3			PCBs only
SD-216	SD-216-0030	4/21/04	3 to 4			PCBs only
SD-216	SD-216-0040	4/21/04	4 to 5			PCBs only
SD-216	SD-216-0050	4/21/04	5 to 5.9			PCBs only
SD-216	SD-216-0060	4/21/04	6 to 7			PCBs only
SD-216	SD-216-0070	4/21/04	7 to 7.7			PCBs only
SD-217		4/22/04	0 to 5.6	1.0 ft	Y	
SD-217	SD-217-0000	4/22/04	0 to 0.9			Metals, PCBs
SD-217	SD-217-0010	4/22/04	1 to 1.9			Metals, PCBs
SD-217	SD-217-0020	4/22/04	2 to 2.9			PCBs only
SD-217	SD-217-0030	4/22/04	3 to 3.7			PCBs only
SD-217	SD-217-0040	4/22/04	4 to 4.5			PCBs only
SD-217	SD-217-0050	4/22/04	5 to 5.6			PCBs only
SD-315-C		8/19/04	1 to 4	1.0 ft	Y	
SD-315-C	SD-315-0001	8/19/04	1 to 2			Metals, PCBs
SD-315-C	SD-315-0002	8/19/04	2 to 3			PCBs only
SD-315-C	SD-315-0003	8/19/04	3 to 4			PCBs only

APPENDIX A

Uplands SAP

Final Uplands SAP
Remedial Investigation/Feasibility Study
Boeing Isaacson-Thompson Site
Tukwila, Washington

September 16, 2011

Prepared for

The Boeing Company

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FIGURES

TABLES

1.0 INTRODUCTION

This sampling and analysis plan (SAP) describes the procedures for conducting upland field activities during the remedial investigation (RI) and feasibility study (FS) at the Boeing Isaacson-Thompson site (Site), located at 8625-8811 Street E-Marginal Way (Figure A-1). This SAP is an appendix to the Site Ecology Review Draft Final *Work Plan, Remedial Investigation/Feasibility Study, Boeing Isaacson-Thompson Site, Tukwila, Washington* (Work Plan), which is one of the required deliverables under the Agreed Order (No. DE7088) dated April 23, 2010 between The Boeing Company (Boeing) and the Washington State Department of Ecology (Ecology). The primary objective of this SAP is to provide sampling and analysis procedures and methodologies consistent with accepted procedures such that the data collected will be adequate for use in characterizing upland environmental conditions. This SAP was prepared consistent with the requirements of Washington Administrative Code (WAC) 173-340-820. It provides field, sampling, and analytical procedures to be used during the RI/FS.

2.0 FIELD INVESTIGATION PROCEDURES

Planned field investigation activities associated with the RI/FS include the following:

- Excavation of 9 test pits and collection of soil samples from the sidewalls of each test pit for chemical analysis
- Drilling of soil borings and collection of soil samples for chemical analysis at 37 locations
- Installation of permanent shallow monitoring wells at 25 of the 37 soil borings
- Collection of a groundwater grab sample at 1 of the 37 soil borings for chemical analysis
- Collection of soil samples from 3 locations, if possible, along the outside of the wooden bulkhead located at the southern portion of the Site for chemical analysis
- Collection of groundwater samples from 25 new and 5 of the existing groundwater monitoring wells and 7 existing piezometers for chemical analysis
- Collection of groundwater samples from seeps located at the Site, if any are present during field sampling activities for chemical analysis
- Measurement of groundwater levels at 25 new and 5 of the existing groundwater monitoring wells and 7 existing piezometers
- Continuous groundwater level monitoring at 6 monitoring well locations
- Collection of solids at existing storm drain system catch basins, oil/water separators, Vortechs® (Vortechs) vaults, and manholes for chemical analysis
- Collection of stormwater samples from each Boeing-owned outfall during 2 separate events for chemical analysis
- Collection of soil vapor samples from 5 subfloor sample locations inside Building 14-01 for chemical analysis
- Abandonment of 2 existing wells, TH-MW-1 and TH-MW-2
- Video survey of the 12-inch metal corrugated pipe located adjacent to the Site's southern property boundary.

Additional field investigation activities that may be conducted based on investigation results include:

- Collection of samples of building materials (e.g., paint from building or equipment surfaces, building siding material, roofing materials, and caulking) for chemical analysis
- Collection of indoor air samples from Building 14-01 for chemical analysis.

This section describes the field procedures to be employed for each of these activities.

2.1 SOIL INVESTIGATION

The soil investigation will consist of collecting and analyzing soil samples from 25 soil borings where new wells will be installed (including 3 wells inside Building 14-01), from 3 soil borings located in the area of the former paint storage areas and paint sludge areas on the Isaacson property, from 3 borings located in the vicinity of the former Slip 5 outfall, from 5 soil borings located within the former Slip 5 limits, from 1 soil boring located inside the southwestern portion of Building 14-01, from 1 test pit located in the area of the former diesel and gasoline underground storage tanks (USTs) on the Isaacson property, from 5 test pits excavated in the vicinity of existing monitoring wells I-205 and I-206, from 1 test pit downgradient of the former hydraulic test pad area, and from 2 test pits north of the eastern Vortechs vault where a vein of tar-like substance was previously observed. Soil samples will also be collected from 3 locations along the outside of the wooden bulkhead located at the southern portion of the Boeing Thompson property. The wooden bulkhead and current Site features are shown on Figure A-2. The proposed sampling locations are shown on Figure A-3. The actual location of each soil exploration will be surveyed using differential global positioning system (DGPS) equipment or by a professional land surveyor to facilitate accurate placement of these features on project figures and drawings, as well as for submittal to Ecology. The ground surface elevation at each soil exploration will also be surveyed by a professional land surveyor. The test pit explorations will be conducted prior to conducting the soil borings.

In March 2011, Boeing prepared a work plan for conducting the RI activities inside Building 14-01 (Landau Associates 2011). The work plan was prepared in advance of the RI/FS work plan to expedite the investigation in Building 14-01 due to Boeing's planned re-occupation of the building, which may significantly restrict the extent of the investigation that can be conducted in the building. Ecology approved the work plan on March 30, 2011 (Landau Associates 2011). In April 2011, the soil boring planned to be completed inside Building 14-01 and the soil borings for three monitoring wells planned to be installed inside Building 14-01 were completed and soil samples were collected and analyzed in accordance with the work plan.

2.1.1 BOREHOLE SAMPLING

Boreholes for collecting soil samples, a groundwater grab sample, and for well installation will be drilled using a truck-mounted hollow-stem auger rig and/or a direct-push probe rig. Borings will be extended to a depth of 25 ft below ground surface (BGS) unless an aquitard (silt or clay) of 1-ft thickness is encountered at depths less than 25 ft BGS. Soil borings will not extend more than 1 foot (ft) into an aquitard. Borings will be completed by a driller licensed in the state of Washington and will be monitored by a Landau Associates' field representative. Soil will be described and classified in accordance with the Unified Soil Classification System (USCS). Prior to initiation of drilling or any other invasive subsurface activity, the locations of each proposed exploration will be checked in the field to locate aboveground utilities or physical limitations that would prevent drilling at the proposed location.

In addition, a public utility locate service will be contacted to locate underground utilities at the perimeter of the Site and a private utility locate service will be retained to clear explorations for underground utilities. The final location for each borehole will be based on the findings of the field check. Before and between drilling of each boring and at completion of the project, downhole drilling equipment will be cleaned using a high-pressure hot water or steam washer as described in Section 2.13.

During drilling, continuous soil samples will be collected at each soil boring location to classify soil lithology in accordance with the USCS. For soil borings drilled using a hollow-stem auger rig, the soil samples will be obtained using a 3-inch diameter, 1.5-ft long, split-spoon sampler. For soil borings drilled using a direct-push probe rig, soil samples will be collected using a closed-piston sampling device with a 48-inch long, 1.5-inch diameter core sampler. A record of the soil and groundwater conditions observed during drilling will be recorded on a Log of Exploration Form. The boring log will also show soil types; evidence of contamination, based on field screening; and other pertinent information. Soil retained in the sampler will be field-screened for evidence of environmental impact. Field-screening will be conducted by visually inspecting the soil for staining and other evidence of environmental impact, and monitoring soil vapors for volatile organic compounds (VOCs) using a portable photoionization detector (PID).

At each boring location, samples will be collected from 2 to 3 ft BGS, 5 to 6 ft BGS, 8 to 9 ft BGS, and 13 to 14 ft BGS and submitted for laboratory analysis. If the 13- to 14-ft depth interval is not at least 1 ft below the groundwater table at the time of drilling, the 13- to 14-ft depth interval sample will be replaced with a sample from a depth interval starting at 1 ft below the groundwater table at the time of drilling. Also, additional samples will be collected from the depth interval where field-screening indicates the likelihood for potential contamination, if any, and from the depth interval below the zone of potential contamination to evaluate the vertical extent of potential impact. If field-screening does not indicate a potential for contamination, a sample will also be collected from 13 to 14 ft BGS and archived at the laboratory for potential future analysis, pending the results of the samples submitted for analysis. Soil samples collected for analysis of VOCs will be collected in accordance with U.S. Environmental Protection Agency (EPA) Method 5035A. The EPA 5035A soil sampling method is intended to reduce volatilization and biodegradation of samples. The EPA 5035A procedure for soil sample collection is as follows:

- Collect soil “cores” from the split-spoon sampler using coring devices (i.e., EnCore® sampler, EasyDraw Syringe®, or a Terra Core™ sampling device). Each “core” will consist of approximately 5 grams of soil. Collect three discrete “cores” from each sampling location. One EasyDraw Syringe® or Terra Core™ device will be used to collect the three discrete “cores”; however, if the EnCore® samplers are used, then three sampling devices are required.

- Remove excess soil from the coring device. If EasyDraw Syringe® or Terra Core™ sampling device are used for sample collection, then place the "cored" soil directly into three preserved 40 milliliter (ml) vials with a stirbar. Vials will be preserved as indicated in Table A-1. If the EnCore® sampler is used, then close the sampler for transport to the laboratory.
- Collect one 2-ounce (oz) soil jar of representative soil for moisture content and laboratory screening purposes. Fill the jar to minimize headspace.

Soil samples to be tested for non-volatile parameters [e.g., metals, semivolatile organic compounds (SVOCs), and polychlorinated biphenyls (PCBs)] will be collected from the identified soil sampling interval using the following methods:

- Scrape the outside of the soil core to expose a fresh sampling surface using a clean decontaminated stainless-steel spoon.
- Homogenize the soil in a decontaminated stainless-steel bowl using the stainless-steel spoon.
- Transfer the homogenized soil into the appropriate laboratory-supplied sample container.

Soil samples collected from monitoring well boreholes for laboratory analysis will be labeled using the following format:

"IT-location(-depth interval)-yymmdd"

where location will be MW-1, MW-2, MW-3, etc.

Soil samples collected from soil boreholes with no monitoring wells will be labeled using the following format:

"IT-location(-depth interval)-yymmdd"

where location will be SB-1, SB-2, SB-3, etc.

2.1.2 TEST PIT SAMPLING

Test pits will be excavated using a backhoe or excavator. Each test pit will extend to the groundwater table. Soil at each test pit location will be removed in 1-ft lifts and each lift stockpiled separately along the side of the test pit. If evidence of potential contamination is observed [i.e., visual presence of potential contamination and/or a PID measurement greater than 50 parts per million (ppm)], the potentially contaminated soil will be stockpiled separately. At each test pit, a record of the soil and groundwater conditions observed in the excavation will be recorded on a Log of Exploration Form. The soil lithology will be classified at each test pit in accordance with the USCS.

Soil samples will be collected from depth intervals where field-screening (i.e., visual presence of potential contamination and/or a PID measurement greater than 50 ppm) indicates the likelihood for potential contamination, from the base of the excavation, and from each side wall. If no zones of potential contamination are identified, a soil sample will be collected from the capillary fringe approximately 1 ft above the groundwater table. Soil samples will be collected from the test pit sidewalls using the backhoe bucket. Soil will be collected in the bucket by scraping the sidewall at the desired depth interval. A sample of the soil from the backhoe bucket will be collected using a decontaminated stainless-steel spoon. Care will be taken to avoid collecting soil that is in direct contact with the bucket. Soil samples collected for analysis of VOCs will be collected in accordance with EPA Method 5035A using the procedures described in Section 2.1.1. Soil samples to be tested for non-volatile parameters (e.g., metals, SVOCs, and PCBs) will be placed into a decontaminated stainless-steel bowl, homogenized using the stainless-steel spoon, and transferred into the appropriate laboratory-supplied sample container. Soil will be placed back in the test pit in approximately the same layer in which it was removed.

Soil samples collected from test pits for laboratory analysis will be labeled using the following format:

"IT-location(-depth interval)-yymmdd"

where location will be TP-101, TP-102, TP-103, etc.

2.1.3 WOODEN BULKHEAD SOIL SAMPLING

Soil samples will be collected at three locations along the LDW side of the wooden bulkhead located at the southern portion of the Boeing Thompson property, if possible. The samples will be collected from cracks in the bulkhead if soil is present and accessible between the cracks. The soil samples will be collected using hand implements such as stainless-steel spoons or trowels. Soil samples collected for analysis of VOCs will be collected in accordance with EPA Method 5035A using the procedures described in Section 2.1.1, if possible. Soil samples to be tested for non-volatile parameters (e.g., metals, SVOCs, and PCBs) will be placed into a decontaminated stainless-steel bowl, homogenized using the stainless-steel spoon, and transferred into the appropriate laboratory-supplied sample container.

Soil samples collected from the wooden bulkhead area for laboratory analysis will be labeled using the following format:

"IT-location-yymmdd"

where location will be WB-1, WB-2, WB-3, etc.

2.1.4 LABORATORY ANALYSIS

All soil samples will be analyzed for the classes of chemicals identified as the Site PCOCs (Section 5.2 of the work plan). The classes of chemicals includes metals, SVOCs [including polycyclic aromatic hydrocarbons (PAHs)], VOCs, petroleum hydrocarbons, and PCBs. The list of specific metals to be analyzed for include antimony, arsenic, barium, beryllium, cadmium, total chromium, hexavalent chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc. A list of specific chemicals for the other classes of chemicals is provided in Table C-1 of the Quality Assurance Project Plan (QAPP; Appendix C of this work plan). The methods for analysis of the above compounds are also summarized in Table C-1 of the QAPP (Appendix C of this work plan).

2.2 GROUNDWATER INVESTIGATION

The groundwater investigation will consist of installing 25 additional monitoring wells; collecting groundwater samples from each of the new monitoring wells, from 5 of the existing monitoring wells, from each of the seven existing piezometers, and from 1 proposed soil boring; laboratory analysis of the groundwater samples; groundwater level monitoring; collecting seep samples at the western property boundary, if any are present during field sampling activities; abandonment of 2 existing wells (TH-MW-1 and TH-MW-2); and re-evaluation of tidal influences on Site groundwater. The tidal study will also be used to evaluate hydraulic conductivity at the Site. Proposed locations for installation of new permanent monitoring wells and for collection of a groundwater grab sample from 1 soil boring are shown on Figure A-4.

2.2.1 SOIL BORING GROUNDWATER GRAB SAMPLING

A groundwater sample will be collected from one soil boring located near the former Slip 5 Outfall (Figure A-4). The groundwater sample will be collected using a groundwater sampler consisting of a 4-ft long, wire-wrapped, stainless-steel screen (0.010-inch slot size) with a retractable protective steel sheath. The groundwater sampler will be advanced to the sample depth and the protective sheath will be retracted to expose the stainless-steel screen to the formation. Low-flow purging will be performed for 10 minutes or until the purge water is clear using a peristaltic pump. During purging, pH, conductivity, and temperature will be measured using a flow-through cell and recorded on a field sample collection form. Groundwater samples will be collected directly into the appropriate sample containers using disposable polyethylene tubing and a peristaltic pump. Samples will be chilled to 4° Centigrade (C) immediately after collecting the sample. Groundwater for dissolved metals analyses will be collected last and field-filtered through a 0.45 micron, in-line disposable filter. Dissolved metals samples will be preserved, as specified in Table A-1. A note will be made on the sample label, sample collection form, and chain-of-custody form to indicate the sample has been field-filtered and preserved, including the type of preservative used.

The groundwater grab sample collected from a soil boring will be labeled using the following format:

"IT-location-GW-yymmdd"

where location will correspond to the location identification used for the soil boring (e.g., SB-1, SB-2, SB-3, etc.).

2.2.2 MONITORING WELL GROUNDWATER SAMPLING

Groundwater samples will be collected from all new monitoring wells, five of the existing monitoring wells, and all existing piezometers during four consecutive quarterly monitoring events.

The proposed locations for the new monitoring wells are as follows:

- One well will be installed along the northern Site property boundary.
- Three wells will be installed in the area containing stabilized arsenic-contaminated soil.
- One well will be installed immediately downgradient of the former paint storage areas on the Isaacson property, and another well will be installed farther downgradient of these former paint storage areas by approximately 500 ft.
- One monitoring well will be located near the former Slip 5 Outfall.
- Two monitoring wells will be installed upgradient (east) of well I-104(s) to evaluate potential sources for the elevated arsenic concentrations detected in groundwater at well I-104(s).
- Three wells will be installed within the limits of the former Slip 5.
- One well will be installed in the former hydraulic test pad area.
- Five monitoring wells will be installed along the western Site boundary. One of these wells will be located downgradient of the former hydraulic test pad area.
- Seven monitoring wells will be installed in the southern portion of the Site to better determine groundwater flow direction and evaluate groundwater quality.

In April 2011, three of seven monitoring wells planned for the southern portion of the Site were installed and developed. The three wells were installed inside Building 14-01 and developed in accordance with the Building 14-01 Work Plan (Landau Associates 2011). A fourth well was planned to be installed inside Building 14-01, but drilling was obstructed by the thickness of the concrete floor slab at the planned location. The location of the well was moved outside of the building near the southern property boundary and is included in the above list of monitoring wells. The revised location is shown on Figure A-4.

Procedures for installing and developing the new wells and collecting groundwater samples from new and existing monitoring wells and the planned laboratory analyses are described below.

2.2.2.1 Installation and Construction of Monitoring Wells

Boreholes for groundwater monitoring wells will be drilled using hollow-stem auger drilling equipment. Depending on the depth-to-water at each monitoring well location, the borings will be advanced to approximately 25 ft BGS. Monitoring wells will be constructed by a licensed drilling contractor in the state of Washington, in accordance with the *Minimum Standards for Construction and Maintenance of Wells* (Chapter 173-160 WAC; Ecology 2008). Oversight of drilling and well installation activities will be performed by an environmental professional familiar with environmental sampling and construction of resource protection wells.

The monitoring wells will be constructed with 2-inch diameter, flush-threaded, Schedule 40 PVC pipe. Based on the variation of water levels previously observed at the Site due to tidal and/or seasonal fluctuations, each well will be constructed with 10-ft screens and screened over a depth of 8 to 18 ft BGS. If necessary, the well screen depth interval will be modified at the time of construction so that the well is screened across the groundwater table. The well screen will be constructed of a 0.010-inch machine-slotted casing. A filter pack material consisting of pre-washed, pre-sized number 20/40 silica sand will be placed from the bottom of the well to approximately 2 ft above the top of the screen. Filter pack material will be placed slowly and carefully to avoid bridging of material. A bentonite seal will be placed above the filter sand pack material to within about 3 ft of ground surface. Grout will be used to backfill the boring to the subgrade for placement of the protective cover. The wells will be completed with flush-mounted protective casings.

The well names and the identification numbers assigned by Ecology will be marked on the well identification tags supplied by Ecology and will be attached to each well casing following well installation.

2.2.2.2 Well Development

The monitoring wells will be developed after construction to remove formation material from the well borehole and the filter pack prior to groundwater level measurement and sampling. Development will be achieved by repeatedly surging the well with a surge block and purging the well until the water runs clear, at least 5 well casing volumes will be removed. During development, the purged groundwater will be monitored for the following field parameters:

- pH
- Specific conductance
- Temperature
- Dissolved oxygen
- Turbidity.

The wells will be developed until the turbidity of the purged groundwater decreases to 5 Nephelometric turbidity units (NTUs), if practicable. If the well dewaters during the initial surging and purging effort, one final well casing volume will be removed after the well has fully recharged, if practicable. Well development activities will be recorded on a Well Development form.

2.2.2.3 Groundwater Sample Collection

The groundwater samples will be collected at least 2 days after well development. During each event, groundwater samples will be collected from monitoring wells and piezometers located in the western half of the Site within 1 hour before and 1 hour after low tide, at a time when groundwater should be flowing from the Site to the Lower Duwamish Waterway (LDW). Water levels will be measured prior to sample collection as described in Section 2.2.6. Collection of groundwater samples at each new monitoring well, five existing monitoring wells, and each piezometer will be completed using low-flow sampling techniques and the following procedures:

- Immediately following removal of each well monument cover, the well head will be observed for damage, leakage, and staining. Additionally, immediately following removal of the well head cap, any odors will be recorded and the condition of the well opening will be observed. Any damage, leakage, or staining to the well head or well opening will be recorded.
- Depth to groundwater will be measured from the top of casing prior to extraction of water from the well or piezometer, using the procedures described in Section 2.2.6.
- Prior to sampling, each well will be purged using a pump that is attached to dedicated purge and sample collection tubing (types of pumps used may vary depending on purge volume and depth and include a centrifugal pump, a peristaltic pump, and an electric submersible pump). Purging will begin with a low pumping rate. The pumping rate will be maintained at less than 1 liter per minute and with drawdown of less than 1 ft during purging. Purging will continue until specific conductance, pH, temperature, oxidation reduction potential (ORP), and dissolved oxygen (field parameters) have stabilized.
- Field parameters, including pH, temperature, specific conductance, dissolved oxygen, and turbidity, will be continuously monitored during purging using a flow cell. Purging of the well will be considered to be complete when all field parameters become stable for three successive readings. The successive readings should be within +/- 0.1 pH units for pH, +/- 3 percent for conductivity, and +/- 10 percent for dissolved oxygen and turbidity.
- Purge data will be recorded on a Groundwater Sample Collection form including purge volume; time of commencement and termination of purging; any observations regarding color, turbidity, or other factors that may have been important in evaluation of sample quality; and field measurements of pH, specific conductance, temperature, dissolved oxygen, and turbidity.
- Following the stabilization of field parameters, the flow cell will be disconnected and groundwater samples will be collected. Sample data will be recorded on a Groundwater Sample Collection form, including sample number and time collected; the observed physical characteristics of the sample (e.g., color, turbidity, etc.); and field parameters (pH, specific conductance, temperature, dissolved oxygen, and turbidity).
- Any problems or significant observations will be noted in the "comments" section of the Groundwater Sample Collection form.
- Groundwater samples will be collected directly into the appropriate sample containers using a peristaltic pump. To prevent degassing during sampling for VOCs, a pumping rate will be maintained below about 100 milliliters per minute (ml/min). The VOC containers will be

filled completely so that no head space remains. Samples will be chilled to 4°C immediately after collection. Clean gloves will be worn when collecting each sample.

- Groundwater for dissolved metals analyses will be collected last and field-filtered through a 0.45 micron, in-line disposable filter. Dissolved metals samples will be preserved, as specified in Table A-1. A note will be made on the sample label, sample collection form, and chain-of-custody to indicate the sample has been field filtered and preserved, including the type of preservative used.

Groundwater samples collected from monitoring wells and piezometers for laboratory analysis will be labeled using the following format:

"IT-location-yymmdd" where location will be MW-1, MW-2, PZ-1, etc.

2.2.3 SEEP SAMPLING

Groundwater samples will be collected from any seep(s) along the LDW shoreline on Boeing property and submitted for laboratory analysis. At least one seep has been identified and sampled during previous investigations. The approximate location of the previously sampled seep is shown on Figure A-4. Seep samples will be collected directly into the appropriate sample containers. Seep samples for total and dissolved metals analyses will first be collected in a non-preserved sample container and field-filtered through a 0.45 micron in-line disposable filter using a hand pump. Filtered water will be collected in a preserved container, as specified in Table A-1. A note will be made on the sample label, sample collection form, and chain-of-custody to indicate the sample has been field-filtered and preserved.

Seep samples collected for laboratory analysis will be labeled using the following format:

"IT-location-yymmdd" where location will be Seep-1, Seep-2, etc.

2.2.4 LABORATORY ANALYSIS

All groundwater and seep samples will be analyzed for the classes of chemicals identified as the Site's PCOCs (Section 5.2 of the work plan). The classes of chemicals include metals, SVOCs (including PAHs), VOCs, petroleum hydrocarbons, and PCBs. Groundwater and seep samples will be analyzed for total and dissolved metals. The list of specific metals to be analyzed for includes antimony, arsenic, barium, beryllium, cadmium, total chromium, hexavalent chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc. A list of specific chemicals for the other classes of chemicals is provided in Table C-1 of the QAPP (Appendix C of this work plan). Groundwater samples will also be analyzed for total dissolved solids (TDS), nitrate, and sulfate. The methods for analysis of the above compounds are summarized in Table C-1 of the QAPP (Appendix C of this work plan).

2.2.5 GROUNDWATER FIELD PARAMETERS

Field parameters including pH, temperature, conductivity, dissolved oxygen, turbidity, and ORP will be measured at each groundwater monitoring location using a flow-through cell. Ferrous iron will also be measured at each sampling location using a field test kit. Field parameters will be measured during all groundwater monitoring events.

2.2.6 GROUNDWATER FLOW MONITORING

To evaluate groundwater flow direction, depth to groundwater will be measured at each new well, five existing wells, and each piezometer during each sampling event. Also, a tidal study will be conducted to evaluate tidal influence on groundwater flow and to calculate hydraulic conductivity. Procedures for monitoring groundwater flow and evaluating tidal influence are discussed below.

2.2.6.1 Monitoring Well Surveying

The location of each new and existing well and each piezometer will be surveyed using DGPS equipment and by a professional land surveyor to facilitate accurate placement of these features on project figures and drawings, as well as for submittal to Ecology. Surveying will be accomplished after completion of the new well installations.

Monitoring well reference elevations at both new and existing monitoring wells will be surveyed by a professional licensed surveyor to the nearest 0.01 ft for use in evaluating groundwater and lithologic unit elevations. Both the top of monitoring well casing elevation and ground surface elevation adjacent to the monitoring well will be obtained. This information will be used to develop groundwater elevation contour maps.

2.2.6.2 Water level Measurements

Water level measurements will be obtained at each monitoring well and piezometer prior to purging and sample collection. Water levels will also be measured in the LDW during each sampling event. All water levels will be measured using an electronic water level indicator and will be recorded to the nearest 0.01 ft. Measurements will be taken from the top of the well casing. Water levels in the LDW will be measured from a surveyed point at the edge of a stationary dock or piling.

2.2.6.3 Tidal Study

To evaluate the tidal influence on groundwater at the Site, water level fluctuation will be logged on a continuous basis for 24 to 48 hours at six wells. The proposed well locations include new wells to be installed in the northwest and southwest corners of the Site, one new well installed along the western Site boundary between existing wells TH-MW-1 and TH-MW-2, and at existing wells I-205(s), PZ-4, and PZ 6. The tidal study will be conducted during a higher high tide and a lower low tide, if possible. In addition to monitoring water levels at selected wells, a transducer will be placed in the LDW during the tidal study. Tidal fluctuation information for the LDW will be used to calculate hydraulic conductivity at the Site.

Water levels in monitoring wells will be recorded using a combination of pressure transducers with internal dataloggers and an electronic water level indicator. The data collection will include continuous (every 15 minutes) transducer-based water level measurements in wells and in the LDW. The datalogger will be programmed to automatically convert pressure changes to water levels. If possible, a vented transducer will be used that internally corrects for fluctuations in atmospheric pressure.

Procedures for conducting the tidal study are summarized below:

1. At each monitoring well, a pressure transducer will be lowered into the well and securely fastened to the top of the well casing for the duration of the monitoring period. A transducer will also be lowered into the LDW from a secured location.
2. The transducers will be set to record the height of the water column above the transducer at 15-minute intervals.
3. Pressure transducers will be rated to a minimum 15 pounds per square inch range capable of measuring a water level change of 23 ft with a resolution of 0.01 ft.
4. Depth to water will also be measured from the top of the well casing to the nearest 0.01 ft with a manual electronic water level indicator. Depth-to-water level will be manually measured a minimum of four times during the monitoring period.
5. At the end of the monitoring period, the pressure transducers will be removed and the water level data will be uploaded to a computer.

Similar procedures will be used to monitor surface water levels in the LDW.

2.2.7 WELL ABANDONMENT

Two wells, TH-MW-1 and TH-MW-2, located on the western Site boundary as shown on Figure A-4, will be abandoned. Well abandonment will be conducted in accordance with the requirements set forth in WAC 173-160-420 and WAC 173-160-460. Prior to the start of decommissioning activities, a Notice of Intent to Decommission Wells and as-built well logs for each well will be submitted to Ecology within a minimum of 72 hours prior to the start of abandonment activities. The wells will be abandoned by backfilling the well screens and casings with bentonite chips. Well monuments at each well will be removed and the ground surface compacted and existing asphalt pavement patched. Upon completion of the well abandonment, a Water Well Report accompanied by as-built well decommissioning logs and a copy of the original Resource Protection Well Report forms will be submitted to Ecology.

2.3 STORM DRAIN SYSTEM SOLIDS SAMPLING

Catch basins, oil/water separators, Vortechs vaults, and manholes connected to the storm drain system at the Boeing Thompson and Isaacson properties will be sampled during the RI. The locations of the catch basins, oil/water separators, Vortechs vaults, and manholes are shown on Figure A-5. Samples will not be collected from catch basins located outside the Site boundaries (CB-1 through CB-4).

Samples from each location will be collected with a telescoping sampling pole with a clean sampling jar or stainless-steel scoop attached to the end. Solids will be collected from the bottom of each catch basin and then transferred directly into a laboratory-provided sample container. If there is sufficient solids material in the catch basin, solids will be collected from several areas of the catch basin and placed into the sample container. If necessary, water collected with the solids material will be decanted back into the catch basin prior to placing the solids material into the sample container. The sampler will remove material greater than approximately ½-inch diameter prior to placing the solids material in the sample container. An 8-oz jar of solids is needed to provide adequate material for the planned analyses. If less than 6 oz of solids material can be collected from a specific catch basin or catch basins, not all planned analyses may be conducted or solids material from nearby catch basins that flow to the same storm drain line may be combined by the laboratory prior to analysis. Samples collected from the oil/water separators will not be combined.

The solids samples will be analyzed for the classes of chemicals identified as the Site's PCOCs (Section 5.2 of the work plan). The classes of chemicals include metals, SVOCs (including PAHs), VOCs, petroleum hydrocarbons, and PCBs. The list of specific metals to be analyzed for include antimony, arsenic, barium, beryllium, cadmium, total chromium, hexavalent chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc. A list of specific chemicals for the other classes of chemicals is provided in Table C-1 of the QAPP (Appendix C of this work plan). Solids samples will also be analyzed for total organic carbon (TOC). If insufficient solids are present for all analyses, priority will be given to PCBs, TOC, and metals. If sufficient volumes of solids are not present to conduct the shorter list of analyses, then solids from a nearby catch basin will be composited. At three catch basins, solids samples will also be analyzed for dioxins/furans. The catch basins where solids will be analyzed for dioxins/furans will consist of the following:

- The westernmost Vortechs vault connected to the storm drain line that discharges to Outfall A. If sufficient solids are not present at this location for the analysis of PCOCs and dioxins/furans, solids at the next upstream catch basin (e.g., CB34, CB35, or CB51) where a sufficient volume of solids is present will be collected and submitted for analysis. A composite sample consisting of solids from two or more of these locations will only be collected if sufficient volume is not present at a single location.

- The catch basin located at the northeast corner of the 14-03 building that has not been given a numerical designation by Boeing for the catch basin location). This catch basin is connected to the storm drain line that discharges to Outfall A. If sufficient solids are not present at this location for the analysis of PCOCs and dioxins/furans, solids from one of the catch basins located north of Buildings 14-02 and 14-03 (CB29 or CB 30) where a sufficient volume of solids is present will be collected and submitted for analysis. A composite sample consisting of solids from two or more of these locations will only be collected if sufficient volume is not present at a single location.
- The catch basin identified as CG76 that is connected to the storm drain line that discharges to Outfall B. If sufficient solids are not present at this location for the analysis of PCOCs and dioxins/furans, a sample will be collected from catch basin CG74 or from catch basin CB77 if a sufficient volume of solids is not present at CG74. A composite sample consisting of solids from two or more of these locations will only be collected if sufficient volume is not present at a single location.

The methods for analysis of the above compounds are summarized in Table C-2 of the QAPP (Appendix C of this work plan). Storm drain system solids samples collected for laboratory analysis will be labeled using the following format:

"IT-location-yymmdd"

where location will correspond to the catch basin number (e.g., CB-39, etc.).

2.4 STORMWATER SAMPLING

Grab samples representative of the stormwater discharged from Outfalls A and B will be collected during two separate events when discharge is present. Due to access limitations, the samples will be collected from manholes located along each storm drain and as close to the point of discharge as possible. To collect samples of stormwater representative of discharge at Outfall A, grab samples will be collected at two locations, MH 40 and MH 86, shown on Figure A-5. To collect samples of stormwater representative of discharge at Outfall B, a grab sample will be collected at MH 80, shown on Figure A-5. The samples will be collected when river water is absent from the storm drain pipes and, if practicable, within the first hour of a storm event. The samples will be collected using a telescoping sampling pole with a clean sampling jar attached to the end. Following filling of the jar, the stormwater will be transferred directly into a laboratory-provided sample container. Additional stormwater samples will be collected, as necessary, to fill all the necessary sample containers. A new, clean jar will be attached to the telescoping pole between sample locations. The stormwater samples will be analyzed for the classes of chemicals identified as the Site's PCOCs (Section 5.2 of the work plan). The classes of chemicals includes metals, SVOCs (including PAHs), VOCs, petroleum hydrocarbons, and PCBs. Stormwater samples will be analyzed for total metals. The list of specific metals to be analyzed for include antimony, arsenic, barium, beryllium, cadmium, total chromium, hexavalent chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc. A list of specific chemicals for the other classes of chemicals is provided in Table C-1 of the QAPP (Appendix C of this work plan). The methods for analysis of the above compounds are summarized in Table C-1 of the QAPP (Appendix C of this work plan).

Stormwater samples collected for laboratory analysis will be labeled using the following format:

"IT-location-yymmdd"

where location will correspond to the manhole number (e.g., MH-40, etc.).

2.5 SOIL VAPOR SAMPLING

In April 2011, the five sub-slab soil vapor samples planned for inside Building 14-01 were collected and analyzed for VOCs, in accordance with the Building 14-01 Work Plan (Landau Associates 2011). All of the samples were collected from the southwest portion of the building at the locations shown on Figure A-6.

2.6 PIPE SURVEY

A video survey of the remaining portion of the 12-inch metal corrugated pipe located south of Building 14-01 that was not surveyed in 2008 will be attempted. Due to the presence of underground utilities (including fiber optics), excavation to expose the pipe is not practicable; therefore, attempts to dislodge the three-pronged electrical plug blocking the western portion of the pipe and pushing it to the eastern end of the pipe will be made using a high-pressure water hose and nozzle (jetting). Jetting will be attempted from the open end of the pipe that is located on the western end of the retaining wall. If successful, this will allow videotaping more of the inside of the pipe, if not the full-length of the pipe.

If exceedances of preliminary screening levels for PCOCs that are detected at elevated concentrations in Site soil are found in outfall stormwater samples, a video survey will be conducted of storm drain piping connected to that outfall.

2.7 BUILDING MATERIALS SAMPLING

Buildingl materials currently present at the Site may be a source of PCOCs in the storm drain system. If exceedances of the Sediment Management Standards (SMS) criteria are found in the catch basin or oil/water separator solids, samples of building materials that are located near the locations where the exceedances occurred will be collected for laboratory analysis. . Materials that may be sampled include paint from building or equipment surfaces, building siding material, caulk from windows or door jams, concrete expansion joint material (CJM), surface debris, and roofing materials. Solids samples will be at least 25 grams to provide adequate material for analysis.

Wipe samples may be collected from site features including building siding and equipment surfaces, and roof runoff water may be collected if samples of roofing material cannot be obtained. Sample collection procedures for each potential sample media and laboratory analysis of each media are discussed in the sections below.

2.7.1 PAINT FROM BUILDING OR EQUIPMENT SURFACES

Paint from building or equipment surfaces may be sampled upon inspection by field personnel. Field personnel will specifically look for areas where exterior building paint is peeling off from the building siding because loose paint fragments have the potential to enter the storm drain system. Chipping or peeling paint from equipment surfaces may also be sampled. Pieces of paint will be removed from surfaces using a knife with removable blade. A 2- to 4-inch square will be cut from the paint with a sharp blade, and all layers of paint down to the building siding will be peeled back and removed for sampling. Caution will be taken to not damage building siding or equipment surfaces. The pieces of paint will be placed into an 8-oz. glass sample jar, labeled, and stored on ice. Blades used for removing paint will either be disposed of between each sample location and replaced with a clean blade, or decontaminated between each sample location.

Paint chip samples collected for laboratory analysis will be labeled using the following format:

"IT-Paint-numeric number-yymmdd"

where the numeric number will correspond to the order in which it was collected in relation to other similar type samples.

2.7.2 BUILDING SIDING MATERIAL

Building siding material samples may be sampled upon inspection by field personnel. Field personnel will specifically look for areas where siding material is in poor condition because loose siding fragments have the potential to enter the storm drain system. Siding material may be evaluated through the collection and analysis of pieces of the siding or through collection and analysis of wipe samples. A 1- to 4-inch square will be collected from the siding using a knife with a removable blade or other hand-held tool. The collected material will be placed into an 8-oz glass sample jar, labeled, and stored on ice. Blades or other hand-held tools used for removing siding will either be disposed of between each sample location and replaced with a clean blade, or decontaminated between each sample location. Wipe samples will be collected to evaluate areas of siding that are in good condition, unless pieces of siding material may be collected without impacting the siding integrity.

Siding samples collected for laboratory analysis will be labeled using the following format:

"IT-Siding-numeric number-yymmdd"

where the numeric number will correspond to the order in which it was collected in relation to other similar type samples.

2.7.3 CAULK FROM WINDOWS OR DOOR JAMS

Caulk from window frames, door frames, and around the exterior piping and vents on buildings, if present, may be sampled upon inspection by field personnel. Field personnel will inspect caulking around window frames, door frames, and around the exterior piping and vents, and will collect samples based on the availability of material at each building location. Caulk material will be removed using a knife with removable blade. The sharp end of the blade will be used to cut out the caulk, and the caulk sample will then be placed into an 8-oz. glass sample jar, labeled, and stored on ice. Field personnel will replace removed caulking with similar material to avoid compromising the integrity of the seals around the windows and doors of a building. Blades used for removing caulk material will either be disposed of between each sample location and replaced with a clean blade, or decontaminated between each sample location.

Caulk samples collect from window frames, door frames, and around the exterior piping and vents on buildings will be labeled using the following format:

"IT-Caulk-numeric number-yymmdd"

where the numeric number will correspond to the order in which it was collected in relation to other similar type samples.

2.7.4 CONCRETE JOINT MATERIAL

Samples of CJM will be collected using a knife with disposable blades. A new blade will be used at each location. At each sample location, a section of CJM sufficient to fill an 8-oz jar will be cut and removed (approximately 2 inches of CJM will be collected from each location). Any backing rod material that may be present in a joint will be separated from the CJM and will not be included in the sample. Each sample will be assigned a unique alphanumeric identifier according to the order in which it was collected in relation to other samples and the date. Each sample will be placed in an individual sample container and labeled with the sample identification number.

CJM samples collected for laboratory analysis will be labeled using the following format:

"IT-CJM-numeric number-yymmdd"

where the numeric number will correspond to the order in which it was collected in relation to other similar type samples.

2.7.5 SURFACE DEBRIS

Surface debris (e.g., soil, fine particulate and organic debris) from selected areas may be sampled if identified by field personnel as potentially impacting or contributing to PCBs in the storm drain system.

Surface debris will be swept together using a new clean broom and/or a clean stainless-steel spoon. Surface samples that are collected in unpaved areas comprised of mostly gravel or soil will be collected from multiple points within the identified sampling area using a clean stainless-steel spoon. Surface debris will be homogenized in a clean stainless-steel bowl using a clean stainless-steel spoon, placed into an 8-oz. glass sample jar, labeled, and stored on ice. Disposable sampling equipment (brooms, etc.) will be discarded after each use. Other sampling equipment such as stainless-steel spoons will be decontaminated between each sample location.

Surface debris samples collected for laboratory analysis will be labeled using the following format:

"IT-Surf Debris -numeric number-yymmdd"

where the numeric number will correspond to the order in which it was collected in relation to other similar type samples.

2.7.6 ROOFING MATERIALS

Roofing materials or roofing runoff may be sampled if identified by field personnel as potentially impacting or contributing to PCBs in the storm drain system. Field personnel will visually inspect the rooftop to determine if the material can be ruled out as a source of PCBs or metals. Field personnel will also visually trace rooftop runoff to the storm drain lines.

The rooftop runoff samples will be collected into 500-milliliter (mL) laboratory-supplied sample bottles and labeled. Where sufficient volume is available, two 500-mL sample bottles will be collected and submitted for laboratory analysis. Roofing material samples may be collected using a knife or other hand-held tool. The collected material will be placed into an 8-oz glass sample jar, labeled, and stored on ice. Any sample tools used to collect the rooftop runoff or roofing material samples will be decontaminated between each sample location.

Samples of roof material collected for laboratory analysis will be labeled using the following format:

IT-Roof Mat -numeric number-yymmdd"

where the numeric number will correspond to the order in which it was collected in relation to other similar type samples.

Samples of roof runoff collected for laboratory analysis will be labeled using the following format:

IT-Roof Water -numeric number-yymmdd"

where the numeric number will correspond to the order in which it was collected in relation to other similar type samples.

2.7.7 WIPE SAMPLES

Wipe samples may be collected from building siding or equipment surfaces. When the sampling location has been identified in the field, an area 10 centimeters (cm) by 10 cm will be isolated using a cardboard template. The sampler, wearing a clean pair of disposable sterile gloves, will remove the laboratory-prepared wipe (i.e., sterile gauze pad soaked with hexane) from its packaging container and firmly wipe the marked surface area to collect a sample. The sample wipe will be collected by wiping first in one direction and then again 90 degrees offset from the original wiping direction to optimize sample collection coverage. After the sample has been collected, the gauze will be placed in an 8-oz. glass sample jar, labeled, and stored on ice.

Wipe samples collected for laboratory analysis will be labeled using the following format:

IT-Wipe -numeric number-yymmdd"

where the numeric number will correspond to the order in which it was collected in relation to other similar type samples.

2.7.8 OTHER MATERIALS

Samples of materials not otherwise specified in Sections 2.2.1 through 2.2.6 may be sampled using appropriate sampling techniques to be identified in the field depending upon the type of material requiring sampling. Appropriate sample collection and preservation procedures will be followed consistent with the preceding sections and other applicable laboratory requirements.

2.7.9 LABORATORY ANALYSIS

Analysis of the building material solids will be as follows:

- All building material solids samples, including surface debris, will be analyzed for those metals detected in nearby catch basin or oil/water separator solids samples at concentrations exceeding the SMS criteria.
- All building material solids samples, including surface debris, will be analyzed for PCBs, if PCBs are detected in nearby catch basin or oil/water separator solids samples at concentrations exceeding the SMS criteria.
- Only surface debris will be analyzed for SVOCs, if SVOCs are detected in the catch basin or oil/water separator solids samples at concentrations exceeding the SMS criteria.

The methods for analysis of the building material solids samples are provided in Table C-5 of the QAPP (Appendix C of this work plan).

Analysis of wipe samples, if wipe samples are collected, will include metals and PCBs, if these constituents are detected in nearby catch basin or oil/water separator solids samples at concentrations exceeding the SMS criteria. The methods for analysis of the wipe samples are provided in Table C-5 of the QAPP (Appendix C of this work plan).

Analysis of rooftop runoff water, if roof runoff water samples are collected, will include metals, PCBs, and SVOCs, if these constituents are detected in nearby catch basin or oil/water separator solids samples at concentrations exceeding the SMS criteria. The methods for analysis of the rooftop runoff water samples are provided in Table C-2 of the QAPP (Appendix C of this work plan).

2.8 INDOOR AIR SAMPLING

Based on the results of soil vapor samples, indoor air samples may be collected from within Building 14-01 to characterize potential vapor intrusion that may result from the VOCs in groundwater along the southern Site boundary. Indoor air samples may be collected in the western portion of Building 14-01, which is within the area where the highest concentrations of VOCs in groundwater have been detected.

Eight-hour, time-weighted average (TWA) samples will be collected at the two indoor air sample locations. Samples will be collected using integrated, passive air samplers consisting of a laboratory-certified, evacuated SUMMA canister. Each SUMMA canister will be equipped with a pressure gauge and a calibrated critical orifice air flow controller for collection of the TWA samples. The sampler will record the initial and final pressures of the summa canister. Initial SUMMA canister pressure should be around 30 inches of Hg (+/- 5) and final pressures should be >5 inches of mercury. If initial pressure is low (<20 inches Hg), the SUMMA canister will be replaced. If the SUMMA canister reaches 5 inches of Hg before the 8-hour sample is completed, the SUMMA canister will be closed and the time recorded.

Canister inlet valves will be placed approximately 5 ft above ground surface in order to sample breathing space air. Canisters will be clearly labeled with signs indicating the purpose of the canisters and that the canisters are not to be interfered with or moved.

Indoor air samples collected for laboratory analysis will be labeled using the following format:

IT-Air -numeric number-yymmdd”

where the numeric number will correspond to the order in which it was collected in relation to other similar type samples

Sample containers will be shipped under chain-of-custody procedures to a laboratory for analysis of VOCs by EPA Method TO-15 SIM modified.

2.9 QUALITY ASSURANCE AND QUALITY CONTROL

Analytical samples collected during the RI will follow Quality Assurance/Quality Control (QA/QC) procedures and standards outlined in the QAPP (Appendix C of this work plan). Field QA/QC includes the collection of quality control samples including blind field duplicate samples, matrix spike and matrix spike duplicate samples, and trip blanks. The procedures for collection of the quality control samples are provided in the QAPP (Appendix C of this work plan).

2.10 SAMPLE CONTAINERS, PRESERVATION, AND STORAGE

Soil, solids, groundwater, stormwater, wipes, rooftop runoff water, soil vapor, and indoor air samples submitted to the analytical laboratory for analysis will be collected in the appropriate sample container provided by the analytical laboratory. Except for soil vapor and indoor air samples, the samples will be preserved by cooling to a temperature of 6°C, and as required by the analytical method. Maximum holding and extraction times until analysis is performed will be strictly adhered to by field personnel and the analytical laboratory. Excess sample may be frozen. Sample containers, preservatives, and holding times for each chemical analysis are presented in Table A-1.

2.11 SAMPLE TRANSPORTATION AND HANDLING

The transportation and handling of groundwater samples will be accomplished in a manner that not only protects the integrity of the sample, but also prevents any detrimental effects due to release of samples. Samples will be logged on a chain-of-custody form and will be kept on ice in secured coolers under the custody of field personnel or an authorized courier until delivery to the analytical laboratory. The chain-of-custody will accompany each shipment of samples to the laboratory.

2.12 SAMPLE CUSTODY

The primary objective of sample custody is to create an accurate, written record that can be used to trace the possession and handling of samples so that their quality and integrity can be maintained from collection until completion of all required analyses. Adequate sample custody will be achieved by means of approved field and analytical documentation. Such documentation includes the chain-of-custody record that is initially completed by the sampler and is, thereafter, signed by those individuals who accept custody of the sample. A sample is in custody if at least one of the following is true:

- It is in someone’s physical possession.
- It is in someone’s view.
- It is secured in a locked container or otherwise sealed so that tampering will be evident.
- It is kept in a secured area, restricted to authorized personnel only.

Sample control and chain-of-custody in the field and during transportation to the laboratory will be conducted in general conformance with the procedures described below:

- As few people as possible will handle samples.

- Sample containers will be obtained new or pre-cleaned from the laboratory performing the analyses.
- The sample collector will be personally responsible for the completion of the chain-of-custody record and the care and custody of samples collected until they are transferred to another person or dispatched properly under chain-of-custody rules.
- The cooler in which the samples are shipped will be accompanied by the chain-of-custody record identifying its contents. The original record and laboratory copy will accompany the shipment (sealed inside the shipping container). The other copy will be forwarded to Landau Associates along with sample collection forms.
- Coolers will be sealed with strapping tape and custody seals for shipment to the laboratory. The method of shipment, name of courier, and other pertinent information will be entered in the "remarks" section of the chain-of-custody record and traffic report.

When samples are transferred, the individuals relinquishing and receiving the samples will sign the chain-of-custody form and record the date and time of transfer. The sample collector will sign the form in the first signature space. Each person taking custody will observe whether the shipping container is correctly sealed and in the same condition as noted by the previous custodian (if applicable); deviations will be noted on the appropriate section of the chain-of-custody record.

A designated sample custodian at the laboratory will accept custody of the shipped samples, verify the integrity of the custody seals, and certify that the sample identification numbers match those on the chain-of-custody record. The custodian will then enter sample identification number data into a bound logbook, which is arranged by a project code and station number. If containers arrive with broken custody seals, the laboratory will note this on the chain-of-custody record and will immediately notify the sampler and Landau Associates.

2.13 EQUIPMENT DECONTAMINATION

The decontamination procedures described below are to be used by field personnel to clean drilling, sampling, and related field equipment. Deviation from these procedures must be documented in field records.

2.13.1 WATER LEVEL INDICATOR

The tape from the water level indicator will be rinsed with potable water between each well measurement, and washed with Alconox soap if petroleum product or sheen is encountered.

2.13.2 SAMPLING EQUIPMENT

All sampling equipment used (e.g., stainless-steel bowls, stainless-steel spoons, soil split-spoon samplers, etc.) will be cleaned using a three-step process, as follows:

1. Scrub surfaces of equipment that would be in contact with the sample with brushes using an Alconox solution
2. Rinse and scrub equipment with clean tap water.
3. Rinse equipment a final time with deionized water to remove tap water impurities.

Decontamination of the reusable sampling devices will occur between collection of each sample.

2.13.3 HEAVY EQUIPMENT

Heavy equipment (e.g., the drilling rigs and drilling equipment that is used downhole, or that contacts material and equipment going downhole) will be cleansed by a hot water, high pressure wash before each use and at completion of the project. Potable tap water will be used as the cleansing agent.

2.14 RESIDUAL WASTE MANAGEMENT

Soil cuttings generated during boring advancement will be temporarily stored onsite in 55-gallon drums. Disposal methods for soil stored in 55-gallon drums will be determined based on the analytical results for the soil. Soil removed from test pits will be placed back in the test pits in the reverse order it was removed. If evidence of potential contamination, such as a sheen, is present, the soil will not be placed back in the test pit and will instead be placed in a 55-gallon drum.

Water generated during well development, purging, and decontamination will be temporarily stored onsite in 55-gallon drums. Disposal methods for groundwater stored in drums will be determined based on the analytical results for the groundwater samples.

* * * * * * * * * *

This document has been prepared under the supervision and direction of the following key staff:

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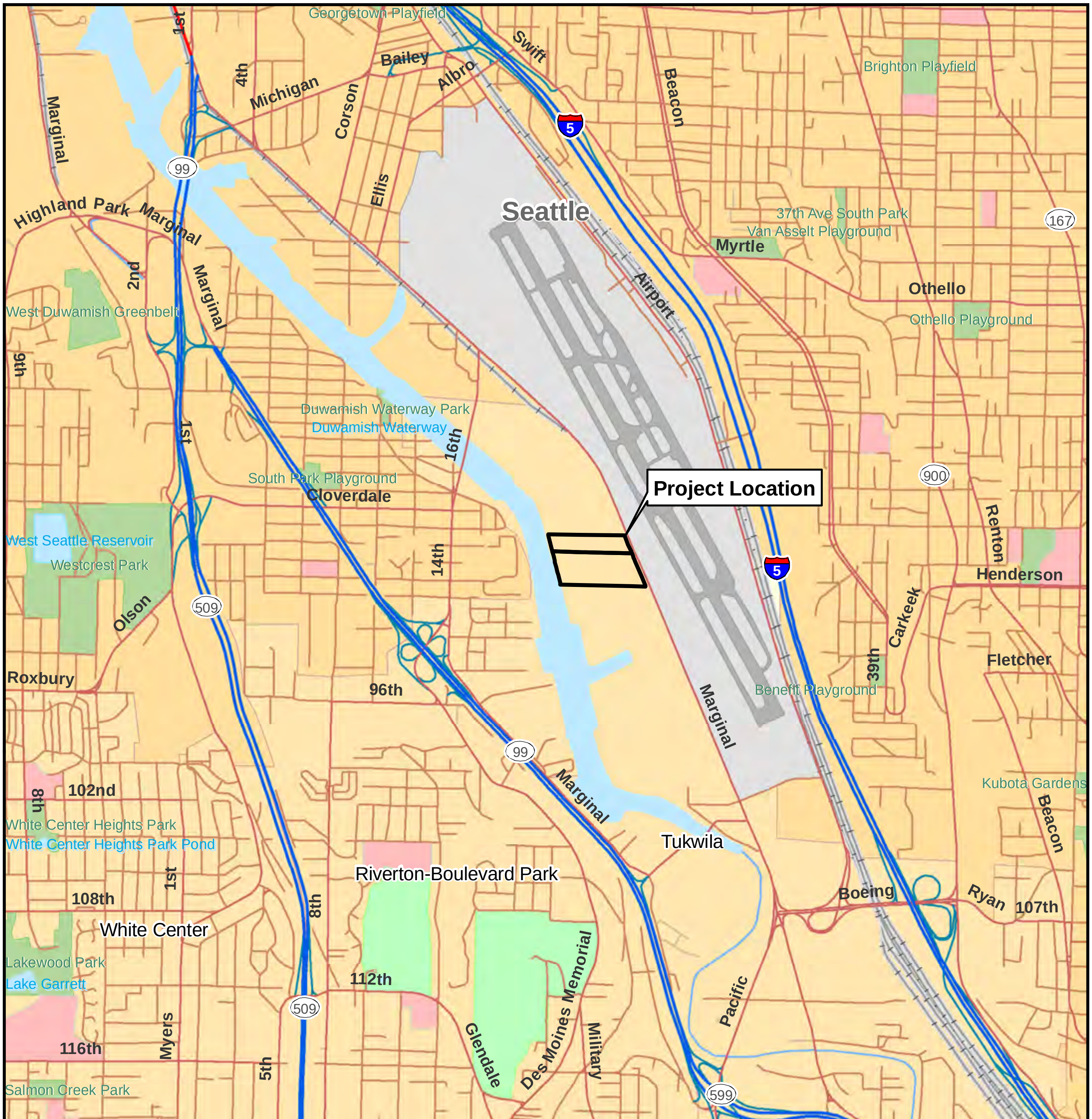
3.0 REFERENCES

Ecology. 2008. *Minimum Standards for Construction and Maintenance of Wells* (Chapter 173-160 WC). Washington State Department of Ecology. Updated December.

Landau Associates. 2011. *Final Work Plan, Building 14-01 Investigation, Boding Isaacson-Thompson Site, Tukwila, Washington*. Prepared for The Boeing Company. March 29.



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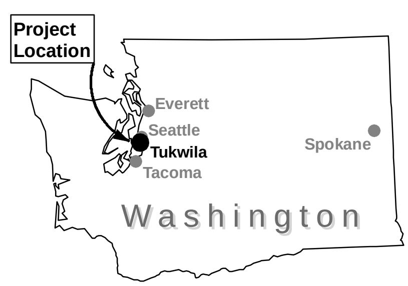

Data Source: ESRI 2008; King County Parcel Data

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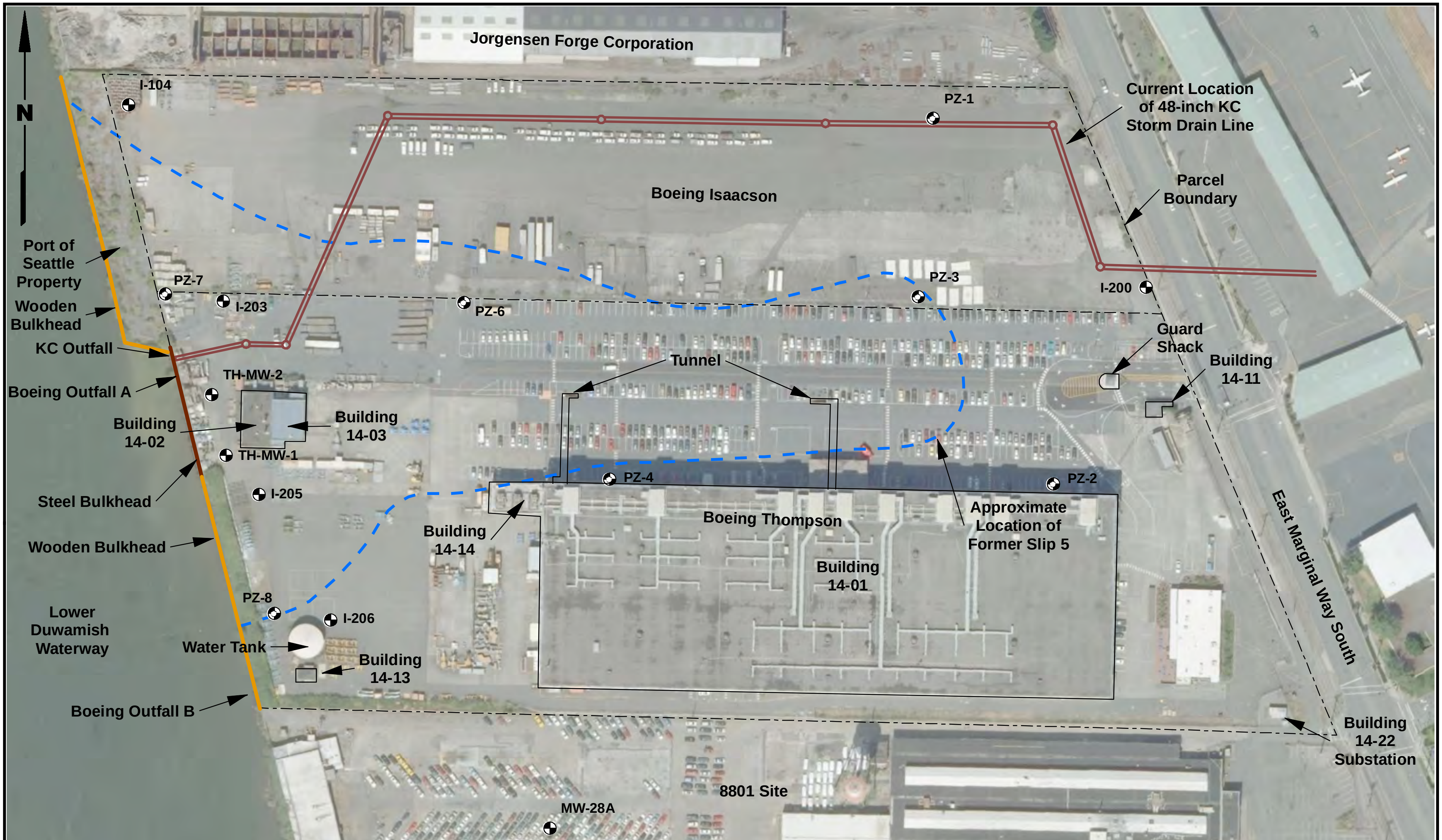
LANDAU ASSOCIATES

Boeing Isaacson-Thompson Site Tukwila, Washington	**Vicinity Map**	Figure A-1

Y:\Projects\025190\MapDocs\I-T RIFS Workplan\Revised\Ecology\FigA-2_SitePlan.mxd 5/17/2011 NAD 1983 HARN StatePlane Washington North FIPS 4601 Feet



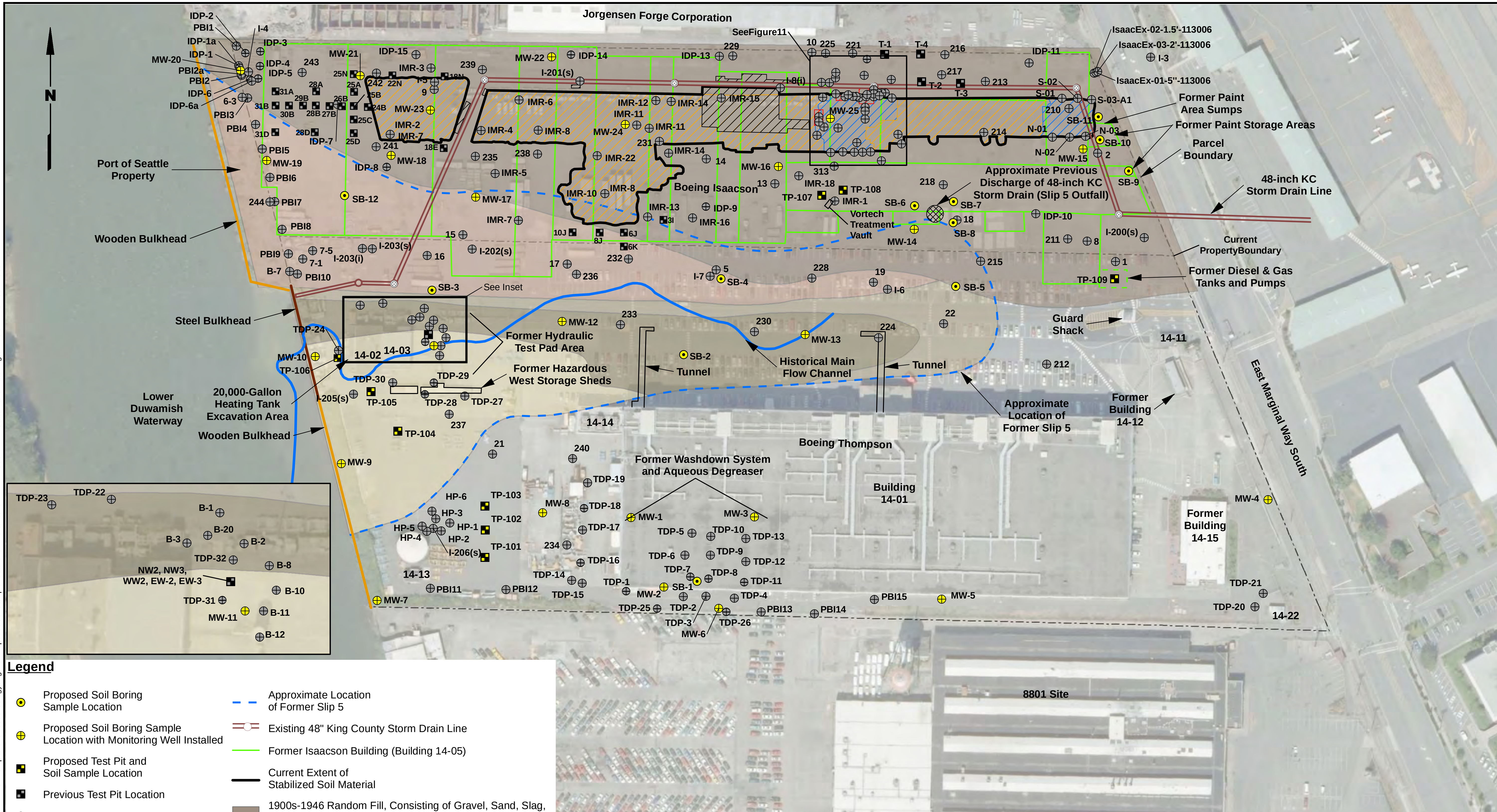
Data Source: Bing Aerial Image; King County Parcel Data

0 200 400

Scale in Feet

Landau Associates

Boeing Isaacson-Thompson Site Tukwila, Washington	**Current Site Features**	Figure A-2



Legend

- Proposed Soil Boring Sample Location
- Proposed Soil Boring Sample Location with Monitoring Well Installed
- Proposed Test Pit and Soil Sample Location
- Previous Test Pit Location
- Previous Soil Sample Location
- 1983 Excavation
- 1989 Excavation
- 1990 Excavation
- 1991 Excavation
- Approximate Location of Former Slip 5
- Existing 48" King County Storm Drain Line
- Former Isaacson Building (Building 14-05)
- Current Extent of Stabilized Soil Material
- 1900s-1946 Random Fill, Consisting of Gravel, Sand, Slag, Demolition Waste, and Crushed Rocks
- 1946-1960 Random Fill
- 1946-1960 Some Random Fill Along with Fill From Off-Site Sources
- 1960-1965 Slag, Construction and Demolition Debris, and Imported Soil
- 1965-1966 Imported Construction - Quality Sand Fill Material

Landau Associates

Data Source: Bing Aerial Image; King County Parcel Data

0 150 300

Scale in Feet

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Boeing Isaacson-Thompson Site Tukwila, Washington	**Proposed Soil Sample Locations**	Figure A-3

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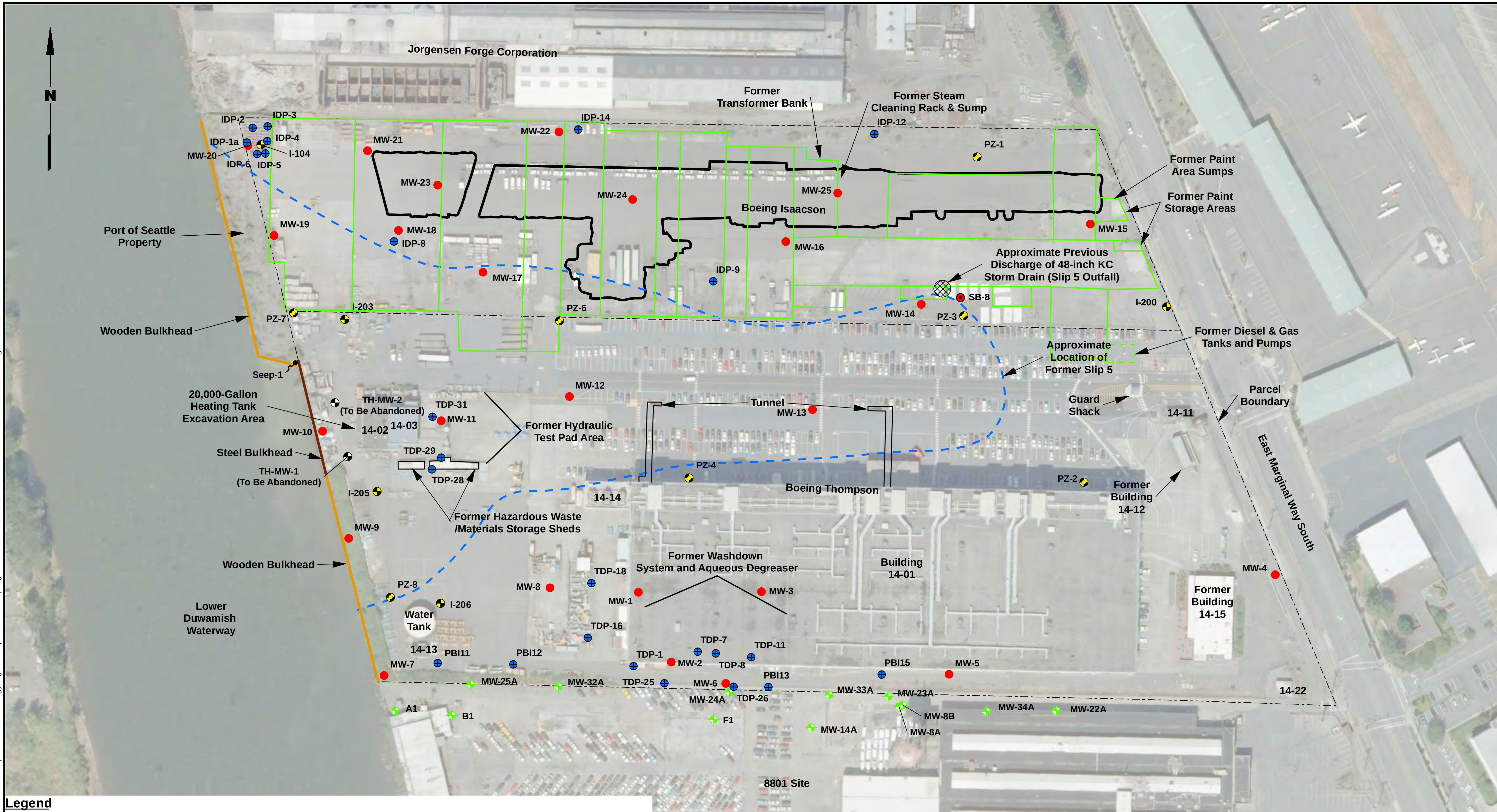

Legend

- Proposed New Monitoring Well Location and Groundwater Sampling Location
- Proposed Groundwater Grab Sample Location
- Seep
- Existing Monitoring Well Location and Proposed Groundwater Sampling Location
- Existing Piezometer Location and Proposed Groundwater Sampling Location
- Previous Direct Push Groundwater Sample Location
- PACCAR Groundwater Sampling Location
- Approximate Location of Former Slip 5
- Current Extent of Stabilized Soil Material
- Former Isaacson Building (Building 14-05)

Note
1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Data Source: Bing Aerial Image; King County Parcel Data

0 150 300
Scale in Feet

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Boeing Isaacson-Thompson Site
Tukwila, Washington

Proposed Groundwater Sample and Monitoring Locations

Figure
A-4

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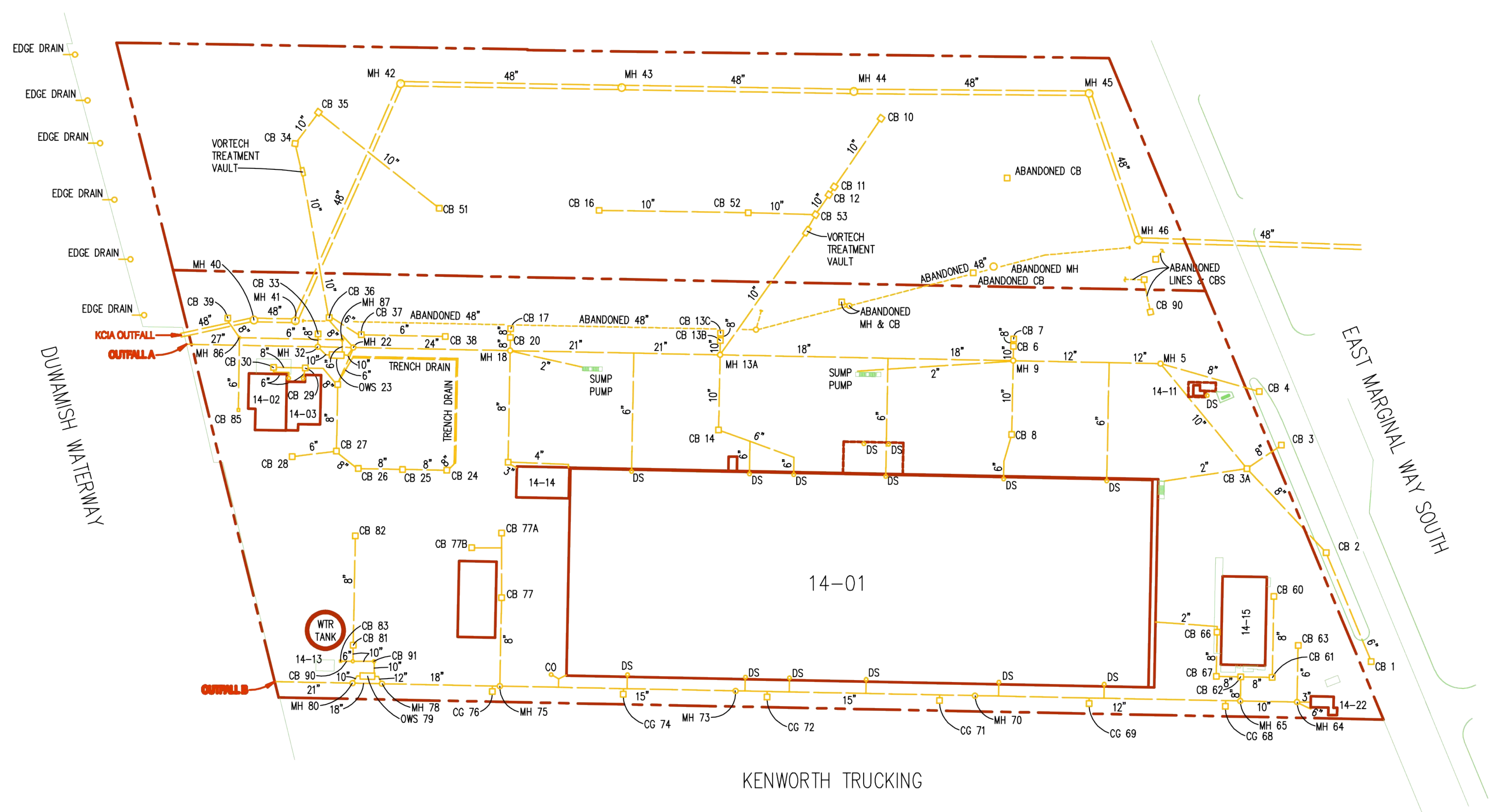

Legend

CB 16	Catch Basin
CG 74	Catch Basin with curb/gutter inlet
CB 15	Removed or Abandoned Catch Basin
MH 45	Storm Drain Manhole
	Storm Drain
	Abandoned Storm Drain
	Property Line

0 200 400
Scale in Feet

Boeing Isaacson - Thompson Site
Tukwila, Washington

Current Storm Drain System

Figure
A-5

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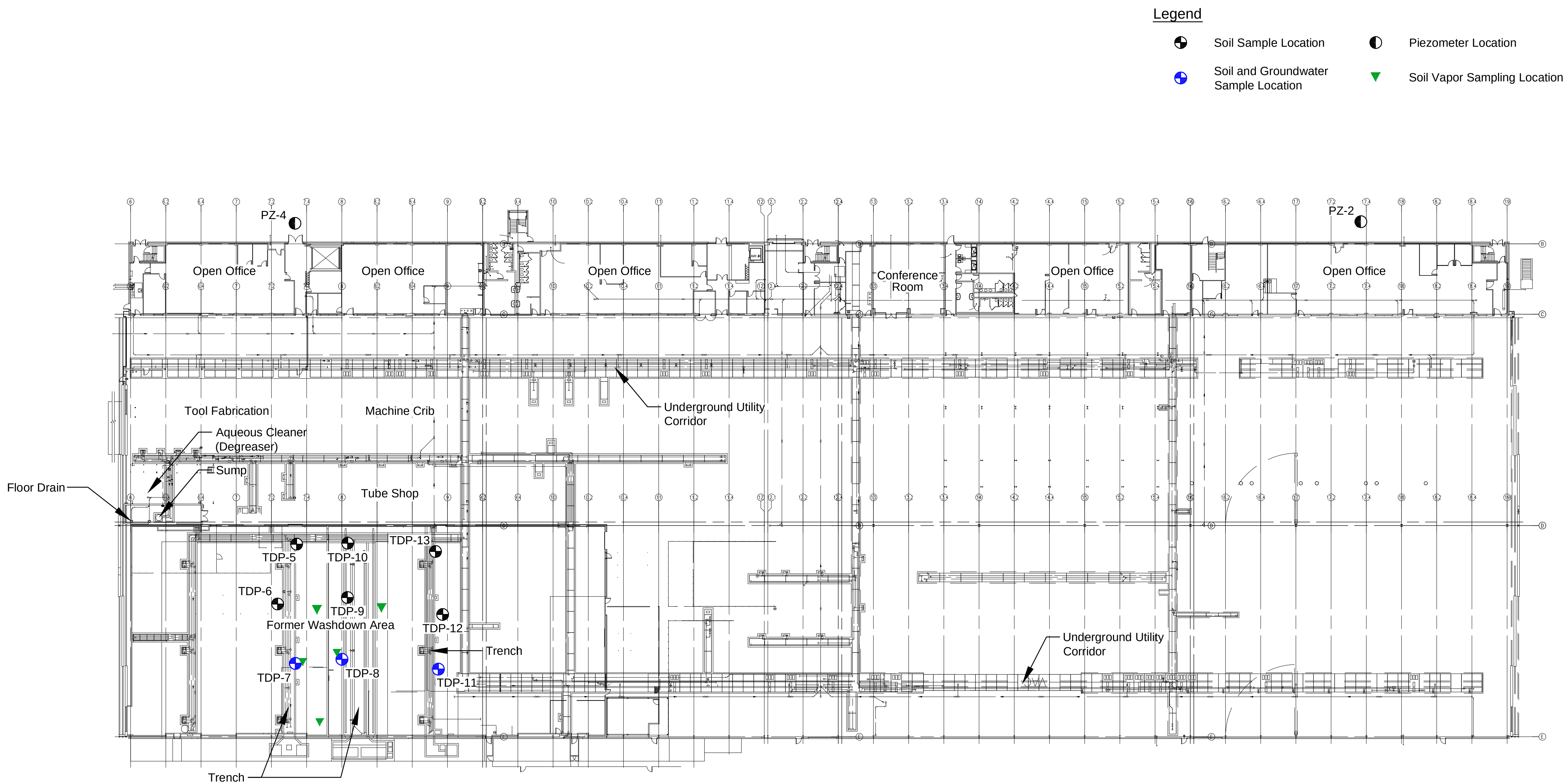

Building 14-01 Work Plan | V:\025\190\111.112\Figure A-6.dwg (A) "Figure A-6" 5/17/2011

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

0 60 120

Scale in Feet

Base map source: Boeing Building 14-01 Mechanical Master (July 25, 1994)

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Boeing Isaacson-Thompson Site Tukwila, Washington	**Soil Vapor Sampling Locations**	Figure A-6

TABLE A-1
SAMPLE CONTAINERS, PRESERVATIVES, AND HOLDING TIMES
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Matrix / Analysis	Container	Preservation	Maximum Holding Time (Days)
Soil:			
NWTPH-Dx	8-oz. jar - glass	Store cool at 6°C	14
NWTPH-Gx	2 x 40-ml vial - glass 1 2-oz jar - glass	Add MeOH Store cool at 6°C 2-oz jar - no headspace	14
VOCs	3 x 40-ml vial - glass 1 2-oz jar - glass	2 vials - Add MeOH 1-vial - Add $NA_2S_2O_4$ 2-oz jar - no headspace Store cool at 6°C	14
Metals (including mercury)	8-oz. jar - glass	Store cool at 6°C	180 (mercury 28 days)
SVOCs / PAHs	8-oz. jar - glass	Store cool at 6°C	14
PCBs	8-oz. jar - glass	Store cool at 6°C	14
Water:			
NWTPH-Gx	2 x 40-ml vials - glass	Add HCl to pH<2; Store cool at 6°C	14
NWTPH-Dx	2 x 500-mL amber glass	Store cool at 6°C	7
VOCs	3 x 40-ml vials - glass	Add HCl to pH<2; Store cool at 6°C	14
Dissolved Metals (including mercury)	500-mL polyethylene	Add $HN0_3$; Store cool at 6°C	180 (mercury 28 days)
SVOCs	2 x 500-mL amber glass	Store cool at 6°C	7
PAHs	2 x 500-mL amber glass	Store cool at 6°C	7
PCBs	2 x 500-mL amber glass	Store cool at 6°C	7
TDS	1-L polyethylene	Store cool at 6°C	7
Nitrate	500-mL polyethylene	Store cool at 6°C	48 hours
Sulfate	Combine with Nitrate	Store cool at 6°C	28
Catch Basin Solids (a):			
Metals	2 x 8-oz. jar - glass	Store cool at 6°C	180 (mercury 28 days)
PCBs		Store cool at 6°C	14
SVOCs / PAHs		Store cool at 6°C	14
TOC	2-oz. jar - glass	Store cool at 6°C or freeze	14/ 6months if frozen
Dioxins	16-oz. jar - glass	Store cool/dark at 4°C	1 year
Soil Vapor and Indoor Air:			
VOCs	SUMMA Canister	--	30 days
Other Materials:			
Metals and PCBs (paint/caulk/building siding)	8-oz. jar - glass	Store cool at 6°C	14
Metals and PCBs (wipe)	8-oz. jar - glass	Store cool at 6°C	14

SVOCs = Semivolatile Organic Compounds
VOCs = Volatile Organic Compounds
PCBs = Polychlorinated Biphenyls
TPH = Total Petroleum Hydrocarbons
PAHs = Polycyclic Aromatic Hydrocarbons
TDS = Total Dissolved Solids
TOC = Total Organic Carbon

APPENDIX B

Sediment SAP

BOEING ISAACSON-THOMPSON SITE
SEDIMENT INVESTIGATION SAMPLE AND ANALYSIS PLAN
Remedial Investigation and Feasibility Study Work Plan
Tukwila, Washington

Submitted to:
The Boeing Company

Submitted by:
AMEC Geomatrix, Inc., Lynnwood, WA

September 2011

Project LY11160060

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(Continued)

TABLES

FIGURES

BOEING ISAACSON-THOMPSON SITE
SEDIMENT INVESTIGATION SAMPLE AND ANALYSIS PLAN
Remedial Investigation and Feasibility Study Work Plan
Tukwila, Washington

1.0 INTRODUCTION

This Sample and Analysis Plan (SAP) describes work to be conducted for characterization of sediments adjacent to the Boeing Isaacson-Thompson Site and will be part of a Remedial Investigation and Feasibility Study (Figure 1). This plan conforms to the substantive requirements of the Washington State Department of Ecology's (Ecology) Sediment Sampling and Analysis Plan Appendix (SAPA; Ecology 2008).

2.0 PROJECT DESCRIPTION

The purpose of this sediment investigation will be to identify surface sediments adjacent to the Boeing Isaacson-Thompson Project site that exceed the Sediment Management Standards (SMS) and to determine the horizontal and vertical extent of sediments with elevated concentrations of the SMS list of chemicals and the distribution of additional chemicals requested by Ecology. The investigation will also look for patterns relating to possible sources of contamination, chemical concentration gradients, and vertical distribution relating to sediment horizons.

Surface sediment samples (0 to 0.33 foot) were collected and analyzed at 39 locations in the vicinity of the project site between September 1997 and December 2009 (Figure 2). The usability of chemistry data from surface samples collected prior to 2004 is questionable. Reworking of surface sediments by organisms, additional sedimentation, and localized scour events limits the usefulness of the older data sets in predicting the current horizontal distribution of compounds that exceed the sediment quality standards (SQS) in the surface sediments. The recent historical data (2004 and later) does not provide sufficient coverage of the project area to determine if there are trends in concentration gradients across the site that are related to possible upstream/downstream transport or nearshore/offshore transport mechanisms. In addition, 16 of the sample locations were analyzed only for polychlorinated biphenyl (PCB) Aroclors and total organic carbons (TOC). The patchy distribution of samples analyzed for the SMS list of chemicals limits the usefulness of the existing data set in determining the horizontal distribution of SMS compounds in the surface sediments.

The core sample locations collected in 2004 and later were clustered together or positioned near previously identified surface sediment hot spots (Figure 2). The existing core sample data provides data on the vertical distribution of contaminants in a limited area. In addition, deeper samples collected at a core location were frequently analyzed for a limited list of analytes. Chemical analysis of the deeper samples was limited to compounds that exceeded the SQS in shallower samples (e.g., PCBs or metals).

Overall, the existing historical sediment data in the vicinity of the project site is limited in distribution both horizontally and vertically across the site. The SMS list of chemicals was not analyzed at all locations or to a consistent depth. Sample intervals were not consistent between surveys or core locations. Sampling at additional locations is needed to provide an adequate distribution of sample locations in areas that were not previously sampled or that were sparsely sampled.

The proposed sampling design consists of a triangular grid design of 15 sampling locations adjacent to the project site and inshore of the navigational channel (Figure 3). The inshore samples are located near the mean lower low water (MLLW) contour line. Samples collected near previously sampled locations will be analyzed for a consistent analyte list (i.e., SMS list and carbazole). Analysis of samples from similar sample intervals will also simplify the interpretation of patterns relating to changes in concentration with depth or with sediment horizons (i.e., older native sediments).

3.0 SAMPLE COLLECTION

This SAP provides sediment sample collection and processing procedures. The location of samples to be collected during this investigation are shown on Figure 3 and presented in Table 1. A differential Global Positioning System with submeter accuracy will be used to navigate to the proposed sampling locations and to record the position of each sample attempt.

A sediment core (up to 20 feet) will be collected at each location. A paired surface grab sample will also be collected within 3 meters (m) of each acceptable core location.

3.1 EQUIPMENT DECONTAMINATION

Sample containers, instruments, working surfaces, technician protective gear, and other items that may come into contact with sediment sample material must meet high standards of cleanliness. Sample containers will be provided by Analytical Resources, Inc., and are pre-cleaned, certified, and individually labeled with a lot number traceable to a Certificate of Analysis.

All core tubes and sediment-handling equipment will be cleaned and decontaminated prior to arrival at the site. Aluminum core tubes will be discarded after use. The grab sampler will be pre-cleaned prior to arrival at the site and cleaned between each location using the procedure described below. All equipment and instruments used to remove sediment from the sampler or to homogenize samples will be stainless steel and will be decontaminated before and in between each use. The AMEC Geomatrix standard decontamination procedure for the grab sampler, core tubes, and other sample handling equipment is modeled after Puget Sound Estuary Program (PSEP) protocols (PSEP 1997); however, the decontamination procedure will not use any acid or solvent rinses (the final rinse will use distilled water). The decontamination procedure is as follows:

1. Prewash rinse with tap water.
2. First wash with solution of tap water and Alconox soap (brush).
3. Second rinse with tap water.
4. Second wash with solution of tap water and Alconox soap (brush).
5. Final rinse with tap water.
6. Final rinse with distilled water.
7. Coverage (no contact) of all decontaminated items with aluminum foil.
8. Storage in clean, closed container prior to use.

3.2 SAMPLE IDENTIFICATIONS

All samples will be assigned a unique identification code. This hyphenated alphanumeric code consists of a media code and a location code and either a sample type code (e.g., G for grab sample), or a sample-depth identifier (e.g., SD 501-0080) for a core sample. The 4-digit sample-depth identifier appended to the media and location code will be used to identify the core segment the sample represents. The 0080 suffix in the example SD 501-0080 identifies the sample as representing the sediment at 8.0 feet below mudline (and extending deeper).

Media type will be SD for all sediment samples. Location will be “sss”, a sequential number series for each proposed sample locations. Location numbers during this investigation will start with 501 and continue through 517. Stations SD-505 and SD-512 will have field-duplicate samples (grab and core) collected within 1 m (approximately 3 feet) of the original location. The duplicate stations will be identified as SD-516 and SD-517 and will represent duplicate grab and core stations collected at stations SD-505 and SD-512, respectively.

3.3 CORE SAMPLE COLLECTION

Core samples will be collected using an impact corer. The impact corer uses the impact from a linear pneumatic hammer, delivering approximately 300 blows per minute to drive a 4-inch-square aluminum core into the sediment. This allows for a continuous core sample to be collected over the depth that the tube is driven. The bottom of each core tube will be fitted with a hinged core catcher to prevent loss of the sediment during extraction. Penetration and recovery information will be recorded during the drilling operation to prepare an *in situ* recovery curve for each core. The recovery curves will be used to estimate the in situ depth below mudline of the sample intervals and sediment horizons or structures within the core.

If penetration or the depth of recovered sediment in a core is less than 75 percent of the proposed drive depth, the corer will be relocated a minimum of 2 m (6.5 feet) and a second core will be attempted. If refusal or insufficient recovery is again encountered, then no further sampling will be attempted at that location.

At all core sampling locations, discrete samples will be collected from each core at 1-foot *in situ* depth intervals starting at 1 foot below mudline (see Table 1) to the proposed core depth of 15 feet below mudline or to the depth of maximum recovered sediment if full penetration is not achieved. If the volume of recovered sediment available within a depth interval is insufficient to perform all the required analyses, additional sediment volume from the next deeper interval will be added to provide sufficient sample volume. The next subsequent sample will be collected from the next full 1-foot *in situ* depth interval. Samples representing sediments from 1 foot below the sediment surface to the maximum depth of the recovered sediment will be collected from each core. Samples will be either analyzed during the initial analysis round or will be archived at the laboratory. Surplus sample volume from core segments analyzed for the SMS list will be archived. This sampling routine may be modified in the field based on site conditions at the direction of the field geologist.

Sample handling and processing will follow procedures described in Section 5.0. The handling and processing of sediment cores will occur within a secured exclusion zone using Level D protection following the requirements specified in the Site-Specific Health and Safety Plan. One core tube will be handled and processed at a time. Cores will be held for a maximum of 24 hours before processing. Unprocessed cores held more than 8 hours will be chilled with ice.

3.4 GRAB SAMPLE COLLECTION

Grab samples will be collected using a stainless-steel, 0.2-square meter (m^2) pneumatically-operated grab sampler. Surface sediments to a depth of 10 centimeters (cm) will be collected to meet sample volume requirements. Sediments touching the sides of the grab sampler will not be collected or included in the homogenized samples. The sampler will be decontaminated prior to arrival at the site and between sample locations in accordance with the procedures in Section 3.1.

The following acceptability criteria for the grab samples should be satisfied:

- The sampler is not overfilled with the sample such that the sediment surface is pressed against the top of the sampler.
- Overlying water is present (indicates minimal leakage).
- The overlying water is not excessively turbid (clear water indicates minimal sample disturbance).
- The sediment surface is relatively flat (indicates minimal disturbance or winnowing).
- The sediment surface does not show evidence of previous coring attempts.
- The penetration depth is at least 15 cm for a 10-cm-deep surficial sample.

If a sample does not meet any one of these criteria, it will be rejected.

Overlying water is slowly siphoned off near one side of the sampler with a minimum of sample disturbance. Sample material that is, or has been, in direct contact with the grab sampler will not be included in the sample volume.

4.0 SAMPLE PROCESSING

4.1 CORE SAMPLES

The steps in processing core tubes to minimize the effects of carry-down are as follows. The core tube will be placed on sawhorses and oriented with the hinged side of the core catcher to the side. The uppermost side of the core tube will be removed using a circular saw. The depth of cut on the saw will be set to just slightly over the wall thickness of the aluminum tube. A thin layer (approximately 1-cm or 0.38-inch thick) will be removed from the exposed surface of the sediment with a decontaminated stainless-steel scraper. The surface layer of sediment will be removed starting at the bottom of the core tube and moving toward the top. This method minimizes potential contamination of clean, deeper layers with material from shallower, potentially more contaminated layers.

The exposed sediment surface of the core will be photo-documented using either still photos or video. A qualified field geologist will log each core for Universal Soil Classification and note the presence of any soil structures, odors, or visible oil sheens. Sediment descriptions and the interpreted *in situ* depths of each sediment horizon will be transcribed into a summary log (Figure 4).

Table 1 lists the proposed core locations, sample segments, and an initial sample analysis schedule. Stainless-steel plates will be inserted between each 1-foot *in situ* depth interval. Sediments from each segment will be collected from the center of the core starting at the inserted plate marking the top of the segment and continuing down the segment to the start of the next depth interval. Sediment touching the sides of the core tube will be left in place. Approximately 1 liter of sediment will be needed for all the required analyses. Additional sample volume may be collected and archived if available within a core segment. Table 2 lists by analyte the holding time requirements. Sediment will be collected from each segment starting from below each inserted plate and extending down the core tube to the start of the next segment, Sediments will be collected proportionally along the entire interval until sufficient sample volume is obtained. The distance down the tube that segment represents will be recorded to provide information on the actual collection interval for each sample.

4.2 GRAB SAMPLES

Table 1 lists the proposed grab locations, sample depth, and the sample analysis schedule. The exposed sediment surface of the core will be photo-documented using still photos. A qualified field geologist will log each grab for Universal Soil Classification and note the presence of any soil structures, odors, or visible oil sheens on the Qualitative Sample Characteristics (QSC) form (Figure 5). Depth of grab sampler penetration, surface winnowing, or other disturbance will be noted. Surface and subsurface sediment descriptions and the *in situ* depths of each identified sediment horizon will be recorded.

Sediments will be collected from the center of the grab sampler to a depth of 10 cm. Sediment touching the sides of the grab sampler will not be placed in the sample container. Approximately 1 liter of sediment will be needed for all the required analyses. Additional sample volume may be collected and archived. Table 2 lists by analyte the holding time requirements.

5.0 SAMPLE HANDLING PROCEDURES

Unopened and unprocessed core tubes will be kept in sight of the sampling crew or in a secure area at all times. Grab samples will be processed as soon as they are collected. Sediment samples also will be kept in sight of the sampling crew or in a secure, locked vehicle at all times. Samples will be transported to the AMEC Geomatrix office at the end of the day for storage (samples will be placed in coolers with "blue ice" or frozen) until transferred to the testing laboratories. Transfer of samples from AMEC Geomatrix custody to the laboratory will be documented using chain-of-custody procedures (Figure 6). If someone other than the sample collector transports samples to the laboratory, the collector will sign and date the chain-of-custody form and insert the name of the person or firm transporting the samples under "transported by" before sealing the container with a Custody Seal.

The chain-of-custody forms will state that the samples are not homogenized. The analytical laboratory will be responsible for homogenizing the entire sample volume prior to taking individual aliquots of the homogenized sediments for separate analytical methods. Samples not scheduled for the initial analysis round will be archived and stored at the analytical laboratory in a secure area. Storage requirements for all archived samples will include freezing and storage of the samples in a temperature-monitored freezer at -18°C.

6.0 ANALYSIS SCHEDULE

Table 1 provides a list of the sediment samples proposed for initial analysis. A total of 83 of the sediment samples collected during this investigation will be initially analyzed for SMS list of analytes, carbazole, and total organic carbon (TOC). Five surface samples in the vicinity of two outfalls within the project boundaries will also be initially analyzed for dioxins/furans. Surplus sediment sample volume from each sample will be frozen (-18°C) and archived at the analytical laboratory. All sediment samples collected but not initially analyzed will be frozen and archived at the analytical laboratory as described in Section 5.0. Depending on the results of the initial round of analyses, additional analysis may be conducted.

7.0 LABORATORY ANALYTICAL METHODS AND TARGET DETECTION LIMITS

All analytical methods will follow rigorous standard testing protocols. The specific analyses chosen for the samples must be capable of returning accurate results at the data-quality objective (DQO) concentrations listed in Table 3. If published compliance criteria are not available for a chemical then the standard reporting limits provided by the analytical laboratory for the method will be used for the DQO. Test methods selected to achieve these results are presented in Table 4 along with the reporting limits for each analytical method provided by ARI. If the reporting limits for an analyte are above the DQO, then the sample may be reanalyzed using a different method to obtain a satisfactory reporting limit.

As described in the SMS, total PCB concentrations will be calculated by summing the detected concentrations for nine Aroclors (i.e., Aroclor 1016, 1221, 1232, 1242, 1248, 1254, 1260, 1262, and 1268). Undetected Aroclors will not be included in the calculation of total PCB values. If all nine Aroclors are reported as undetected, then the value reported as the total PCB value will be the highest reporting unit among the individual Aroclors.

Total low-molecular-weight polycyclic aromatic hydrocarbons (LPAHs) will be calculated by summing the detected concentrations for naphthalene, acenaphthylene, acenaphthene, phenanthrene, anthracene, and fluorene. If all LPAHs are reported as undetected, then the value reported as the total LPAH value will be the LPAH compound with the highest reporting limit.

Total high-molecular-weight polycyclic aromatic hydrocarbons (HPAHs) will be calculated by summing the detected concentrations of fluoranthene, pyrene, benz(a)anthracene, chrysene, total benzofluoranthenes, benzo(a)pyrene, indeno(1,2,3,-c,d)pyrene, dibenzo(a,h)anthracene, and benzo(g,h,i)perylene. If all HPAHs are reported as undetected, then the value reported as the total HPAH value will be the HPAH compound with the highest reporting limit.

Analytical laboratory quality control (QC) checks include the use of standard EPA analytical methodologies (including analysis of method blanks, spikes, and surrogates), laboratory QC samples, and certified reference materials (if required). These QC checks are detailed in Tables 5 through 9. Additionally, the analyses will be carried out under the laboratory's standard operating procedures (SOPs).

8.0 QUALITY OBJECTIVES AND CRITERIA

This section outlines the objectives of the Sample and Analysis Plan and summarizes relevant quality assurance (QA) criteria.

8.1 QUALITY OBJECTIVES

The goals for the analytical data are to produce data of sufficient quality to meet the project DQOs. The primary DQO for this project is that the sediment concentrations must be sufficiently accurate to compare to the SMS SQS for marine sediments (Table 3). Because the SQS for many organic compounds is based on carbon-normalized concentrations, the samples must also be analyzed for TOC. Comparison of carbon-normalized values against the SQS listed in Table 3 may be inappropriate if TOC values are below 0.5 percent or above 4.0 percent. The project DQOs for the semivolatile organic compounds and PCB data must be accurate at the dry-weight-based standards specified in Table 3. The practical quantitation limits for the analytes in this study must be at least as low as the concentrations presented in Table 3.

To meet the goal of returning data accurate to within the SQS, data-quality indicators (DQIs) also need to be established. DQIs are specific measured parameters, including the familiar PARCC parameters (precision, accuracy, representativeness, comparability, and completeness), as well as sensitivity.

The basis for assessing each of these elements of data quality is discussed in the following sections. Precision and accuracy QC limits for analytical methods are identified in Tables 5 through 10.

8.1.1 Precision

Precision measures the reproducibility of measurements. Precision is strictly defined as the degree of mutual agreement among independent measurements as the result of repeated application of the same process under similar conditions. Analytical precision is the measurement of the variability associated with duplicate (two) or replicate (more than two) analyses. If the recoveries of analytes in the laboratory control sample (LCS) are within established control limits, then precision is within limits. Total precision is the measurement of the variability associated with the entire sampling and analysis process. Total precision measures variability introduced by both the laboratory and field operations and is determined by analysis of duplicate or replicate field samples. Field-duplicate samples (10% frequency) and matrix-duplicate spiked samples (one per analytical batch) shall be analyzed to assess field and analytical precision, and the precision measurement is determined using the relative percent difference between the duplicate sample results. For replicate analyses, the relative standard deviation is determined.

8.1.2 Accuracy

Accuracy is a statistical measurement of correctness and includes components of random error (variability due to imprecision) and systemic error. It therefore reflects the total error associated with a measurement. A measurement is accurate when the value reported does not differ from the true value or known concentration of the spike or standard. Analytical accuracy is measured by comparing the percent recovery of analytes spiked into an LCS to a control limit. For compounds, such as PCBs, surrogate compound recoveries are also used to assess accuracy and method performance for each sample analyzed.

Both accuracy and precision are calculated for each analytical batch, and the associated sample results are interpreted by considering these specific measurements. The formula for calculation of accuracy returns a percent recovery from pure and sample matrices. Limits of accuracy for Method 8082 (PCBs), Method 8270D (semivolatile organic compounds [SVOCs]), Method 8081A (Pesticides), Method 6010/200.8 (inductively coupled plasma optical emission spectrophotometer [ICP-OES] and ICP mass spectrophotometer [ICPMS] metals), Method 7000 series (cold vapor atomic absorption [CVAA] metals), and Method 1613B (Dioxins/Furans) are contained in Tables 5 through 10, respectively.

8.1.3 Representativeness

Objectives for representativeness are defined for each sampling and analysis task and are a function of the investigative objectives. Representativeness shall be achieved through use of standard field, sampling, and analytical procedures. Representativeness is also determined by appropriate program design, with consideration of elements such as proper sample locations, sampling procedures, and sample intervals. Decisions regarding the number and locations of samples to be collected are documented in Section 2.0.

8.1.4 Comparability

Comparability is the confidence with which one data set can be compared to another data set. An objective for this quality assurance/quality control (QA/QC) program is to produce data comparable to previously collected data. The range of field conditions encountered is considered in determining comparability. Comparability will be achieved by using standard methods for sampling and analysis, reporting data in standard units, using suitable certified reference material (CRM), and using standard reporting formats. Field documentation using standardized data collection forms shall support the assessment of comparability.

8.1.5 Completeness

Completeness is calculated and reported for each method, matrix, and analyte combination. The number of valid results divided by the number of intended individual analyte results, expressed as a percentage, determines the completeness of the data set. For completeness requirements, valid results are all results not qualified with an “R” flag (see Table 11 for an explanation of flagging criteria). The requirement for completeness is 90 percent for the sediment samples scheduled for the initial round of analyses.

8.2 FIELD QUALITY ASSURANCE

Field QC will include the collection and chemical analysis of field-duplicate samples to meet a field-duplicate frequency of approximately 10 percent.

8.3 DOCUMENTATION AND RECORDS

Documentation and records for the field portion and the analytical portion will consist of the following items.

8.3.1 Field

Data and log forms produced in the field will be reviewed daily by the person recording the data, so that any errors or omissions can be corrected. All completed data sheets will be removed daily from the field clipboard and photocopied; the original data sheets are filed in a fireproof file cabinet and the photocopies stored in the project file. All data transcribed from field forms into electronic forms and tables will be 100 percent verified for accuracy and freedom from transcription errors.

8.3.2 Analytical Laboratory

Analytical laboratory documentation will consist of a case narrative, providing descriptions of any problems and corrective actions, copies of the chain-of-custody forms, tabulated analytical results, data qualifiers, and blank and matrix spike results with calculated percent recoveries and differences. A detailed documentation package (raw data, analyst's reports, extraction logs, chromatograms, etc.) will be provided by the laboratory in case the basic data review discussed in Section 9.1 encounters deficiencies requiring more thorough laboratory documentation.

8.4 INSTRUMENT/EQUIPMENT TESTING, INSPECTION, MAINTENANCE

This section includes procedures for equipment testing, inspection, and maintenance.

8.4.1 Field

Prior to each daily sampling event, the differential Global Positioning System (DGPS) will be tested for accuracy. A checkpoint accessible to the field crew will be occupied. At the DGPS checkpoint, the DGPS unit will be stationed and a position reading will be taken. The DGPS position will be compared to the known checkpoint coordinates. The DGPS position readings should agree to within 1 to 2 m of the known checkpoint coordinates. If the position readings do not agree within 1 to 2 m, the DGPS unit will be carefully checked and electronics reset. After checking and resetting the DGPS, if the positions still do not agree, other actions may be taken including replacing the unit.

8.4.2 Analytical Laboratory

Analytical instruments shall be calibrated in accordance with the analytical methods specified in the laboratory SOPs. All analytes reported shall be included in the initial and continuing calibrations, and these calibrations shall meet the acceptance criteria specified in Tables 5 through 10. Records of standard preparation and instrument calibration shall be maintained, and calibration standards shall be traceable to regional reference materials (RRMs).

Instrument calibration shall be checked at the frequency specified by the relevant analytical method, using materials prepared independently of the CRM. Multipoint calibrations shall contain the minimum number of calibration points specified by the applicable analytical method, with all points used for the calibration being contiguous. If more than the minimum number of standards are analyzed for the initial calibration, all of the standards analyzed shall be included in the initial calibration. The continuing calibration verification will not be used as the LCS.

9.0 DATA VALIDITY AND USABILITY

This section describes procedures for data validation, verification, and usability.

9.1 DATA REVIEW, VERIFICATION, AND VALIDATION

One hundred percent of the data received from the laboratory will be validated at a Level 1 (basic) review. This Level 1 review will include the following steps.

- Verify that the laboratory utilized the specified extract, analysis, and cleanup methods.
- Review sample holding time.
- Verify that sample numbers and analyses match those requested on the chain-of-custody form.
- Verify that the required reporting limits have been achieved.
- Verify that field duplicates, matrix spikes, and laboratory control samples were run at the proper frequency and have met QC criteria.
- Verify that the surrogate compound analyses have been performed and have met QC criteria.
- Verify that initial and continuing calibrations were run at the proper frequency and have met acceptance criteria.
- Verify that the lab blanks are free of contaminants.

9.2 VERIFICATION AND VALIDATION METHODS

Data that appear to have significant deficiencies will be validated using the more comprehensive Level 2 verification and review in accordance with EPA's functional guidelines for data validation (EPA 1999 and 2004). Following this review, data qualifiers assigned by the laboratory may be amended.

9.3 RECONCILIATION WITH USER REQUIREMENTS

Following receipt of all of the analytical data reports, the consultant team project manager will review the sample results to determine if they fall within the acceptance limits and goals set forth in this Plan. If the DQIs do not meet the project requirements, the data may be discarded and reanalysis performed. The decision to discard or reanalyze will be made jointly between the consultant team and the client. If the failure is traced to the analytical laboratory (e.g., sample handling, extraction, or instrument calibration and maintenance), techniques will be reassessed prior to reanalysis.

10.0 REPORTING

A data report summarizing the results of the characterization will be prepared by the consultant team and the Boeing Project Manager for submittal to Ecology. This report will include a narrative of field activities, chain-of-custody records, a Level 1 data review, data tables and maps for sample locations, data tables and maps summarizing the results of the analytical analyses, and electronic data tables.

Sediment chemistry data will be compared against the SMS SQS and Cleanup Screening Level (CSL) numerical criteria (Table 3). The SMS SQS for many organic compounds is based on carbon-normalized concentrations. Comparison of carbon-normalized values against the SQS criteria listed in Table 3 may be inappropriate if TOC values are below 0.5 percent or are above 4.0 percent. Sediment samples with TOC concentrations outside the carbon normalization range will be compared to the dry-weight-based standards specified in Table 3.

11.0 SCHEDULE

The fieldwork for this investigation is dependent on Ecology approval of this Plan. Fieldwork will start within 4 weeks following Ecology approval of the Plan and the issuance of a Hydraulic Permit Approval for the proposed sampling from Washington Department of Fish and Wildlife. Field activities are expected to take up to 6 days. The schedule and duration of the field sampling, laboratory analysis, and reporting is presented below.

Task	Schedule
Collect and submit sediment samples	1 week, Week 1
Receive initial chemical laboratory data (SMS, carbazole, and dioxin/furan)	4 weeks, Weeks 2 through 5
Evaluate preliminary data, depending on results conduct additional analyses	4weeks, Weeks 6 through 9
Coordinate with Ecology and other agencies to determine proposed remediation dredge depth (if required)	2 weeks, Weeks 10 through 11
Receive results of additional dioxin analysis for ecological and human health risk assessment	4 weeks, Weeks 12 through 15

Perform data quality review and prepare data report	4 weeks, Weeks 16 through 19
Submit data report to Ecology	Week 20

12.0 HEALTH AND SAFETY

Worker health and safety requirements will follow the Site-Specific Health and Safety Plan prepared in accordance with applicable state regulations for hazardous waste site workers, Chapter 296-843 WAC.

13.0 WASTE MANAGEMENT

All waste derived during this investigation will be placed in proper containers, labeled, characterized, and disposed of by Boeing in accordance with the appropriate regulations.

14.0 REFERENCES

Ecology (Washington State Department of Ecology). 2008. Sediment Sampling and Analysis Plan Appendix. Ecology, Olympia.

EPA (U.S. Environmental Protection Agency). 1999. Contract Laboratory Program National Functional Guidelines for Organic Data Review. EPA, OSWER, EPA 540/R 99-008, Washington, D.C.

EPA. 2004, Contract Laboratory Program National Functional Guidelines for Inorganic Data Review. EPA, OSWER, EPA 540/R 04-004, Washington, D.C.

PSEP (Puget Sound Estuary Program). 1997. Recommended Guidelines for Sampling Marine Sediment, Water Column, and Tissue in Puget Sound. Prepared for the U.S. Environmental Protection Agency and Puget Sound Water Quality Action Team.

TABLES

TABLE 1

SEDIMENT SAMPLING LOCATIONS AND INITAL ANALYSIS SCHEDULE

Boeing Isaacson-Thompson Site
Tukwila, Washington

Proposed Sample Location	State Plane Coordinates (WA SPC North NAD 83; Survey Feet)		Estimated Mudline Elevation (feet MLLW)[1]	Sample Type	Samples Collected[2]	Preliminary List of Initial Samples Analyzed[3]	Initial Analysis Schedule
	Easting	Northing					
SD-501G	1275945	195120	-11.9	Grab	0-10cm	0-10 cm	SMS list of analytes, carbazole, TOC
SD-501	1275945	195120	-11.9	Core	1-foot intervals from 1 foot below surface to up to 19 feet	2-3 feet	SMS list of analytes, carbazole, TOC
						4-5 feet	SMS list of analytes, carbazole, TOC
						6-7 feet	SMS list of analytes, carbazole, TOC
						8-9 feet	SMS list of analytes, carbazole, TOC
SD-502G	1276019	195069	-1.0	Grab	0-10 cm	0-10 cm	SMS list of analytes, carbazole, TOC
SD-502	1276019	195069	-1.0	Core	1-foot intervals from 1 foot below surface to up to 19 feet	2-3 feet	SMS list of analytes, carbazole, TOC
						4-5 feet	SMS list of analytes, carbazole, TOC
						6-7 feet	SMS list of analytes, carbazole, TOC
						8-9 feet	SMS list of analytes, carbazole, TOC
SD-503G	1275974	195000	-11.5	Grab	0-10 cm	0-10 cm	SMS list of analytes, carbazole, TOC
SD-503	1275974	195000	-11.5	Core	1-foot intervals from 1 foot below surface to up to 19 feet	2-3 feet	SMS list of analytes, carbazole, TOC
						4-5 feet	SMS list of analytes, carbazole, TOC
						6-7 feet	SMS list of analytes, carbazole, TOC
						8-9 feet	SMS list of analytes, carbazole, TOC
SD-504G	1276049	194943	0.4	Grab	0-10 cm	0-10 cm	SMS list of analytes, carbazole, TOC
SD-504	1276049	194943	0.4	Core	1-foot intervals from 1 foot below surface to up to 19 feet	2-3 feet	SMS list of analytes, carbazole, TOC
						4-5 feet	SMS list of analytes, carbazole, TOC
						6-7 feet	SMS list of analytes, carbazole, TOC
						8-9 feet	SMS list of analytes, carbazole, TOC
SD-505G[4]	1276004	194880	-11.1	Grab	0-10 cm	0-10 cm	SMS list of analytes, carbazole, TOC
SD-505[5]	1276004	194880	-11.1	Core	1-foot intervals from 1 foot below surface to up to 19 feet	2-3 feet	SMS list of analytes, carbazole, TOC
						4-5 feet	SMS list of analytes, carbazole, TOC
						6-7 feet	SMS list of analytes, carbazole, TOC
						8-9 feet	SMS list of analytes, carbazole, TOC
SD-506G	1276079	194821	0.0	Grab	0-10 cm	0-10 cm	SMS list of analytes, carbazole, TOC
SD-506	1276079	194821	0.0	Core	1-foot intervals from 1 foot below surface to up to 19 feet	2-3 feet	SMS list of analytes, carbazole, TOC
						4-5 feet	SMS list of analytes, carbazole, TOC
						6-7 feet	SMS list of analytes, carbazole, TOC
						8-9 feet	SMS list of analytes, carbazole, TOC
SD-507G	1276034	194760	-9.7	Grab	0-10 cm	0-10 cm	SMS list of analytes, carbazole, dioxins/furans, TOC
SD-507	1276034	194760	-9.7	Core	1-foot intervals from 1 foot below surface to up to 19 feet	2-3 feet	SMS list of analytes, carbazole, TOC
						4-5 feet	SMS list of analytes, carbazole, TOC
						6-7 feet	SMS list of analytes, carbazole, TOC
						8-9 feet	SMS list of analytes, carbazole, TOC
SD-508G	1276124	194702	-2.9	Grab	0-10 cm	0-10 cm	SMS list of analytes, carbazole, dioxins/furans, TOC
SD-508	1276124	194702	-2.9	Core	1-foot intervals from 1 foot below surface to up to 19 feet	2-3 feet	SMS list of analytes, carbazole, TOC
						4-5 feet	SMS list of analytes, carbazole, TOC
						6-7 feet	SMS list of analytes, carbazole, TOC
						8-9 feet	SMS list of analytes, carbazole, TOC
SD-509G	1276063	194641	-9.9	Grab	0-10 cm	0-10 cm	SMS list of analytes, carbazole, dioxins/furans, TOC
SD-509	1276063	194641	-9.9	Core	1-foot intervals from 1 foot below surface to up to 19 feet	2-3 feet	SMS list of analytes, carbazole, TOC
						4-5 feet	SMS list of analytes, carbazole, TOC
						6-7 feet	SMS list of analytes, carbazole, TOC
						8-9 feet	SMS list of analytes, carbazole, TOC
SD-510G	1276154	194582	0.4	Grab	0-10 cm	0-10 cm	SMS list of analytes, carbazole, TOC
SD-510	1276154	194582	0.4	Core	1-foot intervals from 1 foot below surface to up to 19 feet	2-3 feet	SMS list of analytes, carbazole, TOC
						4-5 feet	SMS list of analytes, carbazole, TOC
						6-7 feet	SMS list of analytes, carbazole, TOC
						8-9 feet	SMS list of analytes, carbazole, TOC

TABLE 1

SEDIMENT SAMPLING LOCATIONS AND INITAL ANALYSIS SCHEDULE

Boeing Isaacson-Thompson Site

Tukwila, Washington

Proposed Sample Location	State Plane Coordinates (WA SPC North NAD 83; Survey Feet)		Estimated Mudline Elevation (feet MLLW) [1]	Sample Type	Samples Collected [2]	Preliminary List of Initial Samples Analyzed [3]	Initial Analysis Schedule
	Easting	Northing					
SD-511G	1276093	194521	-10.1	Grab	0-10 cm	0-10 cm	SMS list of analytes, carbazole, TOC
SD-511	1276093	194521	-10.1	Core	1-foot intervals	2-3 feet	SMS list of analytes, carbazole, TOC
					from 1 foot	4-5 feet	SMS list of analytes, carbazole, TOC
					below surface	6-7 feet	SMS list of analytes, carbazole, TOC
					to up to 19 feet	8-9 feet	SMS list of analytes, carbazole, TOC
SD-512G [6]	1276184	194462	0.4	Grab	0-10 cm	0-10 cm	SMS list of analytes, carbazole, TOC
SD-512 [7]	1276184	194462	0.4	Core	1-foot intervals	2-3 feet	SMS list of analytes, carbazole, TOC
					from 1 foot	4-5 feet	SMS list of analytes, carbazole, TOC
					below surface	6-7 feet	SMS list of analytes, carbazole, TOC
					to up to 19 feet	8-9 feet	SMS list of analytes, carbazole, TOC
SD-513G	1276122	194401	-9.6	Grab	0-10 cm	0-10 cm	SMS list of analytes, carbazole, TOC
SD-513	1276122	194401	-9.6	Core	1-foot intervals	2-3 feet	SMS list of analytes, carbazole, TOC
					from 1 foot	4-5 feet	SMS list of analytes, carbazole, TOC
					below surface	6-7 feet	SMS list of analytes, carbazole, TOC
					to up to 19 feet	8-9 feet	SMS list of analytes, carbazole, TOC
SD-514G	1276213	194342	0.3	Grab	0-10 cm	0-10 cm	SMS list of analytes, carbazole, dioxins/furans, TOC
SD-514	1276213	194342	0.3	Core	1-foot intervals	2-3 feet	SMS list of analytes, carbazole, TOC
					from 1 foot	4-5 feet	SMS list of analytes, carbazole, TOC
					below surface	6-7 feet	SMS list of analytes, carbazole, TOC
					to up to 19 feet	8-9 feet	SMS list of analytes, carbazole, TOC
SD-515G	1276152	194281	-9.3	Grab	0-10 cm	0-10 cm	SMS list of analytes, carbazole, dioxins/furans, TOC
SD-515	1276152	194281	-9.3	Core	1-foot intervals	2-3 feet	SMS list of analytes, carbazole, TOC
					from 1 foot	4-5 feet	SMS list of analytes, carbazole, TOC
					below surface	6-7 feet	SMS list of analytes, carbazole, TOC
					to up to 19 feet	8-9 feet	SMS list of analytes, carbazole, TOC

Notes:

1. Estimated from bathymetric survey.
2. See Section 3.3 and 3.4 for discussion of the target sample depth.
3. Intervals to be analyzed may be changed based on sediment characteristics observed by the field geologist during core processing and actual recovery depth.
4. Duplicate grab collected at this location (sample designated SD-516G).
5. Duplicate core collected at this location (sample designated SD-516).
6. Duplicate grab collected at this location (sample designated SD-517G).
7. Duplicate core collected at this location (sample designated SD-517).

Abbreviations:

cm = centimeter
MLLW = mean lower low water
NAD = North American Datum
SMS = Sediment Management Standards
TOC = total organic carbon
WA SPC = Washington State Plane Coordinates

TABLE 2

ANALYTE HOLDING TIMES
Boeing Isaacson-Thompson Site
Tukwila, Washington

Analyte	Sample Preservation	Holding Time
Metals (except mercury)	Cool 4°C Freeze -18°C	6 months 2 years
Mercury	Freeze -18°C	28 days
Semivolatile Organic Compounds	Cool 4°C Freeze -18°C	14 days 1 years
PCBs	Cool 4°C Freeze -18°C	14 days 1 years
Dioxins/furans	Cool 4°C Freeze -18°C	14 days 1 years
Total Organic Carbon	Cool 4°C Freeze -18°C	14 days 6 months

Abbreviations:
C = centigrade
PCB = polychlorinated biphenyl

TABLE 3

DATA QUALITY OBJECTIVES FOR THE CONSTITUENTS OF CONCERN PRACTICAL QUANTITATION REQUIREMENTS

Boeing Isaacson-Thompson Site

Tukwila, Washington

Chemical Parameter	Sediment Management Standards SQS [1]	CSL [2]	LAET [3]
Metals	**mg/kg dry wt**	**mg/kg dry wt**	**mg/kg dry wt**
Arsenic	57	93	57
Cadmium	5.1	6.7	5.1
Chromium	260	270	260
Copper	390	390	390
Lead	450	530	450
Mercury	0.41	0.59	0.41
Silver	6.1	6.1	6.1
Zinc	410	960	410
Nonionizable Organic Compounds	**mg/kg carbon**	**mg/kg carbon**	**µg/kg dry wt**
Aromatic Hydrocarbons			
Total LPAH	370	780	5200
Naphthalene	99	170	2100
Acenaphthylene	66	66	1300
Acenaphthene	16	57	500
Fluorene	23	79	540
Phenanthrene	100	480	1500
Anthracene	220	1200	960
2-Methylnaphthalene	38	780	670
Total HPAH	960	5300	12000
Fluoranthene	160	1200	1700
Pyrene	1000	1400	2600
Benz[a]anthracene	110	270	1300
Chrysene	110	460	1400
Total benzofluoranthenes	230	450	3200
Benzo[a]pyrene	99	210	1600
Indeno[1,2,3-c,d]pyrene	34	88	600
Dibenzo[a,h]anthracene	12	33	230
Benzo[g,h,i]perylene	31	78	670
Chlorinated Benzenes			
1,2-Dichlorobenzene	2.3	2.3	35
1,4-Dichlorobenzene	3.1	9	110
1,2,4-Trichlorobenzene	0.81	1.8	31
Hexachlorobenzene	0.38	2.3	22

TABLE 3

DATA QUALITY OBJECTIVES FOR THE CONSTITUENTS OF CONCERN
PRACTICAL QUANTITATION REQUIREMENTS

Boeing Isaacson-Thompson Site
Tukwila, Washington

Chemical Parameter	Sediment Management Standards SQS [1]	Sediment Management Standards CSL [2]	LAET [3]
Phthalate Esters			
Dimethyl phthalate	53	53	71
Diethyl phthalate	61	110	200
Di-n-butyl phthalate	220	1700	1400
Butyl benzyl phthalate	4.9	64	63
Bis[2-ethylhexyl]phthalate	47	78	1300
Di-n-octyl phthalate	58	4500	6200
Miscellaneous			
Dibenzofuran	15	58	540
Hexachlorobutadiene	3.9	6.2	11
N-nitrosodiphenylamine	11	11	28
Carbazole [4]	—	—	—
Dioxins/Furans (PCDD/PCDF) [4]	—	—	—
Pesticides and PCBs			
Total PCBs	12	65	130
Ionizable Organic Compounds	**µg/kg dry wt**	**µg/kg dry wt**	**µg/kg dry wt**
Phenol	420	1200	420
2-Methylphenol	63	63	63
4-Methylphenol	670	670	670
2,4-Dimethylphenol	29	29	29
Pentachlorophenol	360	690	360
Benzyl alcohol	57	73	57
Benzoic acid	650	650	650

Notes:
1. Sediment Management Standards Sediment Quality Standards (173-204-320) WAC.
2. Sediment Management Standards Cleanup Screening Levels (173-204-520) WAC.
3. LAET = Lowest-Apparent-Effects Threshold.
4. DQOs have not been established. Standard method reporting limits will be substituted.

Abbreviations:
CSL = Cleanup Screening Level
HPAH = high-molecular-weight polycyclic aromatic hydrocarbon
LAET = lowest-apparent-effects threshold
LPAH = low-molecular-weight polycyclic aromatic hydrocarbon
mg/kg dry wt = milligrams per kilogram dry weight
PCBs = polychlorinated biphenyls
SQS = sediment quality standards
µg/kg dry wt = micrograms per kilogram dry weight
WAC = Washington Administrative Code

TABLE 4

ANALYTICAL METHODOLOGIES AND REPORTING LIMITS
Boeing Isaacson-Thompson Site
Tukwila, Washington

Analyte	Sample Prep/ Extraction	Analytical Method	Reporting Limit [1]
Conventionals			
Total Organic Carbon (Sediment)	ARI 602S	EPA 9060/Plumb 1981	200 mg/kg
Total Solids	ARI 639S	EPA 160.1/PSEP	0.10%
Metals (mg/kg)			
Arsenic	EPA 3050	EPA 200.8 (ICPMS)	0.5
Cadmium	EPA 3050	EPA 6010 (ICP-OES)	0.2
Chromium	EPA 3050	EPA 6010 (ICP-OES)	0.5
Copper	EPA 3050	EPA 6010 (ICP-OES)	0.2
Lead	EPA 3050	EPA 6010 (ICP-OES)	2.0
Mercury	EPA 7471A	EPA 7471A (CVAA)	0.05
Silver	EPA 3050	EPA 6010 (ICP-OES)	1.0
Zinc	EPA 3050	EPA 6010 (ICP-OES)	1
Nonionizable Organic Compounds			
Aromatic Hydrocarbons (µg/kg)			
Total LPAH	—	—	—
Naphthalene	EPA 3550B	EPA 8270D - PSEP	20
Acenaphthylene	EPA 3550B	EPA 8270D - PSEP	20
Acenaphthene	EPA 3550B	EPA 8270D - PSEP	20
Fluorene	EPA 3550B	EPA 8270D - PSEP	20
Phenanthrene	EPA 3550B	EPA 8270D - PSEP	20
Anthracene	EPA 3550B	EPA 8270D - PSEP	20
2-Methylnaphthalene	EPA 3550B	EPA 8270D - PSEP	20
Total HPAH	—	—	—
Fluoranthene	EPA 3550B	EPA 8270D - PSEP	20
Pyrene	EPA 3550B	EPA 8270D - PSEP	20
Benz[a]anthracene	EPA 3550B	EPA 8270D - PSEP	20
Chrysene	EPA 3550B	EPA 8270D - PSEP	20
Total benzofluoranthenes	EPA 3550B	EPA 8270D - PSEP	40
Benzo[a]pyrene	EPA 3550B	EPA 8270D - PSEP	20
Indeno[1,2,3-c,d]pyrene	EPA 3550B	EPA 8270D - PSEP	20
Dibenzo[a,h]anthracene	EPA 3550B	EPA 8270D - PSEP	20
Benzo[g,h,i]perylene	EPA 3550B	EPA 8270D - PSEP	20
Chlorinated Benzenes (µg/kg)			
1,2-Dichlorobenzene	EPA 3550B	EPA 8270D - PSEP	20
1,4-Dichlorobenzene	EPA 3550B	EPA 8270D - PSEP	20
1,2,4-Trichlorobenzene	EPA 3550B	EPA 8270D/8260C - PSEP	20/5
Hexachlorobenzene	EPA 3550B	EPA 8270D/8081A - PSEP	20/1
Phthalate Esters (µg/kg)			
Dimethyl phthalate	EPA 3550B	EPA 8270D - PSEP	20
Diethyl phthalate	EPA 3550B	EPA 8270D - PSEP	20
Di-n-butyl phthalate	EPA 3550B	EPA 8270D - PSEP	20
Butyl benzyl phthalate	EPA 3550B	EPA 8270D - PSEP	20
Bis[2-ethylhexyl]phthalate	EPA 3550B	EPA 8270D - PSEP	20
Di-n-octyl phthalate	EPA 3550B	EPA 8270D - PSEP	20
Miscellaneous (µg/kg)			
Dibenzofuran	EPA 3550B	EPA 8270D - PSEP	20
Hexachlorobutadiene	EPA 3550B	EPA 8270D/8081A - PSEP	20/1
N-nitrosodiphenylamine	EPA 3550B	EPA 8270D - PSEP	20
Carbazole	EPA 3550B	EPA 8270D - PSEP	20
Pesticides and PCBs (µg/kg)			
Total PCBs	PSDDA Sonication [2] (low levels)	EPA 8082	20 µg/kg per Aroclor

TABLE 4

ANALYTICAL METHODOLOGIES AND REPORTING LIMITS

Boeing Isaacson-Thompson Site
Tukwila, Washington

Analyte	Sample Prep/ Extraction	Analytical Method	Reporting Limit [1]
Ionizable Organic Compounds (µg/kg)			
Phenol	EPA 3550B	EPA 8270D - PSEP	20
2-Methylphenol	EPA 3550B	EPA 8270D - PSEP	20
4-Methylphenol	EPA 3550B	EPA 8270D - PSEP	20
2,4-Dimethylphenol	EPA 3550B	EPA 8270D - PSEP	20
Pentachlorophenol	EPA 3550B	EPA 8270D - PSEP	100
Benzyl alcohol	EPA 3550B	EPA 8270D - PSEP	20
Benzoic acid	EPA 3550B	EPA 8270D - PSEP	200
Dioxins/Furans (PCDD/PCDF)			
2,3,7,8-TCDD	—	EPA 1613B	1.0 pg/g
2,3,7,8-TCDF	—	EPA 1613B	1.0 pg/g
1,2,3,7,8-PeCDD	—	EPA 1613B	5.0 pg/g
1,2,3,7,8-PeCDF	—	EPA 1613B	5.0 pg/g
2,3,4,7,8-PeCDF	—	EPA 1613B	5.0 pg/g
1,2,3,4,7,8-HxCDD	—	EPA 1613B	5.0 pg/g
1,2,3,6,7,8-HxCDD	—	EPA 1613B	5.0 pg/g
1,2,3,7,8,9-HxCDD	—	EPA 1613B	5.0 pg/g
1,2,3,4,7,8-HxCDF	—	EPA 1613B	5.0 pg/g
1,2,3,6,7,8-HxCDF	—	EPA 1613B	5.0 pg/g
1,2,3,7,8,9-HxCDF	—	EPA 1613B	5.0 pg/g
2,3,4,6,7,8-HxCDF	—	EPA 1613B	5.0 pg/g
1,2,3,4,6,7,8-HpCDD	—	EPA 1613B	5.0 pg/g
1,2,3,4,6,7,8-HpCDF	—	EPA 1613B	5.0 pg/g
1,2,3,4,7,8,9-HpCDF	—	EPA 1613B	5.0 pg/g
OCDD	—	EPA 1613B	10 pg/g
OCDF	—	EPA 1613B	10 pg/g

Notes:

1. Reporting limits obtained from ARI Labs are subject to change based on MDL studies.
2. Puget Sound Dredged Disposal Analysis protocol for low detection limits.

Abbreviations:

ARI = Analytical Resources, Inc.
CVAA = cold-vapor atomic absorption
EPA = U.S. Environmental Protection Agency
HPAH = high-molecular-weight polycyclic aromatic hydrocarbon
ICP-OES = inductively coupled plasma optical emission spectrophotometer
LPAH = low-molecular-weight polycyclic aromatic hydrocarbon
mg/kg = milligrams per kilogram
PCBs = polychlorinated biphenyls
PSDDA = Puget Sound Dredged Disposal Analysis
PSEP Puget Sound Estuary Program
µg/kg = micrograms per kilogram

TABLE 5

SUMMARY OF QUALITY OBJECTIVES FOR METHOD 8082—PCBs

Boeing Isaacson-Thompson Site
Tukwila, Washington

Quality-Control Element	Frequency of Implementation	Acceptance Criteria
Initial Calibration	After CCVs fail	RSD ≤ 20% or r ≥ 0.995
Continuing Calibration Verification (CCV)	At the beginning and end of analytical sequence, and every 12 hours	% Recovery = 75% to 125%
Method Blank (MB)	1 per extraction batch of ≤20 samples	Analytes < RL
Laboratory Control Sample (LCS)	1 per extraction batch of ≤20 samples	Solids: % Recovery = 37% to 116%
Matrix Spike (MS)	1 per 20 samples	% Recovery = 37% to 116%
Matrix Duplicate (MD) or Matrix-Spike Duplicate (MSD)	1 per 20 samples	RPD ≤ 50%
Regional Reference Material (RRM)	1 per 50 samples	Advisory Limits: Average +/- 2SD % Recovery 19% to 112%
Surrogates	Every sample as specified	% Recovery = 34% to 141%
Target Analyte Confirmation	Every detected compound	RPD ≤ 40%

Abbreviations:
- PCBs = polychlorinated biphenyls
- RL = reporting limit
- RPD = relative percent difference
- RSD = relative standard deviation
- SD = standard deviation

TABLE 6

SUMMARY OF QUALITY OBJECTIVES FOR METHOD 8270D—SVOCs

Boeing Isaacson-Thompson Site
Tukwila, Washington

Quality-Control Element	Frequency of Implementation	Acceptance Criteria
Initial Calibration	After CCV fails	r > 0.990 or RSD < 20%, RRF >0.050 for SPCC and >0.010 for other cmpds.
Continuing Calibration Verification (CCV)	At the beginning of each 12 hour shift	%D < 20% for CCC and < 40% for other cmpds, RRF >0.050 for SPCC and >0.010 for other cmpds.
Method Blank (MB)	1 per extraction batch of <20 samples	Analytes < RL
Laboratory Control Sample (LCS)	1 per extraction batch of <20 samples	Solids: % Recovery = 10% to 160% B/N cmpds % Recovery = 10% to 140% A cmpds
Matrix Spike (MS)	1 per 20 samples	Solids: % Recovery = 10% to 160% B/N cmpds % Recovery = 10% to 140% A cmpds
Matrix Duplicate (MD) or Matrix Spike Duplicate (MSD)	1 per 20 samples	RPD < 50%
Surrogates:	Every sample as specified	
Interference-Free Matrix		Interference-Free Matrix Solids: % Recovery = 34% to 106% B/N cmpds % Recovery = 14% to 109% A cmpds
Project Sample Matrix		Project Sample Matrix % Recovery = 30% to 113% A cmpds % Recovery = 10% to 116% A cmpds

Abbreviations:

A = acid compounds (cmpds)
B/N = base, neutral compounds (cmpds)
CCC = calibration check compounds
cmpds = compounds
RL = reporting limit
RPD = relative percent difference
RSD = relative standard deviation
SPCC = system performance check compounds

TABLE 7

SUMMARY OF QUALITY OBJECTIVES FOR METHOD 8081A—PESTICIDES

Boeing Isaacson-Thompson Site
Tukwila, Washington

Quality Control Element	Frequency of Implementation	Acceptance Criteria [1]
Initial Calibration	As needed	RSD ≤ 20%
Initial Calibration Verification (ICV)	After initial calibration	% Recovery = 80-120%
Continuing Calibration Verification (CCV)	Every 12 hours	% Drift ≤ 20%, %D ≤ 20%
Method Blank (MB)	1 per batch of ≤20 samples	Analytes < RL
Laboratory Control Sample (LCS)	1 per batch of ≤20 samples	Soil: % Recovery = 37% to 150%
Matrix Spike (MS)	1 per 20 samples	% Recovery = 37% to 150%
Matrix-Spike Duplicate (MSD)	1 per 20 samples	RPD ≤ 50%
Surrogates: Interference-Free Matrix Project Sample Matrix	Every sample as specified	 Interference-Free Matrix Soil: % Recovery = 53% to 113% Project Sample Matrix % Recovery = 26% to 143%
Target Analyte Confirmation Duplicate	Every detected compound	RPD ≤ 40%

Notes:

1. Control limits, reporting limits, and method detection limits are subject to change based on annual verification and review by the analytical laboratory.

Abbreviations:

RL = reporting limit
RPD = relative percent difference
RSD = relative standard deviation
%D = percent difference

TABLE 8

SUMMARY OF QUALITY OBJECTIVES FOR METHOD 6010/ 200.8—ICP and ICPMS METALS

Boeing Isaacson-Thompson Site
Tukwila, Washington

Quality-Control Element	Description of Element	Frequency of Implementation	Acceptance Criteria
Initial Calibration	Option 1: 1 std and blank, and a low-level-check standard at RL	Daily	Option 1: Low-level-check standard ± 1 RL
	Option 2: 3 stds and blank		Option 2: r > 0.995
Instrumental Precision	% RSD 3 integrations (exposures)	Each calibration and calibration verification standards (ICV/CCV)	% RSD < 5%
Initial Calibration Verification (ICV)	Midlevel (2nd source) verification	After initial calibration	% Recovery 90% to 110%
Initial Calibration Blank (ICB)	Interference-Free Matrix to assess analysis contamination	After initial calibration	Analytes < RL
Continuing Calibration Verification (CCV)	Midlevel verification	Every 10 samples and at end of analytical sequence	% Recovery 90% to 110%
Continuing Calibration Blank (CCB)	Interference-Free Matrix to assess analysis contamination	Every 10 samples and at end of analytical sequence	Analytes < RL
Method Blank (MB)	Interference-Free Matrix to assess overall method contamination	1 per extraction batch of <20 samples	Analytes < RL or < 1/10th lowest sample instrument concentration.
Laboratory Control Sample (LCS)	Interference-Free Matrix containing all target analytes	1 per extraction batch of <20 samples	% Recovery = 80% to 120%
			Sporadic Marginal Failures[1];
			% Recovery = 80% to 140%
Matrix Spike (MS)	Sample matrix spiked with all or a subset of target analytes prior to digestion	1 per 20 samples	% Recovery = 75% to 125%
Matrix Duplicate (MD) or Matrix-Spike Duplicate (MSD)	Refer to text for MD or MS	1 per 20 samples	RPD < 20%

Notes:

1. The number of Sporadic Marginal Failure (SMF) allowances depend on the number of target analytes reported from the analysis. In the instance of only seven metals, one SMF is allowed.

Abbreviations:

RL = reporting limit
RSD = relative standard deviation
RPD = relative percent difference

TABLE 9

SUMMARY OF QUALITY OBJECTIVES FOR METHOD 7000 SERIES—CVAA METALS

Boeing Isaacson-Thompson Site

Tukwila, Washington

Quality-Control Element	Description of Element	Frequency of Implementation	Acceptance Criteria
Initial Calibration	3 stds and blank	Daily	r > 0.995
Instrumental Precision	RPD of 2 injections	All standards, and ICV/CCV	RPD < 10%
Initial Calibration Verification (ICV)	Midlevel (2nd source) verification	After initial calibration	% Recovery = 90% to 110%
Initial Calibration Blank (ICB)	Interference-Free Matrix to assess analysis contamination	After initial calibration	Analytes < RL
Continuing Calibration Blank (CCB)	Interference-Free Matrix to assess analysis contamination	Every 10 samples and at end of analytical sequence	Analytes < RL
Continuing Calibration Verification (CCV)	Midlevel verification	Every 10 samples and at end of analytical sequence	% Recovery = 80% to 120%
Method Blank (MB)	Interference-Free Matrix to assess overall method contamination	1 per preparation batch of <20 samples	Analytes < RL
Laboratory Control Sample (LCS)	Interference-Free Matrix containing target analytes	1 per preparation batch of <20 samples	% Recovery = 80% to 120%
Matrix Spike (MS)	Sample matrix spiked with target analytes prior to digestion	1 per 20 samples	% Recovery = 75% to 125%
Matrix Duplicate (MD) or Matrix-Spike Duplicate (MSD)	Refer to text for MD or MS	1 per 20 samples	RPD <20%
Post-Digestion Spike (PDS)	Sample digestate spiked with target analytes	As needed to confirm matrix effects	% Recovery = 85% to 115%

Notes:

1. The number of Sporadic Marginal Failure (SMF) allowances depend on the number of target analytes reported from the analysis. In the instance of only seven metals, one SMF is allowed.

Abbreviations:

RL = reporting limit

RPD = relative percent difference

TABLE 10

SUMMARY OF QUALITY OBJECTIVES FOR METHOD 1613B—DIOXINS/FURANS

Boeing Isaacson-Thompson Site

Tukwila, Washington

Quality Control Element	Frequency of Implementation	Acceptance Criteria
Initial Calibration	Until CCV fails	m/z ratio within ± 15% of theoretical Signal/noise ratio ≥10:1 RR RSD ≤ 20% RRF RSD ≤ 35% RTs within windows GC resolution ≤ 25%
Mass Calibration and Mass Spectrometer Resolution	Beginning and end of each 12-hour shift	Resolving power ≥ 10,000
Window Defining Mix	Beginning of each 12-hour shift	RTs within windows
Continuing Calibration Verification (CCV)	Beginning of each 12-hour shift	m/z ratio within ± 15% of theoretical Signal/noise ratio ≥10:1 RR %D ≤ ± 20% RRF %D ≤ ± 35% RTs within windows
Method Blank (MB)	1 per extraction batch	Analytes < RL or < 5x Sample Conc.
Ongoing Precision and Recovery (OPR)	1 per sample batch	2,3,7,8-TCDD 67-158%
		2,3,7,8-TCDF 75-158%
		1,2,3,7,8-PeCDD 70–142%
		1,2,3,7,8-PeCDF 80-134%
		2,3,4,7,8-PeCDF 68-160%
		1,2,3,4,7,8-HxCDD 70-164%
		1,2,3,6,7,8-HxCDD 76-134%
		1,2,3,7,8,9-HxCDD 64-162%
		1,2,3,4,7,8-HxCDF 72-134%
		1,2,3,6,7,8-HxCDF 84-130%
		1,2,3,7,8,9-HxCDF 78-130%
		2,3,4,6,7,8-HxCDF 70–156%
		1,2,3,4,6,7,8-HpCDD 70–140%
		1,2,3,4,6,7,8-HpCDF 82-132%
		1,2,3,4,7,8,9-HpCDF 78-138%
		OCDD 78-144%
		OCDF 63-170 %

TABLE 10

SUMMARY OF QUALITY OBJECTIVES FOR METHOD 1613B—DIOXINS/FURANS

Boeing Isaacson-Thompson Site
Tukwila, Washington

Quality Control Element	Frequency of Implementation	Acceptance Criteria
Labeled Compound Recoveries	Each sample and QC sample	13C12-2,3,7,8-TCDF 24-169%
		13C12-1,2,3,7,8-PeCDD 25-181%
		13C12-1,2,3,7,8-PeCDF 24-185%
		13C12-2,3,4,7,8-PeCDF 21-178%
		13C12-1,2,3,4,7,8-HxCDD 32-141%
		13C12-1,2,3,6,7,8,-HxCDD 28-130%
		13C12-1,2,3,4,7,8-HxCDF 26-152%
		13C12-1,2,3,6,7,8-HxCDF 26-123%
		13C12-1,2,3,7,8,9-HxCDF 29-147%
		13C12-2,3,4,6,7,8,-HxCDF 28-136%
		13C12-1,2,3,4,6,7,8-HpCDD 23-140%
		13C12-1,2,3,4,6,7,8-HpCDF 28-143%
		13C12-1,2,3,4,7,8,9-HpCDF 26-138%
		13C12-OCDD 17-157%
		37Cl4-2,3,7,8-TCDD 35-197%
		13C12-2,3,7,8-TCDD 25-164%

Abbreviation(s)

%D: percent difference
CCV: continuing calibration verification
GC: gas chromatography
MB: method blank
m/z: ion abundance
OPR: ongoing precision and recovery
QC: quality control
RR: relative response
RRF: relative response factor
RSD: relative standard deviation
RT: retention time

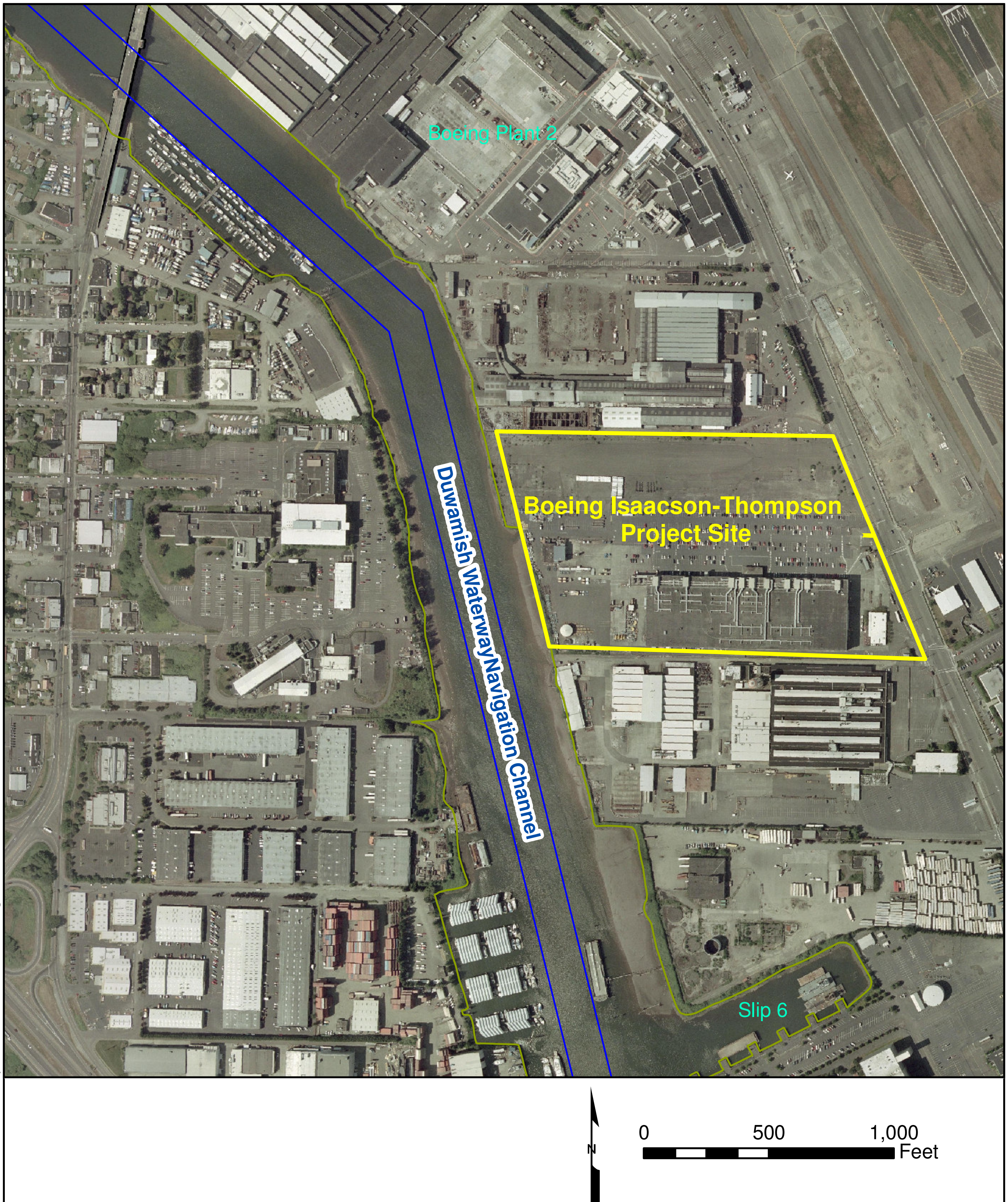
TABLE 11

DATA QUALIFIERS
Boeing Isaacson-Thompson Site
Tukwila, Washington

Qualifier	Description
U	The compound was analyzed for, but not detected.
UJ	The compound was analyzed for, but was not detected; the associated quantitation limit is an estimate because quality-control criteria were not met.
J	The analyte was positively identified, but the associated numerical value is an estimate quantity because quality-control criteria were not met or because concentrations reported are less than the quantitation limit or lowest calibration standard.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a tentative identification.
NJ	The analysis indicates the presence of an analyte that has been “tentatively identified” and the associated numerical value represents its approximate concentration.
R	Quality control indicates that data are unusable (compound may or may not be present). Reanalysis is necessary for verification.
UY	PCB Methods only. The laboratory uses the Y qualifier when interferences (usually the presence of the overlapping PCB Aroclor at high concentrations) cause the detection limit to be raised. The Y-flagged Aroclor may be present at concentrations at or below the limit reported, but in the opinion of the analyst, insufficient information is present to confirm the detection according to the method’s protocols. The concentration should be treated as a non-detected value at a raised detection limit. The “U” has been added to the lab’s “Y” qualifier to stress that the sample should be treated as a non-detected value.
EMPC	Dioxin/furan analysis only. Estimated Maximum Possible Concentration (EMPC) defined in EPA Statement of Work DLM02.2 as a value "calculated for 2,3,7,8-substituted isomers for which the quantitation and /or confirmational ion(s) has signal to noise in excess of 2.5, but does not meet identification criteria".
X	Dioxin/furan analysis only. Analyte signal includes interference from polychlorinated diphenyl ethers.
Z	Dioxin/furan analysis only. Analyte signal includes interference from the sample matrix or perfluorokerosene ions.

Abbreviations:
PCB = polychlorinated biphenyl

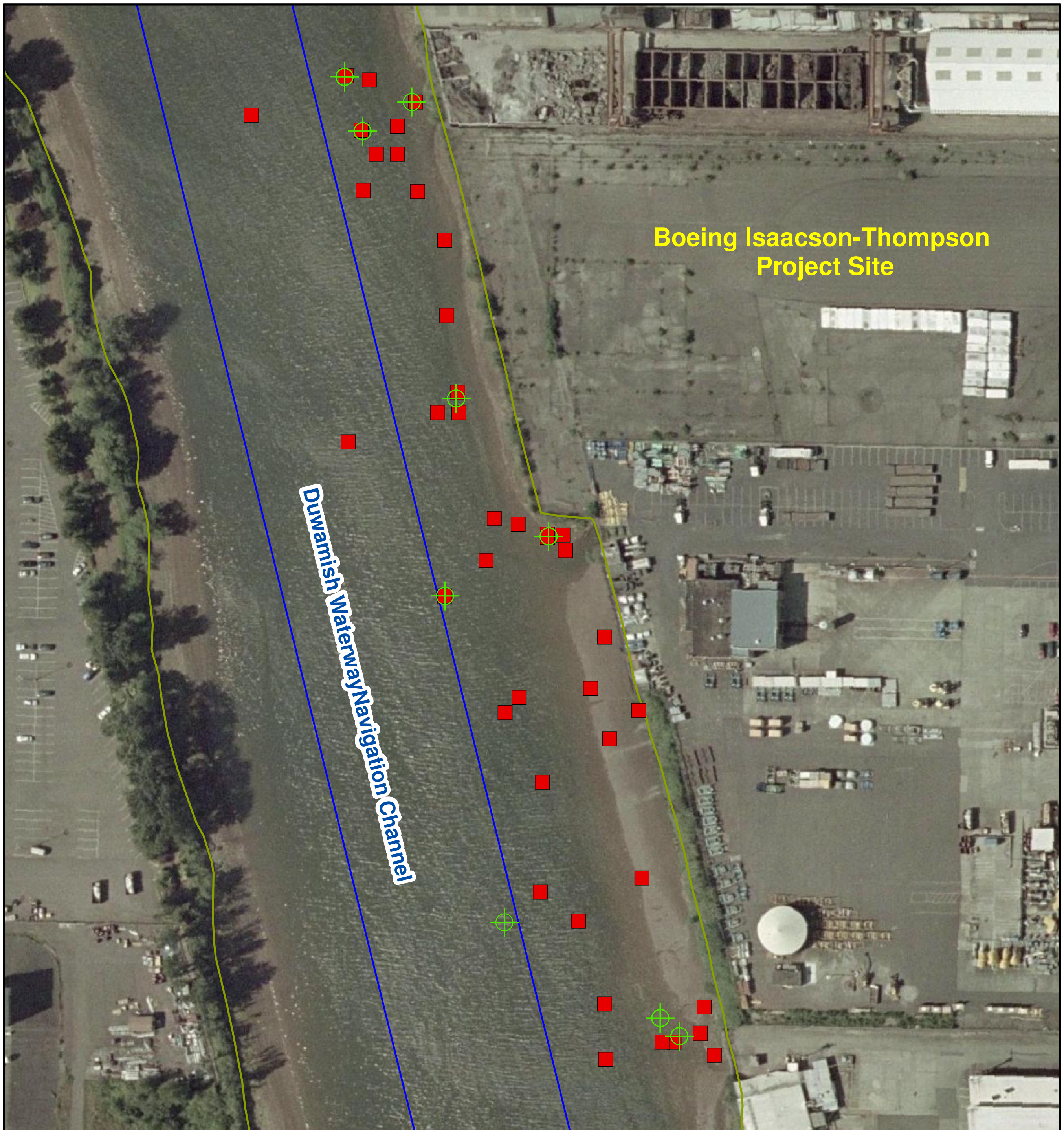
FIGURES



BOEING ISAACSON-THOMPSON SITE
Sediment Investigation Sample and Analysis Plan
Tukwila, Washington

By: rhg	Date: 4/28/2011	Project No. LY11160060
AMEC Geomatrix		Figure 1

File path: P:\Boeing IT\LY11160060 Isaacson-Thompson 2011\Data\SAP\Figure 1.mxd



Previous Surface Locations

Previous Sediment Core Locations

N

0 100 200 Feet

PREVIOUS SAMPLING LOCATIONS
Sediment Investigation Sample and Analysis Plan
Tukwila, Washington

By: rhg	Date: 5/11/2011	Project No. LY11160060
AMEC Geomatrix		Figure 2

File path: P:\Boeing IT\LY11160060 Isaacson-Thompson 2011\Data\SAP\Figure 2Ver2.mxd

Proposed Sampling Locations

Previous Surface Locations

Previous Sediment Core Locations

N

0 100 200 Feet

PROPOSED SAMPLING LOCATIONS
Sediment Investigation Sample and Analysis Plan
Tukwila, Washington

By: rhg	Date: 5/11/2011	Project No. LY11160060
AMEC Geomatrix	Figure 3	

File path: P:\Boeing IT\LY11160060 Isaacson-Thompson 2011\Data\SAP\Figure 3Ver2.mxd

Project: Boeing Isaacson-Thompson

Project No: LY11160060

Station: SD-512

Maximum depth of retained sediment: 16.5 ft

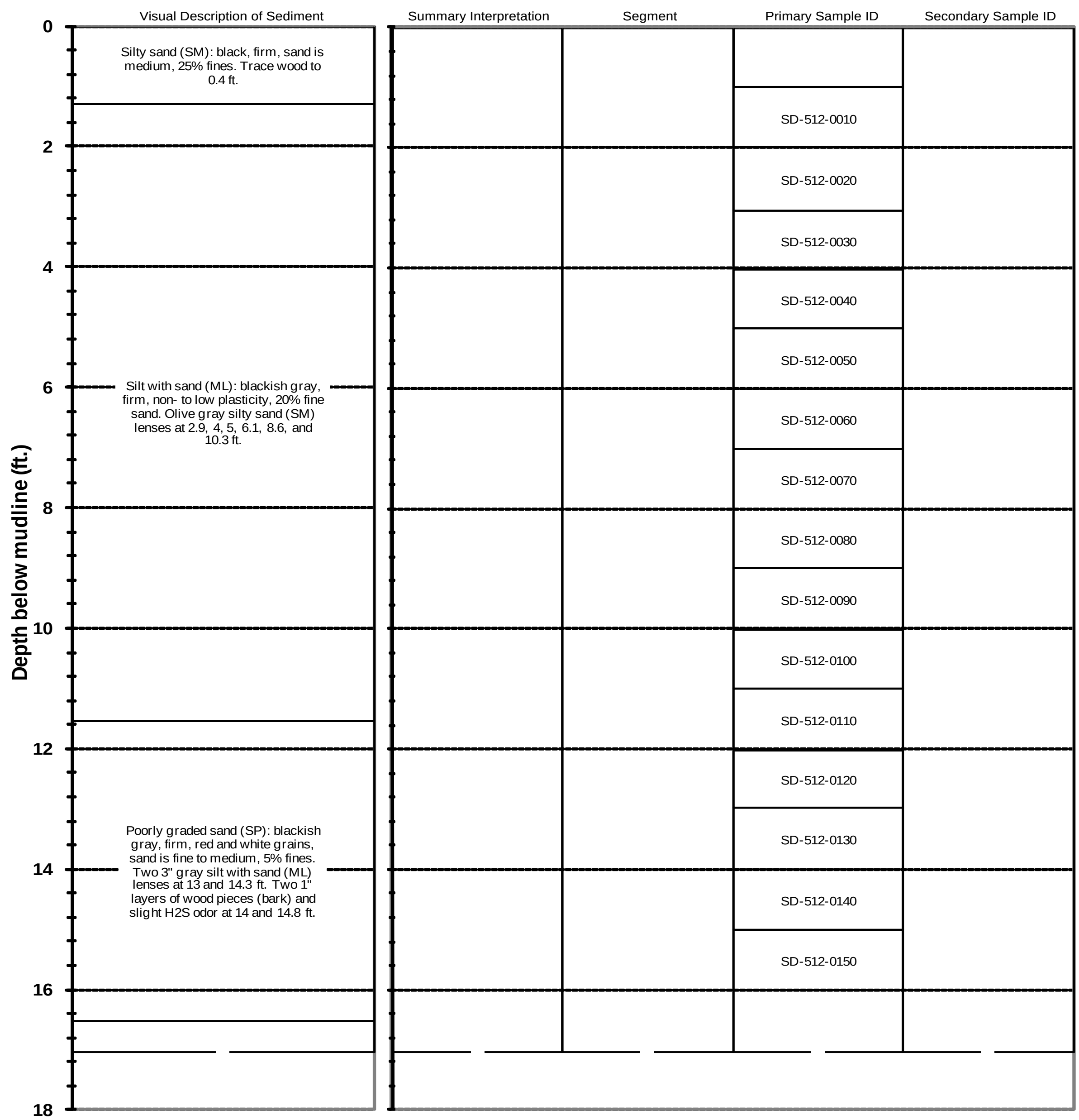
Mudline elevation: -6.9 **ft MLLW**

Percent recovery (on-deck): 75%

	Core collection	Laboratory processing
Date:	8/15/2011	8/15/2011
Time:	8:07	11:00

Field Log: NPB

Summary Log: NPB



CORE SUMMARY LOG

Boeing Isaacson-Thompson Site
Sediment Investigation Sample and Analysis Plan

By: rhg	Date: 04/28/11	Project No.: LY11160060
AMEC Geomatrix		Figure 4

LY11160060 / Figure 4_5_6.xls

QUALITATIVE SAMPLE CHARACTERISTICS

Page ____ of ____

Coordinate Datum	Date (mm/dd/yy)	Project Location	Sample Identification Number

Coordinates		Water Depth		Rep	Gear	Time
North	East	Depth	Unit			
			f t			

Penetration		Initials	Sulfide	VOA	Weather	Fines (%)
Depth	Unit					
	c m					

Surficial Wood Estimate:

Contact Points

__________ X 5 = __________ %

Surficial sediment characteristics:

Biological: ______________ % **Debris:** ______________ % **Oil Sheen:** None Trace (<5%) ________ %

Moisture
Very Wet Wet Moist Damp Dry

Color **(Circle major & underline modifying)**
Light Medium Dark Olive Gray Brown Black Other ____________

Major Constituent **(Circle major & underline modifying)**
Fine Medium Coarse Gravel Sand Silt Clay ____________

Minor Constituent with trace
Fine Medium Coarse Gravel Sand Silt Clay ____________

Subsurface sediment characteristics:

Density / Consistency

Sand / Gravel - Very Loose Loose Medium Dense Dense Very Dense

Silt / Clay - Very Soft Soft Medium Stiff Stiff Very Stiff Hard

Moisture
Very Wet Wet Moist Damp Dry

Color **(Circle major & underline modifying)**
Light Medium Dark Olive Gray Brown Black Other ____________

Major Constituent **(Circle major & underline modifying)**
Fine Medium Coarse Gravel Sand Silt Clay ____________

Minor Constituent with trace
Fine Medium Coarse Gravel Sand Silt Clay ____________

Biological: ______________ % **Debris:** ______________ % **Oil Sheen:** None Trace (<5%) ________ %

Comments:

QUALITATIVE SAMPLE CHARACTERISTICS FORM		
Boeing Isaacson-Thompson Site Sediment Investigation Sample and Analysis Plan		
By: rhg	Date: 04/28/11	Project No.: LY11160060
AMEC Geomatrix		Figure 5

LY11160060 / Figure 4_5_6.xls

AMEC Geomatrix, Inc.
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Rob Gilmour (425) 921-4003

CHAIN OF CUSTODY

Place COC Form Number Label Here or write in seq. number below.	Sample Matrix		Sediment	Archive					Recorded by: ___________ Checked by: ___________
			Analysis Containers						
Place Sample ID Label Here									Number of containers
Place Sample ID Label Here									Number of containers
Place Sample ID Label Here									Number of containers
Place Sample ID Label Here									Number of containers
Place Sample ID Label Here									Number of containers
Place Sample ID Label Here									Number of containers
Place Sample ID Label Here									Number of containers

Laboratory Sample Receipt

ARI Project Manager: Kelley Bottem
Project: Boeing Isaacson-Thompson

Sediment not homogenized. Homogenize entire sample volume for each sample prior to taking
Notes: Analyze for the SMS list of analytes and TOC
Archive samples are to be frozen at -18°C in a secured storage area.

Relinquished By	Transported By	Received By
Name: Date: Time:		Name: Date: Time:
Name: Date:		Name: Date:

CHAIN-OF-CUSTODY FORM

Boeing Isaacson-Thompson Site
Sediment Investigation Sample and Analysis Plan

By: rhg	Date: 04/28/11	Project No.: LY11160060
AMEC Geomatrix		Figure 6

LY11160060 / Figure 4_5_6.xls

APPENDIX C

Uplands Quality Assurance Project Plan (QAPP)

Final Uplands QAPP
Remedial Investigation/Feasibility Study
Boeing Isaacson-Thompson Site
Tukwila, Washington

September 16, 2011

Prepared for

The Boeing Company

LANDAU ASSOCIATES

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1.0 INTRODUCTION

This quality assurance project plan (QAPP) establishes the quality assurance/quality control (QA/QC) procedures in support of the remedial investigation/feasibility study (RI/FS) at the Boeing Isaacson-Thompson Site (Site) located in Tukwila, Washington. This QAPP is an appendix to the Site Ecology Review Draft Final *Work Plan, Remedial Investigation/Feasibility Study, Boeing Isaacson-Thompson Site, Tukwila, Washington* (Work Plan; Landau Associates 2011), one of the required deliverables under the Agreed Order (No. DE7088) dated April 23, 2010 between Boeing and the Washington State Department of Ecology (Ecology). This QAPP was prepared using Ecology's *Guidelines for Preparing Quality Assurance Project Plans for Environmental* Studies (Ecology 2004).

The planned scope of the RI, as described in the Work Plan, includes collection of soil, groundwater, seep, catch basin solids, stormwater, soil vapor, indoor air, and building material samples and submittal of the samples to a laboratory for analysis. This QAPP presents the project quality objectives, laboratory methods, QA/QC requirements, corrective actions, and data management procedures for the RI.

2.0 QUALITY ASSURANCE OBJECTIVES

The QA objectives for this project are to develop and implement procedures that will ensure collection of representative data of known, acceptable, and defensible quality. The data quality parameters used to assess the acceptability of the data are precision, accuracy, representativeness, comparability, and completeness. These parameters are discussed in the following sections.

2.1 DECISION QUALITY OBJECTIVES

The decision quality objectives (DQOs) specify how good the project decisions must be to accomplish the overall project goal. As stated in the Agreed Order, the RI/FS is intended to provide sufficient data, analysis, and evaluations to enable Ecology to select a cleanup action for the Site.

The decisions required to meet this goal include:

- The number of samples to collect and the locations of the samples that will be considered sufficient for evaluating cleanup action alternatives
- The analytical methods required to evaluate the data against screening criteria protective of human health and the environment
- The type of media (e.g., soil, groundwater, storm drain solids, stormwater, soil vapor, indoor air, and building material) that may require cleanup.

To achieve the overall project goal, the DQO will be to obtain data that is representative of site conditions and that is comparable to selected screening criteria, as described below.

2.2 REPRESENTATIVENESS

Representativeness expresses the degree to which data accurately and precisely represent an actual condition or characteristic of a population. Representativeness can be evaluated using replicate samples, representative sampling locations, and blanks. Representativeness for the RI sampling will be accomplished using appropriate selection of sampling locations for each media of potential concern (groundwater, soil, soil vapor, and catch basin solids). A detailed description is provided in the Work Plan and Appendix A (Sampling and Analysis Plan) to the Work Plan. A general description of the sampling plan for each media of concern is described below:

- Twenty-five groundwater monitoring wells and one temporary well point are planned to be installed at the Site. Groundwater monitoring at these wells, five of the existing monitoring wells, seven existing piezometers, and seeps, if any, will provide information adequate for evaluating groundwater flow and groundwater quality at the Site. Groundwater monitoring at the permanent monitoring wells and piezometers, including water level measurements and sample collection, will be conducted during four consecutive quarterly events. All groundwater samples will be analyzed for polychlorinated biphenyls (PCBs), semivolatile organic compounds [SVOCs; including polycyclic aromatic hydrocarbons (PAHs)], total and dissolved metals, volatile organic compounds (VOCs), and diesel-range, motor oil-range, and gasoline-range petroleum hydrocarbons.

- Soil samples will be collected at 49 proposed locations throughout the Site, including at each of the proposed monitoring well locations, and at three locations along the outside of the wooden bulkhead located on the Thompson property, if possible. Soil samples will be collected from additional locations, as required, to determine the extent of any contamination identified based on field observations. At each location, soil samples will be collected from depth intervals with evidence of contamination and from below the zone of contamination to define the vertical limits of the contamination. At soil boring locations where no evidence of contamination is present, at least three soil samples will be collected in the upper 15 ft of soil. Analytical results for these samples, combined with analytical data for soil samples collected previously at over 100 locations, should provide information necessary to evaluate soil quality throughout the Site. All soil samples will be analyzed for PCBs; SVOCs (including PAHs); metals; VOCs; and diesel-range, motor oil-range, and gasoline-range petroleum hydrocarbons

- Samples of the solids in each catch basin, oil/water separator, Vortechs® vault, and manhole connected to the storm drain at the Site will be collected and analyzed for PCBs; SVOCs (including PAHs); metals; VOCs; and diesel-range, motor oil-range, and gasoline-range petroleum hydrocarbons, and total organic carbon (TOC). Three samples will be analyzed for dioxins/furans.

- Stormwater samples will be collected twice from two locations along the storm drain that discharges to Outfall A and from one location along the storm drain that discharges to Outfall B. Stormwater samples will be analyzed for PCB; SVOCs (including PAHs); total metals; VOCs; and diesel-range, motor oil-range, and gasoline-range petroleum hydrocarbons

- Soil vapor samples will be collected within the main building located on the Site (Building 14-01) and analyzed for VOCs. The soil vapor samples will be collected from directly below the floor slab at five locations within the southwestern portion of the building where VOCs have been detected in groundwater.

- Based on the results of the soil vapor samples, indoor air samples may also be collected from the southwestern portion of Building 14-01 to characterize potential vapor intrusion that may result from the VOCs in groundwater.

- Based on the results of the storm drain solids, building material may be sampled. Materials that may be sampled include building siding materials, paint from building or equipment surfaces, roofing materials, rooftop runoff, surface debris, and caulking. Building material samples, including surface debris, may be analyzed for PCBs and metals. Surface debris may also be analyzed for SVOCs.

To determine that the analytical results are representative of the sampled item and not influenced by cross-contamination, method blanks will be analyzed with each analysis as described in Section 4.5.6.

2.3 COMPARABILITY

Comparability expresses the confidence with which one data set can be evaluated in relation to another data set. For this work, comparability of data will be established through the use of standard analytical methodologies with detection limits that can meet screening level criteria to the extent practicable, standard reporting formats, and common traceable calibration and reference materials. Methods to be used for analysis of soil and catch basin solids, soil vapor, indoor air, stormwater, groundwater, and building materials are discussed in Section 3.0.

2.4 MEASUREMENT QUALITY OBJECTIVES

The measurement quality objectives (MQOs) for the project specify how good the data must be in order to meet the objectives of the project and are based on precision and accuracy, as described in this Section.

2.4.1 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 to their average values. Analytical precision is measured through matrix spike/matrix spike duplicate (MS/MSD) samples for organic analysis and through laboratory duplicate samples for inorganic analyses.

Analytical precision measurements will be carried out on project-specific samples at a minimum frequency of 1 per sample analysis group or 1 in 20 samples, whichever is more frequent per matrix analyzed, as practical. Laboratory precision will be evaluated against quantitative relative percent difference (RPD) performance criteria provided by the laboratory.

Field precision will be evaluated by the collection of groundwater blind field duplicates at a minimum frequency of 1 per sampling event or 1 in 20 samples. No field duplicates will be collected for soil and catch basin solids due to the inherent heterogeneity of the media or for soil vapor samples due to the limited number of these samples being collected. Control limits for the groundwater field duplicates and replicates will be 20 percent unless the duplicate sample values are within five times the reporting limit, in which case the control limit interval will be plus or minus the reporting limit.

Precision measurements can be affected by the nearness of a chemical concentration to the method detection limit (MDL), where the percent error (expressed as RPD) increases. The equation used to express precision is as follows:

$$RPD = \left| \frac{C_1 - C_2}{(C_1 + C_2)/2} \right| x\,100$$

where: C_1 = first sample value

C_2 = second sample value (duplicate)

RPD = relative percent difference.

2.4.2 ACCURACY

Accuracy is an expression of the degree to which a measured or computed value represents the true value. Field accuracy is controlled by adherence to sample collection procedures as outlined in the sampling and analysis plan (SAPP.

Analytical accuracy may be assessed by analyzing "spiked" samples with known standards (surrogates, laboratory control samples, and/or matrix spike) and measuring the percent recovery. Accuracy measurements on matrix spike samples will be carried out at a minimum frequency of 1 per laboratory analysis group or 1 in 20 samples per matrix analyzed. Because MS/MSDs measure the effects of potential matrix interferences of a specific matrix, the laboratory will perform MS/MSDs only on samples from this investigation and not from other projects. Surrogate recoveries will be determined for every sample analyzed for organics.

Laboratory accuracy will be evaluated against quantitative matrix spike and surrogate spike recovery performance criteria provided by the laboratory. Accuracy can be expressed as a percentage of the true or reference value, or as a percent recovery in those analyses where reference materials are not available and spiked samples are analyzed. The equation used to express accuracy is as follows:

$$\begin{matrix} \textit{Percent} \\ \textit{Recovery} \end{matrix} = \frac{\textit{(Spiked Sample Result - Unspiked Sample Result)}}{\textit{Amount of Spike Added}}\ x\ 100$$

Control limits for percent recovery for soil, catch basin solids, soil vapor, indoor air, stormwater, building materials, and groundwater samples will be laboratory acceptance limits generated according to U.S. Environmental Protection Agency (EPA) guidelines.

2.4.3 BIAS

Bias is the systematic or persistent distortion of a measured process that causes errors in one direction. Bias of the laboratory results will be evaluated based on analysis of method blanks and matrix spike samples as described in Section 3.0.

2.4.4 SENSITIVITY

Sensitivity is the ability to discern the difference between very small amounts of a substance. For the purposes of this project, sensitivity is the lowest concentration that can be accurately detected by the analytical method. The analytical method will be considered sufficiently sensitive if the detection limits are below project screening levels. Proposed method and detection limits are discussed in Section 3.0.

2.4.5 COMPLETENESS

Completeness is a measure of the proportion of data obtained from a task sampling plan that is determined to be valid. It is calculated as the number of valid data points divided by the total number of data points requested. The QA objective for completeness during this project will be 95 percent. Completeness will be routinely determined and compared to this control criterion.

3.0 LABORATORY METHODS

Soil, groundwater, seep, storm drain solids, and stormwater samples will be analyzed for SVOCs (including PAHs); PCBs; total metals (antimony, arsenic, barium, beryllium, cadmium, total chromium, hexavalent chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc); VOCs; and diesel-range, motor oil-range, and gasoline-range petroleum hydrocarbons. Groundwater and seep samples will also be analyzed for dissolved metals (antimony, arsenic, barium, beryllium, cadmium, total chromium, hexavalent chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc); total dissolved solids (TDS); nitrate; and sulfate. Storm drain solids will also be analyzed for TOC and three samples will be analyzed for dioxins/furans. Soil vapor samples will be analyzed for VOCs only. All analytes detected below the laboratory reporting limit and above the method detection limit will be reported and qualified as an estimate (i.e., flagged with a J).

Laboratory methods, reporting limits, and method detection limits for the analysis of each of the above constituents in soil and groundwater are summarized in Tables C-1 and C-2, respectively. Laboratory methods for the analysis of catch basin solids will include Puget Sound Estuary Program (PSEP methods); the laboratory methods, reporting limits, and method detection limits for this media are summarized separately in Table C-3. Laboratory methods and reporting limits for the analysis of soil vapor samples are summarized in Table C-4. Laboratory methods, reporting limits, and method detection limits for the analysis of building material samples, including wipe samples, are summarized in Table C-5. For all groundwater analyses except dissolved metals, any suspended material in the sample will be allowed to settle and the sample will not be agitated prior to analysis of the supernatant. For the dissolved metals analyses, the samples will be filtered in the field to remove any suspended material. An acid/silica gel cleanup will be applied to all soil samples analyzed for diesel-range and motor oil-range petroleum hydrocarbons.

Sample containers, preservation, and holding times are provided in the SAP (AppendixA of the Work Plan).

4.0 QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

This section describes the procedures that will be implemented to: 1) ensure sample integrity from the time of sample collection to the time of analysis in the laboratory, 2) obtain the appropriate chemical and physical data, 3) collect field and laboratory quality control samples, 4) monitor performance of the laboratory and field measurement systems, 5) correct any deviations from the methods or QA requirements established in this QAPP, and 6) report and validate the data.

4.1 LABORATORY INSTRUMENT CALIBRATION

The analytical laboratory project manager is responsible for maintaining laboratory instruments in proper working order including routine maintenance and calibration, and training of personnel in maintenance and calibration procedures. Laboratory instruments will be properly calibrated with appropriate check standards and calibration blanks for each parameter before beginning each analysis. Instrument performance check standards, where required, and calibration blank results will be recorded in a laboratory logbook dedicated to each instrument. At a minimum, the preventive maintenance schedules contained in the EPA methods and in the equipment manufacturer's instructions will be followed. Laboratory calibration procedures and schedules will be as described in the laboratory QAPP.

4.2 FIELD EQUIPMENT CALIBRATION

Field meters, including pH, conductivity, dissolved oxygen (DO), temperature probes, and photoionization detector (PID) will be calibrated and maintained in accordance with the manufacture’s specifications. All routine maintenance will be recorded in the field sampling logs.

4.3 FIELD DOCUMENTATION

A complete record of all field activities will be maintained for the duration of the field phase of the work. Documentation will include the following:

- Daily recordkeeping by field personnel of all field activities
- Recordkeeping of all samples collected for analysis (field sampling forms)
- Use of sample labels and tracking forms for all samples collected for analysis.

The field logs will provide a description of all sampling activities, sampling personnel, weather conditions, and a record of all modifications to the procedures and plans identified in the SAP. The field logs are intended to provide sufficient data and observations to enable participants to reconstruct events that occurred during the sampling period.

Sample possession and handling will also be documented so that it is traceable from the time of sample collection to the laboratory and data analysis. Sample chain-of-custody forms and procedures are described in the SAP.

4.4 SAMPLE HANDLING PROCEDURES AND TRANSFER OF CUSTODY

Samples submitted to the analytical laboratories will be collected in the appropriate sample containers and preserved as specified in Table A-1 of the SAP (Appendix A of the Work Plan). The storage temperatures and maximum holding times for physical/chemical analyses are also presented in Table A-1 of the SAP.

The transportation and handling of samples will be accomplished in a manner that not only protects the integrity of the sample, but also prevents any detrimental effects due to release of samples. Samples will be logged on a chain-of-custody form and will be kept in coolers on ice until delivery to the analytical laboratory. The chain-of-custody will accompany each shipment of samples to the laboratory. Procedures for sample transportation and handling are described in Section 2.7 of the SAP.

4.5 FIELD AND LABORATORY QUALITY CONTROL SAMPLES

Field and analytical laboratory control samples will be collected to evaluate data precision, accuracy, representativeness, completeness, and comparability of the analytical results for this investigation. Soil, catch basin solids, soil vapor, indoor air, building materials, and groundwater quality control samples are described below. The frequency at which they will be collected and/or analyzed is also described.

4.5.1 BLIND FIELD DUPLICATES

A blind field duplicate will be collected at a frequency of at least 1 per 20 groundwater samples per chemical analysis, not including QC samples, but not less than one field duplicate per sampling event (any continuous sampling period not interrupted by more than 2 days). The blind field duplicate will consist of a split sample collected at a single sample location. No soil or catch basin solids blind field duplicate samples will be collected due to the inherent heterogeneity of the samples. No soil vapor blind field duplicates will be collected due to the limited number of these samples that will be collected. Groundwater blind field duplicates will be collected by alternately filling sample containers for both the original and the corresponding duplicate sample at the same location to decrease variability between the duplicates. Blind field duplicate sample results will be used to evaluate data precision.

4.5.2 FIELD TRIP BLANKS

Field trip blanks will consist of deionized or distilled water sealed in a sample container provided by the analytical laboratory. The trip blank will accompany samples collected for the analysis of VOCs during transportation to and from the field, and then will be returned to the laboratory with each shipment. The trip blank will remain unopened until submitted to the laboratory for analysis. One trip blank per cooler containing groundwater and soil samples for VOCs and gasoline-range petroleum hydrocarbons analysis will be evaluated to determine possible sample contamination during transport.

4.5.3 LABORATORY MATRIX SPIKE

A minimum of one laboratory MS per 20 samples, or one MS sample per batch of samples if fewer than 20 samples are obtained in a sample event, will be analyzed for all organic and inorganic analyses. The matrix spikes will be performed using Site samples. These analyses will be performed to provide information on accuracy and to verify that extraction and concentration levels are acceptable. The laboratory spikes will follow EPA guidance for MS and MSDs.

4.5.4 LABORATORY MATRIX SPIKE DUPLICATE

A minimum of one laboratory MSD per 20 samples, or one MSD sample per batch of samples if fewer than 20 samples are obtained in a sample event, will be analyzed for all organic analyses. The analysis of MSD samples will be performed to provide information on the precision of chemical analyses. The laboratory spikes will follow EPA guidance for matrix and blank spike duplicates.

4.5.5 LABORATORY DUPLICATES

A minimum of one laboratory duplicate per 20 samples, or one laboratory duplicate sample per batch of samples if fewer than 20 samples are obtained in a sample event, will be analyzed for metals. These analyses will be performed to provide information on the precision of chemical analyses. The laboratory duplicate will follow EPA guidance in the method.

4.5.6 LABORATORY METHOD BLANKS

A minimum of one laboratory method blank per 20 samples, one every 12 hours, or one per batch of samples analyzed (if fewer than 20 samples are analyzed in a sample event) will be analyzed for all parameters (except grain size and total solids) to assess possible laboratory contamination. Dilution water will be used whenever possible. Method blanks will contain all reagents used for analysis. The generation and analysis of additional method, reagent, and glassware blanks may be necessary to verify that laboratory procedures do not contaminate samples.

4.5.7 LABORATORY CONTROL SAMPLE

A minimum of one laboratory control sample per 20 samples, or one laboratory control sample per sample batch if fewer than 20 samples are obtained in a sample event, will be analyzed for all parameters.

4.5.8 SURROGATE SPIKES

All project samples analyzed for organic compounds will be spiked with appropriate surrogate compounds as defined by the analytical methods.

4.6 LABORATORY QA/QC FOR CHEMICAL AND CONVENTIONAL ANALYSES

QA/QC for chemical testing includes laboratory instrument and analytical method QA/QC. Instrument QA/QC monitors the performance of the instrument and method QA/QC monitors the performance of sample preparation procedures. The analytical laboratory will be responsible for instrument and method QA/QC. QA/QC procedures to be performed by the laboratory for analysis of soil and groundwater samples will be in accordance with methods specified in Tables C-1 and C-2, respectively. QA/QC procedures to be performed by the laboratory for analysis of catch basin solids samples will be in accordance with methods specified in Table C-3. QA/QC procedures to be performed by the laboratory for analysis of soil vapor samples will be in accordance with methods specified in Table C-4. QA/QC procedures to be performed by the laboratory for analysis of building material samples will be in accordance with methods specified in Table C-5.

When an instrument or method control limit is exceeded, the laboratory will contact the project manager immediately. The laboratory will be responsible for correcting the problem and will reanalyze the samples within the sample holding time if sample reanalysis is appropriate. Corrective actions are described further in Section 5.0.

5.0 CORRECTIVE ACTIONS

Corrective actions will be needed for two categories of nonconformance:

- Deviations from the methods or QA requirements established in this QAPP
- Equipment or analytical malfunctions.

Corrective action procedures to be implemented based on detection of unacceptable data are developed on a case-by-case basis. Such actions may include one or more of the following:

- Altering procedures in the field
- Using a different batch of sample containers
- Performing an audit of field or laboratory procedures
- Reanalyzing samples (if holding times allow)
- Resampling and analyzing
- Evaluating sampling and analytical procedures to determine possible causes of the discrepancies
- Accepting the data without action, acknowledging the level of uncertainty
- Rejecting the data as unusable.

During field operations and sampling procedures, the field personnel will be responsible for conducting and reporting required corrective actions. A description of any action taken will be entered in the daily field notebook. The project manager will be consulted immediately if field conditions are such that conformance with this QAPP is not possible. The field coordinator will consult with the Landau Associates' project manager, who may authorize changes or exceptions to the QA/QC portion of the QAPP, as necessary and appropriate.

During laboratory analysis, the laboratory QA officer will be responsible for taking required corrective actions in response to equipment malfunctions. If an analysis does not meet DQOs outlined in this QAPP, corrective action will follow the guidelines in the noted EPA analytical methods and the EPA guidelines for data validation for organics and inorganics analyses (EPA 1999 and 2004). At a minimum, the laboratory will be responsible for monitoring the following:

- Calibration check compounds must be within performance criteria specified in the EPA method or corrective action must be taken prior to initiation of sample analysis. No analyses may be performed until these criteria are met.
- Before processing any samples, the analyst should demonstrate, through analysis of a reagent blank that interferences from the analytical system, glassware, and reagents are within acceptable limits. Each time a set of samples is extracted or there is a change in reagents, a reagent blank should be processed as a safeguard against chronic laboratory contamination. The blank samples should be carried through all stages of the sample preparation and measurement steps.

- Method blanks should, in general, be below instrument detection limits. If contaminants are present, then the source of contamination must be investigated, corrective action taken and documented, and all samples associated with a contaminated blank reanalyzed. If, upon reanalysis, blanks do not meet these requirements, Landau Associates will be notified immediately to discuss whether analyses may proceed.
- Surrogate spike analysis must be within the specified range for recovery limits for each analytical method utilized or corrective action must be taken and documented. Corrective action includes: 1) reviewing calculations, 2) checking surrogate solutions, 3) checking internal standards, and 4) checking instrument performance. Subsequent action could include recalculating the data and/or reanalyzing the sample if any of the above checks reveal a problem. If the problem is determined to be caused by matrix interference, reanalysis may be waived if so directed following consultation with Landau Associates. If the problem cannot be corrected through reanalysis, the laboratory will notify Landau Associates prior to data submittal so that additional corrective action can be taken, if appropriate.
- If the recovery of a surrogate compound in the method blank is outside the recovery limits, the blank will be reanalyzed along with all samples associated with that blank. If the surrogate recovery is still outside the limits, Landau Associates will be notified immediately to discuss whether analyses may proceed.
- If quantitation limits or matrix spike control limits cannot be met for a sample, Landau Associates will be notified immediately to discuss corrective action required.
- If holding times are exceeded, all positive and undetected results may need to be qualified as estimated concentrations. If holding times are grossly exceeded, Landau Associates may determine the data to be unusable.

If analytical conditions are such that nonconformance with this QAPP is indicated, Landau Associates will be notified as soon as possible so that any additional corrective actions can be taken. The laboratory project manager will then document the corrective action by a memorandum submitted to Landau Associates. A narrative describing the anomaly; the steps taken to identify and correct the anomaly; and any recalculation, reanalyses, or re-extractions will be submitted with the data package in the form of a cover letter.

5.1 DATA VERIFICATION AND VALIDATION

All RI data will be verified and validated to determine the results are acceptable and meet the quality objectives described in Section 2.1. Prior to submitting a laboratory report, the laboratory will verify that all the data are consistent, correct, and complete, with no errors or omissions.

Validation of the data will be performed by Landau Associates following the guidelines in the appropriate sections of the EPA Contract Laboratory Program *National Functional Guidelines for Organic and Inorganic Data Review* (EPA 1999 and 2004) and will include evaluations of the following:

- Chain-of-custody records
- Holding times
- Laboratory method blanks

- Surrogate recoveries
- Laboratory matrix spikes and matrix spike duplicates
- Blank spikes/laboratory control samples
- Laboratory duplicates
- Corrective action records
- Completeness
- Overall assessment of data quality.

In the event that a portion of the data is outside the DQO limits or the EPA guidance (EPA 1999 and 2004), or sample collection and/or documentation practices are deficient, corrective action(s) will be initiated. Corrective action, as described in Section 5.0, will be determined by the field coordinator and Landau Associates' QA officer in consultation with the Landau Associates' project/task manager and may include any of the following:

- Rejection of the data and resampling
- Qualification of the data
- Modified field and/or laboratory procedures.

Data qualification arising from data validation activities will be described in the data validation report, rather than in individual corrective action reports.

6.0 DATA MANAGEMENT PROCEDURES

All laboratory analytical results, including QC data, will be submitted in hard copy and electronically to Landau Associates. Electronic format will include comma separated value (CSV) files that will be downloaded directly to an Excel spreadsheet. Following validation of the data, any qualifiers will be added to the Excel spreadsheets. All survey data will be provided electronically in a format that can be downloaded into an Excel spreadsheet. All field data (groundwater field parameter data and water levels measurements) will be entered into an Excel spreadsheet and verified to determine all entered data is correct and without omissions and errors. Following receipt of all RI data and all survey data, water level measurements, field parameters, and analytical results will be formatted electronically and uploaded to Ecology's Environmental Information Management (EIM) system

* * * * * * * * * *

This document has been prepared under the supervision and direction of the following key staff:

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TABLE C-1
SITE SOIL LABORATORY ANALYTICAL METHODS, METHOD DETECTION LIMITS, AND REPORTING LIMITS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Analyte	Analytical Method (a)	Laboratory Reporting Limits (b)	Method Detection Limits
SEMIVOLATILES			
Phenol	EPA Method 8270 (Low Level)	0.02 mg/kg	0.004 mg/kg
1,2,4-Trichlorobenzene	EPA Method 8270 (Low Level)	0.02 mg/kg	0.004 mg/kg
1,2-Dichlorobenzene	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
1,3-Dichlorobenzene	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
1,4-Dichlorobenzene	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
1-Methylnaphthalene	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
2,2'-Oxybis(1-Chloropropane)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
2,4,5-Trichlorophenol	EPA Method 8270 (Low Level)	0.1 mg/kg	0.021 mg/kg
2,4,6-Trichlorophenol	EPA Method 8270 (Low Level)	0.1 mg/kg	0.011 mg/kg
2,4-Dichlorophenol	EPA Method 8270 (Low Level)	0.1 mg/kg	0.018 mg/kg
2,4-Dimethylphenol	EPA Method 8270 (Low Level)	0.02 mg/kg	0.008 mg/kg
2,4-Dinitrophenol	EPA Method 8270 (Low Level)	0.2 mg/kg	0.05 mg/kg
2,4-Dinitrotoluene	EPA Method 8270 (Low Level)	0.1 mg/kg	0.019 mg/kg
2,6-Dinitrotoluene	EPA Method 8270 (Low Level)	0.1 mg/kg	0.015 mg/kg
2-Chloronaphthalene	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
2-Chlorophenol	EPA Method 8270 (Low Level)	0.02 mg/kg	0.005 mg/kg
2-Methylnaphthalene	EPA Method 8270 SIM	0.005 mg/kg	0.001 mg/kg
2-Methylphenol	EPA Method 8270 (Low Level)	0.02 mg/kg	0.005 mg/kg
2-Nitroaniline	EPA Method 8270 (Low Level)	0.1 mg/kg	0.019 mg/kg
2-Nitrophenol	EPA Method 8270 (Low Level)	0.02 mg/kg	0.009 mg/kg
3,3'-Dichlorobenzidine	EPA Method 8270 (Low Level)	0.1 mg/kg	0.054 mg/kg
3-Nitroaniline	EPA Method 8270 (Low Level)	0.1 mg/kg	0.025 mg/kg
4,6-Dinitro-2-Methylphenol	EPA Method 8270 (Low Level)	0.2 mg/kg	0.041 mg/kg
4-Bromophenyl-phenylether	EPA Method 8270 (Low Level)	0.02 mg/kg	0.004 mg/kg
4-Chloro-3-methylphenol	EPA Method 8270 (Low Level)	0.1 mg/kg	0.015 mg/kg
4-Chloroaniline	EPA Method 8270 (Low Level)	0.1 mg/kg	0.024 mg/kg
4-Chlorophenyl-phenylether	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
4-Methylphenol	EPA Method 8270 (Low Level)	0.02 mg/kg	0.005 mg/kg
4-Nitroaniline	EPA Method 8270 (Low Level)	0.1 mg/kg	0.023 mg/kg
4-Nitrophenol	EPA Method 8270 (Low Level)	0.1 mg/kg	0.028 mg/kg
Acenaphthene	EPA Method 8270 SIM	0.005 mg/kg	0.002 mg/kg
Acenaphthylene	EPA Method 8270 SIM	0.005 mg/kg	0.001 mg/kg
Anthracene	EPA Method 8270 SIM	0.005 mg/kg	0.001 mg/kg
Benzo(a)anthracene	EPA Method 8270 SIM	0.005 mg/kg	0.001 mg/kg
Benzo(a)pyrene	EPA Method 8270 SIM	0.005 mg/kg	0.001 mg/kg
Benzo(b)fluoranthene	EPA Method 8270 SIM	0.005 mg/kg	0.002 mg/kg
Benzo(g,h,i)perylene	EPA Method 8270 SIM	0.005 mg/kg	0.001 mg/kg
Benzo(k)fluoranthene	EPA Method 8270 SIM	0.005 mg/kg	0.002 mg/kg
Benzoic Acid	EPA Method 8270 (Low Level)	0.2 mg/kg	0.043 mg/kg
Benzyl Alcohol	EPA Method 8270 (Low Level)	0.02 mg/kg	0.046 mg/kg
bis(2-Chloroethoxy) Methane	EPA Method 8270 (Low Level)	0.02 mg/kg	0.002 mg/kg
Bis-(2-Chloroethyl) Ether	EPA Method 8270 (Low Level)	0.02 mg/kg	0.005 mg/kg
bis(2-Ethylhexyl)phthalate	EPA Method 8270 (Low Level)	0.02 mg/kg	0.009 mg/kg
Butylbenzylphthalate	EPA Method 8270 (Low Level)	0.02 mg/kg	0.004 mg/kg
Carbazole	EPA Method 8270 (Low Level)	0.02 mg/kg	0.002 mg/kg
Chrysene	EPA Method 8270 SIM	0.005 mg/kg	0.002 mg/kg
Dibenz(a,h)anthracene	EPA Method 8270 SIM	0.005 mg/kg	0.001 mg/kg
Dibenzofuran	EPA Method 8270 SIM	0.005 mg/kg	0.001 mg/kg
Diethylphthalate	EPA Method 8270 (Low Level)	0.02 mg/kg	0.004 mg/kg
Dimethylphthalate	EPA Method 8270 (Low Level)	0.02 mg/kg	0.004 mg/kg
Di-n-Butylphthalate	EPA Method 8270 (Low Level)	0.02 mg/kg	0.005 mg/kg
Di-n-Octyl phthalate	EPA Method 8270 (Low Level)	0.02 mg/kg	0.005 mg/kg
Fluoranthene	EPA Method 8270 SIM	0.005 mg/kg	0.002 mg/kg
Fluorene	EPA Method 8270 SIM	0.005 mg/kg	0.001 mg/kg
Hexachlorobenzene	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
Hexachlorobutadiene	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
Hexachlorocyclopentadiene	EPA Method 8270 (Low Level)	0.1 mg/kg	0.012 mg/kg
Hexachloroethane	EPA Method 8270 (Low Level)	0.02 mg/kg	0.005 mg/kg
Indeno(1,2,3-cd)pyrene	EPA Method 8270 SIM	0.005 mg/kg	0.002 mg/kg
Isophorone	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
Naphthalene	EPA Method 8270 SIM	0.005 mg/kg	0.002 mg/kg
Nitrobenzene	EPA Method 8270 (Low Level)	0.02 mg/kg	0.004 mg/kg
N-Nitroso-Di-N-Propylamine	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
N-Nitrosodiphenylamine	EPA Method 8270 (Low Level)	0.1 mg/kg	0.013 mg/kg
Pentachlorophenol	EPA Method 8270 (Low Level)	0.1 mg/kg	0.027 mg/kg
Phenanthrene	EPA Method 8270 SIM	0.005 mg/kg	0.002 mg/kg
Pyrene	EPA Method 8270 SIM	0.005 mg/kg	0.001 mg/kg

TABLE C-1
SITE SOIL LABORATORY ANALYTICAL METHODS, METHOD DETECTION LIMITS, AND REPORTING LIMITS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Analyte	Analytical Method (a)	Laboratory Reporting Limits (b)	Method Detection Limits
VOLATILES			
Chloromethane	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
1,1,1,2-Tetrachloroethane	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
1,1,1-Trichloroethane	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
1,1,2,2-Tetrachloroethane	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
1,1,2-Trichloroethane	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
1,1,2-Trichlorotrifluoroethane	EPA Method 8260	0.002 mg/kg	0.0003 mg/kg
1,1-Dichloroethane	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
1,1-Dichloroethene	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
1,1-Dichloropropene	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
1,2,3-Trichlorobenzene	EPA Method 8260	0.005 mg/kg	0.0003 mg/kg
1,2,3-Trichloropropane	EPA Method 8260	0.002 mg/kg	0.0005 mg/kg
1,2,4-Trichlorobenzene	EPA Method 8260	0.005 mg/kg	0.0003 mg/kg
1,2,4-Trimethylbenzene	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
1,2-Dibromo-3-chloropropane	EPA Method 8260	0.005 mg/kg	0.0005 mg/kg
1,2-Dichlorobenzene	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
1,2-Dichloroethane	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
1,2-Dichloropropane	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
1,3,5-Trimethylbenzene	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
1,3-Dichlorobenzene	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
1,3-Dichloropropane	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
1,4-Dichlorobenzene	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
2,2-Dichloropropane	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
2-Butanone	EPA Method 8260	0.005 mg/kg	0.0005 mg/kg
2-Chloroethylvinylether	EPA Method 8260	0.005 mg/kg	0.0003 mg/kg
2-Chlorotoluene	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
2-Hexanone	EPA Method 8260	0.005 mg/kg	0.0004 mg/kg
4-Chlorotoluene	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
4-Isopropyltoluene	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
4-Methyl-2-Pentanone (MIBK)	EPA Method 8260	0.005 mg/kg	0.0004 mg/kg
Acetone	EPA Method 8260	0.005 mg/kg	0.0005 mg/kg
Acrolein	EPA Method 8260	0.05 mg/kg	0.038 mg/kg
Acrylonitrile	EPA Method 8260	0.005 mg/kg	0.001 mg/kg
Benzene	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
Bromobenzene	EPA Method 8260	0.001 mg/kg	0.0001 mg/kg
Bromochloromethane	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
Bromodichloromethane	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
Bromoethane	EPA Method 8260	0.002 mg/kg	0.0004 mg/kg
Bromoform	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
Bromomethane	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
Carbon Disulfide	EPA Method 8260	0.001 mg/kg	0.0006 mg/kg
Carbon Tetrachloride	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
Chlorobenzene	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
Chloroethane	EPA Method 8260	0.001 mg/kg	0.0005 mg/kg
Chloroform	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
cis-1,2-Dichloroethene	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
cis-1,3-Dichloropropene	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
Dibromochloromethane	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
Dibromomethane	EPA Method 8260	0.001 mg/kg	0.0001 mg/kg
Ethylbenzene	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
Ethylene Dibromide	EPA Method 8260	0.001 mg/kg	0.0001 mg/kg
Hexachlorobutadiene	EPA Method 8260	0.001 mg/kg	0.0004 mg/kg
Isopropylbenzene	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
m,p-Xylene	EPA Method 8260	0.001 mg/kg	0.0004 mg/kg
Methyl Iodide	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
Methylene Chloride	EPA Method 8260	0.002 mg/kg	0.0006 mg/kg
Naphthalene	EPA Method 8260	0.005 mg/kg	0.0004 mg/kg
n-Butylbenzene	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
n-Propylbenzene	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
o-Xylene	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
sec-Butylbenzene	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
Styrene	EPA Method 8260	0.001 mg/kg	0.0001 mg/kg

TABLE C-1
SITE SOIL LABORATORY ANALYTICAL METHODS, METHOD DETECTION LIMITS, AND REPORTING LIMITS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Analyte	Analytical Method (a)	Laboratory Reporting Limits (b)	Method Detection Limits
VOLATILES (continued)			
tert-Butylbenzene	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
Tetrachloroethene	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
Toluene	EPA Method 8260	0.001 mg/kg	0.0001 mg/kg
trans-1,2-Dichloroethene	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
trans-1,3-Dichloropropene	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
trans-1,4-Dichloro-2-butene	EPA Method 8260	0.005 mg/kg	0.0004 mg/kg
Trichloroethene	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
Trichlorofluoromethane	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
Vinyl Acetate	EPA Method 8260	0.005 mg/kg	0.0004 mg/kg
Vinyl Chloride	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
METALS			
Antimony	EPA Method 6020	0.2 mg/kg	0.013 mg/kg
Arsenic	EPA Method 6020	0.2 mg/kg	0.087 mg/kg
Barium	EPA Method 6020	0.5 mg/kg	0.056 mg/kg
Beryillium	EPA Method 6020	0.2 mg/kg	0.018 mg/kg
Cadmium	EPA Method 6020	0.1 mg/kg	0.012 mg/kg
Chromium	EPA Method 6020	0.5 mg/kg	0.038 mg/kg
Chromium VI	EPA Method 7196	0.1 mg/kg	0.03 mg/kg
Copper	EPA Method 6020	0.5 mg/kg	0.036 mg/kg
Lead	EPA Method 6020	0.1 mg/kg	0.047 mg/kg
Mercury	EPA Method 7471	0.025 mg/kg	0.002 mg/kg
Nickel	EPA Method 6020	0.5 mg/kg	0.049 mg/kg
Selenium	EPA Method 6020	0.5 mg/kg	0.099 mg/kg
Silver	EPA Method 6020	0.2 mg/kg	0.008 mg/kg
Thallium	EPA Method 6020	0.2 mg/kg	0.003 mg/kg
Zinc	EPA Method 6020	4.0 mg/kg	0.339 mg/kg
PCBs			
Aroclor 1016	EPA Method 8082	0.033 mg/kg	0.009 mg/kg
Aroclor 1242	EPA Method 8082	0.033 mg/kg	NA
Aroclor 1248	EPA Method 8082	0.033 mg/kg	NA
Aroclor 1254	EPA Method 8082	0.033 mg/kg	NA
Aroclor 1260	EPA Method 8082	0.033 mg/kg	0.007 mg/kg
Aroclor 1221	EPA Method 8082	0.033 mg/kg	NA
Aroclor 1232	EPA Method 8082	0.033 mg/kg	NA
TOTAL PETROLEUM HYDROCARBONS			
Gasoline-Range Petroleum Hydrocarbons	NWTPH-G (c)	5 mg/kg	0.002 mg/kg
Diesel-Range Petroleum Hydrocarbons	NWTPH-Dx (c,d)	5 mg/kg	0.007 mg/kg
Motor Oil-Range Petroleum Hydrocarbons	NWTPH-Dx (c,d)	10 mg/kg	0.001 mg/kg

NA - Not available
SIM - Selected Ion Monitoring

(a) Analytical methods are from SW-846 and updates.
(b) Laboratory reporting limits are based on current laboratory data and may be modified during the investigation process as methodology is refined. Instances may arise where high sample concentrations, nonhomogeneity of samples or matrix interferences preclude achieving the laboratory reporting limits.
(c) Methods NWTPH-G and NWTPH-Dx as described in *Analytical Methods for Petroleum Hydrocarbons,* Washington State Department of Ecology, Publication ECY97-602, June 1997 (Ecology 1997)
(d) An acid silica gel cleanup will be performed for all NWTPH-Dx analyses.

TABLE C-2
SITE GROUNDWATER, SEEPS, AND STORMWATER LABORATORY ANALYTICAL METHODS, METHOD DETECTION LIMITS, AND REPORTING LIMITS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Analyte	Analytical Method (a)	Laboratory Reporting Limits (b)	Method Detection Limits
SEMIVOLATILES			
1,2,4-Trichlorobenzene	EPA Method 8270D	1.0 µg/L	0.383 µg/L
1,2-Dichlorobenzene	EPA Method 8270D	1.0 µg/L	0.365 µg/L
1,3-Dichlorobenzene	EPA Method 8270D	1.0 µg/L	0.358 µg/L
1,4-Dichlorobenzene	EPA Method 8270D	1.0 µg/L	0.397 µg/L
1-Methylnaphthalene	EPA Method 8270D	1.0 µg/L	0.479 µg/L
2,2'-Oxybis(1-Chloropropane)	EPA Method 8270D	1.0 µg/L	0.623 µg/L
2,4,5-Trichlorophenol	EPA Method 8270D	5.0 µg/L	2.220 µg/L
2,4,6-Trichlorophenol	EPA Method 8270D	5.0 µg/L	2.408 µg/L
2,4-Dichlorophenol	EPA Method 8270D	5.0 µg/L	2.597 µg/L
2,4-Dimethylphenol	EPA Method 8270D	1.0 µg/L	0.359 µg/L
2,4-Dinitrophenol	EPA Method 8270D	10.0 µg/L	3.480 µg/L
2,4-Dinitrotoluene	EPA Method 8270D	5.0 µg/L	2.520 µg/L
2,6-Dinitrotoluene	EPA Method 8270D	5.0 µg/L	2.393 µg/L
2-Chloronaphthalene	EPA Method 8270D	1.0 µg/L	0.477 µg/L
2-Chlorophenol	EPA Method 8270D	1.0 µg/L	0.529 µg/L
2-Methylnaphthalene	EPA Method 8270D	1.0 µg/L	0.475 µg/L
2-Methylphenol	EPA Method 8270D	1.0 µg/L	0.531 µg/L
2-Nitroaniline	EPA Method 8270D	5.0 µg/L	2.627 µg/L
2-Nitrophenol	EPA Method 8270D	5.0 µg/L	1.968 µg/L
3,3'-Dichlorobenzidine	EPA Method 8270D	5.0 µg/L	1.510 µg/L
3-Nitroaniline	EPA Method 8270D	5.0 µg/L	2.314 µg/L
4,6-Dinitro-2-Methylphenol	EPA Method 8270D	10.0 µg/L	3.087 µg/L
4-Bromophenyl-phenylether	EPA Method 8270D	1.0 µg/L	0.423 µg/L
4-Chloro-3-methylphenol	EPA Method 8270D	5.0 µg/L	2.417 µg/L
4-Chloroaniline	EPA Method 8270D	5.0 µg/L	2.599 µg/L
4-Chlorophenyl-phenylether	EPA Method 8270D	1.0 µg/L	0.451 µg/L
4-Methylphenol	EPA Method 8270D	1.0 µg/L	0.523 µg/L
4-Nitroaniline	EPA Method 8270D	5.0 µg/L	2.249 µg/L
4-Nitrophenol	EPA Method 8270D	5.0 µg/L	2.573 µg/L
Acenaphthene	EPA Method 8270D	1.0 µg/L	0.546 µg/L
Acenaphthylene	EPA Method 8270D	1.0 µg/L	0.480 µg/L
Anthracene	EPA Method 8270D	1.0 µg/L	0.531 µg/L
Benzo(a)anthracene	EPA Method 8270D SIM	0.01 µg/L	0.00320 µg/L
Benzo(a)pyrene	EPA Method 8270D SIM	0.01 µg/L	0.00505 µg/L
Benzo(g,h,i)perylene	EPA Method 8270D	1.0 µg/L	0.546 µg/L
Benzoic Acid	EPA Method 8270D	1.0 µg/L	5.111 µg/L
Benzyl Alcohol	EPA Method 8270D	5.0 µg/L	2.008 µg/L
bis(2-Chloroethoxy) Methane	EPA Method 8270D	1.0 µg/L	0.565 µg/L
Bis-(2-Chloroethyl) Ether	EPA Method 8270D	1.0 µg/L	0.583 µg/L
bis(2-Ethylhexyl)phthalate	EPA Method 8270D	1.0 µg/L	1.877 µg/L
Butylbenzylphthalate	EPA Method 8270D	1.0 µg/L	0.557 µg/L
Carbazole	EPA Method 8270D	1.0 µg/L	0.306 µg/L
Chrysene	EPA Method 8270D SIM	0.01 µg/L	0.00374 µg/L
Dibenz(a,h)anthracene	EPA Method 8270D SIM	0.01 µg/L	0.00159 µg/L
Dibenzofuran	EPA Method 8270D	1.0 µg/L	0.479 µg/L
Diethylphthalate	EPA Method 8270D	1.0 µg/L	0.582 µg/L
Dimethylphthalate	EPA Method 8270D	1.0 µg/L	0.528 µg/L
Di-n-Butylphthalate	EPA Method 8270D	1.0 µg/L	0.537 µg/L
Di-n-Octyl phthalate	EPA Method 8270D	1.0 µg/L	0.508 µg/L
Fluoranthene	EPA Method 8270D	1.0 µg/L	0.515 µg/L
Fluorene	EPA Method 8270D	1.0 µg/L	0.558 µg/L
Hexachlorobenzene	EPA Method 8270D	1.0 µg/L	0.470 µg/L
Hexachlorobutadiene	EPA Method 8270D	1.0 µg/L	0.306 µg/L

TABLE C-2
SITE GROUNDWATER, SEEPS, AND STORMWATER LABORATORY ANALYTICAL METHODS, METHOD DETECTION LIMITS, AND REPORTING LIMITS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Analyte	Analytical Method (a)	Laboratory Reporting Limits (b)	Method Detection Limits
SEMIVOLATILES (continued)			
Hexachlorocyclopentadiene	EPA Method 8270D	5.0 µg/L	1.181 µg/L
Hexachloroethane	EPA Method 8270D	1.0 µg/L	0.350 µg/L
Indeno(1,2,3-cd)pyrene	EPA Method 8270D SIM	0.01 µg/L	0.00341 µg/L
Isophorone	EPA Method 8270D	1.0 µg/L	0.481 µg/L
Naphthalene	EPA Method 8270D	1.0 µg/L	0.522 µg/L
Nitrobenzene	EPA Method 8270D	1.0 µg/L	0.575 µg/L
N-Nitroso-Di-N-Propylamine	EPA Method 8270D	1.0 µg/L	0.560 µg/L
N-Nitrosodiphenylamine	EPA Method 8270D	1.0 µg/L	0.460 µg/L
Pentachlorophenol	EPA Method 8270D	5.0 µg/L	2.411 µg/L
Phenanthrene	EPA Method 8270D	1.0 µg/L	0.557 µg/L
Phenol	EPA Method 8270D	1.0 µg/L	0.519 µg/L
Pyrene	EPA Method 8270D SIM	0.01 µg/L	0.00894 µg/L
Total Benzofluoranthenes	EPA Method 8270D SIM	0.02 µg/L	0.00496 µg/L
VOLATILES			
1,1,1,2-Tetrachloroethane	EPA Method 8260C	0.2 µg/L	0.068 µg/L
1,1,1-Trichloroethane	EPA Method 8260C	0.2 µg/L	0.089 µg/L
1,1,2,2-Tetrachloroethane	EPA Method 8260C	0.2 µg/L	0.067 µg/L
1,1,2-Trichloroethane	EPA Method 8260C	0.2 µg/L	0.035 µg/L
1,1,2-Trichlorotrifluoroethane	EPA Method 8260C	0.2 µg/L	0.107 µg/L
1,1-Dichloroethane	EPA Method 8260C	0.2 µg/L	0.053 µg/L
1,1-Dichloroethene	EPA Method 8260C	0.2 µg/L	0.091 µg/L
1,1-Dichloropropene	EPA Method 8260C	0.2 µg/L	0.092 µg/L
1,2,3-Trichlorobenzene	EPA Method 8260C	0.5 µg/L	0.087 µg/L
1,2,3-Trichloropropane	EPA Method 8260C	0.5 µg/L	0.226 µg/L
1,2,4-Trichlorobenzene	EPA Method 8260C	0.5 µg/L	0.100 µg/L
1,2,4-Trimethylbenzene	EPA Method 8260C	0.2 µg/L	0.058 µg/L
1,2-Dibromo-3-chloropropane	EPA Method 8260C	0.5 µg/L	0.212 µg/L
1,2-Dichlorobenzene	EPA Method 8260C	0.2 µg/L	0.055 µg/L
1,2-Dichloroethane	EPA Method 8260C	0.2 µg/L	0.075 µg/L
1,2-Dichloropropane	EPA Method 8260C	0.2 µg/L	0.093 µg/L
1,3,5-Trimethylbenzene	EPA Method 8260C	0.2 µg/L	0.063 µg/L
1,3-Dichlorobenzene	EPA Method 8260C	0.2 µg/L	0.040 µg/L
1,3-Dichloropropane	EPA Method 8260C	0.2 µg/L	0.020 µg/L
1,4-Dichlorobenzene	EPA Method 8260C	0.2 µg/L	0.057 µg/L
2,2-Dichloropropane	EPA Method 8260C	0.2 µg/L	0.083 µg/L
2-Butanone	EPA Method 8260C	5.0 µg/L	0.808 µg/L
2-Chloroethylvinylether	EPA Method 8260C	1.0 µg/L	0.086 µg/L
2-Chlorotoluene	EPA Method 8260C	0.2 µg/L	0.042 µg/L
2-Hexanone	EPA Method 8260C	5.0 µg/L	0.310 µg/L
4-Chlorotoluene	EPA Method 8260C	0.2 µg/L	0.073 µg/L
4-Isopropyltoluene	EPA Method 8260C	0.2 µg/L	0.075 µg/L
4-Methyl-2-Pentanone (MIBK)	EPA Method 8260C	5.0 µg/L	0.384 µg/L
Acetone	EPA Method 8260C	5.0 µg/L	0.720 µg/L
Acrolein	EPA Method 8260C	5.0 µg/L	0.292 µg/L
Acrylonitrile	EPA Method 8260C-SIM	0.05 µg/L	0.0158 µg/L
Benzene	EPA Method 8260C	0.2 µg/L	0.056 µg/L
Bromobenzene	EPA Method 8260C	0.2 µg/L	0.051 µg/L
Bromochloromethane	EPA Method 8260C	0.2 µg/L	0.067 µg/L
Bromodichloromethane	EPA Method 8260C	0.2 µg/L	0.053 µg/L
Bromoethane	EPA Method 8260C	0.2 µg/L	0.090 µg/L
Bromoform	EPA Method 8260C	0.2 µg/L	0.070 µg/L
Bromomethane	EPA Method 8260C	1.0 µg/L	0.043 µg/L
Carbon Disulfide	EPA Method 8260C	0.2 µg/L	0.087 µg/L
Carbon Tetrachloride	EPA Method 8260C	0.2 µg/L	0.075 µg/L

TABLE C-2
SITE GROUNDWATER, SEEPS, AND STORMWATER LABORATORY ANALYTICAL METHODS, METHOD DETECTION LIMITS, AND REPORTING LIMITS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Analyte	Analytical Method (a)	Laboratory Reporting Limits (b)	Method Detection Limits
VOLATILES (continued)			
Chlorobenzene	EPA Method 8260C	0.2 µg/L	0.042 µg/L
Chloroethane	EPA Method 8260C	0.2 µg/L	0.152 µg/L
Chloroform	EPA Method 8260C	0.2 µg/L	0.081 µg/L
Chloromethane	EPA Method 8260C	0.5 µg/L	0.098 µg/L
cis-1,2-Dichloroethene	EPA Method 8260C	0.02 µg/L	0.100 µg/L
cis-1,3-Dichloropropene	EPA Method 8260C	0.2 µg/L	0.058 µg/L
Dibromochloromethane	EPA Method 8260C	0.2 µg/L	0.090 µg/L
Dibromomethane	EPA Method 8260C	0.2 µg/L	0.081 µg/L
Ethylbenzene	EPA Method 8260C	0.2 µg/L	0.094 µg/L
Ethylene Dibromide	EPA Method 8260C	0.2 µg/L	0.075 µg/L
Hexachlorobutadiene	EPA Method 8260C	0.5 µg/L	0.112 µg/L
Isopropylbenzene	EPA Method 8260C	0.2 µg/L	0.062 µg/L
m,p-Xylene	EPA Method 8260C	0.4 µg/L	0.144 µg/L
Methyl Iodide	EPA Method 8260C	1.0 µg/L	0.040 µg/L
Methylene Chloride	EPA Method 8260C	0.5 µg/L	0.391 µg/L
Naphthalene	EPA Method 8260C	0.5 µg/L	0.070 µg/L
n-Butylbenzene	EPA Method 8260C	0.2 µg/L	0.108 µg/L
n-Propylbenzene	EPA Method 8260C	0.2 µg/L	0.081 µg/L
o-Xylene	EPA Method 8260C	0.2 µg/L	0.057 µg/L
sec-Butylbenzene	EPA Method 8260C	0.2 µg/L	0.077 µg/L
Styrene	EPA Method 8260C	0.2 µg/L	0.066 µg/L
tert-Butylbenzene	EPA Method 8260C	0.2 µg/L	0.061 µg/L
Tetrachloroethene	EPA Method 8260C-SIM	0.02 µg/L	0.00364 µg/L
Toluene	EPA Method 8260C	0.2 µg/L	0.056 µg/L
trans-1,2-Dichloroethene	EPA Method 8260C	0.2 µg/L	0.085 µg/L
trans-1,3-Dichloropropene	EPA Method 8260C	0.2 µg/L	0.059 µg/L
trans-1,4-Dichloro-2-butene	EPA Method 8260C	1.0 µg/L	0.243 µg/L
Trichloroethene	EPA Method 8260C	0.2 µg/L	0.076 µg/L
Trichlorofluoromethane	EPA Method 8260C	0.2 µg/L	0.092 µg/L
Vinyl Acetate	EPA Method 8260C	1.0 µg/L	0.068 µg/L
Vinyl Chloride	EPA Method 8260C-SIM	0.02 µg/L	0.00225 µg/L
METALS			
Antimony	EPA Method 200.8	0.2 µg/L	0.010 µg/L
Arsenic	EPA Method 200.8	0.2 µg/L	0.048 µg/L
Barium	EPA Method 200.8	0.5 µg/L	0.020 µg/L
Beryillium	EPA Method 200.8	0.2 µg/L	0.021 µg/L
Cadmium	EPA Method 200.8	0.1 µg/L	0.010 µg/L
Chromium	EPA Method 200.8	0.5 µg/L	0.045 µg/L
Chromium VI	EPA Method 7196	10 µg/L	3 µg/L
Copper	EPA Method 200.8	0.5 µg/L	0.158 µg/L
Lead	EPA Method 200.8	0.1 µg/L	0.046 µg/L
Mercury	EPA Method 7470A	0.02 µg/L	0.0026 µg/L
Nickel	EPA Method 200.8	0.5 µg/L	0.079 µg/L
Selenium	EPA Method 200.8	0.5 µg/L	0.127 µg/L
Silver	EPA Method 200.8	0.2 µg/L	0.008 µg/L
Thallium	EPA Method 200.8	0.2 µg/L	0.004 µg/L
Zinc	EPA Method 200.8	4.0 µg/L	0.497 µg/L
PCBs			
Aroclor 1016	EPA Method 8082B	0.01 µg/L	0.00248 µg/L
Aroclor 1242	EPA Method 8082B	0.01 µg/L	NA
Aroclor 1248	EPA Method 8082B	0.01 µg/L	NA
Aroclor 1254	EPA Method 8082B	0.01 µg/L	NA
Aroclor 1260	EPA Method 8082B	0.01 µg/L	0.00276 µg/L
Aroclor 1221	EPA Method 8082B	0.01 µg/L	NA
Aroclor 1232	EPA Method 8082B	0.01 µg/L	NA

TABLE C-2
SITE GROUNDWATER, SEEPS, AND STORMWATER LABORATORY ANALYTICAL METHODS, METHOD DETECTION LIMITS, AND REPORTING LIMITS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Analyte	Analytical Method (a)	Laboratory Reporting Limits (b)	Method Detection Limits
Total Petroleum Hydrocarbons			
Gasoline-Range Petroleum Hydrocarbons	NWTPH-G (c)	250 µg/L	60 µg/L
Diesel-Range Petroleum Hydrocarbons	NWTPH-Dx (c)	100 µg/L	16 µg/L
Motor Oil-Range Petroleum Hydrocarbons	NWTPH-Dx (c)	200 µg/L	49 µg/L
Conventionals			
Sulfate	EPA Method 300.0	2.0 mg/L	0.13 mg/L
Nitrate	EPA Method 300.0	0.01 mg/L	NA

NA - Not Available
SIM - Selected Ion Monitoring
(a) Analytical methods are from SW-846 (EPA 1986) and updates.
(b) Laboratory reporting limits are based on current laboratory data and may be modified during the investigation process as methodology is refined. Instances may arise where high sample concentrations, nonhomogeneity of samples or matrix interferences preclude achieving the laboratory reporting limits.
(c) Methods NWTPH-G and NWTPH-Dx as described in *Analytical Methods for Petroleum Hydrocarbons,* Washington State Department of Ecology, Publication ECY97-602, June 1997 (Ecology 1997)
(d) Alternative method detection limits and reporting limits are from EPA Method SW-846-8270D

TABLE C-3
CATCH BASIN SOLIDS LABORATORY ANALYTICAL METHODS, METHOD DETECTION LIMITS, AND REPORTING LIMITS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Analyte	Analytical Method (a)	Laboratory Reporting Limits (b)	Method Detection Limits
SEMIVOLATILES			
Phenol	EPA Method 8270 (Low Level)	0.02 mg/kg	0.004 mg/kg
1,2,4-Trichlorobenzene	EPA Method 8270 (Low Level)	0.02 mg/kg	0.004 mg/kg
1,2-Dichlorobenzene	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
1,3-Dichlorobenzene	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
1,4-Dichlorobenzene	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
1-Methylnaphthalene	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
2,2'-Oxybis(1-Chloropropane)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
2,4,5-Trichlorophenol	EPA Method 8270 (Low Level)	0.1 mg/kg	0.021 mg/kg
2,4,6-Trichlorophenol	EPA Method 8270 (Low Level)	0.1 mg/kg	0.011 mg/kg
2,4-Dichlorophenol	EPA Method 8270 (Low Level)	0.1 mg/kg	0.018 mg/kg
2,4-Dimethylphenol	EPA Method 8270 (Low Level)	0.02 mg/kg	0.008 mg/kg
2,4-Dinitrophenol	EPA Method 8270 (Low Level)	0.2 mg/kg	0.05 mg/kg
2,4-Dinitrotoluene	EPA Method 8270 (Low Level)	0.1 mg/kg	0.019 mg/kg
2,6-Dinitrotoluene	EPA Method 8270 (Low Level)	0.1 mg/kg	0.015 mg/kg
2-Chloronaphthalene	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
2-Chlorophenol	EPA Method 8270 (Low Level)	0.02 mg/kg	0.005 mg/kg
2-Methylnaphthalene	EPA Method 8270 SIM	0.005 mg/kg	0.001 mg/kg
2-Methylphenol	EPA Method 8270 (Low Level)	0.02 mg/kg	0.005 mg/kg
2-Nitroaniline	EPA Method 8270 (Low Level)	0.1 mg/kg	0.019 mg/kg
2-Nitrophenol	EPA Method 8270 (Low Level)	0.02 mg/kg	0.009 mg/kg
3,3'-Dichlorobenzidine	EPA Method 8270 (Low Level)	0.1 mg/kg	0.054 mg/kg
3-Nitroaniline	EPA Method 8270 (Low Level)	0.1 mg/kg	0.025 mg/kg
4,6-Dinitro-2-Methylphenol	EPA Method 8270 (Low Level)	0.2 mg/kg	0.041 mg/kg
4-Bromophenyl-phenylether	EPA Method 8270 (Low Level)	0.02 mg/kg	0.004 mg/kg
4-Chloro-3-methylphenol	EPA Method 8270 (Low Level)	0.1 mg/kg	0.015 mg/kg
4-Chloroaniline	EPA Method 8270 (Low Level)	0.1 mg/kg	0.024 mg/kg
4-Chlorophenyl-phenylether	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
4-Methylphenol	EPA Method 8270 (Low Level)	0.02 mg/kg	0.005 mg/kg
4-Nitroaniline	EPA Method 8270 (Low Level)	0.1 mg/kg	0.023 mg/kg
4-Nitrophenol	EPA Method 8270 (Low Level)	0.1 mg/kg	0.028 mg/kg
Acenaphthene	EPA Method 8270 SIM	0.005 mg/kg	0.002 mg/kg
Acenaphthylene	EPA Method 8270 SIM	0.005 mg/kg	0.001 mg/kg
Anthracene	EPA Method 8270 SIM	0.005 mg/kg	0.001 mg/kg
Benzo(a)anthracene	EPA Method 8270 SIM	0.005 mg/kg	0.001 mg/kg
Benzo(a)pyrene	EPA Method 8270 SIM	0.005 mg/kg	0.001 mg/kg
Benzo(b)fluoranthene	EPA Method 8270 SIM	0.005 mg/kg	0.002 mg/kg
Benzo(g,h,i)perylene	EPA Method 8270 SIM	0.005 mg/kg	0.001 mg/kg
Benzo(k)fluoranthene	EPA Method 8270 SIM	0.005 mg/kg	0.002 mg/kg
Benzoic Acid	EPA Method 8270 (Low Level)	0.2 mg/kg	0.043 mg/kg
Benzyl Alcohol	EPA Method 8270 (Low Level)	0.02 mg/kg	0.046 mg/kg
bis(2-Chloroethoxy) Methane	EPA Method 8270 (Low Level)	0.02 mg/kg	0.002 mg/kg
Bis-(2-Chloroethyl) Ether	EPA Method 8270 (Low Level)	0.02 mg/kg	0.005 mg/kg
bis(2-Ethylhexyl)phthalate	EPA Method 8270 (Low Level)	0.02 mg/kg	0.009 mg/kg
Butylbenzylphthalate	EPA Method 8270 (Low Level)	0.02 mg/kg	0.004 mg/kg
Carbazole	EPA Method 8270 (Low Level)	0.02 mg/kg	0.002 mg/kg
Chrysene	EPA Method 8270 SIM	0.005 mg/kg	0.002 mg/kg
Dibenz(a,h)anthracene	EPA Method 8270 SIM	0.005 mg/kg	0.001 mg/kg
Dibenzofuran	EPA Method 8270 SIM	0.005 mg/kg	0.001 mg/kg
Diethylphthalate	EPA Method 8270 (Low Level)	0.02 mg/kg	0.004 mg/kg
Dimethylphthalate	EPA Method 8270 (Low Level)	0.02 mg/kg	0.004 mg/kg
Di-n-Butylphthalate	EPA Method 8270 (Low Level)	0.02 mg/kg	0.005 mg/kg
Di-n-Octyl phthalate	EPA Method 8270 (Low Level)	0.02 mg/kg	0.005 mg/kg
Fluoranthene	EPA Method 8270 SIM	0.005 mg/kg	0.002 mg/kg
Fluorene	EPA Method 8270 SIM	0.005 mg/kg	0.001 mg/kg
Hexachlorobenzene	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
Hexachlorobutadiene	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
Hexachlorocyclopentadiene	EPA Method 8270 (Low Level)	0.1 mg/kg	0.012 mg/kg
Hexachloroethane	EPA Method 8270 (Low Level)	0.02 mg/kg	0.005 mg/kg
Indeno(1,2,3-cd)pyrene	EPA Method 8270 SIM	0.005 mg/kg	0.002 mg/kg
Isophorone	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
Naphthalene	EPA Method 8270 SIM	0.005 mg/kg	0.002 mg/kg
Nitrobenzene	EPA Method 8270 (Low Level)	0.02 mg/kg	0.004 mg/kg
N-Nitroso-Di-N-Propylamine	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
N-Nitrosodiphenylamine	EPA Method 8270 (Low Level)	0.1 mg/kg	0.013 mg/kg
Pentachlorophenol	EPA Method 8270 (Low Level)	0.1 mg/kg	0.027 mg/kg
Phenanthrene	EPA Method 8270 SIM	0.005 mg/kg	0.002 mg/kg
Pyrene	EPA Method 8270 SIM	0.005 mg/kg	0.001 mg/kg

TABLE C-3
CATCH BASIN SOLIDS LABORATORY ANALYTICAL METHODS, METHOD DETECTION LIMITS, AND REPORTING LIMITS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Analyte	Analytical Method (a)	Laboratory Reporting Limits (b)	Method Detection Limits
VOLATILES			
Chloromethane	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
1,1,1,2-Tetrachloroethane	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
1,1,1-Trichloroethane	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
1,1,2,2-Tetrachloroethane	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
1,1,2-Trichloroethane	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
1,1,2-Trichlorotrifluoroethane	EPA Method 8260	0.002 mg/kg	0.0003 mg/kg
1,1-Dichloroethane	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
1,1-Dichloroethene	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
1,1-Dichloropropene	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
1,2,3-Trichlorobenzene	EPA Method 8260	0.005 mg/kg	0.0003 mg/kg
1,2,3-Trichloropropane	EPA Method 8260	0.002 mg/kg	0.0005 mg/kg
1,2,4-Trichlorobenzene	EPA Method 8260	0.005 mg/kg	0.0003 mg/kg
1,2,4-Trimethylbenzene	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
1,2-Dibromo-3-chloropropane	EPA Method 8260	0.005 mg/kg	0.0005 mg/kg
1,2-Dichlorobenzene	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
1,2-Dichloroethane	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
1,2-Dichloropropane	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
1,3,5-Trimethylbenzene	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
1,3-Dichlorobenzene	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
1,3-Dichloropropane	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
1,4-Dichlorobenzene	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
2,2-Dichloropropane	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
2-Butanone	EPA Method 8260	0.005 mg/kg	0.0005 mg/kg
2-Chloroethylvinylether	EPA Method 8260	0.005 mg/kg	0.0003 mg/kg
2-Chlorotoluene	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
2-Hexanone	EPA Method 8260	0.005 mg/kg	0.0004 mg/kg
4-Chlorotoluene	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
4-Isopropyltoluene	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
4-Methyl-2-Pentanone (MIBK)	EPA Method 8260	0.005 mg/kg	0.0004 mg/kg
Acetone	EPA Method 8260	0.005 mg/kg	0.0005 mg/kg
Acrolein	EPA Method 8260	0.05 mg/kg	0.038 mg/kg
Acrylonitrile	EPA Method 8260	0.005 mg/kg	0.001 mg/kg
Benzene	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
Bromobenzene	EPA Method 8260	0.001 mg/kg	0.0001 mg/kg
Bromochloromethane	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
Bromodichloromethane	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
Bromoethane	EPA Method 8260	0.002 mg/kg	0.0004 mg/kg
Bromoform	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
Bromomethane	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
Carbon Disulfide	EPA Method 8260	0.001 mg/kg	0.0006 mg/kg
Carbon Tetrachloride	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
Chlorobenzene	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
Chloroethane	EPA Method 8260	0.001 mg/kg	0.0005 mg/kg
Chloroform	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
cis-1,2-Dichloroethene	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
cis-1,3-Dichloropropene	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
Dibromochloromethane	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
Dibromomethane	EPA Method 8260	0.001 mg/kg	0.0001 mg/kg
Ethylbenzene	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
Ethylene Dibromide	EPA Method 8260	0.001 mg/kg	0.0001 mg/kg
Hexachlorobutadiene	EPA Method 8260	0.001 mg/kg	0.0004 mg/kg
Isopropylbenzene	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
m,p-Xylene	EPA Method 8260	0.001 mg/kg	0.0004 mg/kg
Methyl Iodide	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
Methylene Chloride	EPA Method 8260	0.002 mg/kg	0.0006 mg/kg
Naphthalene	EPA Method 8260	0.005 mg/kg	0.0004 mg/kg
n-Butylbenzene	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
n-Propylbenzene	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
o-Xylene	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
sec-Butylbenzene	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
Styrene	EPA Method 8260	0.001 mg/kg	0.0001 mg/kg

TABLE C-3
CATCH BASIN SOLIDS LABORATORY ANALYTICAL METHODS, METHOD DETECTION LIMITS, AND REPORTING LIMITS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Analyte	Analytical Method (a)	Laboratory Reporting Limits (b)	Method Detection Limits
VOLATILES (continued)			
tert-Butylbenzene	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
Tetrachloroethene	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
Toluene	EPA Method 8260	0.001 mg/kg	0.0001 mg/kg
trans-1,2-Dichloroethene	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
trans-1,3-Dichloropropene	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
trans-1,4-Dichloro-2-butene	EPA Method 8260	0.005 mg/kg	0.0004 mg/kg
Trichloroethene	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
Trichlorofluoromethane	EPA Method 8260	0.001 mg/kg	0.0003 mg/kg
Vinyl Acetate	EPA Method 8260	0.005 mg/kg	0.0004 mg/kg
Vinyl Chloride	EPA Method 8260	0.001 mg/kg	0.0002 mg/kg
METALS			
Antimony	EPA Method 6020	0.2 mg/kg	0.013 mg/kg
Arsenic	EPA Method 6020	0.2 mg/kg	0.087 mg/kg
Barium	EPA Method 6020	0.5 mg/kg	0.056 mg/kg
Beryllium	EPA Method 6020	0.2 mg/kg	0.018 mg/kg
Cadmium	EPA Method 6020	0.1 mg/kg	0.012 mg/kg
Chromium	EPA Method 6020	0.5 mg/kg	0.038 mg/kg
Chromium VI	EPA Method 7196	0.1 mg/kg	0.003 mg/kg
Copper	EPA Method 6020	0.5 mg/kg	0.036 mg/kg
Lead	EPA Method 6020	0.1 mg/kg	0.047 mg/kg
Mercury	EPA Method 7471	0.025 mg/kg	0.002 mg/kg
Nickel	EPA Method 6020	0.5 mg/kg	0.049 mg/kg
Selenium	EPA Method 6020	0.5 mg/kg	0.099 mg/kg
Silver	EPA Method 6020	0.2 mg/kg	0.008 mg/kg
Thallium	EPA Method 6020	0.2 mg/kg	0.003 mg/kg
Zinc	EPA Method 6020	4.0 mg/kg	0.339 mg/kg
PCBs			
Aroclor 1016	EPA Method 8082 (e)	0.020 mg/kg	0.009 mg/kg
Aroclor 1242	EPA Method 8082 (e)	0.020 mg/kg	NA
Aroclor 1248	EPA Method 8082 (e)	0.020 mg/kg	NA
Aroclor 1254	EPA Method 8082 (e)	0.020 mg/kg	NA
Aroclor 1260	EPA Method 8082 (e)	0.020 mg/kg	0.011 mg/kg
Aroclor 1221	EPA Method 8082 (e)	0.020 mg/kg	NA
Aroclor 1232	EPA Method 8082 (e)	0.020 mg/kg	NA
TOTAL PETROLEUM HYDROCARBONS			
Gasoline-Range Petroleum Hydrocarbons	NWTPH-G (c)	5 mg/kg	0.002 mg/kg
Diesel-Range Petroleum Hydrocarbons	NWTPH-Dx (c,d)	5 mg/kg	0.007 mg/kg
Motor Oil-Range Petroleum Hydrocarbons	NWTPH-Dx (c,d)	10 mg/kg	0.001 mg/kg
Total Organic Carbon	Plumb, 1981	0.02 %	0.0029 %
Total Solids	EPA 160.1/PSEP	0.1 %	NA
DIOXINS/FURANS			
2,3,7,8-TCDF	EPA Method 1613B	0.00000019 mg/kg	0.000001 mg/kg
2,3,7,8-TCDD	EPA Method 1613B	0.00000034 mg/kg	0.000001 mg/kg
1,2,3,7,8-PeCDF	EPA Method 1613B	0.00000080 mg/kg	0.000005 mg/kg
2,3,4,7,8-PeCDF	EPA Method 1613B	0.00000079 mg/kg	0.000005 mg/kg
1,2,3,7,8-PeCDD	EPA Method 1613B	0.00000095 mg/kg	0.000005 mg/kg
1,2,3,4,7,8-HxCDF	EPA Method 1613B	0.00000064 mg/kg	0.000005 mg/kg
1,2,3,6,7,8-HxCDF	EPA Method 1613B	0.00000098 mg/kg	0.000005 mg/kg
2,3,4,6,7,8-HxCDF	EPA Method 1613B	0.00000096 mg/kg	0.000005 mg/kg
1,2,3,7,8,9-HxCDF	EPA Method 1613B	0.00000090 mg/kg	0.000005 mg/kg
1,2,3,4,7,8-HxCDD	EPA Method 1613B	0.00000101 mg/kg	0.000005 mg/kg
1,2,3,6,7,8-HxCDD	EPA Method 1613B	0.00000059 mg/kg	0.000005 mg/kg
1,2,3,7,8,9-HxCDD	EPA Method 1613B	0.00000038 mg/kg	0.000005 mg/kg
1,2,3,4,6,7,8-HpCDF	EPA Method 1613B	0.00000065 mg/kg	0.000005 mg/kg
1,2,3,4,7,8,9-HpCDF	EPA Method 1613B	0.00000099 mg/kg	0.000005 mg/kg
1,2,3,4,6,7,8-HpCDD	EPA Method 1613B	0.00000115 mg/kg	0.000005 mg/kg
OCDF	EPA Method 1613B	0.00000139 mg/kg	0.00001 mg/kg
OCDD	EPA Method 1613B	0.00000179 mg/kg	0.00001 mg/kg

NA - Not Available
SIM - Selected Ion Monitoring

(a) Analytical methods are from SW-846 and updates.
(b) Laboratory reporting limits are based on current laboratory data and may be modified during the investigation process as methodology is refined. Instances may arise where high sample concentrations, nonhomogeneity of samples or matrix interferences preclude achieving the laboratory reporting limits.
(c) Methods NWTPH-G and NWTPH-Dx as described in *Analytical Methods for Petroleum Hydrocarbons,* Washington State Department of Ecology, Publication ECY97-602, June 1997 (Ecology 1997)
(d) An acid silica gel cleanup will be performed for all NWTPH-Dx analyses.
(e) Puget Sound Dredged Disposal Analysis (PSDDA) protocol will be applied to sample preparation and extraction.

TABLE C-4
SOIL VAPOR LABORATORY ANALYTICAL METHODS, METHOD DETECTION LIMITS, AND REPORTING LIMITS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Analyte	Analytical Method (a)	Target Reporting Limits (b)	
VOLATILES			
1,1,1-Trichloroethane	EPA Method TO-15	1 µg/m^3	0.18 ppbV
1,1,2,2-Tetrachloroethane	EPA Method TO-15	1.0 µg/m^3	0.15 ppbV
1,1,2-Trichloroethane	EPA Method TO-15	1.0 µg/m^3	0.18 ppbV
1,1-Dichloroethane	EPA Method TO-15	1.0 µg/m^3	0.25 ppbV
1,1-Dichloroethene	EPA Method TO-15	1.0 µg/m^3	0.25 ppbV
1,2-Dibromoethane	EPA Method TO-15	1.0 µg/m^3	0.13 ppbV
1,2-Dichlorobenzene	EPA Method TO-15	1.0 µg/m^3	0.17 ppbV
1,2-Dichloroethane	EPA Method TO-15	1.0 µg/m^3	0.13 ppbV
1,3-Dichlorobenzene	EPA Method TO-15	1.0 µg/m^3	0.17 ppbV
1,4-Dichlorobenzene	EPA Method TO-15	1.0 µg/m^3	0.17 ppbV
2-Butanone	EPA Method TO-15	1.0 µg/m^3	0.34 ppbV
2-Hexanone	EPA Method TO-15	1.0 µg/m^3	0.24 ppbV
4-Methyl-2-Pentanone (MIBK)	EPA Method TO-15	1.0 µg/m^3	0.24 ppbV
Acetone	EPA Method TO-15	5.0 µg/m^3	2.1 ppbV
Benzene	EPA Method TO-15	1.0 µg/m^3	0.31 ppbV
Bromodichloromethane	EPA Method TO-15	1.0 µg/m^3	0.15 ppbV
Bromoethane	EPA Method TO-15	1.0 µg/m^3	0.26 ppbV
Bromoform	EPA Method TO-15	1.0 µg/m^3	0.097 ppbV
Carbon Disulfide	EPA Method TO-15	1.0 µg/m^3	0.32 ppbV
Carbon Tetrachloride	EPA Method TO-15	1.0 µg/m^3	0.16 ppbV
cis-1,2-Dichloroethene	EPA Method TO-15	1.0 µg/m^3	0.25 ppbV
cis-1,3-Dichloropropene	EPA Method TO-15	1.0 µg/m^3	0.22 ppbV
Ethylbenzene	EPA Method TO-15	1.0 µg/m^3	0.23 ppbV
m,p-Xylene	EPA Method TO-15	1.0 µg/m^3	0.23 ppbV
Methyl tert-Butyl Ether	EPA Method TO-15	1.0 µg/m^3	0.28 ppbV
Methylene Chloride	EPA Method TO-15	1.0 µg/m^3	0.29 ppbV
o-Xylene	EPA Method TO-15	1.0 µg/m^3	0.23 ppbV
Styrene	EPA Method TO-15	1.0 µg/m^3	0.23 ppbV
Tetrachloroethene	EPA Method TO-15	1.0 µg/m^3	0.15 ppbV
Toluene	EPA Method TO-15	1.0 µg/m^3	0.27 ppbV
trans-1,2-Dichloroethene	EPA Method TO-15	1.0 µg/m^3	0.25 ppbV
trans-1,3-Dichloropropene	EPA Method TO-15	1.0 µg/m^3	0.22 ppbV
Trichloroethene	EPA Method TO-15	1.0 µg/m^3	0.19 ppbV
Trichlorofluoromethane	EPA Method TO-15	1.0 µg/m^3	0.18 ppbV
Trichlorotrifluoroethane	EPA Method TO-15	1.0 µg/m^3	0.13 ppbV
Vinyl Acetate	EPA Method TO-15	1.0 µg/m^3	0.28 ppbV
Vinyl Chloride	EPA Method TO-15	1.0 µg/m^3	0.39 ppbV

SIM = Selected ion monitoring

(a) Analytical methods are from SW-846 and upddates.
(b) Target reporting limits are based on current laboratory data and may be modified during the investigation process as methodology is refined. Instances may arise where high sample concentrations, nonhomogeneity of samples or matrix interferences preclude achieving the target reporting limits.

TABLE C-5
BUILDING MATERIALS AND WIPE SAMPLES
LABORATORY ANALYTICAL METHODS, METHOD DETECTION LIMITS, AND REPORTING LIMITS
BOEING ISAACSON-THOMPSON

Analysis	Sample Matrix	Analytical Method	Reporting Limits (a)	Method Detection Limits (b)
PCBs				
Aroclor 1016	Solids (c)	EPA Method 8082	0.8 mg/kg	0.0633 mg/kg
Aroclor 1242	Solids (c)	EPA Method 8082	0.8 mg/kg	NA
Aroclor 1248	Solids (c)	EPA Method 8082	0.8 mg/kg	NA
Aroclor 1254	Solids (c)	EPA Method 8082	0.8 mg/kg	NA
Aroclor 1260	Solids (c)	EPA Method 8082	0.8 mg/kg	0.123 mg/kg
Aroclor 1221	Solids (c)	EPA Method 8082	0.8 mg/kg	NA
Aroclor 1232	Solids (c)	EPA Method 8082	0.8 mg/kg	NA
METALS				
Antimony	Solids (c)	EPA Method 6010B	5.0 mg/kg	0.32 mg/kg
Arsenic	Solids (c)	EPA Method 6010B	5.0 mg/kg	0.46 mg/kg
Barium	Solids (c)	EPA Method 6010B	0.3 mg/kg	0.06 mg/kg
Beryllium	Solids (c)	EPA Method 6010B	0.1 mg/kg	0.01 mg/kg
Cadmium	Solids (c)	EPA Method 6010B	0.2 mg/kg	0.11 mg/kg
Chromium	Solids (c)	EPA Method 6010B	0.5 mg/kg	0.27 mg/kg
Hexavalent Chromium	Solids (c)	EPA Method 7196	0.1 mg/kg	0.03 mg/kg
Copper	Solids (c)	EPA Method 6010B	0.2 mg/kg	0.05 mg/kg
Lead	Solids (c)	EPA Method 6010B	2.0 mg/kg	0.13 mg/kg
Mercury	Solids (c)	EPA Method 7471A	0.025 mg/kg	0.00 mg/kg
Nickel	Solids (c)	EPA Method 6010B	1.0 mg/kg	0.30 mg/kg
Selenium	Solids (c)	EPA Method 6010B	5.0 mg/kg	0.65 mg/kg
Silver	Solids (c)	EPA Method 6010B	0.3 mg/kg	0.03 mg/kg
Thallium	Solids (c)	EPA Method 6010B	5.0 mg/kg	0.53 mg/kg
Zinc	Solids (c)	EPA Method 6010B	1.0 mg/kg	0.12 mg/kg
SEMIVOLATILES				
Phenol	Solids (c)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.004 mg/kg
1,2,4-Trichlorobenzene	Solids (c)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.004 mg/kg
1,2-Dichlorobenzene	Solids (c)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
1,3-Dichlorobenzene	Solids (c)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
1,4-Dichlorobenzene	Solids (c)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
1-Methylnaphthalene	Solids (c)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
2,2'-Oxybis(1-Chloropropane)	Solids (c)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
2,4,5-Trichlorophenol	Solids (c)	EPA Method 8270 (Low Level)	0.1 mg/kg	0.021 mg/kg
2,4,6-Trichlorophenol	Solids (c)	EPA Method 8270 (Low Level)	0.1 mg/kg	0.011 mg/kg
2,4-Dichlorophenol	Solids (c)	EPA Method 8270 (Low Level)	0.1 mg/kg	0.018 mg/kg
2,4-Dimethylphenol	Solids (c)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.008 mg/kg
2,4-Dinitrophenol	Solids (c)	EPA Method 8270 (Low Level)	0.2 mg/kg	0.05 mg/kg
2,4-Dinitrotoluene	Solids (c)	EPA Method 8270 (Low Level)	0.1 mg/kg	0.019 mg/kg
2,6-Dinitrotoluene	Solids (c)	EPA Method 8270 (Low Level)	0.1 mg/kg	0.015 mg/kg
2-Chloronaphthalene	Solids (c)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
2-Chlorophenol	Solids (c)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.005 mg/kg
2-Methylnaphthalene	Solids (c)	EPA Method 8270 SIM	0.005 mg/kg	0.001 mg/kg
2-Methylphenol	Solids (c)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.005 mg/kg
2-Nitroaniline	Solids (c)	EPA Method 8270 (Low Level)	0.1 mg/kg	0.019 mg/kg
2-Nitrophenol	Solids (c)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.009 mg/kg
3,3'-Dichlorobenzidine	Solids (c)	EPA Method 8270 (Low Level)	0.1 mg/kg	0.054 mg/kg

TABLE C-5
BUILDING MATERIALS AND WIPE SAMPLES
LABORATORY ANALYTICAL METHODS, METHOD DETECTION LIMITS, AND REPORTING LIMITS
BOEING ISAACSON-THOMPSON

Analysis	Sample Matrix	Analytical Method	Reporting Limits (a)	Method Detection Limits (b)
SEMIVOLATILES (cont)				
3-Nitroaniline	Solids (c)	EPA Method 8270 (Low Level)	0.1 mg/kg	0.025 mg/kg
4,6-Dinitro-2-Methylphenol	Solids (c)	EPA Method 8270 (Low Level)	0.2 mg/kg	0.041 mg/kg
4-Bromophenyl-phenylether	Solids (c)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.004 mg/kg
4-Chloro-3-methylphenol	Solids (c)	EPA Method 8270 (Low Level)	0.1 mg/kg	0.015 mg/kg
4-Chloroaniline	Solids (c)	EPA Method 8270 (Low Level)	0.1 mg/kg	0.024 mg/kg
4-Chlorophenyl-phenylether	Solids (c)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
4-Methylphenol	Solids (c)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.005 mg/kg
4-Nitroaniline	Solids (c)	EPA Method 8270 (Low Level)	0.1 mg/kg	0.023 mg/kg
4-Nitrophenol	Solids (c)	EPA Method 8270 (Low Level)	0.1 mg/kg	0.028 mg/kg
Acenaphthene	Solids (c)	EPA Method 8270 SIM	0.005 mg/kg	0.002 mg/kg
Acenaphthylene	Solids (c)	EPA Method 8270 SIM	0.005 mg/kg	0.001 mg/kg
Anthracene	Solids (c)	EPA Method 8270 SIM	0.005 mg/kg	0.001 mg/kg
Benzo(a)anthracene	Solids (c)	EPA Method 8270 SIM	0.005 mg/kg	0.001 mg/kg
Benzo(a)pyrene	Solids (c)	EPA Method 8270 SIM	0.005 mg/kg	0.001 mg/kg
Benzo(b)fluoranthene	Solids (c)	EPA Method 8270 SIM	0.005 mg/kg	0.002 mg/kg
Benzo(g,h,i)perylene	Solids (c)	EPA Method 8270 SIM	0.005 mg/kg	0.001 mg/kg
Benzo(k)fluoranthene	Solids (c)	EPA Method 8270 SIM	0.005 mg/kg	0.002 mg/kg
Benzoic Acid	Solids (c)	EPA Method 8270 (Low Level)	0.2 mg/kg	0.043 mg/kg
Benzyl Alcohol	Solids (c)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.046 mg/kg
bis(2-Chloroethoxy) Methane	Solids (c)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.002 mg/kg
Bis-(2-Chloroethyl) Ether	Solids (c)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.005 mg/kg
bis(2-Ethylhexyl)phthalate	Solids (c)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.009 mg/kg
Butylbenzylphthalate	Solids (c)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.004 mg/kg
Carbazole	Solids (c)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.002 mg/kg
Chrysene	Solids (c)	EPA Method 8270 SIM	0.005 mg/kg	0.002 mg/kg
Dibenz(a,h)anthracene	Solids (c)	EPA Method 8270 SIM	0.005 mg/kg	0.001 mg/kg
Dibenzofuran	Solids (c)	EPA Method 8270 SIM	0.005 mg/kg	0.001 mg/kg
Diethylphthalate	Solids (c)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.004 mg/kg
Dimethylphthalate	Solids (c)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.004 mg/kg
Di-n-Butylphthalate	Solids (c)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.005 mg/kg
Di-n-Octyl phthalate	Solids (c)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.005 mg/kg
Fluoranthene	Solids (c)	EPA Method 8270 SIM	0.005 mg/kg	0.002 mg/kg
Fluorene	Solids (c)	EPA Method 8270 SIM	0.005 mg/kg	0.001 mg/kg
Hexachlorobenzene	Solids (c)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
Hexachlorobutadiene	Solids (c)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
Hexachlorocyclopentadiene	Solids (c)	EPA Method 8270 (Low Level)	0.1 mg/kg	0.012 mg/kg
Hexachloroethane	Solids (c)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.005 mg/kg
Indeno(1,2,3-cd)pyrene	Solids (c)	EPA Method 8270 SIM	0.005 mg/kg	0.002 mg/kg
Isophorone	Solids (c)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
Naphthalene	Solids (c)	EPA Method 8270 SIM	0.005 mg/kg	0.002 mg/kg
Nitrobenzene	Solids (c)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.004 mg/kg
N-Nitroso-Di-N-Propylamine	Solids (c)	EPA Method 8270 (Low Level)	0.02 mg/kg	0.003 mg/kg
N-Nitrosodiphenylamine	Solids (c)	EPA Method 8270 (Low Level)	0.1 mg/kg	0.013 mg/kg
Pentachlorophenol	Solids (c)	EPA Method 8270 (Low Level)	0.1 mg/kg	0.027 mg/kg
Phenanthrene	Solids (c)	EPA Method 8270 SIM	0.005 mg/kg	0.002 mg/kg
Pyrene	Solids (c)	EPA Method 8270 SIM	0.005 mg/kg	0.001 mg/kg

TABLE C-5
BUILDING MATERIALS AND WIPE SAMPLES
LABORATORY ANALYTICAL METHODS, METHOD DETECTION LIMITS, AND REPORTING LIMITS
BOEING ISAACSON-THOMPSON

Analysis	Sample Matrix	Analytical Method	Reporting Limits (a)		Method Detection Limits (b)
PCBs					
Aroclor 1016	Wipes	8082	1.0	ug/Wipe	NA
Aroclor 1242	Wipes	8082	1.0	ug/Wipe	NA
Aroclor 1248	Wipes	8082	1.0	ug/Wipe	NA
Aroclor 1254	Wipes	8082	1.0	ug/Wipe	NA
Aroclor 1260	Wipes	8082	1.0	ug/Wipe	NA
Aroclor 1221	Wipes	8082	1.0	ug/Wipe	NA
Aroclor 1232	Wipes	8082	1.0	ug/Wipe	NA
METALS					
Antimony	Wipes	6010B	2.5	ug/Wipe	NA
Arsenic	Wipes	6010B	2.5	ug/Wipe	NA
Barium	Wipes	6010B	0.2	ug/Wipe	NA
Beryllium	Wipes	6010B	0.05	ug/Wipe	NA
Cadmium	Wipes	6010B	0.1	ug/Wipe	NA
Chromium	Wipes	6010B	0.25	ug/Wipe	NA
Hexavalent Chromium	Wipes	7196	1	ug/Wipe	NA
Copper	Wipes	6010B	0.1	ug/Wipe	NA
Lead	Wipes	6010B	1	ug/Wipe	NA
Mercury	Wipes	7471A	0.005	ug/Wipe	NA
Nickel	Wipes	6010B	0.5	ug/Wipe	NA
Selenium	Wipes	6010B	2.5	ug/Wipe	NA
Silver	Wipes	6010B	0.15	ug/Wipe	NA
Thallium	Wipes	6010B	2.5	ug/Wipe	NA
Zinc	Wipes	6010B	0.5	ug/Wipe	NA

NA = Not available

(a) Laboratory reporting limits are based on current laboratory data and may be modified during the investigation process as methodology is refined. Instances may arise where high sample concentrations, nonhomogeneity of samples or matrix interferences preclude achieving the laboratory reporting limits.

(b) Method detection limits for solid materials are subject to change based on the specific sample matrix (e.g., paint, caulking, etc)

(c) Solids include paint, building siding, caulk, concrete joint material, surface debris, and roofing materials

APPENDIX D

Site Health and Safety Plans (HASPs)

Upland HASP

Final Uplands HASP
Remedial Investigation/Feasibility Study
Boeing Isaacson-Thompson Site
Tukwila, Washington

September 16, 2011

Prepared for

The Boeing Company

LANDAU ASSOCIATES
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Site Health and Safety Plan
Summary

Site Name: Boeing Isaacson-Thompson Site

Location: 8811 East Marginal Way South, Tukwila, Washington

Client: The Boeing Company

Proposed Dates of Activities: 2011

Type of Facility: Former aerospace manufacturing facility and vacant asphalt capped land

Land Use of Area Surrounding Facility: Industrial

Site Activities: Drilling soil boreholes using direct-push and hollow-stem auger techniques, well installation, groundwater sampling, seep sampling, and catch basin solids sampling

Potential Site Contaminants: Metals, total petroleum hydrocarbons, polycyclic aromatic hydrocarbons, volatile organic compounds, semivolatile organic compounds, and polychlorinated biphenyls

Routes of Entry: Skin contact with soil, groundwater, or catch basin solids; incidental ingestion of soil, water, or catch basin solids; and inhalation of airborne droplets, dusts, or vapors

Protective Measures: Hard hat, safety glasses, gloves, protective clothing, steel-toed boots, fall protection equipment during seep sampling

1.0 INTRODUCTION

This Site-specific health and safety plan (HASP) addresses procedures to minimize the risk of chemical exposures, physical accidents to onsite workers, and environmental contamination.

1.1 PURPOSE AND REGULATORY COMPLIANCE

The HASP covers each of the required elements as specified in 29 CFR 1910.120 or equivalent Washington State Department of Labor and Industries regulations. When combined with the Landau Associates Health and Safety Program, this Site-specific HASP meets all applicable regulatory requirements.

This HASP will be made available to all Landau Associates' personnel and subcontractors involved in field work on this project. For subcontractors, this HASP represents minimum safety procedures. Subcontractors are responsible for their own safety while present onsite or conducting work for this project. Subcontractor work may involve safety and health procedures not addressed in the HASP. The HASP was originally prepared by a Certified Industrial Hygienist and has been reviewed by the Landau Associates' Corporate Health and Safety Officer. By signing the documentation form provided with this HASP (Attachment D-3), project workers also certify their agreement to comply with this HASP. Both Landau Associates and its subcontractors are independently responsible for the health and safety of their own employees on the project.

1.2 CHAIN OF COMMAND

The Landau Associates chain-of-command for health and safety on this project involves the following individuals:

Landau Associates' Task Manager: Stacy Lane. The Task Manager, in conjunction with the Project Manager (Kris Hendrickson), has overall responsibility for the successful outcome of the project. The Task Manager, in consultation with Corporate Health and Safety (H&S) Manager and the Project Manager, makes final decisions regarding questions concerning the implementation of the Site HASP.

Landau Associates' Project H&S Coordinator: To be determined. As the Project H&S Coordinator, this individual is responsible for implementing the HASP in the field. The Project H&S Coordinator informs subcontractors of the minimum requirements of this HASP. This person will conduct ambient air monitoring to determine the level of personal protective equipment (PPE) and monitor for PPE upgrade action levels. This person will also assure that proper protective equipment is available and used in the correct manner, decontamination activities are carried out properly, and that employees have knowledge of the local emergency medical system.

Landau Associates' Corporate H&S Manager: Christine Kimmel. The Landau Associates Corporate H&S Manager has overall responsibility for preparation and modification of this HASP. In the event that health and safety issues arise during Site operations, the H&S Manager will attempt to resolve them in discussion with the appropriate members of the project team.

Project Team Members: Project team members are responsible for having the correct training and understanding the H&S requirements for this project and implementing these procedures in the field. Team members will receive technical guidance from the Project H&S Coordinator.

1.3 SITE WORK ACTIVITIES

This HASP covers Site field activities to be conducted throughout the remedial investigation (RI) at the Boeing Isaacson-Thompson Site. The field activities associated with the RI include:

- Drilling shallow boreholes using direct-push technology
- Installation of shallow groundwater wells using hollow-stem auger methods
- Collection of groundwater samples following installation of the wells
- Collection of seep samples
- Water level monitoring at the monitoring wells
- Collection of solids from stormwater catch basins.

1.4 SITE DESCRIPTION

The Site is located between the eastern bank of the Lower Duwamish Waterway (LDW) and East Marginal Way South in Tukwila, Washington. A strip of land owned by the Port of Seattle separates the Isaacson parcel from the LDW. The Thompson parcel is developed with a large industrial building (Building 14-01) and several support structures. The Isaacson parcel consists of vacant asphalt-capped land used for a variety of commercial, industrial, and marine-related activities. The Site is approximately 29 acres and relatively flat.

2.0 HAZARD EVALUATION AND CONTROL MEASURES

2.1 TOXICITY OF CHEMICALS OF CONCERN

Based on previous Site information and knowledge of the types of activities conducted at the Site, the following chemicals may be present at this Site: metals, total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), and semivolatile organic compounds (SVOCs).

Human health hazards of these chemicals are summarized in Table D-1. The information provided in this table covers potential toxic effects that might occur if relatively significant acute and/or chronic exposure occurred. However, this information does not indicate that such effects are likely to occur from the planned Site activities. The chemicals that may be encountered at this Site are not expected to be present at concentrations that could cause significant health hazards from short-term exposures. The types of planned work activities and use of monitoring procedures and protective measures will further limit potential exposures at this Site.

Health standards are presented using the following abbreviations:

- PEL – Permissible exposure limit
- TWA – Time-weighted average exposure limit for any 8-hour work shift
- STEL – Short-term exposure limit expressed as a 15-minute time-weighted average and not to be exceeded at any time during a work day.

2.2 POTENTIAL EXPOSURE ROUTES

2.2.1 INHALATION

Inhalation of dusts generated during soil sampling and drilling could be an issue if the weather is dry, windy, or warm. Exposure via this route could potentially occur if chemicals are present in the soil and dust particles become airborne during Site activities or if VOCs are liberated when samples are exposed to air or during drilling of soil boreholes.

2.2.2 SKIN CONTACT

Exposure via this route could occur if contaminated soil, groundwater, or catch basin solids contact the skin or clothing. Protective clothing and decontamination activities specified in this HASP will minimize the potential for skin contact with the contaminants.

2.2.3 INGESTION

Exposure via this route could occur if individuals eat, drink, or perform other hand-to-mouth contact in the contaminated (exclusion) zones. Decontamination procedures established in this HASP will minimize the inadvertent ingestion of contaminants.

2.3 HEAT STRESS AND HYPOTHERMIA

2.3.1 HEAT STRESS

Use of impermeable clothing reduces the cooling ability of the body due to evaporation reduction. This may lead to heat stress. If such conditions occur during Site activities, appropriate work-rest cycles will be utilized and water or electrolyte-rich fluids (Gatorade or equivalent) will be made available to minimize heat stress effects.

Also, when ambient temperatures exceed 70°F, monitoring of employee pulse rates will be conducted. Each employee will check his or her pulse rate at the beginning of each break period. Take the pulse at the wrist for 6 seconds, and multiply by 10. If the pulse rate exceeds 110 beats per minute, then reduce the length of the next work period by one-third.

Example: After a 1-hour work period at 80°F, a worker has a pulse rate of 120 beats per minute. The worker must shorten the next work period by one-third, resulting in a work period of 40 minutes until the next break.

2.3.2 HYPOTHERMIA

Hypothermia can result from abnormal cooling of the core body temperature. It is caused by exposure to a cold environment and wind-chill. Wetness or water immersion can also play a significant role.

Typical warning signs of hypothermia include fatigue, weakness, lack of coordination, apathy, and drowsiness. A confused state is a key symptom of hypothermia. Shivering and pallor are usually absent, and the face may appear puffy and pink. Body temperatures below 90°F require immediate treatment to restore temperature to normal.

Current medical practice recommends slow re-warming as treatment for hypothermia, followed by professional medical care. This can be accomplished by moving the person into a sheltered area and wrapping with blankets in a warm room. In emergency situations, where body temperature falls below 90°F and a heated shelter is not available, use a sleeping bag, blankets, and body heat from another individual to help restore normal body temperature.

2.4 OTHER PHYSICAL HAZARDS

2.4.1 SLIPS/FALLS

As with all field work sites, caution will be exercised to prevent slips on rain-slick surfaces, stepping on sharp objects, etc. Personnel will maintain good housekeeping procedures and keep the work area clear of debris and/or equipment. Work will not be performed on elevated platforms without fall protection.

During seep sampling, the following procedures will be used:

- A minimum of two workers will be onsite during seep sampling activities. The first worker (sampler) will be responsible for sample collection and the second worker (rescuer) will be responsible for providing safety oversight. The rescuer will be positioned at the rescue tripod that is attached to the sampler through the fall protection devices and will maintain visual or radio contact with the sampler at all times and will not perform other tasks during sampling.
- Excess vegetation will be removed from the bulkhead in the sampling area prior to sampling.
- A 20-ft extension ladder will be lowered from the bulkhead, placed at an approximate 45 degree angle from the bulkhead, and tied off to the bulkhead. The ladder footing will be secured on solid ground.
- Independent fall protection equipment will be used including a secured tripod and a fall harness for the sampler.

At least one person with current training in first aid and CPR will be onsite at all times.

2.4.2 MACHINERY/MOVING PARTS

The drilling equipment or sampling vessel may be equipped with various winches, motors, booms, and other machines. These present a general physical hazard from moving parts. Personnel will stand clear of machinery at all times unless specific instructions are given by the drill rig operator or other person in authority. Steel-toed shoes or boots will be worn at all times when on the Site. When possible, appropriate guards will be in place during equipment use.

2.4.3 CONFINED SPACES

Confined space entry is not anticipated for this project. Personnel will not enter any confined space without certified training and specific approval of the Project Manager, Task Manager, Corporate H&S Manager, and Boeing project representative.

2.4.4 NOISE

Appropriate hearing protection (ear muffs or ear plugs with a noise reduction rating of at least 20 decibals (acoustic; dBA) will be used if individuals work near high-noise-generating equipment (> 85 dBA). Determination of the need for hearing protection will be made by the Project H&S Coordinator.

3.0 PROTECTIVE EQUIPMENT AND AIR MONITORING

3.1 PROTECTIVE EQUIPMENT

Work for this project will be conducted in Level D protection. Level C protection is presented as a contingency only and represents a modified protection level, incorporating respiratory protection only where required by Site conditions. Situations requiring Levels A or B protection are not anticipated for this project; should they occur, work will stop and the HASP will be amended, as appropriate, prior to resuming work.

Workers performing general Site activities where skin contact with highly contaminated materials is unlikely and inhalation risks are not expected will wear coveralls, eye protection, gloves (whenever handling samples), and safety boots. Level D protection will consist of the following:

- Hard hats
- Rain gear or poly-coated Tyvek (wet operations) or uncoated Tyvek (dry operations)
- Safety glasses
- Steel-toed, chemical-resistant boots
- Nitrile, neoprene, or equivalent inner and outer gloves
- Fall protection equipment during seep sampling.

Workers performing Site activities where heavily contaminated materials are detected will wear chemical-resistant gloves (nitrile, neoprene, or other appropriate outer and inner gloves) and coated Tyvek or other chemical-resistant suits. Workers will use face shields or goggles, as necessary, to avoid splashes.

When performing activities in which inhalation of chemical vapors and dusts is a concern, workers will wear half-mask or full-face air-purifying respirators with combination cartridges. Cartridges should be changed, at a minimum, on a daily basis. They should be changed more frequently if chemical vapors are detected inside the respirator or other symptoms of breakthrough are noted (e.g., irritation, dizziness, breathing difficulty).

Workers performing seep sampling will utilize the procedures and fall protection equipment described in Section 2.4.1.

3.2 AIR MONITORING

Direct-reading instruments give immediate, real time readings of contaminant levels. Reliable direct-reading instruments, such as the combustible gas indicator, photoionization detector (PID), flame ionization detector, dust meter, and colorimetric tubes, are available for situations commonly encountered at hazardous and contaminated substance sites. The appropriate type of monitoring equipment depends on the suspected type and concentration of chemical contaminants. The primary limitation of direct-reading instruments is that most do not quantify specific chemical compounds.

Air monitoring for VOCs and dust will be conducted during drilling or other intrusive activities. A PID will be used to monitor for VOCs and air monitoring for dust will be conducted using a SKC HAZ-DUST 1 (or equivalent) particulate meter (Table D-1). The instruments will be calibrated prior to each day's activity according to manufacturer's instructions. Calibration will be recorded in the health and safety logbook or field notes. Readings will be entered into the logbook at a minimum of 30-minute intervals.

Attachment 1 identifies the air monitoring strategy to be used during field investigations.

4.0 SAFETY EQUIPMENT LIST

The following safety equipment must be available onsite:

- First aid kit
- Mobile telephone
- Steel-toed safety boots
- Chemical-resistant coveralls and gloves
- Safety glasses
- Hard hat
- Air monitoring instruments
- Half-face or full face respirator with cartridges
- Fall protection equipment (during seep sampling).

5.0 EXCLUSION AREAS

If migration of chemicals from the work area is a possibility, or as otherwise required by regulations or client specifications, Site control will be maintained by establishing clearly identified work zones. These will include the exclusion zone, contaminant reduction zone, and support zone, as discussed below.

5.1 EXCLUSION ZONE

Exclusion zones will be established around each contaminated substance activity location. Only persons with appropriate training and authorization from the Project H&S Coordinator will enter this perimeter while work is being conducted.

5.2 CONTAMINATION REDUCTION ZONE

A contamination reduction zone will consist of a decontamination station that must be used to exit the exclusion zone. The station will have the brushes and wash fluids necessary to decontaminate personnel and equipment leaving the exclusion zone. Care will be taken to prevent the spread of contamination from this area.

5.3 SUPPORT ZONE

A support zone will be established outside the contamination reduction area to stage clean equipment, don protective clothing, take rest breaks, etc.

6.0 MINIMIZATION OF CONTAMINATION

To make the work zone procedure function effectively, the amount of equipment and number of personnel allowed in contaminated areas must be minimized. In addition, the amounts of sample collected should not exceed what is needed for laboratory analysis and record samples. Do not kneel on contaminated ground, stir up unnecessary dust, or perform any practice that increases the probability of hand-to-mouth transfer of contaminated materials. Eating, drinking, chewing gum, or using smokeless tobacco, are forbidden in the exclusion zone. Smoking is prohibited everywhere on the Site.

7.0 DECONTAMINATION

Decontamination is necessary to limit the migration of contaminants between sampling intervals, from the work zone(s) onto the Site, or from the Site into the surrounding environment. Equipment decontamination procedures are presented in Section 2.9 of the Sampling and Analysis Plan (SAP; Appendix A of the Work Plan) and personnel decontamination are discussed in the following sections, and the following types of equipment will be available to perform these activities:

- Boot and glove wash bucket and rinse bucket
- Scrub brushes – long handled
- Spray rinse applicator
- Plastic garbage bags
- 5-gallon container with soap solution.

Proper decontamination (decon) procedures will be employed to ensure that contaminated materials do not contact individuals and are not spread from the Site. These procedures will also ensure that contaminated materials generated during Site operations and during decontamination are managed appropriately. All nondisposable equipment will be decontaminated in the contamination reduction zone.

Personnel working in exclusion zones will perform a limited decontamination in the contamination reduction zone prior to changing respirator cartridges (if worn), taking rest breaks, drinking liquids, etc. They will decontaminate fully before eating lunch or leaving the Site. The following describes the procedures for decon activities:

1. In the contamination reduction zone, wash and rinse outer gloves and boots in portable buckets.
2. Inspect protective outer suit, if worn, for severe contamination, rips, or tears.
3. If suit is highly contaminated or damaged, full decontamination will be performed.
4. Remove outer gloves. Inspect and discard if ripped or damaged.

8.0 DISPOSAL OF CONTAMINATED MATERIALS

All disposable sampling equipment and personal protective equipment will be rinsed to remove gross contamination and placed inside of a 10 mil polyethylene bag or other appropriate containers. These disposable supplies and containers will be removed from the Site by the field personnel and disposed of in a normal refuse container (dumpster) and/or solid waste landfill, unless visibly contaminated with hazardous substances. In such cases, the Project Manager and/or Task Manager will determine the need for special handling and disposal, according to applicable regulations. Waste water generated during decontamination will be handled as described in Section 2.0 of the SAP (Appendix A of the Work Plan).

9.0 SITE SECURITY AND CONTROL

Site security and control will be the responsibility of the Project H&S Coordinator. The "buddy system" will be used when working in designated hazardous areas. Any security or control problems will be reported to the client or appropriate authorities.

10.0 SPILL CONTAINMENT

Sources of bulk chemicals subject to spillage are not expected to be used in this project. Accordingly, a spill containment plan is not required for this project.

11.0 EMERGENCY RESPONSE PLAN

The Emergency Response Plan outlines the steps necessary for appropriate response to emergency situations. The following paragraphs summarize the key Emergency Response Plan procedures for this project.

11.1 PLAN CONTENT AND REVIEW

The principal hazards addressed by the Emergency Response Plan include the following: fire or explosion, medical emergencies, uncontrolled contaminant release, and situations such as the presence of chemicals above exposure guidelines or inadequate protective equipment for the hazards present. However, in order to help anticipate potential emergency situations, field personnel should always exercise caution and look for signs of potentially hazardous situations, including the following as examples:

- Visible or odorous chemical contaminants
- Drums or other containers
- General physical hazards (e.g., traffic, cranes, moving equipment, ships, sharp or hot surfaces, slippery or uneven surfaces)
- Possible sources of radiation
- Live electrical wires or equipment; underwater pipelines or cables; and poisonous or dangerous animals.

These and other potential problems should be anticipated and steps taken to avert problems before they occur. All personnel will certify (Attachment 3) that they are familiar with the contents of this HASP and acknowledge their agreement to comply with the provisions of this HASP.

The Emergency Response Plan will be reviewed during the onsite health and safety briefing so that all personnel will know what their duties are should an emergency occur.

11.2 PLAN IMPLEMENTATION

The Project H&S Coordinator will act as the lead individual in the event of an emergency situation and evaluate the situation. This individual will determine the need to implement the emergency procedures, in concert with other resource personnel including client representatives and the Corporate H&S Manager. Other onsite field personnel will assist the H&S Coordinator, as required, during the emergency.

If the Emergency Response Plan is implemented, the Project H&S Coordinator or designees are responsible for alerting all personnel at the affected area by use of a signal device (such as a hand-held air horn), visual, or shouted instructions, as appropriate.

Emergency evacuation routes and safe assembly areas will be identified and discussed in the onsite health and safety briefing, as appropriate. The buddy system will be employed during evacuation to ensure safe escape, and the Project H&S Coordinator will be responsible for roll-call to account for all personnel.

11.3 EMERGENCY RESPONSE CONTACTS

Site personnel must know who to notify in the event of Emergency Response Plan implementation. The following information will be readily available at the Site in a location known to all workers:

- Emergency Telephone Numbers: see list in Attachment 2
- Route to Nearest Hospital: see directions and map in Attachment 2
- Site Descriptions: see the description at the beginning of this HASP
- If a significant environmental release of contaminants occurs, the federal, state, and local agencies noted in this HASP must be notified within 24 hours. Contact the Project Manager as soon as possible and he/she will be responsible for notifying agencies listed in Attachment 2. If the release to the environment includes navigable waters, also notify the National Response Center.

In the event of an emergency situation requiring implementation of the Emergency Response Plan (e.g., fire or explosion, serious injury, tank leak or other material spill, presence of chemicals above exposure guidelines, inadequate personnel protection equipment for the hazards present), cease all work immediately. Offer whatever assistance is required, but do not enter work areas without proper protective equipment. Workers not needed for immediate assistance will decontaminate per normal procedures (if possible) and leave the work area, pending approval by the Project H&S Coordinator for re-start of work. The following general emergency response safety procedures should be followed.

11.4 FIRES

Landau Associates' personnel will attempt to control only very small fires. If an explosion appears likely, evacuate the area immediately. If a fire occurs that cannot be readily controlled, then immediate intervention by the local fire department or other appropriate agency is imperative. Use these steps:

- Contact fire agency identified in Attachment D-2
- Inform Project Manager/Project H&S Coordinator of the situation.

- Contact Boeing Emergency Dispatch (206-655-2222)
- Call 911 if a medical emergency occurs.

If a worker leaves the Site to seek medical attention, another worker should accompany the patient. When in doubt about the severity of an accident or exposure, always seek medical attention as a conservative approach. Notify the Project Manager of the outcome of the medical evaluation as soon as possible. For minor cuts and bruises, an onsite first aid kit will be available.

If a worker is seriously injured or becomes ill or unconscious, immediately request assistance from the emergency contact sources noted in the Site-specific plan. Do not attempt to assist an unconscious worker in an untested confined space without applying confined space entry procedures or without using proper respiratory protection, such as a self-contained breathing apparatus.

In the event that a seriously injured person is also heavily contaminated, use clean plastic sheeting to prevent contamination of the inside of the emergency vehicle. Less severely injured individuals may also have their protective clothing carefully removed or cut off before transport to the hospital. If it is deemed appropriate to transport the victim to the hospital, follow the route map on Attachment 2.

11.5 PLAN DOCUMENTATION AND REVIEW

The Project Manager/Project H&S Coordinator will notify the Corporate H&S Manager as soon as possible after an emergency situation has been stabilized. The Project Manager will also notify the appropriate client contacts, and regulatory agencies, if applicable.

The Project Manager and Corporate H&S Manager will critique the emergency response action following the event. The results of the critique will be used in to improve future Emergency Response Plans and actions.

12.0 MEDICAL SURVEILLANCE

A medical surveillance program has been instituted for Landau Associates and will also be in effect for Subcontractor employees having exposures to hazardous substances. For Landau Associates, exams are given before employment; annually, thereafter; and upon termination. Content of exams is determined by the Occupational Medicine physician, in compliance with applicable regulations, and is detailed in the Landau Associates' General Health and Safety Program.

Each team member will have undergone a physical examination as noted above in order to verify that he/she is physically able to use protective equipment, work in hot environments, and not be predisposed to occupationally induced disease. Additional exams may be needed to evaluate specific exposures or unexplainable illness.

* * * * * * * * * *

This document has been prepared under the supervision and direction of the following key staff:

LANDAU ASSOCIATES, INC.

Kristy J. Hendrickson

Kristy J. Hendrickson, P.E.
Principal

Kathryn F. Hartley

Kathryn F. Hartley
Project Scientist

TABLE D-1
HUMAN HEALTH INFORMATION FOR CONTAMINANTS OF CONCERN

Contaminant	PEL	I.D.L.H.	Route of Exposure	Symptoms of Acute Exposure	Instruments Used to Monitor Contaminant
2-Butanone (MEK)	200 parts per million (ppm)	3,000 ppm	Inhalation, ingestion, dermal contact	Irritated eyes, skin, and nose; headache; dizziness; vomiting; dermatitis	Photoionization (PID) meter
4-Methyl-2-Pentanone (MIBK)	50 ppm	500 ppm	Inhalation, ingestion, dermal contact	Irritated eyes, skin and mucus membranes; headache; narcosis; dermatitis; liver and kidney damage	PID meter
Trichloroethene (TCE)	50 ppm	1,000 ppm	Inhalation, ingestion, dermal contact	Irritated eyes and skin; headache; visual disturbance; lassitude; dizziness; tremor; drowsiness; nausea; vomiting; dermatitis; cardiac arrhythmias; paresthesia; liver injury	PID meter
Tetrachloroethene (PCE)	25 ppm	150 ppm	Inhalation, ingestion, absorption, and skin or eye contact	Irritated eyes, skin, nose, throat, respiratory system; nausea; flushed face and neck; dizziness, incoordination; headache; drowsiness; skin erythema; liver damage	PID meter
Benzene	1 ppm	500 ppm	Inhalation, ingestion, absorption, and skin or eye contact	Irritated eyes, skin, nose, and respiratory system; giddiness; headache; nausea; staggered gait; dermatitis; fatigue; anorexia; lassitude; bone marrow depressant (carcinogenic)	PID meter
Toluene	100 ppm	500 ppm	Inhalation, ingestion, percutaneous absorption, and skin & eye contact.	Headache, dizziness, drowsiness, coordination problems, and coma	PID meter
Xylene	100 ppm	900 ppm	Inhalation, ingestion, percutaneous absorption, and skin & eye contact.	Nervous system depression, liver and kidney damage	PID meter
Ethylbenzene	100 ppm	800 ppm	Inhalation, ingestion, percutaneous absorption, and skin & eye contact.	Nervous system depression, headaches, dizziness, nausea, convulsions, and coma	PID meter

TABLE D-1
HUMAN HEALTH INFORMATION FOR CONTAMINANTS OF CONCERN

Contaminant	PEL	I.D.L.H.	Route of Exposure	Symptoms of Acute Exposure	Instruments Used to Monitor Contaminant
Gasoline	300 ppm	500 ppm	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, mucous membrane; dermatitis; headache; lassitude; blurred vision; dizziness; slurred speech; confusion; convulsions; chemical pneumonitis (aspiration liquid); possible liver, kidney damage; (potential occupational carcinogen)	PID meter
Copper	1 milligram per cubic meter (mg/m^3)	100 mg/m^3	Inhalation, skin or eye contact, ingestion	Irritated eyes, respiratory system; cough dysprea; wheezing	Dust Meter
Arsenic	0.002 mg/m^3	5.0 mg/m^3	Inhalation, eye contact, dermal contact	Skin and mucous membrane irritation; respiration irritation (potential occupational carcinogen)	Dust Meter
Mercury	0.05 mg/m^3	10 mg/m^3	Inhalation eye contact, dermal contact	Irritated eyes, skin; cough; chest pains	Dust Meter
Lead	0.05 mg/m^3	100 mg/m^3	Inhalation, ingestion, dermal contact	Weakness, lassitude, facial pallor, kidney disease	Dust Meter
PCBs	0.2 mg/m^3	10 mg/m^3	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritated eyes; chloracne; liver damage; reproductive effects	Dust Meter

PEL = Permissible exposure limit.
IDLH = Immediately dangerous to life and health [National Institute for Occupational Safety and Health (NIOSH)].

Notes: Occupational Safety and Health Administration (OSHA) ceiling value not to be exceeded during any part of the working day.
Benzo(a)pyrene is listed as an indicator for polycyclic aromatic hydrocarbons (PAHs).

ATTACHMENT D-1
AIR MONITORING STRATEGY

EXPOSURE	METHOD	MONITORING DESCRIPTION	ACTION LEVEL (a)	ACTION
Total Volatile Organics	Photoionization Detector (PID)	Periodically, or when odors are noted	<25 parts per million (ppm) 25-75 ppm >75 ppm	Level D Protection Level C Protection Shut Down; Contact Corp. Health & Safety Officer; Implement Engineering Controls
Particulate Contaminants	Dust Meter	Handling samples/ Continuously	<0.001 milligrams per cubic meter (mg/m^{3}) >0.001 mg/m^{3}	Level D Protection Implement Engineering Controls; Upgrade to Level C in Interim

(a) For ambient air monitoring.

ATTACHMENT D-2

EMERGENCY INFORMATION

HOSPITAL - **Harborview Medical Center**
325 Ninth Avenue
Seattle, Washington 98104

Information: (206) 744-3000

DIRECTIONS -
1. Exit site on East Marginal Way South heading southeast
2. Turn LEFT onto S Boeing Access Road (0.4 miles)
3. Merge onto I-5 North toward Seattle (6.4 miles)
4. Take the Dearborn St./James St. exit (Exit #164A) toward Madison Street (1.0 miles)
5. Take the James St exit
6. Turn RIGHT onto James St (0.1 miles)
7. Turn RIGHT onto 9th Ave (0.1 miles)
8. Proceed to hospital

TELEPHONE - Cellular telephones to be carried by each team on/offshore.

EMERGENCY TRANSPORTATION SYSTEMS (Fire, Police, Ambulance) **-911**

EMERGENCY ROUTES - Map (HASP Figure 1)

EMERGENCY CONTACTS -

Poison Control Center	(206) 526-2121
Project Manager – Kris Hendrickson	(425) 778-0907, cell (206) 910-1378
Corporate H&S Manager – Chris Kimmel	(425) 778-0907
Boeing Contact – Katie Moxley	(206) 579-2110
National Response Center	(800) 424-8802
WA Div. of Emergency Management	(800) 258-5990

In the event of an emergency on land, call for help as soon as possible.

Contact Boeing Onsite Clinic and Medical Technicians (206-655-2222 or 2-2222 from a plant phone) and have the following information available:

- Site Name: Isaacson-Thompson
- Building #: Main Thompson Building is 14-01
- Column Number
- Door Number.

Then dial 911 and give the following information:

- WHERE the emergency is - use cross streets or landmarks
- PHONE NUMBER you are calling from
- WHAT HAPPENED - type of injury
- HOW MANY persons need help
- WHAT is being done for the victim(s)
- YOU HANG UP LAST - let the person you called hang up first.

FIGURE 1

HOSPITAL ROUTE AND MAP

ATTACHMENT D-3
CERTIFICATION

All field members are required to read and familiarize themselves with the contents of this Health & Safety Plan and acknowledge their agreement to comply with the provisions of the plan through the entry of a signature and date on the section below.

By my signature, I certify that:

- I have read
- I understand
- I will comply with this Site Health and Safety Plan for Boeing Isaacson-Thompson environmental investigations.

Printed Name	Signature	Date	Affiliation

Personnel health and safety briefing conducted by:

______________________________ ______________________________ ______________________________
Name Signature Date

Plan prepared by:

________________/_____________ ______________/______________ ______________/______________
Name Signature Date

Plan reviewed by:

________________/_____________ ______________/______________ ______________/______________
Name Signature Date

Sediment HASP

Sediment HASP

SITE-SPECIFIC HEALTH & SAFETY PLAN
Boeing Isaacson-Thompson Site
Field Surveys and Sediment Sampling
Tukwila, Washington

Submitted to:
The Boeing Company

Submitted by:
AMEC Geomatrix, Inc., Lynnwood, WA

May 2011

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SITE-SPECIFIC HEALTH & SAFETY PLAN
Boeing Isaacson-Thompson Site
Field Surveys and Sediment Sampling
Tukwila, Washington

1.0 INTRODUCTION

This Site-Specific Health & Safety Plan (H&S Plan) focuses on field activities that will occur at the Boeing Isaacson-Thompson Site for sediment sampling, and is a supplement to the Corporate Health & Safety Guidelines. The Corporate Health & Safety Guidelines will be used on this project to cover general safety issues. This H&S Plan is designed to comply with State of Washington Occupational Health Standards WAC 296-843, Hazardous Waste Operations (Appendix A).

The project team will conduct sediment sampling at the work site, located on the west side of East Marginal Way S at the end of South 87th Place, Tukwila, Washington. Sampling activities will include collection of sediments from the intertidal and subtidal areas of the river for chemical analysis. Anticipated primary hazards are the potential for tripping or falling along the shoreline and piers, injury from operating vessels and machinery, and hazards from operating sampling equipment. Use of personal safety equipment (boots, gloves, safety glasses, and splash suits) will minimize chemical exposure hazards. Entry into confined spaces is not anticipated.

This H&S Plan applies to all AMEC Geomatrix, Inc. (AMEC), personnel, subcontractors, and visitors present during field surveys and sampling activities.

Any unforeseen situation that is not addressed in this H&S Plan, such as needing to operate gasoline-powered equipment on the site or use of flammable liquids on the site, will be discussed with the Boeing Representative prior to use.

2.0 WORKER TRAINING

All personnel entering the exclusion zone, contamination-reduction zone, or support zone are required to have current hazardous-materials training, first aid and cardiopulmonary resuscitation (CPR) training, and medical surveillance on record with the Project Health & Safety Officer.

All field personnel will be provided with a review copy of this H&S Plan, the Corporate Health & Safety Guidelines, and WAC 296-843 (Appendix A), which details Washington State regulations for hazardous-waste operations. All employees must read these documents and sign (Section 13.0) of the Site Health & Safety Officer's copy.

The Site Health & Safety Officer will hold a daily "toolbox" safety meeting at the start of each field workday. Topics such as work zones, location of safety equipment, evacuation routes, and new safety issues will be discussed at this time. A record of the toolbox safety meeting will be made daily using the Environmental Project Health & Safety Field Meeting Form (Appendix B). Additional "toolbox" safety briefings will be held and documented for any personnel or subcontractors who arrive after the morning safety meeting has been held.

The Site Health & Safety Officer will make a log of the field activities performed each day on the daily safety meeting form.

3.0 PERSONNEL AND RESPONSIBILITIES

The following key personnel from AMEC can be reached at the Lynnwood office by phone at (425) 921-4000 or by fax at (425) 921-4040 unless otherwise noted.

- **Landau Corporate Health & Safety Manager, Chris Kimmel, (425) 778-0907**
  - Addresses matters concerning corporate health and safety policy.
  - Coordinates with agencies on matters of health and safety.
- **Landau Project Manager, Kris Hendrickson (425) 778-0907 (office), (206) 910-1378 (cell)**
  - Coordinates with Project Managers.
  - Informs all employees and subcontractors of potential hazards before they begin work.
  - Implements health and safety requirements.
  - Consults with Site Health & Safety Officer if new site conditions arise.
- **AMEC Project Health & Safety Officer, Tim Reinhardt, CIH (206) 838-8464 (direct), (425) 241-5816 (cell)**
  - Addresses matters concerning corporate health and safety policy.
  - Coordinates with agencies on matters of health and safety.
- **Site Health & Safety Officer, Gary Maxwell (206) 276-1034 (cell)**
  - Develops project health and safety plans.
  - Reviews subcontractor health and safety plans.
  - Coordinates with Project Manager and subcontractors.
- **AMEC Project Manager, Cliff Whitmus (425) 921-4023 (office), (206) 300-0520 (cell)**
  - Coordinates with Site Health & Safety Officer and subcontractors.
  - Informs all employees of potential hazards before they begin work.
  - Implements health and safety requirements.
  - Consults with Site Health & Safety Officer if new site conditions arise.
  - Takes appropriate action as field conditions change.
- **Boeing Representative, Katie Moxley (206) 579-2110**
- **Poison Control Center, (206) 526-2121**
- **National Response Center, (800) 424-8802**
- **WA Division of Emergency Management, (800) 258-5990**
- **Field Team Members**
  - Complies with the H&S Plan requirements.
  - Informs Site Health & Safety Officer of potential uncontrolled work hazards when observed.
  - Works safely within scope of their training and experience.

4.0 HAZARD-CONTROL MEASURES

For site control, establish a support zone, a contamination-reduction zone, and an exclusion zone on the sampling vessel and at any shore-based sample-processing area. These zones are required whenever potentially contaminated sediments or samples are being handled. Clearly define the zones at the site by using rope, barriers, tape, or other obvious marking methods. Also clearly define controlled entrances and exits from each zone. Of critical importance is the definition of the hot line separating the exclusion zone from the contamination-reduction zone and the borders of the contamination-reduction corridor. The exact zones will be determined by the Project Manager at the start of field sampling activities.

Communicate a site plan (Figure 1) at the work site. Identify evacuation routes and muster points, the support zone, contamination-reduction zone, and exclusion zone. Employees will not work alone in the exclusion zone, but will always be in contact with another team member who is equipped and ready to provide aid in an emergency under the “Buddy System.”

Because ingestion is an exposure route for chemical contamination (see Section 6.2.2), eating is not permitted in the contamination-reduction zone or the exclusion zone. Likewise, smoking is not permitted in the support, contamination-reduction, or exclusion zones.

Wear eye protection and steel-toed boots at the work site. Before entering the exclusion zone, don Level “D” protective clothing: This clothing includes hard hats, chemical-resistant steel-toed boots, chemical-resistant splash suits, and eye protection. Wear ear protection while operating sediment coring equipment, the core tube cutting saw, and other loud machinery. Wear chemical-resistant gloves when handling samples or contaminated equipment. Wear life jackets when working on boats or pier structures

After sampling, perform decontamination in the contamination-reduction zone: Wash boots, gloves, and chemical-resistant splash suits (if reusable) with soap and water using a scrub brush; repeat this wash with a second soap bath and brush, followed by a clean-water rinse. After decontamination is complete, remove protective equipment before exiting the contamination-reduction zone. Wash hands after protective gear is removed.

Place soiled disposable protective clothing in plastic bags and seal with tape. Place bags containing waste into on-site waste disposal containers. Transfer waste wash water and rinse water into waste-disposal drums provided by Boeing. When disposing of waste materials, follow the instructions defined in the Hazardous Waste Disposal section (Section 10.0) of this document. All waste drums must be properly labeled to indicate their contents.

Visitors requesting to observe actual site work must be briefed by the Site Health & Safety Officer regarding restricted zones and other safety-related issues. Visitors must remain in the support zone unless they can show that they have hazardous-materials training and can provide their own safety equipment. Keep a record of all visitors and their company affiliations.

A Job Safety Analysis has been performed and is provided in Appendix C.

	Anticipated Hazards															
	Hazards															
		Physical														
TASK	**Chemical**	**Slip / Trip / Fall**	**Heavy Equipment**	**Underground Utilities**	**Overhead Power Lines**	**Noise**	**Heat Stress**	**Cold Stress**	**Sunburn**	**Sharp/abrasion**	**Trench/Excavation**	**Confined Space**	**Traffic**	**Insects and Wildlife**	**Electrical**	**General Safety**
Sediment Sampling	✓	✓				✓	✓	✓	✓	✓			✓			✓
Core Processing	✓	✓	✓			✓	✓			✓			✓		✓	✓

5.0 PERSONAL PROTECTIVE EQUIPMENT

A modified Level D personal protection equipment (PPE) ensemble will be used with the main objective to prevent unnecessary dermal exposure. The Project H&S Officer will be consulted to up- or downgrade the PPE requirements. The following PPE is required for sediment sampling, unless conditions change:

PPE Required	General Site Work and Sediment Sampling
Steel-Toe/Shank Boots (rubber or leather)	X
Hard Hat	X/O
Safety Glasses/Goggles	X
Face Shield (for pressure washing)	O
Hearing Protection	Av
Gloves (nitrile inner/PVC outer):	Av
Outer Only	Av
Inner Only	Av
Splash Suit (rain gear)	Av
Tyvek (or equivalent) Coverall (coated)	Av
High-Visibility Vest	Av
Other (specify)	

Key:
X = PPE Required
O = PPE Optional
Av= Have Available

6.0 CHEMICAL HAZARDS

Material Safety Data Sheets (MSDS) are provided in Appendix D for potentially toxic materials that might be used on project.

Potential chemical hazards are discussed below.

6.1 POTENTIAL CHEMICALS OF CONCERN

Sediments at the study site may be contaminated with a variety of toxic compounds. High levels of polychlorinated biphenyls (PCBs) have been found at nearby sampling locations and low levels of volatile compounds have been found at one nearby sampling location. Although sediments may contain contaminants, concentration levels are expected to be below levels that will produce significant exposures when prescribed personal protective equipment is used. The planned sampling activities should limit potential exposures at this site because sediments to be sampled will be wet. Appropriate protective clothing will be used to further minimize any contact exposures.

Sampling and sample-handling activities may result in exposure to potentially contaminated sediments. Based on available site information, sediment samples are known or suspected to contain the chemicals listed in Table 1A. Chemicals found at a nearby sampling station are listed in Table 1B.

6.2 POTENTIAL CHEMICAL EXPOSURE ROUTES

Possible routes for chemical exposure include skin and eye contact, ingestion, and inhalation. Entry routes and symptoms of contaminants known or suspected to be present at the study site are listed in Table 2A. Entry routes and symptoms for contaminants found at a nearby sampling location are listed in Table 2B.

6.2.1 Skin/Eye Contact

Contamination with some types of chemicals can occur if the contaminant comes in direct contact with skin, eyes, or clothing. Contaminants may directly affect the skin or be absorbed through the skin. Protective clothing, eye protection, and decontamination procedures specified in this plan are designed to minimize the potential for skin and eye contact with contaminants.

6.2.2 Ingestion

Contamination may occur if individuals eat, drink, smoke, or have hand-to-mouth contact while in contaminated areas. Such activities will be restricted to the support zone, and personnel will be decontaminated before entering this area. Smoking is not permitted at the work site.

6.2.3 Inhalation

Vapors from volatile materials can be inhaled and absorbed through the lungs. Low levels of volatile compounds have been found at a single sampling location in the Duwamish River navigation channel. Samples will be processed outside and extra ventilation will be available, if needed, to move stagnant air. The presence of significant amounts of volatile compounds in the air is not expected during core collection or processing.

Because the samples are wet, dusts are not expected to present a significant risk. Mud drippings will be kept damp and cleaned up daily to avoid the generation of any visible dust. Because waste mud and soils will be cleaned daily before they dry, the potential for dust creation is minimal. In the unlikely event that dust becomes an issue, a Dust Exposure Calculation Worksheet is provided in Appendix E.

Because sampling will be performed outdoors or in a well-ventilated environment and only small amounts of contaminated material will be handled, vapors are not expected to present a significant risk.

6.2.4 Air-Monitoring Procedures

During collection of the cores, the sediments will be inside of an unopened core tube; therefore, air quality monitoring is not needed for the on-water coring phase of the project.

The presence of significant amounts of volatile compounds is not expected during sediment sample processing. Sample processing will be performed in well ventilated areas, and only small amounts of sample materials will be handled at any one time. If strong odors are detected, personnel will leave the area until additional ventilation is in place that reduces the vapor levels below noticeable levels. If this is not possible, core processing will be suspended until air quality testing equipment is available.

Based on the maximum site contaminant concentrations, a combined occupational exposure limit to the mixture of soil-borne nonvolatile contaminants would not be reached until personal dust exposures exceeded 1 milligram per cubic meter (mg/m^3), a level that is readily visible in ambient air.

7.0 PHYSICAL HAZARDS

Job Safety Analysis Sheets for these activities on this project are provided in Appendix C.

- The site is a restricted industrial site. Personnel are restricted to authorized areas only. Industrial activities will occur at the site during sampling.
- Follow general safety precautions associated with working in industrial areas. Precautions include watching for moving equipment, overhead hazards, electrical hazards, and loud noises.
- Do not perform sampling activities without prior approval of the Boeing Representative. The Boeing Representative will be informed of the nature and location of each day's activities.
- Use steel-toed boots at all times at the site.
- Wear eye protection during all operations involving sample handling where significant risk of splashing is present.
- Wear ear protection while operating sediment coring equipment and other loud machinery.
- No smoking is permitted aboard vessels, inside buildings, or in sample processing areas.
- The use of matches or lighters is prohibited at all site areas.
- Wear life jackets and hard hats at all times while aboard vessels or on piers or docks.
- Wear hard hats at all times while working under buildings, piers, or dock structures with low overhead clearance.
- When operating a vehicle, observe all posted speed limits and traffic signs.
- Forklifts may be operating inside of buildings. Watch for moving traffic. Make eye contact with operator if are near operating equipment.
- When exiting buildings watch for traffic.

7.1 NOISE HAZARDS

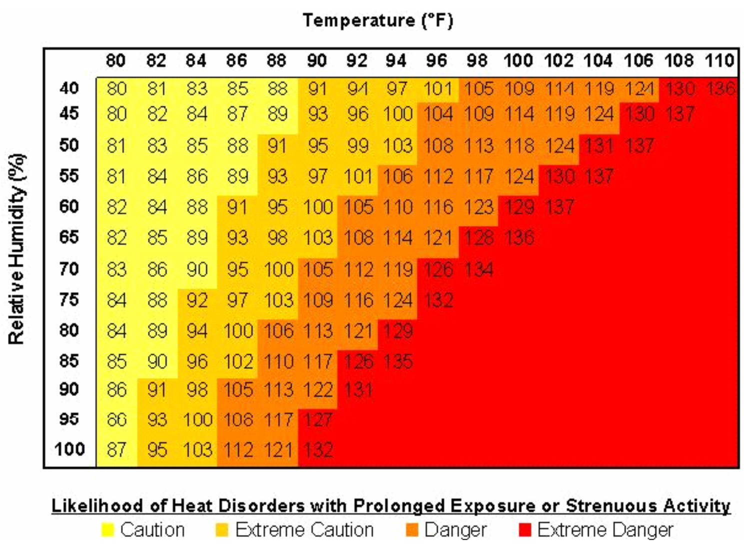
Site personnel will wear hearing protection when working near noisy equipment, such as the MudMole™ sampler, the core tube cutting saw, or in other noisy conditions. Hearing protection will be worn when two people standing within 3 feet of each other cannot communicate at normal conversational voice levels. This is to prevent hearing loss that can occur when daily 8-hour TWA noise exposures meet or exceed 85 decibels adjusted (dBA) (WAC 296-817-20015).

7.2 HEAT STRESS

Heat stress is a moderate hazard during the summer months in the Pacific Northwest, but becomes a significant hazard for workers wearing protective clothing. To avoid heat stress, cool potable water will be readily available, and site personnel will be encouraged to drink plenty of fluids and take periodic work breaks in hot weather. The signs, symptoms, and treatment of heat stress include:

- **Heat rash**, which may result from exposure to heat or humid air.
- **Heat cramps**, which are caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include: muscle spasms and pain in the hands, feet, and abdomen. Persons experiencing these symptoms should rest in a cooler area, drink cool (not cold) liquids, and gently massage cramped muscles.
- **Heat exhaustion**, which occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include: pale, cool, moist skin; heavy sweating; dizziness; nausea; and fainting. Persons experiencing these symptoms should lie down in a cooler area, drink cool liquids with electrolytes (Gatorade, etc.), remove any protective clothing, and cool body with wet compresses at forehead, back and neck, and/or armpits.
- **Heat stroke** is the most serious form of heat stress. Temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occur. Competent medical help must be obtained. Signs and symptoms are: red, hot, usually dry skin; lack of or reduced perspiration; nausea; dizziness and confusion; strong, rapid pulse; and coma.

If site temperatures are forecast to exceed 85 degrees Fahrenheit (°F) and physically demanding site work will occur in impermeable clothing, the Site Health & Safety Officer will promptly consult with a certified industrial hygienist (CIH) and a radial pulse monitoring method will be implemented to ensure that heat stress will be properly managed among the affected workers. The following chart indicates the relative risk of heat stress.


Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution   Extreme Caution   Danger   Extreme Danger

Combined temperature and humidity conditions that result in a heat index exceeding 100 will trigger mandatory radial-pulse monitoring and heat-stress management.

7.3 GRAB SAMPLING (PNEUMATICALLY POWERED GRAB)

Hazards include strains while moving the sampling equipment and pinching extremities in moving parts. When moving the grab sampler use care and observe proper lifting techniques.

On a daily basis, inspect the grab for damage, loose bolts, or cracked welds. Make sure lifting shackles are tight before lifting the grab with the winch.

The winch operator should coordinate movement of lifted loads with the deckhand and not operate the winch until the deckhand is ready and use agreed-upon hand signals in noisy conditions.

When cleaning the grab sampler, the direction control (open or closing) valve should be left in the previous position and the safety valve closed to ensure that the grab cannot be accidentally operated. After making sure that your hands are clear of any moving parts, set the direction control valve then arm the grab by opening the safety valve just prior to deployment of the sampler.

Wear hard hat, heavy chemical-resistant gloves, and eye protection when operating sampler.

Spare air cylinders should be securely stored to avoid tipping or damage to the valves.

7.4 MUDMOLE™ SAMPLING

The MudMole™ uses compressed air to operate a reciprocating pneumatic hammer that drives the sediment core tube into the bottom sediments. Hazards include strains while moving the equipment, noise from the air compressor, hydraulic power pack, and the MudMole™. Care should be used to observe proper lifting techniques when manually moving the MudMole™.

The MudMole™ and air supply hoses should be inspected daily to ensure that they are in good condition.

Air disconnect fittings must be safety pinned before starting the air compressor.

The winch operator should coordinate movement of lifted loads with the deckhand and not operate the winch until the deckhand is ready and use agreed upon hand signals in noisy conditions

Wear hard hat, heavy chemical-resistant gloves, and eye protection when operating sampler. Hearing protection must be worn when the air compressor is running.

8.0 SAMPLE HANDLING

Place samples into containers with snug-fitting lids to prevent leakage of the sample material or preservative. Pack glass containers carefully to reduce the chances of breakage. Clearly label all sample containers. Double-check the sample container lid for tightness before transporting the sample. Pack sediment-sample containers in plastic ice chests for transport.

Wear the prescribed level of protective clothing when handling sample containers. Advise laboratory personnel either by telephone or written statement of the sample hazard level and the potential contaminants the sample may contain.

Samples will be transported by AMEC personnel whenever practical. If transportation by common carrier is necessary, federal regulations relating to the shipment of hazardous materials will be followed. Ask the Site Health & Safety Officer for help in filling out the required paperwork before shipment.

9.0 MEDICAL SURVEILLANCE

All employees and subcontractors must have a medical surveillance physical performed before working at the field site and at least once every other year thereafter, at no cost to the employee. A final medical exam should be performed when employment with the firm ends. The employee has the option to waive the exit medical exam if an annual exam has been performed within the previous 6 months. An additional medical-surveillance physical should be performed as soon as possible following any emergency incident involving chemicals or at any time that signs or symptoms of a chemical overexposure are detected. It is the responsibility of the employee to remind his or her supervisor when it is time to have an annual medical exam.

A record of the physician's report will be provided to the employee, if requested, and a copy of the report will be kept in the employee's personnel record for 30 years from the date of termination of employment.

For the medical-surveillance exam, the physician will do the following:

- Perform an occupational and medical history (baseline) physical examination including the following:
  - Medical history and general physical exam
  - Visual acuity test
  - Audiogram
  - Pulmonary function test
  - Any other tests the physician feels are appropriate
- Provide a written medical report containing the following:
  - The results of the medical examination
  - The examining physician's opinion of the employee's fitness to be exposed to worksite conditions, including any recommended restrictions or limitations.
- Notify patient of any abnormal findings at time of exam.
- Inform the Corporate Health & Safety Manager if there are any medical abnormalities or irregularities.
- Supply patient with copies of exam results, if requested.

WorkCare, Inc., will retain all records of exams.

10.0 HAZARDOUS WASTE DISPOSAL

AMEC and its subcontractors will employ safe and prudent waste-collection and housekeeping practices to minimize the spread of contamination beyond the work zone and the amount of investigation-derived wastes. Although Boeing is ultimately responsible for the final and proper disposal of all investigation-derived wastes, the Project Manager will work with the Boeing Representative to ensure the proper collection, packaging, and identification of waste materials so that Boeing can properly dispose of waste materials.

All hazardous waste materials must be disposed of according to federal and state laws. In the field, place waste chemicals in a leak-proof container, and write the name of the chemical and estimated concentration on the container. Different materials must not be mixed together.

Store waste sediments left over from sample processing and decontamination waste water in waste-disposal drums provided by Boeing. Label each waste-disposal drum with labels provided by the Boeing Representative. Disposal of the stored waste material is the responsibility of Boeing.

To the extent practical, contaminated equipment and soiled disposable protective clothing will be placed in plastic bags, sealed with tape, and placed in designated hazardous waste receptacles. Used core tubes will be plastic wrapped and placed in a hazardous waste dumpster provided by the client.

Equipment that cannot be disposed of will be decontaminated using light oil (WD-40 or kerosene). The decontamination process will be performed over a waterproof tarp, and oil drippings will be captured in pans and then placed in waste drums. A 20:B/C fire extinguisher will be kept nearby while performing decontamination using petroleum products.

If excess sediment is collected, it will be placed into waste disposal drums provided by Boeing. Drum lids are to be securely fastened in place at the end of each day.

Document all material placed into the drums. Record the sampling station number, type, and quantity of each waste material on the barrel label.

11.0 EMERGENCY RESPONSE PLAN

Immediately notify the Project Manager, Project Health & Safety Officer, and the Boeing Representative of any emergency or injury. WorkCare should be contacted within 1 hour of an injury. An emergency situation is defined as any chemical loss, discovery of physical injury, explosion, fire, spill, toxic atmosphere, earthquake, or similar dangerous or harmful situation.

Any person discovering an emergency shall immediately alert others by voice, if practical. Evacuation routes will be discussed during the orientation or daily toolbox safety meetings. Shore based sampling crews will be equipped with a cellular telephone for use in case of emergency. A summary of emergency contacts is provided in Appendix F.

Employees not engaged in correcting or mitigating the emergency must leave the area. Employees will reassemble at a prearranged assembly point, and the Site Health & Safety Officer will account for all personnel.

11.1 EMERGENCY EQUIPMENT

The following minimum emergency equipment will be readily available on site and functional at all times:

- First Aid Kit, contents approved by the Site Health & Safety Officer;
- Absorbent material sufficient to contain the volume of the largest single container of hazardous materials (e.g., gas and diesel) brought on site;
- Portable fire extinguisher(s) (4:A, 20:B/C min or equivalent) (e.g., in truck or drill rig cab);
- Two spare sets of PPE suitable for entering the emergency zone; and
- A copy of the current site-specific health and safety plan.

11.2 ASSEMBLY POINT

An assembly point of refuge will be identified by the Site Health & Safety Officer and communicated to the field team each day. This point will be clear of adjacent hazards and preferably upwind or cross-wind for the entire day. In an emergency, all site personnel and visitors will evacuate to the muster point for roll call versus the daily site log. It is important that each person on site understand their role in an emergency, and that they remain calm and act efficiently to ensure everyone’s safety.

Reasonably foreseeable emergency situations include: Medical emergencies, accidental release of hazardous materials (such as gasoline or diesel) or hazardous waste, and general emergencies such as fire, thunderstorm, flooding, and earthquake. Expected actions for each potential incident are outlined below.

11.3 MEDICAL EMERGENCIES

In the event of a medical emergency, the following procedures should be used.

1. Stop any imminent hazard if you can safely do so.
2. Remove ill, injured, or exposed person(s) from immediate danger if moving them will clearly not cause them harm, and no hazards exist to the rescuers.
3. Evacuate other on-site personnel to a safe place in an upwind or cross-wind direction until it is safe for work to resume.
4. If serious injury or life-threatening condition exists, call:

   Boeing emergency number ([206] 655-2222) immediately.

   Clearly describe the location, injury, and conditions to the dispatcher. Designate a person to go to the site entrance and direct emergency equipment to the injured person(s). Provide the responders with a copy of this H&S Plan, to alert them to chemicals of potential concern.
5. Trained personnel may provide first aid/cardiopulmonary resuscitation if it is necessary and safe to do so. Remove contaminated clothing and PPE only if this can be done without endangering the injured person.
6. Call the Project Health & Safety Officer or the Project Manager.
7. For serious accidents involving a fatality, life threatening injuries, or multiple persons being injured, the accident scene should be persevered for investigators. Equipment involved in the accident should only be moved to the extent necessary to conduct rescue operations and to prevent further injuries.
8. Immediately implement steps to prevent recurrence of the accident.

A map (Figure 2) showing the nearest hospital location is attached to this H&S Plan.

Harborview Medical Center

325 Ninth Avenue

Seattle, Washington 98104

(206) 744-3000

Telephone number of nearest **Poison Control Center: (800) 222-1222.**

11.4 GENERAL EMERGENCIES

In the case of fire, rapid flooding, explosion, earthquake, or other imminent hazard, work shall be halted and the **Boeing Emergency Dispatch will be contacted at (206) 655-2222** when using a Boeing land line. The Boeing Fire Department is the primary emergency response at the site and will call in additional resources as needed. All on-site personnel will be immediately evacuated to a safe place.

The local police/fire department shall be notified if the emergency poses a continuing hazard by calling 911. In the event of a thunderstorm, outdoor work will be discontinued until the threat of lightning has abated. During the incipient phase of a fire, the available fire extinguisher(s) may be used by persons trained in putting out fires, if it is safe for them to do so. In summary, remember the following in an emergency:

- **For all life-threatening emergencies at the site, call (206) 655-2222.**
- **Do not move a victim unless absolutely necessary.**
- **Provide first aid as necessary until paramedics arrive.**
- **Do not move any equipment involved in the accident unless it is necessary to facilitate rescue. This will help investigators to determine the cause of the accident.**
- **Any accident or injury must be reported to the Boeing Representative and the Project Health & Safety Officer as soon as possible.**
- **You must report the death, or probable death, of any employee, or the in-patient hospitalization of two or more employees within 8 hours to the Washington Department of Labor and Industries at 1-800-423-7233.**

12.0 RECORD KEEPING

Documentation of hazardous materials, CPR and first-aid training, medical surveillance, daily health and safety reports, and safety meetings will be kept at the AMEC Seattle office and will be available for inspection at any time. All records are to be kept for 30 years.

Internal health and safety audits to verify implementation of the H&S Plan may be performed at any time and without prior notice during site investigations. Corrective action will be determined and follow-up audits will be performed if violations of the H&S are identified.

13.0 RECORD OF REQUIRED HEALTH AND SAFETY COMMUNICATION

The people listed below were given a copy of the H&S Plan for Boeing Isaacson-Thompson Site Field Surveys and Sediment Sampling. By signing below, they indicate that they have read the plan, including the attached appendices, and that they understand the requirements detailed for work practices on this project.

Name	Signature	Date

TABLES

amec

TABLE 1A

POTENTIAL CONTAMINANTS IN SITE SEDIMENTS
Boeing Isaacson-Thompson Site
Tukwila, Washington

	Maximum Detected Value	PEL in mg/m[1]	TLV in mg/m[1]	STEL in mg/m[1]	IDLH in mg/m[1]
Metals[2] (mg/kg)					
Silver	5.7	0.01	0.01		10
Cadmium	12.4	0.005	0.005		50
Chromium	340	1.0	1.0		250
Mercury	4.6	0.01	0.01	0.03	10
Copper	297	1	1		100
Lead	5,590	0.05	0.05		100
Zinc	1,740	5	5		500
LPAHs[3] (µg/kg)		**0.2**			**80**
Acenaphthene	760	NE	NE	NE	NE
Phenanthrene	1,400	0.2	0.2	NE	NE
HPAHs[3] (µg/kg)		**0.2**			**80**
Fluoranthene	5,300	0.2	0.2		80
Pyrene	830	0.2	0.2		80
Benzo(a)anthracene	2,200	0.2	0.2		80
Chrysene	2,800	0.2	0.2		80
Phthalates (µg/kg)					
Butyl benzyl phthalate	7,100	0.5[4]	NE	NE	NE
Bis(2-ethylhexyl) phthalate	8,600	5	5	10	NE
PCBs[1]	**51,000**	**0.5**	**0.5**		**5**

Note(s)

1. Identified as possible carcinogen; exposure limit based on PCB compound with 54% chlorine (Aroclor® 1254).
2. Exposure limits based on lowest reported value for metallic form as dust or metallic compound.
3. Identified as possible carcinogen; exposure limit based on the closely related coal-tar volatiles.
4. Occupational exposure limit from literature (Aldyreva, M.V., et al., 1974, Gig Tr Sostoyanie Spetsificheskikh Funkts Rab Neftekhim Khim Prom-Sti: 154-9).

Abbreviation(s)

HPAHs = high-molecular-weight polycyclic aromatic hydrocarbons
IDLH = immediately dangerous to life and health
LPAHs = low-molecular-weight polycyclic aromatic hydrocarbons
mg/kg = milligrams per kilogram
mg/m = milligrams per meter
NE = not established
PCBs = polychlorinated biphenyls
PEL = permissible exposure limit
STEL = short-term exposure limit
TLV = threshold limit value
µg/kg = micrograms per kilogram

TABLE 1B

POTENTIAL CONTAMINANTS IN NEARBY SEDIMENTS

Boeing Isaacson-Thompson Site
Tukwila, Washington

	Maximum Detected Value in Sediment in mg/kg	TWA in mg/m^3	STEL in mg/m^3	IDLH in mg/m^3
Volatiles				
Cis-1,2-Dichlorethene[1]	200	790	NE	16,120
Toluene	8.3	375	560	7,660
Xylene	5.3	435	655	4,410
Vinyl chloride[2]	60	1	5	Carcinogen

Note(s)

1. Values based on 1,2-Dicholoethylene. Exposure limits based on lowest reported value for metallic form as dust or metallic compound.
2. Identified as possible carcinogen.

Abbreviation(s)

IDLH = immediately dangerous to life and health
mg/kg = milligrams per kilogram
mg/m^3 = milligrams per cubic meter
NE = not established
STEL = short-term-exposure limit
TWA = time-weighted average

TABLE 2A

ENTRY ROUTES AND SYMPTOMS OF CONTAMINANTS THAT MAY BE PRESENT AT THE STUDY SITE

Boeing Isaacson-Thompson Site
Tukwila, Washington

	Entry Routes	Common Symptoms[1]	Target Organs
Metals			
Cadmium	Inhalation, ingestion	Cough, chest tightness, chills, muscular aches	Respiratory systems, kidneys, prostrate
Chromium Silver	Inhalation, ingestion, skin or eye contact	Sensitization dermatitis	Respiratory system, skin
Silver	Inhalation, ingestion, skin or eye contact	Blue-gray eyes, throat irritation, gastrointestinal distress	Nasal septum, skin, eyes, gastrointestinal tract
Mercury	Inhalation, ingestion, skin or eye contact, skin absorption	Cough; chest pains; irritability; indecision; spastic, jerky movements; visual disturbance	Skin, respiratory, system, CNS, kidneys, eyes
Copper	Inhalation, ingestion, skin or eye contact	Cough, chest tightness, itching, dermatitis, fever, chills, upper respiratory symptoms	Respiratory, system, CNS, liver, kidneys
Lead	Inhalation, ingestion, skin or eye contact	Weakness, lassitude, insomnia, facial pallor, constipation, anemia, eye irritation, paralysis of wrists or ankles	Gastrointestinal tract, CNS, kidneys, blood, gums
Zinc	Inhalation, ingestion	Metallic taste, dry throat, cough, low-back pain, vomiting	Respiratory system
LPAHs	Inhalation, ingestion, skin or eye contact	Skin irritation, nausea, vomiting, diarrhea, convulsions	Skin, CNS, kidneys, liver
Acenaphthene	ND	ND	ND
Phenanthrene	ND	ND	ND
HPAHs	Inhalation, ingestion, skin or eye contact	Skin irritation, nausea, vomiting, diarrhea, convulsions	Skin, CNS, kidneys, liver
Fluoranthene	ND	ND	ND
Pyrene	ND	ND	ND
Benzo(a)anthracene	ND	ND	ND
Chrysene	ND	ND	ND

TABLE 2A

ENTRY ROUTES AND SYMPTOMS OF CONTAMINANTS THAT MAY BE PRESENT AT THE STUDY SITE
Boeing Isaacson-Thompson Site
Tukwila, Washington

	Entry Routes	Common Symptoms[1]	Target Organs
Phthalates			
Butyl benzyl phthalate	ND	ND	ND
Bis(2-ethylhexyl) phthalate	ND	ND	ND
PCBs	Skin or eye contact	Skin irritation, nausea, vomiting	Skin, liver

Note(s)

1. Symptoms are those most useful in recognizing field exposure to a contaminant. Other less-obvious symptoms may occur.

Abbreviation(s)

CNS = central nervous system
HPAHs = high-molecular-weight polycyclic aromatic hydrocarbons
IDLH = immediately dangerous to life and health
LPAHs = low-molecular-weight polycyclic aromatic hydrocarbons
ND = no data were available

TABLE 2B

ENTRY ROUTES AND SYMPTOMS OF CONTAMINANTS FOUND IN NEARBY SEDIMENTS

Boeing Isaacson-Thompson Site
Tukwila, Washington

	Entry Routes	Common Symptoms[1]	Target Organs
Volatiles			
Cis-1,2-Dicholorethene	Inhalation, ingestion, skin or eye contact	Eye and skin irritation, CNS depression[2]	Respiratory system, eyes, CNS
Toluene	Inhalation, skin absorption, ingestion, skin or eye contact	Fatigue, weakness, confusion, euphoria, dizziness, headache, dilated pupils, muscle fatigue, itching or tingling, insomnia	CNS, liver, kidneys, skin
Vinyl chloride	Inhalation	Weakness, abdominal pain, gastrointestinal bleeding, hepatomegaly, pallor or cyan of extremities, carcinogen	Liver, CNS, blood, respiratory system, lymphatic system
Xylene	Inhalation, skin absorption, ingestion, skin or eye contact	Dizziness, excitement, drowsiness, incoherent staggering gait; irritated eyes, nose, and throat; corneal vacuolization; nausea, vomiting, abdominal pain; dermatitis	CNS, eyes, GI tract, blood, liver, kidneys, skin

Note(s)

1. Symptoms are those most useful in recognizing field exposure to a contaminant. Other less-obvious symptoms may occur.
2. Symptoms based on 1,2-Dicholoethylene.

Abbreviation(s)

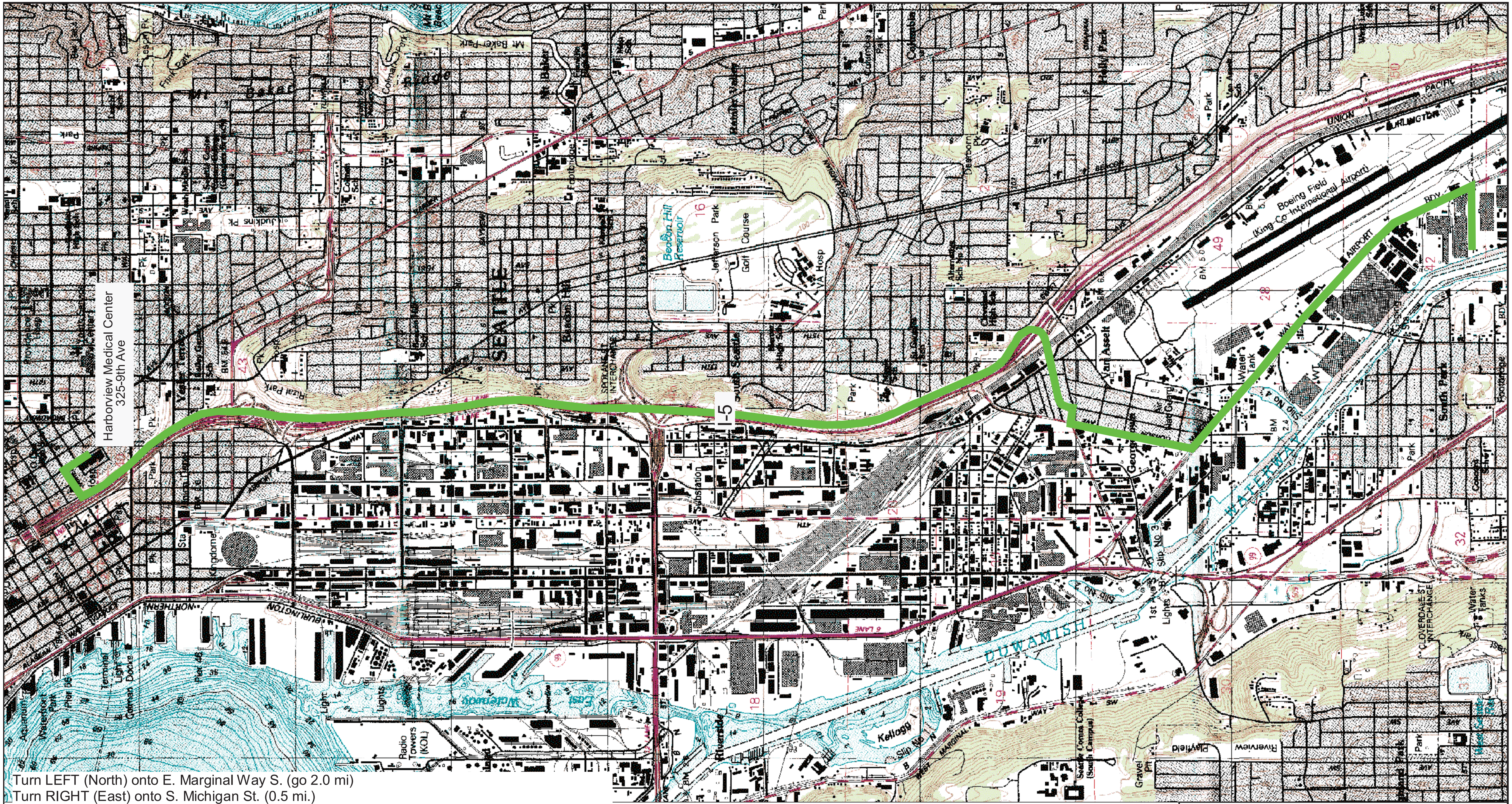
CNS = central nervous system
GI = gastrointestinal

FIGURES

BOEING ISAACSON-THOMPSON SITE
Sediment Investigation Sample and Analysis Plan
Tukwila, Washington

By: rhg	Date: 4/28/2011	Project No. LY11160060
AMEC Geomatrix		Figure 1

File path: P:\Boeing IT\LY11160060 Isaacson-Thompson 2011\Data\SAP\Figure 1.mxd



Turn LEFT (North) onto E. Marginal Way S. (go 2.0 mi)
Turn RIGHT (East) onto S. Michigan St. (0.5 mi.)
Road name changes to S. Baily St. (109 yds)
Turn LEFT (North) onto the I-5 ramp, keep left (0.2 mi.)
Take the left fork to I-5 N/Vancouver BC and merge onto I-5 N (2.9 mi.)
Take the Dearborn St/James St. Exit # 164A to Madison St, keep Right (1.0 mi)
Take the James Street exit
Turn RIGHT (East) at James Street (0.1 mi.)
Turn RIGHT (South) onto 9th Avenue (0.2mi)
Arrive at Harborview Medical Center, 325 – 9th Ave., Seattle WA

FOR SERIOUS INJURIES CALL:
Boeing Emergency (206) 655-2222

BOEING

ROUTE TO HARBORVIEW MEDICAL CENTER

Boeing Isaacson-Thompson Site
Tukwilla, WA

By: GSM	Date: 5-13-2011	Project No. LY11160060
AMEC Geomatrix		Figure 2

Plot Date: 05/13/11 - 4:40pm, Plotted by: gary.maxwell
Drawing Path: P:\Boeing IT\LY11160060 Isaacson-Thompson 2011\CAD\Hospital Map (CAD), Drawing Name: Hospital Route.dwg

APPENDIX A

WAC 296-843 Regulations for Hazardous-Waste Operations

Chapter 296-843 WAC
Hazardous waste operations

Last Update: 2/17/09

WAC Sections

296-843-100
Scope.

This chapter applies if you have any of the following:

 Employees working in operations involving hazardous waste at a treatment, storage, and disposal (TSD) facility required to have a permit or interim status AND regulated by any of the following:

 40 CFR Parts 264 and 265 under the Resource Conservation and Recovery Act of 1976 (RCRA), 42 U.S.C. 6901 et seq.;

 Agencies implementing RCRA through agreements with the United States Environmental Protection Agency (U.S.E.P.A.);

 Chapter 173-303 WAC, Dangerous waste regulations;

OR

 Employees conducting initial investigations of government-identified sites before determining whether hazardous substances are present;

OR

 Corrective actions, involving clean-up operations, at sites covered by the Resource Conservation and Recovery Act of 1976 (RCRA) as amended (42 U.S.C. 6901 et seq.) or chapter 70.105 RCW, Hazardous waste management;

OR

 Employees performing clean-up operations at an uncontrolled hazardous waste site. Sites include, but are not limited to:

 The Environmental Protection Agency's (EPA) National Priority Site List (NPL); see http://www.epa.gov/superfund/sites/npl/wa.htm;

 Sites recommended for inclusion on the EPA NPL;

 State priority site lists, for example those listed under chapter 173-340 WAC, Model Toxics Control Act (MTCA); see http://www.ecy.wa.gov/programs/tcp/cscs/CSCSpage.HTM;

 Unlisted sites recognized by a federal, state or local government as an uncontrolled hazardous waste site. Examples of such sites include:

▪ Sites that do not meet clean-up goals established by the MTCA and that pose a threat or potential threat to human health or the environment;

▪ Clandestine drug lab sites designated for cleanup;

 Postemergency response cleanup at the site of a hazardous substance release regulated by chapter 296-824 WAC, Emergency response.

IMPORTANT:

This chapter applies to hazardous waste sites until cleanup at the site is determined to be complete by the governing regulatory agency.

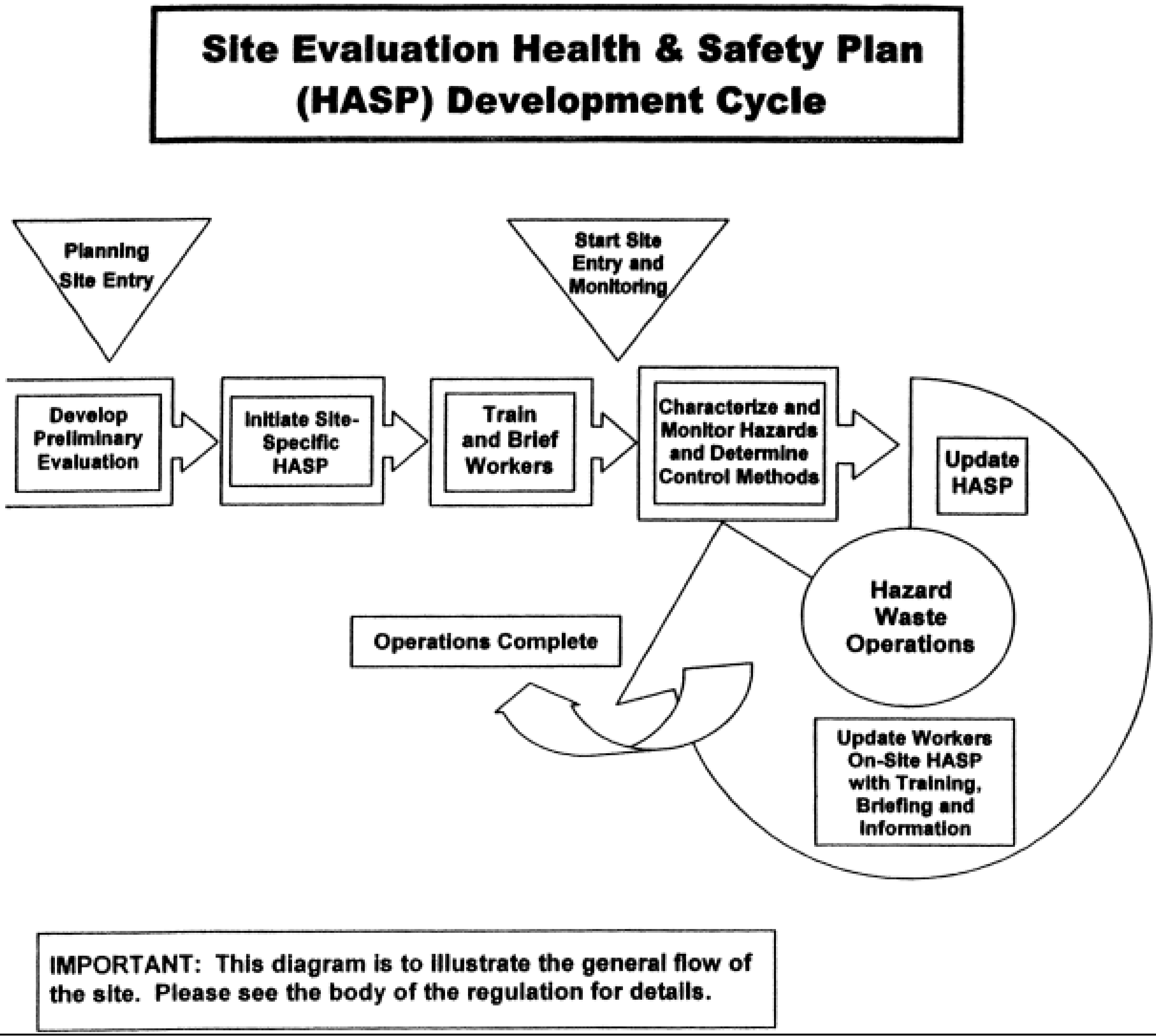


Illustration 1

Other rules that may apply to hazardous waste operations:

You will find safety and health requirements (for example, personal protective equipment) are addressed in other rules and also in this chapter. If you find a conflict in requirements, you need to meet the more protective requirement. Contact your local L&I office if you need assistance in making this determination.

Examples of other rules that may apply:

- Chapter 296-800 WAC, Safety and health core rules:

- WAC 296-800-140, Accident prevention program;

- WAC 296-800-210, Lighting;

- WAC 296-800-230, Drinking water, bathrooms, washing facilities and waste disposal.

- Chapter 296-24 WAC, Safety standards for general safety.

- Chapter 296-833 WAC, Temporary housing for workers.

- Chapter 296-62 WAC, General occupational health.
- Chapter 296-155 WAC, Safety standards for construction work.
- Chapter 296-824 WAC, Emergency response.
- Chapter 296-841 WAC, Respiratory hazards.
- Chapter 296-842 WAC, Respirators.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-100, filed 1/5/04, effective 5/1/04.]

296-843-110
Evaluations and inspections.

Your responsibility:

To conduct evaluations before entering the site and periodically throughout the hazardous waste operations.

You must:

Complete a preliminary site evaluation before allowing employees to enter the site

WAC 296-843-11005.

Conduct ongoing evaluations of safety and health hazards

WAC 296-843-11010.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-110, filed 1/5/04, effective 5/1/04.]

296-843-11005
Complete a preliminary site evaluation before allowing employees to enter the site.

You must:

- Complete a preliminary site evaluation by doing all the following:

Collect or develop the following information to the extent available:	- The site location and approximate size - A description of the response activity and the job tasks to be performed - The time needed to cover all planned activities

	□	The site's topography and all ways to access the site
	□	The current status and capabilities of any emergency response team assisting during an emergency
	□	The safety and health hazards expected at the site
	□	The hazardous substances and health hazards at the site, including their chemical and physical properties
	□	All hazardous substance dispersion pathways
	□	An emergency response plan
Have a qualified person evaluate the preliminary site information to identify:	□	Potential site hazards and risks
	□	The most appropriate methods to protect employees
	□	Conditions that have the potential to cause death or serious harm, including potential inhalation or skin absorption hazards that are immediately dangerous to life or health (IDLH)
		□ Examples include:
		▪ Confined space entry
		▪ Potentially explosive or flammable environments
		▪ Visible vapor clouds
		▪ Areas where plants or animals have died
	□	Risks related to specific on-site hazardous substances and health hazards
		□ Examples include:
		▪ Exposures exceeding the permissible exposure limits (PELs) or published exposure levels
		▪ IDLH concentrations
		▪ Potential skin absorption and irritation sources
		▪ Potential eye irritation sources
		▪ Explosion sensitivity and flammability ranges
		▪ Oxygen deficient atmospheres
Have a qualified person prepare an initial site characterization and analysis for the site to:	□	Identify known and suspected health and safety hazards for the site
	□	Aid in selecting control methods to protect employees from site hazards

	□	Brief employees on site conditions before any work starts
	□	Initiate the site-specific health and safety plan (HASP)

Note: Characterization and analysis of site hazards is an ongoing process for work on the hazardous waste site.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-11005, filed 1/5/04, effective 5/1/04.]

296-843-11010
Conduct ongoing evaluations of safety and health hazards.

You must:

(1) Have a qualified person complete further evaluation of health and safety hazards at the site immediately after initial entry to:

□ Identify site hazards in more detail.

□ Help select appropriate:

□ Control methods to protect employees from site hazards.

□ Personal protective equipment (PPE) for site operations.

Note: For more information, see WAC 296-843-170, Hazard controls, and WAC 296-843-190, Personal protective equipment.

You must:

(2) Make sure your site safety and health supervisor or another qualified person performs periodic inspections to:

□ Determine if the site-specific HASP is effective.

□ Correct any deficiencies.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-11010, filed 1/5/04, effective 5/1/04.]

296-843-120
Health and safety plan (HASP).

Your responsibility:

To establish a written health and safety plan (HASP).

You must:

Develop and maintain a written site-specific health and safety plan (HASP)

WAC 296-843-12005.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-120, filed 1/5/04, effective 5/1/04.]

296-843-12005
Develop and maintain a written site-specific health and safety plan (HASP).

Reference: If your overall program required under WAC 296-800-140, Accident prevention program (APP), meets requirements of this chapter, you do not need to duplicate those portions of your APP in the site-specific health and safety plan (HASP).

You must:

 Develop a written HASP for each hazardous waste site, **BEFORE** beginning hazardous waste operations, that includes at least the following:

Hazard analysis:

 Identification and evaluation of on-site safety and health hazards.

 A safety and health risk (hazard) analysis for each site task and operation that is identified in the comprehensive work plan.

Organization chart:

 An organizational structure that reflects current site operations, including the following:

▪ Establish and identify the chain of command.

▪ Identify the site safety and health supervisor and other personnel responsible for employee safety and health.

▪ Specify the overall responsibilities of supervisors and employees.

▪ Include the name and title of the person with responsibility and authority to direct all hazardous waste operations.

▪ Include a site safety and health supervisor responsible for developing and implementing the HASP and verifying compliance.

▪ Identify the functions and responsibilities of all personnel needed for hazardous waste operations and emergency response.

▪ Identify site specific lines of authority, responsibility, and communication.

Comprehensive work plan:

 A written comprehensive work plan of tasks, objectives, logistics, and resources for site operations, including the following:

▪ Addresses anticipated clean-up activities and normal operating procedures unless that information is already available in another document.

▪ Defines work tasks and objectives.

▪ Describes how the work tasks and objectives will be accomplished.

▪ Establishes the personnel requirements to implement the work plan.

▪ Provides for implementation of training, briefings, and information as required by WAC 296-843-200.

Site control plan:

□ An up-to-date site control plan before clean-up operations begin to minimize employee exposure to hazardous substances and including the following (unless it's available in another document):

▪ A site map.

▪ Establish site work zones.

▪ How the "buddy system" is used.

▪ The site communications plan, including how employees are alerted during emergencies.

▪ The site's standard operating procedures (SOPs) or safe work practices.

▪ Identification of the nearest medical assistance.

Personal protective equipment:

□ A PPE plan that addresses all of the following:

▪ Site hazards and activities.

▪ Methods to evaluate the effectiveness of the PPE plan.

▪ Criteria for selecting and fitting PPE, including work duration, use limitations of particular PPE, and medical considerations such as temperature extremes and heat stress.

▪ Training on PPE use.

▪ Procedures for putting on and taking off PPE.

▪ PPE inspection procedures prior to, during, and after use.

▪ Decontamination and disposal of PPE.

▪ Maintenance and storage of PPE.

Additional elements:

□ A sampling and monitoring plan (see WAC 296-843-130) that includes sampling of drums and containers.

□ Site control measures (see WAC 296-843-140).

□ Decontamination procedures (see WAC 296-843-150).

□ Spill containment plans (see WAC 296-843-180, Drum and container handling).

□ Standard operating procedures for sampling, managing, and handling drums and containers (see WAC 296-843-180).

□ Entry procedures for tanks or vaults (see chapter 296-809 WAC, Confined spaces).

□ A training, briefings, and information plan (see WAC 296-843-200).

□ A medical surveillance plan (see WAC 296-843-210), that includes site-specific medical surveillance requirements.

- Sanitation (see WAC 296-155-140).
- Lighting (see WAC 296-800-210).
- Excavations (see chapter 296-155 WAC, Part N, Excavation, trenching and shoring).
- Any relationship or interaction between other programs and the site-specific program.

Note: The emergency response plan required by WAC 296-843-160, Emergency response for hazardous waste sites, is also included as a separate section in the HASP.

You must:

- Keep a copy of your HASP on site.

Reference: For more information, see WAC 296-843-220, Recordkeeping and information access.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, 49.17.060. 07-03-163, § 296-843-12005, filed 1/24/07, effective 4/1/07; 04-02-053, § 296-843-12005, filed 1/5/04, effective 5/1/04.]

296-843-130
Sampling and monitoring.

Your responsibility:

To conduct monitoring for health and safety hazards to protect employees.

You must:

Conduct monitoring for health and safety hazards during initial site entry

WAC 296-843-13005.

Evaluate employee exposure to hazardous substances during clean-up operations

WAC 296-843-13010.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-130, filed 1/5/04, effective 5/1/04.]

296-843-13005
Conduct monitoring for health and safety hazards during initial site entry.

You must:

 Make visual observations of the site to detect signs of actual or potential immediately dangerous to life or health (IDLH) or other dangerous conditions.

 Conduct representative air monitoring with direct reading test equipment, when the preliminary site evaluation does not eliminate the potential for ionizing radiation or IDLH conditions.

 Assess the following:

 Potential IDLH conditions.

 Exposure over radioactive material dose limits.

 Potential exposure over permissible exposure limits (PELs) or other published exposure levels.

 Other dangerous conditions, such as the presence of flammable or oxygen-deficient atmospheres.

Reference: See WAC 296-62-09004, Ionizing radiation, for additional information about radioactive material dose limits.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-13005, filed 1/5/04, effective 5/1/04.]

296-843-13010
Evaluate employee exposure to hazardous substances during clean-up operations.

IMPORTANT:

The clean-up operation begins when soil, surface water, or containers are moved or disturbed.

You must:

 Identify the type of personnel monitoring and environmental sampling you plan to use, including instrumentation.

 Include requirements for maintaining and calibrating the monitoring and sampling instruments used.

 Monitor whenever employees may be exposed to concentrations exceeding PELs or other published exposure levels.

 Evaluate employees who are likely to have the highest exposure:

 Monitor all employees who are likely to have the highest exposure to hazardous substances or health hazards above the PEL or published exposure limit.

 Use personal sampling frequently enough to characterize the exposures of these employees.

▪ When results indicate exposure is over the PEL or other published exposure level, identify all employees likely to be above the PEL or published exposure limit.

Note: You may use a representative sampling approach by documenting that the employees and chemicals chosen for monitoring are representative of both:

 Employee exposure to hazardous substances;

AND

 Employees not sampled.

You must:

 Conduct monitoring when the possibility of one of the following exists:

 An atmosphere that is immediately dangerous to life or health (IDLH);

OR

 A flammable atmosphere;

OR

 Employee exposures exceeding PELs or other published exposure levels.

Examples of situations where these possibilities may exist:

▪ Work begins on a different portion of the site.

▪ Contaminants other than those previously monitored are being handled.

▪ A different type of site operation starts, such as moving from drum opening to exploratory well drilling.

▪ Handling leaking drums or containers.

▪ Working in areas with obvious liquid contamination such as a spill or lagoon.

▪ Time has passed and employee exposure levels may have significantly increased.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-13010, filed 1/5/04, effective 5/1/04.]

296-843-140
Site control.

Your responsibility:

To establish a plan to control access to the site.

You must:

Establish a site control plan

WAC 296-843-14005.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-140, filed 1/5/04, effective 5/1/04.]

296-843-14005
Establish site control.

You must:

 Maintain site work zones and site control as required by Table 1, Site Work Zone Requirements.

- Control access to the exclusion and contamination reduction zones.
- Make sure people wear personal protective equipment (PPE) appropriate to their work zone.

Table 1

Site Work Zone Requirements

For this type of work zone:	**You must:**
Exclusion zone	- Establish entry and exit checkpoints on the zone's boundary
	- Regulate the flow of people and equipment into and out of the zone
	- Make sure exits go through a contamination reduction corridor
Contamination reduction zone with a contamination reduction corridor	- Enter through a control point from the clean zone - Provide a transition or buffer between the exclusion zone and the clean zone
	- Perform all decontamination procedures
	- Establish separate decontamination routes for people and equipment, if practical
	- Remove all PPE worn in the contamination reduction or exclusion zones before entering the clean zone
Clean zone or support zone	Have no employee exposure to hazardous substances or health hazards

Note: See Illustration 2 for an example of site work zones.

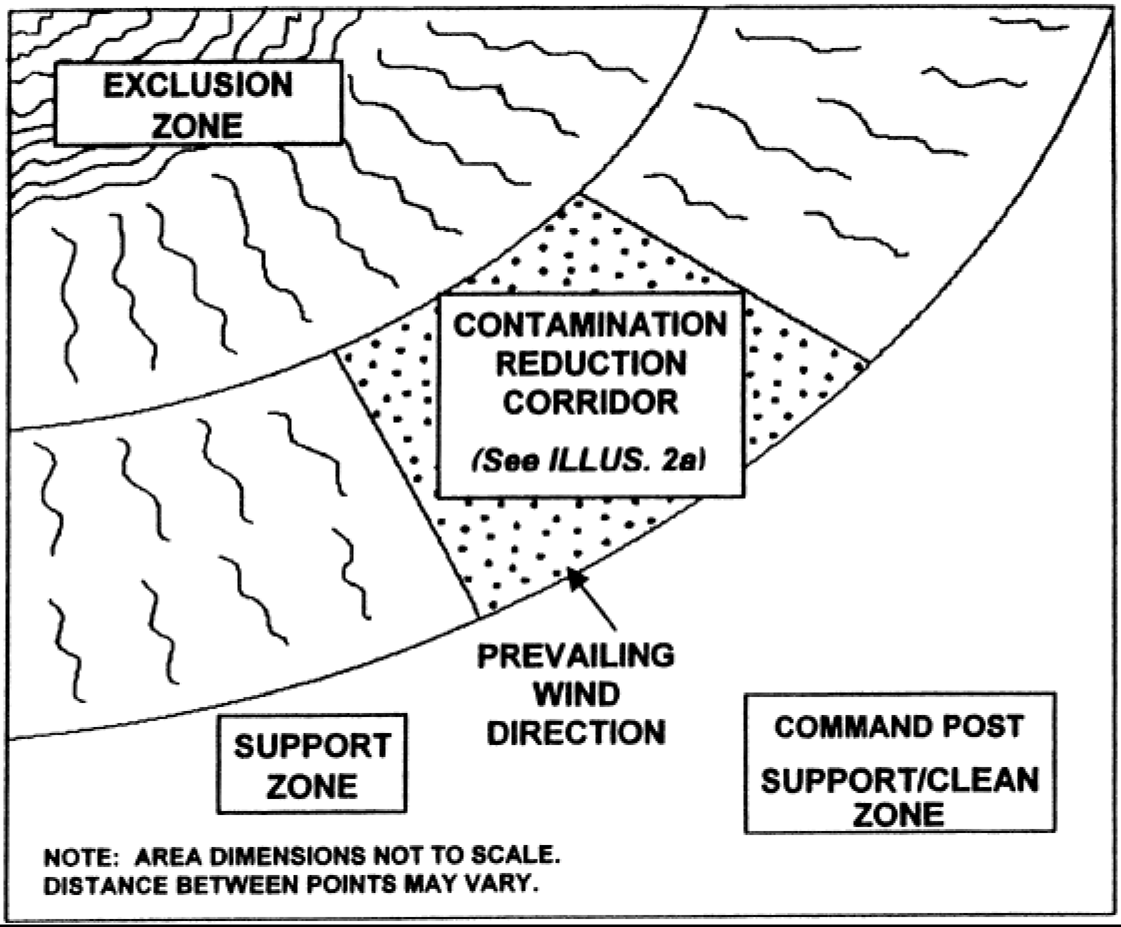


Illustration 2 - SITE

WORK ZONES

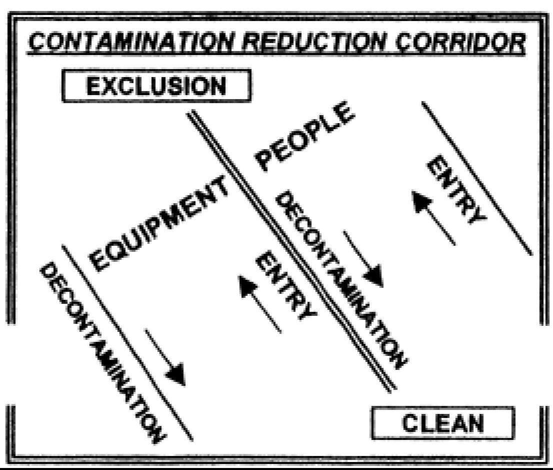


Illustration 2a -

CONTAMINATION

REDUCTION CORRIDOR

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-14005, filed 1/5/04, effective 5/1/04.]

296-843-150
Worker and equipment decontamination.

Your responsibility:

To make sure the necessary facilities and equipment for effective decontamination are available and used.

You must:

Establish and implement decontamination procedures before any worker or equipment enters a contaminated area

WAC 296-843-15005.

Provide showers and changing rooms

WAC 296-843-15010.

Provide washing facilities

WAC 296-843-15015.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-150, filed 1/5/04, effective 5/1/04.]

296-843-15005
Establish and implement decontamination procedures before any worker or equipment enters a contaminated area.

You must:

 Establish, implement, and communicate decontamination procedures to all workers, to include the following:

 Standard operating procedures to minimize worker contact with:

▪ Hazardous substances.

▪ Contaminated equipment.

 Decontaminating all:

▪ Workers leaving a contaminated area.

▪ Equipment leaving a contaminated area.

 Decontaminating, cleaning, laundering, repairing, or replacing protective clothing or equipment (PPE) as needed to maintain effectiveness.

- Immediate removal of clothing, such as cotton coveralls, wet with hazardous substances and use of the nearest shower.

▪ Decontaminate or dispose of clothing before removal from the work zone.

- Periodically monitoring procedures for effectiveness by the site safety and health supervisor.

- Correct your procedures when found ineffective.

- Establish decontamination areas to minimize contact of contaminated employees and equipment with uncontaminated employees or equipment.

- Make sure only authorized employees remove protective clothing or equipment from changing rooms.

- Inform commercial laundries or cleaning establishments about the potentially harmful effects from exposure to hazardous substances.

- Properly decontaminate or dispose of decontamination equipment and solvents.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-15005, filed 1/5/04, effective 5/1/04.]

296-843-15010
Provide showers and changing rooms.

You must:

- Provide changing areas and showers outside a contaminated area, when needed for worker decontamination, that include at least the following:

- Separate changing areas:

▪ One to provide a clean area where employees can remove, store, and put on street clothing with an exit leading off the work site.

▪ Another where employees can put on, remove, store, and dispose of work clothing and PPE with an exit leading to the work site.

- A shower area separating the changing areas.

- Prevent clean areas from being contaminated by hazardous substances.

- Provide and use other effective means for worker cleansing, if temperature conditions prevent the effective use of water.

- Locate showers and change rooms where worker exposures are below permissible exposure limits (PELs) or other published exposure levels.

- If this cannot be accomplished, use a ventilation system to supply air that is below the PELs or published exposure levels.

- Make sure all workers shower at the end of their work shift or before they leave the site, when needed for worker decontamination.

Illustration 3 is a sample diagram of a change room layout.

Change Room Layout

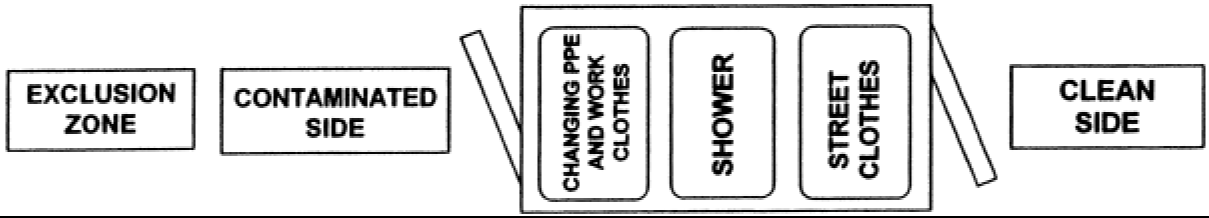


Illustration 3

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-15010, filed 1/5/04, effective 5/1/04.]

296-843-15015
Provide washing facilities.

You must:

- Provide adequate washing facilities to employees working in hazardous waste operations that are:
- Close and convenient to the work area.
- Located in areas where employee exposure is below PELs or other published exposure levels.
- Equipped so an employee can remove hazardous substances from themselves without assistance.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-15015, filed 1/5/04, effective 5/1/04.]

296-843-160
Emergency response for hazardous waste sites.

Your responsibility:

To establish an emergency response plan for emergencies at the hazardous waste site.

You must:

Establish an emergency response plan for anticipated emergencies before beginning hazardous waste operations WAC 296-843-16005.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-160, filed 1/5/04, effective 5/1/04.]

296-843-16005
Establish an emergency response plan for anticipated emergencies before beginning hazardous waste operations.

Exemption: Employers are exempt from preparing an emergency response plan if they do ALL of the following:

- Evacuate all employees from the danger area during an emergency.
- Prohibit employees from assisting in the emergency response.
- Prepare an emergency action plan that complies with WAC 296-24-567(1), Evacuation plan.

IMPORTANT:

Treatment, storage, and disposal (TSD) employers are not required to duplicate subjects fully addressed in the contingency plan required by permits when the contingency plan is part of their emergency response plan. Examples of permits would be those issued by the department of ecology.

You must:

(1) Establish and maintain the plan to reflect current site conditions, information, and personnel:

- Include policies or procedures for at least the following:
- Preemergency planning.
- Coordination with outside organizations.
- Current site topography, layout, and weather conditions.
- Personnel roles.
- Lines of authority.
- Communication.
- Reporting incidents to local, state, and federal government agencies.
- Emergency recognition and prevention.
- Safe distances and places of refuge.
- Site security and control.
- Evacuation routes.
- Decontamination not covered by the site-specific HASP.
- Emergency medical treatment and first aid.
- Emergency alert and response.
- Personal protective equipment and emergency equipment.
- Employee training.
- Critique of the response effort and appropriate followup.
- Use available information at the time of the emergency to:
- Evaluate the incident and site response capabilities.
- Proceed with appropriate steps to implement your emergency response plan.

 Make sure the emergency response plan is:

 Kept as a separate section of your site-specific health and safety plan (HASP);

AND

 Integrated and compatible with, local, state, and federal plans for disasters, fires, and emergency responses.

(2) Establish an alarm system to alert employees to all of the following:

 An on-site emergency incident:

 To stop work activities, if necessary.

 To lower background noise to assist communication.

 To begin emergency procedures.

(3) Rehearse the plan as part of site operations training.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-16005, filed 1/5/04, effective 5/1/04.]

296-843-170
Employee exposure controls.

Your responsibility:

Implement feasible controls to protect employees from exposure to site hazards.

You must:

Control employee exposure to site health and safety hazards

WAC 296-843-17005.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-170, filed 1/5/04, effective 5/1/04.]

296-843-17005
Control employee exposure to site health and safety hazards.

You must:

 Use feasible controls, selected based on monitoring and other available information, to protect employee exposure above permissible exposure limits (PELs) or other published exposure levels.

 Examples of controls include:

▪ Installing pressurized cabs or control booths on equipment.

▪ Using remotely operated material handling equipment.

▪ Removing all nonessential employees when opening drums.

▪ Wetting down dusty operations.

▪ Positioning employees upwind of possible hazards.

 Evaluate new technologies and other control measures before using them on a large scale.

 Use any reasonable combination of controls and personal protective equipment (PPE) to reduce and maintain employee exposure at or below the PELs, published exposure levels, or dose levels when controls are not:

 Feasible;

OR

 Effective.

 Make sure PPE is NOT used as a replacement control.

 PPE should be used only as a supplement to controls.

Note: For those hazardous substances without PELs or published exposure levels, use other published literature and material safety data sheets (MSDSs) to help decide what level of protection is appropriate. For more information about MSDSs, see WAC 296-800-180 in the *Safety and Health Core Rules* book.

You must:

 Use employee rotation to reduce exposure below ionizing radiation PELs or dose limits, when that is the **only** feasible means of protecting employees.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-17005, filed 1/5/04, effective 5/1/04.]

296-843-180
Drum and container handling.

Your responsibility:

To handle drums and containers in ways that minimize the hazard to employees.

You must:

Handle drums and containers safely

WAC 296-843-18005.

Handle drums and containers suspected of containing shock-sensitive (explosive) wastes safely

WAC 296-843-18010.

Maintain worker safety in drum and container opening areas

WAC 296-843-18015.

Ship and transport drums and containers safely

WAC 296-843-18020.

IMPORTANT:

 Containers or drums containing shock-sensitive (explosive) or potentially shock-sensitive wastes require special handling precautions.

 Handle, transport, label, and dispose of drums and containers according to this chapter and other United States Department of Transportation (DOT), WISHA, EPA, and Washington department of ecology regulations for:

 Drums.

 Containers.

 Hazardous substances.

 Contaminated soils.

 Liquids, and other residues.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-180, filed 1/5/04, effective 5/1/04.]

296-843-18005
Handle drums and containers safely.

Preparation for moving drums and containers:

You must:

 Assess hazards to employees, such as radioactive waste, before handling drums and containers.

 Consider unlabeled drums and containers to contain hazardous substances and handle them accordingly, until the contents are positively identified, labeled, and assessed for hazards.

 Inspect and make sure drums and containers are sound before moving them.

 If it is not practical to inspect drums without moving them, move drums and containers to an accessible location and inspect prior to further handling.

 Remove soil or other materials covering drums or containers with caution to prevent rupture.

 Use ground-penetrating systems or other types of detection systems or devices to estimate the location and depth of buried drums or containers.

 Use the sampling plan and procedures included in the site-specific HASP to sample the contents of containers and drums.

Moving drums and containers:

You must:

 Warn all employees exposed to drum movement operations about the potential hazards associated with the contents of the drums or containers prior to moving them.

 Minimize movement of drums or containers.

 Select, position, and operate tools and material handling equipment to prevent the ignition of flammable vapors.

 Handle tanks and vaults containing hazardous substances with the same precautions as for drums and containers, taking into account the size of tank or vault.

Handling spills and leaks:

You must:

 Contain and isolate the entire volume of a hazardous substance in a drum or container when a spill occurs.

 Have available and use both of the following in areas where spills, leaks, or ruptures may occur:

 United States Department of Transportation (DOT) specified salvage drums or containers.

 Suitable quantities of proper absorbent materials.

 Empty drums and containers, that cannot be moved without rupturing, leaking, or spilling, into a sound container.

 Use a pump or other device classified for the material being transferred.

 Have fire-extinguishing equipment on-hand to control fires in their initial stage.

Reference: For further information, see the safety and health core rules, WAC 296-800-300, Portable fire extinguishers.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-18005, filed 1/5/04, effective 5/1/04.]

296-843-18010
Handle drums and containers suspected of containing shock-sensitive (explosive) wastes safely.

You must:

 Allow only essential employees in the transfer area.

 Communicate as follows:

 Signal the beginning and end of shock-sensitive (explosive) waste handling activities with an alarm system that is capable of being perceived above background light and noise.

 Maintain continuous communications throughout the handing operation:

▪ Between the employee-in-charge of the immediate handling area AND the site safety and health supervisor AND the command post.

▪ Using portable radios, hand signals, or telephones, as appropriate.

 Prevent the use of communication equipment or methods that could cause shock-sensitive (explosive) materials to explode.

 Provide material handling equipment with explosive containment devices or shields to protect equipment operators from exploding containers.

 Do not move bulging or swollen drums or containers until the cause for excess pressure is determined and you can move the drum or container safely.

 Consider packaged laboratory wastes or laboratory waste packs shock-sensitive or explosive until the contents have been characterized.

 Make sure laboratory waste packs are opened only:

▪ When necessary.

▪ By a person knowledgeable in the inspection, classification, and segregation of the containers within the pack.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-18010, filed 1/5/04, effective 5/1/04.]

296-843-18015
Maintain worker safety in drum and container opening areas.

You must:

 Keep employees who are not involved in opening drums or containers a safe distance from the opening area.

 Use appropriate shielding between the employee and the drums or containers, when excess interior pressure cannot be relieved from a remote location.

 Provide an explosion-resistant barrier that does not interfere with the work to protect employees working near or adjacent to drum or container opening operations from accidental explosions.

 Position controls for drum or container opening equipment, monitoring equipment, and fire suppression equipment behind the explosion-resistant barrier. Prohibit employees from standing on or working from drums or containers.

Reference: The shipment of shock-sensitive (explosive) waste may be prohibited under United States Department of Transportation (DOT) regulations. You and your shipper should refer to title 49 CFR.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-18015, filed 1/5/04, effective 5/1/04.]

296-843-18020
Ship and transport drums and containers safely.

You must:

(1) Identify and classify drum and container contents prior to packaging for shipment.

(2) Provide staging areas:

 Each staging area must have adequate entry and exit routes.

 The number of drum or container staging areas must be kept to the minimum needed to identify and classify materials safely and prepare them for transport.

(3) Permit bulking of hazardous wastes only after a thorough characterization of the wastes has been completed.

Note: Handle, transport, label, and dispose of drums and containers according to this chapter and other United States Department of Transportation (DOT), WISHA, EPA, and Washington department of ecology regulations for:

- Drums.
- Containers.
- Hazardous substances.
- Contaminated soils.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-18020, filed 1/5/04, effective 5/1/04.]

296-843-190
Personal protective equipment (PPE).

Your responsibility:

To use PPE to protect employees when feasible controls do not remove the hazardous exposure.

You must:

Provide and use appropriate PPE

WAC 296-843-19005.

Reference: For additional information about developing a PPE plan, see the PPE user guide found at http://www.lni.wa.gov/wisha/publications/PPEGuide/PPEload.htm.

Note: The manufacturer's information on PPE may be used to meet your PPE plan requirements. For example, the manufacturer's procedures for putting on and taking off PPE may be attached to the site-specific health and safety plan (HASP).

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-190, filed 1/5/04, effective 5/1/04.]

296-843-19005
Provide and use appropriate PPE.

Reference: See WAC 296-843-110, Evaluations and inspections, found in this chapter, for more information about how to identify hazards and complete your preliminary site evaluation.

You must:

(1) Make sure the PPE you provide and use for initial entry protects employees from known or suspected safety and health hazards identified during the preliminary site evaluation as follows:

If	Then
The need for atmosphere supplying respirators and chemical protective clothing has NOT been eliminated	Provide atmosphere supplying respirators and protective clothing
Employees use respiratory protection other than a positive-pressure SCBA for initial entry	Include an escape self-contained breathing apparatus (SCBA) with enough air to reach a safe location and always at least five minutes of air

□ Use Table 2, Selecting PPE in Various Exposure Situations, to determine the level of PPE to provide during initial entry:

You must:

(2) Make sure the PPE you select provides employee protection based on:

□ Actual and potential hazards identified during the site characterization and analysis (see WAC 296-843-110, Evaluations and inspections).

□ Hazards likely to be encountered.

□ Required tasks and their duration.

□ Site requirements and limitations.

□ Use Table 2 to identify the type of PPE that is required for various exposure situations.

Table 2

Selecting PPE in Various Exposure Situations

If	Then
Changing site conditions indicate a change in employee exposure	Review and adjust the level of protection as appropriate
	Note:
	You may decrease the level of protection when information indicates this will not increase employee exposure to safety or health hazards
There is a substantial possibility that skin absorption or contact with a hazardous substance may:	Use totally encapsulating chemical protective (TECP) suits and make sure they will protect employees from the hazards
□ Impair an employee's ability to escape	□ Use, decontaminate, inspect, and remove TECP suits from service according to the manufacturer's recommendations
□ Cause immediate serious illness or injury	□ Perform any TECP integrity tests recommended by the manufacturer and make sure all TECP suits are capable of:
□ Is an IDLH or immediate death hazard	□ Maintaining positive air pressure

		□	Preventing inward test gas leakage of more than 0.5%
		Note:	
		Follow the manufacturer's recommended procedures for testing a TECP suit's ability to maintain positive air pressure and prevent inward gas leakage. Other established test protocols for these suits, for example, NFPA 1991 and ASTM F1052-97, may also be used	
There is a substantial possibility that employee exposure to hazardous substances will either:		Use a positive-pressure SCBA or an airline respirator with an escape SCBA	
□	Immediately cause death, serious illness, or serious injury	□	Protect air supply from contamination and the entire respirator system from physical damage
OR			
□	Impair an employee's ability to escape		

Note: If there is not a permissible exposure limit (PEL) or other published exposure level for a hazardous substance, you may use published studies and information as a guide for selecting appropriate PPE.

(3) PPE required by this standard is to be provided at no cost to the employees.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, 49.17.060. 09-05-071, § 296-843-19005, filed 2/17/09, effective 4/1/09; 04-02-053, § 296-843-19005, filed 1/5/04, effective 5/1/04.]

296-843-200
Training, briefings, and information.

Your responsibility:

To make sure employees and subcontractors have the training and information needed to work safely.

You must:

Inform workers and employers about the hazardous waste site

WAC 296-843-20005.

Train workers, supervisors and managers before work begins on the site

WAC 296-843-20010.

Provide additional training to your managers and supervisors

WAC 296-843-20015.

Training for postemergency response

WAC 296-843-20020.

Make sure your employees receive written documentation of training

WAC 296-843-20025.

Provide refresher training to employees

WAC 296-843-20030.

Use qualified trainers

WAC 296-843-20035.

IMPORTANT:

If law enforcement personnel participate in clean-up activities, they must receive appropriate hazardous waste clean-up training as described in this chapter.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-200, filed 1/5/04, effective 5/1/04.]

296-843-20005
Inform workers, contractors and subcontractors about the hazardous waste site.

You must:

- Inform employees, contractors, and subcontractors or their representatives, about:
- The nature, level, and degree of exposure to hazardous substances they're likely to encounter.
- All site-related emergency response procedures.
- Any identified potential fire, explosion, health, safety, or other hazards.
- Conduct briefings for employees, contractors, and subcontractors, or their representatives as follows:
- A preentry briefing before any site activity is started.
- Additional briefings, as needed, to make sure that the site-specific HASP is followed.
- Make sure all employees working on the site are:
- ▪ Informed of any risks identified.
- ▪ Trained on how to protect themselves and other workers against the site hazards and risks.
- Update all information to reflect current site activities and hazards.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-20005, filed 1/5/04, effective 5/1/04.]

296-843-20010
Train workers, supervisors and managers before work begins on the site.

IMPORTANT:

- The eighty-hour training requirement does NOT apply to law enforcement personnel entering illicit drug labs, securing the premises, and obtaining evidence. Attendance at a forty-hour training course, such as presented by the criminal justice training commission, is acceptable.

- These training requirements do not apply to workers engaged in limited postemergency response activities provided they meet the conditions described in WAC 296-843-20020.

You must:

- Make sure workers have received twenty-four-, forty- or eighty-hour training as required by Table 3 before participating in hazardous waste operations.

- Make sure workers also receive site-specific training that thoroughly covers at least the following:

- The personnel responsible for employee safety and health.

- Safety, health, and other hazards known or suspected at the site.

- Use of personal protective equipment.

- Work practices to minimize worker's risk from the hazards.

- Use of engineering and other controls and equipment on the site.

- Medical surveillance provided.

- Recognition of signs and symptoms that might indicate overexposure to site hazards.

- The contents of the site-specific health and safety plan (HASP) required by this chapter.

Note: The site-specific training can be provided as part of the twenty-four-, forty- or eighty-hour training or as part of the employee briefings provided all training and information requirements of WAC 296-843-200 are met.

Table 3

Training Requirements

If	Then	Notes	
Work and exposures require use of atmosphere supplying respirators	Provide eighty hours of training and three days of supervised on-site field experience	Eighty-hour training may be fulfilled as follows:	
		☐	One eighty-hour training session with emphasis on hazards requiring the use of atmosphere-supplying respirators and of chemical protective

			clothing
		OR	
		□	One forty-hour training class as described below and an additional forty hours of training that emphasizes hazards requiring the use of atmosphere-supplying respirators and of chemical protective clothing
		Refresher training, previous courses, supervised field experience, and previous work experience may count towards the additional forty hours, if it improves the worker's competency to use respirators and chemical protective clothing ensembles and procedures	
Work and exposures may exceed the PEL or require protective clothing but do not require atmosphere supplying respirators	Provide forty hours of training and three days of supervised on-site field experience	Workers with twenty-four hours of training may become forty hour trained with sixteen hours of offsite training and two additional days of supervised on-site field experience	
Workers are occasionally on-site to perform specific limited tasks and unlikely to be exposed above PELs or other published exposure limits	Provide twenty-four hours of training and one day of supervised on-site field experience		
Workers are regularly on-site but work in areas fully characterized and monitored, with exposure under the PELs or other published exposure limits:	Provide twenty-four hours of training and one day of supervised on-site field experience		
□ No need for respirators			
□ No health hazards			

☐ No possibility of an emergency		
Workers are at TSD facilities under normal operations (this does not include corrective actions cleanup at these facilities)	Provide twenty-four hours of training and one day of supervised on-site field experience	
Employees perform emergency response activities	Train workers to a level of competence in site emergencies, consistent with their assigned duties, to protect themselves and other employees	
Workers qualify for limited postemergency response clean-up training	Provide at least eight hours of training	See WAC 296-843-20020, Training for postemergency response, for detailed training information
Workers have been previously trained (includes equivalent training)	Provide site-specific training, briefings and information required by this chapter and supervised field experience on the site of one day for twenty-four-hour and three days for forty- or eighty-hour trained workers	Document equivalent training and work experience as required by WAC 296-843-20025

Note: When calculating "training hours," WISHA assumes a "normal" workday of eight hours with sufficient time for lunch and other breaks.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-20010, filed 1/5/04, effective 5/1/04.]

296-843-20015
Provide additional training to your managers and supervisors.

You must:

☐ Make sure the following receive appropriate training:

 On-site managers.

 Supervisors responsible for hazardous waste operations.

 Supervisors who directly supervise employees in hazardous waste operations.

 Make sure such supervisors and on-site managers receive the same training as that required by the workers they supervise (see WAC 296-843-20010).

 Make sure such supervisors and managers receive a minimum of eight additional hours of specialized training including the following information:

 Written site-specific health and safety plan (HASP):

▪ Training plan.

▪ Personal protective equipment (PPE) plan.

▪ Spill containment plan.

▪ Emergency management procedures to use when a release of hazardous substances occurs.

▪ Federal, state, and local agencies to be contacted if there is a release of hazardous substances.

▪ Sampling and monitoring plan (including procedures and techniques for monitoring health hazards).

 Managing hazardous wastes and their disposal.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-20015, filed 1/5/04, effective 5/1/04.]

296-843-20020
Training for postemergency response.

You must:

 Provide workers who participate only in limited postemergency response clean-up operations with a minimum of eight hours of training, when these conditions are met:

 Cleanup is at a site that is a hazardous waste operation only because of an emergency response.

 Clean-up work is directly supervised by someone who has completed at least forty hours of training in hazardous waste operations as required in this chapter.

 Written documentation is maintained at the work site supporting less than twenty-four hours of training.

 The work:

▪ Is performed in an area that has been monitored and fully characterized by a qualified person as an area where employee exposure cannot exceed PELs or other published exposure levels.

▪ Does not require using respiratory protection.

▪ Does not require entry into permit-required confined spaces.

▪ Involves minimal health risks from skin exposure and absorption that are effectively controlled by PPE.

 Workers have received training in your emergency response plan and hazard communication program.

Reference: For additional information, see WAC 296-843-160, Emergency response, and WAC 296-800-170, Employer chemical hazard communication.

You must:

 Make sure workers complete any other safety and health training needed to perform assigned clean-up tasks in a safe and healthful manner.

 Training may include topics such as the following:

▪ Safety hazards and controls.

▪ The content and availability of the site-specific health and safety plan.

▪ Decontamination procedures.

▪ Operating procedures related to assigned clean-up tasks.

▪ PPE use and limitations.

▪ Hands-on exercises for PPE and decontamination.

▪ Information about heat stress and hypothermia.

 Make sure workers have been trained within the last twelve months.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-20020, filed 1/5/04, effective 5/1/04.]

296-843-20025
Make sure your employees receive written documentation of training.

You must:

 Certify and document annually that each manager, supervisor, and worker has either:

 Attended and successfully completed the training required by this section;

OR

 Demonstrated their competency.

▪ Record and maintain the method used to demonstrate competency.

 Make sure your employees and supervisors who complete required training and field experience receive written training documentation authenticated by the responsible trainer.

 Provide a copy of the certification or documentation to your employee upon request.

Note: Equivalent training may include academic or work-related training that covers subjects required by this chapter.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-20025, filed 1/5/04, effective 5/1/04.]

296-843-20030
Provide refresher training to employees.

You must:

- Make sure all certified employees, supervisors, and managers receive eight hours of refresher training at least every twelve months that covers:
- The topics specified in WAC 296-843-200.
- Assessments or evaluations of work-related incidents.
- Any other relevant topics.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-20030, filed 1/5/04, effective 5/1/04.]

296-843-20035
Use qualified trainers.

You must:

Use trainers that:

- Have demonstrated competent instructional skills.
- Demonstrate knowledge of the subject matter and have either:
- Satisfactorily completed a training program in the subject;

OR

- Have the academic credentials and instructional experience needed for teaching the subject.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-20035, filed 1/5/04, effective 5/1/04.]

296-843-210
Medical surveillance.

Your responsibility:

To provide medical surveillance for employees that work in hazardous waste operations.

You must:

Provide medical surveillance for your employees

WAC 296-843-21005.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-210, filed 1/5/04, effective 5/1/04.]

296-843-21005
Provide medical surveillance for your employees.

You must:

 Establish a medical surveillance plan for all employees who meet any of the following:

 Are or may be exposed to hazardous substances or health hazards for at least thirty days a year, at or above the permissible exposure limits (PELs) or other published exposure levels.

 Wear a respirator for at least thirty days a year.

 Are injured, become ill, or develop signs or symptoms of possible overexposure to hazardous substances or health hazards.

 Are hazardous materials team (HAZMAT) members.

Reference: Employees who use respirators less than thirty days a year are required to have a respirator medical evaluation as outlined by chapter 296-842 WAC, Respirators. Completion of a medical examination required by this section will meet the requirement for a respirator medical evaluation.

You must:

 Make sure medical examinations, consultations, and procedures are:

 Scheduled according to Table 4, Medical Examination Schedule.

 Performed or supervised by a licensed physician.

 Available:

▪ At a reasonable time and place.

▪ Without loss of pay.

▪ Without cost to employees.

Note: Examples of costs include: Mileage, gas, bus fare, and time spent outside normal work hours.

Table 4

Medical Examination Schedule

If a worker	Then provide an examination
Is assigned to work that is covered by this chapter	Before work assignment begins
Continues to work in hazardous waste operations	At least once every twelve months, unless the attending physician decides a different

	interval, up to twenty-four months or less than twelve months, is appropriate
Needs to be examined more frequently based on the examining physician's medical judgment	At an interval less than twelve months
Is reassigned to an area where their work is not covered	As soon as possible, unless he or she was examined within the past six months
OR	
Employment is terminated	
Has an incident that results in injury or illness	As soon as possible
OR	
Develops signs or symptoms of possible overexposure to hazardous substances and health hazards	
OR	
Has been exposed above the permissible exposure limits or published exposure levels	
Requires follow-up examinations or consultations because of medical necessity for an exposure incident or injury	When determined by the examining physician

You must:

□ Make sure the medical examination includes the following information for each affected employee:

□ A medical and work history, with special emphasis on symptoms related to handling hazardous substances and health hazards.

□ Information about fitness for duty including the ability to wear any personal protective equipment (PPE) under conditions that may be expected at the workplace.

□ Any additional information that is determined by the examining physician.

Note: The physician should consult the NIOSH Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities http://www.cdc.gov/niosh/85-115.html.

You must:

□ Provide complete information to the examining physician, including:

□ A copy of WAC 296-843-210.

□ Medical evaluation information required by chapter 296-842 WAC, Respirators.

□ A description of the employee's duties that relate to hazardous substance exposure.

□ The actual or anticipated hazardous substance exposure levels for the employee.

□ A description of the PPE the employee uses or could use.

□ Information available from previous medical examinations.

□ Instruction to the physician that the physician's written opinion NOT include specific findings or diagnoses that are not related to occupational exposures.

Note: You are NOT required to send duplicate information to the physician for each employee.

You must:

□ Obtain the physician's written medical opinion that includes the following information:

□ Whether medical conditions were found that would increase the employee's risk for impairment during emergency response work or respirator use.

□ Limitations of the employee's assigned work, if any.

□ Examination and test results, if the employee requests this information.

□ A statement that the employee has been confidentially informed of medical examination results (including medical conditions requiring followup required by WAC 296-843-210).

□ Provide the employee with a copy of the physician evaluation.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-21005, filed 1/5/04, effective 5/1/04.]

296-843-220
Recordkeeping and information access.

Your responsibility:

To keep records and make them accessible to employees.

You must:

Make your records accessible

WAC 296-843-22005.

Keep medical surveillance records for your employees

WAC 296-843-22010.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-220, filed 1/5/04, effective 5/1/04.]

296-843-22005
Make your records accessible.

You must:

□ Allow your written health and safety plan (HASP) and all other written plans required by this chapter to be inspected and copied by:

□ Employees or their designated representative.

- Site contractors or their designated representatives.
- Subcontractors or their designated representatives.
- Personnel of any federal, state, or local agency with regulatory authority over the site.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-22005, filed 1/5/04, effective 5/1/04.]

296-843-22010
Keep medical surveillance records for your employees.

You must:

- Keep medical surveillance records for each affected employee that include:
- The employee's name and Social Security number.
- Physicians' written opinions including recommended limitations and results of examinations and tests.
- Any employee medical complaints regarding hazardous substance exposures.
- A copy of all information given to the examining physician (except a copy of this chapter).
- Keep each employee's records for at least the duration of his or her employment plus thirty years.

Reference: For additional requirements on medical and exposure records, see chapter 296-62 WAC, Part B, Access to records.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-22010, filed 1/5/04, effective 5/1/04.]

296-843-300
Definitions.

Buddy system

A system of organizing employees into work groups so that each employee is assigned to observe another employee in the same work group. The purpose of this system is to provide rapid assistance to employees in the event of an emergency.

Clean-up operation

An operation where hazardous substances are removed, contained, incinerated, neutralized, stabilized, cleared up, or in any other manner processed or handled with the goal of making the site safer for people or the environment.

Contamination reduction zone

The buffer zone between the exclusion and the clean zone.

Decontamination

The removal of hazardous substances from employees and equipment, to the extent necessary, to avoid foreseeable adverse health effects.

Emergency response or responding to emergencies

An organized response to an anticipated release of a hazardous substance that is, or could become, an uncontrolled release.

Exclusion zone

A controlled area at a site, where contamination occurs, that is a risk to human health or the environment.

Exposure or exposed

Employee contact with a toxic substance, harmful physical agent, or oxygen deficient condition. Exposure can occur through various routes of entry, such as inhalation, ingestion, skin contact, or skin absorption.

Facility

Any building structure, installation, equipment, pipe, or pipeline (including any pipe into a sewer or publicly owned treatment works), well, pit, pond, lagoon, impoundment, ditch, storage container, motor vehicle, rolling stock, or aircraft;

OR

Any site or area where a hazardous substance has been deposited, stored, disposed of, placed, or otherwise located (not including any boat, ship or barge).

Hazardous substance

Any of the following substances that could adversely affect an exposed employee's health or safety:

- Substances defined under section 101(14) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) or "Superfund" Act (found at: http://www.epa.gov).

- Biological or other disease-causing agents released that could reasonably be expected to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions, including malfunctions in reproduction, or physical deformations in a person or their offspring when the person:

- Is directly exposed to the agent in the environment.

- Directly ingests, inhales, or assimilates the agent from the environment.

- Indirectly ingests the agent through a food chain.

- Substances listed by the United States Department of Transportation as hazardous materials under Title 49 (Transportation) in the Code of Federal Regulations (CFR), Part 172, section 101 and appendices (found at: http://www.nara.gov, search for "List of CFR subjects").

- Hazardous wastes as defined in this chapter.

Hazardous waste

Any substance designated by the department of ecology as a dangerous or extremely hazardous waste by chapter 173-303 WAC, Dangerous waste regulations.

Hazardous waste site

A hazardous waste site is any facility or location within the scope of this chapter.

Hazardous materials team (HAZMAT team)

A group of employees who are expected to perform responses to releases, or possible releases, of hazardous substances for the purpose of control and stabilization. As a result of their duties, HAZMAT team members may have close contact with hazardous substances.

Health hazard

A chemical, mixture, biological agent, or physical agent that may cause health effects in short- or long-term exposed employees based on statistically significant evidence from at least one study conducted using established scientific principles. Health hazards include:

- Carcinogens.
- Toxic or highly toxic agents.
- Reproductive toxins.
- Irritants.
- Corrosives.
- Sensitizers.
- Hepatotoxins (liver toxins).
- Nephrotoxins (kidney toxins).
- Neurotoxins (nervous system toxins).
- Substances that act on the hematopoietic system (blood or blood-forming system).
- Substances that can damage the lungs, skin, eyes, or mucous membranes.
- Hot or cold conditions.

IDLH or immediately dangerous to life or health

Any atmospheric condition that would:

- Cause an immediate threat to life;

OR

- Cause permanent or delayed adverse health effects;

OR

- Interfere with an employee's ability to escape.

Incidental release

A release that can be safely controlled at the time of the release and does not have the potential to become an uncontrolled release.

An example of a situation that results in an incidental release:

A tanker truck is receiving a load of hazardous liquid when a leak occurs. The driver knows the only hazard from the liquid is minor skin irritation. The employer has trained the driver on procedures and provided equipment to use for a release of this quantity. The driver puts on skin protection and stops the leak. A spill kit is used to contain, absorb, and pick up the spilled material for disposal.

Material safety data sheet (MSDS)

Written, printed, or electronic information (on paper, microfiche, or on-screen) that informs manufacturers, distributors, employers or employees about a hazardous chemical, its hazards and protective measures as required by chapter 296-839 WAC, Content and distribution of material safety data sheets (MSDSs) and label information.

Oxygen deficiency

An atmosphere where the percentage of oxygen by volume is less than 19.5%.

Permissible exposure limit (PEL)

Permissible exposure limits (PELs) are employee exposures to toxic substances or harmful physical agents that must not be exceeded. PELs are specified in applicable WISHA rules.

Published exposure level

Exposure limits published in "*National Institute for Occupational Safety and Health (NIOSH) Recommendations for Occupational Safety and Health*" (DHHS publication #92-100, 1992).

If an exposure limit is not published by NIOSH, then "published exposure level" means the exposure limits published by the American Conference of Governmental Industrial Hygienists (ACGIH) in "*TLVs and BEIs-Threshold Limit Values for Chemical Substances and Physical Agents*" (1999 edition).

Postemergency response

The stage of the emergency response where the immediate threat from the release has been stabilized or eliminated, and cleanup of the site has started. For more information, see the definition for "emergency response."

Site safety and health supervisor (or official)

The individual present at a hazardous waste site who is responsible to the employer and has the authority and knowledge necessary to establish the site-specific health and safety plan and verify compliance with applicable safety and health requirements.

Site work zones

Zones established at a hazardous waste site before clean-up work begins to control work on the site and access to the site. The work zones are: Exclusion zone, contamination reduction zone, and clean zone.

Uncontrolled hazardous waste site

An area where an accumulation of hazardous substances creates a threat to the health and safety of individuals or the environment or both. Examples include: Former municipal, county, or state landfills, locations where illegal or poorly managed waste disposal has taken place, or property of generators or former generators of hazardous substance waste (surface impoundments, landfills, dumps, and tank or drum farms).

Uncontrolled release

A release where significant safety and health risks could be created. Releases of hazardous substances that are either incidental or couldn't create a safety or health hazard (i.e., fire, explosion, or chemical exposure) aren't considered to be uncontrolled releases.

Examples of conditions that could create a significant safety and health risk:

- Large-quantity releases.

- Small releases that could be highly toxic.

- Potentially contaminated individuals arriving at hospitals.

- Airborne exposures that could exceed a WISHA permissible exposure limit or a published exposure limit and employees aren't adequately trained or equipped to control the release.

Example of an uncontrolled release:

A forklift driver knocks over a container of a solvent-based liquid, releasing the contents onto the warehouse floor. The driver has been trained to recognize the vapor is flammable and moderately toxic when inhaled. The driver hasn't been trained or provided appropriate equipment to address this type of spill. In this situation, it isn't safe for the driver to attempt a response. The driver needs to notify someone of the release so an emergency response can be initiated.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. 04-02-053, § 296-843-300, filed 1/5/04, effective 5/1/04.]

APPENDIX B

Environmental Project Health and Safety Meeting Form

ENVIRONMENTAL PROJECT
HEALTH AND SAFETY FIELD MEETING FORM

Date: ______________________ Time: ______________ Project No.: ____________

Project Name: ____

Location: ____

Meeting Conducted by: ____

<u>TOPICS DISCUSSED</u>

Physical Hazards:____

Chemical Hazards:____

Personal Protection:____

Decontamination:____

Special Site Considerations:____

____

____

Emergency Information: ____

Hospital Location: ____

Attendees

Name/Company (printed)	Signature

Meeting Conducted by: ______________________________________
Signature

APPENDIX C

Job Safety Analysis Sheets

AMEC Geomatrix

JOB SAFETY ANALYSIS

JSA # 01

Project Name:	All field projects	Project No:	NA	Date:	6/21/07
Task:	Mobilization to and from client sites	Task Location:	All		

For this Project and Task, this document is a Certification of Hazard Assessment

Completed by:	P. Hsieh	Reviewed by:	T. Reinhardt
Notes:			

Task	Hazard	Risk Control Method
Mobilization to Site	Driving accidents	Vehicle to be fit for the purpose and well maintained. If using your own car, note that company insurance may not apply. Best to use a rental car or Flexcar, which are usually well-maintained.
		Loads to be secure and not to exceed vehicle specifications or legal limits. If loading vehicle heavily or towing, check vehicle GVWR and towing limits for vehicle and hitch. Get instruction in proper hitch operation if unfamiliar with towing equipment.
		Driver to be currently licensed and medically fit.
		All occupants will wear their seat belts whenever traveling.
		Driver to be rested and alert. If driving long distances, take breaks to stretch and keep alert. Change drivers or pull off the road to sleep if having difficulty staying awake.
		Minimize cell phone use. Use only a hands-free system, or pull over to use the cell phone.
		Plan your route ahead of time. Have maps or turn directions at hand for reference; highlight them to show critical turns.
		Check driver attitude. Be relaxed, unhurried, and do not drive aggressively. Keep right except to pass, pass only where sufficient distance and visibility exists, and maintain a spacing buffer for other drivers to make mistakes.
		Driver must not be under the influence of alcohol, drugs, or medication that impairs their ability to drive vehicle.

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JOB SAFETY ANALYSIS

JSA # 02

Project Name: Boeing IT Sediment Sampling	Project No: LY11160060	Date: May 2011
Task: Mobilization and trailer towing	Task Location: Boeing IT Site	
Notes: For this Project and Task, this document is a Certification of Hazard Assessment		

Task	**Hazard**	**Risk Control Method**
Mobilization to Site	Driving Accidents	Vehicle to be fit for purpose and well maintained.
		Loads to be secure and not to exceed vehicle specification or legal limits.
		Driver to be licensed, trained, and medically fit.
		Driver to be rested and alert.
		Driver should not use cell phone while driving.
		Plan your route ahead of time, avoid narrow streets, sharp corners, and low overpasses when towing trailer.
		Driver must not be under the influence of alcohol, drugs, or medication that impairs ability to drive vehicle.
		Make sure vehicle has adequate fuel in tank before departure.
		When carrying heavy loads or towing a boat, allow extra stopping distance.
		Use caution when changing lanes.
	Flat tire / Breakdown	Check tires for proper inflation before departure.
		If possible, get completely off of the freeway at next exit.
		Do not hesitate to call a tow truck if repairs cannot be made safely.
		Use extreme caution when outside of a disabled vehicle. Avoid standing behind or on the traffic side of the vehicle.
Boat trailering	Trailer safety	Check trailer tire pressure.
		Make sure that trailer is properly attached to towing vehicle.
		Confirm that the trailer lights are working properly.
Launching boat	Ramp accidents	Prepare the boat for launching in a safe location.
		Inspect for overhead power lines that might hit the boat.
		Attach mooring lines and fenders before launching the boat.
		Watch for pedestrian traffic when backing.
		Firmly set the parking brake when parked on boat ramp. Make sure brake is holding before exiting cab of vehicle.
	Leaving dock	Check for other vessel traffic.
		Crew should not untie mooring lines until instructed to do so.
		Do not jump from dock to boat.
All on water activities	Drowning	All personnel on boat must wear a life jacket.
		Have a throwable life ring readily available.
		Use caution to avoid falling overboard.
		Maintain visual contact with a man overboard as the vessel circles round to pick up victim.
	Head injuries	Wear hard hat when equipment is being lifted.
		The winch operator should coordinate lifting of equipment with deck crew.
	Eye injuries	Wear safety glasses.
		Wear UV filtering safety sun glasses to avoid sun burn to eyes.
	Sunburn	Wear long sleeved shirts to protect from sun exposure.
		Reapply SPF30 or better sun screen often.

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JOB SAFETY ANALYSIS

JSA # 02

Project Name: Boeing IT Sediment Sampling	Project No: LY11160060	Date: May 2011
Task: Mobilization and trailer towing	Task Location: Boeing IT Site	
Notes: For this Project and Task, this document is a Certification of Hazard Assessment		

Task	Hazard	Risk Control Method
		Wear a wide brimmed hat.
	Trips / Falls	Us care when moving around boat.
		Maintain good housekeeping practices. Avoid unnecessary deck clutter.
		Wear appropriate PPE including non-slip rubber boots if working on wet or slick surfaces.
	Heat / Cold stress	Take regular breaks on hot days or if feeling faint or overexerted.
		Consume adequate food / beverages (water or sports drinks)
		If possible, adjust work schedule to avoid temperature extremes.
		Crew should watch each other for signs of thermal stress.
	Fire	Avoid refueling while on the water if possible.
		Have a dry chemical fire extinguisher readily available.
		Smoking is prohibited at all times.
		Avoid using flammable chemicals if possible.
	Sinking	Continually assess weather conditions. Go back to harbor before the weather conditions become dangerous.
		If vessel is tanking on water, immediately contact USCG on VHF radio channel 16 to inform them of the situation. If possible run a sinking vessel onto the beach. If you must abandon ship, place emergency calls to the USCG and 911 if time allows. Take the emergency signaling kit, hand held VHF (which is water proof) and the throwable life ring with you.
	Oil Spills	Avoid pouring oil products while on the water.
		Have absorbent pads available to contain any spills.
		If any oil spill enters the water, promptly notify the oil spill response hotline at 1 (800) 424-8802.
	Collision	all crew members should keep alert for other vessel traffic.
		Observe proper "rules of the road".
		Stay to the right side of designated shipping channels.
	Homeland Security	Maintain a minimum distance of 500 yards from Washington State ferry boats and US Navy vessels. If this is not possible, contact the vessel using the VHF radio to request permission to approach closer. After radio contact, if distance is less than 500 yards, maintain a dead slow speed. Failure to do so may result in fines and/or arrest.
Anchoring	Entanglement	Make sure anchor lines are untangled prior to deploying the anchor.
		Keep feet out of bight of the anchor line.
		Avoid throwing the anchor. It is safer to lower the anchor to the bottom.
	Back strain	If possible, use an anchor winch to recover the anchor.
		Keep back straight to minimize strain.
		If the anchor is set hard, use the boat to break it free.
	Returning to the dock	Approach dock slowly.
		Crew should not jump from the boat to the dock.
		Tie upwind/upstream mooring line first.
Recovering boat	Ramp accidents	Watch for pedestrian traffic when backing.

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JOB SAFETY ANALYSIS

JSA # 02

Project Name: Boeing IT Sediment Sampling	Project No: LY11160060	Date: May 2011
Task: Mobilization and trailer towing	Task Location: Boeing IT Site	
Notes: For this Project and Task, this document is a Certification of Hazard Assessment		

Task	**Hazard**	**Risk Control Method**
		Firmly set the parking brake when parked on boat ramp. Make sure brake is holding before exiting cab of vehicle.
		Confirm that the boat is resting properly on the trailer.
		Prepare the boat for trailering in a safe location. Watch for vehicle traffic.
		Secure all cargo.
		Secure boat to trailer.
		Confirm that the trailer lights are working properly.
On the Job Accident	Minor Injury	Assess accident site to avoid further injury to victim or rescuers.
		Render first aid as necessary.
		Transport victim to local first aid facility for follow up treatment if necessary. The route to the nearest hospital should be included in the Project Health and Safety Plan.
		Call WorkCare for advice within 1 hr of injury 1 (800) 455-6155.
		Fill out Incident Report Form as soon as possible.
	Serious Injury / Fatality	Assess accident site to avoid further injury to victim or rescuers.
		Call 911 to request Emergency Medical Services (EMS) or if
		Render first aid as necessary. Avoid moving the victim.
		Do not move any equipment that was involved in the accident except as necessary to facilitate rescue or to assure safety of other
		Call WorkCare for advice within 1 hr of injury 1 (800) 455-6155.
		Contact AMEC/Geomatrix Corporate H&S Manager Don Kubik
		You must report the death, or probable death, of any employee, or the in-patient hospitalization of two or more employees within 8 hours to the Washington Department of Labor and Industries at 1 (800) 423-7233.

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JOB SAFETY ANALYSIS

JSA # 03

Project Name: Boeing IT Sediment Sampling		Project No: LY11160060	Date: May 2011
Task:	Mudmole Sediment Sampling	Task Location: Duwamish River	
Completed by:	GSM	Reviewed by:	
Notes: For this Project and Task, this document is a Certification of Hazard Assessment			

Task	**Hazard**	**Risk Control Method**
Boat use	Misc.	Refer to: JSA Boat Trailer Towing and Use.dot
Moving the MudMole	Back injury	Use the boat winch whenever possible to lift heavy equipment. If this is not possible, ask someone to help you.
		Keep back straight to minimize strain.
	Foot injury	Wear steel toed boots when handling heavy items.
Running the Hydraulic Power Pack	Fire	Use caution in refueling to avoid fuel spills.
		Let engine cool before refueling.
		Smoking is prohibited when refueling.
		Have the dry chemical fire extinguisher readily available.
	Fuel Spill	If any fuel enters the water use oil spill kit to mitigate damage and promptly notify the oil spill response line at 1 (800) 424-8802.
	Noise	Wear hearing protectors when the power pack is running.
Raising the boat mast	Entanglement	Carefully monitor winch lines so they do not catch on anything.
		Wear your hard hat.
	Pinching	Have personnel move to center of deck away from hinge and hydraulic cylinders.
Lifting the MudMole with the winch	Dropping heavy equipment	Do daily inspection of rigging. Do not use lifting equipment that is not in good operating condition.
		Wear hard hat and steel toed boots.
		Never walk under a lifted load.
		Avoid placing body parts between a heavy load and a fixed object.
	Entanglement	Check that winch lines are not caught on anything before lifting.
	Swinging heavy equipment	Check for wakes before lifting. Lift loads only when the boat is not expected to be rocking.
		Watch for boat wakes, alert other crew members if you see one.
		Do not lift the grab until the deck hand is prepared to guide it.
		Lift slowly so that the deck hand can control the swing of the equipment.
		If a distraction occurs, the winch operator should stop all winch movement.
Running the Air Compressor	Noise	Wear hearing protectors when the air compressor is running.
		Keep in mind that voice communications are impaired when wearing hearing protection.
	Injury from moving parts	Always stop the air compressor before opening machinery covers.
	Injury from high pressure air	Make sure all air fittings are secure before starting air compressor.
		Never direct compressed air towards your body.
Lowering the Mudmole into the water	Entanglement	Keep feet out of the bight of the air line.
	Hitting the diver with the Mudmole	Make sure the diver is clear of the moon pool before lowering MudMole.
Sediment Coring	Communications	The winch operator should not lower or lift the Mudmole unless asked to do so by operator of the Mudmole.
Lifting the Mudmole out of the water	Hitting the diver with the MudMole	Make sure diver is clear of the moon pool before lifting the MudMole.

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JOB SAFETY ANALYSIS

JSA # 03

Project Name: Boeing IT Sediment Sampling		Project No: LY11160060	Date: May 2011
Task:	Mudmole Sediment Sampling	Task Location: Duwamish River	
Completed by:	GSM	Reviewed by:	
Notes: For this Project and Task, this document is a Certification of Hazard Assessment			

Task	**Hazard**	**Risk Control Method**
	Hanging up on the deck	Watch that the Mudmole does not catch under the edge of the deck.
	Swinging	Lay the Mudmole on the deck immediately after use so that it cannot swing if the boat rocks.
Contaminated material spilling out of core tube.	Chemical contamination	Wash the outside of the core tube while it is over the moon pool.
		Decant water inside the core tube over the bow of the boat rather than spilling it on the deck.
		Promptly wrap the ends of the core tube with foil to contain contaminated sediments.
		Promptly wash spilled sediment off of the deck.
		Always wear proper PPE (splash suit, gloves, eye protection).
Lowering the boat mast	Pinching	Have personnel move to center of deck away from hinge and cylinders.
		Make sure the mast does not crush items on tables.
	Entanglement	Make sure winch line does not hang up on anything.
On the Job Accident	Minor Injury	Assess accident site to avoid further injury to victim or rescuers.
		Render first aid as necessary.
		Call WorkCare for advice within 1 hr of injury 1 (800) 455-6155.
		Transport victim to local first aid facility for follow up treatment if necessary. The route to the nearest hospital should be included in the Project Health and Safety Plan.
		Fill out Incident Report Form as soon as possible.
	Serious Injury / Fatality	Assess accident site to avoid further injury to victim or rescuers.
		Call Boeing Emergency at (206) 655-2222 request Emergency Medical Services (EMS) or if access to the beach is difficult, USGS on VHF channel 16.
		Render first aid as necessary. Avoid moving the victim.
		Do not move any equipment that was involved in the accident except as necessary to facilitate rescue or to assure safety of other personnel.
		Call WorkCare for advice within 1 hr of injury 1 (800) 455-6155.
		Contact Geomatrix Corporate H&S Manager Don Kubik (510) 368-6433.
		You must report the death, or probable death, of any employee, or the in-patient hospitalization of two or more employees within 8 hours to the Washington Department of Labor and Industries at 1 (800) 423-7233.

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JOB SAFETY ANALYSIS

JSA # 04

Project Name: Boeing IT Sediment Sampling	Project No: LY11160060	Date: May 2011
Task: Mudmole Sediment Sampling	Task Location: Boeing IT Site	
Notes: For this Project and Task, this document is a Certification of Hazard Assessment		

Task	Hazard	Risk Control Method
Moving Core Tubes	Back injury	Core tubes are heavy, ask someone to help you carry them.
		Keep back straight to minimize strain.
	Foot injury	Wear rubber steel toed boots when handling heavy items.
	Tripping / Falling	Use caution when walking while carrying a core tube.
	Chemical contamination.	Tightly wrap ends of core tube to prevent spillage.
		Always wear proper PPE (splash suit, gloves, eye protection).
Cutting open the Core	Noise	Wear hearing protectors when using the saw.
		Keep in mind that voice communications are impaired when wearing hearing protection.
	Eye injury	Always wear eye protection.
	Electrical shock	Work in a covered area when it is raining.
		Use a ground fault interrupter circuit (GFIC) to protect against electrical shock.
		Inspect electrical cords before use.
	Laceration from saw	Have a firm grip on saw before starting cut.
		Use a sharp saw blade to reduce cutting resistance.
		Unplug the saw when replacing the blade or doing other maintenance.
		Do not reach under the saw when it is running.
Contaminated material spilling out of core tube.	Chemical contamination	Deploy tarp on ground to contain spilled sediment.
		Promptly clean up spilled sediment.
		Always wear proper PPE (splash suit, gloves, eye protection).
		Avoid walking in spilled sediment.
		Decon boot before leaving core processing area.
Dumping waste sediment.	Splashing of contaminated material.	Slowly place waste into buckets.
		Wear eye protection.
		Wear rubber gloves.
Washing used core processing tools.	Splashing of contaminated material.	Do not drop equipment into buckets.
		Wear eye protection.
		Wear splash suit and rubber gloves.
Moving in work area.	Trips and Falls	Keep equipment orgainized to minimize clutter.
On the Job Accident	Minor Injury	Assess accident site to avoid further injury to victim or rescuers.
		Render first aid as necessary.
		Transport victim to local first aid facility for follow up treatment if necessary. The route to the nearest hospital should be included in the Project Health and Safety Plan.
		Call WorkCare for advice within 1 hr of injury 1 (800) 455-6155.
		Fill out Incident Report Form as soon as possible.
	Serious Injury / Fatality	Assess accident site to avoid further injury to victim or rescuers.
		Call 911 to request Emergency Medical Services (EMS) or if access to the beach is difficult, USGS on VHF channel 16.

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JOB SAFETY ANALYSIS

JSA # 04

Project Name: Boeing IT Sediment Sampling	Project No: LY11160060	Date: May 2011
Task: Mudmole Sediment Sampling	Task Location: Boeing IT Site	
Notes: For this Project and Task, this document is a Certification of Hazard Assessment		

Task	**Hazard**	**Risk Control Method**
		Render first aid as necessary. Avoid moving the victim.
		Do not move any equipment that was involved in the accident except as necessary to facilitate rescue or to assure safety of other personnel.
		Call WorkCare for advice within 1 hr of injury 1 (800) 455-6155.
		Contact AMEC/Geomatrix Corporate H&S Manager Don Kubik
		You must report the death, or probable death, of any employee, or the in-patient hospitalization of two or more employees within 8 hours to the Washington Department of Labor and Industries at 1 (800) 423-7233.

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JOB SAFETY ANALYSIS	JSA # 05
Project Name: Boeing IT Sediment	Project No: LY11160060	Date: May 2011
Task: Van Veen Grab Sampling	Task Location: Duwamish River	
Completed by: GSM	Reviewed by:	
Notes: For this Project and Task, this document is a Certification of Hazard Assessment		

Task	Hazard	Risk Control Method
Boat use	Misc.	Refer to: JSA Boat Trailer Towing and Use.dot
Moving the Van Veen Grab	Back injury	Use the boat winch whenever possible to lift heavy equipment. If this is not possible, ask someone to help you.
		Keep back straight to minimize strain when lifting.
	Foot injury	Wear steel toed boots when handling heavy items.

Running the Hydraulic Power	Fire	Use caution in refueling to avoid fuel spills.
		Let engine cool before refueling.
		Smoking is prohibited when refueling.
		Have the dry chemical fire extinguisher readily available.
	Fuel Spill	Use oil spill kit to absorb the spill.
		If any fuel enters the water use the spill kit to contain the spill and promptly notify the oil spill response line at 1 (800) 424-8802.
	Noise	Wear hearing protectors when the power pack is running.
Raising the boat mast	Entanglement	Carefully monitor winch lines so they do not catch on anything.
		Wear your hard hat.
	Pinching	Have personnel move to center of deck away from the mast pivots and hydraulic cylinders.
Deconning the grab (gravity	Pinching	Make sure the grab is stable before reaching inside to clean it.
	Splashing of soap and	Wear eye protection and splash suit.
Deconning the grab (power grab)	Pinching	Engage safety valve before deconning the grab.
	Splashing of soap and	Wear eye protection and splash suit.
Lifting the Van Veen Grab with the winch	Dropping heavy equipment	Do daily inspection of rigging. Do not use lifting equipment that is not in good operating condition.
		Do not lift the grab until the deck hand is prepared to guide it.
		Wear hard hat.
		Never walk under a lifted load.
		Avoid placing body parts between a heavy load and a fixed object.
	Entanglement	Check that winch lines are not caught on anything before lifting.
	Swinging heavy equipment	Check for wakes before lifting. Lift loads only when the boat is not expected to be rocking.
		Watch for boat wakes, alert other crew members if you see one.

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JOB SAFETY ANALYSIS	JSA # 05

Project Name: Boeing IT Sediment	Project No: LY11160060	Date: May 2011
Task: Van Veen Grab Sampling	Task Location: Duwamish River	
Completed by: GSM	Reviewed by:	
Notes: For this Project and Task, this document is a Certification of Hazard Assessment		

Task	**Hazard**	**Risk Control Method**
		Never position your body between a fixed object and a swinging load.
		Position the lifting point directly over the grab so that it is lifted straight up.
		Lift slowly so that the deck hand can control the swing of the equipment.
		If a distraction occurs, the winch operator should stop all winch movement.
Arming the grab	Pinching	Coordinate arming the grab with winch operator.
		Never reach inside the grab after it is armed.
Lowering the Van Veen Grab into the water	Catching the edge of the boat	Lower the grab slowly so that the deck hand can guide the grab if necessary.
Lifting the Van Veen Grab out of the water	Hanging up on the deck	Watch that the Van Veen Grab does not catch under the edge of the deck.
		Have the boat hook handy so that you can guide the grab without having to lean over the side of the boat.
	Swinging	Set the Van Veen Grab on stand immediately after use so that it cannot swing if the boat rocks.
	Pinching	Do not place hands under the grab as it is being lowered onto the stand.
Contaminated Sediment	Chemical contamination	Decant water inside the grab over the bow of the boat rather than spilling it onto the deck.
		Promptly wash spilled sediment off of the deck.
		Do not overfill waste buckets.
		Waste sediment should be stored in an approved waste drum and properly labeled (if required).
		Always wear proper PPE (splash suit, gloves, eye protection).
	Splashing	If dumping waste sediment overboard, use caution to avoid splashing contaminatted sediment.
High pressure air (pneumatic grab only)	Unsecured air tanks	Air tanks must be secured at all times so that they do not roll or tip over.

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JOB SAFETY ANALYSIS		JSA # 05
Project Name: Boeing IT Sediment	Project No: LY11160060	Date: May 2011
Task: Van Veen Grab Sampling	Task Location: Duwamish River	
Completed by: GSM	Reviewed by:	
Notes: For this Project and Task, this document is a Certification of Hazard Assessment		

Task	Hazard	Risk Control Method
	Air induced injury	Always bleed air pressure down before removing regulator from air cylinder.
		Never direct high pressure air onto your skin.
Lowering the boat mast	Pinching	Have personnel move to center of deck away from hinge and cylinders.
		Make sure the mast does not crush items on tables.
	Entanglement	Make sure winch line does not hang up on anything.
On the Job Accident	Minor Injury	Assess accident site to avoid further injury to victim or rescuers.
		Render first aid as necessary.
		Transport victim to local first aid facility for follow up treatment if necessary. The route to the nearest hospital should be included in the Project Health and Safety Plan.
		Call WorkCare for advice within 1 hr of injury 1 (800) 455-6155 .
		Fill out Incident Report Form as soon as possible.
	Serious Injury / Fatality	Assess accident site to avoid further injury to victim or rescuers.
		Call 911 to request Emergency Medical Services (EMS) or if access to the beach is difficult, USGS on VHF channel 16.
		Render first aid as necessary. Avoid moving the victim.
		Do not move any equipment that was involved in the accident
		Call WorkCare for advice within 1 hr of injury 1 (800) 455-6155 .
		Contact AMEC/Geomatrix Corporate H&S Manager Don Kubik
		You must report the death, or probable death, of any employee, or the in-patient hospitalization of two or more employees within 8 hours to the Washington Department of Labor and Industries at 1 (800) 423-7233.

APPENDIX D

Material Safety Data Sheets

ALCONOX MSDS

Section 1 : MANUFACTURER INFORMATION

Product name: Alconox

Supplier: Same as manufacturer.

Manufacturer: Alconox, Inc.
30 Glenn St.
Suite 309
White Plains, NY 10603.

Manufacturer emergency phone number: 800-255-3924.
813-248-0585 (outside of the United States).

Manufacturer: Alconox, Inc.
30 Glenn St.
Suite 309
White Plains, NY 10603.

Supplier MSDS date: 2005/03/09

D.O.T. Classification: Not regulated.

Section 2 : HAZARDOUS INGREDIENTS

C.A.S.	CONCENTRATION %	Ingredient Name	T.L.V.	LD/50	LC/50
25155-30-0	10-30	SODIUM DODECYLBENZENESULFONATE	NOT AVAILABLE	438 MG/KG RAT ORAL 1330 MG/KG MOUSE ORAL	NOT AVAILABLE
497-19-8	7-13	SODIUM CARBONATE	NOT AVAILABLE	4090 MG/KG RAT ORAL 6600 MG/KG MOUSE ORAL	2300 MG/M3/2H RAT INHALATION 1200 MG/M3/2H MOUSE INHALATION
7722-88-5	10-30	TETRASODIUM PYROPHOSPHATE	5 MG/M3	4000 MG/KG RAT ORAL 2980 MG/KG MOUSE ORAL	NOT AVAILABLE
7758-29-4	10-30	SODIUM PHOSPHATE	NOT AVAILABLE	3120 MG/KG RAT ORAL 3100 MG/KG MOUSE ORAL >4640 MG/KG RABBIT DERMAL	NOT AVAILABLE

Section 2A : ADDITIONAL INGREDIENT INFORMATION

Note: (supplier).
CAS# 497-19-8: LD50 4020 mg/kg - rat oral.
CAS# 7758-29-4: LD50 3100 mg/kg - rat oral.

Section 3 : PHYSICAL / CHEMICAL CHARACTERISTICS

Physical state: Solid

Appearance & odor: Almost odourless.
White granular powder.

Odor threshold (ppm): Not available.

Vapour pressure (mmHg): Not applicable.

Vapour density (air=1): Not applicable.

By weight: Not available.

Evaporation rate (butyl acetate = 1): Not applicable.

Boiling point (°C): Not applicable.

Freezing point (°C): Not applicable.

pH: (1% aqueous solution).
9.5

Specific gravity @ 20 °C: (water = 1).
0.85 - 1.10

Solubility in water (%): 100 - > 10% w/w

Coefficient of water\oil dist.: Not available.

VOC: None

Section 4 : FIRE AND EXPLOSION HAZARD DATA

Flammability: Not flammable.

Conditions of flammability: Surrounding fire.

Extinguishing media: Carbon dioxide, dry chemical, foam.
Water
Water fog.

Special procedures: Self-contained breathing apparatus required.
Firefighters should wear the usual protective gear.

Auto-ignition temperature: Not available.

Flash point (°C), method: None

Lower flammability limit (% vol): Not applicable.

Upper flammability limit (% vol): Not applicable.

Not available.

Sensitivity to mechanical impact: Not applicable.

Hazardous combustion products: Oxides of carbon (COx).
Hydrocarbons.

Rate of burning: Not available.

Explosive power: None

Section 5 : REACTIVITY DATA

Chemical stability: Stable under normal conditions.

Conditions of instability: None known.

Hazardous polymerization: Will not occur.

Incompatible substances: Strong acids.
Strong oxidizers.

Hazardous decomposition products: See hazardous combustion products.

Section 6 : HEALTH HAZARD DATA

Route of entry: Skin contact, eye contact, inhalation and ingestion.

Effects of Acute Exposure

Eye contact: May cause irritation.

Skin contact: Prolonged contact may cause irritation.

Inhalation: Airborne particles may cause irritation.

Ingestion: May cause vomiting and diarrhea.
May cause abdominal pain.
May cause gastric distress.

Effects of chronic exposure: Contains an ingredient which may be corrosive.

LD50 of product, species & route: > 5000 mg/kg rat oral.

LC50 of product, species & route: Not available for mixture, see the ingredients section.

Exposure limit of material: Not available for mixture, see the ingredients section.

Sensitization to product: Not available.

Carcinogenic effects: Not listed as a carcinogen.

Reproductive effects: Not available.

Teratogenicity: Not available.

Mutagenicity: Not available.

Synergistic materials: Not available.

Medical conditions aggravated by exposure: Not available.

First Aid

Skin contact: Remove contaminated clothing.
Wash thoroughly with soap and water.
Seek medical attention if irritation persists.

Eye contact: Check for and remove contact lenses.
Flush eyes with clear, running water for 15 minutes while holding eyelids open: if irritation persists, consult a physician.

Inhalation: Remove victim to fresh air.
Seek medical attention if symptoms persist.

Ingestion: Dilute with two glasses of water.
Never give anything by mouth to an unconscious person.
Do not induce vomiting, seek immediate medical attention.

Section 7 : PRECAUTIONS FOR SAFE HANDLING AND USE

Leak / Spill: Contain the spill.
Recover uncontaminated material for re-use.
Wear appropriate protective equipment.
Contaminated material should be swept or shoveled into appropriate waste container for disposal.

Waste disposal: In accordance with municipal, provincial and federal regulations.

Handling procedures and equipment: Protect against physical damage.
Avoid breathing dust.
Wash thoroughly after handling.
Keep out of reach of children.
Avoid contact with skin, eyes and clothing.
Launder contaminated clothing prior to reuse.

Storage requirements: Keep containers closed when not in use.
Store away from strong acids or oxidizers.
Store in a cool, dry and well ventilated area.

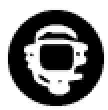
Section 8 : CONTROL MEASURES

<u>Precautionary Measures</u>

Gloves / Type:

Neoprene or rubber gloves.

Respiratory / Type:



If exposure limit is exceeded, wear a NIOSH approved respirator.

Eye / Type:

Safety glasses with side-shields.

Footwear / Type: Safety shoes per local regulations.

Clothing / Type: As required to prevent skin contact.

Other / Type: Eye wash facility should be in close proximity.
Emergency shower should be in close proximity.

Ventilation requirements: Local exhaust at points of emission.

Material Safety Data Sheet

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

CHEVRON REGULAR UNLEADED GASOLINE

Product Number(s): CPS201000 [See Section 16 for Additional Product Numbers]
Synonyms: Calco Regular Unleaded Gasoline

Company Identification
Chevron Products Company
Marketing, MSDS Coordinator
6001 Bollinger Canyon Road
San Ramon, CA 94583
United States of America

Transportation Emergency Response
CHEMTREC: (800) 424-9300 or (703) 527-3887
Health Emergency
ChevronTexaco Emergency Information Center: Located in the USA. International collect calls accepted. (800) 231-0623 or (510) 231-0623
Product Information
Technical Information: (510) 242-5357

SPECIAL NOTES: This MSDS applies to: Federal Reformulated Gasoline, California Reformulated Gasoline, Wintertime Oxygenated Gasoline, Low RVP Gasoline and Conventional Gasoline.

SECTION 2 COMPOSITION/ INFORMATION ON INGREDIENTS

COMPONENTS	CAS NUMBER	AMOUNT

Gasoline	86290-81-5	100 %volume
Benzene	71-43-2	0.1 - 4.9 %volume
Ethyl benzene	100-41-4	0.1 - 3 %volume
Naphthalene	91-20-3	0.1 - 2 %volume
Ethanol	64-17-5	0 - 10 %volume
Methyl tert-butyl ether (MTBE)	1634-04-4	0 - 15 %volume
Tertiary amyl methyl ether (TAME)	994-05-8	0 - 17 %volume
Ethyl tert-butyl ether (ETBE)	637-92-3	0 - 18 %volume

Motor gasoline is considered a mixture by EPA under the Toxic Substances Control Act (TSCA). The refinery streams used to blend motor gasoline are all on the TSCA Chemical Substances Inventory. The appropriate CAS number for refinery blended motor gasoline is 86290-81-5. The product specifications of motor gasoline sold in your area will depend on applicable Federal and State regulations.

SECTION 3 HAZARDS IDENTIFICATION

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EMERGENCY OVERVIEW

- EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE

- HARMFUL OR FATAL IF SWALLOWED - MAY CAUSE LUNG DAMAGE IF SWALLOWED
- VAPOR HARMFUL
- CAUSES SKIN IRRITATION
- CAUSES EYE IRRITATION
- LONG-TERM EXPOSURE TO VAPOR HAS CAUSED CANCER IN LABORATORY ANIMALS
- KEEP OUT OF REACH OF CHILDREN
- TOXIC TO AQUATIC ORGANISMS

****

IMMEDIATE HEALTH EFFECTS

Eye: Contact with the eyes causes irritation. Symptoms may include pain, tearing, reddening, swelling and impaired vision.
Skin: Contact with the skin causes irritation. Skin contact may cause drying or defatting of the skin. Symptoms may include pain, itching, discoloration, swelling, and blistering. Contact with the skin is not expected to cause an allergic skin response. Not expected to be harmful to internal organs if absorbed through the skin.
Ingestion: Because of its low viscosity, this material can directly enter the lungs, if swallowed, or if subsequently vomited. Once in the lungs it is very difficult to remove and can cause severe injury or death.
Inhalation: The vapor or fumes from this material may cause respiratory irritation. Symptoms of respiratory irritation may include coughing and difficulty breathing. Breathing this material at concentrations above the recommended exposure limits may cause central nervous system effects. Central nervous system effects may include headache, dizziness, nausea, vomiting, weakness, loss of coordination, blurred vision, drowsiness, confusion, or disorientation. At extreme exposures, central nervous system effects may include respiratory depression, tremors or convulsions, loss of consciousness, coma or death.

DELAYED OR OTHER HEALTH EFFECTS:

Reproduction and Birth Defects: This material is not expected to cause birth defects or other harm to the developing fetus based on animal data.
Cancer: Prolonged or repeated exposure to this material may cause cancer. Gasoline has been classified as a Group 2B carcinogen (possibly carcinogenic to humans) by the International Agency for Research on Cancer (IARC).

Contains benzene, which has been classified as a carcinogen by the National Toxicology Program (NTP) and a Group 1 carcinogen (carcinogenic to humans) by the International Agency for Research on Cancer (IARC).
Contains ethylbenzene which has been classified as a Group 2B carcinogen (possibly carcinogenic to humans) by the International Agency for Research on Cancer (IARC).
Contains naphthalene, which has been classified as a Group 2B carcinogen (possibly carcinogenic to humans) by the International Agency for Research on Cancer (IARC).

Whole gasoline exhaust has been classified as a Group 2B carcinogen (possibly carcinogenic to humans) by the International Agency for Research on Cancer (IARC).

Risk depends on duration and level of exposure. See Section 11 for additional information.

SECTION 4 FIRST AID MEASURES

Eye: Flush eyes with water immediately while holding the eyelids open. Remove contact lenses, if worn, after initial flushing, and continue flushing for at least 15 minutes. Get medical attention if irritation persists.
Skin: Wash skin with water immediately and remove contaminated clothing and shoes. Get medical attention if any symptoms develop. To remove the material from skin, use soap and water. Discard contaminated clothing and shoes or thoroughly clean before reuse.
Ingestion: If swallowed, get immediate medical attention. Do not induce vomiting. Never give anything by mouth to an unconscious person.
Inhalation: Move the exposed person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if breathing difficulties continue.
Note to Physicians: Ingestion of this product or subsequent vomiting may result in aspiration of light hydrocarbon liquid, which may cause pneumonitis.

SECTION 5 FIRE FIGHTING MEASURES

See Section 7 for proper handling and storage.

FIRE CLASSIFICATION:
OSHA Classification (29 CFR 1910.1200): Flammable liquid.

NFPA RATINGS: Health: 1 Flammability: 3 Reactivity: 0

FLAMMABLE PROPERTIES:
Flashpoint: (Tagliabue Closed Cup) < -45 °C (< -49 °F)
Autoignition: > 280 °C (> 536 °F)
Flammability (Explosive) Limits (% by volume in air): Lower: 1.4 Upper: 7.6

EXTINGUISHING MEDIA: Dry Chemical, CO2, AFFF Foam or alcohol resistant foam if >15% volume polar solvents (oxygenates).

PROTECTION OF FIRE FIGHTERS:
Fire Fighting Instructions: Use water spray to cool fire-exposed containers and to protect personnel. For fires involving this material, do not

enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus.
Combustion Products: Highly dependent on combustion conditions. A complex mixture of airborne solids, liquids, and gases including carbon monoxide, carbon dioxide, and unidentified organic compounds will be evolved when this material undergoes combustion.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Protective Measures: Eliminate all sources of ignition in the vicinity of the spill or released vapor. If this material is released into the work area, evacuate the area immediately. Monitor area with combustible gas indicator.
Spill Management: Stop the source of the release if you can do it without risk. Contain release to prevent further contamination of soil, surface water or groundwater. Clean up spill as soon as possible, observing precautions in Exposure Controls/Personal Protection. Use appropriate techniques such as applying non-combustible absorbent materials or pumping. All equipment used when handling the product must be grounded. A vapor suppressing foam may be used to reduce vapors. Use clean non-sparking tools to collect absorbed material. Where feasible and appropriate, remove contaminated soil. Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations.
Reporting: Report spills to local authorities and/or the U.S. Coast Guard's National Response Center at (800) 424-8802 as appropriate or required. This material is covered by EPA's Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Petroleum Exclusion. Therefore, releases to the environment may not be reportable under CERCLA.

SECTION 7 HANDLING AND STORAGE

Precautionary Measures: READ AND OBSERVE ALL PRECAUTIONS ON PRODUCT LABEL. This product presents an extreme fire hazard. Liquid very quickly evaporates, even at low temperatures, and forms vapor (fumes) which can catch fire and burn with explosive violence. Invisible vapor spreads easily and can be set on fire by many sources such as pilot lights, welding equipment, and electrical motors and switches. Never siphon gasoline by mouth.
Use only as a motor fuel. Do not use for cleaning, pressure appliance fuel, or any other such use. Do not store in open or unlabeled containers. Do not get in eyes, on skin, or on clothing. Do not taste or swallow. Do not breathe vapor or fumes. Wash thoroughly after handling. Keep out of the reach of children.
Unusual Handling Hazards: WARNING! Do not use as portable heater or appliance fuel. Toxic fumes may accumulate and cause death.
General Handling Information: Avoid contaminating soil or releasing this material into sewage and drainage systems and bodies of water.
Static Hazard: Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding may be necessary but may not, by themselves, be sufficient. Review all operations which have the potential of generating an accumulation of electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. For more

information, refer to OSHA Standard 29 CFR 1910.106, 'Flammable and Combustible Liquids', National Fire Protection Association (NFPA 77, 'Recommended Practice on Static Electricity', and/or the American Petroleum Institute (API) Recommended Practice 2003, 'Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents'. Improper filling of portable gasoline containers creates danger of fire. Only dispense gasoline into approved and properly labeled gasoline containers. Always place portable containers on the ground. Be sure pump nozzle is in contact with the container while filling. Do not use a nozzle's lock-open device. Do not fill portable containers that are inside a vehicle or truck/trailer bed.

General Storage Information: DO NOT USE OR STORE near heat, sparks or open flames. USE AND STORE ONLY IN WELL VENTILATED AREA. Keep container closed when not in use.
Container Warnings: Container is not designed to contain pressure. Do not use pressure to empty container or it may rupture with explosive force. Empty containers retain product residue (solid, liquid, and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. They may explode and cause injury or death. Empty containers should be completely drained, properly closed, and promptly returned to a drum reconditioner or disposed of properly.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

GENERAL CONSIDERATIONS:
Consider the potential hazards of this material (see Section 3), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

ENGINEERING CONTROLS:
Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below the recommended exposure limits.

PERSONAL PROTECTIVE EQUIPMENT
Eye/Face Protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields as a good safety practice.
Skin Protection: No special protective clothing is normally required. Where splashing is possible, select protective clothing depending on operations conducted, physical requirements and other substances in the workplace. Suggested materials for protective gloves include: Chlorinated Polyethylene (or Chlorosulfonated Polyethylene), Nitrile Rubber, Polyurethane, Viton.
Respiratory Protection: Determine if airborne concentrations are below the recommended exposure limits. If not, wear an approved respirator that provides adequate protection from measured concentrations of this material, such as: Air-Purifying Respirator for Organic Vapors.
When used as a fuel, this material can produce carbon monoxide in the exhaust. Determine if airborne concentrations are below the occupational

exposure limit for carbon monoxide. If not, wear an approved positive-pressure air-supplying respirator.
Use a positive pressure air-supplying respirator in circumstances where air-purifying respirators may not provide adequate protection.

Occupational Exposure Limits:

Component	Limit	TWA	STEL	Ceiling	Notation
Benzene	ACGIH_TLV	.5 ppm	2.5 ppm		Skin A1
Benzene	OSHA_PEL	1 ppm	5 ppm		
Benzene	OSHA_Z2	10 ppm		25 ppm	
Ethanol	ACGIH_TLV	1000 ppm			A4
Ethanol	OSHA_PEL	1000 ppm			
Ethyl benzene	ACGIH_TLV	100 ppm	125 ppm		A3
Ethyl benzene	OSHA_PEL	100 ppm	125 ppm		
Ethyl tert-butyl ether (ETBE)	ACGIH_TLV	5 ppm			
Gasoline	ACGIH_TLV	300 ppm	500 ppm		A3
Gasoline	OSHA_PEL	300 ppm	500 ppm		
Methyl tert-butyl ether (MTBE)	ACGIH_TLV	50 ppm			A3

Methyl tert-butyl ether (MTBE)	ACGIH_TLV	50 ppm			
Naphthalene	ACGIH_TLV	10 ppm	15 ppm		Skin A4
Naphthalene	OSHA_PEL	10 ppm	15 ppm		
Tertiary amyl methyl ether (TAME)	CHEVRON		50 ppm		

Refer to the OSHA Benzene Standard (29 CFR 1910.1028) and Table Z-2 for detailed training, exposure monitoring, respiratory protection and medical surveillance requirements before using this product.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Attention: the data below are typical values and do not constitute a specification.

Color: Colorless to yellow
Physical State: Liquid
Odor: Petroleum odor
pH: NA
Vapor Pressure: 5 psi - 15 psi (Typical) @ 37.8°C (100°F)
Vapor Density (Air = 1): 3 - 4 (Typical)
Boiling Point: 37.8°C (100°F) - 204.4°C (400°F) (Typical)
Solubility: Insoluble in water; miscible with most organic solvents.
Freezing Point: NA
Melting Point: NA
Specific Gravity: 0.7 g/ml - 0.8 g/ml @ 15.6°C (60.1°F)
Viscosity: <1 SUS @ 37.8°C (100°F)

SECTION 10 STABILITY AND REACTIVITY

Chemical Stability: This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.
Incompatibility With Other Materials: May react with strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.
Hazardous Decomposition Products: None known (None expected)
Hazardous Polymerization: Hazardous polymerization will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

IMMEDIATE HEALTH EFFECTS
Eye Irritation: The Draize eye irritation mean score in rabbits for a 24-hour exposure was: 0/110.
Skin Irritation: For a 4-hour exposure, the Primary Irritation Index (PII) in rabbits is: 4.8/8.0.
Skin Sensitization: This material did not cause sensitization reactions in a Modified Buehler guinea pig test.
Acute Dermal Toxicity: 24 hour(s) LD50: >3.75g/kg (rabbit).
Acute Oral Toxicity: LD50: >5 ml/kg (rat)
Acute Inhalation Toxicity: 4 hour(s) LD50: >2000ppm (rat).

ADDITIONAL TOXICOLOGY INFORMATION:
Gasolines are highly volatile and can produce significant concentrations of vapor at ambient temperatures. Gasoline vapor is heavier than air and at high concentrations may accumulate in confined spaces to present both safety and heath hazards. When vapor exposures are low, or short duration and infrequent, such as during refuelling and tanker loading/unloading, neither total hydrocarbon nor components such as benzene are likely to result in any adverse health effects. In situations such as accidents or spills where exposure to gasoline vapor is potentially high, attention should be paid to potential toxic effects of specific components. Information about specific components in gasoline can be found in Sections 2, 8 and 15 of this MSDS. More detailed information on the health hazard of specific gasoline components can be obtained calling the Chevron Emergency Information Center (see Section 1 for phone numbers).

NEUROTOXICITY: Pathological misuse of solvents and gasoline, involving repeated and prolonged exposure to high concentrations of vapor is a significant exposure on which there are many reports in the medical literature. As with other solvents, persistent abuse involving repeated and prolonged exposures to high concentrations of vapor has been reported to result in central nervous system damage and eventually, death. In a study in which ten human volunteers were exposed for 30 minutes to approximately 200, 500 or 1000 ppm concentrations of gasoline vapor, irritation of the eyes was the only significant effect observed, based on both subjective and objective assessments. In an inhalation study, groups of 6 Fischer rats (3 male. 3 female) were exposed to 2056 ppm of wholy vaporized unleaded gasoline for 6 hours perday, 5 day per week for up to 18 months. Histopathology of the peripheral nervous system and spinal cord revealed no distal axonal neuropthy of the type associated with exposure to n-hexane even though gasoline contained 1.9% n-hexane. The authors concluded that gasoline treatment may have amplified the incidence and prominence of some naturally occurring age-related (subclinical) in the nervous system. BIRTH DEFECTS AND REPRODUCTIVE TOXICITY: An inhalation study with rats exposed to 0, 400 and 1600 ppm of wholly vaporized unleaded gasoline, 6 hours per day on day 6 through 16 of gestation, showed no teratogenic effects nor indication of toxicity to either the mother or the fetus. Another inhalation study in rats exposed to 3000, 6000, or 9000 ppm of gasoline vapor, 6 hours per day on day 6 through 20 of gestation, also showed no teratogenic effects nor indications of toxicity to either the mother or the fetus.

CHRONIC TOXICITY/CANCER: Wholly vaporized unleaded gasoline was used in a 3 month inhalation study. Groups of 40 rats (20 males, 20 female) and 8 squirrel monkeys (4 male, 4 female) were exposed 6 hours per day and 5 days per week for 13 weeks to 384 or 1552 ppm gasoline. One group of each species served as unexposed controls. The initial conclusion of this study was that inhalation of gasoline at airborne concentrations of up to 1522 ppm caused no toxicity in rats or monkeys. However, further histopathological examination of male rat kidneys on the highest dose group revealed an increased incidence and severity of regenerative epithelium and dilated tubules containing proteinaceous deposits. Lifetime inhalation of wholly vaporized unleaded gasoline at 2056 ppm has caused increased liver tumors in female mice. The mechanism of this response is still being investigated but it is thought to be an epigenetic process unique to the female mouse.

This exposure also caused kidney damage and eventually kidney cancer in male rats. No other animal model studied has shown these adverse kidney effects and there is no physiological reason to believe that they would occur in man. EPA has concluded that mechanism by which wholly vaporzied unleaded gasoline causes kidney damage is unque to the male rat. The effects in that species (kidney damage and cancer) should not be used in human risk assesment. In their 1988 review of carcinogenic risk from gasoline, The International Agency for Research on Cancer (IARC) noted that, because published epidemiology studies did not include any exposure data, only occupations where gasoline exposure may have ocurred were reviewed. These included gasoline service station attendants and automobile mechanics. IARC also noted that there was no opportunity to separate effects of combustion products from those of gasoline itself. Although IARC allocated gasoline a final overall classification of Group 2B, i.e. possibly carcinogenic to humans, this was based on limited evidence in experimental animals plus supporting evidence including the presence in gasoline of benzene and 1, 3-butadiene. The actual evidence for carcinogenicity in humans was considered inadequate.

MUTAGENICITY: Gasoline was not mutagenic, with or without activation, in the Ames assay (Salmonella typhimurium), Saccharamyces cerevisesae, or mouse lymphoma assays. In addition, point mutations were not induced in human lymphocytes. Gasoline was not mutagenic when tested in the mouse dominant lethal assay. Administration of gasoline to rats did not cause chomosomal aberrations in their bone marrow cells. EPIDEMIOLOGY: To explore the health effects of workers potentially exposed to gasoline vapors in the marketing and distribution sectors of the petroleum industry, the American Petroleum Institute sponsored a cohort mortality study (Publication 4555), a nested case-control study (Publication 4551), and an exposure assessment study (Publication 4552). Histories of exposure to gasoline were reconstructed for cohort of more than 18,000 employees from four companies for the time period between 1946 and 1985. The results of the cohort mortality study indicated that there was no increased mortality from either kidney cancer or leukemia among marketing and marine distribution employees who were exposed to gasoline in the petroleum industry, when compared to the general population. More importantly, based on internal comparisons, there was no association between mortality from kidney cancer or leukemia and various indices of gasoline exposure. In particular, neither duration of employment, duration of exposure, age at first exposure, year of first exposure, job category, cumulative exposure, frequency of peak exposure, nor average intensity of exposure had any effect on kidney cancer or leukemia mortality. The results of the nested case-control study confirmed the findings of the original cohort study. That is, exposure to gasoline at the levels experienced by this cohort of distribution workers is not a significant risk factor for leukemia (all cell types), acute myeloid leukemia, kidney cancer or multiple myeloma.

SECTION 12 ECOLOGICAL INFORMATION

ECOTOXICITY

The 96 hour(s) LC50 for rainbow trout (Oncorhynchus mykiss) is 2.7 mg/l.
The 48 hour(s) LC50 for water flea (Daphnia magna) is 3.0 mg/l.
The 96 hour(s) LC50 for sheepshead minnow (Cyprinodon variegatus) is 8.3 mg/l.
The 96 hour(s) LC50 for mysid shrimp (Mysidopsis bahia) is 1.8 mg/l.
This material is expected to be toxic to aquatic organisms. Gasoline studies have been conducted in the laboratory under a variety of test conditions with a range of fish and invertebrate species. An even more extensive database is available on the aquatic toxicity of individual aromatic constituents. The majority of published studies do not identify the type of gasoline evaluated, or even provide distinguishing characteristics such as aromatic content or presence of lead alkyls. As a result, comparison of results among studies using open and closed vessels, different ages and species of test animals and different gasoline types, is difficult.

The bulk of the available literature on gasoline relates to the environmental impact of monoaromatic (BTEX) and diaromatic (naphthalene, methylnaphthalenes) constituents. In general, non-oxygenated gasoline exhibits some short-term toxicity to freshwater and marine organisms, especially under closed vessel or flow-through exposure conditions in the laboratory. The components which are the most prominent in the water soluble fraction and cause aquatic toxicity, are also highly volatile and can be readily biodegraded by microorganisms.

ENVIRONMENTAL FATE

This material is expected to be readily biodegradable. Following spillage, the more volatile components of gasoline will be rapidly lost, with concurrent dissolution of these and other constituents into the water. Factors such as local environmental conditions (temperature, wind, mixing or wave action, soil type, etc), photo-oxidation, biodegradation and adsorption onto suspended sediments, can contribute to the weathering of spilled gasoline.

The aqueous solubility of non-oxygenated unleaded gasoline, based on analysis of benzene, toluene, ethylbenzene+xylenes and naphthalene, is reported to be 112 mg/l. Solubility data on individual gasoline constituents also available.

SECTION 13 DISPOSAL CONSIDERATIONS

Use material for its intended purpose or recycle if possible. This material, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA under RCRA (40 CFR 261) or other State and local regulations. Measurement of certain physical properties and analysis for regulated components may be necessary to make a correct determination. If this material is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.

SECTION 14 TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

DOT Shipping Name: GASOLINE
DOT Hazard Class: 3 (Flammable Liquid)
DOT Identification Number: UN1203
DOT Packing Group: II

SECTION 15 REGULATORY INFORMATION

SARA 311/312 CATEGORIES:

1. Immediate (Acute) Health Effects: YES
2. Delayed (Chronic) Health Effects: YES
3. Fire Hazard: YES
4. Sudden Release of Pressure Hazard: NO
5. Reactivity Hazard: NO

REGULATORY LISTS SEARCHED:

4_I1=IARC Group 1

15=SARA Section 313

4_I2A=IARC Group 2A

16=CA Proposition 65

	16=CA Proposition 65
4_I2B=IARC Group 2B	17=MA RTK
05=NTP Carcinogen	18=NJ RTK
06=OSHA Carcinogen	19=DOT Marine Pollutant
09=TSCA 12(b)	20=PA RTK

The following components of this material are found on the regulatory lists indicated.

Benzene	15, 16, 17, 18, 20, 4_I1, 5, 6
Ethanol	17, 18, 20
Ethyl benzene	15, 17, 18, 20, 4_I2B
Gasoline	17, 18, 20
Methyl tert-butyl ether (MTBE)	15, 17, 18, 20, 9
Naphthalene	15, 16, 17, 18, 20, 4_I2B
Tertiary amyl methyl ether (TAME)	9

CERCLA REPORTABLE QUANTITIES(RQ)/SARA 302 THRESHOLD PLANNING QUANTITIES(TPQ):

Component	Component RQ	Component TPQ	Product RQ
Benzene	10 lbs	None	186 lbs
Ethanol	100 lbs	None	1961 lbs
Ethyl benzene	1000 lbs	None	34964 lbs
Methyl tert-butyl ether (MTBE)	1000 lbs	None	7513 lbs
Naphthalene	100 lbs	None	4000 lbs

CHEMICAL INVENTORIES:
CANADA: All the components of this material are on the Canadian DSL or have been notified under the New Substance Notification Regulations, but have not yet been published in the Canada Gazette.
UNITED STATES: All of the components of this material are on the Toxic Substances Control Act (TSCA) Chemical Inventory.

WHMIS CLASSIFICATION:
Class B, Division 2: Flammable Liquids
Class D, Division 2, Subdivision A: Very Toxic Material - Carcinogenicity
Class D, Division 2, Subdivision B: Toxic Material - Skin or Eye Irritation

SECTION 16 OTHER INFORMATION

NFPA RATINGS: Health: 1 Flammability: 3 Reactivity: 0

(0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme, PPE:- Personal Protection Equipment Index recommendation, *- Chronic Effect Indicator). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint and Coating Association (for HMIS ratings).

Additional Product Number(s): CPS201023, CPS201054, CPS201055, CPS201075, CPS201090, CPS201105, CPS201106, CPS201120, CPS201121, CPS201122, CPS201126, CPS201128, CPS201131, CPS201136, CPS201141, CPS201142, CPS201148, CPS201153, CPS201158, CPS201161, CPS201162, CPS201168, CPS201181, CPS201185, CPS201186, CPS201188, CPS201216, CPS201217, CPS201218, CPS201236, CPS201237, CPS201238, CPS201266, CPS201267, CPS201268, CPS201277, CPS201278, CPS201279, CPS201286, CPS201287, CPS201289, CPS201296, CPS201297, CPS201298, CPS201849, CPS201850, CPS201855, CPS201856, CPS201857, CPS204000, CPS204001, CPS204002, CPS204003, CPS204010, CPS204011, CPS204022, CPS204023, CPS204046, CPS204047, CPS204070, CPS204071, CPS204088, CPS204089, CPS204104, CPS204105, CPS204116, CPS204117, CPS204140, CPS204141, CPS204164, CPS204165, CPS204188, CPS204189, CPS204200, CPS204201, CPS204212, CPS204213, CPS204224, CPS204225, CPS204248, CPS204249, CPS204272, CPS204273, CPS204290, CPS204291, CPS204322, CPS204323, CPS204324, CPS204350, CPS204352, CPS204354, CPS204356, CPS204358, CPS204359, CPS204364, CPS204365, CPS204370, CPS204371, CPS204376, CPS204377, CPS204382, CPS204383, CPS204388, CPS204389, CPS204394, CPS204395, CPS204400, CPS204401, CPS204406, CPS204407, CPS204412, CPS204413, CPS204418, CPS204419, CPS204424, CPS204425, CPS204430, CPS204431, CPS204436, CPS204437, CPS204442, CPS204446, CPS204450, CPS204454, CPS204458, CPS204462, CPS204466, CPS204467, CPS204484, CPS204485, CPS204502, CPS204503, CPS204520, CPS204521, CPS204538, CPS204539, CPS204556, CPS204557, CPS204574, CPS204575, CPS204592, CPS204593, CPS204610, CPS204611, CPS204628, CPS204629, CPS204646, CPS204647, CPS204664, CPS204665, CPS204682, CPS204690, CPS204691, CPS204696, CPS204697, CPS204702, CPS204703, CPS204708, CPS204709, CPS204721, CPS204722, CPS204727, CPS204728, CPS241765

REVISION STATEMENT: This revision updates the following sections of this Material Safety Data Sheet: Section 1 (Product Codes). This Material Safety Data Sheet has been prepared using the ProSteward MSDS system.

ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:

TLV	-	Threshold Limit Value	TWA	-	Time Weighted Average
STEL	-	Short-term Exposure Limit	PEL	-	Permissible Exposure Limit
			CAS	-	Chemical Abstract Service Number

NDA	-	No Data Available	NA	-	Not Applicable
<=	-	Less Than or Equal To	>=	-	Greater Than or Equal To

Prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200) and the ANSI MSDS Standard (Z400.1) by the ChevronTexaco Energy Research & Technology Company, 100 Chevron Way, Richmond, California 94802.

WD-40 Company

Material Safety Data Sheet

1 - Chemical Product and Company Identification

Manufacturer: WD-40 Company	**Chemical Name: Organic Mixture**
Address: 1061 Cudahy Place (92110) P.O. Box 80607 San Diego, California, USA 92138 –0607	**Trade Name: WD-40 Aerosol** **Product Use: Cleaner, Lubricant, Penetrant**
Telephone: 1-800-448-9340 Emergency only: 1-888-324-7596 (PROZAR) Information: 1-888-324-7596	**MSDS Date Of Preparation: 5/16/07**

2 – Hazards Identification

Emergency Overview:
DANGER! Harmful or fatal if swallowed. Flammable aerosol. Contents under pressure. Avoid eye contact. Use with adequate ventilation. Keep away from heat, sparks and all other sources of ignition.

Symptoms of Overexposure:
Inhalation: High concentrations may cause nasal and respiratory irritation and central nervous system effects such as headache, dizziness and nausea. Intentional abuse may be harmful or fatal.
Skin Contact: Prolonged and/or repeated contact may produce mild irritation and defatting with possible dermatitis.
Eye Contact: Contact may be mildly irritating to eyes. May cause redness and tearing.
Ingestion: This product has low oral toxicity. Swallowing may cause gastrointestinal irritation, nausea, vomiting and diarrhea. The liquid contents are an aspiration hazard. If swallowed, can enter the lungs and may cause chemical pneumonitis.
Chronic Effects: None expected.
Medical Conditions Aggravated by Exposure: Preexisting eye, skin and respiratory conditions may be aggravated by exposure.

Suspected Cancer Agent:
Yes No X

3 - Composition/Information on Ingredients

Ingredient	CAS #	Weight Percent
Aliphatic Hydrocarbon	64742-47-8 64742-48-9 64742-88-7	45-50
Petroleum Base Oil	64742-65-0	15-25
LVP Aliphatic Hydrocarbon	64742-47-8	12-18
Carbon Dioxide	124-38-9	2-3
Non-Hazardous Ingredients	Mixture	<10

4 – First Aid Measures

Ingestion (Swallowed): Aspiration Hazard. DO NOT induce vomiting. Call physician, poison control center or the WD-40 Safety Hotline at 1-888-324-7596 immediately.
Eye Contact: Flush thoroughly with water. Get medical attention if irritation persists.
Skin Contact: Wash with soap and water. If irritation develops and persists, get medical attention.

Inhalation (Breathing): If irritation is experienced, move to fresh air. Get medical attention if irritation or other symptoms develop and persist.

5 – Fire Fighting Measures

Extinguishing Media: Use water fog, dry chemical, carbon dioxide or foam. Do not use water jet or flooding amounts of water. Burning product will float on the surface and spread fire.
Special Fire Fighting Procedures: Firefighters should always wear positive pressure self-contained breathing apparatus and full protective clothing. Cool fire-exposed containers with water. Use shielding to protect against bursting containers.
Unusual Fire and Explosion Hazards: Contents under pressure. Aerosol containers may burst under fire conditions. Vapors are heavier than air and may travel along surfaces to remote ignition sources and flash back.

6 – Accidental Release Measures

Wear appropriate protective clothing (see Section 8). Eliminate all sources of ignition and ventilate area. Leaking cans should be placed in a plastic bag or open pail until the pressure has dissipated. Contain and collect liquid with an inert absorbent and place in a container for disposal. Clean spill area thoroughly. Report spills to authorities as required.

7 – Handling and Storage

Handling: Avoid contact with eyes. Avoid prolonged contact with skin. Avoid breathing vapors or aerosols. Use with adequate ventilation. Keep away from heat, sparks, hot surfaces and open flames. Wash thoroughly with soap and water after handling. Do not puncture or incinerate containers. Keep can away from electrical current or battery terminals. Electrical arcing can cause burn-through (puncture) which may result in flash fire, causing serious injury. Keep out of the reach of children.
Storage: Do not store above 120°F or in direct sunlight. U.F.C (NFPA 30B) Level 3 Aerosol.

8 – Exposure Controls/Personal Protection

Chemical	Occupational Exposure Limits
Aliphatic Hydrocarbon	100 ppm TWA (ACGIH) 1200 mg/m3 TWA (manufacturer recommended)
Petroleum Base Oil	5 mg/m3 TWA (OSHA/ACGIH)
LVP Aliphatic Hydrocarbon	1200 mg/m3 TWA (manufacturer recommended)
Carbon Dioxide	5000 ppm TWA (OSHA/ACGIH), 30,000 ppm STEL (ACGIH)
Non-Hazardous Ingredients	None Established

The Following Controls are Recommended for Normal Consumer Use of this Product
Engineering Controls: Use in a well-ventilated area.
Personal Protection:
Eye Protection: Avoid eye contact. Safety glasses or goggles recommended.
Skin Protection: Avoid prolonged skin contact. Chemical resistant gloves recommended for operations where skin contact is likely.
Respiratory Protection: None needed for normal use with adequate ventilation.

For Bulk Processing or Workplace Use the Following Controls are Recommended
Engineering Controls: Use adequate general and local exhaust ventilation to maintain exposure levels below that occupational exposure limits.
Personal Protection:
Eye Protection: Safety goggles recommended where eye contact is possible.
Skin Protection: Wear chemical resistant gloves.
Respiratory Protection: None required if ventilation is adequate. If the occupational exposure limits are exceeded, wear a NIOSH approved respirator. Respirator selection and use should be

based on contaminant type, form and concentration. Follow OSHA 1910.134, ANSI Z88.2 and good Industrial Hygiene practice.
Work/Hygiene Practices: Wash with soap and water after handling.

9 – Physical and Chemical Properties

Boiling Point:	323°F (minimum)	Specific Gravity:	0.817 @ 72°F
Solubility in Water:	Insoluble	pH:	Not Applicable
Vapor Pressure:	110 PSI @ 70°F	Vapor Density:	Greater than 1
Percent Volatile:	74%	VOC:	412 grams/liter (49.5%)
Coefficient of Water/Oil Distribution:	Not Determined	Appearance/Odor	Light amber liquid/mild odor
Flash Point:	131°F (concentrate) Tag Closed Cup	Flammable Limits: (Solvent Portion)	LEL: 1.1% UE:: 8.9%

10 – Stability and Reactivity

Stability: Stable
Hazardous Polymerization: Will not occur.
Conditions to Avoid: Avoid heat, sparks, flames and other sources of ignition. Do not puncture or incinerate containers.
Incompatibilities: Strong oxidizing agents.
Hazardous Decomposition Products: Carbon monoxide and carbon dioxide.

11 – Toxicological Information

The oral toxicity of this product is estimated to be greater than 5,000 mg/kg based on an assessment of the ingredients. This product is not classified as toxic by established criteria. It is an aspiration hazard.
None of the components of this product is listed as a carcinogen or suspected carcinogen or is considered a reproductive hazard.

12 – Ecological Information

No data is currently available.

13 - Disposal Considerations

If this product becomes a waste, it would be expected to meet the criteria of a RCRA ignitable hazardous waste (D001). However, it is the responsibility of the generator to determine at the time of disposal the proper classification and method of disposal. Dispose in accordance with federal, state, and local regulations.

14 – Transportation Information_

DOT Surface Shipping Description: Consumer Commodity, ORM-D
IMDG Shipping Description: Aerosols, 2, UN1950

15 – Regulatory Information

U.S. Federal Regulations:
CERCLA 103 Reportable Quantity: This product is not subject to CERCLA reporting requirements, however, oil spills are reportable to the National Response Center under the Clean Water Act and many states have more stringent release reporting requirements. Report spills required under federal, state and local regulations.
SARA TITLE III:
Hazard Category For Section 311/312: Acute Health, Fire Hazard, Sudden Release of Pressure

Section 313 Toxic Chemicals: This product contains the following chemicals subject to SARA Title III Section 313 Reporting requirements: None
Section 302 Extremely Hazardous Substances (TPQ): None
EPA Toxic Substances Control Act (TSCA) Status: All of the components of this product are listed on the TSCA inventory
Canadian Environmental Protection Act: All of the ingredients are listed on the Canadian Domestic Substances List or exempt from notification
Canadian WHMIS Classification: Class B-5 (Flammable Aerosol)
This MSDS has been prepared according to the criteria of the Controlled Products Regulation (CPR) and the MSDS contains all of the information required by the CPR.

16 – Other Information:

HMIS Hazard Rating:
Health – 1 (slight hazard), Fire Hazard – 4 (severe hazard), Reactivity – 0 (minimal hazard)

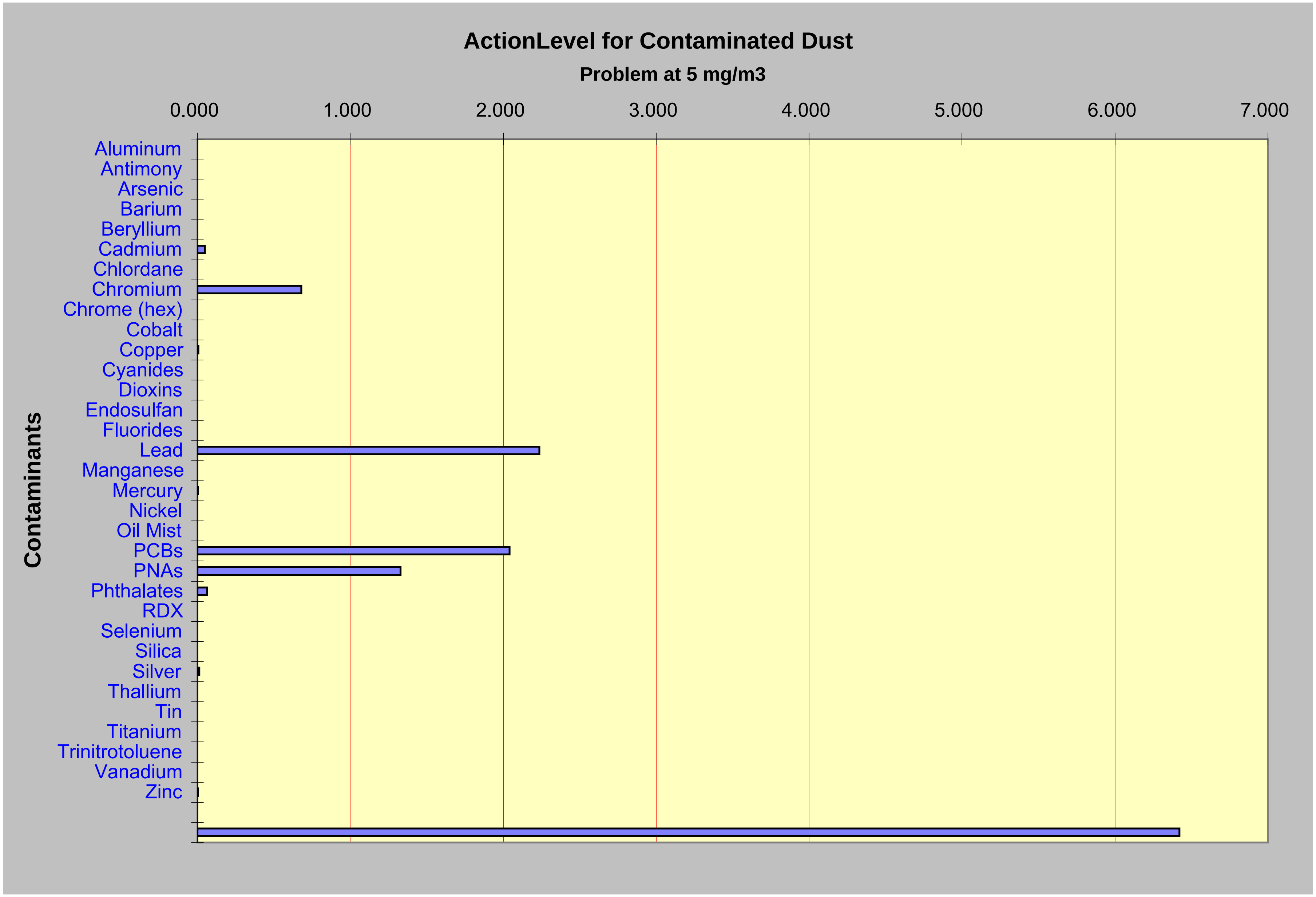
SIGNATURE: Peter P. Ly TITLE: Director of Global Quality Assurance

REVISION DATE: Revision Date: May 2007 SUPERSEDES: December 2004

APPENDIX E

Dust Exposure Calculation Worksheet

DUST EXPOSURE CALCULATION WORKSHEET				
DustLevel		Safety Factor for this site = 4		
Chemical	Exposure Limit (mg/m3)	Maximum Soil Concentration (mg/kg)	Exposure Limit Based on Single Compound (EL Mix, mg/m3)	Dust Quotient for Each Compound (level/limit)
Aluminum	5	1.E-9	1.25E+15	2.00E-10
Antimony	0.5	1.E-9	1.25E+14	2.00E-09
Arsenic	0.01	1.E-9	2.5E+12	1.00E-07
Barium	0.5	1.E-9	1.25E+14	2.00E-09
Beryllium	0.002	1.E-9	5.E+11	5.00E-07
Cadmium	0.005	12	100.81	2.48E+03
Chlordane	0.5	1.E-9	1.25E+14	2.00E-09
Chromium	0.01	340	7.35	3.40E+04
Chrome (hex)	0.01	1.E-9	2.5E+12	1.00E-07
Cobalt	0.02	1.E-9	5.E+12	5.00E-08
Copper	1	297	841.75	2.97E+02
Cyanides	5	1.E-9	1.25E+15	2.00E-10
Dioxins	0.001	1.E-9	2.5E+11	1.00E-06
Endosulfan	0.1	1.E-9	2.5E+13	1.00E-08
Fluorides	2.5	1.E-9	6.25E+14	4.00E-10
Lead	0.05	5,590	2.24	1.12E+05
Manganese	0.2	1.E-9	5.E+13	5.00E-09
Mercury	0.025	4.6	1,358.7	1.84E+02
Nickel	1	1.E-9	2.5E+14	1.00E-09
Oil Mist	5	1.E-9	1.25E+15	2.00E-10
PCBs	0.5	51,000	2.45	1.02E+05
PNAs	0.2	13,290	3.76	6.65E+04
Phthalates	5	15,700	79.62	3.14E+03
RDX	1.5	1.E-9	3.75E+14	6.67E-10
Selenium	0.2	1.E-9	5.E+13	5.00E-09
Silica	0.05	1.E-9	1.25E+13	2.00E-08
Silver	0.01	5.7	438.6	5.70E+02
Thallium	0.1	1.E-9	2.5E+13	1.00E-08
Tin	2	1.E-9	5.E+14	5.00E-10
Titanium	10	1.E-9	2.5E+15	1.00E-10
Trinitrotoluene	0.5	1.E-9	1.25E+14	2.00E-09
Vanadium	0.05	1.E-9	1.25E+13	2.00E-08
Zinc	10	1,740	1,436.78	1.74E+02
			Sum	3.21E+05
Dust Exposure Level at Mixture PEL =			0.779	


ActionLevel for Contaminated Dust
Problem at 5 mg/m3
0.000
1.000
2.000
3.000
4.000
5.000
6.000
7.000
Contaminants
Aluminum
Antimony
Arsenic
Barium
Beryllium
Cadmium
Chlordane
Chromium
Chrome (hex)
Cobalt
Copper
Cyanides
Dioxins
Endosulfan
Fluorides
Lead
Manganese
Mercury
Nickel
Oil Mist
PCBs
PNAs
Phthalates
RDX
Selenium
Silica
Silver
Thallium
Tin
Titanium
Trinitrotoluene
Vanadium
Zinc

APPENDIX F

Emergency Summary Information

SITE-SPECIFIC HEALTH AND SAFETY PLAN SUMMARY

Approvals		
	Initials	Date
Prepared By	RHG	5/13/11
Approved By		

PROJECT INFORMATION

Date(s) of Fieldwork: Not Available

Project Name: Boeing Isaacson-Thompson Sediment Sampling

Project Number: LY11160060

Client: The Boeing Company Site Phone: none

Site Address:

Boeing Isaacson-Thompson Site, S 87th Place and East Marginal Way S, Seattle, Washington

☒ Site Plan Attached

Scope of Work: Collect and process sediment cores and grabs

Type of Project: ☒ Environmental; ☐ Geotechnical; ☐ Industrial Process;

☒ HAZWOPER Project: Training & Medical Surveillance must conform to 29 CFR 1910.120 & AMEC guidelines.

☐ Client Specific Requirements (Attached)

KEY CONTACTS

Project Manager: Cliff Whitmus Phone: 425-921-4023 Cell: 206-300-0520

Project H&S Officer: Tim Reinhardt Phone: 206-838-8464 Cell: 425-241-5816

Site H&S Officer: Gary Maxwell Phone: 425-921-4027 Cell: 206-276-1034

Client Contact: (1) Katie Moxley Phone: 425-237-1905 Cell: 206-579-2110

(2) Kris Hendrickson (Landau) Phone: 425-778-0907 Cell: 206-910-1378

Corp. Health & Safety Manager: Don Kubik, Jr. Phone: 510-663-4115 Cell: 510-368-6433

WorkCare: 1-800-455-6155 (call within 1 hour of injury)

Emergency Medical Facility:

Harborview Medical Center, 325 Ninth Avenue, Seattle, Washington

Phone Number (general): 206-731-3000 Phone Number (emergency): 206-744-3074

☒ Emergency Medical Facility Confirmed ☒ Map to the hospital is attached

Police, Fire, Paramedic / Ambulance,

call Boeing Emergency Response 206-655-2222

Poison Control Center: 1-800-222-1222

EMERGENCY PROCEDURES

Medical Emergencies

1. Remove injured or exposed person(s) from immediate danger if possible.
2. Evacuate other on-site personnel to a safe place in an upwind direction until it is safe for work to resume.
3. If serious injury or life-threatening condition exists, call **Boeing Emergency 206-655-2222**. Clearly describe location, injury and conditions to dispatcher/hospital. Designate a person to direct emergency equipment to the injured person(s).
4. Provide first aid if necessary. Remove contaminated clothing only if this can be done without endangering the injured person.
5. Call WorkCare within 1 hour of injury for advice.
6. Call the Boeing and AMEC Project Managers and/or Project Health & Safety Officer within 1 hour of injury.
7. For serious accidents involving a fatality, life threatening injuries, or multiple persons being injured, the accident scene should be persevered for investigators. Equipment involved in the accident should only be moved to the extent necessary to conduct rescue operations and to prevent further injuries.
8. Immediately implement steps to prevent recurrence of the accident.
9. File an Incident Report within 24 hours.

Accidental Release of Hazardous Materials or Wastes

1. Evacuate all on-site personnel to a safe place in an upwind direction until the Project Manager or Site Health & Safety Officer determines that it is safe for work to resume.
2. Call **Boeing Emergency 206-655-2222**. Clearly describe location and conditions to dispatcher.
3. Immediately instruct a designated person to contact the Project Manager or Site Health & Safety Officer.
4. Contain spill, if it is possible and it can be done safely.
5. Initiate cleanup, if it can be done safely.

General Emergencies

In the case of fire, flood, explosion, or other hazard, work shall be halted and the local police / fire department shall be notified by calling **Boeing Emergency 206-655-2222**. All on-site personnel will be immediately evacuated to a pre-agreed on safe place.

Emergency Equipment On-Site

☒ First Aid Kit; ☒ Fire Extinguisher; ☐ Eye Wash; ☐ Other: _____

MAJOR CHEMICAL HAZARDS
See Appendix Tables 1A, 1B, 2A, and 2B.

TASK	Anticipated Hazards															
	Hazards															
		Physical														
	Chemical	Slip / Trip / Fall	Heavy Equipment	Underground Utilities	Overhead Power Lines	Noise	Heat Stress	Cold Stress	Sunburn	Sharp/abrasion	Trench/Excavation	Confined Space	Traffic	Insects and Wildlife	Electrical	General Safety
Sediment Sampling	✓	✓				✓	✓			✓			✓			✓
Core Processing	✓	✓	✓			✓	✓			✓			✓		✓	✓

SITE CONTROLS: Set up exclusion zone and contamination reduction zone.

PERSONAL DECONTAMINATION PROCEDURES: Wash hands and boots before leaving exclusion area.

PERSONAL PROTECTIVE EQUIPMENT – R = REQUIRED, A = HAVE AVAILABLE

☒ Eye Protection: ☒ Safety Glasses; ☐ Splash Goggles; ☐ Face Shield; ☐ Other: _____

☒ Hard Hat ☒ Steel-Toed Boots ☒ Chemical Resistant Boots

__ Traffic Safety Vest ☒ Hearing Protection: _____

☒ Protective Clothing: ☒ Tyvek®; ☒ Rain Gear

☒ Gloves: ☒ Nitrile; ☒ PVC; ☐ Neoprene; ☐ Cloth/leather; ☐ Other _____

☐ Respiratory: ☐ Full-Face APR; ☐ Half-Face APR, have available

☐ Filter: ☐ Organic Vapor; ☐ Acid Gas; ☐ HEPA; ☐ Other: _____

☐ Other: _____

MONITORING EQUIPMENT

☐ Photo Ionization Detector with 10.6 eV lamp ☐ Flame Ionization Detector

☐ CHIP™ detector with 0.3 to 10 ppm vinyl chloride sampling tubes

Frequency of monitoring: Complete an Environmental Health and Safety Meeting Form each day (see Appendix B).

APPENDIX E

Historical Summary of Contaminants Used at the Site

TABLE E-1
SUMMARY OF CHEMICALS USED
BOEING THOMPSON PROPERTY – TUKWILA, WASHINGTON

Chemicals Potentially Used/Stored or Presently/Formerly Present on Subject Property

2-Pentanone	Lead
Aliphatic Naphtha	Manganese
Ammonia	Methyl Cyclohexane
Aromatic Naphtha	Methyl Ethyl Ketone (MEK)
Butyl Acetate	Methyl Isobutyl
Butyl Acetate, n-	Methyl Isobutyl Ketone (MIBK)
Butyl Alcohol, n-	Methylene Bisphenyl Isocyanate
Butyl Cellosolve	Methylene Chloride
Butyl Xylene	Methylene Diphenyl Diisocyanate (MDI)
Cellosolve Acetate	Naphtha
Chromate	Naphtha VM&P
Chromic acid and chromates (as CRO_3)	n-Butanol
Copper Dust	n-Butyl Acetate
Cyclohexane	n-Propanol
Cyclohexanone	sec-Butanol
Ethoxy Ethyl Acetate	Stoddard solvent
Ethoxyethyl acetate, 2-	Toluene
Ethyl Acetate	Toluene diisocyanate (TDI)
Ethyl acrylate	Total Aldehydes (as Formaldehyde)
Hexamethylene Diisocyanate	Trimethyl Benzene
Hydrogen Cyanide	Xylen 2-Ethoxy Ethyl Acetate
Iron Oxide Fumes	Xylene
Isopropanol O	Xylene (mixed isomers)
Isopropyl Alcohol	

Note:
This list was developed based on Boeing Industrial Hygiene records.

ISAACSON CORPORATION

STATEMENT OF HAZARDOUS WASTE DISPOSAL

In accordance with the provisions of the purchase agreement, a check of all records and practices related to the storage disposal of hazardous wastes and substances has been conducted. Available data indicates that a very low level of hazardous waste has been generated.

PCB - No fabrication functions or plant operations uses or produces PCB. Seattle City Light's Industrial Advisor Group has indicated that PCB has never been used in their transformers.

OILS - Oils are used for machine lubrication only. Waste oil is deposited in a special container and disposed of by a commercial contractor licensed to handle this type of material. New or unused oil is stored in a central location with drip containers positioned to contain any oil spills.

In 1971, traces of lube oil used with a friction steel cutting saw could have entered the Duwamish Waterway via cooling water flowing into an overflow storm sewer. The overflow was raised and cooling water level reduced to prevent the possibility of pollution. This machine will be removed from plant prior to occupancy by Boeing.

In the painting area, the water air wash system used to prevent paint solids from being exhausted into the atmosphere have been disconnected from the storm sewer so that contaminates cannot be pumped into the storm sewer that empties into the Waterway.

GASOLINE - Gasoline is stored in 2 - 5,000 gallon underground tanks located in the Southeast corner of the property.

DIESEL - Diesel is stored in 2 - 5,000 gallon underground tanks located in the same area as the gasoline tanks; also 1 - 500 gallon surface tank as standby fuel for the boiler, located near the maintenance shop.

SOLVENTS - Solvents are used by the Maintenance Department in conjunction with the steam cleaning of equipments. An 8' x 10' cleaning rack is supported by a sand and gravel sump which can be emptied when full of waste sludge. There is no sewer connection to or from this pit. Waste sludge and used solvent from a small parts cleaning tank located in the maintenance area is removed by commercial waste disposal companies.

Metal processing, acids, bases - None are used in structural fabrication.

Asbestos - None used in structural fabrication.

Lead - None used in structural fabrication. Wheelabrator blast machine uses steel shot, blast chamber used ceramic substance.

An interview of several long term employees was used to supplement information contained in company records. No indications of any hazardous waste deposits on the Isaacson property were disclosed.

Reference: Attachment "A" to Boeing Aerospace Company Request for Proposal, Letter 2-4163-2000-97, dated July 28, 1983.

Dames & Moore

APPENDIX F

Phase I ESA 2008 Site Reconnaissance

SITE RECONNAISSANCE – BOEING THOMPSON PROPERTY

A site reconnaissance of the Boeing Thompson and Isaacson properties was conducted on January 31, 2008 and April 21, 2008 (Landau Associates 2008a,b). The focus of the reconnaissance was to visually identify conditions that have the potential to cause adverse environmental impacts at the subject property that could pose an environmental liability to a property owner or operator.

BOEING ISAACSON PROPERTY

The results of the site reconnaissance for the Boeing Isaacson property are summarized below and in Table F-1.

- The subject property is 9.84 acres in size. There are no structures located on the subject property. The surface of the subject property is entirely covered by asphalt or concrete. Areas of concrete appear to be associated with old building foundations. An asphalt-paved mound is present in the north-central portion of the subject property, resulting from a soil stabilization project that was completed at the subject property in 1991. The highest point of the mound is approximately 6 to 7 ft higher than the surrounding grade.
- The subject property is currently used by Boeing for limited storage of empty containers and for truck parking.
- A 48-inch storm drain line is located on the subject property and conveys stormwater from a portion of the King County International Airport (KCIA) located east of the subject property, across East Marginal Way South. Five manholes associated with the drain line are visible on the subject property.
- One pole-mounted electrical transformer was observed along the eastern boundary of the subject property. The transformer was in good condition at the time of the site reconnaissance. There were no visible labels regarding PCB content.

BOEING THOMPSON PROPERTY

The results of the site reconnaissance for the Boeing Thompson property are summarized below and in Table F-2.

- The subject property is approximately 19.35 acres. The subject property is developed with nine buildings, a water tank, a substation, and several hazardous waste accumulation trailers. Areas outside the building footprints are either asphalt-paved or covered in concrete.
- Building 14-01 is a large concrete and steel building, which occupies the eastern two-thirds of the subject property. The northern portion of the building consists of a three-story office area. The southern portion of the building consists of an open manufacturing area and warehouse space. The manufacturing area was not in use at the time of the site reconnaissance.
- An aqueous degreaser is located along the western wall of Building 14-01. The degreaser was not in use at the time of the site reconnaissance. A sign on the degreaser indicates that Daraclean 212, a non-hazardous substance, was used in the cleaning solution. Pumps and

other equipment associated with the degreaser are located in a separate mechanical room to the south of the degreaser. A sump is located within the mechanical room. Liquid was observed in the sump at the time of the site reconnaissance. Labels on piping and equipment within the mechanical room indicate that the sump is associated with a brush plating system, which formerly operated near the current location of the aqueous degreaser. The sump and associated piping may have been converted for use associated with the aqueous degreaser.

- Areas labeled as hazardous materials collection areas were observed within Building 14-01, including in the area of the degreaser, near the center of the building, and along the northern wall of the center of the building. With the exception of the area along the northern wall of the building, no hazardous materials were observed in these areas during the site reconnaissance. Materials observed along the northern wall included batteries, chromate/ water-based paint waste, sec-butyl alcohol, toluene, and contaminated debris. These materials were stored in 55-gallon drums and were being consolidated in this area for disposal. Several of the drums were located on secondary containment systems. There was no evidence of releases from any of the containers.

- Ducting associated with a former small paint booth was observed near the southwestern corner of Building 14-01. Limited paint staining was observed on the surface of the concrete floor in this area.

- Four linear patches were observed in the surface of the concrete floor in the southwestern portion of Building 14-01. The patches are oriented north to south and are approximately 4 ft in length and 18 inches in width. Based on available information, the patches are associated with former trenches that were part of a downdraft system.

- Building 14-02 is the boiler house and is located near the northwestern corner of the subject property. The boiler and associated mechanical equipment are located in this building. A natural gas meter is located near the northwestern corner of the building. Electrical transformers are located along the northern exterior wall of the building and are not labeled as to polychlorinated biphenyl (PCB) content.

- Building 14-03 is a concrete block mechanical building and is attached to the eastern side of Building 14-02. Equipment associated with a hydraulic systems test pad located to the east of Building 14-03 is in this building, but was not in use at the time of the site reconnaissance.

- Building 14-14 is a metal and concrete structure located to the west of Building 14-01 that houses condensers and chillers associated with Building 14-01 operations.

- Building 14-13 is a pump house associated with the fire protection system and is located in the southwestern corner of the subject property. A circular wooden water tank is located to the north of the pump house.

- One active and one inactive guard shack (unlabeled structure and Building 14-11), a restroom/shower unit (Building 14-12), cafeteria (Building 14-15), and substation (Building 14-22) are located along the eastern boundary of the subject property. Dark staining was observed on the gravel surface along the northern side of the substation.

- The portions of the subject property that are outside of the building footprints are asphalt-paved or concrete-covered. A parking area is located to the north of Building 14-01 and equipment staging areas are located in the northern and western portions of the subject property. Stormwater catch basins located in the parking area are connected to oil/water separators that discharge to the Duwamish Waterway via two outfalls along the western subject property boundary.

- Four aboveground storage tanks (ASTs) were observed on the subject property. A 5,000-gallon AST was observed in the western yard of Building 14-01. The AST is labeled "overflow for the aqueous degreaser" and is located within a covered concrete containment structure, which is closed on two sides. A 550-gallon AST containing diesel fuel was observed on the western side of Building 14-02. This AST is associated with an emergency generator. A 240-gallon AST containing diesel fuel was observed on the northern side of Building 14-13 and is associated with an emergency generator for the fire protection system. The diesel ASTs are located within covered concrete containment structures. A propane AST was observed along the western subject property boundary. Evidence of releases from the ASTs was not observed during site reconnaissance.

- A patch was observed in the asphalt on the western side of Building 14-02. Based on available information, a 20,000-gallon underground storage tank (UST) was abandoned in place in this area, and a 1,000-gallon leaded gasoline UST and 500-gallon diesel fuel UST were removed from this area.

- The subject property is located in an area of industrial properties. It is bordered on the north by the Boeing Isaacson property followed by Jorgensen Forge Corp.; on the south by Insurance Auto Auctions (formerly Kenworth Truck Company and Paccar); on the east by East Marginal Way South followed by North Boeing Field; and on the west by the Duwamish Waterway.

REFERENCES

Landau Associates. 2008a. Report: *Environment, Health, and Safety Assessment/Phase I Environmental Site Assessment, Boeing Isaacson Property, Tukwila, Washington*. September 15.

Landau Associates. 2008b. Report: *Environment, Health, and Safety Assessment/Phase I Environmental Site Assessment, Boeing Thompson Property, Tukwila, Washington*. August 11.

TABLE F-1
SUBJECT PROPERTY CHECKLIST
ISAACSON PROPERTY – TUKWILA, WASHINGTON

Checklist Item	Present	Not Observed	Remarks
Chemical Storage Areas		√	
Solid Waste		√	
Hazardous Waste		√	
Evidence of Dumping		√	
Use of Fill Material	√		Fill material was not observed at the time of the site reconnaissance; however, a slip of the Duwamish Waterway was formerly located on the subject property and is known to have been filled in the late 1950s and 1960s.
Soil or Groundwater Contamination	√		Based on the findings of previous investigations at the subject property, soil and groundwater are known to be contaminated with metals, specifically arsenic.
Underground Storage Tanks (USTs)		√	Five USTs have been removed from the subject property. There are no known USTs on the subject property at this time.
Aboveground Storage Tanks (ASTs)		√	
Electrical Transformers	√		A pole-mounted electrical transformer is located along the eastern boundary of the subject property. The transformer appeared to be in good condition at the time of the site reconnaissance. There were no visible labels identifying the PCB content of the transformer.
Septic Tanks		√	
Pits, Ponds, and Lagoons		√	

TABLE F-2
SUBJECT PROPERTY CHECKLIST
BOEING THOMPSON PROPERTY – TUKWILA, WASHINGTON

Checklist Item	Present	Not Observed	Remarks
Chemical Storage Areas	√		Several 55-gallon drums were observed in a hazardous waste accumulation area in the north-central portion of Building 14-01. The drums were observed to be in good condition with no apparent leaks and are temporarily stored in this area awaiting disposal. Hazardous materials storage sheds are located west of Building 14-01 (south of Building 14-03). The sheds that were accessible at the time of the site reconnaissance were empty; however, not all of the sheds were accessible.
Solid Waste		√	
Hazardous Waste	√		Several 55-gallon drums were observed in a hazardous waste accumulation area in the north-central portion of Building 14-01. The drums were observed to be in good condition with no apparent leaks and are temporarily stored in this area awaiting disposal.
Evidence of Dumping		√	
Use of Fill Material	√		Fill material was not observed at the time of the site reconnaissance; however, a slip of the Duwamish Waterway was formerly located on the subject property and is known to have been filled in the late 1950s and 1960s.
Soil or Groundwater Contamination	√		Based on the findings of previous investigations at the subject property, soil and groundwater are known to be contaminated with metals.
Underground Storage Tanks (USTs)	√		Three USTs were formerly located in the western yard of Building 14-02. One 20,000-gallon UST was closed-in-place and two USTs were removed. A patch in the asphalt was observed in this area at the time of the site reconnaissance.
Aboveground Storage Tanks (ASTs)	√		Four ASTs were observed on the subject property. An approximately 500-gallon AST containing diesel fuel is located on the western side of Building 14-02. An approximately 200-gallon diesel AST is located on the northern side of Building 14-13. A 5,000-gallon AST is located in the western yard of Building 14-01 and contains overflow from the aqueous degreaser on the interior of Building 14-01. A propane AST is located along the western property boundary.
Electrical Transformers	√		An electrical substation is located within a fenced area in the southeastern corner of the subject property. Electrical transformers are located on the northern side of Building 14-02. The transformers are not labeled as containing PCBs.
Septic Tanks		√	
Pits, Ponds, and Lagoons		√	

APPENDIX G

Previous Investigation Results for Soil at the Site

TABLE G-1
HISTORICAL ARSENIC SOIL ANALYTICAL RESULTS
LOCATIONS NORTH OF FORMER SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Sample ID	Sample Date	Sample Depth	Arsenic (mg/kg)
1	8/1/83	5.5	3.4
2	8/1/83	2.5	8.7
4	8/1/83	2.5	270.5
4	8/1/83	2.5	124
4	8/1/83	6.5	551
4	8/1/83	10.5	15
10	8/1/83	6	20
10	8/1/83	11	4.7
10-Dup	8/1/83	11	8.8
10	8/1/83	13.5	7.1
13	8/1/83	9	7.2
13	8/1/83	13.5	4.5
14	8/1/83	2	41
18	8/1/83	2	11
18	8/1/83	6.5	4.2
210	1/13/88	13.5-14	48
211	1/12/88	3.5-4	4
211	1/12/88	8.5-9	2 U
211	1/12/88	13.5-14	2
213	1/11/88	2.5-3	3
213	1/11/88	7.5-9	3
213	1/11/88	12.5-13	3 U
213	1/11/88	17.5-18	2 U
214	1/13/88	13.5-14	4
216	1/12/88	2.5-3	4
216	1/12/88	7.5-8	133
216	1/12/88	12.5-13	2
217	1/12/88	2.5-3	4
217	1/12/88	7.5-8	331
217	1/12/88	12.5-13	4.5
217	1/12/88	17.5-18	7
218	1/25/88	3-3.5	2
218	1/25/88	8-8.5	2
218	1/25/88	13-13.5	3
218	1/25/88	18-18.5	5
219	1/13/88	2.5-3	3
219	1/13/88	7.5-9	46
219	1/13/88	12.5-13	33
220	1/13/88	13.5-14	3
221	1/13/88	2.5-3	8
221	1/13/88	7.5-8	7
221	1/13/88	12.5-13	3
222	1/13/88	12.5-13	46
223	1/13/88	12.5-13	6
225	1/13/88	3-3.5	153
225	1/13/88	7.5-8	30
225	1/13/88	12.5-13	6

TABLE G-1
HISTORICAL ARSENIC SOIL ANALYTICAL RESULTS
LOCATIONS NORTH OF FORMER SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Sample ID	Sample Date	Sample Depth	Arsenic (mg/kg)
226	1/22/88	13.5-14	90
227	1/13/88	13.5-14	3
229	1/14/88	3.5-4	37
229	1/14/88	8.5-9	384
229	1/14/88	13.5-14	1
231	1/22/88	13.5-14	60
235	1/14/88	3.5	59
235	1/14/88	8.5	40
235	1/14/88	13.5	51
238	1/22/88	13.5	242
239	1/22/88	3.5	34
239	1/22/88	8.5	3500
239	1/22/88	13.5	511
241	1/14/88	3.5	43
241	1/14/88	8.5	10
241	1/14/88	13.5	63
242	1/25/88	13	113
243	1/25/88	3	61
243	1/25/88	8	51
243	1/25/88	13	7
313	6/22/92	0-2.5	47.6
313	6/22/92	2.5-6.5	15.8
313	6/22/92	6.5-9.5	6.4 U
317	6/22/92	0-2.5	13.1
317	6/22/92	2.5-6.5	49
317	6/22/92	6.5-9.5	59
318	6/22/92	0-2.5	5.6 U
318	6/22/92	2.5-6.5	98.4
318	6/22/92	6.5-9.5	69.8
328	6/22/92	0-2.5	187
328	6/22/92	2.5-6.5	166
328	6/22/92	6.5-9.5	124
330	6/22/92	0-2.5	5.9 U
330	6/22/92	2.5-6.5	6.3 U
330	6/22/92	6.5-9.5	5.2 U
416	8/31/92	0-2.5	240
416	8/31/92	2.5-6.5	547
416	8/31/92	6.5-10.5	37
417	8/31/92	0-2.5	215
417	8/31/92	2.5-6	523
417	8/31/92	6-10.5	486
I-2	10/14/83	14.5	1200
I-3	10/21/83	10.5	11
I-4	10/20/83	3	510

TABLE G-1
HISTORICAL ARSENIC SOIL ANALYTICAL RESULTS
LOCATIONS NORTH OF FORMER SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Sample ID	Sample Date	Sample Depth	Arsenic (mg/kg)
I-8	1/19/88	12.5	262
I-8	1/19/88	17.5	53
I-8	1/19/88	27.5	5
I-8	1/19/88	37.5	3
I-8	1/19/88	47.5	3
I-200s	1/14/88	2.5	3
I-200s	1/14/88	7.5	4
I-200s	1/14/88	12.5	2
I-200s	1/14/88	22.5	4
I-201s	1/22/88	2.5	10
I-201s	1/22/88	7.5	136
I-201s	1/22/88	12.5	176
I-201s	1/22/88	17.5	15
I-201s	1/22/88	27.5	3
IDP-1	2/2/09	4	60
IDP-1A	2/2/09	9	186
IDP-1A	2/2/09	14	9
IDP-2	39846	4	180
IDP-2	2/2/09	8	6 U
IDP-2	2/2/09	11	6 U
IDP-3	2/2/09	4	34
IDP-3	2/2/09	8	48
IDP-3	2/2/09	11	6 U
IDP-4	2/2/09	4	15
IDP-4	2/2/09	8	17
IDP-4	2/2/09	11	6 U
IDP-5	2/2/09	4	60 U
IDP-5	2/2/09	8	333
IDP-5	2/2/09	11	5 U
IDP-6	2/2/09	4	10 U
IDP-6	2/2/09	8	71
IDP-6	2/2/09	12	5 U
IDP-6A	2/3/09	3	14
IDP-7	2/3/09	3	50 U
IDP-8	2/3/09	3	32
IDP-9	2/3/09	3	30
IDP-10	2/3/09	2	23
IDP-11	2/3/09	11	6 U
IDP-12	2/3/09	12	204
IDP-13	2/3/09	12	18
IDP-14	2/3/09	11	220
IDP-15	2/3/09	12	274
IMR-2	10/17/08		5 U
IMR-3	11/13/08		294

TABLE G-1
HISTORICAL ARSENIC SOIL ANALYTICAL RESULTS
LOCATIONS NORTH OF FORMER SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Sample ID	Sample Date	Sample Depth	Arsenic (mg/kg)
IMR-4	10/17/08		1120
IMR-5	10/17/08		8
IMR-6	10/17/08		2440
IMR-7	10/27/08		5 U
IMR-8	10/17/08		253
IMR-10	11/4/08		38
IMR-11	10/27/08		524
IMR-11	11/4/08		439
IMR-12	10/27/08		1780
IMR-12	11/4/08		485
IMR-14	11/4/08		70
IMR-15	11/4/08		919
IMR-16	11/4/08		30
IMR-18	11/13/08		397
IMR-19	11/13/08		383
IssacEx-01-5	11/30/06		18.1
IssacEx-02-1.5	11/30/06		25.1
IssacEx-03-2	11/30/06		6.6
PBI-1	7/27/09	2	28.9 J
PBI-1	7/27/09	5	5.8
PBI-1	7/27/09	8	14.7
PBI-2	7/27/09	2	23.5
PBI-2A	7/27/09	5	329
PBI-2A	7/27/09	8	58.2
PBI-3	7/27/09	2	8.4
PBI-3	7/27/09	5	754
PBI-3	7/27/09	8	4.8
T-1	8/1/84	8-9	26
T-4	8/1/84	8-9	10
M23-1-N	10/17/91		460
M23-1-S	10/18/91		30
M23-2-E2	10/17/91		46
M23-2-E3	10/18/91		62
M23-2-E4	10/18/91		59
M23-2-E5	10/18/91		6

TABLE G-1
HISTORICAL ARSENIC SOIL ANALYTICAL RESULTS
LOCATIONS NORTH OF FORMER SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Sample ID	Sample Date	Sample Depth	Arsenic (mg/kg)
M23-2-N	10/17/91		424
M23-2-S	10/18/91		86
M23-3E1-E	10/22/91		77
M23-3E1-N	10/22/91		64
M23-3E1-S	10/22/91		150
M2W-1-N	9/25/91		586
M2W-1-S	9/25/91		5 U
M2W-2-N	9/25/91		649
M2W-2-S	9/25/91		74
M2W-3-N	9/25/91		601
M2W-3-S	9/25/91		69
M2W-4AS-E	10/18/91		11
M2W-4AS-S	10/18/91		33
M2W-4AS-W	10/18/91		33
M2W-4-N	9/26/91		396
M2W-5-N	9/26/91		94
M2W-5-S	9/26/91		110
M2W-6AS-E	10/18/91		45
M2W-6AS-S	10/18/91		43
M2W-6AS-W	10/18/91		78
M2W-6-N	9/26/91		140
M2W-7-N	9/26/91		120
M2W-7-S	9/26/91		73
M2W-8-N	9/30/91		663
M2W-8-S	9/26/91		20
M2W-9-N	10/1/91		229
M2W-9-S	9/30/91		26
M2W-10-N	10/1/91		655
M2W-10-S	9/30/91		17
M2W-11-N	10/1/91		10
M2W-11-S	10/1/91		7
M2W-12-N	10/1/91		621
M2W-12-S	10/1/91		26
M2W-13A-S	10/18/91		79
M2W-13AS-E	10/18/91		60
M2W-13-AS-W	10/18/91		46
M2W-13-N	10/2/91		980
M2W-14-N	10/2/91		858
M2W-14-S	10/1/91		16
M2W-15-N	10/2/91		604
M2W-15-S	10/2/91		16
M2W-16-N	10/2/91		200
M2W-16-S	10/2/91		54
M2W-17AS-E	10/18/91		47
M2W-17AS-S	10/18/91		41
M2W-17-N	10/3/91		1760
M2W-17-W1	10/3/91		65
M2W-17-W2	10/3/91		130
M2W-17-W3	10/3/91		214
M2W-18A-S	10/14/91		110
M2W-18-N	10/10/91		92
M2W-19B-E	11/7/91		22
M2W-19B-S	11/7/91		22
M2W-19-N	10/14/91		160
M2W-20B-S	11/7/91		28
M2W-20B-W	11/7/91		26
M34-1B-S	10/21/91		44
M34-1-E4	10/15/91		97
M34-1-N	10/15/91		249
M34-2A-E	10/18/91		160
M34-2AS-N	10/18/91		36
M34-2B-E	10/21/91		130
M34-2B-S	10/21/91		17
M34-2-E2	10/15/91		120

TABLE G-1
HISTORICAL ARSENIC SOIL ANALYTICAL RESULTS
LOCATIONS NORTH OF FORMER SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Sample ID	Sample Date	Sample Depth	Arsenic (mg/kg)
M34-2-E3	10/16/91		90
M34-2E3-N	10/16/91		150
M34-2E3-S	10/16/91		110
M34-2-N	10/15/91		200
M34-3E1-E2	11/4/91		110
M34-3E1-N	10/22/91		399
M34-3E1-N2	11/4/91		230
M34-3E1-S2	11/4/91		140
M34-8A-S	10/22/91		170
M34-8A-W	10/22/91		150
M34-8B-N	11/5/91		96
M34-8B-W	11/5/91		150
M3W-0B-S	10/18/91		190
M3W-0-NW	10/4/91		259
M3W-1-NW	10/4/91		204
M3W-2B-S	10/21/91		71
M3W-2B-W	10/21/91		276
M3W-2NW	10/4/91		851
M3W-3A-NW	9/30/91		210
M3W-4A-NW	9/30/91		200
M3W-5A-NW	9/27/91		120
M3W-6A-NW	9/27/91		66
M3W-7B-NW	9/24/91		140
M3W-8B-NW	9/24/91		216
M3W-9B-NW	9/24/91		200
M3W-10B-NW	9/24/91		639
M3W-11B-NW	9/24/91		210
M3W-11-S	9/19/91		49
M3W-12-N	9/20/91		200
M3W-12-S	9/19/91		110
M3W-13-N	9/18/91		1380
M3W-13-S	9/18/91		94
M3W-14-N	9/18/91		659
M3W-14-S	9/18/91		91
M3W-15-N	9/17/91		1380
M3W-15-S	9/18/91		150
M3W-16-N	9/17/91		514
M3W-16-S	9/17/91		81
M4W-1-N	9/16/91		1270
M4W-1-S	9/17/91		160
M4W-2-N	9/16/91		66
M4W-2-S	9/16/91		15
M4W-3-N	9/16/91		56
M4W-3-S	9/16/91		160
M4W-4-N	9/13/91		29
M4W-4-S	9/16/91		27
M4W-5-N	9/13/91		50
M4W-6-N	9/13/91		1740
M4W-7-N	9/12/91		1920
M4W-8-N	9/12/91		1850
M4W-9-N	9/11/91		1620
M4W-10-N	9/11/91		264
M4W-11-N	9/10/91		2150
M4W-12A-S	10/25/91		53
M4W-12-N	9/10/91		992
M4W-12-S	9/10/91		510
M4W-13-N	9/10/91		1650
M4W-13-S	9/10/91		73
M4W-14-N	9/10/91		1420
M4W-14-S	9/10/91		160
M4W-15-N	9/9/91		1540
M4W-15-S	9/9/91		150
M4W-16-N	9/9/91		1520
M4W-16-S	9/9/91		92

TABLE G-1
HISTORICAL ARSENIC SOIL ANALYTICAL RESULTS
LOCATIONS NORTH OF FORMER SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Sample ID	Sample Date	Sample Depth	Arsenic (mg/kg)
M4W-17-N	9/6/91		1530
M4W-17-S	9/6/91		41
M4W-18-N	9/5/91		1230
M4W-18-S	9/6/91		78
M4W-19-N	9/5/91		2460
M4W-19-S	9/6/91		63
M4W-20-N	9/4/91		1100
M4W-20-S	9/5/91		47
M4W-21-N	9/4/91		1210
M4W-21-S	9/5/91		11
M4W-22A-S	10/25/91		45
M4W-22-N	9/4/91		58
M4W-23-N	9/4/91		1440
M4W-23-S	9/4/91		20
M4W-24-N	9/3/91		1940
M4W-24-S	9/4/91		24
M4W-25-N	9/3/91		1900
M4W-25-S	9/3/91		49
M5W-1-S	9/3/91		24
M5W-2-S	8/29/91		60
M5W-3A-N	10/9/91		53
M5W-3AN-E	10/9/91		62
M5W-4A-N	10/9/91		120
M5W-5A-N	10/9/91		23
M5W-6A-N	10/9/91		200
M5W-7A-N	10/8/91		51
M5W-7A-S	10/25/91		110
M5W-8A-N	10/8/91		52
M5W-8-S	8/26/91		150
M5W-9A-N	10/8/91		40
M5W-9-S	8/23/91		140
M5W-10A-N	10/7/91		100
M5W-10A-S	10/24/91		62
M5W-11A-N	10/9/91		44
M5W-11A-S	10/24/91		90
M5W-12A-N	10/15/91		44
M5W-12-S	8/21/91		62
M5W-13A-N	10/15/91		12
M5W-14A-N	10/15/91		28
M5W-14-S	8/19/91		110
TM3W-3A-S	10/28/91		180
TM3W-4A-S	10/28/91		120
TM3W-5A-S	10/28/91		288
TM3W-5A-S2	10/31/91		44
TM3W-6A-S2	10/31/91		94
TM3W-7B-E	11/8/91		130
TM3W-7B-S	11/8/91		91
TM3W-8B-S	11/8/91		73
TM3W-9B-S	11/8/91		67
TM3W-9B-W	11/8/91		22
TM3W-10A-S2	11/1/91		190
TM4W-1C-E	11/21/91		140
TM4W-1C-N	11/21/91		130
TM4W-1C-S	11/21/91		170
TM4W-2.5D-E	11/25/91		140
TM4W-2C-N	11/20/91		200
TM4W-2D-S	11/14/91		213
TM4W-3C2-E	11/20/91		54
TM4W-3C2-N	11/20/91		42
TM4W-3E1-S	11/25/91		180
TM4W-3E-E	11/14/91		11
TM4W-3E-S	11/14/91		18
TM4W-4E-S	11/6/91		5

TABLE G-1
HISTORICAL ARSENIC SOIL ANALYTICAL RESULTS
LOCATIONS NORTH OF FORMER SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Sample ID	Sample Date	Sample Depth	Arsenic (mg/kg)
TM4W-5F-E	11/4/91		11
TM4W-13.5E-W	11/25/91		37
TM4W-13.5F-W	11/25/91		170
TM4W-13.5J	11/18/91		83
TM4W-13.5K-W	11/18/91		58
TM4W-14G-N	11/25/91		17
TM4W-14H-S	11/25/91		200
TM4W-14H-W	11/25/91		160
TM4W-14.5G-N	11/26/91		32
TM4W-14.5G-S	11/26/91		120
TM4W-14.5G-W	11/26/91		77
M-45-1-E	6/21/91		35
M-45-2-E	6/21/91		7
M-45-8-S	6/21/91		5 U
M-45-9-S	6/21/91		7
M-45-10B-S	6/25/91		23 U
M-45-11B-S	6/25/91		25 U
M-45-12B-S	6/25/91		160
M-45-13B-S	6/25/91		110
M-45-(-1B)-W	7/5/91		130
N-01 (CY)	4/27/89	0-12	350
N-02 (CY)	3/31/89	0-12	270
N-03 (CY)	4/4/89	0-12	170
N-04 (CY)	4/21/89	0-12	200
N-05-A1 (CY)	4/27/89	0-12	32 U
S-01-B1 (CY)	4/19/89	0-12	180
S-02 (CY)	3/31/89	0-12	97
S-03 (CY)	4/10/89	0-12	35 U
S-04 (CY)	4/21/89	0-12	130
S-05 (CY)	4/27/89	0-12	33 U
N-01 (BAY13)	5/16/89	0-12	420
N-02 (BAY13)	5/16/89	0-12	130
N-03 (BAY13)	5/16/89	0-12	110
S-01 (BAY13)	5/17/89	0-12	83
S-02-A1 (BAY13)	5/18/89	0-12	180
S-03-A1 (BAY13	5/18/89	0-12	170
E-01-C1 (BAY13)	5/24/89	0-12	250
PZFA	8/28/84	11	530
PZFC	8/28/84	12	290
SW1	11/12/89		20 (a)
SW2	11/12/89		20 (a)
SW3	11/12/89		3,300
SW4	11/12/89		4,000
SW5	11/12/89		80 (a)
SW6	11/12/89		100 (a)
SW7	11/12/89		40 (a)
SW8	11/12/89		80 (a)
SW9	11/12/89		30 (a)
SW10	11/12/89		3,000

TABLE G-1
HISTORICAL ARSENIC SOIL ANALYTICAL RESULTS
LOCATIONS NORTH OF FORMER SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Sample ID	Sample Date	Sample Depth	Arsenic (mg/kg)
SW11	11/12/89		20 (a)
SW12	11/12/89		20 (a)
SW13	11/12/89		10 (a)
SW14	11/12/89		40 (a)
SW15	11/12/89		20 (a)
SW16	11/12/89		20 (a)
SW17	11/12/89		270
SW18	11/12/89		70 (a)
SW19	11/12/89		10 (a)
SW20	11/12/89		10 (a)
SW21	11/12/89		10 (a)
SW22	11/12/89		10 (a)
SW23	11/12/89		10 U(a)
SW24	11/12/89		10 U(a)
SW25	11/12/89		90 (a)
SW26	11/12/89		90 (a)
SW27	11/12/89		20 (a)
SW28	11/12/89		140 (a)
SW33	11/12/89		400 (a)
SW34	11/12/89		100 (a)
SW35	11/12/89		150 (a)
SW36	11/12/89		225 (a)
SW37	11/12/89		150 (a)
SW38	11/12/89		3500 (a)
SW39	11/12/89		2250 (a)
SW40	11/12/89		1500 (a)
SW44	11/12/89		170 (a)
SW45	11/12/89		200 (a)
SW46	11/12/89		20 (a)
SW50	11/12/89		40 (a)
SW54	11/12/89		20 (a)
SW55	11/12/89		30 (a)
SW56	11/12/89		30 (a)

TABLE G-1
HISTORICAL ARSENIC SOIL ANALYTICAL RESULTS
LOCATIONS NORTH OF FORMER SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Sample ID	Sample Date	Sample Depth	Arsenic (mg/kg)
SW57	11/12/89		10 (a)
SW58	11/12/89		20 (a)
SW59	11/12/89		10 (a)
SW60	11/12/89		80 (a)
3I	1991	1-3	30 (a)
3I	1991	3-5	20 (a)
3I	1991	5-9	60
6J	1991	1-3	20 U (a)
6J	1991	3-5	120 (a)
6J	1991	5-9	4000 (a)
6K	1991	1-3	10 U (a)
6K	1991	3-5	10 U (a)
6K	1991	5-9	60 U
8J	1991	1-3	20 U (a)
8J	1991	3-5	20 U (a)
8J	1991	5-9	20 (a)
10I	1991	1-3	30 (a)
10J	1991	1-3	20 U (a)
10J	1991	3-5	20 U (a)
10J	1991	5-9	20 U (a)
18E	1991	1-3	10 (a)
18E	1991	3-5	20 (a)
18E	1991	5-9	200
18N	1991	1-3	10 U (a)
18N	1991	3-5	30 (a)
18N	1991	5-9	310
22N	1991	1-3	10 U (a)
22N	1991	3-5	40 (a)
22N	1991	5-9	150
24B	1991	1-3	10 (a)
24B	1991	3-5	50 (a)
24B	1991	5-9	2250 (a)
25A	1991	1-3	10 U (a)
25A	1991	3-5	10 U (a)
25A	1991	5-9	460
25B	1991	1-3	10 U (a)
25B	1991	3-5	10 (a)
25B	1991	5-9	950
25C	1991	1-3	10 U (a)
25C	1991	3-5	10 U (a)
25C	1991	5-9	1500 (a)
25D	1991	1-3	10 U (a)
25D	1991	3-5	10 U (a)
25D	1991	5-9	410

TABLE G-1
HISTORICAL ARSENIC SOIL ANALYTICAL RESULTS
LOCATIONS NORTH OF FORMER SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Sample ID	Sample Date	Sample Depth	Arsenic (mg/kg)
25N	1991	1-3	50 (a)
25N	1991	3-5	10 U (a)
25N	1991	5-9	30 (a)
26B	1991	1-3	10 U (a)
26B	1991	3-5	10 U (a)
26B	1991	5-9	2500 (a)
27B	1991	1-3	10 U (a)
27B	1991	3-5	90
27B	1991	5-9	2000 (a)
28A	1991	1-3	10 (a)
28A	1991	3-5	40 (a)
28A	1991	5-9	280
28B	1991	1-3	10 U (a)
28B	1991	3-5	10 U (a)
28B	1991	5-9	100 (a)
28D	1991	1-3	20 (a)
28D	1991	3-5	10 (a)
28D	1991	5-9	200
29B	1991	1-3	10 U (a)
29B	1991	3-5	10 U (a)
29B	1991	5-9	3500 (a)
30B	1991	1-3	10 U (a)
30B	1991	3-5	270
30B	1991	5-9	400
31A	1991	1-3	10 (a)
31A	1991	3-5	10 (a)
31A	1991	5-9	140
31B	1991	1-3	10 U (a)
31B	1991	3-5	270
31B	1991	5-9	330
31D	1991	1-3	10 (a)
31D	1991	3-5	20 (a)
31D	1991	5-9	170 (a)
			4000

U = Indicates the compound was undetected at the reported concentration
J = Laboratory flag indicating the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

(a) = Field sample results

TABLE G-2
HISTORICAL SOIL ANALYTICAL RESULTS
LOCATIONS NORTH OF SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location:	1	2	4			10				13		14	18		I-2	I-3	I-4
								Dup of 10									
Sample ID:	1	2	4	4	4	10	10	10-Dup	10	13	13	14	18	18	I-2	I-3	I-4
Laboratory ID:																	
Sample Depth (ft BGS):	5.5	2.5	2.5	6.5	10.5	6	11	11	13.5	9	13.5	2	2	6.5	14.5	10.5	3
Sample Date:	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	10/14/1983	10/21/1983	10/20/1983
TOTAL METALS (mg/kg)																	
EPA 200.8/SW6010B/SW7470A (a)																	
Barium	**26**	**44**		**33**								**33**	**30**	**25**			
Cadmium	**0.03**	**0.12**		**0.06**								**0.78**	**0.6**	**0.31**			
Chromium	**11**	**20**		**11**								**16**	**16**	**11.5**	**9.3**	**47**	**16**
Copper															**420**	**45**	**280**
Lead	**1.3**	**11**		**2.4**								**69**	**73**	**5.5**	**4.5**	**36**	**150**
Mercury	0.03 U	**0.08**		**0.04**								**0.03**	**0.03**	**0.04**			
Nickel	**9.5**	**16**		**9.2**								**14**	**20**	**8.5**			
Selenium												0.2 U	0.2 U	0.2 U			
Silver	0.3 U	0.3 U		0.3 U								0.3 U	0.3 U	0.3 U			
Zinc	**21**	**37**	**124**	**40**	**132**	**59.5**	**31.8**	**31.8**	**27.2**	**25**	**102.5**	**73.9**	**81**	**33.7**	**220**	**50**	**430**
PCBs (mg/kg)																	
EPA SW8082 (a)																	
Aroclor 1016																	
Aroclor 1221																	
Aroclor 1232																	
Aroclor 1242																	
Aroclor 1248																	
Aroclor 1254																	
Aroclor 1260																	
Total PCBs	0.2 U			0.2 U													
CONVENTIONALS (mg/kg)																	
Cyanide	3 U	3 U		3 U													
Oil and Grease			**350**		**130**	**130**	100 U	69 U	**92**	**110**	**53**	**210**	**107**	57 U			
Total Organic Carbon			**2400**	**1800**	**1500**												
PETROLEUM HYDROCARBONS (mg/kg)																	
NWTPH-HCID																	
Diesel Range Organics																	
Gasoline Range Organics																	
Lube Oil																	
NWTPH-Dx																	
Diesel Range Organics																	
Lube Oil																	
VOLATILES (mg/kg)																	
EPA SW8260B/C (a)																	
1,1,1,2-Tetrachloroethane																	
1,1,1-Trichloroethane																	
1,1,2,2-Tetrachloroethane																	
1,1,2-Trichloro-1,2,2-trifluoroethane																	
1,1,2-Trichloroethane																	
1,1-Dichloroethane																	
1,1-Dichloroethene																	
1,1-Dichloropropene																	
1,2,3-Trichlorobenzene																	
1,2,3-Trichloropropane																	
1,2,4-Trichlorobenzene																	
1,2,4-Trimethylbenzene																	
1,2-Dibromo-3-chloropropane																	
1,2-Dichlorobenzene																	
1,2-Dichloroethane																	
1,2-Dichloropropane																	
1,3,5-Trimethylbenzene																	
1,3-Dichlorobenzene																	
1,3-Dichloropropane																	
1,4-Dichlorobenzene																	
2,2-Dichloropropane																	
2-Butanone																	
2-Chloroethylvinylether																	
2-Chlorotoluene																	

TABLE G-2
HISTORICAL SOIL ANALYTICAL RESULTS
LOCATIONS NORTH OF SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

								Dup of 10									
Sample ID:	1	2	4	4	4	10	10	10-Dup	10	13	13	14	18	18	I-2	I-3	I-4
Laboratory ID:																	
Sample Depth (ft BGS):	5.5	2.5	2.5	6.5	10.5	6	11	11	13.5	9	13.5	2	2	6.5	14.5	10.5	3
Sample Date:	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	10/14/1983	10/21/1983	10/20/1983
2-Hexanone																	
4-Chlorotoluene																	
4-Isopropyltoluene																	
4-Methyl-2-Pentanone (MIBK)																	
Acetone																	
Acrolein																	
Acrylonitrile																	
Benzene																	
Bromobenzene																	
Bromochloromethane																	
Bromodichloromethane																	
Bromoethane																	
Bromoform																	
Bromomethane																	
Carbon Disulfide																	
Carbon Tetrachloride																	
Chlorobenzene																	
Chloroethane																	
Chloroform																	
Chloromethane																	
cis-1,2-Dichloroethene																	
cis-1,3-Dichloropropene																	
Dibromochloromethane																	
Dibromomethane																	
Ethylbenzene																	
Ethylene Dibromide																	
Hexachlorobutadiene																	
Isopropylbenzene																	
m, p-Xylene																	
Methyl Iodide																	
Methylene Chloride																	
Naphthalene																	
n-Butylbenzene																	
n-Propylbenzene																	
o-Xylene																	
sec-Butylbenzene																	
Styrene																	
tert-Butylbenzene																	
Tetrachloroethene																	
Toluene																	
trans-1,2-Dichloroethene																	
trans-1,3-Dichloropropene																	
trans-1,4-Dichloro-2-butene																	
Trichloroethene																	
Trichlorofluoromethane																	
Vinyl Acetate																	
Vinyl Chloride																	
SEMIVOLATILES (mg/kg)																	
EPA SW8270D (a)																	
1,2,4-Trichlorobenzene																	
1,2-Dichlorobenzene																	
1,3-Dichlorobenzene																	
1,4-Dichlorobenzene																	
1-Methylnaphthalene																	
2,2'-Oxybis(1-Chloropropane)																	
2,4,5-Trichlorophenol																	
2,4,6-Trichlorophenol																	
2,4-Dichlorophenol																	
2,4-Dimethylphenol																	

TABLE G-2
HISTORICAL SOIL ANALYTICAL RESULTS
LOCATIONS NORTH OF SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Sample ID:	1	2	4	4	4	10	10	Dup of 10 10-Dup	10	13	13	14	18	18	I-2	I-3	I-4
Laboratory ID:																	
Sample Depth (ft BGS):	5.5	2.5	2.5	6.5	10.5	6	11	11	13.5	9	13.5	2	2	6.5	14.5	10.5	3
Sample Date:	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	10/14/1983	10/21/1983	10/20/1983
2,4-Dinitrophenol																	
2,4-Dinitrotoluene																	
2,6-Dinitrotoluene																	
2-Chloronaphthalene																	
2-Chlorophenol																	
2-Methylnaphthalene																	
2-Methylphenol																	
2-Nitroaniline																	
2-Nitrophenol																	
3,3'-Dichlorobenzidine																	
3-Nitroaniline																	
4,6-Dinitro-2-Methylphenol																	
4-Bromophenyl-phenylether																	
4-Chloro-3-methylphenol																	
4-Chloroaniline																	
4-Chlorophenyl-phenylether																	
4-Methylphenol																	
4-Nitroaniline																	
4-Nitrophenol																	
Acenaphthene																	
Acenaphthylene																	
Anthracene																	
Benzo(a)anthracene																	
Benzo(a)pyrene																	
Benzo(b)fluoranthene																	
Benzo(g,h,i)perylene																	
Benzo(k)fluoranthene																	
Benzoic Acid																	
Benzyl Alcohol																	
bis(2-Chloroethoxy) Methane																	
Bis-(2-Chloroethyl) Ether																	
bis(2-Ethylhexyl)phthalate																	
Butylbenzylphthalate																	
Carbazole																	
Chrysene																	
Dibenz(a,h)anthracene																	
Dibenzofuran																	
Diethylphthalate																	
Dimethylphthalate																	
Di-n-Butylphthalate																	
Di-n-Octyl phthalate																	
Fluoranthene																	
Fluorene																	
Hexachlorobenzene																	
Hexachlorobutadiene																	
Hexachlorocyclopentadiene																	
Hexachloroethane																	
Indeno(1,2,3-cd)pyrene																	
Isophorone																	
Naphthalene																	
Nitrobenzene																	
N-Nitroso-Di-N-Propylamine																	
N-Nitrosodiphenylamine																	
Pentachlorophenol																	
Phenanthrene																	
Phenol																	
Pyrene																	

TABLE G-2
HISTORICAL SOIL ANALYTICAL RESULTS
LOCATIONS NORTH OF SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location:	IDP-6		IDP-6A	IDP-7	IDP-8	IDP-9	IDP-10	IDP-11	IDP-12	IDP-13	IDP-14	IDP-15	IMR-2	IMR-3	IMR-4	IMR-5	IMR-6	IMR-7
Sample ID:	IDP-6	IDP-6	IDP-6A	IDP-7	IDP-8	IDP-9	IDP-10	IDP-11	IDP-12	IDP-13	IDP-14	IDP-15	IMR-2	IMR-3	IMR-4	IMR-5	IMR-6	IMR-7
Laboratory ID:	OK85AB	OK85AC	OL03J	OL03A	OL03B	OL03C	OL03D	OL03E	OL03F	OL03G	OL03H	OL03I	NV07A	OA02A	NV07B	NV07C	NV07D	NW45A
Sample Depth (ft BGS):	8	12	3	3	3	3	2	11	12	12	11	12						
Sample Date:	2/2/2009	2/2/2009	2/3/2009	2/3/2009	2/3/2009	2/3/2009	2/3/2009	2/3/2009	2/3/2009	2/3/2009	2/3/2009	2/3/2009	10/17/2008	11/13/2008	10/17/2008	10/17/2008	10/17/2008	10/27/2008
TOTAL METALS (mg/kg)																		
EPA 200.8/SW6010B/SW7470A (a)																		
Barium													**48**	**95.5**	**153**	**61.5**	**78.6**	**31.4**
Cadmium	0.3 U	0.2 U	0.2 U	**4**	**0.4**	**0.6**	**0.6**	0.2 U	0.3 U	0.3 U	0.2 U	0.3 U	0.2 U	**1.6**	**3.1**	**0.6**	**5.6**	0.2 U
Chromium	**19.2**	**9**	**52**	**262**	**36.9**	**58**	**16.2**	**11.8**	**16.3**	**23.5**	**15.4**	**17.3**	**19.5**	**65.8**	**55**	**41.2**	**19.7**	**21.3**
Copper	**26.9**	**9.1**	**20.8**	**177** J	**27.4**	**93.2**	**55.6**	**13.5**	**163**	**131**	**624**	**47.2**						
Lead	**3**	2 U	**27**	**420**	**27**	**112**	**59**	2 U	**4**	**4**	**6**	**5**	2 U	**126**	**136**	**56**	**26**	2 U
Mercury	**0.06**	0.05 U	0.05 U	**0.52** J	**0.08**	**0.18**	**0.15**	0.05 U	**0.06**	**0.08**	**0.21**	**0.06**	0.04 U	**1.44**	**0.46**	**0.1**	**0.68**	0.05 U
Nickel																		
Selenium													5 U	6 U	20 U	5 U	6 U	5 U
Silver													0.3 U	0.4 U	0.9 U	0.3 U	0.4 U	0.3 U
Zinc	**153**	**20**	**68**	**1390** J	**89**	**267**	**220**	**35**	**354**	**97**	**77**	**96**						
PCBs (mg/kg)																		
EPA SW8082 (a)																		
Aroclor 1016	0.032 U	0.031 U	0.031 U		0.032 U	0.032 U			0.031 U		0.031 U							
Aroclor 1221	0.032 U	0.031 U	0.031 U		0.032 U	0.032 U			0.031 U		0.031 U							
Aroclor 1232	0.032 U	0.031 U	0.031 U		0.032 U	0.032 U			0.031 U		0.031 U							
Aroclor 1242	0.032 U	0.031 U	0.031 U		0.032 U	0.032 U			0.031 U		0.031 U							
Aroclor 1248	0.032 U	0.031 U	0.031 U		0.032 U	0.032 U			0.031 U		0.031 U							
Aroclor 1254	0.032 U	0.031 U	0.031 U		0.032 U	0.032 U			0.031 U		0.031 U							
Aroclor 1260	0.032 U	0.031 U	0.031 U		0.032 U	0.032 U			0.031 U		0.031 U							
Total PCBs	0.032 U	0.031 U	0.031 U		0.032 U	0.032 U			0.031 U		0.031 U							
CONVENTIONALS (mg/kg)																		
Cyanide																		
Oil and Grease																		
Total Organic Carbon																		
PETROLEUM HYDROCARBONS (mg/kg)																		
NWTPH-HCID																		
Diesel Range Organics				50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U						
Gasoline Range Organics				20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U						
Lube Oil				100 U	100 U	100 U	**100**	100 U	100 U	100 U	100 U	100 U						
NWTPH-Dx																		
Diesel Range Organics																	**17**	
Lube Oil																	**61**	
VOLATILES (mg/kg)																		
EPA SW8260B/C (a)																		
1,1,1,2-Tetrachloroethane				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
1,1,1-Trichloroethane				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
1,1,2,2-Tetrachloroethane				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
1,1,2-Trichloro-1,2,2-trifluoroethane				0.0023 U	0.0013 U	0.0027 U	0.0016 U	0.0016 U	0.0012 U	0.0015 U	0.0017 U	0.0013 U						
1,1,2-Trichloroethane				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
1,1-Dichloroethane				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
1,1-Dichloroethene				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
1,1-Dichloropropene				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
1,2,3-Trichlorobenzene				0.0057 U	0.0032 U	0.0066 U	0.0039 U	0.004 U	0.003 U	0.0038 U	0.0043 U	0.0032 U						
1,2,3-Trichloropropane				0.0023 U	0.0013 U	0.0027 U	0.0016 U	0.0016 U	0.0012 U	0.0015 U	0.0017 U	0.0013 U						
1,2,4-Trichlorobenzene				0.0057 U	0.0032 U	0.0066 U	0.0039 U	0.004 U	0.003 U	0.0038 U	0.0043 U	0.0032 U						
1,2,4-Trimethylbenzene				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
1,2-Dibromo-3-chloropropane				0.0057 U	0.0032 U	0.0066 U	0.0039 U	0.004 U	0.003 U	0.0038 U	0.0043 U	0.0032 U						
1,2-Dichlorobenzene				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
1,2-Dichloroethane				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
1,2-Dichloropropane				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
1,3,5-Trimethylbenzene				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
1,3-Dichlorobenzene				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
1,3-Dichloropropane				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
1,4-Dichlorobenzene				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
2,2-Dichloropropane				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
2-Butanone				**0.013**	0.0032 U	0.0066 U	0.0039 U	0.004 U	0.003 U	0.0038 U	0.0043 U	**0.0074**						
2-Chloroethylvinylether				0.0057 U	0.0032 U	0.0066 U	0.0039 U	0.004 U	0.003 U	0.0038 U	0.0043 U	0.0032 U						
2-Chlorotoluene				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						

TABLE G-2
HISTORICAL SOIL ANALYTICAL RESULTS
LOCATIONS NORTH OF SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Sample ID:	IDP-6	IDP-6	IDP-6A	IDP-7	IDP-8	IDP-9	IDP-10	IDP-11	IDP-12	IDP-13	IDP-14	IDP-15	IMR-2	IMR-3	IMR-4	IMR-5	IMR-6	IMR-7
Laboratory ID:	OK85AB	OK85AC	OL03J	OL03A	OL03B	OL03C	OL03D	OL03E	OL03F	OL03G	OL03H	OL03I	NV07A	OA02A	NV07B	NV07C	NV07D	NW45A
Sample Depth (ft BGS):	8	12	3	3	3	3	2	11	12	12	11	12						
Sample Date:	2/2/2009	2/2/2009	2/3/2009	2/3/2009	2/3/2009	2/3/2009	2/3/2009	2/3/2009	2/3/2009	2/3/2009	2/3/2009	2/3/2009	10/17/2008	11/13/2008	10/17/2008	10/17/2008	10/17/2008	10/27/2008
2-Hexanone				0.0057 U	0.0032 U	0.0066 U	0.0039 U	0.004 U	0.003 U	0.0038 U	0.0043 U	0.0032 U						
4-Chlorotoluene				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
4-Isopropyltoluene				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
4-Methyl-2-Pentanone (MIBK)				0.0057 U	0.0032 U	0.0066 U	0.0039 U	0.004 U	0.003 U	0.0038 U	0.0043 U	0.0032 U						
Acetone				**0.150**	**0.015**	**0.057**	**0.039**	**0.031**	**0.021**	**0.038**	**0.030**	**0.058**						
Acrolein				0.057 U	0.032 U	0.066 U	0.039 U	0.040 U	0.030 U	0.038 U	0.043 U	0.032 U						
Acrylonitrile				0.0057 U	0.0032 U	0.0066 U	0.0039 U	0.004 U	0.003 U	0.0038 U	0.0043 U	0.0032 U						
Benzene				**0.0027**	0.0006 U	**0.0098**	0.0008 U	**0.009**	0.0006 U	0.0008 U	**0.0009**	**0.0007**						
Bromobenzene				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
Bromochloromethane				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
Bromodichloromethane				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
Bromoethane				0.0023 U	0.0013 U	0.0027 U	0.0016 U	0.0016 U	0.0012 U	0.0015 U	0.0017 U	0.0013 U						
Bromoform				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
Bromomethane				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
Carbon Disulfide				**0.0022**	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	**0.0026**						
Carbon Tetrachloride				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
Chlorobenzene				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
Chloroethane				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
Chloroform				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
Chloromethane				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
cis-1,2-Dichloroethene				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
cis-1,3-Dichloropropene				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
Dibromochloromethane				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
Dibromomethane				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
Ethylbenzene				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
Ethylene Dibromide				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
Hexachlorobutadiene				0.0057 U	0.0032 U	0.0066 U	0.0039 U	0.004 U	0.003 U	0.0038 U	0.0043 U	0.0032 U						
Isopropylbenzene				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
m, p-Xylene				0.0011 U	0.0006 U	**0.015**	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
Methyl Iodide				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	**0.0032**	0.0006 U						
Methylene Chloride				**0.0043**	0.0013 U	0.0028	**0.0017**	**0.002**	**0.0017**	0.0015 U	**0.0034**	**0.0022**						
Naphthalene				0.0057 U	0.0032 U	0.0066 U	0.0039 U	0.004 U	0.003 U	0.0038 U	0.0043 U	0.0032 U						
n-Butylbenzene				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
n-Propylbenzene				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
o-Xylene				0.0011 U	0.0006 U	**0.0077**	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
sec-Butylbenzene				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
Styrene				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
tert-Butylbenzene				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
Tetrachloroethene				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
Toluene				**0.0017**	0.0006 U	**0.017**	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
trans-1,2-Dichloroethene				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
trans-1,3-Dichloropropene				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
trans-1,4-Dichloro-2-butene				0.0057 U	0.0032 U	0.0066 U	0.0039 U	0.004 U	0.003 U	0.0038 U	0.0043 U	0.0032 U						
Trichloroethene				**0.0016**	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
Trichlorofluoromethane				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
Vinyl Acetate				0.0057 U	0.0032 U	0.0066 U	0.0039 U	0.004 U	0.003 U	0.0038 U	0.0043 U	0.0032 U						
Vinyl Chloride				0.0011 U	0.0006 U	0.0013 U	0.0008 U	0.0008 U	0.0006 U	0.0008 U	0.0009 U	0.0006 U						
SEMIVOLATILES (mg/kg)																		
EPA SW8270D (a)																		
1,2,4-Trichlorobenzene	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
1,2-Dichlorobenzene	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
1,3-Dichlorobenzene	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
1,4-Dichlorobenzene	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
1-Methylnaphthalene	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
2,2'-Oxybis(1-Chloropropane)	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
2,4,5-Trichlorophenol	0.310 U	0.330 U	0.290 U		0.320 U	0.310 U			0.320 U		0.290 U							
2,4,6-Trichlorophenol	0.310 U	0.330 U	0.290 U		0.320 U	0.310 U			0.320 U		0.290 U							
2,4-Dichlorophenol	0.310 U	0.330 U	0.290 U		0.320 U	0.310 U			0.320 U		0.290 U							
2,4-Dimethylphenol	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							

TABLE G-2
HISTORICAL SOIL ANALYTICAL RESULTS
LOCATIONS NORTH OF SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Sample ID:	IDP-6	IDP-6	IDP-6A	IDP-7	IDP-8	IDP-9	IDP-10	IDP-11	IDP-12	IDP-13	IDP-14	IDP-15	IMR-2	IMR-3	IMR-4	IMR-5	IMR-6	IMR-7
Laboratory ID:	OK85AB	OK85AC	OL03J	OL03A	OL03B	OL03C	OL03D	OL03E	OL03F	OL03G	OL03H	OL03I	NV07A	OA02A	NV07B	NV07C	NV07D	NW45A
Sample Depth (ft BGS):	8	12	3	3	3	3	2	11	12	12	11	12						
Sample Date:	2/2/2009	2/2/2009	2/3/2009	2/3/2009	2/3/2009	2/3/2009	2/3/2009	2/3/2009	2/3/2009	2/3/2009	2/3/2009	2/3/2009	10/17/2008	11/13/2008	10/17/2008	10/17/2008	10/17/2008	10/27/2008
2,4-Dinitrophenol	0.610 U	0.650 U	0.580 U		0.640 U	0.610 U			0.640 U		0.580 U							
2,4-Dinitrotoluene	0.310 U	0.330 U	0.290 U		0.320 U	0.310 U			0.320 U		0.290 U							
2,6-Dinitrotoluene	0.310 U	0.330 U	0.290 U		0.320 U	0.310 U			0.320 U		0.290 U							
2-Chloronaphthalene	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
2-Chlorophenol	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
2-Methylnaphthalene	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
2-Methylphenol	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
2-Nitroaniline	0.310 U	0.330 U	0.290 U		0.320 U	0.310 U			0.320 U		0.290 U							
2-Nitrophenol	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
3,3'-Dichlorobenzidine	0.310 U	0.330 U	0.290 U		0.320 U	0.310 U			0.320 U		0.290 U							
3-Nitroaniline	0.310 U	0.330 U	0.290 U		0.320 U	0.310 U			0.320 U		0.290 U							
4,6-Dinitro-2-Methylphenol	0.610 U	0.650 U	0.580 U		0.640 U	0.610 U			0.640 U		0.580 U							
4-Bromophenyl-phenylether	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
4-Chloro-3-methylphenol	0.310 U	0.330 U	0.290 U		0.320 U	0.310 U			0.320 U		0.290 U							
4-Chloroaniline	0.310 U	0.330 U	0.290 U		0.320 U	0.310 U			0.320 U		0.290 U							
4-Chlorophenyl-phenylether	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
4-Methylphenol	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
4-Nitroaniline	0.310 U	0.330 U	0.290 U		0.320 U	0.310 U			0.320 U		0.290 U							
4-Nitrophenol	0.310 U	0.330 U	0.290 U		0.320 U	0.310 U			0.320 U		0.290 U							
Acenaphthene	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
Acenaphthylene	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
Anthracene	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
Benzo(a)anthracene	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
Benzo(a)pyrene	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
Benzo(b)fluoranthene	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
Benzo(g,h,i)perylene	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
Benzo(k)fluoranthene	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
Benzoic Acid	0.610 UJ	0.650 UJ	0.580 U		0.640 U	0.610 U			0.640 U		0.580 U							
Benzyl Alcohol	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
bis(2-Chloroethoxy) Methane	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
Bis-(2-Chloroethyl) Ether	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
bis(2-Ethylhexyl)phthalate	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
Butylbenzylphthalate	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
Carbazole	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
Chrysene	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
Dibenz(a,h)anthracene	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
Dibenzofuran	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
Diethylphthalate	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
Dimethylphthalate	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
Di-n-Butylphthalate	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
Di-n-Octyl phthalate	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
Fluoranthene	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
Fluorene	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
Hexachlorobenzene	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
Hexachlorobutadiene	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
Hexachlorocyclopentadiene	0.310 U	0.330 U	0.290 U		0.320 U	0.310 U			0.320 U		0.290 U							
Hexachloroethane	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
Indeno(1,2,3-cd)pyrene	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
Isophorone	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
Naphthalene	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
Nitrobenzene	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
N-Nitroso-Di-N-Propylamine	0.310 U	0.330 U	0.290 U		0.320 U	0.310 U			0.320 U		0.290 U							
N-Nitrosodiphenylamine	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
Pentachlorophenol	0.310 U	0.330 U	0.290 U		0.320 U	0.310 U			0.320 U		0.290 U							
Phenanthrene	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
Phenol	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							
Pyrene	0.061 U	0.065 U	0.058 U		0.064 U	0.061 U			0.064 U		0.058 U							

TABLE G-2
HISTORICAL SOIL ANALYTICAL RESULTS
LOCATIONS NORTH OF SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location:	IMR-8	IMR-10	IMR-11		IMR-12		IMR-14	IMR-15	IMR-16	IMR-18	IMR-19	IssacEx-01	IssacEx-02	IssacEx-03
Sample ID:	IMR-8	IMR-10	IMR-11	IMR-11	IMR-12	IMR-12	IMR-14	IMR-15	IMR-16	IMR-18	IMR-19	IssacEx-01	IssacEx-02	IssacEx-03
Laboratory ID:	NV07E	NY11A	NW45B	NY11B	NW45C	NY11C	NY11E	NY11F	NY11G	OA02B	OA02C	KH07A	KH07B	KH07C
Sample Depth (ft BGS):												5	1.5	
Sample Date:	10/17/2008	11/4/2008	10/27/2008	11/4/2008	10/27/2008	11/4/2008	11/4/2008	11/4/2008	11/4/2008	11/13/2008	11/13/2008	11/30/2006	11/30/2006	11/30/2006
TOTAL METALS (mg/kg)														
EPA 200.8/SW6010B/SW7470A (a)														
Barium	**57.8**	**30.1**	**85**	**46.6**	**93**	**61.4**	**157**	**84.2**	**253**	**40.8**	**78.5**	**46.1**	**51.4**	**61.6**
Cadmium	**1**	**0.3**	**1.4**	**1.6**	**3.1**	**1.6**	**1.9**	**3**	**15**	**1.5**	**1.8**	0.2 U	**0.4**	**0.3**
Chromium	**26.4**	**24.4**	**38.6**	**22.9**	**116**	**25.1**	**109**	**19.5**	**536**	**14.6**	**30.9**	**11.2**	**23.5**	**12.1**
Copper														
Lead	**44**	2 U	**114**	**40**	**46**	**36**	**273**	**51**	**1210**	**24**	**87**	**4**	**85**	**27**
Mercury	**0.81**	0.04 U	**1.82**	**1.12**	**0.7**	**0.12**	**0.33**	**0.8**	**0.06**	**0.16**	**0.69**	0.04 U	0.05 U	**0.05**
Nickel														
Selenium	5 U	5 U	6 U	6 U	20 U	6 U	10 U	7 U	30 U	6 U	6 U	0.6 U	0.6 U	0.5 U
Silver	0.3 U	0.3 U	0.3 U	0.3 U	1 U	0.4 U	0.9 U	0.4 U	**2**	0.3 U	0.4 U	0.2 U	0.2 U	0.2 U
Zinc														
PCBs (mg/kg)														
EPA SW8082 (a)														
Aroclor 1016												0.033 U	0.033 U	0.032 U
Aroclor 1221												0.033 U	0.033 U	0.032 U
Aroclor 1232												0.033 U	0.033 U	0.032 U
Aroclor 1242												0.033 U	0.033 U	0.032 U
Aroclor 1248												0.033 U	0.033 U	0.032 U
Aroclor 1254												0.033 U	0.033 U	0.032 U
Aroclor 1260												0.033 U	**0.041**	0.032 U
Total PCBs												0.033 U	**0.041**	0.032 U
CONVENTIONALS (mg/kg)														
Cyanide														
Oil and Grease														
Total Organic Carbon														
PETROLEUM HYDROCARBONS (mg/kg)														
NWTPH-HCID														
Diesel Range Organics														
Gasoline Range Organics														
Lube Oil														
NWTPH-Dx														
Diesel Range Organics												6.2 U	**7.3**	5.7 U
Lube Oil												12 U	**65**	**11**
VOLATILES (mg/kg)														
EPA SW8260B/C (a)														
1,1,1,2-Tetrachloroethane												0.0008 U	0.0006 U	0.0006 U
1,1,1-Trichloroethane												0.0008 U	0.0006 U	0.0006 U
1,1,2,2-Tetrachloroethane												0.0008 U	0.0006 U	0.0006 U
1,1,2-Trichloro-1,2,2-trifluoroethane												0.0016 U	0.0012 U	0.0013 U
1,1,2-Trichloroethane												0.0008 U	0.0006 U	0.0006 U
1,1-Dichloroethane												0.0008 U	0.0006 U	0.0006 U
1,1-Dichloroethene												0.0008 U	0.0006 U	0.0006 U
1,1-Dichloropropene												0.0008 U	0.0006 U	0.0006 U
1,2,3-Trichlorobenzene												0.004 U	0.003 U	0.0032 U
1,2,3-Trichloropropane												0.0016 U	0.0012 U	0.0013 U
1,2,4-Trichlorobenzene												0.004 U	0.003 U	0.0032 U
1,2,4-Trimethylbenzene												0.0008 U	0.0006 U	0.0006 U
1,2-Dibromo-3-chloropropane												0.004 U	0.003 U	0.0032 U
1,2-Dichlorobenzene												0.0008 U	0.0006 U	0.0006 U
1,2-Dichloroethane												0.0008 U	0.0006 U	0.0006 U
1,2-Dichloropropane												0.0008 U	0.0006 U	0.0006 U
1,3,5-Trimethylbenzene												0.0008 U	0.0006 U	0.0006 U
1,3-Dichlorobenzene												0.0008 U	0.0006 U	0.0006 U
1,3-Dichloropropane												0.0008 U	0.0006 U	0.0006 U
1,4-Dichlorobenzene												0.0008 U	0.0006 U	0.0006 U
2,2-Dichloropropane												0.0008 U	0.0006 U	0.0006 U
2-Butanone												0.004 U	0.003 U	0.0032 U
2-Chloroethylvinylether												0.004 U	0.003 U	0.0032 U
2-Chlorotoluene												0.0008 U	0.0006 U	0.0006 U

TABLE G-2
HISTORICAL SOIL ANALYTICAL RESULTS
LOCATIONS NORTH OF SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Sample ID:	IMR-8	IMR-10	IMR-11	IMR-11	IMR-12	IMR-12	IMR-14	IMR-15	IMR-16	IMR-18	IMR-19	IssacEx-01	IssacEx-02	IssacEx-03
Laboratory ID:	NV07E	NY11A	NW45B	NY11B	NW45C	NY11C	NY11E	NY11F	NY11G	OA02B	OA02C	KH07A	KH07B	KH07C
Sample Depth (ft BGS):												5	1.5	
Sample Date:	10/17/2008	11/4/2008	10/27/2008	11/4/2008	10/27/2008	11/4/2008	11/4/2008	11/4/2008	11/4/2008	11/13/2008	11/13/2008	11/30/2006	11/30/2006	11/30/2006
2-Hexanone												0.004 U	0.003 U	0.0032 U
4-Chlorotoluene												0.0008 U	0.0006 U	0.0006 U
4-Isopropyltoluene												0.0008 U	0.0006 U	0.0006 U
4-Methyl-2-Pentanone (MIBK)												0.004 U	0.003 U	0.0032 U
Acetone												**0.026**	**0.016**	**0.018**
Acrolein												0.040 U	0.030 U	0.032 U
Acrylonitrile												0.004 U	0.003 U	0.0032 U
Benzene												0.0008 U	0.0006 U	0.0006 U
Bromobenzene												0.0008 U	0.0006 U	0.0006 U
Bromochloromethane												0.0008 U	0.0006 U	0.0006 U
Bromodichloromethane												0.0008 U	0.0006 U	0.0006 U
Bromoethane												0.0016 U	0.0012 U	0.0013 U
Bromoform												0.0008 U	0.0006 U	0.0006 U
Bromomethane												0.0008 U	0.0006 U	0.0006 U
Carbon Disulfide												0.0008 U	0.0006 U	0.0006 U
Carbon Tetrachloride												0.0008 U	0.0006 U	0.0006 U
Chlorobenzene												0.0008 U	0.0006 U	0.0006 U
Chloroethane												0.0008 U	0.0006 U	0.0006 U
Chloroform												0.0008 U	0.0006 U	0.0006 U
Chloromethane												0.0008 U	0.0006 U	0.0006 U
cis-1,2-Dichloroethene												0.0008 U	0.0006 U	0.0006 U
cis-1,3-Dichloropropene												0.0008 U	0.0006 U	0.0006 U
Dibromochloromethane												0.0008 U	0.0006 U	0.0006 U
Dibromomethane												0.0008 U	0.0006 U	0.0006 U
Ethylbenzene												0.0008 U	0.0006 U	0.0006 U
Ethylene Dibromide												0.0008 U	0.0006 U	0.0006 U
Hexachlorobutadiene												0.004 U	0.003 U	0.0032 U
Isopropylbenzene												0.0008 U	0.0006 U	0.0006 U
m, p-Xylene												0.0008 U	0.0006 U	0.0006 U
Methyl Iodide												0.0008 U	0.0006 U	0.0006 U
Methylene Chloride												0.0016 U	0.0012 U	0.0013 U
Naphthalene												0.004 U	0.003 U	0.0032 U
n-Butylbenzene												0.0008 U	0.0006 U	0.0006 U
n-Propylbenzene												0.0008 U	0.0006 U	0.0006 U
o-Xylene												0.0008 U	0.0006 U	0.0006 U
sec-Butylbenzene												0.0008 U	0.0006 U	0.0006 U
Styrene												0.0008 U	0.0006 U	0.0006 U
tert-Butylbenzene												0.0008 U	0.0006 U	0.0006 U
Tetrachloroethene												0.0008 U	0.0006 U	0.0006 U
Toluene												0.0008 U	0.0006 U	0.0006 U
trans-1,2-Dichloroethene												0.0008 U	0.0006 U	0.0006 U
trans-1,3-Dichloropropene												0.0008 U	0.0006 U	0.0006 U
trans-1,4-Dichloro-2-butene												0.004 U	0.003 U	0.0032 U
Trichloroethene												0.0008 U	0.0006 U	0.0006 U
Trichlorofluoromethane												0.0008 U	0.0006 U	0.0006 U
Vinyl Acetate												0.004 U	0.003 U	0.0032 U
Vinyl Chloride												0.0008 U	0.0006 U	0.0006 U
SEMIVOLATILES (mg/kg)														
EPA SW8270D (a)														
1,2,4-Trichlorobenzene												0.065 U	0.064 U	0.063 U
1,2-Dichlorobenzene												0.065 U	0.064 U	0.063 U
1,3-Dichlorobenzene												0.065 U	0.064 U	0.063 U
1,4-Dichlorobenzene												0.065 U	0.064 U	0.063 U
1-Methylnaphthalene														
2,2'-Oxybis(1-Chloropropane)												0.065 U	0.064 U	0.063 U
2,4,5-Trichlorophenol												0.330 U	0.320 U	0.320 U
2,4,6-Trichlorophenol												0.330 U	0.320 U	0.320 U
2,4-Dichlorophenol												0.330 U	0.320 U	0.320 U
2,4-Dimethylphenol												0.065 U	0.064 U	0.063 U

TABLE G-2
HISTORICAL SOIL ANALYTICAL RESULTS
LOCATIONS NORTH OF SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Sample ID:	IMR-8	IMR-10	IMR-11	IMR-11	IMR-12	IMR-12	IMR-14	IMR-15	IMR-16	IMR-18	IMR-19	IssacEx-01	IssacEx-02	IssacEx-03
Laboratory ID:	NV07E	NY11A	NW45B	NY11B	NW45C	NY11C	NY11E	NY11F	NY11G	OA02B	OA02C	KH07A	KH07B	KH07C
Sample Depth (ft BGS):												5	1.5	
Sample Date:	10/17/2008	11/4/2008	10/27/2008	11/4/2008	10/27/2008	11/4/2008	11/4/2008	11/4/2008	11/4/2008	11/13/2008	11/13/2008	11/30/2006	11/30/2006	11/30/2006
2,4-Dinitrophenol												0.650 U	0.640 U	0.630 U
2,4-Dinitrotoluene												0.330 U	0.320 U	0.320 U
2,6-Dinitrotoluene												0.330 U	0.320 U	0.320 U
2-Chloronaphthalene												0.065 U	0.064 U	0.063 U
2-Chlorophenol												0.065 U	0.064 U	0.063 U
2-Methylnaphthalene												0.065 U	0.064 U	0.063 U
2-Methylphenol												0.065 U	0.064 U	0.063 U
2-Nitroaniline												0.330 U	0.320 U	0.320 U
2-Nitrophenol												0.330 U	0.320 U	0.320 U
3,3'-Dichlorobenzidine												0.330 U	0.320 U	0.320 U
3-Nitroaniline												0.330 U	0.320 U	0.320 U
4,6-Dinitro-2-Methylphenol												0.650 U	0.640 U	0.630 U
4-Bromophenyl-phenylether												0.065 U	0.064 U	0.063 U
4-Chloro-3-methylphenol												0.330 U	0.320 U	0.320 U
4-Chloroaniline												0.330 U	0.320 U	0.320 U
4-Chlorophenyl-phenylether												0.065 U	0.064 U	0.063 U
4-Methylphenol												0.065 U	0.064 U	0.063 U
4-Nitroaniline												0.330 U	0.320 U	0.320 U
4-Nitrophenol												0.330 U	0.320 U	0.320 U
Acenaphthene												0.065 U	0.064 U	0.063 U
Acenaphthylene												0.065 U	0.064 U	0.063 U
Anthracene												0.065 U	0.064 U	0.063 U
Benzo(a)anthracene												0.065 U	0.064 U	0.063 U
Benzo(a)pyrene												0.065 U	0.064 U	0.063 U
Benzo(b)fluoranthene												0.065 U	0.064 U	0.063 U
Benzo(g,h,i)perylene												0.065 U	0.064 U	0.063 U
Benzo(k)fluoranthene												0.065 U	0.064 U	0.063 U
Benzoic Acid												0.650 U	0.640 U	0.630 U
Benzyl Alcohol												0.330 UJ	0.320 UJ	0.320 UJ
bis(2-Chloroethoxy) Methane												0.065 U	0.064 U	0.063 U
Bis-(2-Chloroethyl) Ether												0.065 U	0.064 U	0.063 U
bis(2-Ethylhexyl)phthalate												0.065 U	**0.520**	0.063 U
Butylbenzylphthalate												0.065 U	0.064 U	0.063 U
Carbazole												0.065 U	0.064 U	0.063 U
Chrysene												0.065 U	**0.078**	0.063 U
Dibenz(a,h)anthracene												0.065 U	0.064 U	0.063 U
Dibenzofuran												0.065 U	0.064 U	0.063 U
Diethylphthalate												0.065 U	0.064 U	0.063 U
Dimethylphthalate												0.065 U	0.064 U	0.063 U
Di-n-Butylphthalate												0.065 U	0.064 U	0.063 U
Di-n-Octyl phthalate												0.065 U	0.064 U	0.063 U
Fluoranthene												0.065 U	**0.075**	**0.066**
Fluorene												0.065 U	0.064 U	0.063 U
Hexachlorobenzene												0.065 U	0.064 U	0.063 U
Hexachlorobutadiene												0.065 U	0.064 U	0.063 U
Hexachlorocyclopentadiene												0.330 U	0.320 U	0.320 U
Hexachloroethane												0.065 U	0.064 U	0.063 U
Indeno(1,2,3-cd)pyrene												0.065 U	0.064 U	0.063 U
Isophorone												0.065 U	0.064 U	0.063 U
Naphthalene												0.065 U	0.064 U	0.063 U
Nitrobenzene												0.065 U	0.064 U	0.063 U
N-Nitroso-Di-N-Propylamine												0.330 U	0.320 U	0.320 U
N-Nitrosodiphenylamine												0.065 U	0.064 U	0.063 U
Pentachlorophenol												0.330 U	0.320 U	0.320 U
Phenanthrene												0.065 U	0.064 U	0.063 U
Phenol												0.065 U	0.064 U	0.063 U
Pyrene												0.065 U	**0.096**	**0.067**

TABLE G-2
HISTORICAL SOIL ANALYTICAL RESULTS
LOCATIONS NORTH OF SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location:	PBI-1			PBI-2	PBI-2A		PBI-3		
Sample ID:	PBI-1	PBI-1	PBI-1	PBI-2	PBI-2A	PBI-2A	PBI-3	PBI-3	PBI-3
Laboratory ID:	PI24A	PI24B	PI24C	PI24D	PI24E	PI24F	PI24G	PI24H	PI24I
Sample Depth (ft BGS):	2	5	8	2	5	8	2	5	8
Sample Date:	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009
TOTAL METALS (mg/kg)									
EPA 200.8/SW6010B/SW7470A (a)									
Barium									
Cadmium	**1.3**	**0.7**	**1.1**	**9.1**	**0.8**	**2.1**	**5.7**	0.6 U	0.6 U
Chromium	**561** J	**299**	**486**	**652**	**54**	**117**	**621**	**16**	**33**
Copper	**107** J	**46**	**128**	**394**	**152**	**136**	**1300**	**526**	**21**
Lead	**141**	**86**	**113**	**1200**	**29**	**164**	**768**	**37**	**29**
Mercury	**0.05**	0.02 U	0.02 U	**0.39**	**0.07**	**0.09**	**2**	**0.19**	**0.07**
Nickel									
Selenium									
Silver									
Zinc	**380** J	**190**	**270**	**3030**	**170**	**560**	**2520**	**210**	**120**
PCBs (mg/kg)									
EPA SW8082 (a)									
Aroclor 1016									
Aroclor 1221									
Aroclor 1232									
Aroclor 1242									
Aroclor 1248									
Aroclor 1254									
Aroclor 1260									
Total PCBs									
CONVENTIONALS (mg/kg)									
Cyanide									
Oil and Grease									
Total Organic Carbon									
PETROLEUM HYDROCARBONS (mg/kg)									
NWTPH-HCID									
Diesel Range Organics									
Gasoline Range Organics									
Lube Oil									
NWTPH-Dx									
Diesel Range Organics									
Lube Oil									
VOLATILES (mg/kg)									
EPA SW8260B/C (a)									
1,1,1,2-Tetrachloroethane									
1,1,1-Trichloroethane									
1,1,2,2-Tetrachloroethane									
1,1,2-Trichloro-1,2,2-trifluoroethane									
1,1,2-Trichloroethane									
1,1-Dichloroethane									
1,1-Dichloroethene									
1,1-Dichloropropene									
1,2,3-Trichlorobenzene									
1,2,3-Trichloropropane									
1,2,4-Trichlorobenzene									
1,2,4-Trimethylbenzene									
1,2-Dibromo-3-chloropropane									
1,2-Dichlorobenzene									
1,2-Dichloroethane									
1,2-Dichloropropane									
1,3,5-Trimethylbenzene									
1,3-Dichlorobenzene									
1,3-Dichloropropane									
1,4-Dichlorobenzene									
2,2-Dichloropropane									
2-Butanone									
2-Chloroethylvinylether									
2-Chlorotoluene									

TABLE G-2
HISTORICAL SOIL ANALYTICAL RESULTS
LOCATIONS NORTH OF SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Sample ID:	PBI-1	PBI-1	PBI-1	PBI-2	PBI-2A	PBI-2A	PBI-3	PBI-3	PBI-3
Laboratory ID:	PI24A	PI24B	PI24C	PI24D	PI24E	PI24F	PI24G	PI24H	PI24I
Sample Depth (ft BGS):	2	5	8	2	5	8	2	5	8
Sample Date:	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009
2-Hexanone									
4-Chlorotoluene									
4-Isopropyltoluene									
4-Methyl-2-Pentanone (MIBK)									
Acetone									
Acrolein									
Acrylonitrile									
Benzene									
Bromobenzene									
Bromochloromethane									
Bromodichloromethane									
Bromoethane									
Bromoform									
Bromomethane									
Carbon Disulfide									
Carbon Tetrachloride									
Chlorobenzene									
Chloroethane									
Chloroform									
Chloromethane									
cis-1,2-Dichloroethene									
cis-1,3-Dichloropropene									
Dibromochloromethane									
Dibromomethane									
Ethylbenzene									
Ethylene Dibromide									
Hexachlorobutadiene									
Isopropylbenzene									
m, p-Xylene									
Methyl Iodide									
Methylene Chloride									
Naphthalene									
n-Butylbenzene									
n-Propylbenzene									
o-Xylene									
sec-Butylbenzene									
Styrene									
tert-Butylbenzene									
Tetrachloroethene									
Toluene									
trans-1,2-Dichloroethene									
trans-1,3-Dichloropropene									
trans-1,4-Dichloro-2-butene									
Trichloroethene									
Trichlorofluoromethane									
Vinyl Acetate									
Vinyl Chloride									
SEMIVOLATILES (mg/kg)									
EPA SW8270D (a)									
1,2,4-Trichlorobenzene									
1,2-Dichlorobenzene									
1,3-Dichlorobenzene									
1,4-Dichlorobenzene									
1-Methylnaphthalene									
2,2'-Oxybis(1-Chloropropane)									
2,4,5-Trichlorophenol									
2,4,6-Trichlorophenol									
2,4-Dichlorophenol									
2,4-Dimethylphenol									

TABLE G-2
HISTORICAL SOIL ANALYTICAL RESULTS
LOCATIONS NORTH OF SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Sample ID:	PBI-1	PBI-1	PBI-1	PBI-2	PBI-2A	PBI-2A	PBI-3	PBI-3	PBI-3
Laboratory ID:	PI24A	PI24B	PI24C	PI24D	PI24E	PI24F	PI24G	PI24H	PI24I
Sample Depth (ft BGS):	2	5	8	2	5	8	2	5	8
Sample Date:	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009
2,4-Dinitrophenol									
2,4-Dinitrotoluene									
2,6-Dinitrotoluene									
2-Chloronaphthalene									
2-Chlorophenol									
2-Methylnaphthalene									
2-Methylphenol									
2-Nitroaniline									
2-Nitrophenol									
3,3'-Dichlorobenzidine									
3-Nitroaniline									
4,6-Dinitro-2-Methylphenol									
4-Bromophenyl-phenylether									
4-Chloro-3-methylphenol									
4-Chloroaniline									
4-Chlorophenyl-phenylether									
4-Methylphenol									
4-Nitroaniline									
4-Nitrophenol									
Acenaphthene									
Acenaphthylene									
Anthracene									
Benzo(a)anthracene									
Benzo(a)pyrene									
Benzo(b)fluoranthene									
Benzo(g,h,i)perylene									
Benzo(k)fluoranthene									
Benzoic Acid									
Benzyl Alcohol									
bis(2-Chloroethoxy) Methane									
Bis-(2-Chloroethyl) Ether									
bis(2-Ethylhexyl)phthalate									
Butylbenzylphthalate									
Carbazole									
Chrysene									
Dibenz(a,h)anthracene									
Dibenzofuran									
Diethylphthalate									
Dimethylphthalate									
Di-n-Butylphthalate									
Di-n-Octyl phthalate									
Fluoranthene									
Fluorene									
Hexachlorobenzene									
Hexachlorobutadiene									
Hexachlorocyclopentadiene									
Hexachloroethane									
Indeno(1,2,3-cd)pyrene									
Isophorone									
Naphthalene									
Nitrobenzene									
N-Nitroso-Di-N-Propylamine									
N-Nitrosodiphenylamine									
Pentachlorophenol									
Phenanthrene									
Phenol									
Pyrene									

U = Indicates the compound was undetected at the reported concentration.
J = Indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
Bold = Detected compound.
(a) = Analytical method was not always listed with historical sample results.
Results listed account for all historical analyses completed in site area as discussed in report text.

TABLE G-3
HISTORICAL ARSENIC SOIL ANALYTICAL RESULTS
FORMER SLIP 5 LOCATIONS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Sample ID	Sample Date	Sample Depth	Arsenic (mg/kg)
5	8/1/83	2.5	33
6-3	8/1/83	1	18
7-1	8/1/83	2.5	12
7-5	8/1/83	8.5	10
7-5	8/1/83	13.5	7
7-5	8/1/83	18.5	25
15	8/1/83	2.5	15
15-Dup	8/1/83	2	11
16	8/1/83	2.5	9.5
16	8/1/83	6.5	5.3
17	8/1/83	2.5	16
17-Dup	8/1/83	2.5	19
17	8/1/83	6.5	7.4
19	8/1/83	1.5	8.9
19	8/1/83	3.5	17
19	8/1/83	9	36
20	8/1/83	4	5.3
20	8/1/83	10.5	9.2
20	8/1/83	14	18
22	8/1/83	4	3.8
22-Dup	8/1/83	4	6.7
22	8/1/83	6.5	8.7
215	1/15/88	3.5-4	5
215	1/15/88	8.5-9	1
215	1/15/88	13.5-14	1
224	1/20/88	2.5-3	7
224	1/20/88	7.5-8	12
224	1/20/88	12.5-13	44
224	1/20/88	17.5-18	39
224	1/20/88	18-18.5	2
228	1/19/88	3.5-4	37
228	1/19/88	8.5-9	12
228	1/19/88	13-13.5	11
228	1/19/88	17-17.5	12
230	1/21/88	2.5-3	3
230	1/21/88	7.5-8	2
230	1/21/88	12.5-13	33
230	1/21/88	15-15.5	17
232	1/19/88	3.5-4	44
232	1/19/88	8.5-9	47
232	1/19/88	13.5-14	92
233	1/21/88	3.5-4	2
233	1/21/88	8.5-9	82
233	1/28/88	10-10.5	46
236	1/20/88	3.5	13
236	1/20/88	8.5	48
236	1/20/88	13.5	41
236	1/20/88	18.5	24

TABLE G-3
HISTORICAL ARSENIC SOIL ANALYTICAL RESULTS
FORMER SLIP 5 LOCATIONS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Sample ID	Sample Date	Sample Depth	Arsenic (mg/kg)
237	1/21/88	3.5	5
237	1/29/88	8.5	4
237	1/29/88	15	3
244	1/21/88	3.5	25
244	1/21/88	8.5	4
244	1/21/88	13.5	5
I-6	10/19/83	10	79
I-7	10/20/83	3	30
I-7	10/20/83	5	2.3
I-202s	1/14/88	2.5	5
I-202s	1/14/88	7.5	33
I-202s	1/14/88	12.5	54
I-202s	1/14/88	17.5	191
I-202s	1/14/88	27.5	27
I-203i	1/15/88	2.5	17
I-203i	1/15/88	7.5	26
I-203i	1/28/88	10	27
I-203i	1/15/88	12.5	22
I-203i	1/28/88	15	47
I-203i	1/28/88	18	10
I-203i	1/28/88	23	59
I-203i	1/28/88	33	11
I-203i	1/28/88	43	2
I-203i	1/28/88	48	2
I-205s	1/19/88	2.5	3
I-205s	1/19/88	12.5	9
I-205s-Dup	1/19/88	12.5	3
I-205s	1/19/88	17.5	6
I-205s	1/19/88	27.5	393
IMR-13	11/4/08		77
PBI-4	7/27/09	2	6.2
PBI-4	7/27/09	5	6.9
PBI-4	7/27/09	8	75.4
PBI-5	7/27/09	2	9.3
PBI-5	7/27/09	5	6.4
PBI-5	7/27/09	8	6.7
PBI-6	7/27/09	2	2.7
PBI-6	7/27/09	5	185
PBI-6	7/27/09	8	74
PBI-7	7/27/09	2	6.2
PBI-7	7/27/09	5	14.7
PBI-7	7/27/09	8	0.5 J
PBI-8	7/27/09	2	23.4
PBI-8	7/27/09	5	4.8
PBI-8	7/27/09	8	7
PBI-9	7/27/09	2	1.4
PBI-9	7/27/09	5	8.6
PBI-9	7/27/09	8	6.3

TABLE G-3
HISTORICAL ARSENIC SOIL ANALYTICAL RESULTS
FORMER SLIP 5 LOCATIONS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Sample ID	Sample Date	Sample Depth	Arsenic (mg/kg)
PBI-10	7/27/09	2	4.7
PBI-10	7/27/09	5	6.3
PBI-10	7/27/09	8	32.7
Transformers North of 14-02			
TDP22	11/5/08	3	5 U
TDP23	11/5/08	3	5 U
Hazardous Materials Storage Sheds			
TDP27	11/6/08	11	6
TDP28	11/6/08	11	6
TDP29	11/6/08	11	8
TDP30	11/6/08	11	13
Hydraulic Test Pad Area			
TDP31	11/6/08	12	9
TDP32	11/6/08	11	5 U
			393

U = Indicates the compound was undetected at the reported concentration
J = Laboratory flag indicating the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

TABLE G-4
HISTORICAL SOIL ANALYTICAL RESULTS
FORMER SLIP 5 LOCATIONS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location:	5	6-3		7-1	7-5			15			16		17		
									Dup of 15					Dup of 17	
Sample ID:	5	6-3	6-3	7-1	7-5	7-5	7-5	15	15-Dup	15	16	16	17	17-Dup	17
Laboratory ID:															
Sample Depth (ft BGS):	2.5	1	2	2.5	8.5	13.5	18.5	2	2	2.5	2.5	6.5	2.5	2.5	6.5
Sample Date:	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983
TOTAL METALS (mg/kg)															
EPA 200.8/SW6010B/SW7470A (a)															
Barium	**650**	**520**		**59**	**42**	**51**	**60**		135	**200**	**83**	**24**	**70**	**70**	**149**
Cadmium	**16**	**7.7**		**1.9**	**0.76**	**0.26**	**1.1**		**1.9**	**1.6**	**1.9**	**0.69**	**2.4**	**3.8**	**5.1**
Chromium	**1130**	**466**		**44**	**15**	**21**	**32**		**33**	**44**	**45**	**40**	**270**	**541**	**62**
Copper											**111**				
Lead	**1170**	**580**		**230**	**100**	**49**	**24**		**200**	**490**	**170**	**36**	**280**	**230**	**396**
Mercury	**0.13**	**0.19**		**0.14**	**0.12**	**0.05**	**0.24**		**0.18**	**0.84**	**0.04**	0.03 U	0.05 U	**0.17**	**0.05**
Nickel	**82**	**76**		**56**	**34**	**17**	**25**		**21**	**35**	**88**	**20**	**180**	**146**	**108**
Selenium					**0.73**		0.2 U		**0.24**	**0.6**	**0.68**	0.2 U	**0.6**	**0.22**	**0.96**
Silver	**2.5**	**2.5**		**1.2**	**0.9**	0.3 U	**0.8**		**0.54**	**0.24**	**0.54**	0.3 U	**0.36**	**0.83**	**3**
Zinc	**2270**	**2320**		**1640**	**877**	**77**	**194**		**272**	**440**	**556**	**88.8**	**390**	**511**	**3640**
PCBs (mg/kg)															
EPA SW8082 (a)															
Aroclor 1016															
Aroclor 1221															
Aroclor 1232															
Aroclor 1242															
Aroclor 1248															
Aroclor 1254															
Aroclor 1260															
Total PCBs	**9.7**		**1.2**	**0.7**		0.2 U		**0.4**	**0.13**		0.1 U			0.1 U	
CONVENTIONALS (mg/kg)															
Cyanide	3 U		3 U	3 U		3 U									
Oil and Grease								**900**	**2020**				**1500**		
PETROLEUM HYDROCARBONS (mg/kg)															
NWTPH-HCID															
Diesel Range Organics															
Gasoline Range Organics															
Lube Oil															
NWTPH-Dx															
Diesel Range Organics															
Lube Oil															
C19 Branched Hydrocarbon											**0.77**				
C11 Hydrocarbon											**0.19**				
C18-C25 Hydrocarbons (total)											**3.7**				
VOLATILES (mg/kg)															
EPA SW8260B/C (a)															
1,1,1,2-Tetrachloroethane															
1,1,1-Trichloroethane															
1,1,2-Trichloroethane															
1,1-Dichloroethane															
1,1-Dichloroethene															
1,2-Dichloroethene (total)															
1,2-Dichloropropane															
2-Butanone															
2-Chloroethylvinylether															
2-Hexanone															
4-Methyl-2-Pentanone (MIBK)															
Acetone															
Benzene															
Bromodichloromethane															
Bromoform															
Bromomethane															
Carbon Disulfide															
Carbon Tetrachloride															
Chlorobenzene															
Chloroethane															
Chloroform											**0.012**				
Chloromethane															
cis-1,2-Dichloroethene															

TABLE G-4
HISTORICAL SOIL ANALYTICAL RESULTS
FORMER SLIP 5 LOCATIONS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location:	5	6-3		7-1	7-5			15			16		17		
									Dup of 15					Dup of 17	
Sample ID:	5	6-3	6-3	7-1	7-5	7-5	7-5	15	15-Dup	15	16	16	17	17-Dup	17
Laboratory ID:															
Sample Depth (ft BGS):	2.5	1	2	2.5	8.5	13.5	18.5	2	2	2.5	2.5	6.5	2.5	2.5	6.5
Sample Date:	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983
cis-1,3-Dichloropropene															
Dibromochloromethane															
Ethylbenzene															
m, p-Xylene															
Methylene Chloride											**0.0095**				
o-Xylene															
Styrene															
Tetrachloroethene															
Toluene											**0.0041**				
Total Xylenes															
trans-1,2-Dichloroethene															
trans-1,3-Dichloropropene															
Trichloroethene											**0.0009**				
Trichlorofluoromethane															
Vinyl Acetate															
Vinyl Chloride															
1,2,3-Propanetriol, Triacetate											**0.31**				
Hexadecane											**0.19**				
Heptadecane											**0.39**				
SEMIVOLATILES (mg/kg)															
EPA SW8270D (a)															
1,2,4-Trichlorobenzene															
1,2-Dichlorobenzene															
1,3-Dichlorobenzene															
1,4-Dichlorobenzene															
1-Methylnaphthalene															
2,2'-Oxybis(1-Chloropropane)															
2,4,5-Trichlorophenol															
2,4,6-Trichlorophenol															
2,4-Dichlorophenol															
2,4-Dimethylphenol															
2,4-Dinitrophenol															
2,4-Dinitrotoluene															
2,6-Dinitrotoluene															
2-Chloronaphthalene															
2-Chlorophenol															
2-Methylnaphthalene															
2-Methylphenol															
2-Nitroaniline															
2-Nitrophenol															
3,3'-Dichlorobenzidine															
3-Nitroaniline															
4,6-Dinitro-2-Methylphenol															
4-Bromophenyl-phenylether															
4-Chloro-3-methylphenol															
4-Chloroaniline															
4-Chlorophenyl-phenylether															
4-Methylphenol															
4-Nitroaniline															
4-Nitrophenol															
Acenaphthene															
Acenaphthylene															
Anthracene															
Benzo(a)anthracene															
Benzo(a)pyrene															
Benzo(b)fluoranthene															
Benzo(g,h,i)perylene															
Benzo(k)fluoranthene															
Benzoic Acid															
Benzyl Alcohol															
bis(2-Chloroethoxy) Methane															
Bis-(2-Chloroethyl) Ether															
bis(2-Ethylhexyl)phthalate															
Butylbenzylphthalate															
Carbazole															
Chrysene															

TABLE G-4
HISTORICAL SOIL ANALYTICAL RESULTS
FORMER SLIP 5 LOCATIONS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location:	5	6-3		7-1	7-5			15			16		17		
Sample ID:	5	6-3	6-3	7-1	7-5	7-5	7-5	15	Dup of 15 15-Dup	15	16	16	17	Dup of 17 17-Dup	17
Laboratory ID:															
Sample Depth (ft BGS):	2.5	1	2	2.5	8.5	13.5	18.5	2	2	2.5	2.5	6.5	2.5	2.5	6.5
Sample Date:	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983
Dibenz(a,h)anthracene															
Dibenzofuran															
Diethylphthalate															
Dimethylphthalate															
Di-n-Butylphthalate															
Di-n-Octyl phthalate															
Fluoranthene															
Fluorene															
Hexachlorobenzene															
Hexachlorobutadiene															
Hexachlorocyclopentadiene															
Hexachloroethane															
Indeno(1,2,3-cd)pyrene															
Isophorone															
Naphthalene															
Nitrobenzene															
N-Nitroso-Di-N-Propylamine															
N-Nitrosodiphenylamine															
Pentachlorophenol															
Phenanthrene, 3,4,5,6-Tetraethyl											**1.4**				
Phenanthrene															
Phenol															
Pyrene															

TABLE G-4
HISTORICAL SOIL ANALYTICAL RESULTS
FORMER SLIP 5 LOCATIONS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location:	19			20			22			215			224				
Sample ID:	19	19	19	20	20	20	22	Dup of 22 22-Dup	22	215	215	215	224	224	224	224	224
Laboratory ID:																	
Sample Depth (ft BGS):	1.5	3.5	9	4	10.5	14	4	4	6.5	3.5-4	8.5-9	13.5-14	2.5-3	7.5-8	12.5-13	17.5-18	18-18.5
Sample Date:	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	1/15/1988	1/15/1988	1/15/1988	1/20/1988	1/20/1988	1/20/1988	1/20/1988	1/20/1988
TOTAL METALS (mg/kg)																	
EPA 200.8/SW6010B/SW7470A (a)																	
Barium	**49**	**75**	**63**	**28**	**49**	**71**	**50**	**34**	**60**								
Cadmium	**0.61**	**1.5**	**2.9**	**0.4**	**0.45**	**0.68**	**0.1**	**0.57**	**1.3**								
Chromium	**19**	**180**	**835**	**19**	**15**	**19**	**23**	**22**	**48**	**100**	**13**	**12**	**27**	**39**	**757**	**120**	**9**
Copper										**27**	**9**	**7**	**22**	**38**	**1500**	**113**	**17**
Lead	**14**	**323**	**220**	**8**	**9**	**93**	**9.2**	**13**	**110**	**94**	3 U	3 U	**8**	**34**	**370**	**149**	4 U
Mercury	**0.11**	**0.03**	0.03 U	0.03 U	0.03 U	**4.3**	**0.07**	0.03 U	**0.06**								
Nickel	**22**	**281**	**2030**	**28**	**19**	**15**	**24**	**27**	**26**	**15**	**8**	**7**	**24**	**28**	**1624**	**350**	**13**
Selenium	0.2 U	**0.28**	0.2 U	**0.4**	**0.75**	**0.31**	0.5 U	**0.27**	**0.26**								
Silver	0.3 U	**1.4**	**2.8**	0.3 U	0.3 U	0.3 U	**0.07**	0.3 U	0.3 U								
Zinc	**32.6**	**289**	**300**	**26.8**	**30.7**	**52.9**	**45**	**70.2**	**268**	**184**	**24.7**	**20.9**	**46.1**	**161**	**332**	**605**	**25.9**
PCBs (mg/kg)																	
EPA SW8082 (a)																	
Aroclor 1016																	
Aroclor 1221																	
Aroclor 1232																	
Aroclor 1242																	
Aroclor 1248																	
Aroclor 1254																	
Aroclor 1260																	
Total PCBs	0.1 U	**0.28**		0.1 U			**0.05**	0.1 U									
CONVENTIONALS (mg/kg)																	
Cyanide																	
Oil and Grease	**642**	**698**		**73**	**179**	**149**	**100**	**165**	**1710**								
PETROLEUM HYDROCARBONS (mg/kg)																	
NWTPH-HCID																	
Diesel Range Organics																	
Gasoline Range Organics																	
Lube Oil																	
NWTPH-Dx																	
Diesel Range Organics																	
Lube Oil																	
C19 Branched Hydrocarbon																	
C11 Hydrocarbon																	
C18-C25 Hydrocarbons (total)																	
VOLATILES (mg/kg)																	
EPA SW8260B/C (a)																	
1,1,1,2-Tetrachloroethane																	
1,1,1-Trichloroethane																	
1,1,2-Trichloroethane																	
1,1-Dichloroethane																	
1,1-Dichloroethene																	
1,2-Dichloroethene (total)																	
1,2-Dichloropropane																	
2-Butanone																	
2-Chloroethylvinylether																	
2-Hexanone																	
4-Methyl-2-Pentanone (MIBK)																	
Acetone																	
Benzene																	
Bromodichloromethane																	
Bromoform																	
Bromomethane																	
Carbon Disulfide																	
Carbon Tetrachloride																	
Chlorobenzene																	
Chloroethane																	
Chloroform																	
Chloromethane																	
cis-1,2-Dichloroethene																	

TABLE G-4
HISTORICAL SOIL ANALYTICAL RESULTS
FORMER SLIP 5 LOCATIONS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location:	19			20			22			215			224				
								Dup of 22									
Sample ID:	19	19	19	20	20	20	22	22-Dup	22	215	215	215	224	224	224	224	224
Laboratory ID:																	
Sample Depth (ft BGS):	1.5	3.5	9	4	10.5	14	4	4	6.5	3.5-4	8.5-9	13.5-14	2.5-3	7.5-8	12.5-13	17.5-18	18-18.5
Sample Date:	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	1/15/1988	1/15/1988	1/15/1988	1/20/1988	1/20/1988	1/20/1988	1/20/1988	1/20/1988
cis-1,3-Dichloropropene																	
Dibromochloromethane																	
Ethylbenzene																	
m, p-Xylene																	
Methylene Chloride																	
o-Xylene																	
Styrene																	
Tetrachloroethene																	
Toluene																	
Total Xylenes																	
trans-1,2-Dichloroethene																	
trans-1,3-Dichloropropene																	
Trichloroethene																	
Trichlorofluoromethane																	
Vinyl Acetate																	
Vinyl Chloride																	
1,2,3-Propanetriol, Triacetate																	
Hexadecane																	
Heptadecane																	
SEMIVOLATILES (mg/kg)																	
EPA SW8270D (a)																	
1,2,4-Trichlorobenzene																	
1,2-Dichlorobenzene																	
1,3-Dichlorobenzene																	
1,4-Dichlorobenzene																	
1-Methylnaphthalene																	
2,2'-Oxybis(1-Chloropropane)																	
2,4,5-Trichlorophenol																	
2,4,6-Trichlorophenol																	
2,4-Dichlorophenol																	
2,4-Dimethylphenol																	
2,4-Dinitrophenol																	
2,4-Dinitrotoluene																	
2,6-Dinitrotoluene																	
2-Chloronaphthalene																	
2-Chlorophenol																	
2-Methylnaphthalene																	
2-Methylphenol																	
2-Nitroaniline																	
2-Nitrophenol																	
3,3'-Dichlorobenzidine																	
3-Nitroaniline																	
4,6-Dinitro-2-Methylphenol																	
4-Bromophenyl-phenylether																	
4-Chloro-3-methylphenol																	
4-Chloroaniline																	
4-Chlorophenyl-phenylether																	
4-Methylphenol																	
4-Nitroaniline																	
4-Nitrophenol																	
Acenaphthene																	
Acenaphthylene																	
Anthracene																	
Benzo(a)anthracene																	
Benzo(a)pyrene																	
Benzo(b)fluoranthene																	
Benzo(g,h,i)perylene																	
Benzo(k)fluoranthene																	
Benzoic Acid																	
Benzyl Alcohol																	
bis(2-Chloroethoxy) Methane																	
Bis-(2-Chloroethyl) Ether																	
bis(2-Ethylhexyl)phthalate																	
Butylbenzylphthalate																	
Carbazole																	
Chrysene																	

TABLE G-4
HISTORICAL SOIL ANALYTICAL RESULTS
FORMER SLIP 5 LOCATIONS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location:	19			20			22			215			224				
Sample ID:	19	19	19	20	20	20	22	Dup of 22 22-Dup	22	215	215	215	224	224	224	224	224
Laboratory ID:																	
Sample Depth (ft BGS):	1.5	3.5	9	4	10.5	14	4	4	6.5	3.5-4	8.5-9	13.5-14	2.5-3	7.5-8	12.5-13	17.5-18	18-18.5
Sample Date:	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	8/1/1983	1/15/1988	1/15/1988	1/15/1988	1/20/1988	1/20/1988	1/20/1988	1/20/1988	1/20/1988
Dibenz(a,h)anthracene																	
Dibenzofuran																	
Diethylphthalate																	
Dimethylphthalate																	
Di-n-Butylphthalate																	
Di-n-Octyl phthalate																	
Fluoranthene																	
Fluorene																	
Hexachlorobenzene																	
Hexachlorobutadiene																	
Hexachlorocyclopentadiene																	
Hexachloroethane																	
Indeno(1,2,3-cd)pyrene																	
Isophorone																	
Naphthalene																	
Nitrobenzene																	
N-Nitroso-Di-N-Propylamine																	
N-Nitrosodiphenylamine																	
Pentachlorophenol																	
Phenanthrene, 3,4,5,6-Tetraethyl																	
Phenanthrene																	
Phenol																	
Pyrene																	

TABLE G-4
HISTORICAL SOIL ANALYTICAL RESULTS
FORMER SLIP 5 LOCATIONS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location:	228				230		230		232			233			236			
Sample ID:	228	228	228	228	230	230	230	230	232	232	232	233	233	233	236	236	236	236
Laboratory ID:																		
Sample Depth (ft BGS):	3.5-4	8.5-9	13-13.5	17-17.5	2.5-3	7.5-8	12.5-13	15-15.5	3.5-4	8.5	13.5	3.5-4	8.5-9	10-10.5	3.5	8.5	13.5	18.5
Sample Date:	1/19/1988	1/19/1988	1/19/1988	1/19/1988	1/21/1988	1/21/1988	1/21/1988	1/21/1988	1/19/1988	1/19/1988	1/19/1988	1/21/1988	1/21/1988	1/28/1988	1/20/1988	1/20/1988	1/20/1988	1/20/1988
TOTAL METALS (mg/kg)																		
EPA 200.8/SW6010B/SW7470A (a)																		
Barium																		
Cadmium				0.5 U				**0.6**					**0.4**					
Chromium	**229**	**311**	**142**	**13**	**33**	**32**	**81**	**1490**	**242**	**158**	**194**	**37**	**1750**	**591**	**853**	**1380**	**4180**	**49**
Copper	**175**	**66**	**87**	**11**	**14**	**11**	**227**	**108**	**273**	**350**	**188**	**11**	**846**	**591**	**151**	**539**	**311**	**49**
Lead	**362**	**152**	**392**	**5**	4 U	4 U	**239**	**274**	**552**	**103**	**109**	4 U	**1110**	**55**	**953**	**1690**	**462**	**20**
Mercury				0.01 U				0.01 U					0.01 U					
Nickel	**481**	**241**	**151**	**10**	**34**	**38**	**125**	**470**	**362**	**734**	**390**	**42**	**1427**	**2460**	**97**	**1684**	**2197**	**24**
Selenium																		
Silver				0.2 U				**1**					**0.5**					
Zinc	**5770**	**3030**	**1130**	**44.1**	**34.2**	**31.3**	**672**	**154**	**385**	**291**	**542**	**32.2**	**351**	**42.6**	**621**	**801**	**737**	**138**
PCBs (mg/kg)																		
EPA SW8082 (a)																		
Aroclor 1016																		
Aroclor 1221																		
Aroclor 1232																		
Aroclor 1242																		
Aroclor 1248																		
Aroclor 1254																		
Aroclor 1260																		
Total PCBs																		
CONVENTIONALS (mg/kg)																		
Cyanide				1.2 U				0.5 U					1 U					
Oil and Grease																		
PETROLEUM HYDROCARBONS (mg/kg)																		
NWTPH-HCID																		
Diesel Range Organics																		
Gasoline Range Organics																		
Lube Oil																		
NWTPH-Dx																		
Diesel Range Organics																		
Lube Oil																		
C19 Branched Hydrocarbon																		
C11 Hydrocarbon																		
C18-C25 Hydrocarbons (total)																		
VOLATILES (mg/kg)																		
EPA SW8260B/C (a)																		
1,1,1,2-Tetrachloroethane																		
1,1,1-Trichloroethane																		
1,1,2-Trichloroethane																		
1,1-Dichloroethane																		
1,1-Dichloroethene																		
1,2-Dichloroethene (total)																		
1,2-Dichloropropane																		
2-Butanone																		
2-Chloroethylvinylether																		
2-Hexanone																		
4-Methyl-2-Pentanone (MIBK)																		
Acetone																		
Benzene																		
Bromodichloromethane																		
Bromoform																		
Bromomethane																		
Carbon Disulfide																		
Carbon Tetrachloride																		
Chlorobenzene																		
Chloroethane																		
Chloroform																		
Chloromethane																		
cis-1,2-Dichloroethene																		

TABLE G-4
HISTORICAL SOIL ANALYTICAL RESULTS
FORMER SLIP 5 LOCATIONS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location:	228				230		230		232			233			236			
Sample ID:	228	228	228	228	230	230	230	230	232	232	232	233	233	233	236	236	236	236
Laboratory ID:																		
Sample Depth (ft BGS):	3.5-4	8.5-9	13-13.5	17-17.5	2.5-3	7.5-8	12.5-13	15-15.5	3.5-4	8.5	13.5	3.5-4	8.5-9	10-10.5	3.5	8.5	13.5	18.5
Sample Date:	1/19/1988	1/19/1988	1/19/1988	1/19/1988	1/21/1988	1/21/1988	1/21/1988	1/21/1988	1/19/1988	1/19/1988	1/19/1988	1/21/1988	1/21/1988	1/28/1988	1/20/1988	1/20/1988	1/20/1988	1/20/1988
cis-1,3-Dichloropropene																		
Dibromochloromethane																		
Ethylbenzene																		
m, p-Xylene																		
Methylene Chloride																		
o-Xylene																		
Styrene																		
Tetrachloroethene																		
Toluene																		
Total Xylenes																		
trans-1,2-Dichloroethene																		
trans-1,3-Dichloropropene																		
Trichloroethene																		
Trichlorofluoromethane																		
Vinyl Acetate																		
Vinyl Chloride																		
1,2,3-Propanetriol, Triacetate																		
Hexadecane																		
Heptadecane																		
SEMIVOLATILES (mg/kg)																		
EPA SW8270D (a)																		
1,2,4-Trichlorobenzene																		
1,2-Dichlorobenzene																		
1,3-Dichlorobenzene																		
1,4-Dichlorobenzene																		
1-Methylnaphthalene																		
2,2'-Oxybis(1-Chloropropane)																		
2,4,5-Trichlorophenol																		
2,4,6-Trichlorophenol																		
2,4-Dichlorophenol																		
2,4-Dimethylphenol																		
2,4-Dinitrophenol																		
2,4-Dinitrotoluene																		
2,6-Dinitrotoluene																		
2-Chloronaphthalene																		
2-Chlorophenol																		
2-Methylnaphthalene																		
2-Methylphenol																		
2-Nitroaniline																		
2-Nitrophenol																		
3,3'-Dichlorobenzidine																		
3-Nitroaniline																		
4,6-Dinitro-2-Methylphenol																		
4-Bromophenyl-phenylether																		
4-Chloro-3-methylphenol																		
4-Chloroaniline																		
4-Chlorophenyl-phenylether																		
4-Methylphenol																		
4-Nitroaniline																		
4-Nitrophenol																		
Acenaphthene																		
Acenaphthylene																		
Anthracene																		
Benzo(a)anthracene																		
Benzo(a)pyrene																		
Benzo(b)fluoranthene																		
Benzo(g,h,i)perylene																		
Benzo(k)fluoranthene																		
Benzoic Acid																		
Benzyl Alcohol																		
bis(2-Chloroethoxy) Methane																		
Bis-(2-Chloroethyl) Ether																		
bis(2-Ethylhexyl)phthalate																		
Butylbenzylphthalate																		
Carbazole																		
Chrysene																		

TABLE G-4
HISTORICAL SOIL ANALYTICAL RESULTS
FORMER SLIP 5 LOCATIONS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location:	228				230		230		232			233			236			
Sample ID:	228	228	228	228	230	230	230	230	232	232	232	233	233	233	236	236	236	236
Laboratory ID:																		
Sample Depth (ft BGS):	3.5-4	8.5-9	13-13.5	17-17.5	2.5-3	7.5-8	12.5-13	15-15.5	3.5-4	8.5	13.5	3.5-4	8.5-9	10-10.5	3.5	8.5	13.5	18.5
Sample Date:	1/19/1988	1/19/1988	1/19/1988	1/19/1988	1/21/1988	1/21/1988	1/21/1988	1/21/1988	1/19/1988	1/19/1988	1/19/1988	1/21/1988	1/21/1988	1/28/1988	1/20/1988	1/20/1988	1/20/1988	1/20/1988
Dibenz(a,h)anthracene																		
Dibenzofuran																		
Diethylphthalate																		
Dimethylphthalate																		
Di-n-Butylphthalate																		
Di-n-Octyl phthalate																		
Fluoranthene																		
Fluorene																		
Hexachlorobenzene																		
Hexachlorobutadiene																		
Hexachlorocyclopentadiene																		
Hexachloroethane																		
Indeno(1,2,3-cd)pyrene																		
Isophorone																		
Naphthalene																		
Nitrobenzene																		
N-Nitroso-Di-N-Propylamine																		
N-Nitrosodiphenylamine																		
Pentachlorophenol																		
Phenanthrene, 3,4,5,6-Tetraethyl																		
Phenanthrene																		
Phenol																		
Pyrene																		

TABLE G-4
HISTORICAL SOIL ANALYTICAL RESULTS
FORMER SLIP 5 LOCATIONS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location:	237			244			I-6	I-7		I-202s				
Sample ID:	237	237	237	244	244	244	I-6	I-7	I-7	I-202s	I-202s	I-202s	I-202s	I-202s
Laboratory ID:														
Sample Depth (ft BGS):	3.5	8.5	15	3.5	8.5	13.5	10	3	5	2.5	7.5	12.5	17.5	27.5
Sample Date:	1/21/1988	1/29/1988	1/29/1988	1/21/1988	1/21/1988	1/21/1988	10/19/1983	10/20/1983	10/20/1983	1/14/1988	1/14/1988	1/14/1988	1/14/1988	1/14/1988
TOTAL METALS (mg/kg)														
EPA 200.8/SW6010B/SW7470A (a)														
Barium								**89**						
Cadmium								**1**				**2.6**		
Chromium	**22**	**16**	**16**	**78**	**17**	**18**	**540**	**580**	**740**	**24**	**2960**	**2230**	**47**	**899**
Copper	**29**	**15**	**10**	**100**	**22**	**39**	**390**	**360**	**340**	**58**	**274**	**398**	**58**	**23**
Lead	**4**	4 U	5 U	**234**	5 U	**25**	**150**	**3900**	**630**	**44**	**503**	**191**	**36**	**301**
Mercury												**0.1**		
Nickel	**13**	**11**	**8**	**36**	**14**	**18**				**22**	**627**	**921**	**19**	**19**
Selenium														
Silver												**1.1**		
Zinc	**40.3**	**30.1**	**27.6**	**521**	**46.8**	**84.2**	**390**	**1500**	**310**	**447**	**2800**	**734**	**445**	**325**
PCBs (mg/kg)														
EPA SW8082 (a)														
Aroclor 1016														
Aroclor 1221														
Aroclor 1232														
Aroclor 1242										ND	ND	ND	ND	**0.06**
Aroclor 1248														
Aroclor 1254										ND	**0.08**	**0.17**	**0.03** J	**0.37**
Aroclor 1260										**0.25**	ND	**0.15**	**0.055** J	ND
Total PCBs										**0.25**	**0.08**	**0.32**	**0.085**	**0.43**
CONVENTIONALS (mg/kg)														
Cyanide												**1.4**		
Oil and Grease														
PETROLEUM HYDROCARBONS (mg/kg)														
NWTPH-HCID														
Diesel Range Organics														
Gasoline Range Organics														
Lube Oil														
NWTPH-Dx														
Diesel Range Organics														
Lube Oil														
C19 Branched Hydrocarbon														
C11 Hydrocarbon														
C18-C25 Hydrocarbons (total)														
VOLATILES (mg/kg)														
EPA SW8260B/C (a)														
1,1,1,2-Tetrachloroethane												ND		
1,1,1-Trichloroethane												ND		
1,1,2-Trichloroethane												ND		
1,1-Dichloroethane												ND		
1,1-Dichloroethene												ND		
1,2-Dichloroethene (total)												ND		
1,2-Dichloropropane														
2-Butanone														
2-Chloroethylvinylether														
2-Hexanone														
4-Methyl-2-Pentanone (MIBK)														
Acetone												**0.0038**		
Benzene												ND		
Bromodichloromethane														
Bromoform														
Bromomethane														
Carbon Disulfide												ND		
Carbon Tetrachloride														
Chlorobenzene														
Chloroethane														
Chloroform														
Chloromethane														
cis-1,2-Dichloroethene														

TABLE G-4
HISTORICAL SOIL ANALYTICAL RESULTS
FORMER SLIP 5 LOCATIONS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location:	**237**			**244**			**I-6**	**I-7**		**I-202s**				
Sample ID:	237	237	237	244	244	244	I-6	I-7	I-7	I-202s	I-202s	I-202s	I-202s	I-202s
Laboratory ID:														
Sample Depth (ft BGS):	3.5	8.5	15	3.5	8.5	13.5	10	3	5	2.5	7.5	12.5	17.5	27.5
Sample Date:	1/21/1988	1/29/1988	1/29/1988	1/21/1988	1/21/1988	1/21/1988	10/19/1983	10/20/1983	10/20/1983	1/14/1988	1/14/1988	1/14/1988	1/14/1988	1/14/1988
cis-1,3-Dichloropropene														
Dibromochloromethane														
Ethylbenzene												ND		
m, p-Xylene														
Methylene Chloride												**0.0044** B		
o-Xylene														
Styrene														
Tetrachloroethene												ND		
Toluene												**0.0014**		
Total Xylenes												**0.0047**		
trans-1,2-Dichloroethene														
trans-1,3-Dichloropropene														
Trichloroethene												ND		
Trichlorofluoromethane														
Vinyl Acetate														
Vinyl Chloride														
1,2,3-Propanetriol, Triacetate														
Hexadecane														
Heptadecane														
SEMIVOLATILES (mg/kg)														
EPA SW8270D (a)														
1,2,4-Trichlorobenzene														
1,2-Dichlorobenzene														
1,3-Dichlorobenzene														
1,4-Dichlorobenzene														
1-Methylnaphthalene														
2,2'-Oxybis(1-Chloropropane)														
2,4,5-Trichlorophenol														
2,4,6-Trichlorophenol														
2,4-Dichlorophenol														
2,4-Dimethylphenol														
2,4-Dinitrophenol														
2,4-Dinitrotoluene														
2,6-Dinitrotoluene														
2-Chloronaphthalene														
2-Chlorophenol														
2-Methylnaphthalene												ND		
2-Methylphenol														
2-Nitroaniline														
2-Nitrophenol														
3,3'-Dichlorobenzidine														
3-Nitroaniline														
4,6-Dinitro-2-Methylphenol														
4-Bromophenyl-phenylether														
4-Chloro-3-methylphenol														
4-Chloroaniline														
4-Chlorophenyl-phenylether														
4-Methylphenol														
4-Nitroaniline														
4-Nitrophenol														
Acenaphthene														
Acenaphthylene														
Anthracene												**0.033**		
Benzo(a)anthracene												**0.11**		
Benzo(a)pyrene														
Benzo(b)fluoranthene														
Benzo(g,h,i)perylene														
Benzo(k)fluoranthene														
Benzoic Acid														
Benzyl Alcohol														
bis(2-Chloroethoxy) Methane														
Bis-(2-Chloroethyl) Ether														
bis(2-Ethylhexyl)phthalate												**0.11**		
Butylbenzylphthalate														
Carbazole														
Chrysene												**0.11**		

TABLE G-4
HISTORICAL SOIL ANALYTICAL RESULTS
FORMER SLIP 5 LOCATIONS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location:	237			244			I-6	I-7		I-202s				
Sample ID:	237	237	237	244	244	244	I-6	I-7	I-7	I-202s	I-202s	I-202s	I-202s	I-202s
Laboratory ID:														
Sample Depth (ft BGS):	3.5	8.5	15	3.5	8.5	13.5	10	3	5	2.5	7.5	12.5	17.5	27.5
Sample Date:	1/21/1988	1/29/1988	1/29/1988	1/21/1988	1/21/1988	1/21/1988	10/19/1983	10/20/1983	10/20/1983	1/14/1988	1/14/1988	1/14/1988	1/14/1988	1/14/1988
Dibenz(a,h)anthracene														
Dibenzofuran														
Diethylphthalate														
Dimethylphthalate														
Di-n-Butylphthalate														
Di-n-Octyl phthalate														
Fluoranthene												**0.2**		
Fluorene														
Hexachlorobenzene														
Hexachlorobutadiene														
Hexachlorocyclopentadiene														
Hexachloroethane														
Indeno(1,2,3-cd)pyrene														
Isophorone														
Naphthalene														
Nitrobenzene														
N-Nitroso-Di-N-Propylamine														
N-Nitrosodiphenylamine														
Pentachlorophenol														
Phenanthrene, 3,4,5,6-Tetraethyl														
Phenanthrene												**0.16**		
Phenol														
Pyrene												**0.18**		

TABLE G-4
HISTORICAL SOIL ANALYTICAL RESULTS
FORMER SLIP 5 LOCATIONS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-203i										I-205s					IMR-13	PBI-4		
													Dup of I-205s						
Sample ID:	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-205s	I-205s	I-205s-Dup	I-205s	I-205s	IMR-13	PBI-4	PBI-4	PBI-4
Laboratory ID:																NY11D	PI24J	PI24K	PI24L
Sample Depth (ft BGS):	2.5	7.5	10	12.5	15	18	23	33	43	48	2.5	12.5	12.5	17.5	27.5		2	5	8
Sample Date:	1/15/1988	1/15/1988	1/28/1988	1/15/1988	1/28/1988	1/28/1988	1/28/1988	1/28/1988	1/28/1988	1/28/1988	1/19/1988	1/19/1988	1/19/1988	1/19/1988	1/19/1988	11/4/2008	7/27/2009	7/27/2009	7/27/2009
TOTAL METALS (mg/kg)																			
EPA 200.8/SW6010B/SW7470A (a)																			
Barium																**75.1**			
Cadmium																**1.3**	**2.6**	**11.1**	**1.4**
Chromium	**133**	**3990**	**760**	**2460**	**3100**	**27**	**23**	**18**	**13**	**11**	**20**	**25**	**18**	**23**	**42**	**52**	**564**	**940**	**359**
Copper	**107**	**252**	**188**	**174**	**580**	**29**	**26**	**18**	**19**	**12**	**19**	**15**	**10**	**18**	**71**		**103**	**190**	**60**
Lead	**284**	**250**	**349**	**349**	**36**	**11**	**7**	6 U	6 U	5 U	**6**	4 U	4 U	**6**	**49**	**86**	**209**	**796**	**114**
Mercury																**0.21**	**0.12**	**0.22**	**0.06**
Nickel	**53**	**149**	**165**	**101**	**1795**	**18**	**17**	**10**	**10**	**8**	**10**	**13**	**10**	**15**	**20**				
Selenium																6 U			
Silver																0.3 U			
Zinc	**686**	**579**	**862**	**1210**	**138**	**75.3**	**40.8**	**25.7**	**26.4**	**20.7**	**33.2**	**47.8**	**34.9**	**53**	**122**		**650**	**3290**	**500**
PCBs (mg/kg)																			
EPA SW8082 (a)																			
Aroclor 1016																			
Aroclor 1221																			
Aroclor 1232																			
Aroclor 1242	ND	ND						ND											
Aroclor 1248																			
Aroclor 1254	**0.06**	**0.08**						ND											
Aroclor 1260	**0.08**	**0.1**						ND											
Total PCBs	**0.14**	**0.18**						ND											
CONVENTIONALS (mg/kg)																			
Cyanide																			
Oil and Grease																			
PETROLEUM HYDROCARBONS (mg/kg)																			
NWTPH-HCID																			
Diesel Range Organics																			
Gasoline Range Organics																			
Lube Oil																			
NWTPH-Dx																			
Diesel Range Organics																			
Lube Oil																			
C19 Branched Hydrocarbon																			
C11 Hydrocarbon																			
C18-C25 Hydrocarbons (total)																			
VOLATILES (mg/kg)																			
EPA SW8260B/C (a)																			
1,1,1,2-Tetrachloroethane								ND											
1,1,1-Trichloroethane								ND											
1,1,2-Trichloroethane								ND											
1,1-Dichloroethane								ND											
1,1-Dichloroethene								ND											
1,2-Dichloroethene (total)								**0.009** J											
1,2-Dichloropropane																			
2-Butanone																			
2-Chloroethylvinylether																			
2-Hexanone																			
4-Methyl-2-Pentanone (MIBK)																			
Acetone								**0.05**											
Benzene								ND											
Bromodichloromethane																			
Bromoform																			
Bromomethane																			
Carbon Disulfide								ND											
Carbon Tetrachloride																			
Chlorobenzene																			
Chloroethane																			
Chloroform																			
Chloromethane																			
cis-1,2-Dichloroethene																			

TABLE G-4
HISTORICAL SOIL ANALYTICAL RESULTS
FORMER SLIP 5 LOCATIONS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-203i										I-205s					IMR-13	PBI-4		
Sample ID:	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-205s	I-205s	Dup of I-205s I-205s-Dup	I-205s	I-205s	IMR-13	PBI-4	PBI-4	PBI-4
Laboratory ID:																NY11D	PI24J	PI24K	PI24L
Sample Depth (ft BGS):	2.5	7.5	10	12.5	15	18	23	33	43	48	2.5	12.5	12.5	17.5	27.5		2	5	8
Sample Date:	1/15/1988	1/15/1988	1/28/1988	1/15/1988	1/28/1988	1/28/1988	1/28/1988	1/28/1988	1/28/1988	1/28/1988	1/19/1988	1/19/1988	1/19/1988	1/19/1988	1/19/1988	11/4/2008	7/27/2009	7/27/2009	7/27/2009
cis-1,3-Dichloropropene																			
Dibromochloromethane																			
Ethylbenzene								ND											
m, p-Xylene																			
Methylene Chloride								**0.0053** B											
o-Xylene																			
Styrene																			
Tetrachloroethene								ND											
Toluene								ND											
Total Xylenes								ND											
trans-1,2-Dichloroethene																			
trans-1,3-Dichloropropene																			
Trichloroethene								ND											
Trichlorofluoromethane																			
Vinyl Acetate																			
Vinyl Chloride																			
1,2,3-Propanetriol, Triacetate																			
Hexadecane																			
Heptadecane																			
SEMIVOLATILES (mg/kg)																			
EPA SW8270D (a)																			
1,2,4-Trichlorobenzene																			
1,2-Dichlorobenzene																			
1,3-Dichlorobenzene																			
1,4-Dichlorobenzene																			
1-Methylnaphthalene																			
2,2'-Oxybis(1-Chloropropane)																			
2,4,5-Trichlorophenol																			
2,4,6-Trichlorophenol																			
2,4-Dichlorophenol																			
2,4-Dimethylphenol																			
2,4-Dinitrophenol																			
2,4-Dinitrotoluene																			
2,6-Dinitrotoluene																			
2-Chloronaphthalene																			
2-Chlorophenol																			
2-Methylnaphthalene																			
2-Methylphenol																			
2-Nitroaniline																			
2-Nitrophenol																			
3,3'-Dichlorobenzidine																			
3-Nitroaniline																			
4,6-Dinitro-2-Methylphenol																			
4-Bromophenyl-phenylether																			
4-Chloro-3-methylphenol																			
4-Chloroaniline																			
4-Chlorophenyl-phenylether																			
4-Methylphenol																			
4-Nitroaniline																			
4-Nitrophenol																			
Acenaphthene																			
Acenaphthylene																			
Anthracene																			
Benzo(a)anthracene																			
Benzo(a)pyrene																			
Benzo(b)fluoranthene																			
Benzo(g,h,i)perylene																			
Benzo(k)fluoranthene																			
Benzoic Acid																			
Benzyl Alcohol																			
bis(2-Chloroethoxy) Methane																			
Bis-(2-Chloroethyl) Ether																			
bis(2-Ethylhexyl)phthalate																			
Butylbenzylphthalate																			
Carbazole																			
Chrysene																			

TABLE G-4
HISTORICAL SOIL ANALYTICAL RESULTS
FORMER SLIP 5 LOCATIONS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-203i										I-205s					IMR-13	PBI-4		
													Dup of I-205s						
Sample ID:	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-205s	I-205s	I-205s-Dup	I-205s	I-205s	IMR-13	PBI-4	PBI-4	PBI-4
Laboratory ID:																NY11D	PI24J	PI24K	PI24L
Sample Depth (ft BGS):	2.5	7.5	10	12.5	15	18	23	33	43	48	2.5	12.5	12.5	17.5	27.5		2	5	8
Sample Date:	1/15/1988	1/15/1988	1/28/1988	1/15/1988	1/28/1988	1/28/1988	1/28/1988	1/28/1988	1/28/1988	1/28/1988	1/19/1988	1/19/1988	1/19/1988	1/19/1988	1/19/1988	11/4/2008	7/27/2009	7/27/2009	7/27/2009
Dibenz(a,h)anthracene																			
Dibenzofuran																			
Diethylphthalate																			
Dimethylphthalate																			
Di-n-Butylphthalate																			
Di-n-Octyl phthalate																			
Fluoranthene																			
Fluorene																			
Hexachlorobenzene																			
Hexachlorobutadiene																			
Hexachlorocyclopentadiene																			
Hexachloroethane																			
Indeno(1,2,3-cd)pyrene																			
Isophorone																			
Naphthalene																			
Nitrobenzene																			
N-Nitroso-Di-N-Propylamine																			
N-Nitrosodiphenylamine																			
Pentachlorophenol																			
Phenanthrene, 3,4,5,6-Tetraethyl																			
Phenanthrene																			
Phenol																			
Pyrene																			

TABLE G-4
HISTORICAL SOIL ANALYTICAL RESULTS
FORMER SLIP 5 LOCATIONS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location:	PBI-5			PBI-6			PBI-7			PBI-8			PBI-9			PBI-10		
Sample ID:	PBI-5	PBI-5	PBI-5	PBI-6	PBI-6	PBI-6	PBI-7	PBI-7	PBI-7	PBI-8	PBI-8	PBI-8	PBI-9	PBI-9	PBI-9	PBI-10	PBI-10	PBI-10
Laboratory ID:	PI24M	PI24N	PI24O	PI24P	PI24Q	PI24R	PI24S	PI24T	PI25A	PI25B	PI25C	PI25D	PI25E	PI25F	PI25G	PI25H	PI25I	PI25J
Sample Depth (ft BGS):	2	5	8	2	5	8	2	5	8	2	5	8	2	5	8	2	5	8
Sample Date:	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009
TOTAL METALS (mg/kg)																		
EPA 200.8/SW6010B/SW7470A (a)																		
Barium																		
Cadmium	**3.5**	**1.9**	**2.3**	**0.6**	0.6 U	**0.6**	**1.6**	**5.4**	**8.3** J	**1**	**1.2**	**6.7**	0.2 U	**6.5**	**0.6**	**0.3**	**0.3**	**1.5**
Chromium	**127**	**101**	**47**	**46**	**14**	**26**	**295**	**361**	**561** J	**30.1**	**57.2**	**123**	**15**	**52.2**	**233**	**26.6**	**51.9**	**790**
Copper	**152**	**145**	**56**	**152**	**60**	**62**	**96**	**118**	**281**	**138**	**75.2**	**47.9**	**82.4**	**102**	**62.5**	**68.7**	**78.6**	**301**
Lead	**138**	**166**	**59**	**55**	**7**	**32**	**200**	**400**	**660**	**205**	**698**	**460**	**3**	**212**	**189**	**65**	**175**	**4200**
Mercury	**0.14**	**0.11**	**0.04**	**0.07**	**0.08**	**0.07**	**0.16**	**0.26**	**0.14**	**0.17**	**0.12**	0.02 U	0.02 U	**0.12**	**0.03**	**0.03**	**0.03**	0.02 U
Nickel																		
Selenium																		
Silver																		
Zinc	**430**	**540**	**190**	**230**	**120**	**140**	**360**	**890**	**1420**	**460**	**249**	**530**	**56**	**550**	**180**	**131**	**194**	**630**
PCBs (mg/kg)																		
EPA SW8082 (a)																		
Aroclor 1016																		
Aroclor 1221																		
Aroclor 1232																		
Aroclor 1242																		
Aroclor 1248																		
Aroclor 1254																		
Aroclor 1260																		
Total PCBs																		
CONVENTIONALS (mg/kg)																		
Cyanide																		
Oil and Grease																		
PETROLEUM HYDROCARBONS (mg/kg)																		
NWTPH-HCID																		
Diesel Range Organics																		
Gasoline Range Organics																		
Lube Oil																		
NWTPH-Dx																		
Diesel Range Organics																		
Lube Oil																		
C19 Branched Hydrocarbon																		
C11 Hydrocarbon																		
C18-C25 Hydrocarbons (total)																		
VOLATILES (mg/kg)																		
EPA SW8260B/C (a)																		
1,1,1,2-Tetrachloroethane																		
1,1,1-Trichloroethane																		
1,1,2-Trichloroethane																		
1,1-Dichloroethane																		
1,1-Dichloroethene																		
1,2-Dichloroethene (total)																		
1,2-Dichloropropane																		
2-Butanone																		
2-Chloroethylvinylether																		
2-Hexanone																		
4-Methyl-2-Pentanone (MIBK)																		
Acetone																		
Benzene																		
Bromodichloromethane																		
Bromoform																		
Bromomethane																		
Carbon Disulfide																		
Carbon Tetrachloride																		
Chlorobenzene																		
Chloroethane																		
Chloroform																		
Chloromethane																		
cis-1,2-Dichloroethene																		

TABLE G-4
HISTORICAL SOIL ANALYTICAL RESULTS
FORMER SLIP 5 LOCATIONS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location:	PBI-5			PBI-6			PBI-7			PBI-8			PBI-9			PBI-10		
Sample ID:	PBI-5	PBI-5	PBI-5	PBI-6	PBI-6	PBI-6	PBI-7	PBI-7	PBI-7	PBI-8	PBI-8	PBI-8	PBI-9	PBI-9	PBI-9	PBI-10	PBI-10	PBI-10
Laboratory ID:	PI24M	PI24N	PI24O	PI24P	PI24Q	PI24R	PI24S	PI24T	PI25A	PI25B	PI25C	PI25D	PI25E	PI25F	PI25G	PI25H	PI25I	PI25J
Sample Depth (ft BGS):	2	5	8	2	5	8	2	5	8	2	5	8	2	5	8	2	5	8
Sample Date:	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009
cis-1,3-Dichloropropene																		
Dibromochloromethane																		
Ethylbenzene																		
m, p-Xylene																		
Methylene Chloride																		
o-Xylene																		
Styrene																		
Tetrachloroethene																		
Toluene																		
Total Xylenes																		
trans-1,2-Dichloroethene																		
trans-1,3-Dichloropropene																		
Trichloroethene																		
Trichlorofluoromethane																		
Vinyl Acetate																		
Vinyl Chloride																		
1,2,3-Propanetriol, Triacetate																		
Hexadecane																		
Heptadecane																		
SEMIVOLATILES (mg/kg)																		
EPA SW8270D (a)																		
1,2,4-Trichlorobenzene																		
1,2-Dichlorobenzene																		
1,3-Dichlorobenzene																		
1,4-Dichlorobenzene																		
1-Methylnaphthalene																		
2,2'-Oxybis(1-Chloropropane)																		
2,4,5-Trichlorophenol																		
2,4,6-Trichlorophenol																		
2,4-Dichlorophenol																		
2,4-Dimethylphenol																		
2,4-Dinitrophenol																		
2,4-Dinitrotoluene																		
2,6-Dinitrotoluene																		
2-Chloronaphthalene																		
2-Chlorophenol																		
2-Methylnaphthalene																		
2-Methylphenol																		
2-Nitroaniline																		
2-Nitrophenol																		
3,3'-Dichlorobenzidine																		
3-Nitroaniline																		
4,6-Dinitro-2-Methylphenol																		
4-Bromophenyl-phenylether																		
4-Chloro-3-methylphenol																		
4-Chloroaniline																		
4-Chlorophenyl-phenylether																		
4-Methylphenol																		
4-Nitroaniline																		
4-Nitrophenol																		
Acenaphthene																		
Acenaphthylene																		
Anthracene																		
Benzo(a)anthracene																		
Benzo(a)pyrene																		
Benzo(b)fluoranthene																		
Benzo(g,h,i)perylene																		
Benzo(k)fluoranthene																		
Benzoic Acid																		
Benzyl Alcohol																		
bis(2-Chloroethoxy) Methane																		
Bis-(2-Chloroethyl) Ether																		
bis(2-Ethylhexyl)phthalate																		
Butylbenzylphthalate																		
Carbazole																		
Chrysene																		

TABLE G-4
HISTORICAL SOIL ANALYTICAL RESULTS
FORMER SLIP 5 LOCATIONS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location:	PBI-5			PBI-6			PBI-7			PBI-8			PBI-9			PBI-10		
Sample ID:	PBI-5	PBI-5	PBI-5	PBI-6	PBI-6	PBI-6	PBI-7	PBI-7	PBI-7	PBI-8	PBI-8	PBI-8	PBI-9	PBI-9	PBI-9	PBI-10	PBI-10	PBI-10
Laboratory ID:	PI24M	PI24N	PI24O	PI24P	PI24Q	PI24R	PI24S	PI24T	PI25A	PI25B	PI25C	PI25D	PI25E	PI25F	PI25G	PI25H	PI25I	PI25J
Sample Depth (ft BGS):	2	5	8	2	5	8	2	5	8	2	5	8	2	5	8	2	5	8
Sample Date:	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009	7/27/2009
Dibenz(a,h)anthracene																		
Dibenzofuran																		
Diethylphthalate																		
Dimethylphthalate																		
Di-n-Butylphthalate																		
Di-n-Octyl phthalate																		
Fluoranthene																		
Fluorene																		
Hexachlorobenzene																		
Hexachlorobutadiene																		
Hexachlorocyclopentadiene																		
Hexachloroethane																		
Indeno(1,2,3-cd)pyrene																		
Isophorone																		
Naphthalene																		
Nitrobenzene																		
N-Nitroso-Di-N-Propylamine																		
N-Nitrosodiphenylamine																		
Pentachlorophenol																		
Phenanthrene, 3,4,5,6-Tetraethyl																		
Phenanthrene																		
Phenol																		
Pyrene																		

TABLE G-4
HISTORICAL SOIL ANALYTICAL RESULTS
FORMER SLIP 5 LOCATIONS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

	Transformers North of 14-02		UST W of 14-02	Hazardous Materials Storage Sheds				Hydraulic Test Pad Area				
Location:	TDP22	TDP23	TDP24	TDP27	TDP28	TDP29	TDP30	B-1	B-2	B-3	TDP31	TDP32
Sample ID:	TDP22	TDP23	TDP24	TDP27	TDP28	TDP29	TDP30	B-1	B-2	B-3	TDP31	TDP32
Laboratory ID:	NY44G	NY44H	NY44I	NY64B	NY64C	NY64D	NY64E				NY64F	NY64G
Sample Depth (ft BGS):	3	3	11	11	11	11	11	10.5	10.5	8	12	11
Sample Date:	11/5/2008	11/5/2008	11/5/2008	11/6/2008	11/6/2008	11/6/2008	11/6/2008	12/17/1993	12/17/1993	12/17/1993	11/6/2008	11/6/2008
TOTAL METALS (mg/kg)												
EPA 200.8/SW6010B/SW7470A (a)												
Barium												
Cadmium	0.2 U	0.2 U		0.2 U	**0.3**	**0.7**	**0.8**				0.2 U	0.2 U
Chromium	**24**	**24.6**		**16.4**	**17.8**	**20.4**	**24.8**				**14.7**	**29.4**
Copper	**15.6**	**17.7**		**13.7**	**20.5**	**26.2**	**35.9**				**15.9**	**20.5**
Lead	**4**	**11**		2 U	**4**	**7**	**15**				**2**	2 U
Mercury	0.04 U	**0.11**		0.05 U	0.06 U	**0.1**	**0.17**				**0.05**	0.05 U
Nickel												
Selenium												
Silver												
Zinc												
PCBs (mg/kg)												
EPA SW8082 (a)												
Aroclor 1016	0.031 U	0.031 U			0.030 U	0.032 U					0.031 U	
Aroclor 1221	0.031 U	0.031 U			0.030 U	0.032 U					0.031 U	
Aroclor 1232	0.031 U	0.031 U			0.030 U	0.032 U					0.031 U	
Aroclor 1242	0.031 U	0.031 U			0.030 U	0.032 U					0.031 U	
Aroclor 1248	0.031 U	0.031 U			0.030 U	0.032 U					0.031 U	
Aroclor 1254	0.031 U	0.031 U			0.030 U	0.032 U					0.031 U	
Aroclor 1260	0.031 U	0.031 U			0.030 U	0.032 U					0.031 U	
Total PCBs	0.031 U	0.031 U			0.030 U	0.032 U					0.031 U	
CONVENTIONALS (mg/kg)												
Cyanide												
Oil and Grease												
PETROLEUM HYDROCARBONS (mg/kg)												
NWTPH-HCID												
Diesel Range Organics	50 U	50 U	50 U	50 U	50 U	50 U	50 U	25 U	**91**	25 U	**50**	50 U
Gasoline Range Organics	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Lube Oil	100 U	100 U	100 U	100 U	100 U	100 U	100 U	50 U	**62**	50 U	**100**	100 U
NWTPH-Dx												
Diesel Range Organics											**58**	
Lube Oil											**400**	
C19 Branched Hydrocarbon												
C11 Hydrocarbon												
C18-C25 Hydrocarbons (total)												
VOLATILES (mg/kg)												
EPA SW8260B/C (a)												
1,1,1,2-Tetrachloroethane												
1,1,1-Trichloroethane				0.0009 U	0.001 U	0.0007 U	0.0011 U				0.0009 U	0.0007 U
1,1,2-Trichloroethane				0.0009 U	0.001 U	0.0007 U	0.0011 U				0.0009 U	0.0007 U
1,1-Dichloroethane				0.0009 U	**0.0054**	**0.0007**	**0.0014**				0.0009 U	0.0007 U
1,1-Dichloroethene				0.0009 U	0.001 U	0.0007 U	0.0011 U				0.0009 U	0.0007 U
1,2-Dichloroethene (total)												
1,2-Dichloropropane				0.0009 U	0.001 U	0.0007 U	0.0011 U				0.0009 U	0.0007 U
2-Butanone				0.0046 U	**0.14**	**0.020**	**0.016**				**0.0073**	0.0034 U
2-Chloroethylvinylether				0.0046 U	0.0048 U	0.0035 U	0.0054 U				0.0043 U	0.0034 U
2-Hexanone				0.0046 U	0.0048 U	0.0035 U	0.0054 U				0.0043 U	0.0034 U
4-Methyl-2-Pentanone (MIBK)				0.0046 U	0.0048 U	0.0035 U	0.0054 U				0.0043 U	0.0034 U
Acetone				**0.025**	**0.072**	**0.095**	**0.083**				**0.047**	**0.015**
Benzene				0.0009 U	0.001 U	0.0007 U	0.0011 U				0.0009 U	0.0007 U
Bromodichloromethane				0.0009 U	0.001 U	0.0007 U	0.0011 U				0.0009 U	0.0007 U
Bromoform				0.0009 U	0.001 U	0.0007 U	0.0011 U				0.0009 U	0.0007 U
Bromomethane				0.0009 U	0.001 U	0.0007 U	0.0011 U				0.0009 U	0.0007 U
Carbon Disulfide				0.0009 U	**0.014**	**0.022**	**0.022**				0.0048	**0.0009**
Carbon Tetrachloride				0.0009 U	0.001 U	0.0007 U	0.0011 U				0.0009 U	0.0007 U
Chlorobenzene				0.0009 U	0.001 U	0.0007 U	0.0011 U				0.0009 U	0.0007 U
Chloroethane				0.0009 U	0.001 U	0.0007 U	0.0011 U				0.0009 U	0.0007 U
Chloroform				0.0009 U	0.001 U	0.0007 U	0.0011 U				0.0009 U	0.0007 U
Chloromethane				0.0009 U	0.001 U	0.0007 U	0.0011 U				0.0009 U	0.0007 U
cis-1,2-Dichloroethene				0.0009 U	0.001 U	0.0007 U	0.0011 U				0.0009 U	0.0007 U

TABLE G-4
HISTORICAL SOIL ANALYTICAL RESULTS
FORMER SLIP 5 LOCATIONS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

	Transformers North of 14-02		UST W of 14-02	Hazardous Materials Storage Sheds				Hydraulic Test Pad Area				
Location:	TDP22	TDP23	TDP24	TDP27	TDP28	TDP29	TDP30	B-1	B-2	B-3	TDP31	TDP32
Sample ID:	TDP22	TDP23	TDP24	TDP27	TDP28	TDP29	TDP30	B-1	B-2	B-3	TDP31	TDP32
Laboratory ID:	NY44G	NY44H	NY44I	NY64B	NY64C	NY64D	NY64E				NY64F	NY64G
Sample Depth (ft BGS):	3	3	11	11	11	11	11	10.5	10.5	8	12	11
Sample Date:	11/5/2008	11/5/2008	11/5/2008	11/6/2008	11/6/2008	11/6/2008	11/6/2008	12/17/1993	12/17/1993	12/17/1993	11/6/2008	11/6/2008
cis-1,3-Dichloropropene				0.0009 U	0.001 U	0.0007 U	0.0011 U				0.0009 U	0.0007 U
Dibromochloromethane				0.0009 U	0.001 U	0.0007 U	0.0011 U				0.0009 U	0.0007 U
Ethylbenzene				0.0009 U	0.001 U	0.0007 U	0.0011 U				0.0009 U	0.0007 U
m, p-Xylene				0.0009 U	0.001 U	0.0007 U	0.0011 U				**0.0016**	0.0007 U
Methylene Chloride				0.0018 U	0.0019 U	0.0014 U	0.0022 U				0.0017 U	0.0014 U
o-Xylene				0.0009 U	0.001 U	0.0007 U	0.0011 U				**0.003**	0.0007 U
Styrene				0.0009 U	0.001 U	0.0007 U	0.0011 U				0.0009 U	0.0007 U
Tetrachloroethene				0.0009 U	0.001 U	0.0007 U	0.0011 U				0.0009 U	0.0007 U
Toluene				0.0009 U	**0.0014**	**0.0009**	0.0011 U				**0.006**	0.0007 U
Total Xylenes												
trans-1,2-Dichloroethene				0.0009 U	0.001 U	0.0007 U	0.0011 U				0.0009 U	0.0007 U
trans-1,3-Dichloropropene				0.0009 U	0.001 U	0.0007 U	0.0011 U				0.0009 U	0.0007 U
Trichloroethene				0.0009 U	0.001 U	0.0007 U	0.0011 U				0.0009 U	0.0007 U
Trichlorofluoromethane				0.0009 U	0.001 U	0.0007 U	0.0011 U				0.0009 U	0.0007 U
Vinyl Acetate				0.0046 U	0.0048 U	0.0035 U	0.0054 U				0.0043 U	0.0034 U
Vinyl Chloride				0.0009 U	0.001 U	0.0007 U	0.0011 U				0.0009 U	0.0007 U
1,2,3-Propanetriol, Triacetate												
Hexadecane												
Heptadecane												
SEMIVOLATILES (mg/kg)												
EPA SW8270D (a)												
1,2,4-Trichlorobenzene					0.061 U	0.060 U					0.064 U	
1,2-Dichlorobenzene					0.061 U	0.060 U					0.064 U	
1,3-Dichlorobenzene					0.061 U	0.060 U					0.064 U	
1,4-Dichlorobenzene					0.061 U	0.060 U					0.064 U	
1-Methylnaphthalene					0.061 U	0.060 U					0.064 U	
2,2'-Oxybis(1-Chloropropane)					0.061 U	0.060 U					0.064 U	
2,4,5-Trichlorophenol					0.310 U	0.300 U					0.320 U	
2,4,6-Trichlorophenol					0.310 U	0.300 U					0.320 U	
2,4-Dichlorophenol					0.310 U	0.300 U					0.320 U	
2,4-Dimethylphenol					0.061 U	0.060 U					0.064 U	
2,4-Dinitrophenol					0.610 U	0.600 U					0.640 U	
2,4-Dinitrotoluene					0.310 U	0.300 U					0.320 U	
2,6-Dinitrotoluene					0.310 U	0.300 U					0.320 U	
2-Chloronaphthalene					0.061 U	0.060 U					0.064 U	
2-Chlorophenol					0.061 U	0.060 U					0.064 U	
2-Methylnaphthalene					0.061 U	0.060 U					0.064 U	
2-Methylphenol					0.061 U	0.060 U					0.064 U	
2-Nitroaniline					0.310 U	0.300 U					0.320 U	
2-Nitrophenol					0.061 U	0.060 U					0.064 U	
3,3'-Dichlorobenzidine					0.310 U	0.300 U					0.320 U	
3-Nitroaniline					0.310 U	0.300 U					0.320 U	
4,6-Dinitro-2-Methylphenol					0.610 U	0.600 U					0.640 U	
4-Bromophenyl-phenylether					0.061 U	0.060 U					0.064 U	
4-Chloro-3-methylphenol					0.310 U	0.300 U					0.320 U	
4-Chloroaniline					0.310 U	0.300 U					0.320 U	
4-Chlorophenyl-phenylether					0.061 U	0.060 U					0.064 U	
4-Methylphenol					0.061 U	0.060 U					0.064 U	
4-Nitroaniline					0.310 U	0.300 U					0.320 U	
4-Nitrophenol					0.310 U	0.300 U					0.320 U	
Acenaphthene					0.061 U	0.060 U					0.064 U	
Acenaphthylene					0.061 U	0.060 U					0.064 U	
Anthracene					0.061 U	0.060 U					0.064 U	
Benzo(a)anthracene					0.061 U	0.060 U					0.064 U	
Benzo(a)pyrene					0.061 U	0.060 U					0.064 U	
Benzo(b)fluoranthene					0.061 U	0.060 U					0.064 U	
Benzo(g,h,i)perylene					0.061 U	0.060 U					0.064 U	
Benzo(k)fluoranthene					0.061 U	0.060 U					0.064 U	
Benzoic Acid					0.610 U	0.600 U					0.640 U	
Benzyl Alcohol					0.061 U	0.060 U					0.064 U	
bis(2-Chloroethoxy) Methane					0.061 U	0.060 U					0.064 U	
Bis-(2-Chloroethyl) Ether					0.061 U	0.060 U					0.064 U	
bis(2-Ethylhexyl)phthalate					0.061 U	0.060 U					0.064 U	
Butylbenzylphthalate					0.061 U	0.060 U					0.064 U	
Carbazole					0.061 U	0.060 U					0.064 U	
Chrysene					0.061 U	0.060 U					0.064 U	

TABLE G-4
HISTORICAL SOIL ANALYTICAL RESULTS
FORMER SLIP 5 LOCATIONS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

	Transformers North of 14-02		UST W of 14-02	Hazardous Materials Storage Sheds				Hydraulic Test Pad Area				
Location:	TDP22	TDP23	TDP24	TDP27	TDP28	TDP29	TDP30	B-1	B-2	B-3	TDP31	TDP32
Sample ID:	TDP22	TDP23	TDP24	TDP27	TDP28	TDP29	TDP30	B-1	B-2	B-3	TDP31	TDP32
Laboratory ID:	NY44G	NY44H	NY44I	NY64B	NY64C	NY64D	NY64E				NY64F	NY64G
Sample Depth (ft BGS):	3	3	11	11	11	11	11	10.5	10.5	8	12	11
Sample Date:	11/5/2008	11/5/2008	11/5/2008	11/6/2008	11/6/2008	11/6/2008	11/6/2008	12/17/1993	12/17/1993	12/17/1993	11/6/2008	11/6/2008
Dibenz(a,h)anthracene					0.061 U	0.060 U					0.064 U	
Dibenzofuran					0.061 U	0.060 U					0.064 U	
Diethylphthalate					0.061 U	0.060 U					0.064 U	
Dimethylphthalate					0.061 U	0.060 U					0.064 U	
Di-n-Butylphthalate					0.061 U	0.060 U					0.064 U	
Di-n-Octyl phthalate					0.061 U	0.060 U					0.064 U	
Fluoranthene					0.061 U	0.060 U					0.064 U	
Fluorene					0.061 U	0.060 U					0.064 U	
Hexachlorobenzene					0.061 U	0.060 U					0.064 U	
Hexachlorobutadiene					0.061 U	0.060 U					0.064 U	
Hexachlorocyclopentadiene					0.310 U	0.300 U					0.320 U	
Hexachloroethane					0.061 U	0.060 U					0.064 U	
Indeno(1,2,3-cd)pyrene					0.061 U	0.060 U					0.064 U	
Isophorone					0.061 U	0.060 U					0.064 U	
Naphthalene					0.061 U	0.060 U					0.064 U	
Nitrobenzene					0.061 U	0.060 U					0.064 U	
N-Nitroso-Di-N-Propylamine					0.310 U	0.300 U					0.320 U	
N-Nitrosodiphenylamine					0.061 U	0.060 U					0.064 U	
Pentachlorophenol					0.310 U	0.300 U					0.320 U	
Phenanthrene, 3,4,5,6-Tetraethyl												
Phenanthrene					0.061 U	0.060 U					0.064 U	
Phenol					0.061 U	0.060 U					0.064 U	
Pyrene					0.061 U	0.060 U					0.064 U	

TABLE G-5
HISTORICAL ARSENIC SOIL ANALYTICAL RESULTS
LOCATIONS SOUTH OF SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Sample ID	Sample Date	Sample Depth	Arsenic (mg/kg)
21	8/1/83	1.5	6
21	8/1/83	8.5	5.2
212	1/14/88	3.5-4	5
212	1/14/88	8.5-9	6
212	1/14/88	13.5-14	3
234	1/22/88	2.5	5
234	1/22/88	7.5	2
234	1/22/88	12.5	3
234	1/22/88	17.5	2
240	1/22/88	2.5	4
240	1/22/88	7.5	4
240	1/22/88	12.5	3
240	1/22/88	17.5	2
HP-1	4/19/00	3	4
HP-1	4/19/00	6	3
HP-1	4/19/00	10	1.8
HP-1	4/19/00	15	0.7
HP-1	4/19/00	20	5.8
HP-2	4/19/00	1	2.9
HP-2	4/19/00	2	1.2
HP-2	4/19/00	3	2.5
HP-2	4/19/00	4	1.2
HP-2	4/19/00	5	1.3
HP-2	4/19/00	6	3.3
HP-2	4/19/00	7	12
HP-2	4/19/00	8	3.7
HP-2	4/19/00	9	2.3
HP-2	4/19/00	10	1.6
HP-2	4/19/00	11	1.6
HP-2	4/19/00	12	1.5
HP-2	4/19/00	14	1.6
HP-2	4/19/00	15	1
HP-2	4/19/00	16	11
HP-2	4/19/00	20	7
HP-3	4/19/00	1	4
HP-3	4/19/00	2	7
HP-3	4/19/00	3	4.2
HP-3	4/19/00	4	2.6
HP-3	4/19/00	5	7
HP-3	4/19/00	6	2.5
HP-3	4/19/00	7	6
HP-3	4/19/00	8	3.5
HP-3	4/19/00	9	5
HP-3	4/19/00	10	4
HP-3	4/19/00	12	1.3
HP-3	4/19/00	13	1.8
HP-3	4/19/00	14	3
HP-3	4/19/00	15	4
HP-3	4/19/00	16	43
HP-3	4/19/00	20	20
HP-4	4/19/00	1	3
HP-4	4/19/00	2	3.5
HP-4	4/19/00	3	14
HP-4	4/19/00	4	3
HP-4	4/19/00	5	4
HP-4	4/19/00	6	5
HP-4	4/19/00	7	11
HP-4	4/19/00	8	3.3
HP-4	4/19/00	9	13

TABLE G-5
HISTORICAL ARSENIC SOIL ANALYTICAL RESULTS
LOCATIONS SOUTH OF SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Sample ID	Sample Date	Sample Depth	Arsenic (mg/kg)
HP-4	4/19/00	10	1.6
HP-4	4/19/00	11	4.6
HP-4	4/19/00	12	1.5
HP-4	4/19/00	13	2.1
HP-4	4/19/00	16	5
HP-4	4/19/00	17	1.6
HP-4	4/19/00	20	5.2
HP-5	4/19/00	2	2.3
HP-5	4/19/00	5	3
HP-5	4/19/00	10	1.7
HP-5	4/19/00	15	1.4
HP-5	4/19/00	20	2.3
HP-6	4/19/00	2	2.1
HP-6	4/19/00	5	2.3
HP-6	4/19/00	10	3.2
HP-6	4/19/00	16	3.7
HP-6	4/19/00	20	4
I-206s	1/19/88	2.5	5
I-206s	1/19/88	7.5	7
I-206s	1/19/88	12.5	2
I-206s	1/19/88	17.5	22
I-206s	1/19/88	27.5	9
Former Washdown System Piping South of 14-01			
TDP1	11/3/08	9	9
TDP2	11/3/08	5	5 U
TDP3	11/3/08	5	6
TDP4	11/3/08	4	18
TDP25	11/5/08	9	5 U
TDP26	11/6/08	8	7
Former Washdown System Piping Inside 14-01			
TDP5	11/3/08	5	5 U
TDP7	11/4/08	8	6 U
TDP8	11/4/08	8	6 U
TDP9	11/4/08	8	6 U
TDP10	11/4/08	8	6 U
TDP11	11/4/08	9	5 U
TDP12	11/4/08	7	8
TDP13	11/4/08	7	10 U

TABLE G-5
HISTORICAL ARSENIC SOIL ANALYTICAL RESULTS
LOCATIONS SOUTH OF SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Sample ID	Sample Date	Sample Depth	Arsenic (mg/kg)
Former Washdown System Piping and ASTs West of 14-01			
TDP14	11/4/08	4	17
TDP15	11/4/08	4	9
TDP16	11/5/08	3	7
TDP17	11/5/08	4	7
TDP18	11/5/08	4	12
TDP19	11/5/08	4	6 U
Substation (Building 14-22)			
TDP20	11/5/08	3	6 U
TDP21	11/5/08	3	5 U

U = Indicates the compound was undetected at the reported concentration

TABLE G-6
HISTORICAL SOIL ANALYTICAL RESULTS
LOCATIONS SOUTH OF SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location:	21		212			234				240				PBI-11		
Sample ID:	21	21	212	212	212	234	234	234	234	240	240	240	240	PBI-11	PBI-11	PBI-11
Laboratory ID:														PI42A	PI42B	PI42C
Sample Depth (ft BGS):	1.5	8.5	3.5-4	8.5-9	13.5-14	2.5	7.5	12.5	17.5	2.5	7.5	12.5	17.5	2	5	8
Sample Date:	8/1/1983	8/1/1983	1/14/1988	1/14/1988	1/14/1988	1/22/1988	1/22/1988	1/22/1988	1/22/1988	1/22/1988	1/22/1988	1/22/1988	1/22/1988	7/28/2009	7/28/2009	7/28/2009
TOTAL METALS (mg/kg)																
EPA 200.8/SW6010B/SW7470A (a)																
Barium	**31**	**18**														
Cadmium	**0.41**	**0.3**														
Chromium	**8.2**	**8.5**	**1003**	**23**	**17**	**16**	**13**	**14**	**13**	**17**	**14**	**16**	**15**			
Copper			**31**	**26**	**12**	**20**	**13**	**11**	**13**	**22**	**19**	**18**	**15**			
Lead	**5.5**	**4**	**8**	**23**	**7**	**13**	**4**	**7**	**9**	**13**	**7**	**10**	**9**			
Mercury	0.03 U	0.03 U														
Nickel	**9.3**	**7**	**600**	**15**	**14**	**20**	**9**	**12**	**12**	**16**	**11**	**13**	**13**			
Selenium	0.2 U	0.2 U														
Silver	0.3 U	0.3 U														
Zinc	**18**	**12.5**	**38.8**	**43.4**	**28.2**	**43.2**	**60.6**	**26.8**	**25.8**	**36.6**	**29.6**	**33**	**29**			
PCBs (mg/kg)																
EPA SW8082 (a)																
Aroclor 1016																
Aroclor 1221																
Aroclor 1232																
Aroclor 1242																
Aroclor 1248																
Aroclor 1254																
Aroclor 1260																
Total PCBs	0.1 U															
CONVENTIONALS (mg/kg)																
Oil and Grease	**55**	**110**														
PETROLEUM HYDROCARBONS (mg/kg)																
NWTPH-HCID																
Diesel Range Organics																
Gasoline Range Organics																
Lube Oil																
NWTPH-Dx																
Diesel Range Organics																
Lube Oil																
VOLATILES (mg/kg)																
EPA SW8260B/C (a)																
1,1,1,2-Tetrachloroethane														0.0006 U	0.001 U	0.0009 U
1,1,1-Trichloroethane																
1,1,2,2-Tetrachloroethane																
1,1,2-Trichloro-1,2,2-trifluoroethane																
1,1,2-Trichloroethane																
1,2-Dichloroethane																
1,1-Dichloroethane																
1,1-Dichloroethene														0.0006 U	0.001 U	0.0009 U
1,2-Dichloropropane																
2-Butanone																
2-Chloroethylvinylether																
2-Hexanone																
4-Methyl-2-Pentanone (MIBK)																
Acetone																
Benzene																
Bromodichloromethane																
Bromoform																
Bromomethane																
Carbon Disulfide																
Carbon Tetrachloride																
Chlorobenzene																
Chloroethane																

TABLE G-6
HISTORICAL SOIL ANALYTICAL RESULTS
LOCATIONS SOUTH OF SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location:	21		212			234				240				PBI-11		
Sample ID:	21	21	212	212	212	234	234	234	234	240	240	240	240	PBI-11	PBI-11	PBI-11
Laboratory ID:														PI42A	PI42B	PI42C
Sample Depth (ft BGS):	1.5	8.5	3.5-4	8.5-9	13.5-14	2.5	7.5	12.5	17.5	2.5	7.5	12.5	17.5	2	5	8
Sample Date:	8/1/1983	8/1/1983	1/14/1988	1/14/1988	1/14/1988	1/22/1988	1/22/1988	1/22/1988	1/22/1988	1/22/1988	1/22/1988	1/22/1988	1/22/1988	7/28/2009	7/28/2009	7/28/2009
Chloroform																
Chloromethane																
cis-1,2-Dichloroethene														0.0006 U	0.001 U	0.0009 U
cis-1,3-Dichloropropene																
Dibromochloromethane																
Ethylbenzene																
m, p-Xylene																
Methylene Chloride																
o-Xylene																
Styrene																
Tetrachloroethene														0.0006 U	**0.0029**	**0.002**
Toluene																
trans-1,2-Dichloroethene																
trans-1,3-Dichloropropene																
Trichloroethene														**0.0021**	**0.011**	**0.007**
Trichlorofluoromethane																
Vinyl Acetate																
Vinyl Chloride														0.0006 U	0.001 U	0.0009 U
SEMIVOLATILES (mg/kg)																
EPA SW8270D (a)																
1,2,4-Trichlorobenzene																
1,2-Dichlorobenzene																
1,3-Dichlorobenzene																
1,4-Dichlorobenzene																
1-Methylnaphthalene																
2,2'-Oxybis(1-Chloropropane)																
2,4,5-Trichlorophenol																
2,4,6-Trichlorophenol																
2,4-Dichlorophenol																
2,4-Dimethylphenol																
2,4-Dinitrophenol																
2,4-Dinitrotoluene																
2,6-Dinitrotoluene																
2-Chloronaphthalene																
2-Chlorophenol																
2-Methylnaphthalene																
2-Methylphenol																
2-Nitroaniline																
2-Nitrophenol																
3,3'-Dichlorobenzidine																
3-Nitroaniline																
4,6-Dinitro-2-Methylphenol																
4-Bromophenyl-phenylether																
4-Chloro-3-methylphenol																
4-Chloroaniline																
4-Chlorophenyl-phenylether																
4-Methylphenol																
4-Nitroaniline																
4-Nitrophenol																
Acenaphthene																
Acenaphthylene																
Anthracene																
Benzo(a)anthracene																
Benzo(a)pyrene																
Benzo(b)fluoranthene																
Benzo(g,h,i)perylene																
Benzo(k)fluoranthene																
Benzoic Acid																
Benzyl Alcohol																
bis(2-Chloroethoxy) Methane																

TABLE G-6
HISTORICAL SOIL ANALYTICAL RESULTS
LOCATIONS SOUTH OF SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location:	21		212			234				240				PBI-11		
Sample ID:	21	21	212	212	212	234	234	234	234	240	240	240	240	PBI-11	PBI-11	PBI-11
Laboratory ID:														PI42A	PI42B	PI42C
Sample Depth (ft BGS):	1.5	8.5	3.5-4	8.5-9	13.5-14	2.5	7.5	12.5	17.5	2.5	7.5	12.5	17.5	2	5	8
Sample Date:	8/1/1983	8/1/1983	1/14/1988	1/14/1988	1/14/1988	1/22/1988	1/22/1988	1/22/1988	1/22/1988	1/22/1988	1/22/1988	1/22/1988	1/22/1988	7/28/2009	7/28/2009	7/28/2009
Bis-(2-Chloroethyl) Ether																
bis(2-Ethylhexyl)phthalate																
Butylbenzylphthalate																
Carbazole																
Chrysene																
Dibenz(a,h)anthracene																
Dibenzofuran																
Diethylphthalate																
Dimethylphthalate																
Di-n-Butylphthalate																
Di-n-Octyl phthalate																
Fluoranthene																
Fluorene																
Hexachlorobenzene																
Hexachlorobutadiene																
Hexachlorocyclopentadiene																
Hexachloroethane																
Indeno(1,2,3-cd)pyrene																
Isophorone																
Naphthalene																
Nitrobenzene																
N-Nitroso-Di-N-Propylamine																
N-Nitrosodiphenylamine																
Pentachlorophenol																
Phenanthrene																
Phenol																
Pyrene																

TABLE G-6
HISTORICAL SOIL ANALYTICAL RESULTS
LOCATIONS SOUTH OF SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

										Former Washdown System Piping South of 14-01					
Location:	**PBI-12**			**PBI-13**			**PBI-15**			**TDP1**	**TDP2**	**TDP3**	**TDP4**	**TDP25**	**TDP26**
Sample ID:	PBI-12	PBI-12	PBI-12	PBI-13	PBI-13	PBI-13	PBI-15	PBI-15	PBI-15	TDP1	TDP2	TDP3	TDP4	TDP25	TDP26
Laboratory ID:	PI42D	PI42E	PI42F	PI42G	PI42H	PI42I	PI42L	PI42M	PI42N	NX93A	NX93B	NX93C	NX93D	NY44J	NY64A
Sample Depth (ft BGS):	2	5	8	2	5	8	2	5	8	9	5	5	4	9	8
Sample Date:	7/28/2009	7/28/2009	7/28/2009	7/28/2009	7/28/2009	7/28/2009	7/28/2009	7/28/2009	7/28/2009	11/3/2008	11/3/2008	11/3/2008	11/3/2008	11/5/2008	11/6/2008
TOTAL METALS (mg/kg)															
EPA 200.8/SW6010B/SW7470A (a)															
Barium															
Cadmium										**0.4**	0.2 U	**0.2**	**1**	0.2 U	**0.4**
Chromium										**12.3**	**21.8**	**21.2**	**29**	**35.8**	**20.8**
Copper										**31.6**	**23.2**	**24.8**	**67.1**	**14.3**	**36.6**
Lead										**17**	**2**	**139**	**106**	**2**	**12**
Mercury										**0.06**	0.05 U	**0.06**	**0.2**	0.04 U	0.06 U
Nickel															
Selenium															
Silver															
Zinc															
PCBs (mg/kg)															
EPA SW8082 (a)															
Aroclor 1016										0.033 U				0.031 U	0.032 U
Aroclor 1221										0.033 U				0.031 U	0.032 U
Aroclor 1232										0.033 U				0.031 U	0.032 U
Aroclor 1242										0.033 U				0.031 U	0.032 U
Aroclor 1248										0.033 U				0.031 U	0.032 U
Aroclor 1254										0.033 U				0.031 U	0.032 U
Aroclor 1260										0.033 U				0.031 U	0.032 U
Total PCBs										0.033 U				0.031 U	0.032 U
CONVENTIONALS (mg/kg)															
Oil and Grease															
PETROLEUM HYDROCARBONS (mg/kg)															
NWTPH-HCID															
Diesel Range Organics										50 U	50 U	**57**	**53**	50 U	50 U
Gasoline Range Organics										20 U	20 U	23 U	21 U	20 U	20 U
Lube Oil										**100**	100 U	**110**	**110**	**100**	**100**
NWTPH-Dx															
Diesel Range Organics										**16**	**19**	**110**	**78**	**61**	**6.5**
Lube Oil										**99**	**95**	**740**	**640**	**340**	**24**
VOLATILES (mg/kg)															
EPA SW8260B/C (a)															
1,1,1,2-Tetrachloroethane	0.001 U	0.0009 U	0.0011 U	0.0009 U	0.0009 U	0.001 U	0.0009 U	0.001 U	0.0008 U						
1,1,1-Trichloroethane										0.0012 U	0.0008 U	0.001 U	0.001 U	0.0007 U	0.0007 U
1,1,2,2-Tetrachloroethane										0.0012 U	0.0008 U	0.001 U	0.001 U	0.0007 U	0.0007 U
1,1,2-Trichloro-1,2,2-trifluoroethane										0.0024 U	0.0016 U	0.0019 U	0.002 U	0.0013 U	0.0014 U
1,1,2-Trichloroethane										0.0012 U	0.0008 U	0.001 U	0.001 U	0.0007 U	0.0007 U
1,2-Dichloroethane										0.0012 U	0.0008 U	0.001 U	0.001 U	0.0007 U	0.0007 U
1,1-Dichloroethane										**0.0016**	0.0008 U	0.001 U	0.001 U	0.0007 U	0.0007 U
1,1-Dichloroethene	0.001 U	0.0009 U	0.0011 U	0.0009 U	0.0009 U	0.001 U	0.0009 U	0.001 U	0.0008 U	0.0012 U	0.0008 U	0.001 U	0.001 U	0.0007 U	0.0007 U
1,2-Dichloropropane										0.0012 U	0.0008 U	0.001 U	0.001 U	0.0007 U	0.0007 U
2-Butanone										**0.053**	0.0041 U	0.0048 U	0.0051 U	0.0033 U	**0.0042**
2-Chloroethylvinylether										0.0059 U	0.0041 U	0.0048 U	0.0051 U	0.0033 U	0.0036 U
2-Hexanone										0.0059 U	0.0041 U	0.0048 U	0.0051 U	0.0033 U	0.0036 U
4-Methyl-2-Pentanone (MIBK)										0.0059 U	0.0041 U	0.0048 U	0.0051 U	0.0033 U	0.0036 U
Acetone										**0.280**	**0.0092**	**0.009**	**0.022**	**0.018**	**0.039**
Benzene										**0.0015**	0.0008 U	0.001 U	0.001 U	0.0007 U	0.0007 U
Bromodichloromethane										0.0012 U	0.0008 U	0.001 U	0.001 U	0.0007 U	0.0007 U
Bromoform										0.0012 U	0.0008 U	0.001 U	0.001 U	0.0007 U	0.0007 U
Bromomethane										0.0012 U	0.0008 U	0.001 U	0.001 U	0.0007 U	0.0007 U
Carbon Disulfide										**0.0077**	0.0008 U	0.001 U	0.001 U	0.0007 U	0.0007 U
Carbon Tetrachloride										0.0012 U	0.0008 U	0.001 U	0.001 U	0.0007 U	0.0007 U
Chlorobenzene										0.0012 U	0.0008 U	0.001 U	0.001 U	0.0007 U	0.0007 U
Chloroethane										0.0012 U	0.0008 U	0.001 U	0.001 U	0.0007 U	0.0007 U

TABLE G-6
HISTORICAL SOIL ANALYTICAL RESULTS
LOCATIONS SOUTH OF SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

										Former Washdown System Piping South of 14-01					
Location:	PBI-12			PBI-13			PBI-15			TDP1	TDP2	TDP3	TDP4	TDP25	TDP26
Sample ID:	PBI-12	PBI-12	PBI-12	PBI-13	PBI-13	PBI-13	PBI-15	PBI-15	PBI-15	TDP1	TDP2	TDP3	TDP4	TDP25	TDP26
Laboratory ID:	PI42D	PI42E	PI42F	PI42G	PI42H	PI42I	PI42L	PI42M	PI42N	NX93A	NX93B	NX93C	NX93D	NY44J	NY64A
Sample Depth (ft BGS):	2	5	8	2	5	8	2	5	8	9	5	5	4	9	8
Sample Date:	7/28/2009	7/28/2009	7/28/2009	7/28/2009	7/28/2009	7/28/2009	7/28/2009	7/28/2009	7/28/2009	11/3/2008	11/3/2008	11/3/2008	11/3/2008	11/5/2008	11/6/2008
Chloroform										0.0012 U	0.0008 U	0.001 U	0.001 U	0.0007 U	0.0007 U
Chloromethane										0.0012 U	0.0008 U	0.001 U	0.001 U	0.0007 U	0.0007 U
cis-1,2-Dichloroethene	0.001 U	0.0009 U	0.0011 U	0.0009 U	0.0009 U	0.001 U	0.0009 U	0.001 U	0.0008 U	**0.074**	0.0008 U	0.001 U	0.001 U	0.0007 U	**0.0051**
cis-1,3-Dichloropropene										0.0012 U	0.0008 U	0.001 U	0.001 U	0.0007 U	0.0007 U
Dibromochloromethane										0.0012 U	0.0008 U	0.001 U	0.001 U	0.0007 U	0.0007 U
Ethylbenzene										0.0012 U	0.0008 U	0.001 U	0.001 U	0.0007 U	0.0007 U
m, p-Xylene										0.0012 U	0.0008 U	0.001 U	0.001 U	0.0007 U	0.0007 U
Methylene Chloride										**0.0077**	0.0016 U	0.0019 U	0.002 U	0.0013 U	0.0014 U
o-Xylene										0.0012 U	0.0008 U	0.001 U	0.001 U	0.0007 U	0.0007 U
Styrene										0.0012 U	0.0008 U	0.001 U	0.001 U	0.0007 U	0.0007 U
Tetrachloroethene	0.001 U	**0.0021**	0.0011 U	**0.0017**	**0.0023**	**0.005**	0.0009 U	0.001 U	0.0008 U	0.0012 U	0.0008 U	0.001 U	0.001 U	0.0007 U	**0.001**
Toluene										0.0012 U	0.0008 U	0.001 U	0.001 U	0.0007 U	0.0007 U
trans-1,2-Dichloroethene										**0.0026**	0.0008 U	0.001 U	0.001 U	0.0007 U	0.0007 U
trans-1,3-Dichloropropene										0.0012 U	0.0008 U	0.001 U	0.001 U	0.0007 U	0.0007 U
Trichloroethene	**0.0037**	**0.0083**	0.0011 U	**0.020**	**0.028**	**0.035**	0.0009 U	0.001 U	0.0008 U	**0.0062**	0.0008 U	0.001 U	0.001 U	**0.0062**	**0.066**
Trichlorofluoromethane										0.0012 U	0.0008 U	0.001 U	0.001 U	0.0007 U	0.0007 U
Vinyl Acetate										0.0059 U	0.0041 U	0.0048 U	0.0051 U	0.0033 U	0.0036 U
Vinyl Chloride	0.001 U	0.0009 U	0.0011 U	0.0009 U	0.0009 U	0.001 U	0.0009 U	0.001 U	0.0008 U	0.0012 U	0.0008 U	0.001 U	0.001 U	0.0007 U	0.0007 U
SEMIVOLATILES (mg/kg)															
EPA SW8270D (a)															
1,2,4-Trichlorobenzene										0.062 U				0.064 U	0.059 U
1,2-Dichlorobenzene										0.062 U				0.064 U	0.059 U
1,3-Dichlorobenzene										0.062 U				0.064 U	0.059 U
1,4-Dichlorobenzene										0.062 U				0.064 U	0.059 U
1-Methylnaphthalene										0.062 U				0.064 U	0.059 U
2,2'-Oxybis(1-Chloropropane)										0.062 U				0.064 U	0.059 U
2,4,5-Trichlorophenol										0.310 U				0.320 U	0.300 U
2,4,6-Trichlorophenol										0.310 U				0.320 U	0.300 U
2,4-Dichlorophenol										0.310 U				0.320 U	0.300 U
2,4-Dimethylphenol										0.062 U				0.064 U	0.059 U
2,4-Dinitrophenol										0.620 U				0.640 U	0.590 U
2,4-Dinitrotoluene										0.310 U				0.320 U	0.300 U
2,6-Dinitrotoluene										0.310 U				0.320 U	0.300 U
2-Chloronaphthalene										0.062 U				0.064 U	0.059 U
2-Chlorophenol										0.062 U				0.064 U	0.059 U
2-Methylnaphthalene										0.062 U				0.064 U	0.059 U
2-Methylphenol										0.062 U				0.064 U	0.059 U
2-Nitroaniline										0.310 U				0.320 U	0.300 U
2-Nitrophenol										0.062 U				0.064 U	0.059 U
3,3'-Dichlorobenzidine										0.310 U				0.320 U	0.300 U
3-Nitroaniline										0.310 U				0.320 U	0.300 U
4,6-Dinitro-2-Methylphenol										0.620 U				0.640 U	0.590 U
4-Bromophenyl-phenylether										0.062 U				0.064 U	0.059 U
4-Chloro-3-methylphenol										0.310 U				0.320 U	0.300 U
4-Chloroaniline										0.310 U				0.320 U	0.300 U
4-Chlorophenyl-phenylether										0.062 U				0.064 U	0.059 U
4-Methylphenol										0.062 U				0.064 U	0.059 U
4-Nitroaniline										0.310 U				0.320 U	0.300 U
4-Nitrophenol										0.310 U				0.320 U	0.300 U
Acenaphthene										0.062 U				0.064 U	0.059 U
Acenaphthylene										0.062 U				0.064 U	0.059 U
Anthracene										0.062 U				0.064 U	0.059 U
Benzo(a)anthracene										0.062 U				0.064 U	0.059 U
Benzo(a)pyrene										0.062 U				0.064 U	0.059 U
Benzo(b)fluoranthene										0.062 U				0.064 U	0.059 U
Benzo(g,h,i)perylene										0.062 U				0.064 U	0.059 U
Benzo(k)fluoranthene										0.062 U				0.064 U	0.059 U
Benzoic Acid										0.620 U				0.640 U	0.590 U
Benzyl Alcohol										0.062 U				0.064 U	0.059 U
bis(2-Chloroethoxy) Methane										0.062 U				0.064 U	0.059 U

TABLE G-6
HISTORICAL SOIL ANALYTICAL RESULTS
LOCATIONS SOUTH OF SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

										Former Washdown System Piping South of 14-01					
Location:	PBI-12			PBI-13			PBI-15			TDP1	TDP2	TDP3	TDP4	TDP25	TDP26
Sample ID:	PBI-12	PBI-12	PBI-12	PBI-13	PBI-13	PBI-13	PBI-15	PBI-15	PBI-15	TDP1	TDP2	TDP3	TDP4	TDP25	TDP26
Laboratory ID:	PI42D	PI42E	PI42F	PI42G	PI42H	PI42I	PI42L	PI42M	PI42N	NX93A	NX93B	NX93C	NX93D	NY44J	NY64A
Sample Depth (ft BGS):	2	5	8	2	5	8	2	5	8	9	5	5	4	9	8
Sample Date:	7/28/2009	7/28/2009	7/28/2009	7/28/2009	7/28/2009	7/28/2009	7/28/2009	7/28/2009	7/28/2009	11/3/2008	11/3/2008	11/3/2008	11/3/2008	11/5/2008	11/6/2008
Bis-(2-Chloroethyl) Ether										0.062 U				0.064 U	0.059 U
bis(2-Ethylhexyl)phthalate										0.062 U				0.064 U	0.059 U
Butylbenzylphthalate										0.062 U				0.064 U	0.059 U
Carbazole										0.062 U				0.064 U	0.059 U
Chrysene										0.062 U				0.064 U	0.059 U
Dibenz(a,h)anthracene										0.062 U				0.064 U	0.059 U
Dibenzofuran										0.062 U				0.064 U	0.059 U
Diethylphthalate										0.062 U				0.064 U	0.059 U
Dimethylphthalate										0.062 U				0.064 U	0.059 U
Di-n-Butylphthalate										0.062 U				0.064 U	0.059 U
Di-n-Octyl phthalate										0.062 U				0.064 U	0.059 U
Fluoranthene										0.062 U				0.064 U	0.059 U
Fluorene										0.062 U				0.064 U	0.059 U
Hexachlorobenzene										0.062 U				0.064 U	0.059 U
Hexachlorobutadiene										0.062 U				0.064 U	0.059 U
Hexachlorocyclopentadiene										0.310 U				0.320 U	0.300 U
Hexachloroethane										0.062 U				0.064 U	0.059 U
Indeno(1,2,3-cd)pyrene										0.062 U				0.064 U	0.059 U
Isophorone										0.062 U				0.064 U	0.059 U
Naphthalene										0.062 U				0.064 U	0.059 U
Nitrobenzene										0.062 U				0.064 U	0.059 U
N-Nitroso-Di-N-Propylamine										0.310 U				0.320 U	0.300 U
N-Nitrosodiphenylamine										0.062 U				0.064 U	0.059 U
Pentachlorophenol										0.310 U				0.320 U	0.300 U
Phenanthrene										0.062 U				0.064 U	0.059 U
Phenol										0.062 U				0.064 U	0.059 U
Pyrene										0.062 U				0.064 U	0.059 U

TABLE G-6
HISTORICAL SOIL ANALYTICAL RESULTS
LOCATIONS SOUTH OF SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

	Former Washdown System Piping Inside 14-01										Former Washdown System Piping and ASTs West of 14-01					
Location:	**TDP5**	**TDP7**	**TDP8**	**TDP9**	**TDP10**		**TDP11**		**TDP12**	**TDP13**	**TDP14**	**TDP15**	**TDP16**	**TDP17**	**TDP18**	**TDP19**
Sample ID:	TDP5	TDP7	TDP8	TDP9	TDP10	TDP10	TDP11	TDP11	TDP12	TDP13	TDP14	TDP15	TDP16	TDP17	TDP18	TDP19
Laboratory ID:	NX93E	NY07B	NY07C	NY07D	NY07P	NY07E	NY07F	NY07G	NY07H	NY07J	NY07K	NY07L	NY44A	NY44B	NY44C	NY44D
Sample Depth (ft BGS):	5	8	8	8	7	8	7	9	7	7	4	4	3	4	4	4
Sample Date:	11/3/2008	11/4/2008	11/4/2008	11/4/2008	11/4/2008	11/4/2008	11/4/2008	11/4/2008	11/4/2008	11/4/2008	11/4/2008	11/4/2008	11/5/2008	11/5/2008	11/5/2008	11/5/2008
TOTAL METALS (mg/kg)																
EPA 200.8/SW6010B/SW7470A (a)																
Barium																
Cadmium	0.2 U	0.2 U	**0.2**	0.2 U		0.2 U		0.2 U	**0.8**	0.6 U	**0.6**	0.2 U	0.3 U	0.3 U	**0.6**	0.3 U
Chromium	**8.8**	**16.5**	**13.8**	**15.1**		**20.7**		**17.1**	**20**	**17**	**24.6**	**17.3**	**18.1**	**21.3**	**26.1**	**12.9**
Copper	**10.8**	**20.2**	**21.6**	**17.7**		**18.9**		**24.8**	**31.3**	**97.1**	**36.6**	**25.7**	**28.8**	**34.3**		**16.4**
Lead	2 U	**2**	**7**	2 U		2 U		**3**	**13**	6 U	**18**	**3**	**4**	**5**	**28**	**30**
Mercury	0.04 U	0.05 U	0.05 U	0.05 U		0.06 U		0.04 U	**0.19**	0.06 U	**0.13**	0.06 U	**0.05**	**0.11**	**0.23**	**0.07**
Nickel																
Selenium																
Silver																
Zinc																
PCBs (mg/kg)																
EPA SW8082 (a)																
Aroclor 1016		0.032 U	0.031 U					0.031 U					0.032 U		0.032 U	
Aroclor 1221		0.032 U	0.031 U					0.031 U					0.032 U		0.032 U	
Aroclor 1232		0.032 U	0.031 U					0.031 U					0.032 U		0.032 U	
Aroclor 1242		0.032 U	0.031 U					0.031 U					0.032 U		0.032 U	
Aroclor 1248		0.032 U	0.031 U					0.031 U					0.032 U		0.032 U	
Aroclor 1254		0.032 U	0.031 U					0.031 U					0.032 U		0.032 U	
Aroclor 1260		0.032 U	0.031 U					0.031 U					0.032 U		0.032 U	
Total PCBs		0.032 U	0.031 U					0.031 U					0.032 U		0.032 U	
CONVENTIONALS (mg/kg)																
Oil and Grease																
PETROLEUM HYDROCARBONS (mg/kg)																
NWTPH-HCID																
Diesel Range Organics	50 U	50 U	50 U	50 U		50 U		50 U	170 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Gasoline Range Organics	20 U	**20**	**20**	**20**		**20**		**20**	67 U	**20**	**20**	**20**	20 U	20 U	20 U	20 U
Lube Oil	100 U	100 U	100 U	100 U		100 U		**100**	**330**	100 U	100 U	100 U	100 U	100 U	100 U	**100**
NWTPH-Dx																
Diesel Range Organics								**20**	**140**							**23**
Lube Oil								**130**	**990**							**110**
VOLATILES (mg/kg)																
EPA SW8260B/C (a)																
1,1,1,2-Tetrachloroethane																
1,1,1-Trichloroethane	0.0011 U	0.0008 U	0.0011 U	0.0006 U	0.0012 U	0.0007 U	0.0009 U	0.0006 U	0.0012 U	0.0011 U	0.0011 U	0.0008 U	0.0012 U	0.001 U	0.0011 U	0.001 U
1,1,2,2-Tetrachloroethane	0.0011 U	0.0008 U	0.0011 U	0.0006 U	0.0012 U	0.0007 U	0.0009 U	0.0006 U	0.0012 U	0.0011 U	0.0011 U	0.0008 U	0.0012 U	0.001 U	0.0011 U	0.001 U
1,1,2-Trichloro-1,2,2-trifluoroethane	0.0021 U	0.0016 U	0.0023 U	0.0013 U	0.0025 U	0.0013 U	0.0018 U	0.0013 U	0.0025 U	0.0022 U	0.0022 U	0.0016 U	0.0023 U	0.002 U	0.0021 U	0.002 U
1,1,2-Trichloroethane	0.0011 U	0.0008 U	0.0011 U	0.0006 U	0.0012 U	0.0007 U	0.0009 U	0.0006 U	0.0012 U	0.0011 U	0.0011 U	0.0008 U	0.0012 U	0.001 U	0.0011 U	0.001 U
1,2-Dichloroethane	0.0011 U	0.0008 U	0.0011 U	0.0006 U	0.0012 U	0.0007 U	0.0009 U	0.0006 U	0.0012 U	0.0011 U	0.0011 U	0.0008 U	0.0012 U	0.001 U	0.0011 U	0.001 U
1,1-Dichloroethane	0.0011 U	0.0008 U	0.0011 U	0.0006 U	0.0012 U	0.0007 U	0.0009 U	0.0006 U	0.0012 U	0.0011 U	0.0011 U	0.0008 U	0.0012 U	0.001 U	0.0011 U	0.001 U
1,1-Dichloroethene	0.0011 U	0.0008 U	0.0011 U	0.0006 U	0.0012 U	0.0007 U	0.0009 U	0.0006 U	0.0012 U	0.0011 U	0.0011 U	0.0008 U	0.0012 U	0.001 U	0.0011 U	0.001 U
1,2-Dichloropropane	0.0011 U	0.0008 U	0.0011 U	0.0006 U	0.0012 U	0.0007 U	0.0009 U	0.0006 U	0.0012 U	0.0011 U	0.0011 U	0.0008 U	0.0012 U	0.001 U	0.0011 U	0.001 U
2-Butanone	0.0076	**0.007**	**0.012**	**0.0099**	**0.025**	**0.0074**	**0.020**	0.0045	**0.014**	**0.0079**	0.0055 U	0.004 U	**0.0092**	**0.009**	0.0053 U	**0.0052**
2-Chloroethylvinylether	0.0053 U	0.0041 U	0.0057 U	0.0032 U	0.0062 U	0.0033 U	0.0044 U	0.0032 U	0.0062 U	0.0055 U	0.0055 U	0.004 U	0.0058 U	0.005 U	0.0053 U	0.0049 U
2-Hexanone	0.0053 U	0.0041 U	0.0057 U	0.0032 U	0.0062 U	0.0033 U	0.0044 U	0.0032 U	0.0062 U	0.0055 U	0.0055 U	0.004 U	0.0058 U	0.005 U	0.0053 U	0.0049 U
4-Methyl-2-Pentanone (MIBK)	0.0053 U	0.0041 U	0.0057 U	0.0032 U	0.0062 U	0.0033 U	0.0044 U	0.0032 U	0.0062 U	0.0055 U	0.0055 U	0.004 U	0.0058 U	0.005 U	0.0053 U	0.0049 U
Acetone	**0.045**	**0.044**	**0.094**	**0.050**	**0.120**	**0.044**	**0.097**	**0.023**	**0.086**	**0.051**	**0.025**	**0.031**	**0.070**	**0.057**	**0.022**	**0.077**
Benzene	0.0011 U	0.0008 U	**0.0043**	0.0006 U	0.0012 U	0.0007 U	0.0009 U	0.0006 U	0.0012 U	0.0011 U	0.0011 U	**0.0023**	**0.0039**	0.001 U	0.0011 U	**0.0013**
Bromodichloromethane	0.0011 U	0.0008 U	0.0011 U	0.0006 U	0.0012 U	0.0007 U	0.0009 U	0.0006 U	0.0012 U	0.0011 U	0.0011 U	0.0008 U	0.0012 U	0.001 U	0.0011 U	0.001 U
Bromoform	0.0011 U	0.0008 U	0.0011 U	0.0006 U	0.0012 U	0.0007 U	0.0009 U	0.0006 U	0.0012 U	0.0011 U	0.0011 U	0.0008 U	0.0012 U	0.001 U	0.0011 U	0.001 U
Bromomethane	0.0011 U	0.0008 U	0.0011 U	0.0006 U	0.0012 U	0.0007 U	0.0009 U	0.0006 U	0.0012 U	0.0011 U	0.0011 U	0.0008 U	0.0012 U	0.001 U	0.0011 U	0.001 U
Carbon Disulfide	0.0011 U	**0.001**	**0.0044**	**0.0023**	**0.026**	**0.0058**	**0.022**	**0.0025**	**0.0088**	**0.0085**	**0.0013**	0.0008 U	**0.0022**	**0.0056**	0.0011 U	0.001 U
Carbon Tetrachloride	0.0011 U	0.0008 U	0.0011 U	0.0006 U	0.0012 U	0.0007 U	0.0009 U	0.0006 U	0.0012 U	0.0011 U	0.0011 U	0.0008 U	0.0012 U	0.001 U	0.0011 U	0.001 U
Chlorobenzene	0.0011 U	0.0008 U	0.0011 U	0.0006 U	0.0012 U	0.0007 U	0.0009 U	0.0006 U	0.0012 U	0.0011 U	0.0011 U	0.0008 U	0.0012 U	0.001 U	0.0011 U	0.001 U
Chloroethane	0.0011 U	0.0008 U	0.0011 U	0.0006 U	0.0012 U	0.0007 U	0.0009 U	0.0006 U	0.0012 U	0.0011 U	0.0011 U	0.0008 U	0.0012 U	0.001 U	0.0011 U	0.001 U

TABLE G-6
HISTORICAL SOIL ANALYTICAL RESULTS
LOCATIONS SOUTH OF SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

	Former Washdown System Piping Inside 14-01										Former Washdown System Piping and ASTs West of 14-01					
Location:	TDP5	TDP7	TDP8	TDP9	TDP10		TDP11		TDP12	TDP13	TDP14	TDP15	TDP16	TDP17	TDP18	TDP19
Sample ID:	TDP5	TDP7	TDP8	TDP9	TDP10	TDP10	TDP11	TDP11	TDP12	TDP13	TDP14	TDP15	TDP16	TDP17	TDP18	TDP19
Laboratory ID:	NX93E	NY07B	NY07C	NY07D	NY07P	NY07E	NY07F	NY07G	NY07H	NY07J	NY07K	NY07L	NY44A	NY44B	NY44C	NY44D
Sample Depth (ft BGS):	5	8	8	8	7	8	7	9	7	7	4	4	3	4	4	4
Sample Date:	11/3/2008	11/4/2008	11/4/2008	11/4/2008	11/4/2008	11/4/2008	11/4/2008	11/4/2008	11/4/2008	11/4/2008	11/4/2008	11/4/2008	11/5/2008	11/5/2008	11/5/2008	11/5/2008
Chloroform	0.0011 U	0.0008 U	0.0011 U	0.0006 U	0.0012 U	0.0007 U	0.0009 U	0.0006 U	0.0012 U	0.0011 U	0.0011 U	0.0008 U	0.0012 U	0.001 U	0.0011 U	0.001 U
Chloromethane	0.0011 U	0.0008 U	0.0011 U	0.0006 U	0.0012 U	0.0007 U	0.0009 U	0.0006 U	0.0012 U	0.0011 U	0.0011 U	0.0008 U	0.0012 U	0.001 U	0.0011 U	0.001 U
cis-1,2-Dichloroethene	0.0011 U	0.0008 U	**0.0015**	0.0006 U	0.0012 U	0.0007 U	0.0009 U	0.0006 U	0.0012 U	0.0011 U	0.0011 U	0.0008 U	0.0012 U	0.001 U	0.0011 U	0.001 U
cis-1,3-Dichloropropene	0.0011 U	0.0008 U	0.0011 U	0.0006 U	0.0012 U	0.0007 U	0.0009 U	0.0006 U	0.0012 U	0.0011 U	0.0011 U	0.0008 U	0.0012 U	0.001 U	0.0011 U	0.001 U
Dibromochloromethane	0.0011 U	0.0008 U	0.0011 U	0.0006 U	0.0012 U	0.0007 U	0.0009 U	0.0006 U	0.0012 U	0.0011 U	0.0011 U	0.0008 U	0.0012 U	0.001 U	0.0011 U	0.001 U
Ethylbenzene	0.0011 U	0.0008 U	0.0011 U	0.0006 U	0.0012 U	0.0007 U	0.0009 U	0.0006 U	0.0012 U	0.0011 U	0.0011 U	0.0008 U	0.0012 U	0.001 U	0.0011 U	0.001 U
m, p-Xylene	0.0011 U	0.0008 U	0.0011 U	0.0006 U	0.0012 U	0.0007 U	0.0009 U	0.0006 U	0.0012 U	0.0011 U	0.0011 U	0.0008 U	0.0012 U	0.001 U	0.0011 U	0.001 U
Methylene Chloride	0.0021 U	0.0016 U	0.0023 U	0.0013 U	0.0025 U	0.0013 U	0.0018 U	0.0013 U	0.0025 U	0.0022 U	0.0022 U	0.0016 U	0.0023 U	0.002 U	0.0021 U	0.002 U
o-Xylene	0.0011 U	0.0008 U	0.0011 U	0.0006 U	0.0012 U	0.0007 U	0.0009 U	0.0006 U	0.0012 U	0.0011 U	0.0011 U	0.0008 U	0.0012 U	0.001 U	0.0011 U	0.001 U
Styrene	0.0011 U	0.0008 U	0.0011 U	0.0006 U	0.0012 U	0.0007 U	0.0009 U	0.0006 U	0.0012 U	0.0011 U	0.0011 U	0.0008 U	0.0012 U	0.001 U	0.0011 U	0.001 U
Tetrachloroethene	0.0011 U	0.0008 U	0.0011 U	0.0006 U	0.0012 U	0.0007 U	0.0009 U	0.0006 U	0.0012 U	0.0011 U	0.0011 U	**0.0015**	0.0012 U	0.001 U	0.0011 U	0.001 U
Toluene	0.0011 U	0.0008 U	**0.002**	0.0006 U	0.0012 U	0.0007 U	0.0009 U	0.0006 U	0.0012 U	0.0011 U	0.0011 U	0.0008 U	0.0012 U	0.001 U	0.0011 U	0.001 U
trans-1,2-Dichloroethene	0.0011 U	0.0008 U	0.0011 U	0.0006 U	0.0012 U	0.0007 U	0.0009 U	0.0006 U	0.0012 U	0.0011 U	0.0011 U	0.0008 U	0.0012 U	0.001 U	0.0011 U	0.001 U
trans-1,3-Dichloropropene	0.0011 U	0.0008 U	0.0011 U	0.0006 U	0.0012 U	0.0007 U	0.0009 U	0.0006 U	0.0012 U	0.0011 U	0.0011 U	0.0008 U	0.0012 U	0.001 U	0.0011 U	0.001 U
Trichloroethene	0.0011 U	0.0008 U	0.0011 U	0.0006 U	0.0012 U	0.0007 U	0.0009 U	0.0006 U	0.0012 U	0.0011 U	0.0011 U	0.0008 U	0.0012 U	0.001 U	0.0011 U	0.001 U
Trichlorofluoromethane	0.0011 U	0.0008 U	0.0011 U	0.0006 U	0.0012 U	0.0007 U	0.0009 U	0.0006 U	0.0012 U	0.0011 U	0.0011 U	0.0008 U	0.0012 U	0.001 U	0.0011 U	0.001 U
Vinyl Acetate	0.0053 U	0.0041 U	0.0057 U	0.0032 U	0.0062 U	0.0033 U	0.0044 U	0.0032 U	0.0062 U	0.0055 U	0.0055 U	0.004 U	0.0058 U	0.005 U	0.0053 U	0.0049 U
Vinyl Chloride	0.0011 U	0.0008 U	0.0011 U	0.0006 U	0.0012 U	0.0007 U	0.0009 U	0.0006 U	0.0012 U	0.0011 U	0.0011 U	0.0008 U	0.0012 U	0.001 U	0.0011 U	0.001 U
SEMIVOLATILES (mg/kg)																
EPA SW8270D (a)																
1,2,4-Trichlorobenzene		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
1,2-Dichlorobenzene		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
1,3-Dichlorobenzene		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
1,4-Dichlorobenzene		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
1-Methylnaphthalene		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
2,2'-Oxybis(1-Chloropropane)		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
2,4,5-Trichlorophenol		0.310 U	0.300 U					0.300 U					0.310 U		0.310 U	
2,4,6-Trichlorophenol		0.310 U	0.300 U					0.300 U					0.310 U		0.310 U	
2,4-Dichlorophenol		0.310 U	0.300 U					0.300 U					0.310 U		0.310 U	
2,4-Dimethylphenol		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
2,4-Dinitrophenol		0.630 U	0.610 U					0.600 U					0.620 U		0.620 U	
2,4-Dinitrotoluene		0.310 U	0.300 U					0.300 U					0.310 U		0.310 U	
2,6-Dinitrotoluene		0.310 U	0.300 U					0.300 U					0.310 U		0.310 U	
2-Chloronaphthalene		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
2-Chlorophenol		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
2-Methylnaphthalene		0.063 U	**0.064**					0.060 U					0.062 U		0.062 U	
2-Methylphenol		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
2-Nitroaniline		0.310 U	0.300 U					0.300 U					0.310 U		0.310 U	
2-Nitrophenol		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
3,3'-Dichlorobenzidine		0.310 U	0.300 U					0.300 U					0.310 U		0.310 U	
3-Nitroaniline		0.310 U	0.300 U					0.300 U					0.310 U		0.310 U	
4,6-Dinitro-2-Methylphenol		0.630 U	0.610 U					0.600 U					0.620 U		0.620 U	
4-Bromophenyl-phenylether		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
4-Chloro-3-methylphenol		0.310 U	0.300 U					0.300 U					0.310 U		0.310 U	
4-Chloroaniline		0.310 U	0.300 U					0.300 U					0.310 U		0.310 U	
4-Chlorophenyl-phenylether		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
4-Methylphenol		0.063 U	**0.170**					0.060 U					0.062 U		0.062 U	
4-Nitroaniline		0.310 U	0.300 U					0.300 U					0.310 U		0.310 U	
4-Nitrophenol		0.310 U	0.300 U					0.300 U					0.310 U		0.310 U	
Acenaphthene		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
Acenaphthylene		0.063 U	**0.071**					0.060 U					0.062 U		0.062 U	
Anthracene		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
Benzo(a)anthracene		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
Benzo(a)pyrene		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
Benzo(b)fluoranthene		0.063 U	0.061 U					0.060 U					0.062 U		**0.076**	
Benzo(g,h,i)perylene		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
Benzo(k)fluoranthene		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
Benzoic Acid		0.630 U	0.610 U					0.600 U					0.620 U		0.620 U	
Benzyl Alcohol		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
bis(2-Chloroethoxy) Methane		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	

TABLE G-6
HISTORICAL SOIL ANALYTICAL RESULTS
LOCATIONS SOUTH OF SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

	Former Washdown System Piping Inside 14-01										Former Washdown System Piping and ASTs West of 14-01					
Location:	TDP5	TDP7	TDP8	TDP9	TDP10		TDP11		TDP12	TDP13	TDP14	TDP15	TDP16	TDP17	TDP18	TDP19
Sample ID:	TDP5	TDP7	TDP8	TDP9	TDP10	TDP10	TDP11	TDP11	TDP12	TDP13	TDP14	TDP15	TDP16	TDP17	TDP18	TDP19
Laboratory ID:	NX93E	NY07B	NY07C	NY07D	NY07P	NY07E	NY07F	NY07G	NY07H	NY07J	NY07K	NY07L	NY44A	NY44B	NY44C	NY44D
Sample Depth (ft BGS):	5	8	8	8	7	8	7	9	7	7	4	4	3	4	4	4
Sample Date:	11/3/2008	11/4/2008	11/4/2008	11/4/2008	11/4/2008	11/4/2008	11/4/2008	11/4/2008	11/4/2008	11/4/2008	11/4/2008	11/4/2008	11/5/2008	11/5/2008	11/5/2008	11/5/2008
Bis-(2-Chloroethyl) Ether		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
bis(2-Ethylhexyl)phthalate		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
Butylbenzylphthalate		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
Carbazole		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
Chrysene		0.063 U	0.061 U					0.060 U					0.062 U		**0.091**	
Dibenz(a,h)anthracene		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
Dibenzofuran		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
Diethylphthalate		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
Dimethylphthalate		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
Di-n-Butylphthalate		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
Di-n-Octyl phthalate		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
Fluoranthene		0.063 U	**0.100**					0.060 U					0.062 U		**0.150**	
Fluorene		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
Hexachlorobenzene		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
Hexachlorobutadiene		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
Hexachlorocyclopentadiene		0.310 U	0.300 U					0.300 U					0.310 U		0.310 U	
Hexachloroethane		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
Indeno(1,2,3-cd)pyrene		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
Isophorone		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
Naphthalene		0.063 U	**0.260**					0.060 U					0.062 U		**0.110**	
Nitrobenzene		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
N-Nitroso-Di-N-Propylamine		0.310 U	0.300 U					0.300 U					0.310 U		0.310 U	
N-Nitrosodiphenylamine		0.063 U	0.061 U					0.060 U					0.062 U		0.062 U	
Pentachlorophenol		0.310 U	0.300 U					0.300 U					0.310 U		0.310 U	
Phenanthrene		0.063 U	**0.160**					60 U					**0.071**		**0.120**	
Phenol		0.063 U	0.061 U					60 U					0.062 U		0.062 U	
Pyrene		0.063 U	**0.110**					60 U					0.062 U		**0.120**	

TABLE G-6
HISTORICAL SOIL ANALYTICAL RESULTS
LOCATIONS SOUTH OF SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

	Substation (Building 14-22)	
Location:	TDP20	TDP21
Sample ID:	TDP20	TDP21
Laboratory ID:	NY44E	NY44F
Sample Depth (ft BGS):	3	3
Sample Date:	11/5/2008	11/5/2008
TOTAL METALS (mg/kg)		
EPA 200.8/SW6010B/SW7470A (a)		
Barium		
Cadmium	0.3 U	**0.3**
Chromium	**14.5**	**15.1**
Copper		**13.3**
Lead	**3**	2 U
Mercury	0.05 U	0.05 U
Nickel		
Selenium		
Silver		
Zinc		
PCBs (mg/kg)		
EPA SW8082 (a)		
Aroclor 1016	0.032 U	0.031 U
Aroclor 1221	0.032 U	0.031 U
Aroclor 1232	0.032 U	0.031 U
Aroclor 1242	0.032 U	0.031 U
Aroclor 1248	0.032 U	0.031 U
Aroclor 1254	0.032 U	0.031 U
Aroclor 1260	0.032 U	0.031 U
Total PCBs	0.032 U	0.031 U
CONVENTIONALS (mg/kg)		
Oil and Grease		
PETROLEUM HYDROCARBONS (mg/kg)		
NWTPH-HCID		
Diesel Range Organics	50 U	50 U
Gasoline Range Organics	20 U	20 U
Lube Oil	100 U	100 U
NWTPH-Dx		
Diesel Range Organics		
Lube Oil		
VOLATILES (mg/kg)		
EPA SW8260B/C (a)		
1,1,1,2-Tetrachloroethane		
1,1,1-Trichloroethane		
1,1,2,2-Tetrachloroethane		
1,1,2-Trichloro-1,2,2-trifluoroethane		
1,1,2-Trichloroethane		
1,2-Dichloroethane		
1,1-Dichloroethane		
1,1-Dichloroethene		
1,2-Dichloropropane		
2-Butanone		
2-Chloroethylvinylether		
2-Hexanone		
4-Methyl-2-Pentanone (MIBK)		
Acetone		
Benzene		
Bromodichloromethane		
Bromoform		
Bromomethane		
Carbon Disulfide		
Carbon Tetrachloride		
Chlorobenzene		
Chloroethane		

TABLE G-6
HISTORICAL SOIL ANALYTICAL RESULTS
LOCATIONS SOUTH OF SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

	Substation (Building 14-22)	
Location:	TDP20	TDP21
Sample ID:	TDP20	TDP21
Laboratory ID:	NY44E	NY44F
Sample Depth (ft BGS):	3	3
Sample Date:	11/5/2008	11/5/2008
Chloroform		
Chloromethane		
cis-1,2-Dichloroethene		
cis-1,3-Dichloropropene		
Dibromochloromethane		
Ethylbenzene		
m, p-Xylene		
Methylene Chloride		
o-Xylene		
Styrene		
Tetrachloroethene		
Toluene		
trans-1,2-Dichloroethene		
trans-1,3-Dichloropropene		
Trichloroethene		
Trichlorofluoromethane		
Vinyl Acetate		
Vinyl Chloride		
SEMIVOLATILES (mg/kg)		
EPA SW8270D (a)		
1,2,4-Trichlorobenzene		
1,2-Dichlorobenzene		
1,3-Dichlorobenzene		
1,4-Dichlorobenzene		
1-Methylnaphthalene		
2,2'-Oxybis(1-Chloropropane)		
2,4,5-Trichlorophenol		
2,4,6-Trichlorophenol		
2,4-Dichlorophenol		
2,4-Dimethylphenol		
2,4-Dinitrophenol		
2,4-Dinitrotoluene		
2,6-Dinitrotoluene		
2-Chloronaphthalene		
2-Chlorophenol		
2-Methylnaphthalene		
2-Methylphenol		
2-Nitroaniline		
2-Nitrophenol		
3,3'-Dichlorobenzidine		
3-Nitroaniline		
4,6-Dinitro-2-Methylphenol		
4-Bromophenyl-phenylether		
4-Chloro-3-methylphenol		
4-Chloroaniline		
4-Chlorophenyl-phenylether		
4-Methylphenol		
4-Nitroaniline		
4-Nitrophenol		
Acenaphthene		
Acenaphthylene		
Anthracene		
Benzo(a)anthracene		
Benzo(a)pyrene		
Benzo(b)fluoranthene		
Benzo(g,h,i)perylene		
Benzo(k)fluoranthene		
Benzoic Acid		
Benzyl Alcohol		
bis(2-Chloroethoxy) Methane		

TABLE G-6
HISTORICAL SOIL ANALYTICAL RESULTS
LOCATIONS SOUTH OF SLIP 5
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

	Substation (Building 14-22)	
Location:	TDP20	TDP21
Sample ID:	TDP20	TDP21
Laboratory ID:	NY44E	NY44F
Sample Depth (ft BGS):	3	3
Sample Date:	11/5/2008	11/5/2008
Bis-(2-Chloroethyl) Ether		
bis(2-Ethylhexyl)phthalate		
Butylbenzylphthalate		
Carbazole		
Chrysene		
Dibenz(a,h)anthracene		
Dibenzofuran		
Diethylphthalate		
Dimethylphthalate		
Di-n-Butylphthalate		
Di-n-Octyl phthalate		
Fluoranthene		
Fluorene		
Hexachlorobenzene		
Hexachlorobutadiene		
Hexachlorocyclopentadiene		
Hexachloroethane		
Indeno(1,2,3-cd)pyrene		
Isophorone		
Naphthalene		
Nitrobenzene		
N-Nitroso-Di-N-Propylamine		
N-Nitrosodiphenylamine		
Pentachlorophenol		
Phenanthrene		
Phenol		
Pyrene		

U = Indicates the compound was undetected at the reported concentration
J = Indicates the analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
Bold = Detected compound.

(a) = Analytical method was not always listed with historical sample results

Note: Results listed account for all historical analyses completed in site area as discussed in report text

APPENDIX H

Previous Groundwater Sample Results

TABLE H-1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING ISAACSON SITE
TUKWILA, WASHINGTON

Location:	B-12									I-1			I-2		
Sample ID:	B-12	B-12	B-12	B-12	B-12	B-12	B-12	B-12	Dup of B-12 B-12-Dup	I-1	Dup of I-1 I-1-Dup	I-1	I-2	I-2	Dup of I-2 I-2-Dup
Laboratory ID:															
Sample Date:	8/1/1983	10/1/1983	12/1/1983	6/1/1985	12/1/1985	7/1/1986	1/1/1987	2/1/1988	2/1/1988	10/1/1983	10/1/1983	12/1/1983	10/1/1983	12/1/1983	12/1/1983
TOTAL METALS (ug/L)															
EPA 200.8/SW6010B/SW7470A (b)															
Antimony	**19**														
Arsenic	**260**			**620**	**1200**	**1000**	**640**								
Barium	250 U														
Cadmium	**0.4**														
Chromium	**20**														
Iron															
Lead	**1**														
Mercury	0.2 U														
Selenium	**3**														
Silver	**1.9**														
Zinc															
DISSOLVED METALS (ug/L)															
EPA 200.8/SW6010B/SW7470A (b)															
Antimony															
Arsenic		**360**	**340**	**310**	**22**	**510**	**270**	**500**		**270**	**235**	**310**	**9200**	**4400**	**3000**
Barium															
Cadmium															
Chromium		**5** U	8 U					**2**		5 U	**4.3**	8 U	**10**	8 U	**10.9**
Copper		**700**	**470**					**500**		**49**	**62**	**27**	**16**	**8**	**8**
Iron															
Lead		1 U	5 U					1 U		1 U	**3**	5 U	1 U	5 U	**4**
Manganese															
Mercury								0.1 U							
Nickel		**60**	**40**					**25**		10 U	**5**	**10**	**30**	**20**	**44**
Selenium															
Zinc		**14,000**	**800**					**9090**		**270**	**333**	**520**	**800**	**180**	**505**
PETROLEUM HYDROCARBONS (ug/L)															
NWTPH-HCID															
Diesel Range Organics															
Gasoline Range Organics															
Lube Oil															
PCBs (ug/L)															
EPA SW8082															
Aroclor 1016															
Aroclor 1221															
Aroclor 1232															
Aroclor 1242															
Aroclor 1248															
Aroclor 1254															
Aroclor 1260															
Total PCBs															
VOLATILES (ug/L)															
EPA SW8260B (b)															
1,1,2,2-Tetrachloroethane															
1,1,1-Trichloroethane								**110**	**120**						
1,1,2,2-Tetrachloroethane															
1,1,2-Trichloro-1,2,2-Trifluoroethane								ND	**0.9**						
1,1,2-Trichloroethane															
1,1-Dichloroethane								**15**	**15**						
1,1-Dichloroethene								**13**	**13**						
1,2-Dichloroethene (total)								**2** J	**2** J						
1,1-Dichloropropene															
1,2,3-Trichlorobenzene															
1,2,3-Trichloropropane															
1,2,4-Trichlorobenzene															
1,2,4-Trimethylbenzene															
1,2-Dibromo-3-chloropropane															

TABLE H-1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING ISAACSON SITE
TUKWILA, WASHINGTON

Location:	B-12									I-1			I-2		
Sample ID:	B-12	B-12	B-12	B-12	B-12	B-12	B-12	B-12	Dup of B-12 B-12-Dup	I-1	Dup of I-1 I-1-Dup	I-1	I-2	I-2	Dup of I-2 I-2-Dup
Laboratory ID:															
Sample Date:	8/1/1983	10/1/1983	12/1/1983	6/1/1985	12/1/1985	7/1/1986	1/1/1987	2/1/1988	2/1/1988	10/1/1983	10/1/1983	12/1/1983	10/1/1983	12/1/1983	12/1/1983
1,2-Dichlorobenzene															
1,2-Dichloroethane															
1,2-Dichloropropane															
1,3,5-Trimethylbenzene															
1,3-Dichlorobenzene															
1,3-Dichloropropane															
1,4-Dichlorobenzene															
2,2-Dichloropropane															
2-Butanone								**21**	ND						
2-Chloroethylvinylether															
2-Chlorotoluene															
2-Hexanone															
4-Chlorotoluene															
4-Isopropyltoluene															
4-Methyl-2-Pentanone (MIBK)															
Acetone								**9** J	ND						
Acrolein															
Acrylonitrile															
Benzene								**0.9** M	**1** M						
Bromobenzene															
Bromochloromethane															
Bromodichloromethane															
Bromoethane															
Bromoform															
Bromomethane															
Carbon Disulfide															
Carbon Tetrachloride															
Chlorobenzene															
Chloroethane															
Chloroform								ND	ND						
Chloromethane															
cis-1,2-Dichloroethene															
cis-1,3-Dichloropropene															
Dibromochloromethane															
Dibromomethane															
Ethylbenzene								ND	**0.8** J						
Ethylene Dibromide															
Hexachlorobutadiene															
Isopropylbenzene															
m, p-Xylene															
Methyl Iodide															
Methylene Chloride								**6** B	**9** B						
Naphthalene															
n-Butylbenzene															
n-Propylbenzene															
o-Xylene															
sec-Butylbenzene															
Styrene															
tert-Butylbenzene															
Tetrachloroethene								**41**	**38**						
Toluene								**1** J	**2** J						
trans-1,2-Dichloroethene															
trans-1,3-Dichloropropene															
trans-1,4-Dichloro-2-butene															
Total Xylenes								**320**	**370**						
Trichloroethene								**18**	**18**						
Trichlorofluoromethane															
Vinyl Acetate															
Vinyl Chloride								ND	ND						

TABLE H-1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING ISAACSON SITE
TUKWILA, WASHINGTON

Location:	B-12									I-1			I-2		
									Dup of B-12		Dup of I-1				Dup of I-2
Sample ID:	B-12	B-12	B-12	B-12	B-12	B-12	B-12	B-12	B-12-Dup	I-1	I-1-Dup	I-1	I-2	I-2	I-2-Dup
Laboratory ID:															
Sample Date:	8/1/1983	10/1/1983	12/1/1983	6/1/1985	12/1/1985	7/1/1986	1/1/1987	2/1/1988	2/1/1988	10/1/1983	10/1/1983	12/1/1983	10/1/1983	12/1/1983	12/1/1983
SEMIVOLATILES (ug/L)															
EPA SW8270D (b)															
1,2,4-Trichlorobenzene															
1,2-Dichlorobenzene															
1,3-Dichlorobenzene															
1,4-Dichlorobenzene															
1-Methylnaphthalene															
2,2'-Oxybis(1-Chloropropane)															
2,4,5-Trichlorophenol															
2,4,6-Trichlorophenol															
2,4-Dichlorophenol															
2,4-Dimethylphenol															
2,4-Dinitrophenol															
2,4-Dinitrotoluene															
2,6-Dinitrotoluene															
2-Chloronaphthalene															
2-Chlorophenol															
2-Methylnaphthalene															
2-Methylphenol															
2-Nitroaniline															
2-Nitrophenol															
3,3'-Dichlorobenzidine															
3-Nitroaniline															
4,6-Dinitro-2-Methylphenol															
4-Bromophenyl-phenylether															
4-Chloro-3-methylphenol															
4-Chloroaniline															
4-Chlorophenyl-phenylether															
4-Methylphenol															
4-Nitroaniline															
4-Nitrophenol															
Acenaphthene															
Acenaphthylene															
Anthracene															
Benzo(a)anthracene															
Benzo(a)pyrene															
Benzo(b)fluoranthene															
Benzo(g,h,i)perylene															
Benzo(k)fluoranthene															
Benzoic Acid															
Benzyl Alcohol															
bis(2-Chloroethoxy) Methane															
Bis-(2-Chloroethyl) Ether															
bis(2-Ethylhexyl)phthalate															
Butylbenzylphthalate															
Carbazole															
Chrysene															
Dibenz(a,h)anthracene															
Dibenzofuran															
Diethylphthalate															
Dimethylphthalate															
Di-n-Butylphthalate															
Di-n-Octyl phthalate															
Fluoranthene															
Fluorene															
Hexachlorobenzene															
Hexachlorobutadiene															
Hexachlorocyclopentadiene															
Hexachloroethane															
Indeno(1,2,3-cd)pyrene															
Isophorone															
Naphthalene															
Nitrobenzene															

TABLE H-1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING ISAACSON SITE
TUKWILA, WASHINGTON

Location:	B-12									I-1			I-2		
									Dup of B-12		Dup of I-1				Dup of I-2
Sample ID:	B-12	B-12	B-12	B-12	B-12	B-12	B-12	B-12	B-12-Dup	I-1	I-1-Dup	I-1	I-2	I-2	I-2-Dup
Laboratory ID:															
Sample Date:	8/1/1983	10/1/1983	12/1/1983	6/1/1985	12/1/1985	7/1/1986	1/1/1987	2/1/1988	2/1/1988	10/1/1983	10/1/1983	12/1/1983	10/1/1983	12/1/1983	12/1/1983
N-Nitroso-Di-N-Propylamine															
N-Nitrosodiphenylamine															
Pentachlorophenol															
Phenanthrene															
Phenol	**25**														
Pyrene															
PAHs (ug/L)															
EPA SW8270D-SIM															
Benzo(a)anthracene															
Benzo(a)pyrene															
Benzo(b)fluoranthene															
Benzo(k)fluoranthene															
Chrysene															
Dibenz(a,h)anthracene															
Indeno(1,2,3-cd)pyrene															
TEQ															
CONVENTIONALS (ug/L)															
Total Cyanide	3 U														
Fluoride	**240**														
Oil and Grease															
Total Organic Carbon (EPA 415.1 (b))															
Ferrous Iron (SM3500FeD)															

TABLE H-1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING ISAACSON SITE
TUKWILA, WASHINGTON

Location:	I-3						I-4			I-5		I-8				I-008i
Sample ID:	I-3	I-3	I-3	I-3	I-3	I-3	I-4	Dup of I-4 I-4-Dup	I-4	I-5	I-5	I-8	I-8	I-8	I-8	I-008i
Laboratory ID:																
Sample Date:	10/1/1983	12/1/1983	6/1/1985	12/1/1985	7/1/1986	1/1/1987	10/1/1983	10/1/1983	12/1/1983	10/1/1983	12/1/1983	12/1/1985	7/1/1986	1/1/1987	2/1/1988	2/1/1988
TOTAL METALS (ug/L)																
EPA 200.8/SW6010B/SW7470A (b)																
Antimony																
Arsenic			**15**	**12**	**14**	**27**						**210**	**240**	**50**		
Barium																
Cadmium																
Chromium																
Iron																
Lead																
Mercury																
Selenium																
Silver																
Zinc																
DISSOLVED METALS (ug/L)																
EPA 200.8/SW6010B/SW7470A (b)																
Antimony																
Arsenic	5 U	10 U	5 U	5 U	5 U	5 U	**41**	**49**	**42**	**360**	**590**	**21**	**19**	**8**	**40**	**14**
Barium																
Cadmium																
Chromium	5 U	**10**					5 U	**4.1**	8 U	5 U	8 U					1 U
Copper	**4**	4 U					4 U	**3**	4 U	**4**	4 U					**6**
Iron																
Lead	1 U	5 U					1 U	**4**	5 U	1 U	5 U					1 U
Manganese																
Mercury																
Nickel	10 U	**10**					10 U	**3**	10 U	10 U	10 U					1 U
Selenium																
Zinc	**50**	**10**					**41**	**48**	**18**	**48**	**220**					**8**
PETROLEUM HYDROCARBONS (ug/L)																
NWTPH-HCID																
Diesel Range Organics																
Gasoline Range Organics																
Lube Oil																
PCBs (ug/L)																
EPA SW8082																
Aroclor 1016																
Aroclor 1221																
Aroclor 1232																
Aroclor 1242																
Aroclor 1248																
Aroclor 1254																
Aroclor 1260																
Total PCBs																
VOLATILES (ug/L)																
EPA SW8260B (b)																
1,1,2,2-Tetrachloroethane																
1,1,1-Trichloroethane															ND	
1,1,2,2-Tetrachloroethane																
1,1,2-Trichloro-1,2,2-Trifluoroethane															ND	
1,1,2-Trichloroethane																
1,1-Dichloroethane															ND	
1,1-Dichloroethene															ND	
1,2-Dichloroethene (total)															**0.5** J	
1,1-Dichloropropene																
1,2,3-Trichlorobenzene																
1,2,3-Trichloropropane																
1,2,4-Trichlorobenzene																
1,2,4-Trimethylbenzene																
1,2-Dibromo-3-chloropropane																

TABLE H-1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING ISAACSON SITE
TUKWILA, WASHINGTON

Location:	I-3						I-4			I-5		I-8				I-008i
Sample ID:	I-3	I-3	I-3	I-3	I-3	I-3	I-4	Dup of I-4 I-4-Dup	I-4	I-5	I-5	I-8	I-8	I-8	I-8	I-008i
Laboratory ID:																
Sample Date:	10/1/1983	12/1/1983	6/1/1985	12/1/1985	7/1/1986	1/1/1987	10/1/1983	10/1/1983	12/1/1983	10/1/1983	12/1/1983	12/1/1985	7/1/1986	1/1/1987	2/1/1988	2/1/1988
1,2-Dichlorobenzene																
1,2-Dichloroethane																
1,2-Dichloropropane																
1,3,5-Trimethylbenzene																
1,3-Dichlorobenzene																
1,3-Dichloropropane																
1,4-Dichlorobenzene																
2,2-Dichloropropane																
2-Butanone															ND	
2-Chloroethylvinylether																
2-Chlorotoluene																
2-Hexanone																
4-Chlorotoluene																
4-Isopropyltoluene																
4-Methyl-2-Pentanone (MIBK)																
Acetone															ND	
Acrolein																
Acrylonitrile																
Benzene															ND	
Bromobenzene																
Bromochloromethane																
Bromodichloromethane																
Bromoethane																
Bromoform																
Bromomethane																
Carbon Disulfide																
Carbon Tetrachloride																
Chlorobenzene																
Chloroethane																
Chloroform															ND	
Chloromethane																
cis-1,2-Dichloroethene																
cis-1,3-Dichloropropene																
Dibromochloromethane																
Dibromomethane																
Ethylbenzene															ND	
Ethylene Dibromide																
Hexachlorobutadiene																
Isopropylbenzene																
m, p-Xylene																
Methyl Iodide																
Methylene Chloride															**0.5** BJ	
Naphthalene																
n-Butylbenzene																
n-Propylbenzene																
o-Xylene																
sec-Butylbenzene																
Styrene																
tert-Butylbenzene																
Tetrachloroethene															ND	
Toluene															ND	
trans-1,2-Dichloroethene																
trans-1,3-Dichloropropene																
trans-1,4-Dichloro-2-butene																
Total Xylenes															ND	
Trichloroethene															ND	
Trichlorofluoromethane																
Vinyl Acetate																
Vinyl Chloride															ND	

TABLE H-1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING ISAACSON SITE
TUKWILA, WASHINGTON

Location:	I-3						I-4			I-5		I-8				I-008i
								Dup of I-4								
Sample ID:	I-3	I-3	I-3	I-3	I-3	I-3	I-4	I-4-Dup	I-4	I-5	I-5	I-8	I-8	I-8	I-8	I-008i
Laboratory ID:																
Sample Date:	10/1/1983	12/1/1983	6/1/1985	12/1/1985	7/1/1986	1/1/1987	10/1/1983	10/1/1983	12/1/1983	10/1/1983	12/1/1983	12/1/1985	7/1/1986	1/1/1987	2/1/1988	2/1/1988
SEMIVOLATILES (ug/L)																
EPA SW8270D (b)																
1,2,4-Trichlorobenzene																
1,2-Dichlorobenzene																
1,3-Dichlorobenzene																
1,4-Dichlorobenzene																
1-Methylnaphthalene																
2,2'-Oxybis(1-Chloropropane)																
2,4,5-Trichlorophenol																
2,4,6-Trichlorophenol																
2,4-Dichlorophenol																
2,4-Dimethylphenol																
2,4-Dinitrophenol																
2,4-Dinitrotoluene																
2,6-Dinitrotoluene																
2-Chloronaphthalene																
2-Chlorophenol																
2-Methylnaphthalene																
2-Methylphenol																
2-Nitroaniline																
2-Nitrophenol																
3,3'-Dichlorobenzidine																
3-Nitroaniline																
4,6-Dinitro-2-Methylphenol																
4-Bromophenyl-phenylether																
4-Chloro-3-methylphenol																
4-Chloroaniline																
4-Chlorophenyl-phenylether																
4-Methylphenol																
4-Nitroaniline																
4-Nitrophenol																
Acenaphthene																
Acenaphthylene																
Anthracene																
Benzo(a)anthracene																
Benzo(a)pyrene																
Benzo(b)fluoranthene																
Benzo(g,h,i)perylene																
Benzo(k)fluoranthene																
Benzoic Acid																
Benzyl Alcohol																
bis(2-Chloroethoxy) Methane																
Bis-(2-Chloroethyl) Ether																
bis(2-Ethylhexyl)phthalate																
Butylbenzylphthalate																
Carbazole																
Chrysene																
Dibenz(a,h)anthracene																
Dibenzofuran																
Diethylphthalate																
Dimethylphthalate																
Di-n-Butylphthalate																
Di-n-Octyl phthalate																
Fluoranthene																
Fluorene																
Hexachlorobenzene																
Hexachlorobutadiene																
Hexachlorocyclopentadiene																
Hexachloroethane																
Indeno(1,2,3-cd)pyrene																
Isophorone																
Naphthalene																
Nitrobenzene																

TABLE H-1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING ISAACSON SITE
TUKWILA, WASHINGTON

Location:	I-3						I-4			I-5		I-8				I-008i
								Dup of I-4								
Sample ID:	I-3	I-3	I-3	I-3	I-3	I-3	I-4	I-4-Dup	I-4	I-5	I-5	I-8	I-8	I-8	I-8	I-008i
Laboratory ID:																
Sample Date:	10/1/1983	12/1/1983	6/1/1985	12/1/1985	7/1/1986	1/1/1987	10/1/1983	10/1/1983	12/1/1983	10/1/1983	12/1/1983	12/1/1985	7/1/1986	1/1/1987	2/1/1988	2/1/1988
N-Nitroso-Di-N-Propylamine																
N-Nitrosodiphenylamine																
Pentachlorophenol																
Phenanthrene																
Phenol																
Pyrene																
PAHs (ug/L)																
EPA SW8270D-SIM																
Benzo(a)anthracene																
Benzo(a)pyrene																
Benzo(b)fluoranthene																
Benzo(k)fluoranthene																
Chrysene																
Dibenz(a,h)anthracene																
Indeno(1,2,3-cd)pyrene																
TEQ																
CONVENTIONALS (ug/L)																
Total Cyanide																
Fluoride																
Oil and Grease																
Total Organic Carbon (EPA 415.1 (b))																
Ferrous Iron (SM3500FeD)																

TABLE H-1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING ISAACSON SITE
TUKWILA, WASHINGTON

Location:	I-104																	
Sample ID:	I-104	I-104	I-104	I-104	I-104s	I-104s	I-104s	I-104s	I-104s	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104
Laboratory ID:																		
Sample Date:	12/1/1985	7/1/1986	1/1/1987	2/1/1988	2/1/1988	3/21/1991	3/28/1991	4/4/1991	4/11/1991	9/12/1991	9/19/1991	9/26/1991	10/3/1991	4/16/1992	4/23/1992	4/30/1992	5/7/1992	9/24/1992
TOTAL METALS (ug/L)																		
EPA 200.8/SW6010B/SW7470A (b)																		
Antimony																		
Arsenic	**18**	5 U	**6**															
Barium																		
Cadmium																		
Chromium																		
Iron																		
Lead																		
Mercury																		
Selenium																		
Silver																		
Zinc																		
DISSOLVED METALS (ug/L)																		
EPA 200.8/SW6010B/SW7470A (b)																		
Antimony																		
Arsenic	**5**	5U	5U	**12**	**12**	**25**	**17**	**19**	**17**	**12**	**15**	**15**	**29**	2 U	**10**	**10**	**9**	**8** J
Barium																		
Cadmium																		
Chromium					**2**													
Copper					**3**													
Iron																		
Lead					1 U													
Manganese																		
Mercury																		
Nickel					1 U													
Selenium																		
Zinc					2 U													
PETROLEUM HYDROCARBONS (ug/L)																		
NWTPH-HCID																		
Diesel Range Organics																		
Gasoline Range Organics																		
Lube Oil																		
PCBs (ug/L)																		
EPA SW8082																		
Aroclor 1016																		
Aroclor 1221																		
Aroclor 1232																		
Aroclor 1242																		
Aroclor 1248																		
Aroclor 1254																		
Aroclor 1260																		
Total PCBs																		
VOLATILES (ug/L)																		
EPA SW8260B (b)																		
1,1,2,2-Tetrachloroethane																		
1,1,1-Trichloroethane																		
1,1,2,2-Tetrachloroethane																		
1,1,2-Trichloro-1,2,2-Trifluoroethane																		
1,1,2-Trichloroethane																		
1,1-Dichloroethane																		
1,1-Dichloroethene																		
1,2-Dichloroethene (total)																		
1,1-Dichloropropene																		
1,2,3-Trichlorobenzene																		
1,2,3-Trichloropropane																		
1,2,4-Trichlorobenzene																		
1,2,4-Trimethylbenzene																		
1,2-Dibromo-3-chloropropane																		

TABLE H-1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING ISAACSON SITE
TUKWILA, WASHINGTON

Location:	I-104																	
Sample ID:	I-104	I-104	I-104	I-104	I-104s	I-104s	I-104s	I-104s	I-104s	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104
Laboratory ID:																		
Sample Date:	12/1/1985	7/1/1986	1/1/1987	2/1/1988	2/1/1988	3/21/1991	3/28/1991	4/4/1991	4/11/1991	9/12/1991	9/19/1991	9/26/1991	10/3/1991	4/16/1992	4/23/1992	4/30/1992	5/7/1992	9/24/1992
1,2-Dichlorobenzene																		
1,2-Dichloroethane																		
1,2-Dichloropropane																		
1,3,5-Trimethylbenzene																		
1,3-Dichlorobenzene																		
1,3-Dichloropropane																		
1,4-Dichlorobenzene																		
2,2-Dichloropropane																		
2-Butanone																		
2-Chloroethylvinylether																		
2-Chlorotoluene																		
2-Hexanone																		
4-Chlorotoluene																		
4-Isopropyltoluene																		
4-Methyl-2-Pentanone (MIBK)																		
Acetone																		
Acrolein																		
Acrylonitrile																		
Benzene																		
Bromobenzene																		
Bromochloromethane																		
Bromodichloromethane																		
Bromoethane																		
Bromoform																		
Bromomethane																		
Carbon Disulfide																		
Carbon Tetrachloride																		
Chlorobenzene																		
Chloroethane																		
Chloroform																		
Chloromethane																		
cis-1,2-Dichloroethene																		
cis-1,3-Dichloropropene																		
Dibromochloromethane																		
Dibromomethane																		
Ethylbenzene																		
Ethylene Dibromide																		
Hexachlorobutadiene																		
Isopropylbenzene																		
m, p-Xylene																		
Methyl Iodide																		
Methylene Chloride																		
Naphthalene																		
n-Butylbenzene																		
n-Propylbenzene																		
o-Xylene																		
sec-Butylbenzene																		
Styrene																		
tert-Butylbenzene																		
Tetrachloroethene																		
Toluene																		
trans-1,2-Dichloroethene																		
trans-1,3-Dichloropropene																		
trans-1,4-Dichloro-2-butene																		
Total Xylenes																		
Trichloroethene																		
Trichlorofluoromethane																		
Vinyl Acetate																		
Vinyl Chloride																		

TABLE H-1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING ISAACSON SITE
TUKWILA, WASHINGTON

Location:	I-104																	
Sample ID:	I-104	I-104	I-104	I-104	I-104s	I-104s	I-104s	I-104s	I-104s	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104
Laboratory ID:																		
Sample Date:	12/1/1985	7/1/1986	1/1/1987	2/1/1988	2/1/1988	3/21/1991	3/28/1991	4/4/1991	4/11/1991	9/12/1991	9/19/1991	9/26/1991	10/3/1991	4/16/1992	4/23/1992	4/30/1992	5/7/1992	9/24/1992
SEMIVOLATILES (ug/L)																		
EPA SW8270D (b)																		
1,2,4-Trichlorobenzene																		
1,2-Dichlorobenzene																		
1,3-Dichlorobenzene																		
1,4-Dichlorobenzene																		
1-Methylnaphthalene																		
2,2'-Oxybis(1-Chloropropane)																		
2,4,5-Trichlorophenol																		
2,4,6-Trichlorophenol																		
2,4-Dichlorophenol																		
2,4-Dimethylphenol																		
2,4-Dinitrophenol																		
2,4-Dinitrotoluene																		
2,6-Dinitrotoluene																		
2-Chloronaphthalene																		
2-Chlorophenol																		
2-Methylnaphthalene																		
2-Methylphenol																		
2-Nitroaniline																		
2-Nitrophenol																		
3,3'-Dichlorobenzidine																		
3-Nitroaniline																		
4,6-Dinitro-2-Methylphenol																		
4-Bromophenyl-phenylether																		
4-Chloro-3-methylphenol																		
4-Chloroaniline																		
4-Chlorophenyl-phenylether																		
4-Methylphenol																		
4-Nitroaniline																		
4-Nitrophenol																		
Acenaphthene																		
Acenaphthylene																		
Anthracene																		
Benzo(a)anthracene																		
Benzo(a)pyrene																		
Benzo(b)fluoranthene																		
Benzo(g,h,i)perylene																		
Benzo(k)fluoranthene																		
Benzoic Acid																		
Benzyl Alcohol																		
bis(2-Chloroethoxy) Methane																		
Bis-(2-Chloroethyl) Ether																		
bis(2-Ethylhexyl)phthalate																		
Butylbenzylphthalate																		
Carbazole																		
Chrysene																		
Dibenz(a,h)anthracene																		
Dibenzofuran																		
Diethylphthalate																		
Dimethylphthalate																		
Di-n-Butylphthalate																		
Di-n-Octyl phthalate																		
Fluoranthene																		
Fluorene																		
Hexachlorobenzene																		
Hexachlorobutadiene																		
Hexachlorocyclopentadiene																		
Hexachloroethane																		
Indeno(1,2,3-cd)pyrene																		
Isophorone																		
Naphthalene																		
Nitrobenzene																		

TABLE H-1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING ISAACSON SITE
TUKWILA, WASHINGTON

Location:	I-104																	
Sample ID:	I-104	I-104	I-104	I-104	I-104s	I-104s	I-104s	I-104s	I-104s	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104
Laboratory ID:																		
Sample Date:	12/1/1985	7/1/1986	1/1/1987	2/1/1988	2/1/1988	3/21/1991	3/28/1991	4/4/1991	4/11/1991	9/12/1991	9/19/1991	9/26/1991	10/3/1991	4/16/1992	4/23/1992	4/30/1992	5/7/1992	9/24/1992
N-Nitroso-Di-N-Propylamine																		
N-Nitrosodiphenylamine																		
Pentachlorophenol																		
Phenanthrene																		
Phenol																		
Pyrene																		
PAHs (ug/L)																		
EPA SW8270D-SIM																		
Benzo(a)anthracene																		
Benzo(a)pyrene																		
Benzo(b)fluoranthene																		
Benzo(k)fluoranthene																		
Chrysene																		
Dibenz(a,h)anthracene																		
Indeno(1,2,3-cd)pyrene																		
TEQ																		
CONVENTIONALS (ug/L)																		
Total Cyanide																		
Fluoride																		
Oil and Grease																		
Total Organic Carbon (EPA 415.1 (b))																		
Ferrous Iron (SM3500FeD)																		

TABLE H-1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING ISAACSON SITE
TUKWILA, WASHINGTON

Location:	I-104																
Sample ID:	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104s
Laboratory ID:																	
Sample Date:	10/1/1992	10/8/1992	10/15/1992	4/8/1993	4/15/1993	4/22/1993	4/29/1993	10/15/1993	10/22/1993	10/29/1993	11/5/1993	4/14/1994	4/21/1994	4/28/1994	5/5/1994	12/28/1995	12/28/1995
TOTAL METALS (ug/L)																	
EPA 200.8/SW6010B/SW7470A (b)																	
Antimony																	
Arsenic																**360**	**360**
Barium																	
Cadmium																	
Chromium																	
Iron																	
Lead																	
Mercury																	
Selenium																	
Silver																	
Zinc																	
DISSOLVED METALS (ug/L)																	
EPA 200.8/SW6010B/SW7470A (b)																	
Antimony																	
Arsenic	**6**	**7**	**5**	**10**	**8**	**11**	**7**	**14**	**16**	**17**	**15**	**35**	**38**	**30**	**40**	**380**	**380**
Barium																	
Cadmium																	
Chromium																	
Copper																	
Iron																	
Lead																	
Manganese																	
Mercury																	
Nickel																	
Selenium																	
Zinc																	
PETROLEUM HYDROCARBONS (ug/L)																	
NWTPH-HCID																	
Diesel Range Organics																	
Gasoline Range Organics																	
Lube Oil																	
PCBs (ug/L)																	
EPA SW8082																	
Aroclor 1016																	
Aroclor 1221																	
Aroclor 1232																	
Aroclor 1242																	
Aroclor 1248																	
Aroclor 1254																	
Aroclor 1260																	
Total PCBs																	
VOLATILES (ug/L)																	
EPA SW8260B (b)																	
1,1,2,2-Tetrachloroethane																	
1,1,1-Trichloroethane																	
1,1,2,2-Tetrachloroethane																	
1,1,2-Trichloro-1,2,2-Trifluoroethane																	
1,1,2-Trichloroethane																	
1,1-Dichloroethane																	
1,1-Dichloroethene																	
1,2-Dichloroethene (total)																	
1,1-Dichloropropene																	
1,2,3-Trichlorobenzene																	
1,2,3-Trichloropropane																	
1,2,4-Trichlorobenzene																	
1,2,4-Trimethylbenzene																	
1,2-Dibromo-3-chloropropane																	

TABLE H-1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING ISAACSON SITE
TUKWILA, WASHINGTON

Location:	I-104																
Sample ID:	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104s
Laboratory ID:																	
Sample Date:	10/1/1992	10/8/1992	10/15/1992	4/8/1993	4/15/1993	4/22/1993	4/29/1993	10/15/1993	10/22/1993	10/29/1993	11/5/1993	4/14/1994	4/21/1994	4/28/1994	5/5/1994	12/28/1995	12/28/1995
1,2-Dichlorobenzene																	
1,2-Dichloroethane																	
1,2-Dichloropropane																	
1,3,5-Trimethylbenzene																	
1,3-Dichlorobenzene																	
1,3-Dichloropropane																	
1,4-Dichlorobenzene																	
2,2-Dichloropropane																	
2-Butanone																	
2-Chloroethylvinylether																	
2-Chlorotoluene																	
2-Hexanone																	
4-Chlorotoluene																	
4-Isopropyltoluene																	
4-Methyl-2-Pentanone (MIBK)																	
Acetone																	
Acrolein																	
Acrylonitrile																	
Benzene																	
Bromobenzene																	
Bromochloromethane																	
Bromodichloromethane																	
Bromoethane																	
Bromoform																	
Bromomethane																	
Carbon Disulfide																	
Carbon Tetrachloride																	
Chlorobenzene																	
Chloroethane																	
Chloroform																	
Chloromethane																	
cis-1,2-Dichloroethene																	
cis-1,3-Dichloropropene																	
Dibromochloromethane																	
Dibromomethane																	
Ethylbenzene																	
Ethylene Dibromide																	
Hexachlorobutadiene																	
Isopropylbenzene																	
m, p-Xylene																	
Methyl Iodide																	
Methylene Chloride																	
Naphthalene																	
n-Butylbenzene																	
n-Propylbenzene																	
o-Xylene																	
sec-Butylbenzene																	
Styrene																	
tert-Butylbenzene																	
Tetrachloroethene																	
Toluene																	
trans-1,2-Dichloroethene																	
trans-1,3-Dichloropropene																	
trans-1,4-Dichloro-2-butene																	
Total Xylenes																	
Trichloroethene																	
Trichlorofluoromethane																	
Vinyl Acetate																	
Vinyl Chloride																	

TABLE H-1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING ISAACSON SITE
TUKWILA, WASHINGTON

Location:	I-104																
Sample ID:	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104s
Laboratory ID:																	
Sample Date:	10/1/1992	10/8/1992	10/15/1992	4/8/1993	4/15/1993	4/22/1993	4/29/1993	10/15/1993	10/22/1993	10/29/1993	11/5/1993	4/14/1994	4/21/1994	4/28/1994	5/5/1994	12/28/1995	12/28/1995
SEMIVOLATILES (ug/L)																	
EPA SW8270D (b)																	
1,2,4-Trichlorobenzene																	
1,2-Dichlorobenzene																	
1,3-Dichlorobenzene																	
1,4-Dichlorobenzene																	
1-Methylnaphthalene																	
2,2'-Oxybis(1-Chloropropane)																	
2,4,5-Trichlorophenol																	
2,4,6-Trichlorophenol																	
2,4-Dichlorophenol																	
2,4-Dimethylphenol																	
2,4-Dinitrophenol																	
2,4-Dinitrotoluene																	
2,6-Dinitrotoluene																	
2-Chloronaphthalene																	
2-Chlorophenol																	
2-Methylnaphthalene																	
2-Methylphenol																	
2-Nitroaniline																	
2-Nitrophenol																	
3,3'-Dichlorobenzidine																	
3-Nitroaniline																	
4,6-Dinitro-2-Methylphenol																	
4-Bromophenyl-phenylether																	
4-Chloro-3-methylphenol																	
4-Chloroaniline																	
4-Chlorophenyl-phenylether																	
4-Methylphenol																	
4-Nitroaniline																	
4-Nitrophenol																	
Acenaphthene																	
Acenaphthylene																	
Anthracene																	
Benzo(a)anthracene																	
Benzo(a)pyrene																	
Benzo(b)fluoranthene																	
Benzo(g,h,i)perylene																	
Benzo(k)fluoranthene																	
Benzoic Acid																	
Benzyl Alcohol																	
bis(2-Chloroethoxy) Methane																	
Bis-(2-Chloroethyl) Ether																	
bis(2-Ethylhexyl)phthalate																	
Butylbenzylphthalate																	
Carbazole																	
Chrysene																	
Dibenz(a,h)anthracene																	
Dibenzofuran																	
Diethylphthalate																	
Dimethylphthalate																	
Di-n-Butylphthalate																	
Di-n-Octyl phthalate																	
Fluoranthene																	
Fluorene																	
Hexachlorobenzene																	
Hexachlorobutadiene																	
Hexachlorocyclopentadiene																	
Hexachloroethane																	
Indeno(1,2,3-cd)pyrene																	
Isophorone																	
Naphthalene																	
Nitrobenzene																	

TABLE H-1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING ISAACSON SITE
TUKWILA, WASHINGTON

Location:	I-104																
Sample ID:	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104	I-104s
Laboratory ID:																	
Sample Date:	10/1/1992	10/8/1992	10/15/1992	4/8/1993	4/15/1993	4/22/1993	4/29/1993	10/15/1993	10/22/1993	10/29/1993	11/5/1993	4/14/1994	4/21/1994	4/28/1994	5/5/1994	12/28/1995	12/28/1995
N-Nitroso-Di-N-Propylamine																	
N-Nitrosodiphenylamine																	
Pentachlorophenol																	
Phenanthrene																	
Phenol																	
Pyrene																	
PAHs (ug/L)																	
EPA SW8270D-SIM																	
Benzo(a)anthracene																	
Benzo(a)pyrene																	
Benzo(b)fluoranthene																	
Benzo(k)fluoranthene																	
Chrysene																	
Dibenz(a,h)anthracene																	
Indeno(1,2,3-cd)pyrene																	
TEQ																	
CONVENTIONALS (ug/L)																	
Total Cyanide																	
Fluoride																	
Oil and Grease																	
Total Organic Carbon (EPA 415.1 (b))																	
Ferrous Iron (SM3500FeD)																	

TABLE H-1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING ISAACSON SITE
TUKWILA, WASHINGTON

Location:	I-104									I-105				
								Dup of I-104						
Sample ID:	I-104	I-104s	I-104	I-104	I-104	I-104	I-104	I-1044	I-104	I-105	I-105	I-105	I-105	I-105s
Laboratory ID:						NB06A/NB06H	OK85B	OK85D	PC88B/PC88I					
Sample Date:	4/19/1996	4/19/1996	12/1/1999	8/24/2000	10/25/2000	6/16/2008	2/2/2009	2/2/2009	6/16/2009	12/1/1985	7/1/1986	8/1/1986	1/1/1987	2/1/1988
TOTAL METALS (ug/L)														
EPA 200.8/SW6010B/SW7470A (b)														
Antimony														
Arsenic	**330**	**330**		**1600**	**810**					**2400**	**1500**		**4300**	
Barium														
Cadmium														
Chromium														
Iron						**17,300**			**14,700**					
Lead														
Mercury														
Selenium														
Silver														
Zinc														
DISSOLVED METALS (ug/L)														
EPA 200.8/SW6010B/SW7470A (b)														
Antimony														
Arsenic	**330**	**330**	**160**	**1600**	**810**	**3640**	**2130**	**2270**	**1920**	**1200/2400 (a)**	**480**	**1500/480 (a)**	**4300**	**700**
Barium														**6**
Cadmium							2 U	2 U						2 U
Chromium							5 U	5 U						1 U
Copper							**13** J	**7** J						1 U
Iron														**3690**
Lead							1 U	1 U						1 U
Manganese														**490**
Mercury							0.1 U	0.1 U						**0.1**
Nickel														1 U
Selenium														10 U
Zinc							**20** J	**10** UJ						**3**
PETROLEUM HYDROCARBONS (ug/L)														
NWTPH-HCID														
Diesel Range Organics							630 U	630 U						
Gasoline Range Organics							250 U	250 U						
Lube Oil							630 U	630 U						
PCBs (ug/L)														
EPA SW8082														
Aroclor 1016							1 U	1 U						
Aroclor 1221							1 U	1 U						
Aroclor 1232							1 U	1 U						
Aroclor 1242							1 U	1 U						
Aroclor 1248							1 U	1 U						
Aroclor 1254							1 U	1 U						
Aroclor 1260							1 U	1 U						
Total PCBs							1 U	1 U						
VOLATILES (ug/L)														
EPA SW8260B (b)														
1,1,2,2-Tetrachloroethane							0.2 U	0.2 U						
1,1,1-Trichloroethane							0.2 U	0.2 U						ND
1,1,2,2-Tetrachloroethane							0.2 U	0.2 U						
1,1,2-Trichloro-1,2,2-Trifluoroethane							0.2 U	0.2 U						**0.5** J
1,1,2-Trichloroethane							0.2 U	0.2 U						
1,1-Dichloroethane							0.2 U	0.2 U						ND
1,1-Dichloroethene							0.2 U	0.2 U						ND
1,2-Dichloroethene (total)														**0.8** J
1,1-Dichloropropene							0.2 U	0.2 U						
1,2,3-Trichlorobenzene							0.5 U	0.5 U						
1,2,3-Trichloropropane							0.5 U	0.5 U						
1,2,4-Trichlorobenzene							0.5 U	0.5 U						
1,2,4-Trimethylbenzene							0.2 U	0.2 U						
1,2-Dibromo-3-chloropropane							0.5 U	0.5 U						

TABLE H-1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING ISAACSON SITE
TUKWILA, WASHINGTON

Location:	I-104									I-105				
								Dup of I-104						
Sample ID:	I-104	I-104s	I-104	I-104	I-104	I-104	I-104	I-1044	I-104	I-105	I-105	I-105	I-105	I-105s
Laboratory ID:						NB06A/NB06H	OK85B	OK85D	PC88B/PC88I					
Sample Date:	4/19/1996	4/19/1996	12/1/1999	8/24/2000	10/25/2000	6/16/2008	2/2/2009	2/2/2009	6/16/2009	12/1/1985	7/1/1986	8/1/1986	1/1/1987	2/1/1988
1,2-Dichlorobenzene							0.2 U	0.2 U						
1,2-Dichloroethane							0.2 U	0.2 U						
1,2-Dichloropropane							0.2 U	0.2 U						
1,3,5-Trimethylbenzene							0.2 U	0.2 U						
1,3-Dichlorobenzene							0.2 U	0.2 U						
1,3-Dichloropropane							0.2 U	0.2 U						
1,4-Dichlorobenzene							0.2 U	0.2 U						
2,2-Dichloropropane							0.2 U	0.2 U						
2-Butanone							2.5 U	2.5 U						ND
2-Chloroethylvinylether							1 U	1 U						
2-Chlorotoluene							0.2 U	0.2 U						
2-Hexanone							2.5 U	2.5 U						
4-Chlorotoluene							0.2 U	0.2 U						
4-Isopropyltoluene							0.2 U	0.2 U						
4-Methyl-2-Pentanone (MIBK)							2.5 U	2.5 U						
Acetone							**3.7**	**3.4**						ND
Acrolein							5 U	5 U						
Acrylonitrile							1 U	1 U						
Benzene							0.2 U	0.2 U						ND
Bromobenzene							0.2 U	0.2 U						
Bromochloromethane							0.2 U	0.2 U						
Bromodichloromethane							0.2 U	0.2 U						
Bromoethane							0.2 U	0.2 U						
Bromoform							0.2 U	0.2 U						
Bromomethane							0.5 U	0.5 U						
Carbon Disulfide							0.2 U	0.2 U						
Carbon Tetrachloride							0.2 U	0.2 U						
Chlorobenzene							0.2 U	0.2 U						
Chloroethane							0.2 U	0.2 U						
Chloroform							0.2 U	0.2 U						ND
Chloromethane							0.2 U	0.2 U						
cis-1,2-Dichloroethene							0.2 U	0.2 U						
cis-1,3-Dichloropropene							0.2 U	0.2 U						
Dibromochloromethane							0.2 U	0.2 U						
Dibromomethane							0.2 U	0.2 U						
Ethylbenzene							0.2 U	0.2 U						ND
Ethylene Dibromide							0.2 U	0.2 U						
Hexachlorobutadiene							0.5 U	0.5 U						
Isopropylbenzene							0.2 U	0.2 U						
m, p-Xylene							0.4 U	0.4 U						
Methyl Iodide							1 U	1 U						
Methylene Chloride							0.5 U	0.5 U						**0.6** BJ
Naphthalene							0.5 U	0.5 U						
n-Butylbenzene							0.2 U	0.2 U						
n-Propylbenzene							0.2 U	0.2 U						
o-Xylene							0.2 U	0.2 U						
sec-Butylbenzene							0.2 U	0.2 U						
Styrene							0.2 U	0.2 U						
tert-Butylbenzene							0.2 U	0.2 U						
Tetrachloroethene							0.2 U	0.2 U						ND
Toluene							0.2 U	0.2 U						ND
trans-1,2-Dichloroethene							0.2 U	0.2 U						
trans-1,3-Dichloropropene							0.2 U	0.2 U						
trans-1,4-Dichloro-2-butene							1 U	1 U						
Total Xylenes														ND
Trichloroethene							0.2 U	0.2 U						ND
Trichlorofluoromethane							0.2 U	0.2 U						
Vinyl Acetate							1 U	1 U						
Vinyl Chloride							**0.2**	0.2 U						ND

TABLE H-1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING ISAACSON SITE
TUKWILA, WASHINGTON

Location:	I-104										I-105				
Sample ID:	I-104	I-104s	I-104	I-104	I-104	I-104	I-104	Dup of I-104 I-1044	I-104		I-105	I-105	I-105	I-105	I-105s
Laboratory ID:						NB06A/NB06H	OK85B	OK85D	PC88B/PC88I						
Sample Date:	4/19/1996	4/19/1996	12/1/1999	8/24/2000	10/25/2000	6/16/2008	2/2/2009	2/2/2009	6/16/2009		12/1/1985	7/1/1986	8/1/1986	1/1/1987	2/1/1988
SEMIVOLATILES (ug/L)															
EPA SW8270D (b)															
1,2,4-Trichlorobenzene							1 U	1 U							
1,2-Dichlorobenzene							1 U	1 U							
1,3-Dichlorobenzene							1 U	1 U							
1,4-Dichlorobenzene							1 U	1 U							
1-Methylnaphthalene							1 U	1 U							
2,2'-Oxybis(1-Chloropropane)							1 U	1 U							
2,4,5-Trichlorophenol							5 U	5 U							
2,4,6-Trichlorophenol							5 U	5 U							
2,4-Dichlorophenol							5 U	5 U							
2,4-Dimethylphenol							1 U	1 U							
2,4-Dinitrophenol							10 U	10 U							
2,4-Dinitrotoluene							5 U	5 U							
2,6-Dinitrotoluene							5 U	5 U							
2-Chloronaphthalene							1 U	1 U							
2-Chlorophenol							1 U	1 U							
2-Methylnaphthalene							1 U	1 U							
2-Methylphenol							1 U	1 U							
2-Nitroaniline							5 U	5 U							
2-Nitrophenol							5 U	5 U							
3,3'-Dichlorobenzidine							5 U	5 U							
3-Nitroaniline							5 U	5 U							
4,6-Dinitro-2-Methylphenol							10 U	10 U							
4-Bromophenyl-phenylether							1 U	1 U							
4-Chloro-3-methylphenol							5 U	5 U							
4-Chloroaniline							5 U	5 U							
4-Chlorophenyl-phenylether							1 U	1 U							
4-Methylphenol							1 U	1 U							
4-Nitroaniline							5 U	5 U							
4-Nitrophenol							5 U	5 U							
Acenaphthene							1 U	1 U							
Acenaphthylene							1 U	1 U							
Anthracene							1 U	1 U							
Benzo(a)anthracene							1 U	1 U							
Benzo(a)pyrene							1 U	1 U							
Benzo(b)fluoranthene							1 U	1 U							
Benzo(g,h,i)perylene							1 U	1 U							
Benzo(k)fluoranthene							1 U	1 U							
Benzoic Acid							10 U	10 U							
Benzyl Alcohol							5 U	5 U							
bis(2-Chloroethoxy) Methane							1 U	1 U							
Bis-(2-Chloroethyl) Ether							1 U	1 U							
bis(2-Ethylhexyl)phthalate							1 U	1 U							
Butylbenzylphthalate							1 U	1 U							
Carbazole							1 U	1 U							
Chrysene							1 U	1 U							
Dibenz(a,h)anthracene							1 U	1 U							
Dibenzofuran							1 U	1 U							
Diethylphthalate							1 U	1 U							
Dimethylphthalate							1 U	1 U							
Di-n-Butylphthalate							1 U	1 U							
Di-n-Octyl phthalate							1 U	1 U							
Fluoranthene							1 U	1 U							
Fluorene							1 U	1 U							
Hexachlorobenzene							1 U	1 U							
Hexachlorobutadiene							1 U	1 U							
Hexachlorocyclopentadiene							5 U	5 U							
Hexachloroethane							1 U	1 U							
Indeno(1,2,3-cd)pyrene							1 U	1 U							
Isophorone							1 U	1 U							
Naphthalene							1 U	1 U							
Nitrobenzene							1 U	1 U							

TABLE H-1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING ISAACSON SITE
TUKWILA, WASHINGTON

Location:	I-104									I-105				
								Dup of I-104						
Sample ID:	I-104	I-104s	I-104	I-104	I-104	I-104	I-104	I-1044	I-104	I-105	I-105	I-105	I-105	I-105s
Laboratory ID:						NB06A/NB06H	OK85B	OK85D	PC88B/PC88I					
Sample Date:	4/19/1996	4/19/1996	12/1/1999	8/24/2000	10/25/2000	6/16/2008	2/2/2009	2/2/2009	6/16/2009	12/1/1985	7/1/1986	8/1/1986	1/1/1987	2/1/1988
N-Nitroso-Di-N-Propylamine							5 U	5 U						
N-Nitrosodiphenylamine							1 U	1 U						
Pentachlorophenol							5 U	5 U						
Phenanthrene							1 U	1 U						
Phenol							1 U	1 U						
Pyrene							1 U	1 U						
PAHs (ug/L)														
EPA SW8270D-SIM														
Benzo(a)anthracene							0.1 U	0.1 U						
Benzo(a)pyrene							0.1 U	0.1 U						
Benzo(b)fluoranthene							0.1 U	0.1 U						
Benzo(k)fluoranthene							0.1 U	0.1 U						
Chrysene							0.1 U	0.1 U						
Dibenz(a,h)anthracene							0.1 U	0.1 U						
Indeno(1,2,3-cd)pyrene							0.1 U	0.1 U						
TEQ							NA	NA						
CONVENTIONALS (ug/L)														
Total Cyanide														
Fluoride														
Oil and Grease														**36,290**
Total Organic Carbon (EPA 415.1 (b))						**16,300**			**12,400**					**11,600**
Ferrous Iron (SM3500FeD)						**16,200**			**14,800**					

TABLE H-1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING ISAACSON SITE
TUKWILA, WASHINGTON

Location:	I-200																	
Sample ID:	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s
Laboratory ID:																		
Sample Date:	2/1/1988	3/21/1991	3/28/1991	4/4/1991	4/11/1991	9/12/1991	9/19/1991	9/26/1991	10/3/1991	4/16/1992	4/23/1992	4/30/1992	5/7/1992	9/24/1992	10/1/1992	10/8/1992	10/15/1992	4/8/1993
TOTAL METALS (ug/L)																		
EPA 200.8/SW6010B/SW7470A (b)																		
Antimony																		
Arsenic																		
Barium																		
Cadmium																		
Chromium																		
Iron																		
Lead																		
Mercury																		
Selenium																		
Silver																		
Zinc																		
DISSOLVED METALS (ug/L)																		
EPA 200.8/SW6010B/SW7470A (b)																		
Antimony																		
Arsenic	**10**	**2**	**3**	**2**	**3**	**3**	**2**	**2**	**3**	1 U	1 U	1 U	1 U	**1** J	**1**	**1**	**1**	**2**
Barium																		
Cadmium																		
Chromium	1 U																	
Copper	**2**																	
Iron																		
Lead	1 U																	
Manganese																		
Mercury																		
Nickel	1 U																	
Selenium																		
Zinc	**2**																	
PETROLEUM HYDROCARBONS (ug/L)																		
NWTPH-HCID																		
Diesel Range Organics																		
Gasoline Range Organics																		
Lube Oil																		
PCBs (ug/L)																		
EPA SW8082																		
Aroclor 1016																		
Aroclor 1221																		
Aroclor 1232																		
Aroclor 1242																		
Aroclor 1248																		
Aroclor 1254																		
Aroclor 1260																		
Total PCBs																		
VOLATILES (ug/L)																		
EPA SW8260B (b)																		
1,1,2,2-Tetrachloroethane																		
1,1,1-Trichloroethane																		
1,1,2,2-Tetrachloroethane																		
1,1,2-Trichloro-1,2,2-Trifluoroethane																		
1,1,2-Trichloroethane																		
1,1-Dichloroethane																		
1,1-Dichloroethene																		
1,2-Dichloroethene (total)																		
1,1-Dichloropropene																		
1,2,3-Trichlorobenzene																		
1,2,3-Trichloropropane																		
1,2,4-Trichlorobenzene																		
1,2,4-Trimethylbenzene																		
1,2-Dibromo-3-chloropropane																		

TABLE H-1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING ISAACSON SITE
TUKWILA, WASHINGTON

Location:	I-200																	
Sample ID:	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s
Laboratory ID:																		
Sample Date:	2/1/1988	3/21/1991	3/28/1991	4/4/1991	4/11/1991	9/12/1991	9/19/1991	9/26/1991	10/3/1991	4/16/1992	4/23/1992	4/30/1992	5/7/1992	9/24/1992	10/1/1992	10/8/1992	10/15/1992	4/8/1993
1,2-Dichlorobenzene																		
1,2-Dichloroethane																		
1,2-Dichloropropane																		
1,3,5-Trimethylbenzene																		
1,3-Dichlorobenzene																		
1,3-Dichloropropane																		
1,4-Dichlorobenzene																		
2,2-Dichloropropane																		
2-Butanone																		
2-Chloroethylvinylether																		
2-Chlorotoluene																		
2-Hexanone																		
4-Chlorotoluene																		
4-Isopropyltoluene																		
4-Methyl-2-Pentanone (MIBK)																		
Acetone																		
Acrolein																		
Acrylonitrile																		
Benzene																		
Bromobenzene																		
Bromochloromethane																		
Bromodichloromethane																		
Bromoethane																		
Bromoform																		
Bromomethane																		
Carbon Disulfide																		
Carbon Tetrachloride																		
Chlorobenzene																		
Chloroethane																		
Chloroform																		
Chloromethane																		
cis-1,2-Dichloroethene																		
cis-1,3-Dichloropropene																		
Dibromochloromethane																		
Dibromomethane																		
Ethylbenzene																		
Ethylene Dibromide																		
Hexachlorobutadiene																		
Isopropylbenzene																		
m, p-Xylene																		
Methyl Iodide																		
Methylene Chloride																		
Naphthalene																		
n-Butylbenzene																		
n-Propylbenzene																		
o-Xylene																		
sec-Butylbenzene																		
Styrene																		
tert-Butylbenzene																		
Tetrachloroethene																		
Toluene																		
trans-1,2-Dichloroethene																		
trans-1,3-Dichloropropene																		
trans-1,4-Dichloro-2-butene																		
Total Xylenes																		
Trichloroethene																		
Trichlorofluoromethane																		
Vinyl Acetate																		
Vinyl Chloride																		

TABLE H-1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING ISAACSON SITE
TUKWILA, WASHINGTON

Location:	I-200																	
Sample ID:	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s
Laboratory ID:																		
Sample Date:	2/1/1988	3/21/1991	3/28/1991	4/4/1991	4/11/1991	9/12/1991	9/19/1991	9/26/1991	10/3/1991	4/16/1992	4/23/1992	4/30/1992	5/7/1992	9/24/1992	10/1/1992	10/8/1992	10/15/1992	4/8/1993
SEMIVOLATILES (ug/L)																		
EPA SW8270D (b)																		
1,2,4-Trichlorobenzene																		
1,2-Dichlorobenzene																		
1,3-Dichlorobenzene																		
1,4-Dichlorobenzene																		
1-Methylnaphthalene																		
2,2'-Oxybis(1-Chloropropane)																		
2,4,5-Trichlorophenol																		
2,4,6-Trichlorophenol																		
2,4-Dichlorophenol																		
2,4-Dimethylphenol																		
2,4-Dinitrophenol																		
2,4-Dinitrotoluene																		
2,6-Dinitrotoluene																		
2-Chloronaphthalene																		
2-Chlorophenol																		
2-Methylnaphthalene																		
2-Methylphenol																		
2-Nitroaniline																		
2-Nitrophenol																		
3,3'-Dichlorobenzidine																		
3-Nitroaniline																		
4,6-Dinitro-2-Methylphenol																		
4-Bromophenyl-phenylether																		
4-Chloro-3-methylphenol																		
4-Chloroaniline																		
4-Chlorophenyl-phenylether																		
4-Methylphenol																		
4-Nitroaniline																		
4-Nitrophenol																		
Acenaphthene																		
Acenaphthylene																		
Anthracene																		
Benzo(a)anthracene																		
Benzo(a)pyrene																		
Benzo(b)fluoranthene																		
Benzo(g,h,i)perylene																		
Benzo(k)fluoranthene																		
Benzoic Acid																		
Benzyl Alcohol																		
bis(2-Chloroethoxy) Methane																		
Bis-(2-Chloroethyl) Ether																		
bis(2-Ethylhexyl)phthalate																		
Butylbenzylphthalate																		
Carbazole																		
Chrysene																		
Dibenz(a,h)anthracene																		
Dibenzofuran																		
Diethylphthalate																		
Dimethylphthalate																		
Di-n-Butylphthalate																		
Di-n-Octyl phthalate																		
Fluoranthene																		
Fluorene																		
Hexachlorobenzene																		
Hexachlorobutadiene																		
Hexachlorocyclopentadiene																		
Hexachloroethane																		
Indeno(1,2,3-cd)pyrene																		
Isophorone																		
Naphthalene																		
Nitrobenzene																		

TABLE H-1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING ISAACSON SITE
TUKWILA, WASHINGTON

Location:	I-200																	
Sample ID:	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s
Laboratory ID:																		
Sample Date:	2/1/1988	3/21/1991	3/28/1991	4/4/1991	4/11/1991	9/12/1991	9/19/1991	9/26/1991	10/3/1991	4/16/1992	4/23/1992	4/30/1992	5/7/1992	9/24/1992	10/1/1992	10/8/1992	10/15/1992	4/8/1993
N-Nitroso-Di-N-Propylamine																		
N-Nitrosodiphenylamine																		
Pentachlorophenol																		
Phenanthrene																		
Phenol																		
Pyrene																		
PAHs (ug/L)																		
EPA SW8270D-SIM																		
Benzo(a)anthracene																		
Benzo(a)pyrene																		
Benzo(b)fluoranthene																		
Benzo(k)fluoranthene																		
Chrysene																		
Dibenz(a,h)anthracene																		
Indeno(1,2,3-cd)pyrene																		
TEQ																		
CONVENTIONALS (ug/L)																		
Total Cyanide																		
Fluoride																		
Oil and Grease																		
Total Organic Carbon (EPA 415.1 (b))																		
Ferrous Iron (SM3500FeD)																		

TABLE H-1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING ISAACSON SITE
TUKWILA, WASHINGTON

Location:	I-200																
Sample ID:	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200
Laboratory ID:																	NB15A/NB15C
Sample Date:	4/15/1993	4/22/1993	4/29/1993	10/15/1993	10/22/1993	10/29/1993	11/5/1993	4/14/1994	4/21/1994	4/28/1994	5/5/1994	12/28/1995	4/19/1996	12/1/1999	8/24/2000	10/25/2000	6/17/2008
TOTAL METALS (ug/L)																	
EPA 200.8/SW6010B/SW7470A (b)																	
Antimony																	
Arsenic												**15**	**13**		**3**	**2.7**	
Barium																	
Cadmium																	
Chromium																	
Iron																	**6630**
Lead																	
Mercury																	
Selenium																	
Silver																	
Zinc																	
DISSOLVED METALS (ug/L)																	
EPA 200.8/SW6010B/SW7470A (b)																	
Antimony																	
Arsenic	**1**	**2**	**1**	**2**	**1**	1 U	1 U	1 U	**1**	**1**	1 U	**2**	**2**	**2**	**3**	**2.7**	**0.7**
Barium																	
Cadmium																	
Chromium																	
Copper																	
Iron																	
Lead																	
Manganese																	
Mercury																	
Nickel																	
Selenium																	
Zinc																	
PETROLEUM HYDROCARBONS (ug/L)																	
NWTPH-HCID																	
Diesel Range Organics																	
Gasoline Range Organics																	
Lube Oil																	
PCBs (ug/L)																	
EPA SW8082																	
Aroclor 1016																	
Aroclor 1221																	
Aroclor 1232																	
Aroclor 1242																	
Aroclor 1248																	
Aroclor 1254																	
Aroclor 1260																	
Total PCBs																	
VOLATILES (ug/L)																	
EPA SW8260B (b)																	
1,1,2,2-Tetrachloroethane																	
1,1,1-Trichloroethane																	
1,1,2,2-Tetrachloroethane																	
1,1,2-Trichloro-1,2,2-Trifluoroethane																	
1,1,2-Trichloroethane																	
1,1-Dichloroethane																	
1,1-Dichloroethene																	
1,2-Dichloroethene (total)																	
1,1-Dichloropropene																	
1,2,3-Trichlorobenzene																	
1,2,3-Trichloropropane																	
1,2,4-Trichlorobenzene																	
1,2,4-Trimethylbenzene																	
1,2-Dibromo-3-chloropropane																	

TABLE H-1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING ISAACSON SITE
TUKWILA, WASHINGTON

Location:	I-200																
Sample ID:	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200
Laboratory ID:																	NB15A/NB15C
Sample Date:	4/15/1993	4/22/1993	4/29/1993	10/15/1993	10/22/1993	10/29/1993	11/5/1993	4/14/1994	4/21/1994	4/28/1994	5/5/1994	12/28/1995	4/19/1996	12/1/1999	8/24/2000	10/25/2000	6/17/2008
1,2-Dichlorobenzene																	
1,2-Dichloroethane																	
1,2-Dichloropropane																	
1,3,5-Trimethylbenzene																	
1,3-Dichlorobenzene																	
1,3-Dichloropropane																	
1,4-Dichlorobenzene																	
2,2-Dichloropropane																	
2-Butanone																	
2-Chloroethylvinylether																	
2-Chlorotoluene																	
2-Hexanone																	
4-Chlorotoluene																	
4-Isopropyltoluene																	
4-Methyl-2-Pentanone (MIBK)																	
Acetone																	
Acrolein																	
Acrylonitrile																	
Benzene																	
Bromobenzene																	
Bromochloromethane																	
Bromodichloromethane																	
Bromoethane																	
Bromoform																	
Bromomethane																	
Carbon Disulfide																	
Carbon Tetrachloride																	
Chlorobenzene																	
Chloroethane																	
Chloroform																	
Chloromethane																	
cis-1,2-Dichloroethene																	
cis-1,3-Dichloropropene																	
Dibromochloromethane																	
Dibromomethane																	
Ethylbenzene																	
Ethylene Dibromide																	
Hexachlorobutadiene																	
Isopropylbenzene																	
m, p-Xylene																	
Methyl Iodide																	
Methylene Chloride																	
Naphthalene																	
n-Butylbenzene																	
n-Propylbenzene																	
o-Xylene																	
sec-Butylbenzene																	
Styrene																	
tert-Butylbenzene																	
Tetrachloroethene																	
Toluene																	
trans-1,2-Dichloroethene																	
trans-1,3-Dichloropropene																	
trans-1,4-Dichloro-2-butene																	
Total Xylenes																	
Trichloroethene																	
Trichlorofluoromethane																	
Vinyl Acetate																	
Vinyl Chloride																	

TABLE H-1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING ISAACSON SITE
TUKWILA, WASHINGTON

Location:	I-200																
Sample ID:	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200
Laboratory ID:																	NB15A/NB15C
Sample Date:	4/15/1993	4/22/1993	4/29/1993	10/15/1993	10/22/1993	10/29/1993	11/5/1993	4/14/1994	4/21/1994	4/28/1994	5/5/1994	12/28/1995	4/19/1996	12/1/1999	8/24/2000	10/25/2000	6/17/2008
SEMIVOLATILES (ug/L)																	
EPA SW8270D (b)																	
1,2,4-Trichlorobenzene																	
1,2-Dichlorobenzene																	
1,3-Dichlorobenzene																	
1,4-Dichlorobenzene																	
1-Methylnaphthalene																	
2,2'-Oxybis(1-Chloropropane)																	
2,4,5-Trichlorophenol																	
2,4,6-Trichlorophenol																	
2,4-Dichlorophenol																	
2,4-Dimethylphenol																	
2,4-Dinitrophenol																	
2,4-Dinitrotoluene																	
2,6-Dinitrotoluene																	
2-Chloronaphthalene																	
2-Chlorophenol																	
2-Methylnaphthalene																	
2-Methylphenol																	
2-Nitroaniline																	
2-Nitrophenol																	
3,3'-Dichlorobenzidine																	
3-Nitroaniline																	
4,6-Dinitro-2-Methylphenol																	
4-Bromophenyl-phenylether																	
4-Chloro-3-methylphenol																	
4-Chloroaniline																	
4-Chlorophenyl-phenylether																	
4-Methylphenol																	
4-Nitroaniline																	
4-Nitrophenol																	
Acenaphthene																	
Acenaphthylene																	
Anthracene																	
Benzo(a)anthracene																	
Benzo(a)pyrene																	
Benzo(b)fluoranthene																	
Benzo(g,h,i)perylene																	
Benzo(k)fluoranthene																	
Benzoic Acid																	
Benzyl Alcohol																	
bis(2-Chloroethoxy) Methane																	
Bis-(2-Chloroethyl) Ether																	
bis(2-Ethylhexyl)phthalate																	
Butylbenzylphthalate																	
Carbazole																	
Chrysene																	
Dibenz(a,h)anthracene																	
Dibenzofuran																	
Diethylphthalate																	
Dimethylphthalate																	
Di-n-Butylphthalate																	
Di-n-Octyl phthalate																	
Fluoranthene																	
Fluorene																	
Hexachlorobenzene																	
Hexachlorobutadiene																	
Hexachlorocyclopentadiene																	
Hexachloroethane																	
Indeno(1,2,3-cd)pyrene																	
Isophorone																	
Naphthalene																	
Nitrobenzene																	

TABLE H-1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING ISAACSON SITE
TUKWILA, WASHINGTON

Location:	I-200																
Sample ID:	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200s	I-200
Laboratory ID:																	NB15A/NB15C
Sample Date:	4/15/1993	4/22/1993	4/29/1993	10/15/1993	10/22/1993	10/29/1993	11/5/1993	4/14/1994	4/21/1994	4/28/1994	5/5/1994	12/28/1995	4/19/1996	12/1/1999	8/24/2000	10/25/2000	6/17/2008
N-Nitroso-Di-N-Propylamine																	
N-Nitrosodiphenylamine																	
Pentachlorophenol																	
Phenanthrene																	
Phenol																	
Pyrene																	
PAHs (ug/L)																	
EPA SW8270D-SIM																	
Benzo(a)anthracene																	
Benzo(a)pyrene																	
Benzo(b)fluoranthene																	
Benzo(k)fluoranthene																	
Chrysene																	
Dibenz(a,h)anthracene																	
Indeno(1,2,3-cd)pyrene																	
TEQ																	
CONVENTIONALS (ug/L)																	
Total Cyanide																	
Fluoride																	
Oil and Grease																	
Total Organic Carbon (EPA 415.1 (b))																	1500 U
Ferrous Iron (SM3500FeD)																	**4930**

TABLE H-1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING ISAACSON SITE
TUKWILA, WASHINGTON

Location:	I-200		I-201s	IDP-9	IDP-1A	IDP-2	IDP-3	IDP-4	IDP-5	IDP-6	IDP-8	IDP-12	IDP-14	PZ-1	PZ-3
Sample ID:	I-200	I-200	I-201s	IDP-9-GW	IDP-1A-GW	IDP-2-GW	IDP-3-GW	IDP-4-GW	IDP-5-GW	IDP-6-GW	IDP-8-GW	IDP-12-GW	IDP-14-GW	PZ-1	PZ-3
Laboratory ID:	OL24C	PC88A/PC88H		OL03L	OK85E	OK85F	OK85G	OK85H	OK85I	OK85J	OL03K	OL03M	OL03N	OK85C	OL24B
Sample Date:	2/4/2009	6/16/2009	2/1/1988	2/3/2009	2/2/2009	2/2/2009	2/2/2009	2/2/2009	2/2/2009	2/2/2009	2/3/2009	2/3/2009	2/3/2009	2/2/2009	2/4/2009
TOTAL METALS (ug/L)															
EPA 200.8/SW6010B/SW7470A (b)															
Antimony															
Arsenic															
Barium															
Cadmium															
Chromium															
Iron		**5890**													
Lead															
Mercury															
Selenium															
Silver															
Zinc															
DISSOLVED METALS (ug/L)															
EPA 200.8/SW6010B/SW7470A (b)															
Antimony															
Arsenic	**0.8**	**0.5**	**15,000**	0.5 U	**77.7**	**24.4**	**12**	**2360**	**1610**	**346**	**13,600**	**13**	**16,600**	**7.1**	**11.7**
Barium															
Cadmium	2 U			2 U							10 U	2 U	10 U	2 U	2 U
Chromium	5 U		**2**	5 U							20 U	5 U	20 U	5 U	5 U
Copper	2 U		**25**	**6**							10 U	**6**	**20**	**17**	2 U
Iron															
Lead	1 U		1 U	1 U							**1**	1 U	1 U	1 U	1 U
Manganese															
Mercury	0.1 U			0.1 U							0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel			1 U												
Selenium															
Zinc	10 U		**52**	10 U							50 U	**40**	50 U	**240**	10
PETROLEUM HYDROCARBONS (ug/L)															
NWTPH-HCID	630 U														
Diesel Range Organics	250 U			630 U							630 U	630 U	630 U	630 U	630 U
Gasoline Range Organics	630 U			250 U							250 U	250 U	250 U	250 U	250 U
Lube Oil				630 U							630 U	630 U	630 U	630 U	630 U
PCBs (ug/L)															
EPA SW8082															
Aroclor 1016	1 U			1 U							1 U	1 U	1 U	1 U	1 U
Aroclor 1221	1 U			1 U							1 U	1 U	1 U	1 U	1 U
Aroclor 1232	1 U			1 U							1 U	1 U	1 U	1 U	1 U
Aroclor 1242	1 U			1 U							1 U	1 U	1 U	1 U	1 U
Aroclor 1248	1 U			1 U							1 U	1 U	1 U	1 U	1 U
Aroclor 1254	1 U			1 U							1 U	1 U	1 U	1 U	1 U
Aroclor 1260	1 U			1 U							1 U	1 U	1 U	1 U	1 U
Total PCBs	1 U			1 U							1 U	1 U	1 U	1 U	1 U
VOLATILES (ug/L)															
EPA SW8260B (b)															
1,1,2,2-Tetrachloroethane	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,1,1-Trichloroethane	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,1,2,2-Tetrachloroethane	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,1,2-Trichloroethane	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,1-Dichloroethane	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,1-Dichloroethene	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2-Dichloroethene (total)															
1,1-Dichloropropene	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2,3-Trichlorobenzene	0.5 U			0.5 U							0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,3-Trichloropropane	0.5 U			0.5 U							0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-Trichlorobenzene	0.5 U			0.5 U							0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
1,2,4-Trimethylbenzene	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2-Dibromo-3-chloropropane	0.5 U			0.5 U							0.5 U	0.5 U	0.5 U	0.5 U	0.5 U

TABLE H-1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING ISAACSON SITE
TUKWILA, WASHINGTON

Location:	I-200		I-201s	IDP-9	IDP-1A	IDP-2	IDP-3	IDP-4	IDP-5	IDP-6	IDP-8	IDP-12	IDP-14	PZ-1	PZ-3
Sample ID:	I-200	I-200	I-201s	IDP-9-GW	IDP-1A-GW	IDP-2-GW	IDP-3-GW	IDP-4-GW	IDP-5-GW	IDP-6-GW	IDP-8-GW	IDP-12-GW	IDP-14-GW	PZ-1	PZ-3
Laboratory ID:	OL24C	PC88A/PC88H		OL03L	OK85E	OK85F	OK85G	OK85H	OK85I	OK85J	OL03K	OL03M	OL03N	OK85C	OL24B
Sample Date:	2/4/2009	6/16/2009	2/1/1988	2/3/2009	2/2/2009	2/2/2009	2/2/2009	2/2/2009	2/2/2009	2/2/2009	2/3/2009	2/3/2009	2/3/2009	2/2/2009	2/4/2009
1,2-Dichlorobenzene	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2-Dichloroethane	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2-Dichloropropane	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,3,5-Trimethylbenzene	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,3-Dichlorobenzene	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,3-Dichloropropane	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,4-Dichlorobenzene	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
2,2-Dichloropropane	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
2-Butanone	2.5 U			2.5 U							2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
2-Chloroethylvinylether	1 U			1 U							1 U	1 U	1 U	1 U	1 U
2-Chlorotoluene	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
2-Hexanone	2.5 U			2.5 U							2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
4-Chlorotoluene	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
4-Isopropyltoluene	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
4-Methyl-2-Pentanone (MIBK)	2.5 U			2.5 U							2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Acetone	**11**			2.5 U							2.5 U	2.5 U	2.5 U	3 U	**7.1**
Acrolein	5 U			5 U							5 U	5 U	5 U	5 U	5 U
Acrylonitrile	1 U			1 U							1 U	1 U	1 U	1 U	1 U
Benzene	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Bromobenzene	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Bromochloromethane	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Bromodichloromethane	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Bromoethane	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Bromoform	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Bromomethane	0.5 U			0.5 U							0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon Disulfide	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Carbon Tetrachloride	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Chlorobenzene	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Chloroethane	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Chloroform	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Chloromethane	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
cis-1,2-Dichloroethene	0.2 U			0.2 U							**0.5**	0.2 U	0.2 U	0.2 U	0.2 U
cis-1,3-Dichloropropene	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Dibromochloromethane	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Dibromomethane	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Ethylbenzene	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Ethylene Dibromide	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Hexachlorobutadiene	0.5 U			0.5 U							0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Isopropylbenzene	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
m, p-Xylene	0.4 U			0.4 U							0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Methyl Iodide	1 U			1 U							1 U	1 U	1 U	1 U	1 U
Methylene Chloride	0.5 U			0.5 U							0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Naphthalene	0.5 U			0.5 U							0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
n-Butylbenzene	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
n-Propylbenzene	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
o-Xylene	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
sec-Butylbenzene	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Styrene	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
tert-Butylbenzene	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Tetrachloroethene	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Toluene	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
trans-1,2-Dichloroethene	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
trans-1,3-Dichloropropene	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
trans-1,4-Dichloro-2-butene	1 U			1 U							1 U	1 U	1 U	1 U	1 U
Total Xylenes															
Trichloroethene	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Trichlorofluoromethane	0.2 U			0.2 U							0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Vinyl Acetate	1 U			1 U							1 U	1 U	1 U	1 U	1 U
Vinyl Chloride	0.2 U			0.2 U							**0.2**	0.2 U	0.2 U	0.2 U	0.2 U

TABLE H-1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING ISAACSON SITE
TUKWILA, WASHINGTON

Location:	I-200		I-201s	IDP-9	IDP-1A	IDP-2	IDP-3	IDP-4	IDP-5	IDP-6	IDP-8	IDP-12	IDP-14	PZ-1	PZ-3
Sample ID:	I-200	I-200	I-201s	IDP-9-GW	IDP-1A-GW	IDP-2-GW	IDP-3-GW	IDP-4-GW	IDP-5-GW	IDP-6-GW	IDP-8-GW	IDP-12-GW	IDP-14-GW	PZ-1	PZ-3
Laboratory ID:	OL24C	PC88A/PC88H		OL03L	OK85E	OK85F	OK85G	OK85H	OK85I	OK85J	OL03K	OL03M	OL03N	OK85C	OL24B
Sample Date:	2/4/2009	6/16/2009	2/1/1988	2/3/2009	2/2/2009	2/2/2009	2/2/2009	2/2/2009	2/2/2009	2/2/2009	2/3/2009	2/3/2009	2/3/2009	2/2/2009	2/4/2009
SEMIVOLATILES (ug/L)															
EPA SW8270D (b)															
1,2,4-Trichlorobenzene	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
1,2-Dichlorobenzene	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
1,3-Dichlorobenzene	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
1,4-Dichlorobenzene	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
1-Methylnaphthalene	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
2,2'-Oxybis(1-Chloropropane)	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
2,4,5-Trichlorophenol	5 U			5 UJ							5 UJ	5 UJ	5 UJ	5 U	5 U
2,4,6-Trichlorophenol	5 U			5 UJ							5 UJ	5 UJ	5 UJ	5 U	5 U
2,4-Dichlorophenol	5 U			5 UJ							5 UJ	5 UJ	5 UJ	5 U	5 U
2,4-Dimethylphenol	1 U			1 UJ							1 UJ	1 UJ	1 UJ	1 U	1 U
2,4-Dinitrophenol	10 U			10 UJ							10 UJ	10 UJ	10 UJ	10 U	10 U
2,4-Dinitrotoluene	5 U			5 U							5 UJ	5 UJ	5 U	5 U	5 U
2,6-Dinitrotoluene	5 U			5 U							5 UJ	5 UJ	5 U	5 U	5 U
2-Chloronaphthalene	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
2-Chlorophenol	1 U			1 UJ							1 UJ	1 UJ	1 UJ	1 U	1 U
2-Methylnaphthalene	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
2-Methylphenol	1 U			1 UJ							1 UJ	1 UJ	1 UJ	1 U	1 U
2-Nitroaniline	5 U			5 U							5 UJ	5 UJ	5 U	5 U	5 U
2-Nitrophenol	5 U			5 UJ							5 UJ	5 UJ	5 UJ	5 U	5 U
3,3'-Dichlorobenzidine	5 U			5 U							5 UJ	5 UJ	5 U	5 U	5 U
3-Nitroaniline	5 U			5 U							5 UJ	5 UJ	5 U	5 U	5 U
4,6-Dinitro-2-Methylphenol	10 U			10 UJ							10 UJ	10 UJ	10 UJ	10 U	10 U
4-Bromophenyl-phenylether	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
4-Chloro-3-methylphenol	5 U			5 UJ							5 UJ	5 UJ	5 UJ	5 U	5 U
4-Chloroaniline	5 U			5 U							5 UJ	5 UJ	5 U	5 U	5 U
4-Chlorophenyl-phenylether	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
4-Methylphenol	1 U			1 UJ							1 UJ	1 UJ	1 UJ	1 U	1 U
4-Nitroaniline	5 U			5 U							5 UJ	5 UJ	5 U	5 U	5 U
4-Nitrophenol	5 UJ			5 UJ							5 UJ	5 UJ	5 UJ	5 U	5 UJ
Acenaphthene	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
Acenaphthylene	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
Anthracene	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
Benzo(a)anthracene	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
Benzo(a)pyrene	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
Benzo(b)fluoranthene	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
Benzo(g,h,i)perylene	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
Benzo(k)fluoranthene	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
Benzoic Acid	10 U			10 UJ							10 UJ	10 UJ	10 UJ	10 U	10 U
Benzyl Alcohol	5 U			5 U							5 UJ	5 UJ	5 U	5 U	5 U
bis(2-Chloroethoxy) Methane	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
Bis-(2-Chloroethyl) Ether	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
bis(2-Ethylhexyl)phthalate	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
Butylbenzylphthalate	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
Carbazole	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
Chrysene	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
Dibenz(a,h)anthracene	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
Dibenzofuran	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
Diethylphthalate	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
Dimethylphthalate	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
Di-n-Butylphthalate	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
Di-n-Octyl phthalate	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
Fluoranthene	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
Fluorene	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
Hexachlorobenzene	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
Hexachlorobutadiene	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
Hexachlorocyclopentadiene	5 U			5 U							5 UJ	5 UJ	5 U	5 U	5 U
Hexachloroethane	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
Indeno(1,2,3-cd)pyrene	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
Isophorone	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
Naphthalene	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
Nitrobenzene	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U

TABLE H-1
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING ISAACSON SITE
TUKWILA, WASHINGTON

Location:	I-200		I-201s	IDP-9	IDP-1A	IDP-2	IDP-3	IDP-4	IDP-5	IDP-6	IDP-8	IDP-12	IDP-14	PZ-1	PZ-3
Sample ID:	I-200	I-200	I-201s	IDP-9-GW	IDP-1A-GW	IDP-2-GW	IDP-3-GW	IDP-4-GW	IDP-5-GW	IDP-6-GW	IDP-8-GW	IDP-12-GW	IDP-14-GW	PZ-1	PZ-3
Laboratory ID:	OL24C	PC88A/PC88H		OL03L	OK85E	OK85F	OK85G	OK85H	OK85I	OK85J	OL03K	OL03M	OL03N	OK85C	OL24B
Sample Date:	2/4/2009	6/16/2009	2/1/1988	2/3/2009	2/2/2009	2/2/2009	2/2/2009	2/2/2009	2/2/2009	2/2/2009	2/3/2009	2/3/2009	2/3/2009	2/2/2009	2/4/2009
N-Nitroso-Di-N-Propylamine	5 U			5 U							5 UJ	5 UJ	5 U	5 U	5 U
N-Nitrosodiphenylamine	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
Pentachlorophenol	5 U			5 UJ							5 UJ	5 UJ	5 UJ	5 U	5 U
Phenanthrene	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
Phenol	1 UJ			1 UJ							1 UJ	1 UJ	1 UJ	1 U	1 UJ
Pyrene	1 U			1 U							1 UJ	1 UJ	1 U	1 U	1 U
PAHs (ug/L)															
EPA SW8270D-SIM															
Benzo(a)anthracene	0.1 U			0.1 U							0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Benzo(a)pyrene	0.1 U			0.1 U							0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Benzo(b)fluoranthene	0.1 U			0.1 U							0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Benzo(k)fluoranthene	0.1 U			0.1 U							0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Chrysene	0.1 U			0.1 U							0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Dibenz(a,h)anthracene	0.1 U			0.1 U							0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Indeno(1,2,3-cd)pyrene	0.1 U			0.1 U							0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
TEQ	NA			NA							NA	NA	NA	NA	NA
CONVENTIONALS (ug/L)															
Total Cyanide															
Fluoride															
Oil and Grease															
Total Organic Carbon (EPA 415.1 (b))		1500 U													
Ferrous Iron (SM3500FeD)		**4180**													

B = Method blank contamination.
M = Indicates an estimated value of analyte found and confirmed by analyst but with low spectral match
ND = Not detected.
J = Indicates the analyte was positively identified; the associated numerical value is the
approximate concentration of the analyte in the sample
UJ = The analyte was not detected in the sample; the reported sample reporting limit is an estimate
U = Indicates the compound was undetected at the reported concentration
Bold = Detected compound.

(a) = Historical sample appears to have been analyzed multiple times.
(b) = Analytical method was not always listed with historical sample results

Note: Results listed account for all historical analyses completed in site area as discussed in report text

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	B-7			B-20						HP-1	HP-2	HP-3	HP-4	HP-5	HP-6
					Dup of B-20		Dup of B-20								
Sample ID:	B-7	B-7	B-7	B-20	B-20-Dup	B-20	B-20-Dup	B-20	B-20	HP-1	HP-2	HP-3	HP-4	HP-5	HP-6
Laboratory ID:															
Sample Date:	8/1/1983	10/1/1983	12/1/1983	8/1/1983	8/1/1983	10/1/1983	10/1/1983	12/1/1983	2/1/1988	4/19/1996	4/19/1996	4/19/1996	4/19/1996	4/19/1996	4/19/1996
TOTAL METALS (ug/L)															
EPA 200.8/SW6010B/SW7470A (a)															
Antimony				**41**	**8**										
Arsenic	**28**			**300**	**310**					**120**	**370**	**570**	**510**	**130**	**110**
Barium	**390**			**360**	**260**										
Cadmium	2 U			**3.6**	2 U										
Chromium	**20**			**130**	**31**										
Copper															
Iron															
Lead	**95**			**17**	**38**										
Manganese															
Mercury	1 U			0.2 U	1 U										
Nickel	**10**														
Selenium				**4**	5 U										
Silver	10 U			**8.1**	**2**										
Zinc	**110**														
DISSOLVED METALS (ug/L)															
EPA 200.8/SW6010B/SW7470A (a)															
Arsenic		**53**	**20**			**56**	**81**	**140**	**100**	**71**	**650**	**660**	**390**	**70**	**66**
Barium															
Cadmium									2 U						
Chromium		5 U	**29**			5 U	**41.6**	**30**	**3**						
Copper		**5**	**11**			60	**34**	**13**	**7**						
Iron															
Lead		**2**	5 U			30	**2**	5 U	**3**						
Manganese															
Mercury									0.1 U						
Nickel		10 U	**40**			30 U	**5**	**40**	40 U						
Selenium															
Silver									2 U						
Zinc		**27**	**26**			30 U	**27**	**25**	**17**						
PETROLEUM HYDROCARBONS (ug/L)															
NWTPH-HCID															
Diesel Range Organics															
Gasoline Range Organics															
Lube Oil															
NWTPH-Dx															
Diesel Range Organics															
Lube Oil															
PCBs (ug/L)															
EPA SW8082															
Aroclor 1016															
Aroclor 1221															
Aroclor 1232															
Aroclor 1242															
Aroclor 1248															
Aroclor 1254															
Aroclor 1260															
Total PCBs															
VOLATILES (ug/L)															
EPA SW8260B (a)															
1,1,2,2-Tetrachloroethane															
1,1,1-Trichloroethane									ND						
1,1,2,2-Tetrachloroethane															
1,1,2-Trichloro-1,2,2-Trifluoroethane									ND						
1,1,2-Trichloroethane															
1,1-Dichloroethane									ND						

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	B-7			B-20						HP-1	HP-2	HP-3	HP-4	HP-5	HP-6
					Dup of B-20		Dup of B-20								
Sample ID:	B-7	B-7	B-7	B-20	B-20-Dup	B-20	B-20-Dup	B-20	B-20	HP-1	HP-2	HP-3	HP-4	HP-5	HP-6
Laboratory ID:															
Sample Date:	8/1/1983	10/1/1983	12/1/1983	8/1/1983	8/1/1983	10/1/1983	10/1/1983	12/1/1983	2/1/1988	4/19/1996	4/19/1996	4/19/1996	4/19/1996	4/19/1996	4/19/1996
1,1-Dichloroethene									ND						
1,2-Dichloroethane															
1,2-Dichloroethene (total)									ND						
1,1-Dichloropropene															
1,2-Dichloropropane															
1,2,3-Trichlorobenzene															
1,2,3-Trichloropropane															
1,2,4-Trichlorobenzene															
1,2,4-Trimethylbenzene															
1,2-Dibromo-3-chloropropane															
1,2-Dichlorobenzene															
1,2-Dichloroethane															
1,2-Dichloropropane															
1,3,5-Trimethylbenzene															
1,3-Dichlorobenzene															
1,3-Dichloropropane															
1,4-Dichlorobenzene															
2,2-Dichloropropane															
2-Butanone									ND						
2-Chloroethylvinylether															
2-Chlorotoluene															
2-Hexanone															
4-Chlorotoluene															
4-Isopropyltoluene															
4-Methyl-2-Pentanone (MIBK)															
Acetone									**2** BJ						
Acrolein															
Acrylonitrile															
Benzene									ND						
Bromobenzene															
Bromochloromethane															
Bromodichloromethane															
Bromoethane															
Bromoform															
Bromomethane															
Carbon Disulfide															
Carbon Tetrachloride															
Chlorobenzene															
Chloroethane															
Chloroform									ND						
Chloromethane															
cis-1,2-Dichloroethene															
cis-1,3-Dichloropropene															
Dibromochloromethane															
Dibromomethane															
Ethylbenzene									ND						
Ethylene Dibromide															
Hexachlorobutadiene															
Isopropylbenzene															
m, p-Xylene															
Methyl Iodide															
Methylene Chloride									**0.4** BJ						
Naphthalene															
n-Butylbenzene															
n-Propylbenzene															
o-Xylene															
sec-Butylbenzene															
Styrene															
tert-Butylbenzene															
Tetrachloroethene									ND						
Toluene									ND						
trans-1,2-Dichloroethene															

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	B-7			B-20						HP-1	HP-2	HP-3	HP-4	HP-5	HP-6
Sample ID:	B-7	B-7	B-7	B-20	Dup of B-20 B-20-Dup	B-20	Dup of B-20 B-20-Dup	B-20	B-20	HP-1	HP-2	HP-3	HP-4	HP-5	HP-6
Laboratory ID:															
Sample Date:	8/1/1983	10/1/1983	12/1/1983	8/1/1983	8/1/1983	10/1/1983	10/1/1983	12/1/1983	2/1/1988	4/19/1996	4/19/1996	4/19/1996	4/19/1996	4/19/1996	4/19/1996
trans-1,3-Dichloropropene															
trans-1,4-Dichloro-2-butene															
Total Xylenes									ND						
Trichloroethene									ND						
Trichlorofluoromethane															
Vinyl Acetate															
Vinyl Chloride									ND						
VOLATILES (ug/L)															
EPA SW8260C-SIM															
1,1,2,2-Tetrachloroethane															
1,1-Dichloroethene															
cis-1,2-Dichloroethene															
Tetrachloroethene															
Trichloroethene															
Vinyl Chloride															
SEMIVOLATILES (ug/L)															
EPA SW8270D (a)															
1,2,4-Trichlorobenzene															
1,2-Dichlorobenzene															
1,3-Dichlorobenzene															
1,4-Dichlorobenzene															
1-Methylnaphthalene															
2,2'-Oxybis(1-Chloropropane)															
2,4,5-Trichlorophenol															
2,4,6-Trichlorophenol															
2,4-Dichlorophenol															
2,4-Dimethylphenol															
2,4-Dinitrophenol															
2,4-Dinitrotoluene															
2,6-Dinitrotoluene															
2-Chloronaphthalene															
2-Chlorophenol															
2-Methylnaphthalene															
2-Methylphenol															
2-Nitroaniline															
2-Nitrophenol															
3,3'-Dichlorobenzidine															
3-Nitroaniline															
4,6-Dinitro-2-Methylphenol															
4-Bromophenyl-phenylether															
4-Chloro-3-methylphenol															
4-Chloroaniline															
4-Chlorophenyl-phenylether															
4-Methylphenol															
4-Nitroaniline															
4-Nitrophenol															
Acenaphthene									**2** M						
Acenaphthylene															
Anthracene															
Benzo(a)anthracene															
Benzo(a)pyrene															
Benzo(b)fluoranthene															
Benzo(g,h,i)perylene															
Benzo(k)fluoranthene															
Benzoic Acid															
Benzyl Alcohol															
bis(2-Chloroethoxy) Methane															
Bis-(2-Chloroethyl) Ether															
bis(2-Ethylhexyl)phthalate									**6**						
Butylbenzylphthalate															

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	B-7			B-20						HP-1	HP-2	HP-3	HP-4	HP-5	HP-6
					Dup of B-20		Dup of B-20								
Sample ID:	B-7	B-7	B-7	B-20	B-20-Dup	B-20	B-20-Dup	B-20	B-20	HP-1	HP-2	HP-3	HP-4	HP-5	HP-6
Laboratory ID:															
Sample Date:	8/1/1983	10/1/1983	12/1/1983	8/1/1983	8/1/1983	10/1/1983	10/1/1983	12/1/1983	2/1/1988	4/19/1996	4/19/1996	4/19/1996	4/19/1996	4/19/1996	4/19/1996
Carbazole															
Chrysene															
Dibenz(a,h)anthracene															
Dibenzofuran															
Diethylphthalate									ND						
Dimethylphthalate															
Di-n-Butylphthalate															
Di-n-Octyl phthalate															
Fluoranthene															
Fluorene															
Hexachlorobenzene															
Hexachlorobutadiene															
Hexachlorocyclopentadiene															
Hexachloroethane															
Indeno(1,2,3-cd)pyrene															
Isophorone															
Naphthalene															
Nitrobenzene															
N-Nitroso-Di-N-Propylamine															
N-Nitrosodiphenylamine															
Pentachlorophenol															
Phenanthrene															
Phenol				**16**	**81**				ND						
Pyrene															
PAHs (ug/L)															
EPA SW8270D-SIM															
1-Methylnaphthalene															
2-Methylnaphthalene															
Acenaphthene															
Acenaphthylene															
Anthracene															
Benzo(a)anthracene															
Benzo(a)pyrene															
Benzo(b)fluoranthene															
Benzo(g,h,i)perylene															
Benzo(k)fluoranthene															
Chrysene															
Dibenz(a,h)anthracene															
Dibenzofuran															
Fluoranthene															
Fluorene															
Indeno(1,2,3-cd)pyrene															
Naphthalene															
Phenanthrene															
Pyrene															
TEQ															
CONVENTIONALS (ug/L)															
Chloride						**6,600,000**									
Total Cyanide	**13**			3 U	5 U										
Fluoride				**540**	**400**										
Oil and Grease															
Sulfate						**120,000**									
Total Organic Carbon (EPA 415.1 (a))	**400**														
Ferrous Iron (SM3500FeD)															

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-6							I-7									I-202s
Sample ID:	I-6	I-6	I-6	I-6	I-6	I-006s	I-6	I-7	I-7	Dup of I-7 I-7-Dup	I-7	I-7	I-7	I-7	I-007s	I-7s	I-202s
Laboratory ID:																	
Sample Date:	10/1/1983	12/1/1983	12/1/1985	7/1/1986	1/1/1987	2/1/1988	2/1/1988	10/1/1983	12/1/1983	12/1/1983	6/1/1985	12/1/1985	7/1/1986	1/1/1987	2/1/1988	2/1/1988	2/1/1988
TOTAL METALS (ug/L)																	
EPA 200.8/SW6010B/SW7470A (a)																	
Antimony																	
Arsenic			**48**	**87**	**24**						**110**	**110**	**150**	**80**			
Barium																	
Cadmium																	
Chromium																	
Copper																	
Iron																	
Lead																	
Manganese																	
Mercury																	
Nickel																	
Selenium																	
Silver																	
Zinc																	
DISSOLVED METALS (ug/L)																	
EPA 200.8/SW6010B/SW7470A (a)																	
Arsenic	**14**	**34**	**5**	**87**	**6**	**20**	**20**	**96**	**110**	**8.5**	**80**	**25**	**50**	**45**	**50**	**50**	**1,300**
Barium						**22**											
Cadmium						**2**									**4**		2 U
Chromium	5 U	8 U				1 U		5 U	8 U	**8.1**					**4**		1 U
Copper	4 U	4 U				1 U		**26**	4 U	**4**					1 U		**12**
Iron						**33,100**											
Lead	1 U	5 U				1 U		1 U	5 U	**3**					1 U		1 U
Manganese						**1010**											
Mercury						0.1 U									0.1 U		0.1 U
Nickel	10 U	**10**				1 U		10 U	10 U	1 U					1 U		**2**
Selenium						2 U											
Silver						2 U									2 U		2 U
Zinc	**36**	**18**				**2**		**380**	**100**	**58**					**15**		2 U
PETROLEUM HYDROCARBONS (ug/L)																	
NWTPH-HCID																	
Diesel Range Organics																	
Gasoline Range Organics																	
Lube Oil																	
NWTPH-Dx																	
Diesel Range Organics																	
Lube Oil																	
PCBs (ug/L)																	
EPA SW8082																	
Aroclor 1016																	
Aroclor 1221																	
Aroclor 1232																	
Aroclor 1242																	
Aroclor 1248																	
Aroclor 1254																	
Aroclor 1260																	
Total PCBs																	
VOLATILES (ug/L)																	
EPA SW8260B (a)																	
1,1,2,2-Tetrachloroethane																	
1,1,1-Trichloroethane							ND									ND	ND
1,1,2,2-Tetrachloroethane																	
1,1,2-Trichloro-1,2,2-Trifluoroethane							ND									ND	ND
1,1,2-Trichloroethane																	
1,1-Dichloroethane							ND									ND	ND

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-6							I-7									I-202s
Sample ID:	I-6	I-6	I-6	I-6	I-6	I-006s	I-6	I-7	I-7	Dup of I-7 I-7-Dup	I-7	I-7	I-7	I-7	I-007s	I-7s	I-202s
Laboratory ID:																	
Sample Date:	10/1/1983	12/1/1983	12/1/1985	7/1/1986	1/1/1987	2/1/1988	2/1/1988	10/1/1983	12/1/1983	12/1/1983	6/1/1985	12/1/1985	7/1/1986	1/1/1987	2/1/1988	2/1/1988	2/1/1988
1,1-Dichloroethene							ND									ND	ND
1,2-Dichloroethane																	
1,2-Dichloroethene (total)							ND									ND	**2** J
1,1-Dichloropropene																	
1,2-Dichloropropane																	
1,2,3-Trichlorobenzene																	
1,2,3-Trichloropropane																	
1,2,4-Trichlorobenzene																	
1,2,4-Trimethylbenzene																	
1,2-Dibromo-3-chloropropane																	
1,2-Dichlorobenzene																	
1,2-Dichloroethane																	
1,2-Dichloropropane																	
1,3,5-Trimethylbenzene																	
1,3-Dichlorobenzene																	
1,3-Dichloropropane																	
1,4-Dichlorobenzene																	
2,2-Dichloropropane																	
2-Butanone							ND									ND	ND
2-Chloroethylvinylether																	
2-Chlorotoluene																	
2-Hexanone																	
4-Chlorotoluene																	
4-Isopropyltoluene																	
4-Methyl-2-Pentanone (MIBK)																	
Acetone							ND									ND	**19** B
Acrolein																	
Acrylonitrile																	
Benzene							ND									ND	ND
Bromobenzene																	
Bromochloromethane																	
Bromodichloromethane																	
Bromoethane																	
Bromoform																	
Bromomethane																	
Carbon Disulfide																	
Carbon Tetrachloride																	
Chlorobenzene																	
Chloroethane																	
Chloroform							ND									ND	ND
Chloromethane																	
cis-1,2-Dichloroethene																	
cis-1,3-Dichloropropene																	
Dibromochloromethane																	
Dibromomethane																	
Ethylbenzene							ND									ND	ND
Ethylene Dibromide																	
Hexachlorobutadiene																	
Isopropylbenzene																	
m, p-Xylene																	
Methyl Iodide																	
Methylene Chloride							**11**									**11** B	**10** B
Naphthalene																	
n-Butylbenzene																	
n-Propylbenzene																	
o-Xylene																	
sec-Butylbenzene																	
Styrene																	
tert-Butylbenzene																	
Tetrachloroethene							ND									ND	ND
Toluene							ND									ND	ND
trans-1,2-Dichloroethene																	

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-6							I-7									I-202s
Sample ID:	I-6	I-6	I-6	I-6	I-6	I-006s	I-6	I-7	I-7	Dup of I-7 I-7-Dup	I-7	I-7	I-7	I-7	I-007s	I-7s	I-202s
Laboratory ID:																	
Sample Date:	10/1/1983	12/1/1983	12/1/1985	7/1/1986	1/1/1987	2/1/1988	2/1/1988	10/1/1983	12/1/1983	12/1/1983	6/1/1985	12/1/1985	7/1/1986	1/1/1987	2/1/1988	2/1/1988	2/1/1988
trans-1,3-Dichloropropene																	
trans-1,4-Dichloro-2-butene																	
Total Xylenes							ND									ND	ND
Trichloroethene							ND									ND	ND
Trichlorofluoromethane																	
Vinyl Acetate																	
Vinyl Chloride							ND									ND	**0.9** J
VOLATILES (ug/L)																	
EPA SW8260C-SIM																	
1,1,2,2-Tetrachloroethane																	
1,1-Dichloroethene																	
cis-1,2-Dichloroethene																	
Tetrachloroethene																	
Trichloroethene																	
Vinyl Chloride																	
SEMIVOLATILES (ug/L)																	
EPA SW8270D (a)																	
1,2,4-Trichlorobenzene																	
1,2-Dichlorobenzene																	
1,3-Dichlorobenzene																	
1,4-Dichlorobenzene																	
1-Methylnaphthalene																	
2,2'-Oxybis(1-Chloropropane)																	
2,4,5-Trichlorophenol																	
2,4,6-Trichlorophenol																	
2,4-Dichlorophenol																	
2,4-Dimethylphenol																	
2,4-Dinitrophenol																	
2,4-Dinitrotoluene																	
2,6-Dinitrotoluene																	
2-Chloronaphthalene																	
2-Chlorophenol																	
2-Methylnaphthalene																	
2-Methylphenol																	
2-Nitroaniline																	
2-Nitrophenol																	
3,3'-Dichlorobenzidine																	
3-Nitroaniline																	
4,6-Dinitro-2-Methylphenol																	
4-Bromophenyl-phenylether																	
4-Chloro-3-methylphenol																	
4-Chloroaniline																	
4-Chlorophenyl-phenylether																	
4-Methylphenol																	
4-Nitroaniline																	
4-Nitrophenol																	
Acenaphthene							ND									ND	ND
Acenaphthylene																	
Anthracene																	
Benzo(a)anthracene																	
Benzo(a)pyrene																	
Benzo(b)fluoranthene																	
Benzo(g,h,i)perylene																	
Benzo(k)fluoranthene																	
Benzoic Acid																	
Benzyl Alcohol																	
bis(2-Chloroethoxy) Methane																	
Bis-(2-Chloroethyl) Ether																	
bis(2-Ethylhexyl)phthalate							8									**17**	**16**
Butylbenzylphthalate																	

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-6							I-7										I-202s
Sample ID:	I-6	I-6	I-6	I-6	I-6	I-006s	I-6	I-7	I-7	Dup of I-7 I-7-Dup	I-7	I-7	I-7	I-7	I-007s	I-7s	I-202s
Laboratory ID:																	
Sample Date:	10/1/1983	12/1/1983	12/1/1985	7/1/1986	1/1/1987	2/1/1988	2/1/1988	10/1/1983	12/1/1983	12/1/1983	6/1/1985	12/1/1985	7/1/1986	1/1/1987	2/1/1988	2/1/1988	2/1/1988
Carbazole																	
Chrysene																	
Dibenz(a,h)anthracene																	
Dibenzofuran																	
Diethylphthalate							ND									ND	**4** M
Dimethylphthalate																	
Di-n-Butylphthalate																	
Di-n-Octyl phthalate																	
Fluoranthene																	
Fluorene																	
Hexachlorobenzene																	
Hexachlorobutadiene																	
Hexachlorocyclopentadiene																	
Hexachloroethane																	
Indeno(1,2,3-cd)pyrene																	
Isophorone																	
Naphthalene																	
Nitrobenzene																	
N-Nitroso-Di-N-Propylamine																	
N-Nitrosodiphenylamine																	
Pentachlorophenol																	
Phenanthrene																	
Phenol							ND									ND	**5**
Pyrene																	
PAHs (ug/L)																	
EPA SW8270D-SIM																	
1-Methylnaphthalene																	
2-Methylnaphthalene																	
Acenaphthene																	
Acenaphthylene																	
Anthracene																	
Benzo(a)anthracene																	
Benzo(a)pyrene																	
Benzo(b)fluoranthene																	
Benzo(g,h,i)perylene																	
Benzo(k)fluoranthene																	
Chrysene																	
Dibenz(a,h)anthracene																	
Dibenzofuran																	
Fluoranthene																	
Fluorene																	
Indeno(1,2,3-cd)pyrene																	
Naphthalene																	
Phenanthrene																	
Pyrene																	
TEQ																	
CONVENTIONALS (ug/L)																	
Chloride																	
Total Cyanide																	
Fluoride																	
Oil and Grease						**25,850**											
Sulfate																	
Total Organic Carbon (EPA 415.1 (a))						**8340**											
Ferrous Iron (SM3500FeD)																	

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-203																	
Sample ID:	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i
Laboratory ID:																		
Sample Date:	2/1/1988	3/21/1991	3/28/1991	4/4/1991	4/11/1991	9/12/1991	9/19/1991	9/26/1991	10/3/1991	4/16/1992	4/23/1992	4/30/1992	5/7/1992	9/24/1992	10/1/1992	10/8/1992	10/15/1992	4/8/1993
TOTAL METALS (ug/L)																		
EPA 200.8/SW6010B/SW7470A (a)																		
Antimony																		
Arsenic																		
Barium																		
Cadmium																		
Chromium																		
Copper																		
Iron																		
Lead																		
Manganese																		
Mercury																		
Nickel																		
Selenium																		
Silver																		
Zinc																		
DISSOLVED METALS (ug/L)																		
EPA 200.8/SW6010B/SW7470A (a)																		
Arsenic	**110**	**272**	**236**	**180**	**576**	**317**	**382**	**342**	**253**	**55**	**47**	**193**	**40**	**196** J	**200**	**122**	**148**	**82**
Barium																		
Cadmium	**3**																	
Chromium	1 U																	
Copper	2 U																	
Iron																		
Lead	**2**																	
Manganese																		
Mercury	0.1 U																	
Nickel	1 U																	
Selenium																		
Silver	2 U																	
Zinc	**26**																	
PETROLEUM HYDROCARBONS (ug/L)																		
NWTPH-HCID																		
Diesel Range Organics																		
Gasoline Range Organics																		
Lube Oil																		
NWTPH-Dx																		
Diesel Range Organics																		
Lube Oil																		
PCBs (ug/L)																		
EPA SW8082																		
Aroclor 1016																		
Aroclor 1221																		
Aroclor 1232																		
Aroclor 1242																		
Aroclor 1248																		
Aroclor 1254																		
Aroclor 1260																		
Total PCBs																		
VOLATILES (ug/L)																		
EPA SW8260B (a)																		
1,1,2,2-Tetrachloroethane																		
1,1,1-Trichloroethane	ND																	
1,1,2,2-Tetrachloroethane																		
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND																	
1,1,2-Trichloroethane																		
1,1-Dichloroethane	ND																	

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-203																	
Sample ID:	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i
Laboratory ID:																		
Sample Date:	2/1/1988	3/21/1991	3/28/1991	4/4/1991	4/11/1991	9/12/1991	9/19/1991	9/26/1991	10/3/1991	4/16/1992	4/23/1992	4/30/1992	5/7/1992	9/24/1992	10/1/1992	10/8/1992	10/15/1992	4/8/1993
1,1-Dichloroethene	ND																	
1,2-Dichloroethane																		
1,2-Dichloroethene (total)	ND																	
1,1-Dichloropropene																		
1,2-Dichloropropane																		
1,2,3-Trichlorobenzene																		
1,2,3-Trichloropropane																		
1,2,4-Trichlorobenzene																		
1,2,4-Trimethylbenzene																		
1,2-Dibromo-3-chloropropane																		
1,2-Dichlorobenzene																		
1,2-Dichloroethane																		
1,2-Dichloropropane																		
1,3,5-Trimethylbenzene																		
1,3-Dichlorobenzene																		
1,3-Dichloropropane																		
1,4-Dichlorobenzene																		
2,2-Dichloropropane																		
2-Butanone	ND																	
2-Chloroethylvinylether																		
2-Chlorotoluene																		
2-Hexanone																		
4-Chlorotoluene																		
4-Isopropyltoluene																		
4-Methyl-2-Pentanone (MIBK)																		
Acetone	ND																	
Acrolein																		
Acrylonitrile																		
Benzene	ND																	
Bromobenzene																		
Bromochloromethane																		
Bromodichloromethane																		
Bromoethane																		
Bromoform																		
Bromomethane																		
Carbon Disulfide																		
Carbon Tetrachloride																		
Chlorobenzene																		
Chloroethane																		
Chloroform	**1** J																	
Chloromethane																		
cis-1,2-Dichloroethene																		
cis-1,3-Dichloropropene																		
Dibromochloromethane																		
Dibromomethane																		
Ethylbenzene	ND																	
Ethylene Dibromide																		
Hexachlorobutadiene																		
Isopropylbenzene																		
m, p-Xylene																		
Methyl Iodide																		
Methylene Chloride	**9** B																	
Naphthalene																		
n-Butylbenzene																		
n-Propylbenzene																		
o-Xylene																		
sec-Butylbenzene																		
Styrene																		
tert-Butylbenzene																		
Tetrachloroethene	ND																	
Toluene	ND																	
trans-1,2-Dichloroethene																		

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-203																	
Sample ID:	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i
Laboratory ID:																		
Sample Date:	2/1/1988	3/21/1991	3/28/1991	4/4/1991	4/11/1991	9/12/1991	9/19/1991	9/26/1991	10/3/1991	4/16/1992	4/23/1992	4/30/1992	5/7/1992	9/24/1992	10/1/1992	10/8/1992	10/15/1992	4/8/1993
trans-1,3-Dichloropropene																		
trans-1,4-Dichloro-2-butene																		
Total Xylenes	ND																	
Trichloroethene	ND																	
Trichlorofluoromethane																		
Vinyl Acetate																		
Vinyl Chloride	ND																	
VOLATILES (ug/L)																		
EPA SW8260C-SIM																		
1,1,2,2-Tetrachloroethane																		
1,1-Dichloroethene																		
cis-1,2-Dichloroethene																		
Tetrachloroethene																		
Trichloroethene																		
Vinyl Chloride																		
SEMIVOLATILES (ug/L)																		
EPA SW8270D (a)																		
1,2,4-Trichlorobenzene																		
1,2-Dichlorobenzene																		
1,3-Dichlorobenzene																		
1,4-Dichlorobenzene																		
1-Methylnaphthalene																		
2,2'-Oxybis(1-Chloropropane)																		
2,4,5-Trichlorophenol																		
2,4,6-Trichlorophenol																		
2,4-Dichlorophenol																		
2,4-Dimethylphenol																		
2,4-Dinitrophenol																		
2,4-Dinitrotoluene																		
2,6-Dinitrotoluene																		
2-Chloronaphthalene																		
2-Chlorophenol																		
2-Methylnaphthalene																		
2-Methylphenol																		
2-Nitroaniline																		
2-Nitrophenol																		
3,3'-Dichlorobenzidine																		
3-Nitroaniline																		
4,6-Dinitro-2-Methylphenol																		
4-Bromophenyl-phenylether																		
4-Chloro-3-methylphenol																		
4-Chloroaniline																		
4-Chlorophenyl-phenylether																		
4-Methylphenol																		
4-Nitroaniline																		
4-Nitrophenol																		
Acenaphthene	ND																	
Acenaphthylene																		
Anthracene																		
Benzo(a)anthracene																		
Benzo(a)pyrene																		
Benzo(b)fluoranthene																		
Benzo(g,h,i)perylene																		
Benzo(k)fluoranthene																		
Benzoic Acid																		
Benzyl Alcohol																		
bis(2-Chloroethoxy) Methane																		
Bis-(2-Chloroethyl) Ether																		
bis(2-Ethylhexyl)phthalate	**4**																	
Butylbenzylphthalate																		

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-203																	
Sample ID:	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i
Laboratory ID:																		
Sample Date:	2/1/1988	3/21/1991	3/28/1991	4/4/1991	4/11/1991	9/12/1991	9/19/1991	9/26/1991	10/3/1991	4/16/1992	4/23/1992	4/30/1992	5/7/1992	9/24/1992	10/1/1992	10/8/1992	10/15/1992	4/8/1993
Carbazole																		
Chrysene																		
Dibenz(a,h)anthracene																		
Dibenzofuran																		
Diethylphthalate	ND																	
Dimethylphthalate																		
Di-n-Butylphthalate																		
Di-n-Octyl phthalate																		
Fluoranthene																		
Fluorene																		
Hexachlorobenzene																		
Hexachlorobutadiene																		
Hexachlorocyclopentadiene																		
Hexachloroethane																		
Indeno(1,2,3-cd)pyrene																		
Isophorone																		
Naphthalene																		
Nitrobenzene																		
N-Nitroso-Di-N-Propylamine																		
N-Nitrosodiphenylamine																		
Pentachlorophenol																		
Phenanthrene																		
Phenol	ND																	
Pyrene																		
PAHs (ug/L)																		
EPA SW8270D-SIM																		
1-Methylnaphthalene																		
2-Methylnaphthalene																		
Acenaphthene																		
Acenaphthylene																		
Anthracene																		
Benzo(a)anthracene																		
Benzo(a)pyrene																		
Benzo(b)fluoranthene																		
Benzo(g,h,i)perylene																		
Benzo(k)fluoranthene																		
Chrysene																		
Dibenz(a,h)anthracene																		
Dibenzofuran																		
Fluoranthene																		
Fluorene																		
Indeno(1,2,3-cd)pyrene																		
Naphthalene																		
Phenanthrene																		
Pyrene																		
TEQ																		
CONVENTIONALS (ug/L)																		
Chloride																		
Total Cyanide																		
Fluoride																		
Oil and Grease																		
Sulfate																		
Total Organic Carbon (EPA 415.1 (a))																		
Ferrous Iron (SM3500FeD)																		

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-203																
Sample ID:	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203
Laboratory ID:																	NB06C/NB06J
Sample Date:	4/15/1993	4/22/1993	4/29/1993	10/15/1993	10/22/1993	10/29/1993	11/5/1993	4/14/1994	4/21/1994	4/28/1994	5/5/1994	12/28/1995	4/19/1996	12/1/1999	8/24/2000	10/25/2000	6/18/2008
TOTAL METALS (ug/L)																	
EPA 200.8/SW6010B/SW7470A (a)																	
Antimony																	
Arsenic												**140**	**68**		**1200**	**98**	
Barium																	
Cadmium																	
Chromium																	
Copper																	
Iron																	**20,900**
Lead																	
Manganese																	
Mercury																	
Nickel																	
Selenium																	
Silver																	
Zinc																	
DISSOLVED METALS (ug/L)																	
EPA 200.8/SW6010B/SW7470A (a)																	
Arsenic	**82**	**88**	**98**	**140**	**130**	**150**	**100**	**41**	**58**	**50**	**13**	**160**	**70**	**150**	**1200**	**98**	**182**
Barium																	
Cadmium																	
Chromium																	
Copper																	
Iron																	
Lead																	
Manganese																	
Mercury																	
Nickel																	
Selenium																	
Silver																	
Zinc																	
PETROLEUM HYDROCARBONS (ug/L)																	
NWTPH-HCID																	
Diesel Range Organics																	
Gasoline Range Organics																	
Lube Oil																	
NWTPH-Dx																	
Diesel Range Organics																	
Lube Oil																	
PCBs (ug/L)																	
EPA SW8082																	
Aroclor 1016																	
Aroclor 1221																	
Aroclor 1232																	
Aroclor 1242																	
Aroclor 1248																	
Aroclor 1254																	
Aroclor 1260																	
Total PCBs																	
VOLATILES (ug/L)																	
EPA SW8260B (a)																	
1,1,2,2-Tetrachloroethane																	
1,1,1-Trichloroethane																	
1,1,2,2-Tetrachloroethane																	
1,1,2-Trichloro-1,2,2-Trifluoroethane																	
1,1,2-Trichloroethane																	
1,1-Dichloroethane																	

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-203																
Sample ID:	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203
Laboratory ID:																	NB06C/NB06J
Sample Date:	4/15/1993	4/22/1993	4/29/1993	10/15/1993	10/22/1993	10/29/1993	11/5/1993	4/14/1994	4/21/1994	4/28/1994	5/5/1994	12/28/1995	4/19/1996	12/1/1999	8/24/2000	10/25/2000	6/18/2008
1,1-Dichloroethene																	
1,2-Dichloroethane																	
1,2-Dichloroethene (total)																	
1,1-Dichloropropene																	
1,2-Dichloropropane																	
1,2,3-Trichlorobenzene																	
1,2,3-Trichloropropane																	
1,2,4-Trichlorobenzene																	
1,2,4-Trimethylbenzene																	
1,2-Dibromo-3-chloropropane																	
1,2-Dichlorobenzene																	
1,2-Dichloroethane																	
1,2-Dichloropropane																	
1,3,5-Trimethylbenzene																	
1,3-Dichlorobenzene																	
1,3-Dichloropropane																	
1,4-Dichlorobenzene																	
2,2-Dichloropropane																	
2-Butanone																	
2-Chloroethylvinylether																	
2-Chlorotoluene																	
2-Hexanone																	
4-Chlorotoluene																	
4-Isopropyltoluene																	
4-Methyl-2-Pentanone (MIBK)																	
Acetone																	
Acrolein																	
Acrylonitrile																	
Benzene																	
Bromobenzene																	
Bromochloromethane																	
Bromodichloromethane																	
Bromoethane																	
Bromoform																	
Bromomethane																	
Carbon Disulfide																	
Carbon Tetrachloride																	
Chlorobenzene																	
Chloroethane																	
Chloroform																	
Chloromethane																	
cis-1,2-Dichloroethene																	
cis-1,3-Dichloropropene																	
Dibromochloromethane																	
Dibromomethane																	
Ethylbenzene																	
Ethylene Dibromide																	
Hexachlorobutadiene																	
Isopropylbenzene																	
m, p-Xylene																	
Methyl Iodide																	
Methylene Chloride																	
Naphthalene																	
n-Butylbenzene																	
n-Propylbenzene																	
o-Xylene																	
sec-Butylbenzene																	
Styrene																	
tert-Butylbenzene																	
Tetrachloroethene																	
Toluene																	
trans-1,2-Dichloroethene																	

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-203																
Sample ID:	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203
Laboratory ID:																	NB06C/NB06J
Sample Date:	4/15/1993	4/22/1993	4/29/1993	10/15/1993	10/22/1993	10/29/1993	11/5/1993	4/14/1994	4/21/1994	4/28/1994	5/5/1994	12/28/1995	4/19/1996	12/1/1999	8/24/2000	10/25/2000	6/18/2008
trans-1,3-Dichloropropene																	
trans-1,4-Dichloro-2-butene																	
Total Xylenes																	
Trichloroethene																	
Trichlorofluoromethane																	
Vinyl Acetate																	
Vinyl Chloride																	
VOLATILES (ug/L)																	
EPA SW8260C-SIM																	
1,1,2,2-Tetrachloroethane																	
1,1-Dichloroethene																	
cis-1,2-Dichloroethene																	
Tetrachloroethene																	
Trichloroethene																	
Vinyl Chloride																	
SEMIVOLATILES (ug/L)																	
EPA SW8270D (a)																	
1,2,4-Trichlorobenzene																	
1,2-Dichlorobenzene																	
1,3-Dichlorobenzene																	
1,4-Dichlorobenzene																	
1-Methylnaphthalene																	
2,2'-Oxybis(1-Chloropropane)																	
2,4,5-Trichlorophenol																	
2,4,6-Trichlorophenol																	
2,4-Dichlorophenol																	
2,4-Dimethylphenol																	
2,4-Dinitrophenol																	
2,4-Dinitrotoluene																	
2,6-Dinitrotoluene																	
2-Chloronaphthalene																	
2-Chlorophenol																	
2-Methylnaphthalene																	
2-Methylphenol																	
2-Nitroaniline																	
2-Nitrophenol																	
3,3'-Dichlorobenzidine																	
3-Nitroaniline																	
4,6-Dinitro-2-Methylphenol																	
4-Bromophenyl-phenylether																	
4-Chloro-3-methylphenol																	
4-Chloroaniline																	
4-Chlorophenyl-phenylether																	
4-Methylphenol																	
4-Nitroaniline																	
4-Nitrophenol																	
Acenaphthene																	
Acenaphthylene																	
Anthracene																	
Benzo(a)anthracene																	
Benzo(a)pyrene																	
Benzo(b)fluoranthene																	
Benzo(g,h,i)perylene																	
Benzo(k)fluoranthene																	
Benzoic Acid																	
Benzyl Alcohol																	
bis(2-Chloroethoxy) Methane																	
Bis-(2-Chloroethyl) Ether																	
bis(2-Ethylhexyl)phthalate																	
Butylbenzylphthalate																	

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-203																
Sample ID:	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203i	I-203
Laboratory ID:																	NB06C/NB06J
Sample Date:	4/15/1993	4/22/1993	4/29/1993	10/15/1993	10/22/1993	10/29/1993	11/5/1993	4/14/1994	4/21/1994	4/28/1994	5/5/1994	12/28/1995	4/19/1996	12/1/1999	8/24/2000	10/25/2000	6/18/2008
Carbazole																	
Chrysene																	
Dibenz(a,h)anthracene																	
Dibenzofuran																	
Diethylphthalate																	
Dimethylphthalate																	
Di-n-Butylphthalate																	
Di-n-Octyl phthalate																	
Fluoranthene																	
Fluorene																	
Hexachlorobenzene																	
Hexachlorobutadiene																	
Hexachlorocyclopentadiene																	
Hexachloroethane																	
Indeno(1,2,3-cd)pyrene																	
Isophorone																	
Naphthalene																	
Nitrobenzene																	
N-Nitroso-Di-N-Propylamine																	
N-Nitrosodiphenylamine																	
Pentachlorophenol																	
Phenanthrene																	
Phenol																	
Pyrene																	
PAHs (ug/L)																	
EPA SW8270D-SIM																	
1-Methylnaphthalene																	
2-Methylnaphthalene																	
Acenaphthene																	
Acenaphthylene																	
Anthracene																	
Benzo(a)anthracene																	
Benzo(a)pyrene																	
Benzo(b)fluoranthene																	
Benzo(g,h,i)perylene																	
Benzo(k)fluoranthene																	
Chrysene																	
Dibenz(a,h)anthracene																	
Dibenzofuran																	
Fluoranthene																	
Fluorene																	
Indeno(1,2,3-cd)pyrene																	
Naphthalene																	
Phenanthrene																	
Pyrene																	
TEQ																	
CONVENTIONALS (ug/L)																	
Chloride																	
Total Cyanide																	
Fluoride																	
Oil and Grease																	
Sulfate																	
Total Organic Carbon (EPA 415.1 (a))																	**9730**
Ferrous Iron (SM3500FeD)																	**20,400**

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-203			I-203s	I-205												
Sample ID:	Dup of I-203 I-DUP	I-203	I-203	I-203s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s
Laboratory ID:	NB06G/NB06N	OL19F	PC88D/PC88K														
Sample Date:	6/18/2008	2/4/2009	6/16/2009	2/1/1988	2/1/1988	3/21/1991	3/28/1991	4/4/1991	4/11/1991	9/12/1991	9/19/1991	9/26/1991	10/3/1991	4/16/1992	4/23/1992	4/30/1992	5/7/1992
TOTAL METALS (ug/L)																	
EPA 200.8/SW6010B/SW7470A (a)																	
Antimony																	
Arsenic																	
Barium																	
Cadmium																	
Chromium																	
Copper																	
Iron	**21,900**		**26,400**														
Lead																	
Manganese																	
Mercury																	
Nickel																	
Selenium																	
Silver																	
Zinc																	
DISSOLVED METALS (ug/L)																	
EPA 200.8/SW6010B/SW7470A (a)																	
Arsenic	**194**	**122**	**125**	**60**	**30**	**6**	**6**	**26**	**210**	**129**	**36**	**23**	**126**	**2**	**2**	**7**	1 U
Barium																	
Cadmium		2 U		2 U	2 U												
Chromium		5 U		1 U	1 U												
Copper		2 U		**20**	**10**												
Iron																	
Lead		1 U		**6**	**1**												
Manganese																	
Mercury		0.1 U		0.1 U	0.1 U												
Nickel				40 U	40 U												
Selenium																	
Silver				2 U	2 U												
Zinc		10 U		2 U	**56**												
PETROLEUM HYDROCARBONS (ug/L)																	
NWTPH-HCID																	
Diesel Range Organics		630 U															
Gasoline Range Organics		250 U															
Lube Oil		630 U															
NWTPH-Dx																	
Diesel Range Organics																	
Lube Oil																	
PCBs (ug/L)																	
EPA SW8082																	
Aroclor 1016		1 U															
Aroclor 1221		1 U															
Aroclor 1232		1 U															
Aroclor 1242		1 U															
Aroclor 1248		1 U															
Aroclor 1254		1 U															
Aroclor 1260		1 U															
Total PCBs		1 U															
VOLATILES (ug/L)																	
EPA SW8260B (a)																	
1,1,2,2-Tetrachloroethane		0.2 U															
1,1,1-Trichloroethane		0.2 U		ND	ND												
1,1,2,2-Tetrachloroethane		0.2 U															
1,1,2-Trichloro-1,2,2-Trifluoroethane		0.2 U		ND	ND												
1,1,2-Trichloroethane		0.2 U															
1,1-Dichloroethane		0.2 U		ND	ND												

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-203			I-203s	I-205												
Sample ID:	Dup of I-203 I-DUP	I-203	I-203	I-203s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s
Laboratory ID:	NB06G/NB06N	OL19F	PC88D/PC88K														
Sample Date:	6/18/2008	2/4/2009	6/16/2009	2/1/1988	2/1/1988	3/21/1991	3/28/1991	4/4/1991	4/11/1991	9/12/1991	9/19/1991	9/26/1991	10/3/1991	4/16/1992	4/23/1992	4/30/1992	5/7/1992
1,1-Dichloroethene		0.2 U		ND	ND												
1,2-Dichloroethane																	
1,2-Dichloroethene (total)				ND	ND												
1,1-Dichloropropene		0.2 U															
1,2-Dichloropropane																	
1,2,3-Trichlorobenzene		0.5 U															
1,2,3-Trichloropropane		0.5 U															
1,2,4-Trichlorobenzene		0.5 U															
1,2,4-Trimethylbenzene		0.2 U															
1,2-Dibromo-3-chloropropane		0.5 U															
1,2-Dichlorobenzene		0.2 U															
1,2-Dichloroethane		0.2 U															
1,2-Dichloropropane		0.2 U															
1,3,5-Trimethylbenzene		0.2 U															
1,3-Dichlorobenzene		0.2 U															
1,3-Dichloropropane		0.2 U															
1,4-Dichlorobenzene		0.2 U															
2,2-Dichloropropane		0.2 U															
2-Butanone		2.5 U		ND	ND												
2-Chloroethylvinylether		1 U															
2-Chlorotoluene		0.2 U															
2-Hexanone		2.5 U															
4-Chlorotoluene		0.2 U															
4-Isopropyltoluene		0.2 U															
4-Methyl-2-Pentanone (MIBK)		2.5 U															
Acetone		**3.1**		ND	**15**												
Acrolein		5 U															
Acrylonitrile		1 U															
Benzene		0.2 U		ND	ND												
Bromobenzene		0.2 U															
Bromochloromethane		0.2 U															
Bromodichloromethane		0.2 U															
Bromoethane		0.2 U															
Bromoform		0.2 U															
Bromomethane		0.5 U															
Carbon Disulfide		0.2 U															
Carbon Tetrachloride		0.2 U															
Chlorobenzene		0.2 U															
Chloroethane		0.2 U															
Chloroform		0.2 U		ND	ND												
Chloromethane		0.2 U															
cis-1,2-Dichloroethene		**1.3**															
cis-1,3-Dichloropropene		0.2 U															
Dibromochloromethane		0.2 U															
Dibromomethane		0.2 U															
Ethylbenzene		0.2 U		ND	ND												
Ethylene Dibromide		0.2 U															
Hexachlorobutadiene		0.5 U															
Isopropylbenzene		0.2 U															
m, p-Xylene		0.4 U															
Methyl Iodide		1 U															
Methylene Chloride		0.5 U		**6** B	**7** B												
Naphthalene		0.5 U															
n-Butylbenzene		0.2 U															
n-Propylbenzene		0.2 U															
o-Xylene		0.2 U															
sec-Butylbenzene		0.2 U															
Styrene		0.2 U															
tert-Butylbenzene		0.2 U															
Tetrachloroethene		0.2 U		ND	ND												
Toluene		0.2 U		ND	ND												
trans-1,2-Dichloroethene		0.2 U															

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-203			I-203s	I-205												
Sample ID:	Dup of I-203 I-DUP	I-203	I-203	I-203s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s
Laboratory ID:	NB06G/NB06N	OL19F	PC88D/PC88K														
Sample Date:	6/18/2008	2/4/2009	6/16/2009	2/1/1988	2/1/1988	3/21/1991	3/28/1991	4/4/1991	4/11/1991	9/12/1991	9/19/1991	9/26/1991	10/3/1991	4/16/1992	4/23/1992	4/30/1992	5/7/1992
trans-1,3-Dichloropropene		0.2 U															
trans-1,4-Dichloro-2-butene		1 U															
Total Xylenes				ND	ND												
Trichloroethene		0.2 U		ND	ND												
Trichlorofluoromethane		0.2 U															
Vinyl Acetate		1 U															
Vinyl Chloride		0.2 U		ND	ND												
VOLATILES (ug/L)																	
EPA SW8260C-SIM																	
1,1,2,2-Tetrachloroethane																	
1,1-Dichloroethene																	
cis-1,2-Dichloroethene																	
Tetrachloroethene																	
Trichloroethene																	
Vinyl Chloride																	
SEMIVOLATILES (ug/L)																	
EPA SW8270D (a)																	
1,2,4-Trichlorobenzene		1 U															
1,2-Dichlorobenzene		1 U															
1,3-Dichlorobenzene		1 U															
1,4-Dichlorobenzene		1 U															
1-Methylnaphthalene		1 U															
2,2'-Oxybis(1-Chloropropane)		1 U															
2,4,5-Trichlorophenol		5 U															
2,4,6-Trichlorophenol		5 U															
2,4-Dichlorophenol		5 U															
2,4-Dimethylphenol		1 U															
2,4-Dinitrophenol		10 U															
2,4-Dinitrotoluene		5 U															
2,6-Dinitrotoluene		5 U															
2-Chloronaphthalene		1 U															
2-Chlorophenol		1 U															
2-Methylnaphthalene		1 U															
2-Methylphenol		1 U															
2-Nitroaniline		5 U															
2-Nitrophenol		5 U															
3,3'-Dichlorobenzidine		5 U															
3-Nitroaniline		5 U															
4,6-Dinitro-2-Methylphenol		10 U															
4-Bromophenyl-phenylether		1 U															
4-Chloro-3-methylphenol		5 U															
4-Chloroaniline		5 U															
4-Chlorophenyl-phenylether		1 U															
4-Methylphenol		1 U															
4-Nitroaniline		5 U															
4-Nitrophenol		5 UJ															
Acenaphthene		1 U		ND	ND												
Acenaphthylene		1 U															
Anthracene		1 U															
Benzo(a)anthracene		1 U															
Benzo(a)pyrene		1 U															
Benzo(b)fluoranthene		1 U															
Benzo(g,h,i)perylene		1 U															
Benzo(k)fluoranthene		1 U															
Benzoic Acid		10 U															
Benzyl Alcohol		5 U															
bis(2-Chloroethoxy) Methane		1 U															
Bis-(2-Chloroethyl) Ether		1 U															
bis(2-Ethylhexyl)phthalate		1 U		**7**	**4**												
Butylbenzylphthalate		1 U															

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:		I-203		I-203s	I-205												
	Dup of I-203																
Sample ID:	I-DUP	I-203	I-203	I-203s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s
Laboratory ID:	NB06G/NB06N	OL19F	PC88D/PC88K														
Sample Date:	6/18/2008	2/4/2009	6/16/2009	2/1/1988	2/1/1988	3/21/1991	3/28/1991	4/4/1991	4/11/1991	9/12/1991	9/19/1991	9/26/1991	10/3/1991	4/16/1992	4/23/1992	4/30/1992	5/7/1992
Carbazole		1 U															
Chrysene		1 U															
Dibenz(a,h)anthracene		1 U															
Dibenzofuran		1 U															
Diethylphthalate		1 U		ND	ND												
Dimethylphthalate		1 U															
Di-n-Butylphthalate		1 U															
Di-n-Octyl phthalate		1 U															
Fluoranthene		1 U															
Fluorene		1 U															
Hexachlorobenzene		1 U															
Hexachlorobutadiene		1 U															
Hexachlorocyclopentadiene		5 U															
Hexachloroethane		1 U															
Indeno(1,2,3-cd)pyrene		1 U															
Isophorone		1 U															
Naphthalene		1 U															
Nitrobenzene		1 U															
N-Nitroso-Di-N-Propylamine		5 U															
N-Nitrosodiphenylamine		1 U															
Pentachlorophenol		5 U															
Phenanthrene		1 U															
Phenol		1 UJ		ND													
Pyrene		1 U															
PAHs (ug/L)																	
EPA SW8270D-SIM																	
1-Methylnaphthalene																	
2-Methylnaphthalene																	
Acenaphthene																	
Acenaphthylene																	
Anthracene																	
Benzo(a)anthracene		0.1 U															
Benzo(a)pyrene		0.1 U															
Benzo(b)fluoranthene		0.1 U															
Benzo(g,h,i)perylene																	
Benzo(k)fluoranthene		0.1 U															
Chrysene		0.1 U															
Dibenz(a,h)anthracene		0.1 U															
Dibenzofuran																	
Fluoranthene																	
Fluorene																	
Indeno(1,2,3-cd)pyrene		0.1 U															
Naphthalene																	
Phenanthrene																	
Pyrene																	
TEQ		NA															
CONVENTIONALS (ug/L)																	
Chloride																	
Total Cyanide																	
Fluoride																	
Oil and Grease																	
Sulfate																	
Total Organic Carbon (EPA 415.1 (a))	**9400**		**9620**														
Ferrous Iron (SM3500FeD)	**19,600**		**26,400**														

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-205																
Sample ID:	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s
Laboratory ID:																	
Sample Date:	9/24/1992	10/1/1992	10/8/1992	10/15/1992	4/8/1993	4/15/1993	4/22/1993	4/29/1993	10/15/1993	10/22/1993	10/29/1993	11/5/1993	4/14/1994	4/21/1994	4/28/1994	5/5/1994	12/28/1995
TOTAL METALS (ug/L)																	
EPA 200.8/SW6010B/SW7470A (a)																	
Antimony																	
Arsenic																	**580**
Barium																	
Cadmium																	
Chromium																	
Copper																	
Iron																	
Lead																	
Manganese																	
Mercury																	
Nickel																	
Selenium																	
Silver																	
Zinc																	
DISSOLVED METALS (ug/L)																	
EPA 200.8/SW6010B/SW7470A (a)																	
Arsenic	**57**	**2**	**1**	**9**	**24**	**46**	**25**	**56**	**11**	**11**	**19**	**310**	1 U	**1**	**7**	**1**	**640**
Barium																	
Cadmium																	
Chromium																	
Copper																	
Iron																	
Lead																	
Manganese																	
Mercury																	
Nickel																	
Selenium																	
Silver																	
Zinc																	
PETROLEUM HYDROCARBONS (ug/L)																	
NWTPH-HCID																	
Diesel Range Organics																	
Gasoline Range Organics																	
Lube Oil																	
NWTPH-Dx																	
Diesel Range Organics																	
Lube Oil																	
PCBs (ug/L)																	
EPA SW8082																	
Aroclor 1016																	
Aroclor 1221																	
Aroclor 1232																	
Aroclor 1242																	
Aroclor 1248																	
Aroclor 1254																	
Aroclor 1260																	
Total PCBs																	
VOLATILES (ug/L)																	
EPA SW8260B (a)																	
1,1,2,2-Tetrachloroethane																	
1,1,1-Trichloroethane																	
1,1,2,2-Tetrachloroethane																	
1,1,2-Trichloro-1,2,2-Trifluoroethane																	
1,1,2-Trichloroethane																	
1,1-Dichloroethane																	

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-205																
Sample ID:	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s
Laboratory ID:																	
Sample Date:	9/24/1992	10/1/1992	10/8/1992	10/15/1992	4/8/1993	4/15/1993	4/22/1993	4/29/1993	10/15/1993	10/22/1993	10/29/1993	11/5/1993	4/14/1994	4/21/1994	4/28/1994	5/5/1994	12/28/1995
1,1-Dichloroethene																	
1,2-Dichloroethane																	
1,2-Dichloroethene (total)																	
1,1-Dichloropropene																	
1,2-Dichloropropane																	
1,2,3-Trichlorobenzene																	
1,2,3-Trichloropropane																	
1,2,4-Trichlorobenzene																	
1,2,4-Trimethylbenzene																	
1,2-Dibromo-3-chloropropane																	
1,2-Dichlorobenzene																	
1,2-Dichloroethane																	
1,2-Dichloropropane																	
1,3,5-Trimethylbenzene																	
1,3-Dichlorobenzene																	
1,3-Dichloropropane																	
1,4-Dichlorobenzene																	
2,2-Dichloropropane																	
2-Butanone																	
2-Chloroethylvinylether																	
2-Chlorotoluene																	
2-Hexanone																	
4-Chlorotoluene																	
4-Isopropyltoluene																	
4-Methyl-2-Pentanone (MIBK)																	
Acetone																	
Acrolein																	
Acrylonitrile																	
Benzene																	
Bromobenzene																	
Bromochloromethane																	
Bromodichloromethane																	
Bromoethane																	
Bromoform																	
Bromomethane																	
Carbon Disulfide																	
Carbon Tetrachloride																	
Chlorobenzene																	
Chloroethane																	
Chloroform																	
Chloromethane																	
cis-1,2-Dichloroethene																	
cis-1,3-Dichloropropene																	
Dibromochloromethane																	
Dibromomethane																	
Ethylbenzene																	
Ethylene Dibromide																	
Hexachlorobutadiene																	
Isopropylbenzene																	
m, p-Xylene																	
Methyl Iodide																	
Methylene Chloride																	
Naphthalene																	
n-Butylbenzene																	
n-Propylbenzene																	
o-Xylene																	
sec-Butylbenzene																	
Styrene																	
tert-Butylbenzene																	
Tetrachloroethene																	
Toluene																	
trans-1,2-Dichloroethene																	

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-205																
Sample ID:	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s
Laboratory ID:																	
Sample Date:	9/24/1992	10/1/1992	10/8/1992	10/15/1992	4/8/1993	4/15/1993	4/22/1993	4/29/1993	10/15/1993	10/22/1993	10/29/1993	11/5/1993	4/14/1994	4/21/1994	4/28/1994	5/5/1994	12/28/1995
trans-1,3-Dichloropropene																	
trans-1,4-Dichloro-2-butene																	
Total Xylenes																	
Trichloroethene																	
Trichlorofluoromethane																	
Vinyl Acetate																	
Vinyl Chloride																	
VOLATILES (ug/L)																	
EPA SW8260C-SIM																	
1,1,2,2-Tetrachloroethane																	
1,1-Dichloroethene																	
cis-1,2-Dichloroethene																	
Tetrachloroethene																	
Trichloroethene																	
Vinyl Chloride																	
SEMIVOLATILES (ug/L)																	
EPA SW8270D (a)																	
1,2,4-Trichlorobenzene																	
1,2-Dichlorobenzene																	
1,3-Dichlorobenzene																	
1,4-Dichlorobenzene																	
1-Methylnaphthalene																	
2,2'-Oxybis(1-Chloropropane)																	
2,4,5-Trichlorophenol																	
2,4,6-Trichlorophenol																	
2,4-Dichlorophenol																	
2,4-Dimethylphenol																	
2,4-Dinitrophenol																	
2,4-Dinitrotoluene																	
2,6-Dinitrotoluene																	
2-Chloronaphthalene																	
2-Chlorophenol																	
2-Methylnaphthalene																	
2-Methylphenol																	
2-Nitroaniline																	
2-Nitrophenol																	
3,3'-Dichlorobenzidine																	
3-Nitroaniline																	
4,6-Dinitro-2-Methylphenol																	
4-Bromophenyl-phenylether																	
4-Chloro-3-methylphenol																	
4-Chloroaniline																	
4-Chlorophenyl-phenylether																	
4-Methylphenol																	
4-Nitroaniline																	
4-Nitrophenol																	
Acenaphthene																	
Acenaphthylene																	
Anthracene																	
Benzo(a)anthracene																	
Benzo(a)pyrene																	
Benzo(b)fluoranthene																	
Benzo(g,h,i)perylene																	
Benzo(k)fluoranthene																	
Benzoic Acid																	
Benzyl Alcohol																	
bis(2-Chloroethoxy) Methane																	
Bis-(2-Chloroethyl) Ether																	
bis(2-Ethylhexyl)phthalate																	
Butylbenzylphthalate																	

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-205																
Sample ID:	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s	I-205s
Laboratory ID:																	
Sample Date:	9/24/1992	10/1/1992	10/8/1992	10/15/1992	4/8/1993	4/15/1993	4/22/1993	4/29/1993	10/15/1993	10/22/1993	10/29/1993	11/5/1993	4/14/1994	4/21/1994	4/28/1994	5/5/1994	12/28/1995
Carbazole																	
Chrysene																	
Dibenz(a,h)anthracene																	
Dibenzofuran																	
Diethylphthalate																	
Dimethylphthalate																	
Di-n-Butylphthalate																	
Di-n-Octyl phthalate																	
Fluoranthene																	
Fluorene																	
Hexachlorobenzene																	
Hexachlorobutadiene																	
Hexachlorocyclopentadiene																	
Hexachloroethane																	
Indeno(1,2,3-cd)pyrene																	
Isophorone																	
Naphthalene																	
Nitrobenzene																	
N-Nitroso-Di-N-Propylamine																	
N-Nitrosodiphenylamine																	
Pentachlorophenol																	
Phenanthrene																	
Phenol																	
Pyrene																	
PAHs (ug/L)																	
EPA SW8270D-SIM																	
1-Methylnaphthalene																	
2-Methylnaphthalene																	
Acenaphthene																	
Acenaphthylene																	
Anthracene																	
Benzo(a)anthracene																	
Benzo(a)pyrene																	
Benzo(b)fluoranthene																	
Benzo(g,h,i)perylene																	
Benzo(k)fluoranthene																	
Chrysene																	
Dibenz(a,h)anthracene																	
Dibenzofuran																	
Fluoranthene																	
Fluorene																	
Indeno(1,2,3-cd)pyrene																	
Naphthalene																	
Phenanthrene																	
Pyrene																	
TEQ																	
CONVENTIONALS (ug/L)																	
Chloride																	
Total Cyanide																	
Fluoride																	
Oil and Grease																	
Sulfate																	
Total Organic Carbon (EPA 415.1 (a))																	
Ferrous Iron (SM3500FeD)																	

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-205								I-206								
Sample ID:	I-205s	I-205s	I-205s	I-205s	I-205	I-205	Dup of I-205 I-2055	I-205	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s
Laboratory ID:					NB06D/NB06K	OL19E	OL19G	PC88E/PC88L									
Sample Date:	4/19/1996	12/1/1999	8/24/2000	10/25/2000	6/16/2008	2/4/2009	2/4/2009	6/16/2009	2/1/1988	3/21/1991	3/28/1991	4/4/1991	4/11/1991	9/12/1991	9/19/1991	9/26/1991	10/3/1991
TOTAL METALS (ug/L)																	
EPA 200.8/SW6010B/SW7470A (a)																	
Antimony																	
Arsenic	**26**		**27**	**112**													
Barium																	
Cadmium																	
Chromium																	
Copper																	
Iron					**27,500**			**12,900**									
Lead																	
Manganese																	
Mercury																	
Nickel																	
Selenium																	
Silver																	
Zinc																	
DISSOLVED METALS (ug/L)																	
EPA 200.8/SW6010B/SW7470A (a)																	
Arsenic	**320**	**10**	**27**	**112**	**45.9**	**28.1**	**27.4**	**33.5**	**1700**	**1780**	**1610**	**1740**	**1730**	**1470**	**1790**	**1580**	**1610**
Barium																	
Cadmium						2 U	2 U										
Chromium						5 U	5 U		**2**								
Copper						2 U	2 U		**3**								
Iron																	
Lead						1 U	1 U		**1**								
Manganese																	
Mercury						0.1 U	0.1 U										
Nickel									1 U								
Selenium																	
Silver																	
Zinc						10 U	10 U		2 U								
PETROLEUM HYDROCARBONS (ug/L)																	
NWTPH-HCID																	
Diesel Range Organics						630 U	630 U										
Gasoline Range Organics						250 U	250 U										
Lube Oil						630 U	630 U										
NWTPH-Dx																	
Diesel Range Organics																	
Lube Oil																	
PCBs (ug/L)																	
EPA SW8082																	
Aroclor 1016						1 U	1 U										
Aroclor 1221						1 U	1 U										
Aroclor 1232						1 U	1 U										
Aroclor 1242						1 U	1 U										
Aroclor 1248						1 U	1 U										
Aroclor 1254						1 U	1 U										
Aroclor 1260						1 U	1 U										
Total PCBs						1 U	1 U										
VOLATILES (ug/L)																	
EPA SW8260B (a)																	
1,1,2,2-Tetrachloroethane						0.2 U	0.2 U										
1,1,1-Trichloroethane						0.2 U	0.2 U										
1,1,2,2-Tetrachloroethane						0.2 U	0.2 U										
1,1,2-Trichloro-1,2,2-Trifluoroethane						0.2 U	0.2 U										
1,1,2-Trichloroethane						0.2 U	0.2 U										
1,1-Dichloroethane						0.2 U	0.2 U										

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-205								I-206								
							Dup of I-205										
Sample ID:	I-205s	I-205s	I-205s	I-205s	I-205	I-205	I-2055	I-205	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s
Laboratory ID:					NB06D/NB06K	OL19E	OL19G	PC88E/PC88L									
Sample Date:	4/19/1996	12/1/1999	8/24/2000	10/25/2000	6/16/2008	2/4/2009	2/4/2009	6/16/2009	2/1/1988	3/21/1991	3/28/1991	4/4/1991	4/11/1991	9/12/1991	9/19/1991	9/26/1991	10/3/1991
1,1-Dichloroethene						0.2 U	0.2 U										
1,2-Dichloroethane																	
1,2-Dichloroethene (total)																	
1,1-Dichloropropene						0.2 U	0.2 U										
1,2-Dichloropropane																	
1,2,3-Trichlorobenzene						0.5 U	0.5 U										
1,2,3-Trichloropropane						0.5 U	0.5 U										
1,2,4-Trichlorobenzene						0.5 U	0.5 U										
1,2,4-Trimethylbenzene						0.2 U	0.2 U										
1,2-Dibromo-3-chloropropane						0.5 U	0.5 U										
1,2-Dichlorobenzene						0.2 U	0.2 U										
1,2-Dichloroethane						0.2 U	0.2 U										
1,2-Dichloropropane						0.2 U	0.2 U										
1,3,5-Trimethylbenzene						0.2 U	0.2 U										
1,3-Dichlorobenzene						0.2 U	0.2 U										
1,3-Dichloropropane						0.2 U	0.2 U										
1,4-Dichlorobenzene						0.2 U	0.2 U										
2,2-Dichloropropane						0.2 U	0.2 U										
2-Butanone						2.5 U	2.5 U										
2-Chloroethylvinylether						1 U	1 U										
2-Chlorotoluene						0.2 U	0.2 U										
2-Hexanone						2.5 U	2.5 U										
4-Chlorotoluene						0.2 U	0.2 U										
4-Isopropyltoluene						0.2 U	0.2 U										
4-Methyl-2-Pentanone (MIBK)						2.5 U	2.5 U										
Acetone						2.5 U	2.5 U										
Acrolein						5 U	5 U										
Acrylonitrile						1 U	1 U										
Benzene						0.2 U	0.2 U										
Bromobenzene						0.2 U	0.2 U										
Bromochloromethane						0.2 U	0.2 U										
Bromodichloromethane						0.2 U	0.2 U										
Bromoethane						0.2 U	0.2 U										
Bromoform						0.2 U	0.2 U										
Bromomethane						0.5 U	0.5 U										
Carbon Disulfide						0.2 U	0.2 U										
Carbon Tetrachloride						0.2 U	0.2 U										
Chlorobenzene						0.2 U	0.2 U										
Chloroethane						0.2 U	0.2 U										
Chloroform						0.2 U	0.2 U										
Chloromethane						0.2 U	0.2 U										
cis-1,2-Dichloroethene						0.2 U	0.2 U										
cis-1,3-Dichloropropene						0.2 U	0.2 U										
Dibromochloromethane						0.2 U	0.2 U										
Dibromomethane						0.2 U	0.2 U										
Ethylbenzene						0.2 U	0.2 U										
Ethylene Dibromide						0.2 U	0.2 U										
Hexachlorobutadiene						0.5 U	0.5 U										
Isopropylbenzene						0.2 U	0.2 U										
m, p-Xylene						0.4 U	0.4 U										
Methyl Iodide						1 U	1 U										
Methylene Chloride						0.5 U	0.5 U										
Naphthalene						0.5 U	0.5 U										
n-Butylbenzene						0.2 U	0.2 U										
n-Propylbenzene						0.2 U	0.2 U										
o-Xylene						0.2 U	0.2 U										
sec-Butylbenzene						0.2 U	0.2 U										
Styrene						0.2 U	0.2 U										
tert-Butylbenzene						0.2 U	0.2 U										
Tetrachloroethene						0.2 U	0.2 U										
Toluene						0.2 U	0.2 U										
trans-1,2-Dichloroethene						0.2 U	0.2 U										

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-205								I-206								
							Dup of I-205										
Sample ID:	I-205s	I-205s	I-205s	I-205s	I-205	I-205	I-2055	I-205	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s
Laboratory ID:					NB06D/NB06K	OL19E	OL19G	PC88E/PC88L									
Sample Date:	4/19/1996	12/1/1999	8/24/2000	10/25/2000	6/16/2008	2/4/2009	2/4/2009	6/16/2009	2/1/1988	3/21/1991	3/28/1991	4/4/1991	4/11/1991	9/12/1991	9/19/1991	9/26/1991	10/3/1991
trans-1,3-Dichloropropene						0.2 U	0.2 U										
trans-1,4-Dichloro-2-butene						1 U	1 U										
Total Xylenes																	
Trichloroethene						0.2 U	0.2 U										
Trichlorofluoromethane						0.2 U	0.2 U										
Vinyl Acetate						1 U	1 U										
Vinyl Chloride						0.2 U	0.2 U										
VOLATILES (ug/L)																	
EPA SW8260C-SIM																	
1,1,2,2-Tetrachloroethane																	
1,1-Dichloroethene																	
cis-1,2-Dichloroethene																	
Tetrachloroethene																	
Trichloroethene																	
Vinyl Chloride																	
SEMIVOLATILES (ug/L)																	
EPA SW8270D (a)																	
1,2,4-Trichlorobenzene						1 UJ	1 U										
1,2-Dichlorobenzene						1 UJ	1 U										
1,3-Dichlorobenzene						1 UJ	1 U										
1,4-Dichlorobenzene						1 UJ	1 U										
1-Methylnaphthalene						1 UJ	1 U										
2,2'-Oxybis(1-Chloropropane)						1 UJ	1 U										
2,4,5-Trichlorophenol						5 UJ	5 U										
2,4,6-Trichlorophenol						5 UJ	5 U										
2,4-Dichlorophenol						5 UJ	5 U										
2,4-Dimethylphenol						1 UJ	1 U										
2,4-Dinitrophenol						10 UJ	10 U										
2,4-Dinitrotoluene						5 UJ	5 U										
2,6-Dinitrotoluene						5 UJ	5 U										
2-Chloronaphthalene						1 UJ	1 U										
2-Chlorophenol						1 UJ	1 U										
2-Methylnaphthalene						1 UJ	1 U										
2-Methylphenol						1 UJ	1 U										
2-Nitroaniline						5 UJ	5 U										
2-Nitrophenol						5 UJ	5 U										
3,3'-Dichlorobenzidine						5 UJ	5 U										
3-Nitroaniline						5 UJ	5 U										
4,6-Dinitro-2-Methylphenol						10 UJ	10 U										
4-Bromophenyl-phenylether						1 UJ	1 U										
4-Chloro-3-methylphenol						5 UJ	5 U										
4-Chloroaniline						5 UJ	5 U										
4-Chlorophenyl-phenylether						1 UJ	1 U										
4-Methylphenol						1 UJ	1 U										
4-Nitroaniline						5 UJ	5 U										
4-Nitrophenol						5 UJ	5 UJ										
Acenaphthene						1 UJ	1 U										
Acenaphthylene						1 UJ	1 U										
Anthracene						1 UJ	1 U										
Benzo(a)anthracene						1 UJ	1 U										
Benzo(a)pyrene						1 UJ	1 U										
Benzo(b)fluoranthene						1 UJ	1 U										
Benzo(g,h,i)perylene						1 UJ	1 U										
Benzo(k)fluoranthene						1 UJ	1 U										
Benzoic Acid						10 UJ	10 U										
Benzyl Alcohol						5 UJ	5 U										
bis(2-Chloroethoxy) Methane						1 UJ	1 U										
Bis-(2-Chloroethyl) Ether						1 UJ	1 U										
bis(2-Ethylhexyl)phthalate						1 UJ	1 U										
Butylbenzylphthalate						1 UJ	1 U										

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-205								I-206								
							Dup of I-205										
Sample ID:	I-205s	I-205s	I-205s	I-205s	I-205	I-205	I-2055	I-205	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s
Laboratory ID:					NB06D/NB06K	OL19E	OL19G	PC88E/PC88L									
Sample Date:	4/19/1996	12/1/1999	8/24/2000	10/25/2000	6/16/2008	2/4/2009	2/4/2009	6/16/2009	2/1/1988	3/21/1991	3/28/1991	4/4/1991	4/11/1991	9/12/1991	9/19/1991	9/26/1991	10/3/1991
Carbazole						1 UJ	1 U										
Chrysene						1 UJ	1 U										
Dibenz(a,h)anthracene						1 UJ	1 U										
Dibenzofuran						1 UJ	1 U										
Diethylphthalate						1 UJ	1 U										
Dimethylphthalate						1 UJ	1 U										
Di-n-Butylphthalate						1 UJ	1 U										
Di-n-Octyl phthalate						1 UJ	1 U										
Fluoranthene						1 UJ	1 U										
Fluorene						1 UJ	1 U										
Hexachlorobenzene						1 UJ	1 U										
Hexachlorobutadiene						1 UJ	1 U										
Hexachlorocyclopentadiene						5 UJ	5 U										
Hexachloroethane						1 UJ	1 U										
Indeno(1,2,3-cd)pyrene						1 UJ	1 U										
Isophorone						1 UJ	1 U										
Naphthalene						1 UJ	1 U										
Nitrobenzene						1 UJ	1 U										
N-Nitroso-Di-N-Propylamine						5 UJ	5 U										
N-Nitrosodiphenylamine						1 UJ	1 U										
Pentachlorophenol						5 UJ	5 U										
Phenanthrene						1 UJ	1 U										
Phenol						1 UJ	1 UJ										
Pyrene						1 UJ	1 U										
PAHs (ug/L)																	
EPA SW8270D-SIM																	
1-Methylnaphthalene																	
2-Methylnaphthalene																	
Acenaphthene																	
Acenaphthylene																	
Anthracene																	
Benzo(a)anthracene						0.1 U	0.1 U										
Benzo(a)pyrene						0.1 U	0.1 U										
Benzo(b)fluoranthene						0.1 U	0.1 U										
Benzo(g,h,i)perylene																	
Benzo(k)fluoranthene						0.1 U	0.1 U										
Chrysene						0.1 U	0.1 U										
Dibenz(a,h)anthracene						0.1 U	0.1 U										
Dibenzofuran																	
Fluoranthene																	
Fluorene																	
Indeno(1,2,3-cd)pyrene						0.1 U	0.1 U										
Naphthalene																	
Phenanthrene																	
Pyrene																	
TEQ						NA	NA										
CONVENTIONALS (ug/L)																	
Chloride																	
Total Cyanide																	
Fluoride																	
Oil and Grease																	
Sulfate																	
Total Organic Carbon (EPA 415.1 (a))					**8840**			**10,800**									
Ferrous Iron (SM3500FeD)					**23,400**			**13,100**									

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-206																
Sample ID:	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s
Laboratory ID:																	
Sample Date:	4/16/1992	4/23/1992	4/30/1992	5/7/1992	9/24/1992	10/1/1992	10/8/1992	10/15/1992	4/8/1993	4/15/1993	4/22/1993	4/29/1993	10/15/1993	10/22/1993	10/29/1993	11/5/1993	4/14/1994
TOTAL METALS (ug/L)																	
EPA 200.8/SW6010B/SW7470A (a)																	
Antimony																	
Arsenic																	
Barium																	
Cadmium																	
Chromium																	
Copper																	
Iron																	
Lead																	
Manganese																	
Mercury																	
Nickel																	
Selenium																	
Silver																	
Zinc																	
DISSOLVED METALS (ug/L)																	
EPA 200.8/SW6010B/SW7470A (a)																	
Arsenic	**1610**	**1770**	**1670**	**1600**	**1680** J	**1580**	**1550**	**1700**	**1710**	**1580**	**1510**	**1700**	**1680**	**1590**	**1810**	**1510**	**1360**
Barium																	
Cadmium																	
Chromium																	
Copper																	
Iron																	
Lead																	
Manganese																	
Mercury																	
Nickel																	
Selenium																	
Silver																	
Zinc																	
PETROLEUM HYDROCARBONS (ug/L)																	
NWTPH-HCID																	
Diesel Range Organics																	
Gasoline Range Organics																	
Lube Oil																	
NWTPH-Dx																	
Diesel Range Organics																	
Lube Oil																	
PCBs (ug/L)																	
EPA SW8082																	
Aroclor 1016																	
Aroclor 1221																	
Aroclor 1232																	
Aroclor 1242																	
Aroclor 1248																	
Aroclor 1254																	
Aroclor 1260																	
Total PCBs																	
VOLATILES (ug/L)																	
EPA SW8260B (a)																	
1,1,2,2-Tetrachloroethane																	
1,1,1-Trichloroethane																	
1,1,2,2-Tetrachloroethane																	
1,1,2-Trichloro-1,2,2-Trifluoroethane																	
1,1,2-Trichloroethane																	
1,1-Dichloroethane																	

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-206																
Sample ID:	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s
Laboratory ID:																	
Sample Date:	4/16/1992	4/23/1992	4/30/1992	5/7/1992	9/24/1992	10/1/1992	10/8/1992	10/15/1992	4/8/1993	4/15/1993	4/22/1993	4/29/1993	10/15/1993	10/22/1993	10/29/1993	11/5/1993	4/14/1994
1,1-Dichloroethene																	
1,2-Dichloroethane																	
1,2-Dichloroethene (total)																	
1,1-Dichloropropene																	
1,2-Dichloropropane																	
1,2,3-Trichlorobenzene																	
1,2,3-Trichloropropane																	
1,2,4-Trichlorobenzene																	
1,2,4-Trimethylbenzene																	
1,2-Dibromo-3-chloropropane																	
1,2-Dichlorobenzene																	
1,2-Dichloroethane																	
1,2-Dichloropropane																	
1,3,5-Trimethylbenzene																	
1,3-Dichlorobenzene																	
1,3-Dichloropropane																	
1,4-Dichlorobenzene																	
2,2-Dichloropropane																	
2-Butanone																	
2-Chloroethylvinylether																	
2-Chlorotoluene																	
2-Hexanone																	
4-Chlorotoluene																	
4-Isopropyltoluene																	
4-Methyl-2-Pentanone (MIBK)																	
Acetone																	
Acrolein																	
Acrylonitrile																	
Benzene																	
Bromobenzene																	
Bromochloromethane																	
Bromodichloromethane																	
Bromoethane																	
Bromoform																	
Bromomethane																	
Carbon Disulfide																	
Carbon Tetrachloride																	
Chlorobenzene																	
Chloroethane																	
Chloroform																	
Chloromethane																	
cis-1,2-Dichloroethene																	
cis-1,3-Dichloropropene																	
Dibromochloromethane																	
Dibromomethane																	
Ethylbenzene																	
Ethylene Dibromide																	
Hexachlorobutadiene																	
Isopropylbenzene																	
m, p-Xylene																	
Methyl Iodide																	
Methylene Chloride																	
Naphthalene																	
n-Butylbenzene																	
n-Propylbenzene																	
o-Xylene																	
sec-Butylbenzene																	
Styrene																	
tert-Butylbenzene																	
Tetrachloroethene																	
Toluene																	
trans-1,2-Dichloroethene																	

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-206																
Sample ID:	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s
Laboratory ID:																	
Sample Date:	4/16/1992	4/23/1992	4/30/1992	5/7/1992	9/24/1992	10/1/1992	10/8/1992	10/15/1992	4/8/1993	4/15/1993	4/22/1993	4/29/1993	10/15/1993	10/22/1993	10/29/1993	11/5/1993	4/14/1994
trans-1,3-Dichloropropene																	
trans-1,4-Dichloro-2-butene																	
Total Xylenes																	
Trichloroethene																	
Trichlorofluoromethane																	
Vinyl Acetate																	
Vinyl Chloride																	
VOLATILES (ug/L)																	
EPA SW8260C-SIM																	
1,1,2,2-Tetrachloroethane																	
1,1-Dichloroethene																	
cis-1,2-Dichloroethene																	
Tetrachloroethene																	
Trichloroethene																	
Vinyl Chloride																	
SEMIVOLATILES (ug/L)																	
EPA SW8270D (a)																	
1,2,4-Trichlorobenzene																	
1,2-Dichlorobenzene																	
1,3-Dichlorobenzene																	
1,4-Dichlorobenzene																	
1-Methylnaphthalene																	
2,2'-Oxybis(1-Chloropropane)																	
2,4,5-Trichlorophenol																	
2,4,6-Trichlorophenol																	
2,4-Dichlorophenol																	
2,4-Dimethylphenol																	
2,4-Dinitrophenol																	
2,4-Dinitrotoluene																	
2,6-Dinitrotoluene																	
2-Chloronaphthalene																	
2-Chlorophenol																	
2-Methylnaphthalene																	
2-Methylphenol																	
2-Nitroaniline																	
2-Nitrophenol																	
3,3'-Dichlorobenzidine																	
3-Nitroaniline																	
4,6-Dinitro-2-Methylphenol																	
4-Bromophenyl-phenylether																	
4-Chloro-3-methylphenol																	
4-Chloroaniline																	
4-Chlorophenyl-phenylether																	
4-Methylphenol																	
4-Nitroaniline																	
4-Nitrophenol																	
Acenaphthene																	
Acenaphthylene																	
Anthracene																	
Benzo(a)anthracene																	
Benzo(a)pyrene																	
Benzo(b)fluoranthene																	
Benzo(g,h,i)perylene																	
Benzo(k)fluoranthene																	
Benzoic Acid																	
Benzyl Alcohol																	
bis(2-Chloroethoxy) Methane																	
Bis-(2-Chloroethyl) Ether																	
bis(2-Ethylhexyl)phthalate																	
Butylbenzylphthalate																	

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-206																
Sample ID:	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s
Laboratory ID:																	
Sample Date:	4/16/1992	4/23/1992	4/30/1992	5/7/1992	9/24/1992	10/1/1992	10/8/1992	10/15/1992	4/8/1993	4/15/1993	4/22/1993	4/29/1993	10/15/1993	10/22/1993	10/29/1993	11/5/1993	4/14/1994
Carbazole																	
Chrysene																	
Dibenz(a,h)anthracene																	
Dibenzofuran																	
Diethylphthalate																	
Dimethylphthalate																	
Di-n-Butylphthalate																	
Di-n-Octyl phthalate																	
Fluoranthene																	
Fluorene																	
Hexachlorobenzene																	
Hexachlorobutadiene																	
Hexachlorocyclopentadiene																	
Hexachloroethane																	
Indeno(1,2,3-cd)pyrene																	
Isophorone																	
Naphthalene																	
Nitrobenzene																	
N-Nitroso-Di-N-Propylamine																	
N-Nitrosodiphenylamine																	
Pentachlorophenol																	
Phenanthrene																	
Phenol																	
Pyrene																	
PAHs (ug/L)																	
EPA SW8270D-SIM																	
1-Methylnaphthalene																	
2-Methylnaphthalene																	
Acenaphthene																	
Acenaphthylene																	
Anthracene																	
Benzo(a)anthracene																	
Benzo(a)pyrene																	
Benzo(b)fluoranthene																	
Benzo(g,h,i)perylene																	
Benzo(k)fluoranthene																	
Chrysene																	
Dibenz(a,h)anthracene																	
Dibenzofuran																	
Fluoranthene																	
Fluorene																	
Indeno(1,2,3-cd)pyrene																	
Naphthalene																	
Phenanthrene																	
Pyrene																	
TEQ																	
CONVENTIONALS (ug/L)																	
Chloride																	
Total Cyanide																	
Fluoride																	
Oil and Grease																	
Sulfate																	
Total Organic Carbon (EPA 415.1 (a))																	
Ferrous Iron (SM3500FeD)																	

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-206											PBI-11	PBI-12	PBI-13	PBI-15	PZ-2	PZ-4
Sample ID:	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206	I-206	I-206	PBI-11-GW	PBI-12-GW	PBI-13-GW	PBI-15-GW	PZ-2	PZ-4
Laboratory ID:									NB06F/NB06M	OL19D	PC88G/PC88N	PI41A	PI41B	PI41C	PI41D	OL19C	OL19B
Sample Date:	4/21/1994	4/28/1994	5/5/1994	12/28/1995	4/19/1996	12/1/1999	8/24/2000	10/25/2000	6/16/2008	2/4/2009	6/16/2009	7/28/2009	7/28/2009	7/28/2009	7/28/2009	2/4/2009	2/4/2009
TOTAL METALS (ug/L)																	
EPA 200.8/SW6010B/SW7470A (a)																	
Antimony																	
Arsenic				**1600**	**2270**		**1100**	**1350**									
Barium																	
Cadmium																	
Chromium																	
Copper																	
Iron									**48,400**		**30,500**						
Lead																	
Manganese																	
Mercury																	
Nickel																	
Selenium																	
Silver																	
Zinc																	
DISSOLVED METALS (ug/L)																	
EPA 200.8/SW6010B/SW7470A (a)																	
Arsenic	**1480**	**1370**	**1430**	**2000**	**1800**	**1600**	**1100**	**1350**	**690**	**575**	**412**					**11.3**	**29.2**
Barium																	
Cadmium										2 U						2 U	2 U
Chromium										5 U						5 U	5 U
Copper										2 U						2 U	2 U
Iron																	
Lead										1 U						1 U	1 U
Manganese																	
Mercury										0.1 U						0.1 U	0.1 U
Nickel																	
Selenium																	
Silver																	
Zinc										10 U						10 U	10 U
PETROLEUM HYDROCARBONS (ug/L)																	
NWTPH-HCID																	
Diesel Range Organics										630 U						630 U	630 U
Gasoline Range Organics										250 U						250 U	250 U
Lube Oil										630 U						630 U	630 U
NWTPH-Dx																	
Diesel Range Organics																	
Lube Oil																	
PCBs (ug/L)																	
EPA SW8082																	
Aroclor 1016										1 U						1 U	1 U
Aroclor 1221										1 U						1 U	1 U
Aroclor 1232										1 U						1 U	1 U
Aroclor 1242										1 U						1 U	1 U
Aroclor 1248										1 U						1 U	1 U
Aroclor 1254										1 U						1 U	1 U
Aroclor 1260										1 U						1 U	1 U
Total PCBs										1 U						1 U	1 U
VOLATILES (ug/L)																	
EPA SW8260B (a)																	
1,1,2,2-Tetrachloroethane										0.2 U		1 U		1 U		0.2 U	0.2 U
1,1,1-Trichloroethane										0.2 U						0.2 U	0.2 U
1,1,2,2-Tetrachloroethane										0.2 U						0.2 U	0.2 U
1,1,2-Trichloro-1,2,2-Trifluoroethane										0.2 U						0.2 U	0.2 U
1,1,2-Trichloroethane										0.2 U						0.2 U	0.2 U
1,1-Dichloroethane										**0.3**						0.2 U	0.2 U

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-206											PBI-11	PBI-12	PBI-13	PBI-15	PZ-2	PZ-4
Sample ID:	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206	I-206	I-206	PBI-11-GW	PBI-12-GW	PBI-13-GW	PBI-15-GW	PZ-2	PZ-4
Laboratory ID:									NB06F/NB06M	OL19D	PC88G/PC88N	PI41A	PI41B	PI41C	PI41D	OL19C	OL19B
Sample Date:	4/21/1994	4/28/1994	5/5/1994	12/28/1995	4/19/1996	12/1/1999	8/24/2000	10/25/2000	6/16/2008	2/4/2009	6/16/2009	7/28/2009	7/28/2009	7/28/2009	7/28/2009	2/4/2009	2/4/2009
1,1-Dichloroethene										0.2 U		**1.2**		1 U		0.2 U	0.2 U
1,2-Dichloroethane																	
1,2-Dichloroethene (total)																	
1,1-Dichloropropene										0.2 U						0.2 U	0.2 U
1,2-Dichloropropane																	
1,2,3-Trichlorobenzene										0.5 U						0.5 U	0.5 U
1,2,3-Trichloropropane										0.5 U						0.5 U	0.5 U
1,2,4-Trichlorobenzene										0.5 U						0.5 U	0.5 U
1,2,4-Trimethylbenzene										0.2 U						0.2 U	0.2 U
1,2-Dibromo-3-chloropropane										0.5 U						0.5 U	0.5 U
1,2-Dichlorobenzene										0.2 U						0.2 U	0.2 U
1,2-Dichloroethane										0.2 U						0.2 U	0.2 U
1,2-Dichloropropane										0.2 U						**0.3**	0.2 U
1,3,5-Trimethylbenzene										0.2 U						0.2 U	0.2 U
1,3-Dichlorobenzene										0.2 U						0.2 U	0.2 U
1,3-Dichloropropane										0.2 U						0.2 U	0.2 U
1,4-Dichlorobenzene										0.2 U						0.2 U	0.2 U
2,2-Dichloropropane										0.2 U						0.2 U	0.2 U
2-Butanone										2.5 U						2.5 U	2.5 U
2-Chloroethylvinylether										1 U						1 U	1 U
2-Chlorotoluene										0.2 U						0.2 U	0.2 U
2-Hexanone										2.5 U						2.5 U	2.5 U
4-Chlorotoluene										0.2 U						0.2 U	0.2 U
4-Isopropyltoluene										0.2 U						0.2 U	0.2 U
4-Methyl-2-Pentanone (MIBK)										2.5 U						2.5 U	2.5 U
Acetone										**4.2**						**2.6**	**3**
Acrolein										5 U						5 U	5 U
Acrylonitrile										1 U						1 U	1 U
Benzene										0.2 U						0.2 U	0.2 U
Bromobenzene										0.2 U						0.2 U	0.2 U
Bromochloromethane										0.2 U						0.2 U	0.2 U
Bromodichloromethane										0.2 U						0.2 U	0.2 U
Bromoethane										0.2 U						0.2 U	0.2 U
Bromoform										0.2 U						0.2 U	0.2 U
Bromomethane										0.5 U						0.5 U	0.5 U
Carbon Disulfide										0.2 U						0.2 U	0.2 U
Carbon Tetrachloride										0.2 U						0.2 U	0.2 U
Chlorobenzene										0.2 U						0.2 U	0.2 U
Chloroethane										0.2 U						0.2 U	0.2 U
Chloroform										0.2 U						0.2 U	0.2 U
Chloromethane										0.2 U						0.2 U	0.2 U
cis-1,2-Dichloroethene										**0.7**		**100**		**190**		**0.5**	0.2 U
cis-1,3-Dichloropropene										0.2 U						0.2 U	0.2 U
Dibromochloromethane										0.2 U						0.2 U	0.2 U
Dibromomethane										0.2 U						0.2 U	0.2 U
Ethylbenzene										0.2 U						0.2 U	0.2 U
Ethylene Dibromide										0.2 U						0.2 U	0.2 U
Hexachlorobutadiene										0.5 U						0.5 U	0.5 U
Isopropylbenzene										0.2 U						0.2 U	0.2 U
m, p-Xylene										0.4 U						0.4 U	0.4 U
Methyl Iodide										1 U						1 U	1 U
Methylene Chloride										0.5 U						0.5 U	0.5 U
Naphthalene										0.5 U						0.5 U	0.5 U
n-Butylbenzene										0.2 U						0.2 U	0.2 U
n-Propylbenzene										0.2 U						0.2 U	0.2 U
o-Xylene										0.2 U						0.2 U	0.2 U
sec-Butylbenzene										0.2 U						0.2 U	0.2 U
Styrene										0.2 U						0.2 U	0.2 U
tert-Butylbenzene										0.2 U						0.2 U	0.2 U
Tetrachloroethene										0.2 U		1 U		**78**		0.2 U	0.2 U
Toluene										0.2 U						0.2 U	0.2 U
trans-1,2-Dichloroethene										**0.4**						0.2 U	0.2 U

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	**I-206**											**PBI-11**	**PBI-12**	**PBI-13**	**PBI-15**	**PZ-2**	**PZ-4**
Sample ID:	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206	I-206	I-206	PBI-11-GW	PBI-12-GW	PBI-13-GW	PBI-15-GW	PZ-2	PZ-4
Laboratory ID:									NB06F/NB06M	OL19D	PC88G/PC88N	PI41A	PI41B	PI41C	PI41D	OL19C	OL19B
Sample Date:	4/21/1994	4/28/1994	5/5/1994	12/28/1995	4/19/1996	12/1/1999	8/24/2000	10/25/2000	6/16/2008	2/4/2009	6/16/2009	7/28/2009	7/28/2009	7/28/2009	7/28/2009	2/4/2009	2/4/2009
trans-1,3-Dichloropropene										0.2 U						0.2 U	0.2 U
trans-1,4-Dichloro-2-butene										1 U						1 U	1 U
Total Xylenes																	
Trichloroethene										0.2 U		**2.4**		**1000**		0.2 U	0.2 U
Trichlorofluoromethane										0.2 U						0.2 U	0.2 U
Vinyl Acetate										1 U						1 U	1 U
Vinyl Chloride										**1.8**		**1.3**		1 U		0.2 U	0.2 U
VOLATILES (ug/L)																	
EPA SW8260C-SIM																	
1,1,2,2-Tetrachloroethane												0.02 U	0.02 U	0.02 UJ	0.02 U		
1,1-Dichloroethene												**1.2**	0.02 U	**0.58** J	**0.14**		
cis-1,2-Dichloroethene												**77** ES	**0.68**	**92** ESJ	0.02 U		
Tetrachloroethene												**0.038**	**0.071**	**32** ESJ	0.02 U		
Trichloroethene												**2.3**	**0.28**	**57** ESJ	0.02 U		
Vinyl Chloride												**1.3**	**0.18**	**0.051** J	0.02 U		
SEMIVOLATILES (ug/L)																	
EPA SW8270D (a)																	
1,2,4-Trichlorobenzene										1 U						1 U	1 UJ
1,2-Dichlorobenzene										1 U						1 U	1 UJ
1,3-Dichlorobenzene										1 U						1 U	1 UJ
1,4-Dichlorobenzene										1 U						1 U	1 UJ
1-Methylnaphthalene										1 U						1 U	1 UJ
2,2'-Oxybis(1-Chloropropane)										1 U						1 U	1 UJ
2,4,5-Trichlorophenol										5 U						5 U	5 U
2,4,6-Trichlorophenol										5 U						5 U	5 U
2,4-Dichlorophenol										5 U						5 U	5 U
2,4-Dimethylphenol										1 U						1 U	1 U
2,4-Dinitrophenol										10 U						10 U	10 U
2,4-Dinitrotoluene										5 U						5 U	5 UJ
2,6-Dinitrotoluene										5 U						5 U	5 UJ
2-Chloronaphthalene										1 U						1 U	1 UJ
2-Chlorophenol										1 U						1 U	1 U
2-Methylnaphthalene										1 U						1 U	1 UJ
2-Methylphenol										1 U						1 U	1 U
2-Nitroaniline										5 U						5 U	5 UJ
2-Nitrophenol										5 U						5 U	5 U
3,3'-Dichlorobenzidine										5 U						5 U	5 UJ
3-Nitroaniline										5 U						5 U	5 UJ
4,6-Dinitro-2-Methylphenol										10 U						10 U	10 U
4-Bromophenyl-phenylether										1 U						1 U	1 UJ
4-Chloro-3-methylphenol										5 U						5 U	5 U
4-Chloroaniline										5 U						5 U	5 UJ
4-Chlorophenyl-phenylether										1 U						1 U	1 UJ
4-Methylphenol										1 U						1 U	1 U
4-Nitroaniline										5 U						5 U	5 UJ
4-Nitrophenol										5 UJ						5 UJ	5 UJ
Acenaphthene										1 U						1 U	1 UJ
Acenaphthylene										1 U						1 U	1 UJ
Anthracene										1 U						1 U	1 UJ
Benzo(a)anthracene										1 U						1 U	1 UJ
Benzo(a)pyrene										1 U						1 U	1 UJ
Benzo(b)fluoranthene										1 U						1 U	1 UJ
Benzo(g,h,i)perylene										1 U						1 U	1 UJ
Benzo(k)fluoranthene										1 U						1 U	1 UJ
Benzoic Acid										10 U						10 U	10 U
Benzyl Alcohol										5 U						5 U	5 UJ
bis(2-Chloroethoxy) Methane										1 U						1 U	1 UJ
Bis-(2-Chloroethyl) Ether										1 U						1 U	1 UJ
bis(2-Ethylhexyl)phthalate										1 U						1 U	1 UJ
Butylbenzylphthalate										1 U						1 U	1 UJ

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	I-206											PBI-11	PBI-12	PBI-13	PBI-15	PZ-2	PZ-4
Sample ID:	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206s	I-206	I-206	I-206	PBI-11-GW	PBI-12-GW	PBI-13-GW	PBI-15-GW	PZ-2	PZ-4
Laboratory ID:									NB06F/NB06M	OL19D	PC88G/PC88N	PI41A	PI41B	PI41C	PI41D	OL19C	OL19B
Sample Date:	4/21/1994	4/28/1994	5/5/1994	12/28/1995	4/19/1996	12/1/1999	8/24/2000	10/25/2000	6/16/2008	2/4/2009	6/16/2009	7/28/2009	7/28/2009	7/28/2009	7/28/2009	2/4/2009	2/4/2009
Carbazole										1 U						1 U	1 UJ
Chrysene										1 U						1 U	1 UJ
Dibenz(a,h)anthracene										1 U						1 U	1 UJ
Dibenzofuran										1 U						1 U	1 UJ
Diethylphthalate										1 U						1 U	1 UJ
Dimethylphthalate										1 U						1 U	1 UJ
Di-n-Butylphthalate										1 U						1 U	1 UJ
Di-n-Octyl phthalate										1 U						1 U	1 UJ
Fluoranthene										1 U						1 U	1 UJ
Fluorene										1 U						1 U	1 UJ
Hexachlorobenzene										1 U						1 U	1 UJ
Hexachlorobutadiene										1 U						1 U	1 UJ
Hexachlorocyclopentadiene										5 U						5 U	5 UJ
Hexachloroethane										1 U						1 U	1 UJ
Indeno(1,2,3-cd)pyrene										1 U						1 U	1 UJ
Isophorone										1 U						1 U	1 UJ
Naphthalene										1 U						1 U	1 UJ
Nitrobenzene										1 U						1 U	1 UJ
N-Nitroso-Di-N-Propylamine										5 U						5 U	5 UJ
N-Nitrosodiphenylamine										1 U						1 U	1 UJ
Pentachlorophenol										5 U						5 U	5 U
Phenanthrene										1 U						1 U	1 UJ
Phenol										1 UJ						1 UJ	1 UJ
Pyrene										1 U						1 U	1 UJ
PAHs (ug/L)																	
EPA SW8270D-SIM																	
1-Methylnaphthalene																	
2-Methylnaphthalene																	
Acenaphthene																	
Acenaphthylene																	
Anthracene																	
Benzo(a)anthracene										0.1 U						0.1 U	0.1 U
Benzo(a)pyrene										0.1 U						0.1 U	0.1 U
Benzo(b)fluoranthene										0.1 U						0.1 U	0.1 U
Benzo(g,h,i)perylene																	
Benzo(k)fluoranthene										0.1 U						0.1 U	0.1 U
Chrysene										0.1 U						0.1 U	0.1 U
Dibenz(a,h)anthracene										0.1 U						0.1 U	0.1 U
Dibenzofuran																	
Fluoranthene																	
Fluorene																	
Indeno(1,2,3-cd)pyrene										0.1 U						0.1 U	0.1 U
Naphthalene																	
Phenanthrene																	
Pyrene																	
TEQ										NA						NA	NA
CONVENTIONALS (ug/L)																	
Chloride																	
Total Cyanide																	
Fluoride																	
Oil and Grease																	
Sulfate																	
Total Organic Carbon (EPA 415.1 (a))									**12,000**		**11,800**						
Ferrous Iron (SM3500FeD)									**47,200**		**30,200**						

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

												Former Washdown System Piping North of 14-01		
Location:	PZ-6	PZ-7					PZ-8					TDP1	TDP25	TDP26
Sample ID:	PZ-6	PZ-7	PZ-7	PZ-7	PZ-7	PZ-7	PZ-8	PZ-8	PZ-8	PZ-8	PZ-8	TDP1-GW	TDP25-GW	TDP26-GW
Laboratory ID:	OL24A			NB06B/NB06I	OK85A	PC88C/PC88J			NB06E/NB06L	OL19A	PC88F/PC88M	NX93F	NY44M	NY64H
Sample Date:	2/4/2009	8/24/2000	10/25/2000	6/16/2008	2/2/2009	6/16/2009	8/24/2000	10/25/2000	6/16/2008	2/4/2009	6/16/2009	11/3/2008	11/5/2008	11/6/2008
TOTAL METALS (ug/L)														
EPA 200.8/SW6010B/SW7470A (a)														
Antimony														
Arsenic														
Barium														
Cadmium														
Chromium														
Copper														
Iron				**70**		50 U			**32,400**		**28,000**			
Lead														
Manganese														
Mercury														
Nickel														
Selenium														
Silver														
Zinc														
DISSOLVED METALS (ug/L)														
EPA 200.8/SW6010B/SW7470A (a)														
Arsenic	**505**	**9**	**3.7**	**18.4**	**5**	**15.5**	**2**	**2.8**	**3.6**	1 U	**2**	**13**	**4**	**1.3**
Barium														
Cadmium	2 U				2 U					2 U		2 U	2 U	2 U
Chromium	5 U				5 U					5 U		**6**	5 U	5 U
Copper	2 U				2 U					2 U		2 U	2 U	2 U
Iron														
Lead	5 U				1 U					1 U		1 U	1 U	1 U
Manganese														
Mercury	0.1 U				0.1 U					0.1 U		0.1 U	0.1 U	0.1 U
Nickel														
Selenium														
Silver														
Zinc	10 U				10 U					10 U				
PETROLEUM HYDROCARBONS (ug/L)														
NWTPH-HCID														
Diesel Range Organics	630 U				630 U					630 U		630 U	630 U	630 U
Gasoline Range Organics	250 U				250 U					250 U		250 U	250 U	250 U
Lube Oil	630 U				630 U					630 U		630 U	630 U	630 U
NWTPH-Dx														
Diesel Range Organics														
Lube Oil														
PCBs (ug/L)														
EPA SW8082														
Aroclor 1016	1 U				1 U					1 U		1 U	1 U	1 U
Aroclor 1221	1 U				1 U					1 U		1 U	1 U	1 U
Aroclor 1232	1 U				1 U					1 U		1 U	1 U	1 U
Aroclor 1242	1 U				1 U					1 U		1 U	1 U	1 U
Aroclor 1248	1 U				1 U					1 U		1 U	1 U	1 U
Aroclor 1254	1 U				1 U					1 U		1 U	1 U	1 U
Aroclor 1260	1 U				1 U					1 U		1 U	1 U	1 U
Total PCBs	1 U				1 U					1 U		1 U	1 U	1 U
VOLATILES (ug/L)														
EPA SW8260B (a)														
1,1,2,2-Tetrachloroethane	0.2 U				0.2 U					0.2 U		1 U	0.2 U	1 U
1,1,1-Trichloroethane	0.2 U				0.2 U					0.2 U		1 U	**0.4**	**1.2**
1,1,2,2-Tetrachloroethane	0.2 U				0.2 U					0.2 U				
1,1,2-Trichloro-1,2,2-Trifluoroethane	0.2 U				0.2 U					0.2 U		2 U	0.2 U	2 U
1,1,2-Trichloroethane	0.2 U				0.2 U					0.2 U		1 U	0.2 U	1 U
1,1-Dichloroethane	0.2 U				0.2 U					0.2 U		1 U	**1.9**	**4**

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

												Former Washdown System Piping North of 14-01		
Location:	**PZ-6**	**PZ-7**					**PZ-8**					**TDP1**	**TDP25**	**TDP26**
Sample ID:	PZ-6	PZ-7	PZ-7	PZ-7	PZ-7	PZ-7	PZ-8	PZ-8	PZ-8	PZ-8	PZ-8	TDP1-GW	TDP25-GW	TDP26-GW
Laboratory ID:	OL24A			NB06B/NB06I	OK85A	PC88C/PC88J			NB06E/NB06L	OL19A	PC88F/PC88M	NX93F	NY44M	NY64H
Sample Date:	2/4/2009	8/24/2000	10/25/2000	6/16/2008	2/2/2009	6/16/2009	8/24/2000	10/25/2000	6/16/2008	2/4/2009	6/16/2009	11/3/2008	11/5/2008	11/6/2008
1,1-Dichloroethene	0.2 U				0.2 U					0.2 U		1 U	0.2 U	**1**
1,2-Dichloroethane												1 U	0.2 U	1 U
1,2-Dichloroethene (total)														
1,1-Dichloropropene	0.2 U				0.2 U					0.2 U				
1,2-Dichloropropane												1 U	0.2 U	1 U
1,2,3-Trichlorobenzene	0.5 U				0.5 U					0.5 U				
1,2,3-Trichloropropane	0.5 U				0.5 U					0.5 U				
1,2,4-Trichlorobenzene	0.5 U				0.5 U					0.5 U				
1,2,4-Trimethylbenzene	0.2 U				0.2 U					0.2 U				
1,2-Dibromo-3-chloropropane	0.5 U				0.5 U					0.5 U				
1,2-Dichlorobenzene	0.2 U				0.2 U					0.2 U				
1,2-Dichloroethane	0.2 U				0.2 U					0.2 U				
1,2-Dichloropropane	0.2 U				0.2 U					0.2 U				
1,3,5-Trimethylbenzene	0.2 U				0.2 U					0.2 U				
1,3-Dichlorobenzene	0.2 U				0.2 U					0.2 U				
1,3-Dichloropropane	0.2 U				0.2 U					0.2 U				
1,4-Dichlorobenzene	0.2 U				0.2 U					0.2 U				
2,2-Dichloropropane	0.2 U				0.2 U					0.2 U				
2-Butanone	2.5 U				2.5 U					2.5 U		5 U	2.5 U	5 U
2-Chloroethylvinylether	1 U				1 U					1 U		5 U	1 U	5 U
2-Chlorotoluene	0.2 U				0.2 U					0.2 U				
2-Hexanone	2.5 U				2.5 U					2.5 U		5 U	2.5 U	5 U
4-Chlorotoluene	0.2 U				0.2 U					0.2 U				
4-Isopropyltoluene	0.2 U				0.2 U					0.2 U				
4-Methyl-2-Pentanone (MIBK)	2.5 U				2.5 U					2.5 U		5 U	2.5 U	5 U
Acetone	**3.9**				**4.8**					2.5 U		5 U	**5.8**	5 U
Acrolein	5 U				5 U					5 U				
Acrylonitrile	1 U				1 U					1 U				
Benzene	0.2 U				0.2 U					0.2 U		1 U	0.2 U	1 U
Bromobenzene	0.2 U				0.2 U					0.2 U				
Bromochloromethane	0.2 U				0.2 U					0.2 U				
Bromodichloromethane	0.2 U				0.2 U					0.2 U		1 U	0.2 U	1 U
Bromoethane	0.2 U				0.2 U					0.2 U				
Bromoform	0.2 U				0.2 U					0.2 U		1 U	0.2 U	1 U
Bromomethane	0.5 U				0.5 U					0.5 U		1 U	0.5 U	1 U
Carbon Disulfide	**0.2**				0.2 U					0.2 U		1 U	0.2 U	1 U
Carbon Tetrachloride	0.2 U				0.2 U					0.2 U		1 U	0.2 U	1 U
Chlorobenzene	0.2 U				0.2 U					0.2 U		1 U	0.2 U	1 U
Chloroethane	0.2 U				0.2 U					0.2 U		1 U	**0.2**	1 U
Chloroform	0.2 U				0.2 U					0.2 U		1 U	0.2 U	1 U
Chloromethane	0.2 U				0.2 U					0.2 U		1 U	0.2 U	1 U
cis-1,2-Dichloroethene	0.2 U				0.2 U					0.2 U		1 U	**45**	**460**
cis-1,3-Dichloropropene	0.2 U				0.2 U					0.2 U		1 U	0.2 U	1 U
Dibromochloromethane	0.2 U				0.2 U					0.2 U		1 U	0.2 U	1 U
Dibromomethane	0.2 U				0.2 U					0.2 U				
Ethylbenzene	0.2 U				0.2 U					0.2 U		1 U	**0.4**	1 U
Ethylene Dibromide	0.2 U				0.2 U					0.2 U				
Hexachlorobutadiene	0.5 U				0.5 U					0.5 U				
Isopropylbenzene	0.2 U				0.2 U					0.2 U				
m, p-Xylene	0.4 U				0.4 U					0.4 U		2 U	0.4 U	2 U
Methyl Iodide	1 U				1 U					1 U				
Methylene Chloride	0.5 U				0.5 U					0.5 U		2 U	0.5 U	2 U
Naphthalene	0.5 U				0.5 U					0.5 U				
n-Butylbenzene	0.2 U				0.2 U					0.2 U				
n-Propylbenzene	0.2 U				0.2 U					0.2 U				
o-Xylene	0.2 U				0.2 U					0.2 U		1 U	**0.2**	1 U
sec-Butylbenzene	0.2 U				0.2 U					0.2 U				
Styrene	0.2 U				0.2 U					0.2 U		1 U	0.2 U	1 U
tert-Butylbenzene	0.2 U				0.2 U					0.2 U				
Tetrachloroethene	0.2 U				0.2 U					0.2 U		1 U	**2.6**	**1.9**
Toluene	0.2 U				0.2 U					0.2 U		1 U	0.2 U	1 U
trans-1,2-Dichloroethene	0.2 U				0.2 U					0.2 U		1 U	**0.5**	**7.6**

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

												Former Washdown System Piping North of 14-01		
Location:	PZ-6	PZ-7					PZ-8					TDP1	TDP25	TDP26
Sample ID:	PZ-6	PZ-7	PZ-7	PZ-7	PZ-7	PZ-7	PZ-8	PZ-8	PZ-8	PZ-8	PZ-8	TDP1-GW	TDP25-GW	TDP26-GW
Laboratory ID:	OL24A			NB06B/NB06I	OK85A	PC88C/PC88J			NB06E/NB06L	OL19A	PC88F/PC88M	NX93F	NY44M	NY64H
Sample Date:	2/4/2009	8/24/2000	10/25/2000	6/16/2008	2/2/2009	6/16/2009	8/24/2000	10/25/2000	6/16/2008	2/4/2009	6/16/2009	11/3/2008	11/5/2008	11/6/2008
trans-1,3-Dichloropropene	0.2 U				0.2 U					0.2 U		1 U	0.2 U	1 U
trans-1,4-Dichloro-2-butene	1 U				1 U					1 U				
Total Xylenes														
Trichloroethene	0.2 U				0.2 U					0.2 U		1 U	**71**	**240**
Trichlorofluoromethane	0.2 U				0.2 U					0.2 U		1 U	0.2 U	1 U
Vinyl Acetate	1 U				1 U					1 U		5 U	1 U	5 U
Vinyl Chloride	0.2 U				0.2 U					0.2 U		1 U	**1.8**	**140**
VOLATILES (ug/L)														
EPA SW8260C-SIM														
1,1,2,2-Tetrachloroethane														
1,1-Dichloroethene														
cis-1,2-Dichloroethene														
Tetrachloroethene														
Trichloroethene														
Vinyl Chloride														
SEMIVOLATILES (ug/L)														
EPA SW8270D (a)														
1,2,4-Trichlorobenzene	1 U				1 U					1 U		1 U	1 U	1 U
1,2-Dichlorobenzene	1 U				1 U					1 U		1 U	1 U	1 U
1,3-Dichlorobenzene	1 U				1 U					1 U		1 U	1 U	1 U
1,4-Dichlorobenzene	1 U				1 U					1 U		1 U	1 U	1 U
1-Methylnaphthalene	1 U				1 U					1 U		**6.9**	1 U	1 U
2,2'-Oxybis(1-Chloropropane)	1 U				1 U					1 U		1 U	1 U	1 U
2,4,5-Trichlorophenol	5 U				5 U					5 U		5 U	5 U	5 U
2,4,6-Trichlorophenol	5 U				5 U					5 U		5 U	5 U	5 U
2,4-Dichlorophenol	5 U				5 U					5 U		5 U	5 U	5 U
2,4-Dimethylphenol	1 U				1 U					1 U		1 U	1 U	1 U
2,4-Dinitrophenol	10 U				10 U					10 U		10 U	10 U	10 U
2,4-Dinitrotoluene	5 U				5 U					5 U		5 U	5 U	5 U
2,6-Dinitrotoluene	5 U				5 U					5 U		5 U	5 U	5 U
2-Chloronaphthalene	1 U				1 U					1 U		1 U	1 U	1 U
2-Chlorophenol	1 U				1 U					1 U		1 U	1 U	1 U
2-Methylnaphthalene	1 U				1 U					1 U		**7.9**	1 U	1 U
2-Methylphenol	1 U				1 U					1 U		1 U	1 U	1 U
2-Nitroaniline	5 U				5 U					5 U		5 U	5 U	5 U
2-Nitrophenol	5 U				5 U					5 U		5 U	5 U	5 U
3,3'-Dichlorobenzidine	5 U				5 U					5 U		5 U	5 U	5 U
3-Nitroaniline	5 U				5 U					5 U		5 U	5 U	5 U
4,6-Dinitro-2-Methylphenol	10 U				10 U					10 U		10 U	10 U	10 U
4-Bromophenyl-phenylether	1 U				1 U					1 U		1 U	1 U	1 U
4-Chloro-3-methylphenol	5 U				5 U					5 U		5 U	5 U	5 U
4-Chloroaniline	5 U				5 U					5 U		5 U	5 U	5 U
4-Chlorophenyl-phenylether	1 U				1 U					1 U		1 U	1 U	1 U
4-Methylphenol	1 U				1 U					1 U		1 U	1 U	1 U
4-Nitroaniline	5 U				5 U					5 U		5 U	5 U	5 U
4-Nitrophenol	5 UJ				5 U					5 UJ		5 U	5 U	5 U
Acenaphthene	1 U				1 U					1 U		**14**	1 U	1 U
Acenaphthylene	1 U				1 U					1 U		1 U	1 U	1 U
Anthracene	1 U				1 U					1 U		1 U	1 U	1 U
Benzo(a)anthracene	1 U				1 U					1 U		1 U	1 U	1 U
Benzo(a)pyrene	1 U				1 U					1 U		1 U	1 U	1 U
Benzo(b)fluoranthene	1 U				1 U					1 U		1 U	1 U	1 U
Benzo(g,h,i)perylene	1 U				1 U					1 U		1 U	1 U	1 U
Benzo(k)fluoranthene	1 U				1 U					1 U		1 U	1 U	1 U
Benzoic Acid	10 U				10 U					10 U		10 U	10 U	10 U
Benzyl Alcohol	5 U				5 U					5 U		5 U	5 U	5 U
bis(2-Chloroethoxy) Methane	1 U				1 U					1 U		1 U	1 U	1 U
Bis-(2-Chloroethyl) Ether	1 U				1 U					1 U		1 U	1 U	1 U
bis(2-Ethylhexyl)phthalate	1 U				1 U					1 U		1 U	**1.3**	1 U
Butylbenzylphthalate	1 U				1 U					1 U		1 U	1 U	1 U

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

												Former Washdown System Piping North of 14-01		
Location:	PZ-6	PZ-7					PZ-8					TDP1	TDP25	TDP26
Sample ID:	PZ-6	PZ-7	PZ-7	PZ-7	PZ-7	PZ-7	PZ-8	PZ-8	PZ-8	PZ-8	PZ-8	TDP1-GW	TDP25-GW	TDP26-GW
Laboratory ID:	OL24A			NB06B/NB06I	OK85A	PC88C/PC88J			NB06E/NB06L	OL19A	PC88F/PC88M	NX93F	NY44M	NY64H
Sample Date:	2/4/2009	8/24/2000	10/25/2000	6/16/2008	2/2/2009	6/16/2009	8/24/2000	10/25/2000	6/16/2008	2/4/2009	6/16/2009	11/3/2008	11/5/2008	11/6/2008
Carbazole	1 U				1 U					1 U		**6.9**	1 U	1 U
Chrysene	1 U				1 U					1 U		1 U	1 U	1 U
Dibenz(a,h)anthracene	1 U				1 U					1 U		1 U	1 U	1 U
Dibenzofuran	1 U				1 U					1 U		1 U	1 U	1 U
Diethylphthalate	1 U				1 U					1 U		1 U	1 U	1 U
Dimethylphthalate	1 U				1 U					1 U		1 U	1 U	1 U
Di-n-Butylphthalate	1 U				1 U					1 U		1 U	1 U	1 U
Di-n-Octyl phthalate	1 U				1 U					1 U		1 U	1 U	1 U
Fluoranthene	1 U				1 U					1 U		1 U	1 U	1 U
Fluorene	1 U				1 U					1 U		1 U	1 U	1 U
Hexachlorobenzene	1 U				1 U					1 U		1 U	1 U	1 U
Hexachlorobutadiene	1 U				1 U					1 U		1 U	1 U	1 U
Hexachlorocyclopentadiene	5 U				5 U					5 U		5 U	5 U	5 U
Hexachloroethane	1 U				1 U					1 U		1 U	1 U	1 U
Indeno(1,2,3-cd)pyrene	1 U				1 U					1 U		1 U	1 U	1 U
Isophorone	1 U				1 U					1 U		1 U	1 U	1 U
Naphthalene	1 U				1 U					1 U		1 U	1 U	1 U
Nitrobenzene	1 U				1 U					1 U		1 U	1 U	1 U
N-Nitroso-Di-N-Propylamine	5 U				5 U					5 U		5 U	5 U	5 U
N-Nitrosodiphenylamine	1 U				1 U					1 U		1 U	1 U	1 U
Pentachlorophenol	5 U				5 U					5 U		5 U	5 U	5 U
Phenanthrene	1 U				1 U					1 U		**1.8**	1 U	1 U
Phenol	1 UJ				1 U					1 UJ		1 U	1 U	1 U
Pyrene	1 U				1 U					1 U		1 U	1 U	1 U
PAHs (ug/L)														
EPA SW8270D-SIM														
1-Methylnaphthalene												**4.4**	0.1 U	0.1 U
2-Methylnaphthalene												**5.8**	0.1 U	0.1 U
Acenaphthene												**8.6**	0.1 U	0.1 U
Acenaphthylene												0.1 U	0.1 U	0.1 U
Anthracene												0.1 U	0.1 U	0.1 U
Benzo(a)anthracene	0.1 U				0.1 U					0.1 U		0.1 U	0.1 U	0.1 U
Benzo(a)pyrene	0.1 U				0.1 U					0.1 U		0.1 U	0.1 U	0.1 U
Benzo(b)fluoranthene	0.1 U				0.1 U					0.1 U		0.1 U	0.1 U	0.1 U
Benzo(g,h,i)perylene												0.1 U	0.1 U	0.1 U
Benzo(k)fluoranthene	0.1 U				0.1 U					0.1 U		0.1 U	0.1 U	0.1 U
Chrysene	0.1 U				0.1 U					0.1 U		0.1 U	0.1 U	0.1 U
Dibenz(a,h)anthracene	0.1 U				0.1 U					0.1 U		0.1 U	0.1 U	0.1 U
Dibenzofuran												0.1 U	0.1 U	0.1 U
Fluoranthene												0.1 U	0.1 U	0.1 U
Fluorene												**0.62**	0.1 U	0.1 U
Indeno(1,2,3-cd)pyrene	0.1 U				0.1 U					0.1 U		0.1 U	0.1 U	0.1 U
Naphthalene												**0.13**	**0.13**	0.1 U
Phenanthrene												**1.2**	0.1 U	0.1 U
Pyrene												0.1 U	0.1 U	0.1 U
TEQ	NA				NA					NA		NA	NA	NA
CONVENTIONALS (ug/L)														
Chloride														
Total Cyanide														
Fluoride														
Oil and Grease														
Sulfate														
Total Organic Carbon (EPA 415.1 (a))				1500 U		1500 U			**4610**		**6450**			
Ferrous Iron (SM3500FeD)				**617**		**47**			**32,500**		**28,800**			

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

	Former Washdown System Piping Inside 14-01			Former Washdown System West of 14-01		Hazardous Materials Storage Sheds		Hydraulic Oil Spill Area
Location:	TDP7	TDP8	TDP11	TDP16	TDP18	TDP28	TDP29	TDP31
Sample ID:	TDP7-GW	TDP8-GW	TDP11-GW	TDP16-GW	TDP18-GW	TDP28-GW	TDP29-GW	TDP31-GW
Laboratory ID:	NY07N	NY07M	NY07O	NY44K	NY44L	NY64I	NY64J	NY64K
Sample Date:	11/4/2008	11/4/2008	11/4/2008	11/5/2008	11/5/2008	11/6/2008	11/6/2008	11/6/2008
TOTAL METALS (ug/L)								
EPA 200.8/SW6010B/SW7470A (a)								
Antimony								
Arsenic								
Barium								
Cadmium								
Chromium								
Copper								
Iron								
Lead								
Manganese								
Mercury								
Nickel								
Selenium								
Silver								
Zinc								
DISSOLVED METALS (ug/L)								
EPA 200.8/SW6010B/SW7470A (a)								
Arsenic	**11.4**	**1.8**	**21.5**	**35**	**1.8**	**13**	**5.2**	**3.5**
Barium								
Cadmium	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Chromium	**7**	5 U	**14**	5 U	5 U	5 U	5 U	5 U
Copper	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Iron								
Lead	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Manganese								
Mercury	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel								
Selenium								
Silver								
Zinc								
PETROLEUM HYDROCARBONS (ug/L)								
NWTPH-HCID								
Diesel Range Organics	630 U	630 U	630 U	630 U	630 U	630 U	**630**	630 U
Gasoline Range Organics	250 U	250 U	250 U	250 U	250 U	250 U	250 U	250 U
Lube Oil	630 U	630 U	630 U	630 U	630 U	630 U	**630**	**630**
NWTPH-Dx								
Diesel Range Organics							250 U	**470**
Lube Oil							500 U	**3200**
PCBs (ug/L)								
EPA SW8082								
Aroclor 1016	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Aroclor 1221	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Aroclor 1232	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Aroclor 1242	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Aroclor 1248	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Aroclor 1254	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Aroclor 1260	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Total PCBs	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
VOLATILES (ug/L)								
EPA SW8260B (a)								
1,1,2,2-Tetrachloroethane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,1,1-Trichloroethane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,1,2,2-Tetrachloroethane								
1,1,2-Trichloro-1,2,2-Trifluoroethane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	**0.4**
1,1,2-Trichloroethane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,1-Dichloroethane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	**1**	**0.4**	**0.3**

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

	Former Washdown System Piping Inside 14-01			Former Washdown System West of 14-01		Hazardous Materials Storage Sheds		Hydraulic Oil Spill Area
Location:	TDP7	TDP8	TDP11	TDP16	TDP18	TDP28	TDP29	TDP31
Sample ID:	TDP7-GW	TDP8-GW	TDP11-GW	TDP16-GW	TDP18-GW	TDP28-GW	TDP29-GW	TDP31-GW
Laboratory ID:	NY07N	NY07M	NY07O	NY44K	NY44L	NY64I	NY64J	NY64K
Sample Date:	11/4/2008	11/4/2008	11/4/2008	11/5/2008	11/5/2008	11/6/2008	11/6/2008	11/6/2008
1,1-Dichloroethene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2-Dichloroethane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2-Dichloroethene (total)								
1,1-Dichloropropene								
1,2-Dichloropropane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2,3-Trichlorobenzene								
1,2,3-Trichloropropane								
1,2,4-Trichlorobenzene								
1,2,4-Trimethylbenzene								
1,2-Dibromo-3-chloropropane								
1,2-Dichlorobenzene								
1,2-Dichloroethane								
1,2-Dichloropropane								
1,3,5-Trimethylbenzene								
1,3-Dichlorobenzene								
1,3-Dichloropropane								
1,4-Dichlorobenzene								
2,2-Dichloropropane								
2-Butanone	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
2-Chloroethylvinylether	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Chlorotoluene								
2-Hexanone	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
4-Chlorotoluene								
4-Isopropyltoluene								
4-Methyl-2-Pentanone (MIBK)	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Acetone	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Acrolein								
Acrylonitrile								
Benzene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Bromobenzene								
Bromochloromethane								
Bromodichloromethane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Bromoethane								
Bromoform	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Bromomethane	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Carbon Disulfide	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	**0.4**
Carbon Tetrachloride	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Chlorobenzene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Chloroethane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Chloroform	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Chloromethane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
cis-1,2-Dichloroethene	0.2 U	0.4	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
cis-1,3-Dichloropropene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Dibromochloromethane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Dibromomethane								
Ethylbenzene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Ethylene Dibromide								
Hexachlorobutadiene								
Isopropylbenzene								
m, p-Xylene	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Methyl Iodide								
Methylene Chloride	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Naphthalene								
n-Butylbenzene								
n-Propylbenzene								
o-Xylene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
sec-Butylbenzene								
Styrene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
tert-Butylbenzene								
Tetrachloroethene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Toluene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
trans-1,2-Dichloroethene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

	Former Washdown System Piping Inside 14-01			Former Washdown System West of 14-01		Hazardous Materials Storage Sheds		Hydraulic Oil Spill Area
Location:	TDP7	TDP8	TDP11	TDP16	TDP18	TDP28	TDP29	TDP31
Sample ID:	TDP7-GW	TDP8-GW	TDP11-GW	TDP16-GW	TDP18-GW	TDP28-GW	TDP29-GW	TDP31-GW
Laboratory ID:	NY07N	NY07M	NY07O	NY44K	NY44L	NY64I	NY64J	NY64K
Sample Date:	11/4/2008	11/4/2008	11/4/2008	11/5/2008	11/5/2008	11/6/2008	11/6/2008	11/6/2008
trans-1,3-Dichloropropene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
trans-1,4-Dichloro-2-butene								
Total Xylenes								
Trichloroethene	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Trichlorofluoromethane	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Vinyl Acetate	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Vinyl Chloride	**0.2**	**0.7**	0.2 U	**0.3**	0.2 U	0.2 U	0.2 U	0.2 U
VOLATILES (ug/L)								
EPA SW8260C-SIM								
1,1,2,2-Tetrachloroethane								
1,1-Dichloroethene								
cis-1,2-Dichloroethene								
Tetrachloroethene								
Trichloroethene								
Vinyl Chloride								
SEMIVOLATILES (ug/L)								
EPA SW8270D (a)								
1,2,4-Trichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,3-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1-Methylnaphthalene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2,2'-Oxybis(1-Chloropropane)	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2,4,5-Trichlorophenol	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2,4,6-Trichlorophenol	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2,4-Dichlorophenol	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2,4-Dimethylphenol	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2,4-Dinitrophenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrotoluene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2,6-Dinitrotoluene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2-Chloronaphthalene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Chlorophenol	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Methylnaphthalene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Methylphenol	1 U	1 U	1 U	1 U	1 U	1 U	**1**	1 U
2-Nitroaniline	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
2-Nitrophenol	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
3,3'-Dichlorobenzidine	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
3-Nitroaniline	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
4,6-Dinitro-2-Methylphenol	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Bromophenyl-phenylether	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
4-Chloro-3-methylphenol	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
4-Chloroaniline	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
4-Chlorophenyl-phenylether	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
4-Methylphenol	1 U	1 U	1 U	1 U	1 U	1 U	**3.9**	1 U
4-Nitroaniline	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
4-Nitrophenol	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Acenaphthene	1 U	1 U	1 U	**28**	1 U	1 U	1 U	1 U
Acenaphthylene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Anthracene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Benzo(a)anthracene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Benzo(a)pyrene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Benzo(b)fluoranthene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Benzo(g,h,i)perylene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Benzo(k)fluoranthene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Benzoic Acid	10 U	10 U	10 U	10 U	10 U	10 U	**24**	10 U
Benzyl Alcohol	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
bis(2-Chloroethoxy) Methane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bis-(2-Chloroethyl) Ether	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
bis(2-Ethylhexyl)phthalate	**1**	**2.5**	**1.1**	1 U	**1.8**	**3.8**	1 U	**3**
Butylbenzylphthalate	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

	Former Washdown System Piping Inside 14-01			Former Washdown System West of 14-01		Hazardous Materials Storage Sheds		Hydraulic Oil Spill Area
Location:	TDP7	TDP8	TDP11	TDP16	TDP18	TDP28	TDP29	TDP31
Sample ID:	TDP7-GW	TDP8-GW	TDP11-GW	TDP16-GW	TDP18-GW	TDP28-GW	TDP29-GW	TDP31-GW
Laboratory ID:	NY07N	NY07M	NY07O	NY44K	NY44L	NY64I	NY64J	NY64K
Sample Date:	11/4/2008	11/4/2008	11/4/2008	11/5/2008	11/5/2008	11/6/2008	11/6/2008	11/6/2008
Carbazole	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chrysene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dibenz(a,h)anthracene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dibenzofuran	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Diethylphthalate	**2**	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dimethylphthalate	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Di-n-Butylphthalate	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Di-n-Octyl phthalate	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Fluoranthene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Fluorene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Hexachlorobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Hexachlorobutadiene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Hexachlorocyclopentadiene	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Hexachloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Indeno(1,2,3-cd)pyrene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Isophorone	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Naphthalene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Nitrobenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
N-Nitroso-Di-N-Propylamine	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
N-Nitrosodiphenylamine	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Pentachlorophenol	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
Phenanthrene	1 U	1 U	1 U	**4.7**	1 U	1 U	1 U	1 U
Phenol	1 U	1 U	1 U	1 U	1 U	1 U	**9.1**	1 U
Pyrene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
PAHs (ug/L)								
EPA SW8270D-SIM								
1-Methylnaphthalene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
2-Methylnaphthalene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Acenaphthene	0.1 U	0.1 U	0.1 U	**15**	**0.64**	0.1 U	0.1 U	0.1 U
Acenaphthylene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Anthracene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Benzo(a)anthracene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.14**	0.1 U	0.1 U
Benzo(a)pyrene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Benzo(b)fluoranthene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Benzo(g,h,i)perylene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Benzo(k)fluoranthene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.1**	0.1 U	0.1 U
Chrysene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.1**	0.1 U	0.1 U
Dibenz(a,h)anthracene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Dibenzofuran	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Fluoranthene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.39**	0.1 U	0.1 U
Fluorene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Indeno(1,2,3-cd)pyrene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Naphthalene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.11**
Phenanthrene	0.1 U	0.1 U	0.1 U	**2.6**	0.1 U	**0.13**	**0.11**	**0.1**
Pyrene	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.36**	**0.11**	0.1 U
TEQ	NA	NA	NA	NA	NA	**0.025**	NA	NA
CONVENTIONALS (ug/L)								
Chloride								
Total Cyanide								
Fluoride								
Oil and Grease								
Sulfate								
Total Organic Carbon (EPA 415.1 (a))								
Ferrous Iron (SM3500FeD)								

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	SEEP			TANK	DRUM	SUMP
Sample ID:	SEEP-1	I-SEEP	SEEP	TANK-ATS721	TH-DRUM2-WATER	TH-SUMP
Laboratory ID:		NB15B	PD99A/PD99B	OQ13A	NY64N	NY64L
Sample Date:	8/24/2000	6/17/2008	6/23/2009	3/11/2009	11/6/2008	11/6/2008
TOTAL METALS (ug/L)						
EPA 200.8/SW6010B/SW7470A (a)						
Antimony						
Arsenic				50 U	**34.5**	**23.8**
Barium				**15**		
Cadmium				**7**	2 U	**58**
Chromium				**14**	**67**	**510**
Copper					**58**	**1950**
Iron		**3470**	**1070**			
Lead				20 U	**13**	**6**
Manganese						
Mercury				0.1 U	0.1 U	2 U
Nickel					**40**	
Selenium				50 U		
Silver				3 U	3 U	
Zinc					**140**	
DISSOLVED METALS (ug/L)						
EPA 200.8/SW6010B/SW7470A (a)						
Arsenic	**7**	**3.4**	**5**			
Barium						
Cadmium						
Chromium						
Copper						
Iron						
Lead						
Manganese						
Mercury						
Nickel						
Selenium						
Silver						
Zinc						
PETROLEUM HYDROCARBONS (ug/L)						
NWTPH-HCID						
Diesel Range Organics					630 U	**2500**
Gasoline Range Organics					250 U	1000 U
Lube Oil					630 U	**2500**
NWTPH-Dx						
Diesel Range Organics						**25,000**
Lube Oil						**62,000**
PCBs (ug/L)						
EPA SW8082						
Aroclor 1016					1 U	
Aroclor 1221					1 U	
Aroclor 1232					1 U	
Aroclor 1242					1 U	
Aroclor 1248					1 U	
Aroclor 1254					1 U	
Aroclor 1260					1 U	
Total PCBs					1 U	
VOLATILES (ug/L)						
EPA SW8260B (a)						
1,1,2,2-Tetrachloroethane				0.2 U	0.2 U	10 U
1,1,1-Trichloroethane				0.2 U	0.2 U	10 U
1,1,2,2-Tetrachloroethane				0.2 U		
1,1,2-Trichloro-1,2,2-Trifluoroethane				0.2 U	0.2 U	20 U
1,1,2-Trichloroethane				0.2 U	0.2 U	10 U
1,1-Dichloroethane				0.2 U	0.2 U	10 U

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	SEEP			TANK	DRUM	SUMP
Sample ID:	SEEP-1	I-SEEP	SEEP	TANK-ATS721	TH-DRUM2-WATER	TH-SUMP
Laboratory ID:		NB15B	PD99A/PD99B	OQ13A	NY64N	NY64L
Sample Date:	8/24/2000	6/17/2008	6/23/2009	3/11/2009	11/6/2008	11/6/2008
1,1-Dichloroethene				0.2 U	0.2 U	10 U
1,2-Dichloroethane					0.2 U	10 U
1,2-Dichloroethene (total)						
1,1-Dichloropropene				0.2 U		
1,2-Dichloropropane					0.2 U	10 U
1,2,3-Trichlorobenzene				0.5 U		
1,2,3-Trichloropropane				0.5 U		
1,2,4-Trichlorobenzene				0.5 U		
1,2,4-Trimethylbenzene				0.2 U		
1,2-Dibromo-3-chloropropane				0.5 U		
1,2-Dichlorobenzene				0.2 U		
1,2-Dichloroethane				0.2 U		
1,2-Dichloropropane				0.2 U		
1,3,5-Trimethylbenzene				0.2 U		
1,3-Dichlorobenzene				0.2 U		
1,3-Dichloropropane				0.2 U		
1,4-Dichlorobenzene				0.2 U		
2,2-Dichloropropane				0.2 U		
2-Butanone				2.5 U	2.5 U	50 U
2-Chloroethylvinylether				1 U	1 U	50 U
2-Chlorotoluene				0.2 U		
2-Hexanone				2.5 U	2.5 U	50 U
4-Chlorotoluene				0.2 U		
4-Isopropyltoluene				0.2 U		
4-Methyl-2-Pentanone (MIBK)				2.5 U	2.5 U	50 U
Acetone				2.5 U	**40**	50 U
Acrolein				5 U		
Acrylonitrile				1 U		
Benzene				0.2 U	0.2 U	10 U
Bromobenzene				0.2 U		
Bromochloromethane				0.2 U		
Bromodichloromethane				0.2 U	0.2 U	10 U
Bromoethane				0.2 U		
Bromoform				0.2 U	0.2 U	10 U
Bromomethane				0.5 U	0.5 U	10 U
Carbon Disulfide				0.2 U	**0.6**	10 U
Carbon Tetrachloride				0.2 U	0.2 U	10 U
Chlorobenzene				0.2 U	0.2 U	10 U
Chloroethane				0.2 U	0.2 U	10 U
Chloroform				0.2 U	**2.3**	10 U
Chloromethane				0.2 U	0.2 U	10 U
cis-1,2-Dichloroethene				0.2 U	0.2 U	10 U
cis-1,3-Dichloropropene				0.2 U	0.2 U	10 U
Dibromochloromethane				0.2 U	0.2 U	10 U
Dibromomethane				0.2 U		
Ethylbenzene				0.2 U	0.2 U	10 U
Ethylene Dibromide				0.2 U		
Hexachlorobutadiene				0.5 U		
Isopropylbenzene				0.2 U		
m, p-Xylene				0.4 U	0.4 U	20 U
Methyl Iodide				1 U		
Methylene Chloride				0.5 U	**0.6**	**42**
Naphthalene				0.5 U		
n-Butylbenzene				0.2 U		
n-Propylbenzene				0.2 U		
o-Xylene				0.2 U	0.2 U	10 U
sec-Butylbenzene				0.2 U		
Styrene				0.2 U	0.2 U	**11**
tert-Butylbenzene				0.2 U		
Tetrachloroethene				0.2 U	0.2 U	10 U
Toluene				0.2 U	**0.2**	29
trans-1,2-Dichloroethene				0.2 U	0.2 U	10 U

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	SEEP			TANK	DRUM	SUMP
Sample ID:	SEEP-1	I-SEEP	SEEP	TANK-ATS721	TH-DRUM2-WATER	TH-SUMP
Laboratory ID:		NB15B	PD99A/PD99B	OQ13A	NY64N	NY64L
Sample Date:	8/24/2000	6/17/2008	6/23/2009	3/11/2009	11/6/2008	11/6/2008
trans-1,3-Dichloropropene				0.2 U	0.2 U	10 U
trans-1,4-Dichloro-2-butene				1 U		
Total Xylenes						
Trichloroethene				0.2 U	**0.3**	10 U
Trichlorofluoromethane				0.2 U	0.2 U	10 U
Vinyl Acetate				1 U	1 U	50 U
Vinyl Chloride				0.2 U	0.2 U	10 U
VOLATILES (ug/L)						
EPA SW8260C-SIM						
1,1,2,2-Tetrachloroethane						
1,1-Dichloroethene						
cis-1,2-Dichloroethene						
Tetrachloroethene						
Trichloroethene						
Vinyl Chloride						
SEMIVOLATILES (ug/L)						
EPA SW8270D (a)						
1,2,4-Trichlorobenzene					1 U	
1,2-Dichlorobenzene					1 U	
1,3-Dichlorobenzene					1 U	
1,4-Dichlorobenzene					1 U	
1-Methylnaphthalene					1 U	
2,2'-Oxybis(1-Chloropropane)					1 U	
2,4,5-Trichlorophenol					5 U	
2,4,6-Trichlorophenol					5 U	
2,4-Dichlorophenol					5 U	
2,4-Dimethylphenol					1 U	
2,4-Dinitrophenol					10 U	
2,4-Dinitrotoluene					5 U	
2,6-Dinitrotoluene					5 U	
2-Chloronaphthalene					1 U	
2-Chlorophenol					1 U	
2-Methylnaphthalene					1 U	
2-Methylphenol					1 U	
2-Nitroaniline					5 U	
2-Nitrophenol					5 U	
3,3'-Dichlorobenzidine					5 U	
3-Nitroaniline					5 U	
4,6-Dinitro-2-Methylphenol					10 U	
4-Bromophenyl-phenylether					1 U	
4-Chloro-3-methylphenol					5 U	
4-Chloroaniline					5 U	
4-Chlorophenyl-phenylether					1 U	
4-Methylphenol					1 U	
4-Nitroaniline					5 U	
4-Nitrophenol					5 U	
Acenaphthene					1 U	
Acenaphthylene					1 U	
Anthracene					1 U	
Benzo(a)anthracene					1 U	
Benzo(a)pyrene					1 U	
Benzo(b)fluoranthene					1 U	
Benzo(g,h,i)perylene					1 U	
Benzo(k)fluoranthene					1 U	
Benzoic Acid					**36**	
Benzyl Alcohol					5 U	
bis(2-Chloroethoxy) Methane					1 U	
Bis-(2-Chloroethyl) Ether					1 U	
bis(2-Ethylhexyl)phthalate					**3.1**	
Butylbenzylphthalate					1 U	

TABLE H-2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS
BOEING THOMPSON SITE
TUKWILA, WASHINGTON

Location:	SEEP			TANK	DRUM	SUMP
Sample ID:	SEEP-1	I-SEEP	SEEP	TANK-ATS721	TH-DRUM2-WATER	TH-SUMP
Laboratory ID:		NB15B	PD99A/PD99B	OQ13A	NY64N	NY64L
Sample Date:	8/24/2000	6/17/2008	6/23/2009	3/11/2009	11/6/2008	11/6/2008
Carbazole					1 U	
Chrysene					1 U	
Dibenz(a,h)anthracene					1 U	
Dibenzofuran					1 U	
Diethylphthalate					1 U	
Dimethylphthalate					**1.8**	
Di-n-Butylphthalate					1 U	
Di-n-Octyl phthalate					1 U	
Fluoranthene					1 U	
Fluorene					1 U	
Hexachlorobenzene					1 U	
Hexachlorobutadiene					1 U	
Hexachlorocyclopentadiene					5 U	
Hexachloroethane					1 U	
Indeno(1,2,3-cd)pyrene					1 U	
Isophorone					1 U	
Naphthalene					1 U	
Nitrobenzene					1 U	
N-Nitroso-Di-N-Propylamine					5 U	
N-Nitrosodiphenylamine					1 U	
Pentachlorophenol					5 U	
Phenanthrene					1 U	
Phenol					1 U	
Pyrene					1 U	
PAHs (ug/L)						
EPA SW8270D-SIM						
1-Methylnaphthalene					0.1 U	
2-Methylnaphthalene					**0.1**	
Acenaphthene					**0.31**	
Acenaphthylene					0.1 U	
Anthracene					0.1 U	
Benzo(a)anthracene					0.1 U	
Benzo(a)pyrene					0.1 U	
Benzo(b)fluoranthene					0.1 U	
Benzo(g,h,i)perylene					0.1 U	
Benzo(k)fluoranthene					0.1 U	
Chrysene					0.1 U	
Dibenz(a,h)anthracene					0.1 U	
Dibenzofuran					0.1 U	
Fluoranthene					**0.12**	
Fluorene					0.1 U	
Indeno(1,2,3-cd)pyrene					0.1 U	
Naphthalene					**0.13**	
Phenanthrene					**0.17**	
Pyrene					**0.12**	
TEQ					NA	
CONVENTIONALS (ug/L)						
Chloride						
Total Cyanide						
Fluoride						
Oil and Grease						
Sulfate						
Total Organic Carbon (EPA 415.1 (a))		1500 U	1500 U			
Ferrous Iron (SM3500FeD)		**58**	**41**			

B = Method blank contamination.
E = Estimated concentration calculated for an analyte response above the valid instrument calibration range.
A dilution is required to obtain an accurate quantification of the analyte
S = Indicates an analyte response that has saturated the detector. The calculated concentration is not valid
a dilution is required to obtain valid quantification of the analyte
ND = Not detected.
J = Indicates the analyte was positively identified; the associated numerical value is the
approximate concentration of the analyte in the sample
UJ = The analyte was not detected in the sample; the sample reporting limit is an estimate
U = Indicates the compound was undetected at the reported concentration
Bold = Detected compound.

(a) = Analytical method was not always listed with historical sample results

Note: Results listed account for all historical analyses completed in site area as discussed in report text

APPENDIX I

Summary of Slag Material Analytical Results

TABLE I-1
SLAG MATERIAL ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Sample Identification:	Slag		I-4/I-6	I-4	I-6	I-7
Year Collected:	1983		1983	1983	1983	1983
Major Components (mg/kg)						
Silica	--					
Alumina	99,500					
Iron	123,000					
Calcium	280,000					
Magnesium	81,900					
Sodium	3,800					
Potassium	750					
Sulphur	--					
Trace Components (mg/kg)						
Antimony	15	U				
Arsenic	30	U	18	120	33	26
Barium	1,350		440			
Beryillium	0.3	U				
Bismuth	50	U				
Boron	1.0	U				
Cadmium	2.5	U	2.2			
Chromium	4,330		1,300	920	2,200	1,700
Cobalt	2.0	U				
Copper	62		430	370	1,200	160
Lead	105		240	630	1,400	120
Manganese	70,000					
Molybdenum	42.2					
Nickel	275					
Phosphorus	9,520					
Silver	3.0	U				
Strontium	240					
Tin	8.1					
Titanium	3,980					
Tungsten	--					
Uranium	--					
Vanadium	1,270					
Zinc	280		790	580	700	170
EP Toxicity Test (mg/L)						
Arsenic			ND	ND	ND	ND
Barium			ND	ND	ND	ND
Cadmium			ND	ND	ND	ND
Total Chromium			ND	ND	ND	ND
Hexavalent Chromium			ND	ND	ND	ND
Lead			ND	ND	ND	ND
Mercury			ND	ND	ND	ND
Selenium			ND	ND	ND	ND
Silver			ND	ND	ND	ND

U = Indicates the compound was undetected at the reported concentration.
ND = Not Detected
-- = Not Analyzed

APPENDIX J

Surface Grab Samples/Core Samples

TABLE J-1
SURFACE SEDIMENT ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	AN-029	AN-029	AN-030	AN-045	AN-046	AN-046	AN-047	DR187	DR188	DR220	EIT060	EST141
Sample ID	AN029-SS-061025	AN029-SS-061025	AN030-SS-061025	AN045-SS-080211	AN046-SS-080211	AN096-SS-080211	AN047-SS-080211	SD-DR187-0000	SD-DR188-0000	SD-DR220-0000	EIT06-01	EST09-01
Sample Date	10/25/06	10/25/06	10/25/06	02/11/08	02/11/08	02/11/08	02/11/08	08/27/98	08/25/98	08/25/98	09/26/97	09/25/97
Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33
Conventionals												
Ammonia (mg-N/kg dw)												
Percent moisture (%ww)		48.6										
Total organic carbon (%dw)		1.51	1.88	1.5	3.16	2.28	2.65		1.75	2.76	0.88	1.52
Total solids (%ww)		52.3	47.9	70.2	64.6	65.1	54.2					
Total solids (preserved) (%ww)												
Total sulfides (mg/kg dw)												
Grain size (%dw)												
Fractional % >9525 microns									0.01 U	0.01 U		
Fractional % phi >-1 (>2000 microns)		1.1	1.1									
Fractional % phi >-3 (>8000 microns)												
Fractional % phi 0-1 (500-1000 microns)		2.3	1.6						0.96 J	1.94 J		
Fractional % phi -1-0 (1000-2000 microns)		1.2	1.6						0.02 J	0.83 J		
Fractional % phi 10+ (<0.98 micron)									4.69	6.38		
Fractional % phi 1-2 (250-500 microns)		8.3	2.9						1.3 J	1.35 J		
Fractional % phi -2-(-1) (2000-4000 microns)									0.01 U	0.01 J		
Fractional % phi 2-3 (125-250 microns)		16.7	4.2						3.31 J	1.9 J		
Fractional % phi -3-(-2) (4000-8000 microns)												
Fractional % phi 3-4 (62.5-125 microns)		19.8	13.6						13.43 J	7.49 J		
Fractional % phi 4-5 (31.2-62.5 microns)		20.4	26.2						22.87	18.79		
Fractional % phi 5-6 (15.6-31.2 microns)		11.1	20.4						12.63	24.23		
Fractional % phi 6-7 (7.8-15.6 microns)		7.3	11.6						27.36	18.92		
Fractional % phi 7-8 (3.9-7.8 microns)		4.4	6.3						7.17	9.8		
Fractional % phi 8-9 (1.95-3.9 microns)									4.12	4.97		
Fractional % phi 9-10 (0.98-1.95 microns)									2.14	3.22		
Fractional % Sieve 3/8-inch (4750-9525 microns)									0.01 U	0.18 J		
Total clay				5.4	5	4.8	11.3		10.95	14.57	5.6	16.08
Total fines (percent silt+clay)		43.2	64.5	15.9	17.3	17.3	59.7		80.98	86.3		
Total gravel		1.1	1.1	8.3	21.2	19.1	0.9		0.01 U	0.19 J	1.33	0.01
Total sand		48.3	23.9	75.8	61.6	63.6	39.5		19.0 J	13.5 J	80.79	14.61
Total silt		43.2	64.5	10.5	12.3	12.5	48.4		70.03	71.7	12.28	69.3
Metals (mg/kg dw)												
Aluminum								12,200	18,100	23,000		
Antimony									10 U	10 U		
Arsenic		11.3	8.9	8.2	25.5	40.6	15		12.5	15.3		
Barium								42	55	78		
Beryllium								0.25	0.34	0.42		
Cadmium		0.5	0.4 U	0.4	2.9	3.6	2.4		0.29	0.38		
Calcium								14,700	5,380	6,300		
Chromium		33.7	26	27.1 J	240 J	165 J	178 J		25	28		
Cobalt									8	10		
Copper		54.8	42	35.3 J	228 J	268 J	87.6 J		37	47		
Iron								32,900	23,900	31,600		
Lead		128	28	152 J	2,930 J	21,700 J	370 J		20.7	22.3		
Magnesium								5,940	7,130	8,450		
Manganese								558	258	336		
Mercury		6.8	0.13	0.06 U	0.14	0.19	0.29		0.13	0.14		
Molybdenum												
Nickel									18.8	20.8		
Potassium								1,180	2,180	2,670		
Selenium									10 J	12 J		
Silver		0.7	0.4 U	0.3 U	1.2	2.8	2		0.19	0.3		
Sodium								6,770	10,800	13,800		
Thallium									0.07	0.09		

TABLE J-1
SURFACE SEDIMENT ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	AN-029	AN-029	AN-030	AN-045	AN-046	AN-046	AN-047	DR187	DR188	DR220	EIT060	EST141
Sample ID	AN029-SS-061025	AN029-SS-061025	AN030-SS-061025	AN045-SS-080211	AN046-SS-080211	AN096-SS-080211	AN047-SS-080211	SD-DR187-0000	SD-DR188-0000	SD-DR220-0000	EIT06-01	EST09-01
Sample Date	10/25/06	10/25/06	10/25/06	02/11/08	02/11/08	02/11/08	02/11/08	08/27/98	08/25/98	08/25/98	09/26/97	09/25/97
Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33
Tin								7 UJ	4	3		
Vanadium									54	71		
Zinc		154 J	96 J	75	950	1,050	280		81	98		
PAHs (ug/kg dw)												
1-Methylnaphthalene				20 U	20 U	20 U	98 U					
2-Chloronaphthalene									20 U	20 U		
2-Methylnaphthalene		20 U	20 U	20 UJ	20 UJ	20 UJ	98 UJ		20 U	20 U		
Acenaphthene		10 J	20 U	20 U	12 J	20 U	98 U		20 U	20 U		
Acenaphthylene		20 U	20 U	20 UJ	20 UJ	20 UJ	98 UJ		20 U	20 U		
Anthracene		40	26	20 UJ	43 J	29 J	98 UJ		20	20		
Benzo(a)anthracene		150	100	30 J	180 J	140 J	110 J		120	110		
Benzo(a)pyrene		200	130	43	250	210	110		140	130		
Benzo(b)fluoranthene		230	140	57	330	290	180		150	170		
Benzo(g,h,i)perylene		110	90	20	89	71	73 J		100	100		
Benzo(k)fluoranthene		190	180	45	240	210	140		170	160		
Chrysene		260	160	45 J	280 J	240 J	170 J		180	180		
cPAHs - mammal - half DL		290	190 J	62 J	350 J	290 J	170 J		210	190		
Dibenzo(a,h)anthracene		48	18 J	6.7	22	18 J	18 U		30	20		
Dibenzofuran		20 U	20 U	20 UJ	20 UJ	20 UJ	98 UJ		20 U	20 U		
Fluoranthene		410	220	68	540	460	470		340	340		
Fluorene		14 J	20 U	20 U	16 J	11 J	98 U		20 U	20 U		
Indeno(1,2,3-cd)pyrene		110	84	22	100	80 J	72 J		110	100		
Naphthalene		20 U	20 U	20 UJ	20 UJ	20 UJ	98 UJ		20 U	20 U		
Phenanthrene		190	99	24 J	240 J	180 J	180 J		140	110		
Pyrene		360	240	46 J	370 J	310 J	420		290	270		
Total benzofluoranthenes		420	320	102	570	500	320		320	330		
Total HPAHs		2,100	1,400 J	383 J	2,400 J	2,030 J	1,750 J		1,630	1,580		
Total LPAHs		250 J	125	24 J	310 J	220 J	180 J		160	130		
Total PAHs		2,300 J	1,500 J	407 J	2,710 J	2,250 J	1,930 J		1,790	1,710		
Other SVOCs (ug/kg dw)												
1,2,4-Trichlorobenzene		20 U	20 U	6.1 U	19 U	6.1 U	18 U		20 U	20 U		
1,2-Dichlorobenzene		20 U	20 U	6.1 UJ	19 UJ	6.1 UJ	18 UJ		20 U	20 U		
1,3-Dichlorobenzene		20 U	20 U	20 U	20 U	20 U	98 U		20 U	20 U		
1,4-Dichlorobenzene		20 U	20 U	6.1 U	19 U	6.1 U	18 U		20 U	20 U		
2,4,5-Trichlorophenol									200 UJ	200 UJ		
2,4,6-Trichlorophenol									200 UJ	200 UJ		
2,4-Dichlorophenol									60 UJ	60 UJ		
2,4-Dimethylphenol		20 U	20 U	6.1 UJ	19 UJ	6.1 UJ	18 UJ		20 UJ	20 UJ		
2,4-Dinitrophenol									200 UJ	200 UJ		
2,4-Dinitrotoluene									200 U	200 U		
2,6-Dinitrotoluene									200 U	200 U		
2-Chlorophenol									20 UJ	20 UJ		
2-Methylphenol		20 U	20 U	6.1 UJ	19 UJ	6.1 UJ	18 UJ		20 UJ	20 UJ		
2-Nitroaniline									100 U	100 U		
2-Nitrophenol									100 UJ	100 UJ		
3,3'-Dichlorobenzidine									200 U	200 U		
3-Nitroaniline									200 U	200 U		
4,6-Dinitro-o-cresol									200 UJ	200 UJ		
4-Bromophenyl phenyl ether									40 U	40 U		
4-Chloro-3-methylphenol									40 UJ	40 UJ		
4-Chloroaniline									60 U	60 U		
4-Chlorophenyl phenyl ether									20 U	20 U		
4-Methylphenol		20 U	20 U	20 UJ	20 UJ	20 UJ	98 UJ		20 UJ	20 UJ		
4-Nitroaniline									100 U	100 U		

TABLE J-1
SURFACE SEDIMENT ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	AN-029	AN-029	AN-030	AN-045	AN-046	AN-046	AN-047	DR187	DR188	DR220	EIT060	EST141
Sample ID	AN029-SS-061025	AN029-SS-061025	AN030-SS-061025	AN045-SS-080211	AN046-SS-080211	AN096-SS-080211	AN047-SS-080211	SD-DR187-0000	SD-DR188-0000	SD-DR220-0000	EIT06-01	EST09-01
Sample Date	10/25/06	10/25/06	10/25/06	02/11/08	02/11/08	02/11/08	02/11/08	08/27/98	08/25/98	08/25/98	09/26/97	09/25/97
Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33
4-Nitrophenol									100 UJ	100 UJ		
Aniline												
Benzoic acid		200 U	200 U	200 U	200 U	200 U	790 J		200 U	200 U		
Benzyl alcohol		20 U	20 U	20 UJ	20 UJ	20 UJ	98 U		50 U	50 U		
bis(2-chloroethoxy)methane									40	40 U		
bis(2-chloroethyl)ether									40 U	40 U		
bis(2-chloroisopropyl)ether									40 U	40 U		
Carbazole									20	20		
Hexachlorobenzene		20 U	20 U	6.1 U	19 U	6.1 U	18 U		20 U	20 U		
Hexachlorobutadiene		20 U	20 U	6.1 U	19 U	6.1 U	18 U		20 U	20 U		
Hexachlorocyclopentadiene									100 UJ	100 UJ		
Hexachloroethane		20 U	20 U	20 U	20 U	20 U	98 U		20 U	20 U		
Isophorone									20 U	20 U		
Nitrobenzene									20 U	20 U		
n-Nitrosodimethylamine												
n-Nitroso-di-n-propylamine									40 U	40 U		
n-Nitrosodiphenylamine		20 UJ	20 UJ	6.1 UJ	19 UJ	6.1 UJ	18 UJ		40 U	40 U		
Pentachlorophenol		98 U	99 U	30 UJ	93 UJ	31 UJ	92 UJ		100 UJ	100 UJ		
Phenol		20 U	20 U	20 U	30	28	98 U		20 UJ	20 UJ		
PCBs (ug/kg dw)												
Aroclor-1016		9.7 U	9.9 U	9.9 U	9.8 U	10 U	120 U		20 U	20 U		
Aroclor-1221		9.7 U	9.9 U	9.9 U	9.8 U	10 U	120 U		40 U	40 U		
Aroclor-1232		9.7 U	9.9 U	9.9 U	9.8 U	10 U	120 U		20 U	20 U		
Aroclor-1242		19 U	16	9.9 U	9.8 U	10 U	120 U		20 U	20 U		
Aroclor-1248		9.7 U	9.9 U	9.9 U	20	25 U	1,100		20 U	20 U		
Aroclor-1254		150	72 J	120	69	89	1,800		58	42		
Aroclor-1260		71	47	40 U	43	40 U	120 U		46	35		
Aroclor-1262		9.7 U	9.9 U	9.9 U	9.8 U	10 U	120 U					
Aroclor-1268		9.7 U	9.9 U	9.9 U	9.8 U	10 U	120 U					
Total PCBs		220	135 J	120	132	89	2,900		104	77	170	110
Total PCBs + PCTs											200	130
Total PCTs											31	19
PCBs (ng/kg dw)												
PCB TEQ - mammal (half DL)								66 J				
PCB-018								1,000 UJ	1,000 UJ	1,000 UJ		
PCB-028								1,000 UJ	1,000 UJ	1,000 UJ		
PCB-044								3,000 J	1,000 J	1,000 UJ		
PCB-055								6,000 J	2,000 J	1,000 J		
PCB-066								12,000 J	4,000	3,000		
PCB-077								1,000 U	1,000 U	1,000 U	670 U	770 U
PCB-081								1,000 UJ	1,000 U	1,000 U		
PCB-101								10,000 J	4,000	3,000	25,000 J	29,000 J
PCB-105								5,000 J	1,000	1,000 U	550 U	4,300
PCB-110											550 U	7,700
PCB-114								1,000 UJ	1,000 U	1,000 U		
PCB-118								11,000 J	3,000	2,000	5,600	8,700
PCB-123								2,000 UJ	1,000 U	1,000 U		
PCB-126								1,000 UJ	1,000 U	1,000 U	610 U	690 U
PCB-128								4,000 J	1,000	1,000 U	590 U	3,800 J
PCB-138								21,000	6,000	4,000	7,300	8,400
PCB-153								12,000 J	4,000	3,000	15,000 J	23,000 J
PCB-156								2,000 J	1,000 U	1,000 U	530 U	610 U
PCB-157								1,000 UJ	1,000 U	1,000 U		540 U
PCB-167								1,000 UJ	1,000 U	1,000 U		

TABLE J-1
SURFACE SEDIMENT ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	AN-029	AN-029	AN-030	AN-045	AN-046	AN-046	AN-047	DR187	DR188	DR220	EIT060	EST141
Sample ID	AN029-SS-061025	AN029-SS-061025	AN030-SS-061025	AN045-SS-080211	AN046-SS-080211	AN096-SS-080211	AN047-SS-080211	SD-DR187-0000	SD-DR188-0000	SD-DR220-0000	EIT06-01	EST09-01
Sample Date	10/25/06	10/25/06	10/25/06	02/11/08	02/11/08	02/11/08	02/11/08	08/27/98	08/25/98	08/25/98	09/26/97	09/25/97
Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33
PCB-169								1,000 UJ	1,000 U	1,000 U	1,500 U	1,700 U
PCB-170								7,000 UJ	2,000 U	2,000 U	530 U	7,800
PCB-180								7,000 J	2,000	2,000	5,500	11,000
PCB-187								3,000 J	2,000	1,000		
PCB-189								1,000 UJ	1,000 U	1,000 U	680 U	780 U
PCB-195								1,000 UJ	1,000 U	1,000 U		
PCB-206								1,000 UJ	1,000 U	1,000 U		
PCB-209								1,000 UJ	1,000 U	1,000 U		
Phthalates (ug/kg dw)												
Bis(2-ethylhexyl)phthalate		570	200	33 UJ	250 J	320 J	950 J		260	400		
Butyl benzyl phthalate		83	29	36	55	70 J	2,200		60	30		
Diethyl phthalate		20 U	20 U	20 UJ	20 UJ	20 UJ	98 UJ		20 U	20 U		
Dimethyl phthalate		37	15 J	12 J	47 U	38 J	310 J		40	20 U		
Di-n-butyl phthalate		96 U	32 U	100 J	33 J	28 J	300 J		20 U	20 U		
Di-n-octyl phthalate		20 U	20 U	20 UJ	20 UJ	15 J	98 UJ		20 U	20 U		
Organometals (ug/kg dw)												
Dibutyltin as ion								20				
Monobutyltin as ion								8.0 J				
Tetrabutyltin as ion								5.0 U				
Tributyltin as ion								27				
Pesticides (ug/kg dw)												
2,4'-DDD	9.8 U											
2,4'-DDE	9.8 U											
2,4'-DDT	9.8 U											
4,4'-DDD	9.8 U											
4,4'-DDE	9.8 U											
4,4'-DDT	22 U											
Aldrin	4.9 U											
alpha-BHC	4.9 U											
alpha-Chlordane	4.9 U											
alpha-Endosulfan	4.9 U											
beta-BHC	4.9 U											
beta-Chlordane												
beta-Endosulfan	9.8 U											
cis-Nonachlor	9.8 U											
delta-BHC	40 U											
Dieldrin	9.8 U											
Endosulfan sulfate	9.8 U											
Endrin	9.8 U											
Endrin aldehyde	9.8 U											
Endrin ketone	9.8 U											
gamma-BHC	4.9 U											
gamma-Chlordane	4.9 U											
Heptachlor	4.9 U											
Heptachlor epoxide	4.9 U											
Methoxychlor	49 U											
Mirex												
Oxychlordane												
Total aldrin/dieldrin	9.8 U											
Total chlordane	9.8 U											
Total DDTs	22 U											
Toxaphene	490 U											
trans-Nonachlor	9.8 U											
VOCs (ug/kg dw)												

TABLE J-1
SURFACE SEDIMENT ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	AN-029	AN-029	AN-030	AN-045	AN-046	AN-046	AN-047	DR187	DR188	DR220	EIT060	EST141
Sample ID	AN029-SS-061025	AN029-SS-061025	AN030-SS-061025	AN045-SS-080211	AN046-SS-080211	AN096-SS-080211	AN047-SS-080211	SD-DR187-0000	SD-DR188-0000	SD-DR220-0000	EIT06-01	EST09-01
Sample Date	10/25/06	10/25/06	10/25/06	02/11/08	02/11/08	02/11/08	02/11/08	08/27/98	08/25/98	08/25/98	09/26/97	09/25/97
Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33
1,1,1,2-Tetrachloroethane								2.3 U				
1,1,1-Trichloroethane								2.3 U				
1,1,2,2-Tetrachloroethane								2.3 U				
1,1,2-Trichloroethane								2.3 U				
1,1,2-Trichlorotrifluoroethane								2.3 U				
1,1-Dichloroacetone								4.6 U				
1,1-Dichloroethane								2.3 U				
1,1-Dichloroethene								2.3 U				
1,1-Dichloropropene								2.3 U				
1,2,3-Trichlorobenzene								4.6 U				
1,2,3-Trichloropropane								2.3 U				
1,2,4-Trimethylbenzene								2.3 U				
1,2-Dibromo-3-chloropropane								11.5 U				
1,2-Dibromoethane (EDB)								2.3 U				
1,2-Dichloroethane								2.3 U				
1,2-Dichloropropane								2.3 U				
1,3,5-Trimethylbenzene								2.3 U				
1,3-Dichloropropane								2.3 U				
1-Chlorobutane								2.3 U				
2,2-Dichloropropane								2.3 U				
2-Chlorotoluene								2.3 U				
2-Hexanone								4.6 U				
2-Nitropropane								11.5 U				
4-Chlorotoluene								2.3 U				
Acetone								23 UJ				
Allyl chloride								2.3 U				
Benzene								2.3 U				
Bromobenzene								2.3 U				
Bromochloromethane								2.3 U				
Bromodichloromethane								2.3 U				
Bromoform								4.6 U				
Bromomethane								11.5 U				
Carbon disulfide								4.6 U				
Carbon tetrachloride								2.3 U				
Chlorobenzene								2.3 U				
Chloroethane								4.6 U				
Chloroform								2.3 U				
Chloromethane								2.3 U				
cis-1,2-Dichloroethene								2.3 U				
cis-1,3-Dichloropropene								2.4 U				
Dibromochloromethane								2.3 U				
Dibromomethane								2.3 U				
Dichloromethane								11.5 U				
Diethyl ether								2.3 U				
Ethyl methacrylate								2.3 U				
Ethylbenzene								2.3 U				
Iodomethane								2.3 U				
Isopropylbenzene								11.5 U				
m,p-Xylene								4.6 U				
Methacrylonitrile								11.5 U				
Methyl acrylate								11.5 U				
Methyl ethyl ketone								4.6 U				
Methyl isobutyl ketone								4.6 U				
Methyl methacrylate								4.6 U				

TABLE J-1
SURFACE SEDIMENT ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	AN-029	AN-029	AN-030	AN-045	AN-046	AN-046	AN-047	DR187	DR188	DR220	EIT060	EST141
Sample ID	AN029-SS-061025	AN029-SS-061025	AN030-SS-061025	AN045-SS-080211	AN046-SS-080211	AN096-SS-080211	AN047-SS-080211	SD-DR187-0000	SD-DR188-0000	SD-DR220-0000	EIT06-01	EST09-01
Sample Date	10/25/06	10/25/06	10/25/06	02/11/08	02/11/08	02/11/08	02/11/08	08/27/98	08/25/98	08/25/98	09/26/97	09/25/97
Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33
n-Butylbenzene								2.3 U				
n-Propylbenzene								2.3 U				
o-Xylene								2.3 U				
p-Cymene								2.3 U				
Pentachloroethane								2.3 U				
sec-Butylbenzene								2.3 U				
Styrene								2.3 U				
tert-Butyl methyl ether								2.3 U				
tert-Butylbenzene								2.3 U				
Tetrachloroethene								2.3 U				
Toluene								2.3 U				
Total xylenes								4.6 U				
trans-1,2-Dichloroethene								2.3 U				
trans-1,3-Dichloropropene								4.3 U				
trans-1,4-Dichloro-2-butene								11.5 U				
Trichloroethene								2.3 U				
Trichlorofluoromethane								2.3 U				
Vinyl chloride								2.3 U				
Dioxin/furan (ng/kg dw)												
1,2,3,4,6,7,8-HpCDD	160							220				
1,2,3,4,6,7,8-HpCDF	40							42				
1,2,3,4,7,8,9-HpCDF	3.2 U							7.6 J				
1,2,3,4,7,8-HxCDD	2.4 U							3.0 U				
1,2,3,4,7,8-HxCDF	6.9 J							9				
1,2,3,6,7,8-HxCDD	6.8 J							12				
1,2,3,6,7,8-HxCDF	4 U							3.7 U				
1,2,3,7,8,9-HxCDD	5.8 J							7.9				
1,2,3,7,8,9-HxCDF	0.31 U							0.41 U				
1,2,3,7,8-PeCDD	1.7 U							2.3 U				
1,2,3,7,8-PeCDF	3.8 U							1.7 U				
2,3,4,6,7,8-HxCDF	3.7 U							1.9 U				
2,3,4,7,8-PeCDF	5.2 J							3.0 U				
2,3,7,8-TCDD	0.45 U							2				
2,3,7,8-TCDF	6.3							4.3				
Dioxin/furan TEQ - mammal (half DL)	8.30 J							11 J				
OCDD	1,400							1,800				
OCDF	90							93				
Total HpCDD								510				
Total HpCDF								140				
Total HxCDD								80				
Total HxCDF								60				
Total PeCDD								6.7 U				
Total PeCDF								38				
Total TCDD								14				
Total TCDF								45				

TABLE J-1
SURFACE SEDIMENT ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	EST142	EST143	EST147	EST148	EST157	EST158	EST159	EST160	EST161	EST162	LDW-SS112	LDW-SS114
Sample ID	EST09-02	EST09-03	EST10-01	EST10-02	EST11-07	EST11-08	EST11-09	EST11-10	EST11-11	EST11-12	LDW-SS112-010	LDW-SS114-010
Sample Date	10/24/97	09/25/97	09/25/97	11/12/97	09/24/97	09/24/97	09/24/97	09/25/97	11/13/97	09/25/97	01/19/05	01/20/05
Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33
Conventionals												
Ammonia (mg-N/kg dw)											4.99	2.71
Percent moisture (%ww)												
Total organic carbon (%dw)	1.64	1.38	1.3	2.23	1.79	1.52	1.19	1.59	0.85	1.46	1.82	1.53
Total solids (%ww)											53	57.98
Total solids (preserved) (%ww)											55	55.15
Total sulfides (mg/kg dw)											6.2 UJ	5.8 UJ
Grain size (%dw)												
Fractional % >9525 microns												
Fractional % phi >-1 (>2000 microns)											2.4	2.1
Fractional % phi >-3 (>8000 microns)												
Fractional % phi 0-1 (500-1000 microns)											4.8	4
Fractional % phi -1-0 (1000-2000 microns)											2	2.1
Fractional % phi 10+ (<0.98 micron)											3.4	3.3
Fractional % phi 1-2 (250-500 microns)											20	13.3
Fractional % phi -2-(-1) (2000-4000 microns)												
Fractional % phi 2-3 (125-250 microns)											18.1	16.8
Fractional % phi -3-(-2) (4000-8000 microns)												
Fractional % phi 3-4 (62.5-125 microns)											14.6	16.6
Fractional % phi 4-5 (31.2-62.5 microns)											11	14.6
Fractional % phi 5-6 (15.6-31.2 microns)											8.5	11.2
Fractional % phi 6-7 (7.8-15.6 microns)											6.7	7.2
Fractional % phi 7-8 (3.9-7.8 microns)											3.8	4.1
Fractional % phi 8-9 (1.95-3.9 microns)											2.7	2.8
Fractional % phi 9-10 (0.98-1.95 microns)											2	1.8
Fractional % Sieve 3/8-inch (4750-9525 microns)												
Total clay	17.07	12.16	13.6	15.27	18.81	17.69	7.98	17.29	8.62	15.26	8.1	7.9
Total fines (percent silt+clay)											38.1	45
Total gravel	0.01 U	0.01	0.37	0.73	0.01 U	0.04	1.86	0.01 U	2.81	0.01 U	2.4	2.1
Total sand	8.73	46.41	39.01	39.36	7.83	13.7	69.96	10.94	61.37	25.92	59.5	52.8
Total silt	74.2	41.42	47.02	44.64	73.35	68.57	20.2	71.77	27.21	58.82	30	37.1
Metals (mg/kg dw)												
Aluminum												
Antimony											0.4 UJ	0.3 UJ
Arsenic											481	1,100
Barium												
Beryllium												
Cadmium											0.7	1.6 J
Calcium												
Chromium											62.4	72.8 J
Cobalt											7.6	9
Copper											77.7	58.5
Iron												
Lead											82	110
Magnesium												
Manganese												
Mercury											0.08 U	0.12
Molybdenum											3.5	3.4
Nickel											25	26
Potassium												
Selenium											9 U	8 U
Silver											0.5	0.8
Sodium												
Thallium											0.4 U	0.3 U

TABLE J-1
SURFACE SEDIMENT ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	EST142	EST143	EST147	EST148	EST157	EST158	EST159	EST160	EST161	EST162	LDW-SS112	LDW-SS114
Sample ID	EST09-02	EST09-03	EST10-01	EST10-02	EST11-07	EST11-08	EST11-09	EST11-10	EST11-11	EST11-12	LDW-SS112-010	LDW-SS114-010
Sample Date	10/24/97	09/25/97	09/25/97	11/12/97	09/24/97	09/24/97	09/24/97	09/25/97	11/13/97	09/25/97	01/19/05	01/20/05
Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33
Tin												
Vanadium											71.9	72.6
Zinc											206	230
PAHs (ug/kg dw)												
1-Methylnaphthalene												
2-Chloronaphthalene											98 U	130 U
2-Methylnaphthalene											98 U	130 U
Acenaphthene											98 U	140
Acenaphthylene											98 U	130 U
Anthracene											200	250
Benzo(a)anthracene											930	1,100
Benzo(a)pyrene											1,100	1,300
Benzo(b)fluoranthene											1,400	1,300
Benzo(g,h,i)perylene											370	460
Benzo(k)fluoranthene											1,200	1,200
Chrysene											1,600	1,900
cPAHs - mammal - half DL											1,500	1,800 J
Dibenzo(a,h)anthracene											98 U	86 J
Dibenzofuran											98 U	130 U
Fluoranthene											3,400	3,100
Fluorene											98 U	130
Indeno(1,2,3-cd)pyrene											410	560
Naphthalene											98 U	130 U
Phenanthrene											1,200	1,600
Pyrene											2,000	2,500
Total benzofluoranthenes											2,600	2,500
Total HPAHs											12,400	13,500 J
Total LPAHs											1,400	2,100
Total PAHs											13,800	15,600 J
Other SVOCs (ug/kg dw)												
1,2,4-Trichlorobenzene											98 U	130 U
1,2-Dichlorobenzene											98 U	130 U
1,3-Dichlorobenzene											98 U	130 U
1,4-Dichlorobenzene											98 U	130 U
2,4,5-Trichlorophenol											490 U	640 U
2,4,6-Trichlorophenol											490 U	640 U
2,4-Dichlorophenol											490 U	640 U
2,4-Dimethylphenol											98 U	130 U
2,4-Dinitrophenol											980 U	1,300 U
2,4-Dinitrotoluene											490 U	640 U
2,6-Dinitrotoluene											490 U	640 U
2-Chlorophenol											98 U	130 U
2-Methylphenol											98 U	130 U
2-Nitroaniline											490 U	640 U
2-Nitrophenol											490 U	640 U
3,3'-Dichlorobenzidine											490 U	640 U
3-Nitroaniline											490 U	640 U
4,6-Dinitro-o-cresol											980 U	1,300 U
4-Bromophenyl phenyl ether											98 U	130 U
4-Chloro-3-methylphenol											490 U	640 U
4-Chloroaniline											490 U	640 U
4-Chlorophenyl phenyl ether											98 U	130 U
4-Methylphenol											98 U	130 U
4-Nitroaniline											490 U	640 U

TABLE J-1
SURFACE SEDIMENT ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	EST142	EST143	EST147	EST148	EST157	EST158	EST159	EST160	EST161	EST162	LDW-SS112	LDW-SS114
Sample ID	EST09-02	EST09-03	EST10-01	EST10-02	EST11-07	EST11-08	EST11-09	EST11-10	EST11-11	EST11-12	LDW-SS112-010	LDW-SS114-010
Sample Date	10/24/97	09/25/97	09/25/97	11/12/97	09/24/97	09/24/97	09/24/97	09/25/97	11/13/97	09/25/97	01/19/05	01/20/05
Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33
4-Nitrophenol											490 U	640 U
Aniline											98 U	130 U
Benzoic acid											980 U	1,300 U
Benzyl alcohol											98 U	130 U
bis(2-chloroethoxy)methane											98 U	130 U
bis(2-chloroethyl)ether											98 U	130 U
bis(2-chloroisopropyl)ether											98 U	130 U
Carbazole											220	240
Hexachlorobenzene											98 U	130 U
Hexachlorobutadiene											98 U	130 U
Hexachlorocyclopentadiene											490 U	640 U
Hexachloroethane											98 U	130 U
Isophorone											98 U	130 U
Nitrobenzene											98 U	130 U
n-Nitrosodimethylamine											490 U	130 U
n-Nitroso-di-n-propylamine											490 U	640 U
n-Nitrosodiphenylamine											98 U	130 U
Pentachlorophenol											490 U	640 U
Phenol											98 U	130 U
PCBs (ug/kg dw)												
Aroclor-1016											34 U	110 U
Aroclor-1221											34 U	110 U
Aroclor-1232											34 U	110 U
Aroclor-1242											34 U	110 U
Aroclor-1248											76	210 U
Aroclor-1254											240	540
Aroclor-1260											150	280
Aroclor-1262												
Aroclor-1268												
Total PCBs	87 J	390	690 J	670 J	41 J	74 J	78 J	32 J	160	230	470	820
Total PCBs + PCTs	97	440	1,400	740	49	86	110	45	190	250		
Total PCTs	10	53	710	73	7.8 J	12	32	13	33	23		
PCBs (ng/kg dw)												
PCB TEQ - mammal (half DL)												
PCB-018												
PCB-028												
PCB-044												
PCB-055												
PCB-066												
PCB-077	700 U	590 U	910 U	1,400	440 U	480 U	350 U	700 U	310 U	440 U		
PCB-081												
PCB-101	25,000 J	100,000 J	150,000 J	150,000 J	13,000 J	22,000 J	24,000 J	12,000 J	53,000 J	68,000 J		
PCB-105	3,200	14,000	40,000	36,000 J	1,700	3,400	3,300	1,700	6,000 J	7,200		
PCB-110	9,300	45,000	130,000	47,000	3,600 U	6,600 U	11,000	3,800 U	17,000	22,000		
PCB-114												
PCB-118	7,700	31,000	93,000	41,000	4,200	6,200	7,700	3,500	14,000	18,000		
PCB-123												
PCB-126	630 U	530 U	830 U	360 U	400 U	430 U	310 U	630 U	290 U	390 U		
PCB-128	3,300 J	11,000 J	100,000 J	20,000 J	2,000 J	2,500 J	6,200 J	2,400 J	6,800 J	6,000 J		
PCB-138	6,400	28,000	69,000	36,000	380 U	5,300	9,300	2,900	14,000	14,000		
PCB-153	17,000 J	75,000 J	130,000 J	110,000 J		15,000 J	20,000 J	8,400 J	33,000 J	44,000 J		
PCB-156	550 U	3,300	7,400	5,000	350 U	380 U	280 U	560 U	250 U	1,000		
PCB-157	490 U	410 U	640 U	280 U	310 U	340 U	240 U	490 U	220 U	310 U		
PCB-167												

TABLE J-1
SURFACE SEDIMENT ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	EST142	EST143	EST147	EST148	EST157	EST158	EST159	EST160	EST161	EST162	LDW-SS112	LDW-SS114
Sample ID	EST09-02	EST09-03	EST10-01	EST10-02	EST11-07	EST11-08	EST11-09	EST11-10	EST11-11	EST11-12	LDW-SS112-010	LDW-SS114-010
Sample Date	10/24/97	09/25/97	09/25/97	11/12/97	09/24/97	09/24/97	09/24/97	09/25/97	11/13/97	09/25/97	01/19/05	01/20/05
Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33
PCB-169	1,600 U	1,300 U	2,000 U	870 U	980 U	1,100 U	770 U	1,600 U	680 U	970 U		
PCB-170	2,300	8,000	54,000	20,000	1,100	3,300	4,300	2,000	5,600	6,500		
PCB-180	3,800	9,400	110,000	29,000	3,200 U	4,900 U	6,300	2,700 U	9,100	12,000		
PCB-187												
PCB-189	710 U	600 U	930 U	400 U	450 U	490 U	350 U	710 U	310 U	440 U		
PCB-195												
PCB-206												
PCB-209												
Phthalates (ug/kg dw)												
Bis(2-ethylhexyl)phthalate											320	1,200
Butyl benzyl phthalate											220	130 U
Diethyl phthalate											110	130 U
Dimethyl phthalate											98 U	130 U
Di-n-butyl phthalate											98 U	83 J
Di-n-octyl phthalate											98 U	130 U
Organometals (ug/kg dw)												
Dibutyltin as ion												
Monobutyltin as ion												
Tetrabutyltin as ion												
Tributyltin as ion												
Pesticides (ug/kg dw)												
2,4'-DDD												
2,4'-DDE												
2,4'-DDT												
4,4'-DDD												
4,4'-DDE												
4,4'-DDT												
Aldrin												
alpha-BHC												
alpha-Chlordane												
alpha-Endosulfan												
beta-BHC												
beta-Chlordane												
beta-Endosulfan												
cis-Nonachlor												
delta-BHC												
Dieldrin												
Endosulfan sulfate												
Endrin												
Endrin aldehyde												
Endrin ketone												
gamma-BHC												
gamma-Chlordane												
Heptachlor												
Heptachlor epoxide												
Methoxychlor												
Mirex												
Oxychlordane												
Total aldrin/dieldrin												
Total chlordane												
Total DDTs												
Toxaphene												
trans-Nonachlor												
VOCs (ug/kg dw)												

TABLE J-1
SURFACE SEDIMENT ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	EST142	EST143	EST147	EST148	EST157	EST158	EST159	EST160	EST161	EST162	LDW-SS112	LDW-SS114
Sample ID	EST09-02	EST09-03	EST10-01	EST10-02	EST11-07	EST11-08	EST11-09	EST11-10	EST11-11	EST11-12	LDW-SS112-010	LDW-SS114-010
Sample Date	10/24/97	09/25/97	09/25/97	11/12/97	09/24/97	09/24/97	09/24/97	09/25/97	11/13/97	09/25/97	01/19/05	01/20/05
Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33
1,1,1,2-Tetrachloroethane												
1,1,1-Trichloroethane												
1,1,2,2-Tetrachloroethane												
1,1,2-Trichloroethane												
1,1,2-Trichlorotrifluoroethane												
1,1-Dichloroacetone												
1,1-Dichloroethane												
1,1-Dichloroethene												
1,1-Dichloropropene												
1,2,3-Trichlorobenzene												
1,2,3-Trichloropropane												
1,2,4-Trimethylbenzene												
1,2-Dibromo-3-chloropropane												
1,2-Dibromoethane (EDB)												
1,2-Dichloroethane												
1,2-Dichloropropane												
1,3,5-Trimethylbenzene												
1,3-Dichloropropane												
1-Chlorobutane												
2,2-Dichloropropane												
2-Chlorotoluene												
2-Hexanone												
2-Nitropropane												
4-Chlorotoluene												
Acetone												
Allyl chloride												
Benzene												
Bromobenzene												
Bromochloromethane												
Bromodichloromethane												
Bromoform												
Bromomethane												
Carbon disulfide												
Carbon tetrachloride												
Chlorobenzene												
Chloroethane												
Chloroform												
Chloromethane												
cis-1,2-Dichloroethene												
cis-1,3-Dichloropropene												
Dibromochloromethane												
Dibromomethane												
Dichloromethane												
Diethyl ether												
Ethyl methacrylate												
Ethylbenzene												
Iodomethane												
Isopropylbenzene												
m,p-Xylene												
Methacrylonitrile												
Methyl acrylate												
Methyl ethyl ketone												
Methyl isobutyl ketone												
Methyl methacrylate												

TABLE J-1
SURFACE SEDIMENT ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	EST142	EST143	EST147	EST148	EST157	EST158	EST159	EST160	EST161	EST162	LDW-SS112	LDW-SS114
Sample ID	EST09-02	EST09-03	EST10-01	EST10-02	EST11-07	EST11-08	EST11-09	EST11-10	EST11-11	EST11-12	LDW-SS112-010	LDW-SS114-010
Sample Date	10/24/97	09/25/97	09/25/97	11/12/97	09/24/97	09/24/97	09/24/97	09/25/97	11/13/97	09/25/97	01/19/05	01/20/05
Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33
n-Butylbenzene												
n-Propylbenzene												
o-Xylene												
p-Cymene												
Pentachloroethane												
sec-Butylbenzene												
Styrene												
tert-Butyl methyl ether												
tert-Butylbenzene												
Tetrachloroethene												
Toluene												
Total xylenes												
trans-1,2-Dichloroethene												
trans-1,3-Dichloropropene												
trans-1,4-Dichloro-2-butene												
Trichloroethene												
Trichlorofluoromethane												
Vinyl chloride												
Dioxin/furan (ng/kg dw)												
1,2,3,4,6,7,8-HpCDD												
1,2,3,4,6,7,8-HpCDF												
1,2,3,4,7,8,9-HpCDF												
1,2,3,4,7,8-HxCDD												
1,2,3,4,7,8-HxCDF												
1,2,3,6,7,8-HxCDD												
1,2,3,6,7,8-HxCDF												
1,2,3,7,8,9-HxCDD												
1,2,3,7,8,9-HxCDF												
1,2,3,7,8-PeCDD												
1,2,3,7,8-PeCDF												
2,3,4,6,7,8-HxCDF												
2,3,4,7,8-PeCDF												
2,3,7,8-TCDD												
2,3,7,8-TCDF												
Dioxin/furan TEQ - mammal (half DL)												
OCDD												
OCDF												
Total HpCDD												
Total HpCDF												
Total HxCDD												
Total HxCDF												
Total PeCDD												
Total PeCDF												
Total TCDD												
Total TCDF												

TABLE J-1
SURFACE SEDIMENT ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	LDW-SS115	LDW-SS116	LDW-SS118	LDW-SS119	LDW-SS157	LDW-SS158	LDW-SS159	LDW-SS338	LDW-SS541	R22SD	R23SD	R26SD
Sample ID	LDW-SS115-010	LDW-SS116-010	LDW-SS118-010	LDW-SS119-010	LDW-SS157-010	LDW-SS158-010	LDW-SS159-010	LDW-SS338-010	LDW-SS541-010	SD0001	SD0020	SD0002
Sample Date	01/25/05	01/20/05	01/20/05	01/19/05	03/16/05	03/16/05	03/16/05	10/03/06	12/17/09	10/08/97	10/11/97	10/09/97
Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33
Conventionals												
Ammonia (mg-N/kg dw)	4.61	4.81	11.3	6.41	4.13	4.32	7.86					
Percent moisture (%ww)												
Total organic carbon (%dw)	1.92	1.34	1.84	1.5	3.1	1.96	2.78	1.99	1.1	1.4	1.7	1.1
Total solids (%ww)	64.8	64.1	46.9	54.1	55.2	54.5	42.7	48.5	69.9	49.1	48.9	50.4
Total solids (preserved) (%ww)	54.8	57.6	42.4	50.9	54.6	61.6	61.6					
Total sulfides (mg/kg dw)	3.7 U	6.5 UJ	480 J	7.7 UJ	5.9 U	4.9 UJ	5.1 J					
Grain size (%dw)												
Fractional % >9525 microns												
Fractional % phi >-1 (>2000 microns)	53.3	1.3	0.3	2.8	3.8	4.4	0.3	0.6	0.1			
Fractional % phi >-3 (>8000 microns)										4		
Fractional % phi 0-1 (500-1000 microns)	4.8	6.5	0.4	2.8	9.8	7.3	4.5	0.9	1.4	7	6	2
Fractional % phi -1-0 (1000-2000 microns)	3	1	0.3	0.8	3.8	2.7	0.9	1	0.3	4	1	1
Fractional % phi 10+ (<0.98 micron)	1.1	1.8	8.4	3.1	3.4	4.5	3.3	6.9	2.5	4	3	4
Fractional % phi 1-2 (250-500 microns)	15	22.4	1.9	8.6	29	14.7	15.1	2.6	19.4	10	19	8
Fractional % phi -2-(-1) (2000-4000 microns)										4	2	1
Fractional % phi 2-3 (125-250 microns)	9	21.2	4.1	15.9	19.3	10.5	24.3	9.4	48.5	8	12	11
Fractional % phi -3-(-2) (4000-8000 microns)										2	1	1
Fractional % phi 3-4 (62.5-125 microns)	2.8	15.3	16.8	21	8.3	13.4	16.6	16.8	9	8	8	15
Fractional % phi 4-5 (31.2-62.5 microns)	0.6	10.3	23.4	13.3	5.7	13.4	9.7	14.6	7.1	20	14	21
Fractional % phi 5-6 (15.6-31.2 microns)	3.5	7.8	18.8	13.2	5	11.6	9.6	17.4	4	10	14	18
Fractional % phi 6-7 (7.8-15.6 microns)	2.8	5.3	11.6	8	4.3	7.9	6.7	14.3	3.3	9	10	10
Fractional % phi 7-8 (3.9-7.8 microns)	2	3.1	7.1	5.2	3.6	4.9	4.8	8.2	2.4	5	5	5
Fractional % phi 8-9 (1.95-3.9 microns)	1.2	2.4	4.1	3.1	2.5	2.8	2.7	4	1.1	3	3	4
Fractional % phi 9-10 (0.98-1.95 microns)	0.8	1.8	2.8	2.1	1.5	1.7	1.7	3.3	1	2	2	2
Fractional % Sieve 3/8-inch (4750-9525 microns)												
Total clay	3.1	6	15.3	8.3	7.4	9	7.7	14.2	4.6	9	8	10
Total fines (percent silt+clay)	12	32.5	76.2	48	26	46.8	38.5	68.7	21.4	53	51	60
Total gravel	53.3	1.3	0.3	2.8	3.8	4.4	0.3	0.6	0.1	10	3	2
Total sand	34.6	66.4	23.5	49.1	70.2	48.6	61.4	30.7	78.6	37	46	37
Total silt	8.9	26.5	60.9	39.7	18.6	37.8	30.8	54.5	16.8	44	43	50
Metals (mg/kg dw)												
Aluminum												
Antimony	0.3 UJ	0.3 UJ	0.4 UJ	0.3 UJ	0.4 UJ	0.3 UJ	0.3 UJ	0.4 UJ				
Arsenic	44.4	9.6	13	10.9	21.1	20.5	10	8.7		79.4	36.2	15.8
Barium												
Beryllium												
Cadmium	1.1	0.3 UJ	0.4 UJ	0.6	1.6	0.7	0.4	0.4 U		1.4 J	1.7 J	0.4 UJ
Calcium												
Chromium	55	26.2 J	29 J	37.6	69	174	29.3	26		76 J	53 J	28 J
Cobalt	11	7.6	8.5	8.3	9	7.7	6.9	8.3				
Copper	99.7	38.5	47.4	46.8	74.7 J	52.1 J	37.0 J	43		53	56	40
Iron												
Lead	98	30	28	71	148	51	36	22		78	221	28
Magnesium												
Manganese												
Mercury	0.07	0.07	0.12	0.16	0.12 J	0.10 J	0.10 J	0.13		0.11	0.1	0.1
Molybdenum	4	1.2	1	1.7	6	7.6	1.6	0.8				
Nickel	35	20	20	19	37	48	19	22		30	35	23
Potassium												
Selenium	20 U	8 U	10 U	9 U	20 U	9 U	8 U	1 U				
Silver	1	0.5 U	0.6 U	0.7	2	0.6	0.5 U	0.4 U		1.8	2.3	0.7
Sodium												
Thallium	0.3 U	0.3 U	0.4 U	0.3 U	0.4 U	0.3 U	0.3 U	0.4 U				

TABLE J-1
SURFACE SEDIMENT ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	LDW-SS115	LDW-SS116	LDW-SS118	LDW-SS119	LDW-SS157	LDW-SS158	LDW-SS159	LDW-SS338	LDW-SS541	R22SD	R23SD	R26SD
Sample ID	LDW-SS115-010	LDW-SS116-010	LDW-SS118-010	LDW-SS119-010	LDW-SS157-010	LDW-SS158-010	LDW-SS159-010	LDW-SS338-010	LDW-SS541-010	SD0001	SD0020	SD0002
Sample Date	01/25/05	01/20/05	01/20/05	01/19/05	03/16/05	03/16/05	03/16/05	10/03/06	12/17/09	10/08/97	10/11/97	10/09/97
Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33
Tin												
Vanadium	81	61.3	67.6	58.8	67	65.7	53.5	57.5				
Zinc	343	92.8	103	115	248	151	99	95		293	188	91
PAHs (ug/kg dw)												
1-Methylnaphthalene								62 U				
2-Chloronaphthalene	200 U	99 U	99 U	96 U	58 U	59 U	58 U	62 U		20 U	20 U	20 U
2-Methylnaphthalene	200 U	99 U	99 U	96 U	58 U	59 U	58 U	62 U		36	110	20 U
Acenaphthene	150 J	99 U	99 U	96 U	86	59 U	58 U	62 U		210	390	20 U
Acenaphthylene	200 U	99 U	99 U	96 U	34 J	59 U	58 U	62 U		20 U	22	20 U
Anthracene	390	51 J	99 U	96 U	270	63	90	62 U		630	1,000	52
Benzo(a)anthracene	1,500	310	130	160	1,100	53	410	82		2,100	3,900	230
Benzo(a)pyrene	1,700	390	140	180	1,300	58	360	79		2,400	4,500	290
Benzo(b)fluoranthene	1,900	560	210	230	1,900	58	740	120		2,100	4,600	330
Benzo(g,h,i)perylene	490	120	71 J	96 U	510	140	120	58 J		1,400	3,100	190
Benzo(k)fluoranthene	1,700	360	120	160	1,500	310	600	84		2,500	4,200	310
Chrysene	2,500	660	270	350	1,500	320	780	120		2,800	5,300	370
cPAHs - mammal - half DL	2,400	550	210	260	1,900	140 J	570	120 J		3,500	6,600	430
Dibenzo(a,h)anthracene	240	99 U	99 U	96 U	79	54 J	58 U	8		510	1,200	83
Dibenzofuran	200 U	99 U	99 U	96 U	59	59 U	58 U	62 U		140	300	20 U
Fluoranthene	5,200	1,000	490	510	3,400	610	2,100	170		5,600	11,000	590
Fluorene	180 J	99 U	99 U	96 U	99	59 U	40 J	62 U		260	500	25
Indeno(1,2,3-cd)pyrene	600	150	46	63	670	170	180	51 J		1,500	3,200	200
Naphthalene	200 U	99 U	99 U	96 U	40 J	59 U	58 U	62 U		43	100	20 U
Phenanthrene	2,400	280	140	160	1,400	310	570	54 J		2,900	6,600	330
Pyrene	3,200	780 J	360	380	2,200	500	1,600	160		4,800	9,600	660
Total benzofluoranthenes	3,600	920	330	390	3,400	370	1,340	200		4,600	8,800	640
Total HPAHs	19,000	4,300 J	1,840 J	2,030	14,200	2,270 J	6,900	930 J		25,700	51,000	3,250
Total LPAHs	3,100 J	330 J	140	160	1,900 J	370	700 J	54 J		4,000	8,600	410
Total PAHs	22,200 J	4,700 J	1,980 J	2,190	16,100 J	2,650 J	7,600 J	990 J		29,800	59,000	3,660
Other SVOCs (ug/kg dw)												
1,2,4-Trichlorobenzene	200 U	6.6 U	6.6 U	6.6 U	6.4 U	6.4 U	6.6 U	6.2 U		20 U	20 U	20 U
1,2-Dichlorobenzene	200 U	6.6 U	6.6 U	6.6 U	6.4 U	6.4 U	6.6 U	6.2 U		20 U	20 U	20 U
1,3-Dichlorobenzene	200 U	99 U	99 U	96 U	58 U	59 U	58 U	62 U		20 U	20 U	20 U
1,4-Dichlorobenzene	200 U	6.6 U	6.6 U	6.6 U	6.4 U	6.4 U	6.6 U	6.2 U		20 UJ	20 UJ	20 UJ
2,4,5-Trichlorophenol	980 U	490 U	500 U	480 U	290 U	290 U	290 U	310 U		98 U	2,000 U	99 U
2,4,6-Trichlorophenol	980 U	490 U	500 U	480 U	290 U	290 U	290 U	310 U		98 U	2,000 U	99 U
2,4-Dichlorophenol	980 U	490 U	500 U	480 U	290 U	290 U	290 U	310 U		59 U	1,200 U	59 U
2,4-Dimethylphenol	200 U	6.6 U	6.6 U	6.6 U	6.4 U	6.4 U	6.6 U	6.2 U		20 U	20 U	20 U
2,4-Dinitrophenol	2,000 U	990 U	990 U	960 U	580 U	590 U	580 U	620 U		200 UJ	200 UJ	200 UJ
2,4-Dinitrotoluene	980 U	490 U	500 U	480 U	290 U	290 U	290 U	310 U		98 U	99 U	99 U
2,6-Dinitrotoluene	980 U	490 U	500 U	480 U	290 U	290 U	290 U	310 U		98 U	99 U	99 U
2-Chlorophenol	200 U	99 U	99 U	96 U	58 U	59 U	58 U	62 U		20 U	20 U	20 U
2-Methylphenol	200 U	6.6 U	6.6 U	6.6 U	6.4 U	6.4 U	6.6 U	6.2 U		20 U	20 U	20 U
2-Nitroaniline	980 U	490 U	500 U	480 U	290 U	290 U	290 U	310 U		98 U	2,000 U	99 U
2-Nitrophenol	980 U	490 U	500 U	480 U	290 U	290 U	290 U	310 U		98 U	2,000 U	99 U
3,3'-Dichlorobenzidine	980 U	490 U	500 U	480 U	290 U	290 U	290 U	310 U		98 U	99 U	99 U
3-Nitroaniline	980 U	490 U	500 U	480 U	290 U	290 U	290 U	310 U		120 U	120 U	120 U
4,6-Dinitro-o-cresol	2,000 U	990 U	990 U	960 U	580 U	590 U	580 U	620 U		200 UJ	200 UJ	200 UJ
4-Bromophenyl phenyl ether	200 U	99 U	99 U	96 U	58 U	59 U	58 U	62 U		20 U	20 U	20 U
4-Chloro-3-methylphenol	980 U	490 U	500 U	480 U	290 U	290 U	290 U	310 U		39 U	40 U	40 U
4-Chloroaniline	980 U	490 U	500 U	480 U	290 U	290 U	290 U	310 U		59 U	60 U	59 U
4-Chlorophenyl phenyl ether	200 U	99 U	99 U	96 U	58 U	59 U	58 U	62 U		20 U	20 U	20 U
4-Methylphenol	200 U	99 U	99 U	96 U	58 U	59 U	58 U	62 U		20 U	51	47
4-Nitroaniline	980 U	490 U	500 U	480 U	290 U	290 U	290 U	310 U		98 UJ	99 UJ	99 UJ

TABLE J-1
SURFACE SEDIMENT ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	LDW-SS115	LDW-SS116	LDW-SS118	LDW-SS119	LDW-SS157	LDW-SS158	LDW-SS159	LDW-SS338	LDW-SS541	R22SD	R23SD	R26SD
Sample ID	LDW-SS115-010	LDW-SS116-010	LDW-SS118-010	LDW-SS119-010	LDW-SS157-010	LDW-SS158-010	LDW-SS159-010	LDW-SS338-010	LDW-SS541-010	SD0001	SD0020	SD0002
Sample Date	01/25/05	01/20/05	01/20/05	01/19/05	03/16/05	03/16/05	03/16/05	10/03/06	12/17/09	10/08/97	10/11/97	10/09/97
Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33
4-Nitrophenol	980 U	490 U	500 U	480 U	290 U	290 U	290 U	310 U		98 UJ	99 UJ	99 UJ
Aniline	200 U	99 U	99 U	96 U	58 U	59 U	58 U	62 UJ				
Benzoic acid	2,000 U	66 U	84	130	770	64 U	66 U	620 U		200 UJ	200 UJ	200 UJ
Benzyl alcohol	200 U	33 U	33 U	33 U	32 U	32 U	33 U	31 UJ		27 J	20 UJ	20 UJ
bis(2-chloroethoxy)methane	200 U	99 U	99 U	96 U	58 U	59 U	58 U	62 U		200 U	400 U	20 U
bis(2-chloroethyl)ether	200 U	99 U	99 U	96 U	58 U	59 U	58 U	62 U		39 U	40 U	40 U
bis(2-chloroisopropyl)ether	200 U	99 U	99 U	96 U	58 U	59 U	58 U	62 U		20 U	400 U	20 U
Carbazole	350	55 J	99 U	96 U	260	54 J	85			900	2,000	78
Hexachlorobenzene	0.98 U	0.98 U	6.6 U	6.6 U	6.4 U	6.4 U	6.6 U	6.2 U		1.0 U	1.3	1.2
Hexachlorobutadiene	0.98 U	0.98 U	6.6 U	6.6 U	6.4 U	6.4 U	6.6 U	6.2 U		20 U	20 U	20 U
Hexachlorocyclopentadiene	980 U	490 U	500 U	480 U	290 U	290 U	290 U	310 U		98 UJ	2,000 UJ	99 UJ
Hexachloroethane	200 U	99 U	99 U	96 U	58 U	59 U	58 U	62 U		20 U	20 U	20 U
Isophorone	200 U	99 U	99 U	96 U	58 U	59 U	58 U	62 U		20 U	20 U	20 U
Nitrobenzene	200 U	99 U	99 U	96 U	58 U	59 U	58 U	62 U		20 U	20 U	20 U
n-Nitrosodimethylamine	200 U	33 U	33 U	33 U	32 U	32 U	33 U	31 U				
n-Nitroso-di-n-propylamine	980 U	33 U	33 U	33 U	32 U	32 U	33 U	31 U		39 U	790 U	40 U
n-Nitrosodiphenylamine	200 U	6.6 U	6.6 U	6.6 U	7.1	6.4 U	8	6.2 U		20 U	20 U	20 U
Pentachlorophenol	980 U	33 UJ	33 U	33 U	32 U	32 U	33 U	31 U				
Phenol	200 U	99 U	99 U	96 U	110	59 U	58 U	62 U		40	64	48
PCBs (ug/kg dw)												
Aroclor-1016	20 U	20 U	20 U	120 U	20 U	20 U	20 U	24 U		20 U	20 U	20 U
Aroclor-1221	20 U	20 U	20 U	120 U	20 U	20 U	20 U	16 U		39 U	39 U	40 U
Aroclor-1232	20 U	20 U	20 U	120 U	39 U	20 U	39 U	32 U		20 U	20 U	20 U
Aroclor-1242	20 U	20 U	20 U	120 U	20 U	61 J	20 U	24 U		20 U	20 U	20 U
Aroclor-1248	39 U	39 UJ	20 U	180	39 U	20 U	39 U	32 U		20 U	80 UJ	20 U
Aroclor-1254	110	65 J	24	460	110	190	96	47		98	480	100
Aroclor-1260	110	53 J	20 U	240 J	150	140	77	41		84	390	63
Aroclor-1262												
Aroclor-1268												
Total PCBs	220	118 J	24	880 J	260	390 J	173	88		182	870	160
Total PCBs + PCTs												
Total PCTs												
PCBs (ng/kg dw)												
PCB TEQ - mammal (half DL)												
PCB-018												
PCB-028												
PCB-044												
PCB-055												
PCB-066												
PCB-077												
PCB-081												
PCB-101												
PCB-105												
PCB-110												
PCB-114												
PCB-118												
PCB-123												
PCB-126												
PCB-128												
PCB-138												
PCB-153												
PCB-156												
PCB-157												
PCB-167												

TABLE J-1
SURFACE SEDIMENT ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	LDW-SS115	LDW-SS116	LDW-SS118	LDW-SS119	LDW-SS157	LDW-SS158	LDW-SS159	LDW-SS338	LDW-SS541	R22SD	R23SD	R26SD
Sample ID	LDW-SS115-010	LDW-SS116-010	LDW-SS118-010	LDW-SS119-010	LDW-SS157-010	LDW-SS158-010	LDW-SS159-010	LDW-SS338-010	LDW-SS541-010	SD0001	SD0020	SD0002
Sample Date	01/25/05	01/20/05	01/20/05	01/19/05	03/16/05	03/16/05	03/16/05	10/03/06	12/17/09	10/08/97	10/11/97	10/09/97
Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33
PCB-169												
PCB-170												
PCB-180												
PCB-187												
PCB-189												
PCB-195												
PCB-206												
PCB-209												
Phthalates (ug/kg dw)												
Bis(2-ethylhexyl)phthalate	330	240	240	280	1,200	510	190	180		690	1,400	370
Butyl benzyl phthalate	200 U	63 J	25	140	200	78	24	17		140 UJ	200	110 J
Diethyl phthalate	200 U	7.3 U	8.6	110	7.7 U	6.4 U	6.6 U	62 U		20 U	20 U	20 U
Dimethyl phthalate	200 U	8.6	7.3	37	6.4 U	6.4 U	30	9.3		26	200	25
Di-n-butyl phthalate	200 U	99 U	99 U	96 U	91	59 U	58 U	32 J		21	43	64
Di-n-octyl phthalate	200 U	99 U	99 U	96 U	58 U	59 U	58 U	62 U		20 U	20 U	20 U
Organometals (ug/kg dw)												
Dibutyltin as ion												
Monobutyltin as ion												
Tetrabutyltin as ion												
Tributyltin as ion												
Pesticides (ug/kg dw)												
2,4'-DDD	2.0 U	2.0 U										
2,4'-DDE	2.0 U	2.0 U										
2,4'-DDT	2.0 U	2.0 U										
4,4'-DDD	2.0 U	2.0 U										
4,4'-DDE	2.0 U	2.0 U										
4,4'-DDT	20 U	2.0 U										
Aldrin	0.98 U	0.98 U										
alpha-BHC	0.98 U	0.98 U										
alpha-Chlordane	0.98 U	0.98 U										
alpha-Endosulfan	0.98 U	0.98 U										
beta-BHC	0.98 U	0.98 U										
beta-Chlordane	0.98 U	0.98 U										
beta-Endosulfan	2.0 U	2.0 U										
cis-Nonachlor	15 U	2.0 U										
delta-BHC	0.98 U	0.98 U										
Dieldrin	2.0 U	2.0 U										
Endosulfan sulfate	2.0 U	2.0 U										
Endrin	2.0 U	2.0 U										
Endrin aldehyde	3.8 UJ	2.0 UJ										
Endrin ketone	2.0 U	2.0 U										
gamma-BHC	0.98 U	0.98 U										
gamma-Chlordane												
Heptachlor	0.98 U	0.98 U										
Heptachlor epoxide	11 U	0.98 U										
Methoxychlor	9.8 U	9.8 U										
Mirex	2.0 U	2.0 U										
Oxychlordane	2.0 U	2.0 U										
Total aldrin/dieldrin	2.0 U	2.0 U										
Total chlordane	15 U	2.0 U										
Total DDTs	20 U	2.0 U										
Toxaphene	98 U	98 U										
trans-Nonachlor	2.0 U	2.0 U										
VOCs (ug/kg dw)												

TABLE J-1
SURFACE SEDIMENT ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	LDW-SS115	LDW-SS116	LDW-SS118	LDW-SS119	LDW-SS157	LDW-SS158	LDW-SS159	LDW-SS338	LDW-SS541	R22SD	R23SD	R26SD
Sample ID	LDW-SS115-010	LDW-SS116-010	LDW-SS118-010	LDW-SS119-010	LDW-SS157-010	LDW-SS158-010	LDW-SS159-010	LDW-SS338-010	LDW-SS541-010	SD0001	SD0020	SD0002
Sample Date	01/25/05	01/20/05	01/20/05	01/19/05	03/16/05	03/16/05	03/16/05	10/03/06	12/17/09	10/08/97	10/11/97	10/09/97
Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33
1,1,1,2-Tetrachloroethane												
1,1,1-Trichloroethane												
1,1,2,2-Tetrachloroethane												
1,1,2-Trichloroethane												
1,1,2-Trichlorotrifluoroethane												
1,1-Dichloroacetone												
1,1-Dichloroethane												
1,1-Dichloroethene												
1,1-Dichloropropene												
1,2,3-Trichlorobenzene												
1,2,3-Trichloropropane												
1,2,4-Trimethylbenzene												
1,2-Dibromo-3-chloropropane												
1,2-Dibromoethane (EDB)												
1,2-Dichloroethane												
1,2-Dichloropropane												
1,3,5-Trimethylbenzene												
1,3-Dichloropropane												
1-Chlorobutane												
2,2-Dichloropropane												
2-Chlorotoluene												
2-Hexanone												
2-Nitropropane												
4-Chlorotoluene												
Acetone												
Allyl chloride												
Benzene												
Bromobenzene												
Bromochloromethane												
Bromodichloromethane												
Bromoform												
Bromomethane												
Carbon disulfide												
Carbon tetrachloride												
Chlorobenzene												
Chloroethane												
Chloroform												
Chloromethane												
cis-1,2-Dichloroethene												
cis-1,3-Dichloropropene												
Dibromochloromethane												
Dibromomethane												
Dichloromethane												
Diethyl ether												
Ethyl methacrylate												
Ethylbenzene												
Iodomethane												
Isopropylbenzene												
m,p-Xylene												
Methacrylonitrile												
Methyl acrylate												
Methyl ethyl ketone												
Methyl isobutyl ketone												
Methyl methacrylate												

TABLE J-1
SURFACE SEDIMENT ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	LDW-SS115	LDW-SS116	LDW-SS118	LDW-SS119	LDW-SS157	LDW-SS158	LDW-SS159	LDW-SS338	LDW-SS541	R22SD	R23SD	R26SD
Sample ID	LDW-SS115-010	LDW-SS116-010	LDW-SS118-010	LDW-SS119-010	LDW-SS157-010	LDW-SS158-010	LDW-SS159-010	LDW-SS338-010	LDW-SS541-010	SD0001	SD0020	SD0002
Sample Date	01/25/05	01/20/05	01/20/05	01/19/05	03/16/05	03/16/05	03/16/05	10/03/06	12/17/09	10/08/97	10/11/97	10/09/97
Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33
n-Butylbenzene												
n-Propylbenzene												
o-Xylene												
p-Cymene												
Pentachloroethane												
sec-Butylbenzene												
Styrene												
tert-Butyl methyl ether												
tert-Butylbenzene												
Tetrachloroethene												
Toluene												
Total xylenes												
trans-1,2-Dichloroethene												
trans-1,3-Dichloropropene												
trans-1,4-Dichloro-2-butene												
Trichloroethene												
Trichlorofluoromethane												
Vinyl chloride												
Dioxin/furan (ng/kg dw)												
1,2,3,4,6,7,8-HpCDD									50.7			
1,2,3,4,6,7,8-HpCDF									35.1			
1,2,3,4,7,8,9-HpCDF									3.06 J			
1,2,3,4,7,8-HxCDD									0.354 U			
1,2,3,4,7,8-HxCDF									5.57			
1,2,3,6,7,8-HxCDD									1.92 J			
1,2,3,6,7,8-HxCDF									0.906 J			
1,2,3,7,8,9-HxCDD									1.06 J			
1,2,3,7,8,9-HxCDF									0.0630 J			
1,2,3,7,8-PeCDD									0.220 J			
1,2,3,7,8-PeCDF									0.119 J			
2,3,4,6,7,8-HxCDF									0.391 J			
2,3,4,7,8-PeCDF									0.287 J			
2,3,7,8-TCDD									0.126 J			
2,3,7,8-TCDF									0.269 J			
Dioxin/furan TEQ - mammal (half DL)									2.53 J			
OCDD									496			
OCDF									70.3			
Total HpCDD									105			
Total HpCDF									112			
Total HxCDD									10.9			
Total HxCDF									34.5			
Total PeCDD									1.21			
Total PeCDF									4.3			
Total TCDD									1.04			
Total TCDF									2.83			

TABLE J-1
SURFACE SEDIMENT ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	R27SD	R31SD	SD-216	SD-217
Sample ID	SD0022	SD0003	SD-216-0000	SD-217-0000
Sample Date	10/11/97	10/09/97	08/26/04	08/27/04
Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33
Conventionals				
Ammonia (mg-N/kg dw)				
Percent moisture (%ww)				
Total organic carbon (%dw)	1.5	1.2	2.02	1.84
Total solids (%ww)	50.7	47.9		
Total solids (preserved) (%ww)				
Total sulfides (mg/kg dw)				
Grain size (%dw)				
Fractional % >9525 microns				
Fractional % phi >-1 (>2000 microns)				
Fractional % phi >-3 (>8000 microns)				
Fractional % phi 0-1 (500-1000 microns)	1	1		
Fractional % phi -1-0 (1000-2000 microns)		1		
Fractional % phi 10+ (<0.98 micron)	5	5		
Fractional % phi 1-2 (250-500 microns)	3	4		
Fractional % phi -2-(-1) (2000-4000 microns)		1		
Fractional % phi 2-3 (125-250 microns)	5	6		
Fractional % phi -3-(-2) (4000-8000 microns)				
Fractional % phi 3-4 (62.5-125 microns)	12	10		
Fractional % phi 4-5 (31.2-62.5 microns)	28	25		
Fractional % phi 5-6 (15.6-31.2 microns)	20	23		
Fractional % phi 6-7 (7.8-15.6 microns)	13	12		
Fractional % phi 7-8 (3.9-7.8 microns)	7	6		
Fractional % phi 8-9 (1.95-3.9 microns)	4	4		
Fractional % phi 9-10 (0.98-1.95 microns)	2	2		
Fractional % Sieve 3/8-inch (4750-9525 microns)				
Total clay	11	11		
Total fines (percent silt+clay)	79	77		
Total gravel		1		
Total sand	21	22		
Total silt	68	66		
Metals (mg/kg dw)				
Aluminum				
Antimony				
Arsenic	14.1	26.7		
Barium				
Beryllium				
Cadmium	0.4 UJ	0.5 J		
Calcium				
Chromium	31 J	36 J		
Cobalt				
Copper	40	53		
Iron				
Lead	31	94		
Magnesium				
Manganese				
Mercury	0.17	0.1		
Molybdenum				
Nickel	26	24		
Potassium				
Selenium				
Silver	0.4 U	0.4 U		
Sodium				
Thallium				

TABLE J-1
SURFACE SEDIMENT ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	R27SD	R31SD	SD-216	SD-217
Sample ID	SD0022	SD0003	SD-216-0000	SD-217-0000
Sample Date	10/11/97	10/09/97	08/26/04	08/27/04
Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33
Tin				
Vanadium				
Zinc	93	128		
PAHs (ug/kg dw)				
1-Methylnaphthalene				
2-Chloronaphthalene	19 U	19 U		
2-Methylnaphthalene	19 U	19 U		
Acenaphthene	30	20		
Acenaphthylene	19 U	19 U		
Anthracene	55	160		
Benzo(a)anthracene	220	300		
Benzo(a)pyrene	260	360		
Benzo(b)fluoranthene	250	400		
Benzo(g,h,i)perylene	210	280		
Benzo(k)fluoranthene	320	370		
Chrysene	340	480		
cPAHs - mammal - half DL	400	540		
Dibenzo(a,h)anthracene	95	100		
Dibenzofuran	23	24		
Fluoranthene	540	570		
Fluorene	34	34		
Indeno(1,2,3-cd)pyrene	220	250		
Naphthalene	19 U	19 U		
Phenanthrene	360	390		
Pyrene	640	830		
Total benzofluoranthenes	570	770		
Total HPAHs	3,100	3,940		
Total LPAHs	480	600		
Total PAHs	3,570	4,540		
Other SVOCs (ug/kg dw)				
1,2,4-Trichlorobenzene	19 U	19 U		
1,2-Dichlorobenzene	19 U	19 U		
1,3-Dichlorobenzene	19 U	19 U		
1,4-Dichlorobenzene	19 UJ	19 UJ		
2,4,5-Trichlorophenol	97 U	96 U		
2,4,6-Trichlorophenol	97 U	96 U		
2,4-Dichlorophenol	58 U	58 U		
2,4-Dimethylphenol	19 U	19 U		
2,4-Dinitrophenol	190 UJ	190 UJ		
2,4-Dinitrotoluene	97 U	96 U		
2,6-Dinitrotoluene	97 U	96 U		
2-Chlorophenol	19 U	19 U		
2-Methylphenol	19 U	19 U		
2-Nitroaniline	97 U	96 U		
2-Nitrophenol	97 U	96 U		
3,3'-Dichlorobenzidine	97 U	96 U		
3-Nitroaniline	120 U	120 U		
4,6-Dinitro-o-cresol	190 UJ	190 UJ		
4-Bromophenyl phenyl ether	19 U	19 U		
4-Chloro-3-methylphenol	39 U	38 U		
4-Chloroaniline	58 U	58 U		
4-Chlorophenyl phenyl ether	19 U	19 U		
4-Methylphenol	19 U	19 U		
4-Nitroaniline	97 UJ	96 UJ		

TABLE J-1
SURFACE SEDIMENT ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	R27SD	R31SD	SD-216	SD-217
Sample ID	SD0022	SD0003	SD-216-0000	SD-217-0000
Sample Date	10/11/97	10/09/97	08/26/04	08/27/04
Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33
4-Nitrophenol	97 UJ	96 UJ		
Aniline				
Benzoic acid	190 UJ	190 UJ		
Benzyl alcohol	19 UJ	19 UJ		
bis(2-chloroethoxy)methane	19 U	19 U		
bis(2-chloroethyl)ether	39 U	38 U		
bis(2-chloroisopropyl)ether	19 U	19 U		
Carbazole	82	120		
Hexachlorobenzene	1.0 U	1.2		
Hexachlorobutadiene	19 U	19 U		
Hexachlorocyclopentadiene	97 UJ	96 UJ		
Hexachloroethane	19 U	19 U		
Isophorone	19 U	19 U		
Nitrobenzene	19 U	19 U		
n-Nitrosodimethylamine				
n-Nitroso-di-n-propylamine	39 U	38 U		
n-Nitrosodiphenylamine	19 U	19 U		
Pentachlorophenol				
Phenol	19 U	19 U		
PCBs (ug/kg dw)				
Aroclor-1016	19 U	19 U	93 U	20 U
Aroclor-1221	39 U	39 U	93 U	20 U
Aroclor-1232	19 U	19 U	190 U	20 U
Aroclor-1242	38 UJ	12 J	93 U	
Aroclor-1248	19 U	19 U	120 J	48.3 J
Aroclor-1254	230	59	240 J	201 J
Aroclor-1260	110	48	93 U	43.4
Aroclor-1262				
Aroclor-1268				
Total PCBs	340	119 J	360 J	293 J
Total PCBs + PCTs				
Total PCTs				
PCBs (ng/kg dw)				
PCB TEQ - mammal (half DL)				
PCB-018				
PCB-028				
PCB-044				
PCB-055				
PCB-066				
PCB-077				
PCB-081				
PCB-101				
PCB-105				
PCB-110				
PCB-114				
PCB-118				
PCB-123				
PCB-126				
PCB-128				
PCB-138				
PCB-153				
PCB-156				
PCB-157				
PCB-167				

TABLE J-1
SURFACE SEDIMENT ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	R27SD	R31SD	SD-216	SD-217
Sample ID	SD0022	SD0003	SD-216-0000	SD-217-0000
Sample Date	10/11/97	10/09/97	08/26/04	08/27/04
Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33
PCB-169				
PCB-170				
PCB-180				
PCB-187				
PCB-189				
PCB-195				
PCB-206				
PCB-209				
Phthalates (ug/kg dw)				
Bis(2-ethylhexyl)phthalate	280	720		
Butyl benzyl phthalate	91 J	220		
Diethyl phthalate	19 U	19 U		
Dimethyl phthalate	19 U	97		
Di-n-butyl phthalate	19 U	31		
Di-n-octyl phthalate	19 U	51 J		
Organometals (ug/kg dw)				
Dibutyltin as ion				
Monobutyltin as ion				
Tetrabutyltin as ion				
Tributyltin as ion				
Pesticides (ug/kg dw)				
2,4'-DDD				
2,4'-DDE				
2,4'-DDT				
4,4'-DDD				
4,4'-DDE				
4,4'-DDT				
Aldrin				
alpha-BHC				
alpha-Chlordane				
alpha-Endosulfan				
beta-BHC				
beta-Chlordane				
beta-Endosulfan				
cis-Nonachlor				
delta-BHC				
Dieldrin				
Endosulfan sulfate				
Endrin				
Endrin aldehyde				
Endrin ketone				
gamma-BHC				
gamma-Chlordane				
Heptachlor				
Heptachlor epoxide				
Methoxychlor				
Mirex				
Oxychlordane				
Total aldrin/dieldrin				
Total chlordane				
Total DDTs				
Toxaphene				
trans-Nonachlor				
VOCs (ug/kg dw)				

TABLE J-1
SURFACE SEDIMENT ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	R27SD	R31SD	SD-216	SD-217
Sample ID	SD0022	SD0003	SD-216-0000	SD-217-0000
Sample Date	10/11/97	10/09/97	08/26/04	08/27/04
Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33	0 to 0.33
1,1,1,2-Tetrachloroethane				
1,1,1-Trichloroethane				
1,1,2,2-Tetrachloroethane				
1,1,2-Trichloroethane				
1,1,2-Trichlorotrifluoroethane				
1,1-Dichloroacetone				
1,1-Dichloroethane				
1,1-Dichloroethene				
1,1-Dichloropropene				
1,2,3-Trichlorobenzene				
1,2,3-Trichloropropane				
1,2,4-Trimethylbenzene				
1,2-Dibromo-3-chloropropane				
1,2-Dibromoethane (EDB)				
1,2-Dichloroethane				
1,2-Dichloropropane				
1,3,5-Trimethylbenzene				
1,3-Dichloropropane				
1-Chlorobutane				
2,2-Dichloropropane				
2-Chlorotoluene				
2-Hexanone				
2-Nitropropane				
4-Chlorotoluene				
Acetone				
Allyl chloride				
Benzene				
Bromobenzene				
Bromochloromethane				
Bromodichloromethane				
Bromoform				
Bromomethane				
Carbon disulfide				
Carbon tetrachloride				
Chlorobenzene				
Chloroethane				
Chloroform				
Chloromethane				
cis-1,2-Dichloroethene				
cis-1,3-Dichloropropene				
Dibromochloromethane				
Dibromomethane				
Dichloromethane				
Diethyl ether				
Ethyl methacrylate				
Ethylbenzene				
Iodomethane				
Isopropylbenzene				
m,p-Xylene				
Methacrylonitrile				
Methyl acrylate				
Methyl ethyl ketone				
Methyl isobutyl ketone				
Methyl methacrylate				

TABLE J-1
SURFACE SEDIMENT ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location Sample ID Sample Date Depth (ft bgs)	R27SD SD0022 10/11/97 0 to 0.33	R31SD SD0003 10/09/97 0 to 0.33	SD-216 SD-216-0000 08/26/04 0 to 0.33	SD-217 SD-217-0000 08/27/04 0 to 0.33
n-Butylbenzene				
n-Propylbenzene				
o-Xylene				
p-Cymene				
Pentachloroethane				
sec-Butylbenzene				
Styrene				
tert-Butyl methyl ether				
tert-Butylbenzene				
Tetrachloroethene				
Toluene				
Total xylenes				
trans-1,2-Dichloroethene				
trans-1,3-Dichloropropene				
trans-1,4-Dichloro-2-butene				
Trichloroethene				
Trichlorofluoromethane				
Vinyl chloride				
Dioxin/furan (ng/kg dw)				
1,2,3,4,6,7,8-HpCDD				
1,2,3,4,6,7,8-HpCDF				
1,2,3,4,7,8,9-HpCDF				
1,2,3,4,7,8-HxCDD				
1,2,3,4,7,8-HxCDF				
1,2,3,6,7,8-HxCDD				
1,2,3,6,7,8-HxCDF				
1,2,3,7,8,9-HxCDD				
1,2,3,7,8,9-HxCDF				
1,2,3,7,8-PeCDD				
1,2,3,7,8-PeCDF				
2,3,4,6,7,8-HxCDF				
2,3,4,7,8-PeCDF				
2,3,7,8-TCDD				
2,3,7,8-TCDF				
Dioxin/furan TEQ - mammal (half DL)				
OCDD				
OCDF				
Total HpCDD				
Total HpCDF				
Total HxCDD				
Total HxCDF				
Total PeCDD				
Total PeCDF				
Total TCDD				
Total TCDF				

TABLE J-1
SURFACE SEDIMENT ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	SD-315	SD-336	SD-345
Sample ID	SD-315-0000	SD-336-0000	SD-345-0000
Sample Date	08/17/04	08/27/04	08/26/04
Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33
Conventionals			
Ammonia (mg-N/kg dw)			
Percent moisture (%ww)			
Total organic carbon (%dw)	1.57	1.55	1.24
Total solids (%ww)			
Total solids (preserved) (%ww)			
Total sulfides (mg/kg dw)			
Grain size (%dw)			
Fractional % >9525 microns			
Fractional % phi >-1 (>2000 microns)	1.4		
Fractional % phi >-3 (>8000 microns)			
Fractional % phi 0-1 (500-1000 microns)	3.7		
Fractional % phi -1-0 (1000-2000 microns)	1.7		
Fractional % phi 10+ (<0.98 micron)	4.6		
Fractional % phi 1-2 (250-500 microns)	17		
Fractional % phi -2-(-1) (2000-4000 microns)			
Fractional % phi 2-3 (125-250 microns)	18.4		
Fractional % phi -3-(-2) (4000-8000 microns)			
Fractional % phi 3-4 (62.5-125 microns)	10.4		
Fractional % phi 4-5 (31.2-62.5 microns)	10.7		
Fractional % phi 5-6 (15.6-31.2 microns)	12.8		
Fractional % phi 6-7 (7.8-15.6 microns)	9.9		
Fractional % phi 7-8 (3.9-7.8 microns)	5.2		
Fractional % phi 8-9 (1.95-3.9 microns)	2.5		
Fractional % phi 9-10 (0.98-1.95 microns)	1.7		
Fractional % Sieve 3/8-inch (4750-9525 microns)			
Total clay	8.8		
Total fines (percent silt+clay)	47.4		
Total gravel	1.4		
Total sand	51		
Total silt	38.6		
Metals (mg/kg dw)			
Aluminum			
Antimony			
Arsenic	12		
Barium			
Beryllium			
Cadmium	0.54		
Calcium			
Chromium	77.7		
Cobalt			
Copper	68.8		
Iron			
Lead	67.6		
Magnesium			
Manganese			
Mercury	0.09 J		
Molybdenum			
Nickel	57.5		
Potassium			
Selenium			
Silver	0.99 U		
Sodium			
Thallium			

TABLE J-1
SURFACE SEDIMENT ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	SD-315	SD-336	SD-345
Sample ID	SD-315-0000	SD-336-0000	SD-345-0000
Sample Date	08/17/04	08/27/04	08/26/04
Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33
Tin			
Vanadium			
Zinc	133		
PAHs (ug/kg dw)			
1-Methylnaphthalene			
2-Chloronaphthalene	20 U		
2-Methylnaphthalene	20 U		
Acenaphthene	44		
Acenaphthylene	23		
Anthracene	130		
Benzo(a)anthracene	660		
Benzo(a)pyrene	780		
Benzo(b)fluoranthene	1,100		
Benzo(g,h,i)perylene	300		
Benzo(k)fluoranthene	950		
Chrysene	950		
cPAHs - mammal - half DL	1,200		
Dibenzo(a,h)anthracene	150		
Dibenzofuran	31		
Fluoranthene	2,300		
Fluorene	51		
Indeno(1,2,3-cd)pyrene	390		
Naphthalene	20 U		
Phenanthrene	680		
Pyrene	1,800		
Total benzofluoranthenes	2,100		
Total HPAHs	9,400		
Total LPAHs	930		
Total PAHs	10,300		
Other SVOCs (ug/kg dw)			
1,2,4-Trichlorobenzene	20 U		
1,2-Dichlorobenzene	20 U		
1,3-Dichlorobenzene	20 U		
1,4-Dichlorobenzene	20 U		
2,4,5-Trichlorophenol	100 U		
2,4,6-Trichlorophenol	100 U		
2,4-Dichlorophenol	100 U		
2,4-Dimethylphenol	20 U		
2,4-Dinitrophenol	200 U		
2,4-Dinitrotoluene	100 U		
2,6-Dinitrotoluene	100 U		
2-Chlorophenol	20 U		
2-Methylphenol	20 U		
2-Nitroaniline	100 U		
2-Nitrophenol	100 U		
3,3'-Dichlorobenzidine	100 U		
3-Nitroaniline	100 U		
4,6-Dinitro-o-cresol	200 U		
4-Bromophenyl phenyl ether	20 U		
4-Chloro-3-methylphenol	100 U		
4-Chloroaniline	100 U		
4-Chlorophenyl phenyl ether	20 U		
4-Methylphenol	20 U		
4-Nitroaniline	100 U		

TABLE J-1
SURFACE SEDIMENT ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	SD-315	SD-336	SD-345
Sample ID	SD-315-0000	SD-336-0000	SD-345-0000
Sample Date	08/17/04	08/27/04	08/26/04
Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33
4-Nitrophenol	100 U		
Aniline			
Benzoic acid	200 U		
Benzyl alcohol	20 U		
bis(2-chloroethoxy)methane	20 U		
bis(2-chloroethyl)ether	20 U		
bis(2-chloroisopropyl)ether	20 U		
Carbazole	150		
Hexachlorobenzene	20 U		
Hexachlorobutadiene	20 U		
Hexachlorocyclopentadiene	100 U		
Hexachloroethane	20 U		
Isophorone	20 U		
Nitrobenzene	20 U		
n-Nitrosodimethylamine			
n-Nitroso-di-n-propylamine	100 U		
n-Nitrosodiphenylamine	20 U		
Pentachlorophenol	100 U		
Phenol	28		
PCBs (ug/kg dw)			
Aroclor-1016	66 U	71 U	20 U
Aroclor-1221	66 U	71 U	20 U
Aroclor-1232	130 U	140 U	20 U
Aroclor-1242	66 U	71 U	
Aroclor-1248	66 U	71 U	20 U
Aroclor-1254	150	180 J	124
Aroclor-1260	110 J	71 J	58.1
Aroclor-1262			
Aroclor-1268			
Total PCBs	260 J	250 J	182
Total PCBs + PCTs			
Total PCTs			
PCBs (ng/kg dw)			
PCB TEQ - mammal (half DL)			
PCB-018			
PCB-028			
PCB-044			
PCB-055			
PCB-066			
PCB-077			
PCB-081			
PCB-101			
PCB-105			
PCB-110			
PCB-114			
PCB-118			
PCB-123			
PCB-126			
PCB-128			
PCB-138			
PCB-153			
PCB-156			
PCB-157			
PCB-167			

TABLE J-1
SURFACE SEDIMENT ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location Sample ID Sample Date Depth (ft bgs)	SD-315 SD-315-0000 08/17/04 0 to 0.33	SD-336 SD-336-0000 08/27/04 0 to 0.33	SD-345 SD-345-0000 08/26/04 0 to 0.33
PCB-169			
PCB-170			
PCB-180			
PCB-187			
PCB-189			
PCB-195			
PCB-206			
PCB-209			
Phthalates (ug/kg dw)			
Bis(2-ethylhexyl)phthalate	610		
Butyl benzyl phthalate	140		
Diethyl phthalate	20 U		
Dimethyl phthalate	35		
Di-n-butyl phthalate	20 U		
Di-n-octyl phthalate	20 U		
Organometals (ug/kg dw)			
Dibutyltin as ion			
Monobutyltin as ion			
Tetrabutyltin as ion			
Tributyltin as ion			
Pesticides (ug/kg dw)			
2,4'-DDD			
2,4'-DDE			
2,4'-DDT			
4,4'-DDD			
4,4'-DDE			
4,4'-DDT			
Aldrin			
alpha-BHC			
alpha-Chlordane			
alpha-Endosulfan			
beta-BHC			
beta-Chlordane			
beta-Endosulfan			
cis-Nonachlor			
delta-BHC			
Dieldrin			
Endosulfan sulfate			
Endrin			
Endrin aldehyde			
Endrin ketone			
gamma-BHC			
gamma-Chlordane			
Heptachlor			
Heptachlor epoxide			
Methoxychlor			
Mirex			
Oxychlordane			
Total aldrin/dieldrin			
Total chlordane			
Total DDTs			
Toxaphene			
trans-Nonachlor			
VOCs (ug/kg dw)			

TABLE J-1
SURFACE SEDIMENT ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location Sample ID Sample Date Depth (ft bgs)	SD-315 SD-315-0000 08/17/04 0 to 0.33	SD-336 SD-336-0000 08/27/04 0 to 0.33	SD-345 SD-345-0000 08/26/04 0 to 0.33
1,1,1,2-Tetrachloroethane			
1,1,1-Trichloroethane			
1,1,2,2-Tetrachloroethane			
1,1,2-Trichloroethane			
1,1,2-Trichlorotrifluoroethane			
1,1-Dichloroacetone			
1,1-Dichloroethane			
1,1-Dichloroethene			
1,1-Dichloropropene			
1,2,3-Trichlorobenzene			
1,2,3-Trichloropropane			
1,2,4-Trimethylbenzene			
1,2-Dibromo-3-chloropropane			
1,2-Dibromoethane (EDB)			
1,2-Dichloroethane			
1,2-Dichloropropane			
1,3,5-Trimethylbenzene			
1,3-Dichloropropane			
1-Chlorobutane			
2,2-Dichloropropane			
2-Chlorotoluene			
2-Hexanone			
2-Nitropropane			
4-Chlorotoluene			
Acetone			
Allyl chloride			
Benzene			
Bromobenzene			
Bromochloromethane			
Bromodichloromethane			
Bromoform			
Bromomethane			
Carbon disulfide			
Carbon tetrachloride			
Chlorobenzene			
Chloroethane			
Chloroform			
Chloromethane			
cis-1,2-Dichloroethene			
cis-1,3-Dichloropropene			
Dibromochloromethane			
Dibromomethane			
Dichloromethane			
Diethyl ether			
Ethyl methacrylate			
Ethylbenzene			
Iodomethane			
Isopropylbenzene			
m,p-Xylene			
Methacrylonitrile			
Methyl acrylate			
Methyl ethyl ketone			
Methyl isobutyl ketone			
Methyl methacrylate			

TABLE J-1
SURFACE SEDIMENT ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	SD-315	SD-336	SD-345
Sample ID	SD-315-0000	SD-336-0000	SD-345-0000
Sample Date	08/17/04	08/27/04	08/26/04
Depth (ft bgs)	0 to 0.33	0 to 0.33	0 to 0.33
n-Butylbenzene			
n-Propylbenzene			
o-Xylene			
p-Cymene			
Pentachloroethane			
sec-Butylbenzene			
Styrene			
tert-Butyl methyl ether			
tert-Butylbenzene			
Tetrachloroethene			
Toluene			
Total xylenes			
trans-1,2-Dichloroethene			
trans-1,3-Dichloropropene			
trans-1,4-Dichloro-2-butene			
Trichloroethene			
Trichlorofluoromethane			
Vinyl chloride			
Dioxin/furan (ng/kg dw)			
1,2,3,4,6,7,8-HpCDD			
1,2,3,4,6,7,8-HpCDF			
1,2,3,4,7,8,9-HpCDF			
1,2,3,4,7,8-HxCDD			
1,2,3,4,7,8-HxCDF			
1,2,3,6,7,8-HxCDD			
1,2,3,6,7,8-HxCDF			
1,2,3,7,8,9-HxCDD			
1,2,3,7,8,9-HxCDF			
1,2,3,7,8-PeCDD			
1,2,3,7,8-PeCDF			
2,3,4,6,7,8-HxCDF			
2,3,4,7,8-PeCDF			
2,3,7,8-TCDD			
2,3,7,8-TCDF			
Dioxin/furan TEQ - mammal (half DL)			
OCDD			
OCDF			
Total HpCDD			
Total HpCDF			
Total HxCDD			
Total HxCDF			
Total PeCDD			
Total PeCDF			
Total TCDD			
Total TCDF			

Notes:

1. Data qualifiers are as follows.
   J = Analyte was positively identified and detected; however, concentration is an estimated value because the result is less than the quantitation limit or quality control criteria were not met.
   U = Analyte not detected at quantitation limit indicated.
   UJ = Analyte not detected at the indicated quantitation limit, which is estimated.

2. Organic carbon normalization is performed on samples with TOC between 0.5% and 4%.

Abbreviations:
CSL = Cleanup Screening Level
mg/kg = milligrams per kilogram
OC = organic carbon
PCBs = polychlorinated biphenyls
SQS = Sediment Quality Standard
TOC = total organic carbon
µg/kg = micrograms per kilogram
dw = dry weight
ft bgs = feet below ground or sediment surface

TABLE J-2
SEDIMENT CORE SAMPLE ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	AN-043	AN-043	AN-043	AN-043	AN-043	AN-043	AN-044	AN-044	AN-044	AN-044	AN-044	AN-044	AN-044	DR220
Sample ID	AN043-SC-080211-A	AN043-SC-080211-B	AN043-SC-080211-C	AN043-SC-080211-D	AN043-SC-080211-E	AN043-SC-080211-F	AN044-SC-080211-A	AN044-SC-080211-B	AN044-SC-080211-C	AN044-SC-080211-D	AN044-SC-080211-E	AN044-SC-080211-F	AN094-SC-080211-B	SD-DR220-0000A
Sample Date	2/11/08	2/11/08	2/11/08	2/11/08	2/11/08	2/11/08	2/11/08	2/11/08	2/11/08	2/11/08	2/11/08	2/11/08	2/12/08	9/23/98
Depth (ft BGS)	0 to 1	1 to 2	2 to 3	3 to 4	4 to 5	5 to 6	0 to 1	1 to 2	2 to 3.5	3.5 to 4.5	4.5 to 5.5	5.5 to 6.5	1 to 2	0 to 2
Conventionals														
Ammonia (mg/kg dw)														
Percent moisture (%dw)														
Specific gravity (g/cc)														
Total organic carbon (% dw)	1.06	2.86	3.03	0.061	0.069	0.076	2.3	2.79	1.05	0.291	0.125	0.348	2.17	2.42
Total solids (%ww)	66.3	59.7	74.5	81.3	89.8	87.6	62.7	65.6	74.1	93.3	93.7	93.7	65.1	
Total volatile solids (%ww)														
Grain size (%dw)														
Fractional % >9525 microns														0.010 U
Fractional % phi >-1 (>2000 microns)														
Fractional % phi 0-1 (500-1000 microns)														0.95 J
Fractional % phi -1-0 (1000-2000 microns)														0.17 J
Fractional % phi 10+ (<0.98 micron)														6.6
Fractional % phi 1-2 (250-500 microns)														1.1 J
Fractional % phi -2-(-1) (2000-4000 microns)														0.080 J
Fractional % phi 2-3 (125-250 microns)														2.2 J
Fractional % phi 3-4 (62.5-125 microns)														12 J
Fractional % phi 4-5 (31.2-62.5 microns)														20
Fractional % phi 5-6 (15.6-31.2 microns)														23
Fractional % phi 6-7 (7.8-15.6 microns)														19
Fractional % phi 7-8 (3.9-7.8 microns)														7.7
Fractional % phi 8-9 (1.95-3.9 microns)														4.2
Fractional % phi 9-10 (0.98-1.95 microns)														2.8
Fractional % Sieve 3/8-inch (4750-9525 microns)														0.010 U
Total clay	7.3	12.6	4.4				15	12.5	6	0.6			13.8	13.6
Total Fines	35.7	60.2	21.9	0.6	0.7	1.2	80.1	57.9	33.6	2.9	0.2	0.1	64.7	
Total fines (percent silt+clay)														83
Total gravel	2.7	7.2	2.1	0.01	0.01	0.3	1	10.4	0.1	0.6	0.6	1.1	1.1	0.080 J
Total sand	61.7	32.5	76	99.5	99.3	98.5	18.9	31.7	66.1	96.5	99.2	98.7	34.2	16 J
Total silt	28.5	47.6	17.5				65.2	45.3	27.7	2.3			50.8	70
Geotechnical														
Atterberg limits classification														
Bulk density (dry) (pcf)														
Bulk density (wet) (pcf)														
Porosity (S.U.)														
Metals (mg/kg dw)														
Aluminum														23,000
Antimony														10 UJ
Arsenic	7.2	10.9	10.2	1.2	1.2	1.3	14.3	23.2	4.3	2	2.1	1.9	21.6	10
Barium														79
Beryllium														0.42
Cadmium	0.6	16.9	0.4	0.2 U	0.2 U	0.2 U	1.6	1.5	0.3 U	0.2 U	0.2 U	0.2 U	1.6	0.35
Calcium														6,100
Chromium	30.0 J	514 J	19.0 J	7.5 J	10.7 J	12.2 J	67.9	37.4	13.1	9.2	9.1	11.9	40.4	30
Cobalt														10
Copper	36.0 J	0.8 J	0.6 J	0.6 J	0.5 J	0.6 J	68.8	46.9	18.3	9.9	10.1	9.3	51.5	47
Iron														31,000
Lead	1 J	2,530 J	1 J	1 J	1 J	1 J	161	52	7	1	1	1	63	25

TABLE J-2
SEDIMENT CORE SAMPLE ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	AN-043	AN-043	AN-043	AN-043	AN-043	AN-043	AN-044	AN-044	AN-044	AN-044	AN-044	AN-044	AN-044	DR220
Sample ID	AN043-SC-080211-A	AN043-SC-080211-B	AN043-SC-080211-C	AN043-SC-080211-D	AN043-SC-080211-E	AN043-SC-080211-F	AN044-SC-080211-A	AN044-SC-080211-B	AN044-SC-080211-C	AN044-SC-080211-D	AN044-SC-080211-E	AN044-SC-080211-F	AN094-SC-080211-B	SD-DR220-0000A
Sample Date	2/11/08	2/11/08	2/11/08	2/11/08	2/11/08	2/11/08	2/11/08	2/11/08	2/11/08	2/11/08	2/11/08	2/11/08	2/12/08	9/23/98
Depth (ft BGS)	0 to 1	1 to 2	2 to 3	3 to 4	4 to 5	5 to 6	0 to 1	1 to 2	2 to 3.5	3.5 to 4.5	4.5 to 5.5	5.5 to 6.5	1 to 2	0 to 2
Magnesium														8,100
Manganese														320
Mercury	0.09	1.51	0.09	0.05 U	0.04 U	0.05 U	0.34	0.24	0.06	0.04 U	0.05 U	0.04 U	0.27	0.20 J
Molybdenum														
Nickel														22
Potassium														2,900
Selenium														0.70 J
Silver	0.3 U	2.3	0.8	0.2 U	0.2 U	0.2 U	1.4 J	1.7 J	0.3 UJ	0.2 UJ	0.2 UJ	0.2 UJ	1.8 J	0.22
Sodium														11,000
Thallium														0.08
Tin														5
Vanadium														70
Zinc	112	1,250	54	21	23	24	167	100	37	22	23	24	108	100
PAHs (ug/kg dw)														
1-Methylnaphthalene	10 J	380	20 U				20 U	20 U						
2-Chloronaphthalene														20 U
2-Methylnaphthalene	11 J	99 J	10 J				13 J						13 J	20 U
Acenaphthene	20 J	310	12 J											20 U
Acenaphthylene		99 UJ	20 J										12 J	20 U
Anthracene	28 J	99 J	17 J				27	10 J					20 J	20 U
Benzo(a)anthracene	20 J	99 J	20 J				72	23 J					20 J	60
Benzo(a)pyrene	110	520	20 J				69	20 J					28	70
Benzo(b)fluoranthene	160	670	27				84	21					34	80
Benzo(g,h,i)perylene	34	110					27	17 J					25	50
Benzo(k)fluoranthene	120	540	20 J				96	26					33	80
Chrysene	130 J	1,400 J	28 J				100	30					41	90
cPAHs - mammal - half DL	150 J	690 J	27 J				98	29 J					39 J	100
Dibenzo(a,h)anthracene	20 J	41												20 U
Dibenzofuran	13 J	96 J	10 J											20 U
Fluoranthene	310	4,600	130				260	88	25				120	140
Fluorene	14 J	120	14 J				10 J						12 J	20 U
Indeno(1,2,3-cd)pyrene	41	120					27	14 J					20 J	60
Naphthalene	20 J	100 J	20 J				10 J	12 J					23 J	20 U
Phenanthrene	120 J	99 J	20 J				60	34	20 J				50	60
Pyrene	20 J	2,800	85				190	70	20				96	170
Total benzofluoranthenes	280	1,210	47 J				180	47					67	160
Total HPAHs	970 J	10,900 J	330 J				930	309 J	45				420 J	800
Total LPAHs	200 J	730 J	103 J				107 J	56 J	20 J				117 J	60
Total PAHs	1,170 J	11,600 J	430 J				1,030 J	365 J	65 J				530 J	860
Other SVOCs (ug/kg dw)														
1,2,4-Trichlorobenzene												5.9 UJ		20 U
1,2-Dichlorobenzene												5.9 UJ		20 U
1,3-Dichlorobenzene	6.1 U	18 U	6.2 U	6.1 U	6.2 U	6.2 U	18 U	6.1 U	6.1 U	6.0 U	6.0 U	5.9 U		20 U
1,4-Dichlorobenzene														20 U
2,4,5-Trichlorophenol														200 U
2,4,6-Trichlorophenol														200 U
2,4-Dichlorophenol														60 U
2,4-Dimethylphenol		54 J										5.9 UJ		20 U

TABLE J-2
SEDIMENT CORE SAMPLE ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	AN-043	AN-043	AN-043	AN-043	AN-043	AN-043	AN-044	AN-044	AN-044	AN-044	AN-044	AN-044	AN-044	DR220
Sample ID	AN043-SC-080211-A	AN043-SC-080211-B	AN043-SC-080211-C	AN043-SC-080211-D	AN043-SC-080211-E	AN043-SC-080211-F	AN044-SC-080211-A	AN044-SC-080211-B	AN044-SC-080211-C	AN044-SC-080211-D	AN044-SC-080211-E	AN044-SC-080211-F	AN094-SC-080211-B	SD-DR220-0000A
Sample Date	2/11/08	2/11/08	2/11/08	2/11/08	2/11/08	2/11/08	2/11/08	2/11/08	2/11/08	2/11/08	2/11/08	2/11/08	2/12/08	9/23/98
Depth (ft BGS)	0 to 1	1 to 2	2 to 3	3 to 4	4 to 5	5 to 6	0 to 1	1 to 2	2 to 3.5	3.5 to 4.5	4.5 to 5.5	5.5 to 6.5	1 to 2	0 to 2
2,4-Dinitrophenol														200 U
2,4-Dinitrotoluene														200 U
2,6-Dinitrotoluene														200 U
2-Chlorophenol														20 U
2-Methylphenol												5.9 UJ		20 U
2-Nitroaniline														100 U
2-Nitrophenol														100 U
3,3'-Dichlorobenzidine														200 U
3-Nitroaniline														200 U
4,6-Dinitro-o-cresol														200 U
4-Bromophenyl phenyl ether														40 U
4-Chloro-3-methylphenol														40 U
4-Chloroaniline														60 U
4-Chlorophenyl phenyl ether														20 U
4-Methylphenol		67 J											17 J	20 U
4-Nitroaniline														100 U
4-Nitrophenol														100 U
Aniline														
Benzoic acid		990 U					130 J							200 U
Benzyl alcohol		99 U												50 U
bis(2-chloroethoxy)methane														40 U
bis(2-chloroethyl)ether														40 U
bis(2-chloroisopropyl)ether														40 U
Carbazole														20 U
Hexachlorobenzene														20 U
Hexachlorobutadiene												5.9 UJ		20 U
Hexachlorocyclopentadiene														100 U
Hexachloroethane	20 U	99 U	20 U				20 U	20 U						20 U
Isophorone														20 U
Nitrobenzene														20 U
n-Nitrosodimethylamine														
n-Nitroso-di-n-propylamine														40 U
n-Nitrosodiphenylamine	10 UJ											5.9 UJ		40 U
Pentachlorophenol		93 UJ												100 UJ
Phenol		99 U					28		25	83	20 J	170	21	20 U
PCBs (ug/kg dw)														
Aroclor-1016										10 U				20 U
Aroclor-1221										10 U				40 U
Aroclor-1232										10 U				20 U
Aroclor-1242							500			10 U				130
Aroclor-1248										10 U				20 U
Aroclor-1254	270	1,500					2,000	240		10 U			190	470
Aroclor-1260		310					510	230		10 U			180	230
Aroclor-1262			55							10 U				
Aroclor-1268										10 U				
PCB-018														6
PCB-028														13
PCB-044														14

TABLE J-2
SEDIMENT CORE SAMPLE ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location Sample ID Sample Date Depth (ft BGS)	AN-043 AN043-SC-080211-A 2/11/08 0 to 1	AN-043 AN043-SC-080211-B 2/11/08 1 to 2	AN-043 AN043-SC-080211-C 2/11/08 2 to 3	AN-043 AN043-SC-080211-D 2/11/08 3 to 4	AN-043 AN043-SC-080211-E 2/11/08 4 to 5	AN-043 AN043-SC-080211-F 2/11/08 5 to 6	AN-044 AN044-SC-080211-A 2/11/08 0 to 1	AN-044 AN044-SC-080211-B 2/11/08 1 to 2	AN-044 AN044-SC-080211-C 2/11/08 2 to 3.5	AN-044 AN044-SC-080211-D 2/11/08 3.5 to 4.5	AN-044 AN044-SC-080211-E 2/11/08 4.5 to 5.5	AN-044 AN044-SC-080211-F 2/11/08 5.5 to 6.5	AN-044 AN094-SC-080211-B 2/12/08 1 to 2	DR220 SD-DR220-0000A 9/23/98 0 to 2
PCB-055														22
PCB-066														34
PCB-077														2.0 U
PCB-081														1.0 U
PCB-101														27
PCB-105														13
PCB-114														2
PCB-118														24
PCB-123														4.0 U
PCB-126														1.0 U
PCB-128														7
PCB-138														40
PCB-153														26
PCB-156														4
PCB-157														1.0 U
PCB-167														2
PCB-169														1.0 U
PCB-170														9
PCB-180														14
PCB-187														9
PCB-189														1.0 U
PCB-195														2
PCB-206														1
PCB-209														1.0 U
Total PCBs	270	1,800	55				3,000	470		10 U			370	830
Phthalates (ug/kg dw)														
Bis(2-ethylhexyl)phthalate	330 J	1,100 J					290	21					23	160
Butyl benzyl phthalate	57		16 U		16 U		240						16 U	20
Diethyl phthalate		99 UJ												20 U
Dimethyl phthalate	24		16 U		16 U		48						16 U	20 U
Di-n-butyl phthalate	20 J	99 J					71							20 U
Di-n-octyl phthalate		99 UJ												20 U
Pesticides (ug/kg dw)														
Aldrin														
beta-Chlordane														
Chlordane														
Dieldrin														
Heptachlor epoxide														
Total aldrin/dieldrin														
Total chlordane														
Total DDTs														
VOCs (ug/kg dw)														
Ethylbenzene														
Total xylenes														
Trichloroethene														

TABLE J-2
SEDIMENT CORE SAMPLE ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	DR220	DU9120XX	LDW-SC50a	LDW-SC50a	LDW-SC50a	LDW-SC50a	LDW-SC51	LDW-SC51	LDW-SC51	LDW-SC51	LDW-SC51	LDW-SC51	LDW-SC51	SD-216
Sample ID	SD-DR220-0020	DUWO&M91S012	LDW-SC50-0-1	LDW-SC50-1-2	LDW-SC50-2_8-4	LDW-SC50-2-2_8	LDW-SC51-0-2	LDW-SC51-0-0_5	LDW-SC51-0_5-1	LDW-SC51-1-1_5	LDW-SC51-1_5-2	LDW-SC51-2-3_8	LDW-SC51-3_8-5_8	SD-216-0000
Sample Date	9/23/98	8/6/91	2/24/06	2/24/06	2/24/06	2/24/06	2/22/200	2/22/06	2/22/06	2/22/06	2/22/06	2/22/06	2/22/06	4/21/04
Depth (ft BGS)	2 to 4	0 to 3	0 to 1	1 to 2	2.8 to 4	2 to 2.8	0 to 2	0 to 0.5	0.5 to 1	1 to 1.5	1.5 to 2	2 to 3.8	3.8 to 5.8	0 to 1
Conventionals														
Ammonia (mg/kg dw)		140												
Percent moisture (%dw)				51.47		39.94	42.42					44.57		
Specific gravity (g/cc)				2.65		2.68	2.73					2.63		
Total organic carbon (% dw)	2.37	1.5	0.63	0.816	0.129	1.18	1.47	1.61	1.64	0.473	0.643	1.73	0.615	1.61
Total solids (%ww)		54	68.6	74.9	83.1	74.6	72.3	68.6	80.4	80.7	79	70.9	82.1	49.1
Total volatile solids (%ww)		4.1												
Grain size (%dw)														
Fractional % >9525 microns	0.010 U													
Fractional % phi >-1 (>2000 microns)			1.6	0.2	1.5	1	23.4					15.9		0.100 J
Fractional % phi 0-1 (500-1000 microns)	1.2 J		3.2	9.2	41.4	22.3	6.9					12.2		1.10 J
Fractional % phi -1-0 (1000-2000 microns)	0.090 J		0.9	0.8	6.4	3.3	2.6					2.5		0.900 J
Fractional % phi 10+ (<0.98 micron)	4.5		2.5	2.2	0.6	1.9	1.5					2.8		6.20 J
Fractional % phi 1-2 (250-500 microns)	2.1 J		12.7	24.9	41.6	25.6	23.2					23.3		2.10 J
Fractional % phi -2-(-1) (2000-4000 microns)	0.010 U													
Fractional % phi 2-3 (125-250 microns)	3.8 J		26.4	23.3	7	11.6	20.2					9.3		3.80 J
Fractional % phi 3-4 (62.5-125 microns)	15 J		26.4	19.9	0.8	14	6.3					5.7		10.8 J
Fractional % phi 4-5 (31.2-62.5 microns)	23		13.8	10.6	0.2	8.8	5.3					6.4		16.4 J
Fractional % phi 5-6 (15.6-31.2 microns)	26		5.4	2.9	0.1	5	4.8					7.5		25.6 J
Fractional % phi 6-7 (7.8-15.6 microns)	16		3.3	2.8	0.2	3.3	1.7					1.9		21.3 J
Fractional % phi 7-8 (3.9-7.8 microns)	4.4		1.7	1.7	0.1	1.8	2.1					9.1		5.40 J
Fractional % phi 8-9 (1.95-3.9 microns)	2.4		1.4	1	0.1 U	1	1.2					2.1		3.90 J
Fractional % phi 9-10 (0.98-1.95 microns)	2		0.8	0.5	0.1 U	0.5	0.8					1.4		2.30 J
Fractional % Sieve 3/8-inch (4750-9525 microns)	0.010 U													
Total clay	8.9		4.7	3.7	0.6	3.4	3.5					6.3		12.40 J
Total Fines														
Total fines (percent silt+clay)	78		28.9	21.7	1.2	22.3	17.4					31.2		81.1 J
Total gravel	0.010 U		1.6	0.2	1.5	1	23.4					15.9		0.100 J
Total sand	22 J		69.6	78.1	97.2	76.8	59.2					53		18.7 J
Total silt	69		24.2	18	0.6	18.9	13.9					24.9		68.7 J
Geotechnical														
Atterberg limits classification				Non-Plastic		Non-Plastic	Non-Plastic					Non-Plastic		
Bulk density (dry) (pcf)				73.4		76.4	77					72.6		
Bulk density (wet) (pcf)				111.2		106.9	109.6					105		
Porosity (S.U.)				0.56		0.54	0.55					0.56		
Metals (mg/kg dw)														
Aluminum	22,000													
Antimony	10 UJ	1.8	6 UJ	7 UJ	6 UJ	6 UJ	6 UJ					7 UJ		
Arsenic	10	9.8	707	281	21	161	25					55		
Barium	81													
Beryllium	0.4													
Cadmium	0.48	0.46	0.3 U	0.3 U	0.2 U	0.2 U	0.7					1		0.6
Calcium	5,700													
Chromium	28		28.5	24.3	11.8	21.6	67.4					34.8		33.3
Cobalt	10		5.9	5.6	4.9	6.9	7.5					7.4		
Copper	46	47	36.1	24.4	9.4	24.9	44.5					38.2		51.8
Iron	29,000													
Lead	33	23	47	22	2 U	11	76 J					41 J		33

TABLE J-2
SEDIMENT CORE SAMPLE ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location Sample ID Sample Date Depth (ft BGS)	DR220 SD-DR220-0020 9/23/98 2 to 4	DU9120XX DUWO&M91S012 8/6/91 0 to 3	LDW-SC50a LDW-SC50-0-1 2/24/06 0 to 1	LDW-SC50a LDW-SC50-1-2 2/24/06 1 to 2	LDW-SC50a LDW-SC50-2_8-4 2/24/06 2.8 to 4	LDW-SC50a LDW-SC50-2-2_8 2/24/06 2 to 2.8	LDW-SC51 LDW-SC51-0-2 2/22/200 0 to 2	LDW-SC51 LDW-SC51-0-0_5 2/22/06 0 to 0.5	LDW-SC51 LDW-SC51-0_5-1 2/22/06 0.5 to 1	LDW-SC51 LDW-SC51-1-1_5 2/22/06 1 to 1.5	LDW-SC51 LDW-SC51-1_5-2 2/22/06 1.5 to 2	LDW-SC51 LDW-SC51-2-3_8 2/22/06 2 to 3.8	LDW-SC51 LDW-SC51-3_8-5_8 2/22/06 3.8 to 5.8	SD-216 SD-216-0000 4/21/04 0 to 1
Magnesium	7,400													
Manganese	280													
Mercury	0.20 J	0.1	0.2	0.06 U	0.06 U	0.07	0.10 J					0.12 J		0.12
Molybdenum			1.5	1	0.6 U	0.7	3					7.6		
Nickel	19	27	17	14	8	32	34					33		
Potassium	2,800													
Selenium	0.70 J		6 U	7 U	6 U	6 U	6 U					7 U		
Silver	0.41	0.43	0.4 U	0.4 U	0.3 U	0.4 U	1.1					0.4 U		0.600 U
Sodium	11,000													
Thallium	0.08		6 U	7 U	6 U	6 U	6 U					7 U		
Tin	4													
Vanadium	64		50.6	52.2	39.9	52.4	52.5					60.1		
Zinc	110	130	161	124	47.7	108	203					269		108
PAHs (ug/kg dw)														
1-Methylnaphthalene			60 U	59 U	20 U	20 U	60 U	61 U	60 U	62 U	62 U	59 U		
2-Chloronaphthalene	20 U		60 U	59 U	20 U	20 U	60 U	61 U	60 U	62 U	62 U	59 U		
2-Methylnaphthalene	20 U	28 U	56 J	59 U	20 U	20 U	60 U	79	60 U	62 U	62 U	59 U		
Acenaphthene	20 U	28 U	41 J	59 U	20 U	20 U	380	350	180	250	84	62		
Acenaphthylene	20 U	28 U	60 U	59 U	20 U	20 U	60 U	61 U	60 U	62 U	62 U	59 U		
Anthracene	30	28 U	100	46 J	20 U	20 U	200	540	160	59 J	42 J	82		
Benzo(a)anthracene	170	120	280	140	20 U	12 J	540	1,600	410	130	71	270		
Benzo(a)pyrene	190	130	260	92	20 U	20 U	490	1,600	390	50 J	42 J	260		
Benzo(b)fluoranthene	230		230	88	20 U	11 J	520	1,600	410	87	50 J	210		
Benzo(g,h,i)perylene	130	73	75	59 U	20 U	20 U	160	590	130	62 U	62 U	78		
Benzo(k)fluoranthene	170		260	110	20 U	10 J	480	1,400	360	54 J	52 J	280		
Chrysene	230	160	330	160	20 U	14 J	590	1,900	490	120	67	320		
cPAHs - mammal - half DL	280	160	360	140 J	18 U	18 J	690 J	2,200	540	83 J	65 J	360		
Dibenzo(a,h)anthracene	40	28 U	60 U	59 U	20 U	20 U	49 J	160	38	4.3 J	3.7 J	59 U		
Dibenzofuran	20 U	28 U	60 U	59 U	20 U	20 U	230	230	89	130	92	59 U		
Fluoranthene	350	260	770	200	14 J	40	2,100	4,000	1,200	720	730	810		
Fluorene	20 U	28 U	41 J	59 U	20 U	20 U	150	320	110	62 U	62 U	53 J		
Indeno(1,2,3-cd)pyrene	170	82	100	35 J	20 U	20 UJ	220	690	160	62 U	62 U	110		
Naphthalene	20 U	28 U	60 U	59 U	20 U	20 U	56 J	230	54 J	62 U	62 U	59 U		
Phenanthrene	180	140	420	96	20 U	20	910	2,300	840	120	97	440		
Pyrene	440	380	500	140	11 J	28	1,200	2,600	900	400	360	590		
Total benzofluoranthenes	400	280	490	200	20 U	21 J	1,000	3,000	770	141 J	102 J	490		
Total HPAHs	2,120	2,960	2,810	970 J	25 J	115 J	6,300 J	16,100	4,500	1,570 J	1,380 J	2,930		
Total LPAHs	210	280	600 J	142 J	20 U	20	1,700 J	3,700	1,340 J	430 J	223 J	640 J		
Total PAHs	2,330	1,630	3,410 J	1,110 J	25 J	135 J	8,000 J	19,900	5,800 J	1,990 J	1,600 J	3,570 J		
Other SVOCs (ug/kg dw)														
1,2,4-Trichlorobenzene	20 U	8.4 U	3.6 J	4.1 J	6.0 UJ	6.0 UJ	6.0 U	6.1 UJ	6.0 UJ	6.2 UJ	6.2 UJ	5.9 U		
1,2-Dichlorobenzene	20 U	4.1 U	6.0 U	5.9 U	6.0 U	6.0 U	4.8 J	6.1 U	4.8 J	6.2 U	6.2	20		
1,3-Dichlorobenzene	20 U	4.1 U	60 U	59 U	20 U	20 U	60 U	61 U	60 U	62 U	62 U	59 U		
1,4-Dichlorobenzene	20 U	4.1 U	6.0 U	5.9 U	6.0 U	6.0 U	5.4 J	6.1 U	6.0 U	6.2 U	8.7	11		
2,4,5-Trichlorophenol	200 U		300 U	300 U	99 U	99 U	300 U	300 U	300 U	310 U	310 U	300 U		
2,4,6-Trichlorophenol	200 U		300 U	300 U	99 U	99 U	300 U	300 U	300 U	310 U	310 U	300 U		
2,4-Dichlorophenol	60 U		300 U	300 U	99 U	99 U	300 U	300 U	300 U	310 U	310 U	300 U		
2,4-Dimethylphenol	20 U	14 U	6.0 UJ	5.9 UJ	6.0 UJ	6.0 UJ	6.0 UJ	6.1 UJ	6.0 UJ	6.2 UJ	6.2 UJ	9.5 J		

TABLE J-2
SEDIMENT CORE SAMPLE ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location / Sample ID / Sample Date / Depth (ft BGS)	DR220 SD-DR220-0020 9/23/98 2 to 4	DU9120XX DUWO&M91S012 8/6/91 0 to 3	LDW-SC50a LDW-SC50-0-1 2/24/06 0 to 1	LDW-SC50a LDW-SC50-1-2 2/24/06 1 to 2	LDW-SC50a LDW-SC50-2_8-4 2/24/06 2.8 to 4	LDW-SC50a LDW-SC50-2-2_8 2/24/06 2 to 2.8	LDW-SC51 LDW-SC51-0-2 2/22/200 0 to 2	LDW-SC51 LDW-SC51-0-0_5 2/22/06 0 to 0.5	LDW-SC51 LDW-SC51-0_5-1 2/22/06 0.5 to 1	LDW-SC51 LDW-SC51-1-1_5 2/22/06 1 to 1.5	LDW-SC51 LDW-SC51-1_5-2 2/22/06 1.5 to 2	LDW-SC51 LDW-SC51-2-3_8 2/22/06 2 to 3.8	LDW-SC51 LDW-SC51-3_8-5_8 2/22/06 3.8 to 5.8	SD-216 SD-216-0000 4/21/04 0 to 1
2,4-Dinitrophenol	200 U		600 UJ	590 UJ	200 UJ	200 UJ	600 UJ	610 U	600 U	620 U	620 U	590 UJ		
2,4-Dinitrotoluene	200 U		300 U	300 U	99 U	99 U	300 U	300 U	300 U	310 U	310 U	300 U		
2,6-Dinitrotoluene	200 U		300 U	300 U	99 U	99 U	300 U	300 U	300 U	310 U	310 U	300 U		
2-Chlorophenol	20 U		60 U	59 U	20 U	20 U	60 U	61 U	60 U	62 U	62 U	59 U		
2-Methylphenol	20 U	14 U	3.0 J	5.9 U	6.0 U	6.0 U	6.0 UJ	21 J	6.0 UJ	6.2 UJ	6.2 UJ	5.9 UJ		
2-Nitroaniline	100 U		300 U	300 U	99 U	99 U	300 U	300 U	300 U	310 U	310 U	300 U		
2-Nitrophenol	100 U		300 U	300 U	99 U	99 U	300 U	300 U	300 U	310 U	310 U	300 U		
3,3'-Dichlorobenzidine	200 U		300 UJ	300 UJ	99 UJ	99 UJ	300 UJ	300 U	300 U	310 U	310 U	300 UJ		
3-Nitroaniline	200 U		300 U	300 U	99 U	99 U	300 UJ	300 U	300 U	310 U	310 U	300 UJ		
4,6-Dinitro-o-cresol	200 U		600 UJ	590 UJ	200 UJ	200 UJ	600 U	610 U	600 U	620 U	620 U	590 U		
4-Bromophenyl phenyl ether	40 U		60 U	59 U	20 U	20 U	60 U	61 U	60 U	62 U	62 U	59 U		
4-Chloro-3-methylphenol	40 U		300 U	300 U	99 U	99 U	300 U	300 U	300 U	310 U	310 U	300 U		
4-Chloroaniline	60 U		300 UJ	300 UJ	99 UJ	99 UJ	300 UJ	300 UJ	300 UJ	310 UJ	310 UJ	300 UJ		
4-Chlorophenyl phenyl ether	20 U		60 U	59 U	20 U	20 U	60 U	61 U	60 U	62 U	62 U	59 U		
4-Methylphenol	20 U	28 U	60 U	59 U	20 U	20 U	60 U	61 U	60 U	62 U	62 U	59 U		
4-Nitroaniline	100 U		300 U	300 U	99 U	99 U	300 U	300 U	300 U	310 U	310 U	300 U		
4-Nitrophenol	100 U		300 U	300 U	99 U	99 UJ	300 U	300 U	300 U	310 U	310 U	300 U		
Aniline			60 UJ	59 UJ	20 UJ	20 UJ	60 UJ	61 UJ	60 UJ	62 UJ	62 UJ	59 UJ		
Benzoic acid	200 U	140 U	330 J	130 UJ	64 UJ	100 UJ	90	610 U	600 U	620 U	620 U	68		
Benzyl alcohol	50 U	17 U	30 U	30 U	30 U	30 U	18 J	180	30 U	31 U	31 U	21 J		
bis(2-chloroethoxy)methane	40 U		60 U	59 U	20 U	20 U	60 U	61 U	60 U	62 U	62 U	59 U		
bis(2-chloroethyl)ether	40 U		60 U	59 U	20 U	20 U	60 U	61 U	60 U	62 U	62 U	59 U		
bis(2-chloroisopropyl)ether	40 U		60 U	59 U	20 U	20 U	60 U	61 U	60 U	62 U	62 U	59 U		
Carbazole	30													
Hexachlorobenzene	20 U	17 U	6.0 U	5.9 U	6.0 U	6.0 U	6.0 U	6.1 U	6.0 U	6.2 U	6.2 U	5.9 U		
Hexachlorobutadiene	20 U	28 U	6.0 UJ	5.9 U	6.0 U	6.0 U	6.0 U	6.1 U	6.0 U	6.2 U	6.2 U	5.9 U		
Hexachlorocyclopentadiene	100 U		300 U	300 U	99 U	99 UJ	300 U	300 U	300 U	310 U	310 U	300 U		
Hexachloroethane	20 U	28 U	60 U	59 U	20 U	20 U	60 U	61 U	60 U	62 U	62 U	59 U		
Isophorone	20 U		60 U	59 U	20 U	20 U	60 U	61 U	60 U	62 U	62 U	59 U		
Nitrobenzene	20 U		60 U	59 U	20 U	20 U	60 U	61 U	60 U	62 U	62 U	59 U		
n-Nitrosodimethylamine			30 U	30 U	30 U	30 U	30 U	30 U	30 U	31 U	31 U	30 U		
n-Nitroso-di-n-propylamine	40 U		30 U	30 U	30 U	30 U	30 UJ	30 U	30 U	31 U	31 U	30 UJ		
n-Nitrosodiphenylamine	40 U	17 U	100 U	30 U	6.0 U	21 U	68 U	6.1 U	6.0 U	6.2 U	6.2 U	67 U		
Pentachlorophenol	100 UJ	84 U	30 U	30 U	30 U	30 U	30 U	30 U	30 U	31 U	31 U	30 U		
Phenol	80	28 U	42 J	59 U	13 J	13 J	60 U	96 U	60 U	62 U	62 U	59 U		
PCBs (ug/kg dw)														
Aroclor-1016	20 U	14 U	55 U	110 U	3.8 UJ	7.8 UJ	57 U					54 U	3.9 U	20 U
Aroclor-1221	40 U	56 U	55 U	110 U	3.8 UJ	7.8 UJ	57 U					54 U	3.9 U	20 U
Aroclor-1232	20 U	14 U	55 U	110 U	3.8 UJ	7.8 UJ	57 U					54 U	3.9 U	20 U
Aroclor-1242	33	14 U	55 U	110 U	3.8 U	7.8 U	57 U					54 U	3.9 U	20 U
Aroclor-1248	20 U	14 U	140	270	3.8 U	14 J	170					120	3.9 U	23 J
Aroclor-1254	110	14 U	370	510	3.8 U	27	930					400	3.9 U	39 J
Aroclor-1260	84	48	110 U	210 U	3.8 U	34	190					180	3.9 U	20 U
Aroclor-1262														
Aroclor-1268														
PCB-018	1.0 U													
PCB-028	3													
PCB-044	3													

TABLE J-2
SEDIMENT CORE SAMPLE ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	DR220	DU9120XX	LDW-SC50a	LDW-SC50a	LDW-SC50a	LDW-SC50a	LDW-SC51	LDW-SC51	LDW-SC51	LDW-SC51	LDW-SC51	LDW-SC51	LDW-SC51	SD-216
Sample ID	SD-DR220-0020	DUWO&M91S012	LDW-SC50-0-1	LDW-SC50-1-2	LDW-SC50-2_8-4	LDW-SC50-2-2_8	LDW-SC51-0-2	LDW-SC51-0-0_5	LDW-SC51-0_5-1	LDW-SC51-1-1_5	LDW-SC51-1_5-2	LDW-SC51-2-3_8	LDW-SC51-3_8-5_8	SD-216-0000
Sample Date	9/23/98	8/6/91	2/24/06	2/24/06	2/24/06	2/24/06	2/22/200	2/22/06	2/22/06	2/22/06	2/22/06	2/22/06	2/22/06	4/21/04
Depth (ft BGS)	2 to 4	0 to 3	0 to 1	1 to 2	2.8 to 4	2 to 2.8	0 to 2	0 to 0.5	0.5 to 1	1 to 1.5	1.5 to 2	2 to 3.8	3.8 to 5.8	0 to 1
PCB-055	5													
PCB-066	8													
PCB-077	1.0 U													
PCB-081	1.0 U													
PCB-101	5													
PCB-105	2													
PCB-114	1.0 U													
PCB-118	5													
PCB-123	2.0 U													
PCB-126	1.0 U													
PCB-128	2													
PCB-138	11													
PCB-153	8													
PCB-156	1.0 U													
PCB-157	1.0 U													
PCB-167	1.0 U													
PCB-169	1.0 U													
PCB-170	3													
PCB-180	6													
PCB-187	4													
PCB-189	1.0 U													
PCB-195	1													
PCB-206	1													
PCB-209	1.0 U													
Total PCBs	230	96	510	780	3.8 UJ	75 J	1,290					700	3.9 U	62 J
Phthalates (ug/kg dw)														
Bis(2-ethylhexyl)phthalate	470	590	680	64	20 U	63	480	970	1,800	62 U	75	76		
Butyl benzyl phthalate	50	28 U	24	14	6.0 U	6.6	36	43	35	10	17	29		
Diethyl phthalate	20 U	28 U	60 U	59 U	20 U	20 U	60 U	61 U	60 U	62 U	62 U	59 U		
Dimethyl phthalate	30	28 U	60 U	59 U	20 U	20 U	60 U	61 U	60 U	62 U	62 U	59 U		
Di-n-butyl phthalate	20	28 U	60 U	59 U	20 U	23 U	69 U	44 J	51 J	62 U	62 U	59 U		
Di-n-octyl phthalate	20 U	28 U	60 U	59 U	20 U	20 U	60 U	61 U	60 U	62 U	62 U	59 U		
Pesticides (ug/kg dw)														
Aldrin		5												
beta-Chlordane		4.5												
Chlordane		2.8 U												
Dieldrin		1.1 U												
Heptachlor epoxide		1.4 U												
Total aldrin/dieldrin		5												
Total chlordane		4.5												
Total DDTs		6.8												
VOCs (ug/kg dw)														
Ethylbenzene		4.1 U												
Total xylenes		4.1 U												
Trichloroethene		4.1 U												

TABLE J-2
SEDIMENT CORE SAMPLE ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	SD-216	SD-216	SD-216	SD-216	SD-216	SD-216	SD-216	SD-217	SD-217	SD-217	SD-217	SD-217	SD-217	SD-315-C
Sample ID	SD-216-0010	SD-216-0020	SD-216-0030	SD-216-0040	SD-216-0050	SD-216-0060	SD-216-0070	SD-217-0000	SD-217-0010	SD-217-0020	SD-217-0030	SD-217-0040	SD-217-0050	SD-315-0001
Sample Date	4/21/04	4/21/04	4/21/04	4/21/04	4/21/04	4/21/04	4/21/04	4/22/04	4/22/04	4/22/04	4/22/04	4/22/04	4/22/04	8/19/04
Depth (ft BGS)	1 to 2	2 to 3	3 to 4	4 to 5	5 to 5.9	6 to 7	7 to 7.7	0 to 0.9	1 to 1.9	2 to 2.9	3 to 3.7	4 to 4.5	5 to 5.6	1 to 2
Conventionals														
Ammonia (mg/kg dw)														
Percent moisture (%dw)														
Specific gravity (g/cc)														
Total organic carbon (% dw)	1.58	1.43	1.33	1.13	1.02	1.09	0.96	1.73	1.51	1.15	1.09	0.28	0.07	0.21
Total solids (%ww)	61.4	70.4	65.9	73.2	71.6	77.6	75.4	61.2	61.4	78	78.3	82.9	81.2	
Total volatile solids (%ww)														
Grain size (%dw)														
Fractional % >9525 microns														
Fractional % phi >-1 (>2000 microns)	0.500 J							0.600 J	0.100 J					
Fractional % phi 0-1 (500-1000 microns)	2.90 J							4.00 J	4.50 J					
Fractional % phi -1-0 (1000-2000 microns)	0.700 J							1.10 J	0.900 J					
Fractional % phi 10+ (<0.98 micron)	2.40 J							5.10 J	5.00 J					
Fractional % phi 1-2 (250-500 microns)	10.1 J							10.4 J	12.3 J					
Fractional % phi -2-(-1) (2000-4000 microns)														
Fractional % phi 2-3 (125-250 microns)	12.4 J							11.1 J	10.1 J					
Fractional % phi 3-4 (62.5-125 microns)	16.1 J							17.0 J	16.4 J					
Fractional % phi 4-5 (31.2-62.5 microns)	16.2 J							14.1 J	14.7 J					
Fractional % phi 5-6 (15.6-31.2 microns)	11.0 J							13.7 J	13.7 J					
Fractional % phi 6-7 (7.8-15.6 microns)	14.4 J							10.1 J	9.90 J					
Fractional % phi 7-8 (3.9-7.8 microns)	7.10 J							6.70 J	6.60 J					
Fractional % phi 8-9 (1.95-3.9 microns)	4.50 J							3.70 J	3.50 J					
Fractional % phi 9-10 (0.98-1.95 microns)	1.70 J							2.30 J	2.30 J					
Fractional % Sieve 3/8-inch (4750-9525 microns)														
Total clay	8.60 J							11.10 J	10.80 J					
Total Fines														
Total fines (percent silt+clay)	57.3 J							55.7 J	55.7 J					
Total gravel	0.500 J							0.600 J	0.100 J					
Total sand	42.2 J							43.6 J	44.2 J					
Total silt	48.7 J							44.6 J	44.9 J					
Geotechnical														
Atterberg limits classification														
Bulk density (dry) (pcf)														
Bulk density (wet) (pcf)														
Porosity (S.U.)														
Metals (mg/kg dw)														
Aluminum														
Antimony														
Arsenic														4.5 U
Barium														
Beryllium														
Cadmium	1.5							0.7	0.6					0.5 U
Calcium														
Chromium	49.1							143 J	37.4 J					9.96
Cobalt														
Copper	80.8							69.5	72.4					7.32
Iron														
Lead	119							97	106					2.5 U

TABLE J-2
SEDIMENT CORE SAMPLE ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	SD-216	SD-216	SD-216	SD-216	SD-216	SD-216	SD-216	SD-217	SD-217	SD-217	SD-217	SD-217	SD-217	SD-315-C
Sample ID	SD-216-0010	SD-216-0020	SD-216-0030	SD-216-0040	SD-216-0050	SD-216-0060	SD-216-0070	SD-217-0000	SD-217-0010	SD-217-0020	SD-217-0030	SD-217-0040	SD-217-0050	SD-315-0001
Sample Date	4/21/04	4/21/04	4/21/04	4/21/04	4/21/04	4/21/04	4/21/04	4/22/04	4/22/04	4/22/04	4/22/04	4/22/04	4/22/04	8/19/04
Depth (ft BGS)	1 to 2	2 to 3	3 to 4	4 to 5	5 to 5.9	6 to 7	7 to 7.7	0 to 0.9	1 to 1.9	2 to 2.9	3 to 3.7	4 to 4.5	5 to 5.6	1 to 2
Magnesium														
Manganese														
Mercury	0.16							0.16	0.13					
Molybdenum														
Nickel														6.92
Potassium														
Selenium														
Silver	1.6							1.3	1.5					0.99 U
Sodium														
Thallium														
Tin														
Vanadium														
Zinc	172							150	141					20.2
PAHs (ug/kg dw)														
1-Methylnaphthalene														
2-Chloronaphthalene														
2-Methylnaphthalene														
Acenaphthene														
Acenaphthylene														
Anthracene														
Benzo(a)anthracene														
Benzo(a)pyrene														
Benzo(b)fluoranthene														
Benzo(g,h,i)perylene														
Benzo(k)fluoranthene														
Chrysene														
cPAHs - mammal - half DL														
Dibenzo(a,h)anthracene														
Dibenzofuran														
Fluoranthene														
Fluorene														
Indeno(1,2,3-cd)pyrene														
Naphthalene														
Phenanthrene														
Pyrene														
Total benzofluoranthenes														
Total HPAHs														
Total LPAHs														
Total PAHs														
Other SVOCs (ug/kg dw)														
1,2,4-Trichlorobenzene														
1,2-Dichlorobenzene														
1,3-Dichlorobenzene														
1,4-Dichlorobenzene														
2,4,5-Trichlorophenol														
2,4,6-Trichlorophenol														
2,4-Dichlorophenol														
2,4-Dimethylphenol														

TABLE J-2
SEDIMENT CORE SAMPLE ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	SD-216	SD-216	SD-216	SD-216	SD-216	SD-216	SD-216	SD-217	SD-217	SD-217	SD-217	SD-217	SD-217	SD-315-C
Sample ID	SD-216-0010	SD-216-0020	SD-216-0030	SD-216-0040	SD-216-0050	SD-216-0060	SD-216-0070	SD-217-0000	SD-217-0010	SD-217-0020	SD-217-0030	SD-217-0040	SD-217-0050	SD-315-0001
Sample Date	4/21/04	4/21/04	4/21/04	4/21/04	4/21/04	4/21/04	4/21/04	4/22/04	4/22/04	4/22/04	4/22/04	4/22/04	4/22/04	8/19/04
Depth (ft BGS)	1 to 2	2 to 3	3 to 4	4 to 5	5 to 5.9	6 to 7	7 to 7.7	0 to 0.9	1 to 1.9	2 to 2.9	3 to 3.7	4 to 4.5	5 to 5.6	1 to 2
2,4-Dinitrophenol														
2,4-Dinitrotoluene														
2,6-Dinitrotoluene														
2-Chlorophenol														
2-Methylphenol														
2-Nitroaniline														
2-Nitrophenol														
3,3'-Dichlorobenzidine														
3-Nitroaniline														
4,6-Dinitro-o-cresol														
4-Bromophenyl phenyl ether														
4-Chloro-3-methylphenol														
4-Chloroaniline														
4-Chlorophenyl phenyl ether														
4-Methylphenol														
4-Nitroaniline														
4-Nitrophenol														
Aniline														
Benzoic acid														
Benzyl alcohol														
bis(2-chloroethoxy)methane														
bis(2-chloroethyl)ether														
bis(2-chloroisopropyl)ether														
Carbazole														
Hexachlorobenzene														
Hexachlorobutadiene														
Hexachlorocyclopentadiene														
Hexachloroethane														
Isophorone														
Nitrobenzene														
n-Nitrosodimethylamine														
n-Nitroso-di-n-propylamine														
n-Nitrosodiphenylamine														
Pentachlorophenol														
Phenol														
PCBs (ug/kg dw)														
Aroclor-1016	19 U	20 U	19 U	20 U	19 U	20 U	19 U	19 U	96 U	19 U	19 U	19 U	19 U	11.3 U
Aroclor-1221	19 U	20 U	19 U	20 U	19 U	20 U	19 U	19 U	96 U	19 U	19 U	19 U	19 U	22.6 U
Aroclor-1232	19 U	20 U	19 U	20 U	19 U	20 U	19 U	19 U	96 U	19 U	19 U	19 U	19 U	11.3 U
Aroclor-1242	19 U	20 U	19 U	20 U	19 U	20 U	19 U	19 U	96 U	19 U	19 U	19 U	19 U	11.3 U
Aroclor-1248	60	220	300	190	110	490	370	100	240	64	97	19 U	19 U	11.3 U
Aroclor-1254	120	260	490	230	99	590	380	200	450	170	260	34	19 U	11.3 U
Aroclor-1260	50	47 J	190	63	27	210	160	100	96 U	45	99	19 U	19 U	11.3 U
Aroclor-1262														
Aroclor-1268														
PCB-018														
PCB-028														
PCB-044														

TABLE J-2
SEDIMENT CORE SAMPLE ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	SD-216	SD-216	SD-216	SD-216	SD-216	SD-216	SD-216	SD-217	SD-217	SD-217	SD-217	SD-217	SD-217	SD-315-C
Sample ID	SD-216-0010	SD-216-0020	SD-216-0030	SD-216-0040	SD-216-0050	SD-216-0060	SD-216-0070	SD-217-0000	SD-217-0010	SD-217-0020	SD-217-0030	SD-217-0040	SD-217-0050	SD-315-0001
Sample Date	4/21/04	4/21/04	4/21/04	4/21/04	4/21/04	4/21/04	4/21/04	4/22/04	4/22/04	4/22/04	4/22/04	4/22/04	4/22/04	8/19/04
Depth (ft BGS)	1 to 2	2 to 3	3 to 4	4 to 5	5 to 5.9	6 to 7	7 to 7.7	0 to 0.9	1 to 1.9	2 to 2.9	3 to 3.7	4 to 4.5	5 to 5.6	1 to 2
PCB-055														
PCB-066														
PCB-077														
PCB-081														
PCB-101														
PCB-105														
PCB-114														
PCB-118														
PCB-123														
PCB-126														
PCB-128														
PCB-138														
PCB-153														
PCB-156														
PCB-157														
PCB-167														
PCB-169														
PCB-170														
PCB-180														
PCB-187														
PCB-189														
PCB-195														
PCB-206														
PCB-209														
Total PCBs	230	530 J	980	480	240	1,290	910	400	690	280	460	34	19 U	22.6 U
Phthalates (ug/kg dw)														
Bis(2-ethylhexyl)phthalate														
Butyl benzyl phthalate														
Diethyl phthalate														
Dimethyl phthalate														
Di-n-butyl phthalate														
Di-n-octyl phthalate														
Pesticides (ug/kg dw)														
Aldrin														
beta-Chlordane														
Chlordane														
Dieldrin														
Heptachlor epoxide														
Total aldrin/dieldrin														
Total chlordane														
Total DDTs														
VOCs (ug/kg dw)														
Ethylbenzene														
Total xylenes														
Trichloroethene														

TABLE J-2
SEDIMENT CORE SAMPLE ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location Sample ID Sample Date Depth (ft BGS)	SD-315-C SD-315-0002 8/19/04 2 to 3	SD-315-C SD-315-0003 8/19/04 3 to 4
Conventionals		
Ammonia (mg/kg dw)		
Percent moisture (%dw)		
Specific gravity (g/cc)		
Total organic carbon (% dw)	0.3	0.18
Total solids (%ww)		
Total volatile solids (%ww)		
Grain size (%dw)		
Fractional % >9525 microns		
Fractional % phi >-1 (>2000 microns)		
Fractional % phi 0-1 (500-1000 microns)		
Fractional % phi -1-0 (1000-2000 microns)		
Fractional % phi 10+ (<0.98 micron)		
Fractional % phi 1-2 (250-500 microns)		
Fractional % phi -2-(-1) (2000-4000 microns)		
Fractional % phi 2-3 (125-250 microns)		
Fractional % phi 3-4 (62.5-125 microns)		
Fractional % phi 4-5 (31.2-62.5 microns)		
Fractional % phi 5-6 (15.6-31.2 microns)		
Fractional % phi 6-7 (7.8-15.6 microns)		
Fractional % phi 7-8 (3.9-7.8 microns)		
Fractional % phi 8-9 (1.95-3.9 microns)		
Fractional % phi 9-10 (0.98-1.95 microns)		
Fractional % Sieve 3/8-inch (4750-9525 microns)		
Total clay		
Total Fines		
Total fines (percent silt+clay)		
Total gravel		
Total sand		
Total silt		
Geotechnical		
Atterberg limits classification		
Bulk density (dry) (pcf)		
Bulk density (wet) (pcf)		
Porosity (S.U.)		
Metals (mg/kg dw)		
Aluminum		
Antimony		
Arsenic		
Barium		
Beryllium		
Cadmium		
Calcium		
Chromium		
Cobalt		
Copper		
Iron		
Lead		

TABLE J-2
SEDIMENT CORE SAMPLE ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	SD-315-C	SD-315-C
Sample ID	SD-315-0002	SD-315-0003
Sample Date	8/19/04	8/19/04
Depth (ft BGS)	2 to 3	3 to 4
Magnesium		
Manganese		
Mercury		
Molybdenum		
Nickel		
Potassium		
Selenium		
Silver		
Sodium		
Thallium		
Tin		
Vanadium		
Zinc		
PAHs (ug/kg dw)		
1-Methylnaphthalene		
2-Chloronaphthalene		
2-Methylnaphthalene		
Acenaphthene		
Acenaphthylene		
Anthracene		
Benzo(a)anthracene		
Benzo(a)pyrene		
Benzo(b)fluoranthene		
Benzo(g,h,i)perylene		
Benzo(k)fluoranthene		
Chrysene		
cPAHs - mammal - half DL		
Dibenzo(a,h)anthracene		
Dibenzofuran		
Fluoranthene		
Fluorene		
Indeno(1,2,3-cd)pyrene		
Naphthalene		
Phenanthrene		
Pyrene		
Total benzofluoranthenes		
Total HPAHs		
Total LPAHs		
Total PAHs		
Other SVOCs (ug/kg dw)		
1,2,4-Trichlorobenzene		
1,2-Dichlorobenzene		
1,3-Dichlorobenzene		
1,4-Dichlorobenzene		
2,4,5-Trichlorophenol		
2,4,6-Trichlorophenol		
2,4-Dichlorophenol		
2,4-Dimethylphenol		

TABLE J-2
SEDIMENT CORE SAMPLE ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	SD-315-C	SD-315-C
Sample ID	SD-315-0002	SD-315-0003
Sample Date	8/19/04	8/19/04
Depth (ft BGS)	2 to 3	3 to 4
2,4-Dinitrophenol		
2,4-Dinitrotoluene		
2,6-Dinitrotoluene		
2-Chlorophenol		
2-Methylphenol		
2-Nitroaniline		
2-Nitrophenol		
3,3'-Dichlorobenzidine		
3-Nitroaniline		
4,6-Dinitro-o-cresol		
4-Bromophenyl phenyl ether		
4-Chloro-3-methylphenol		
4-Chloroaniline		
4-Chlorophenyl phenyl ether		
4-Methylphenol		
4-Nitroaniline		
4-Nitrophenol		
Aniline		
Benzoic acid		
Benzyl alcohol		
bis(2-chloroethoxy)methane		
bis(2-chloroethyl)ether		
bis(2-chloroisopropyl)ether		
Carbazole		
Hexachlorobenzene		
Hexachlorobutadiene		
Hexachlorocyclopentadiene		
Hexachloroethane		
Isophorone		
Nitrobenzene		
n-Nitrosodimethylamine		
n-Nitroso-di-n-propylamine		
n-Nitrosodiphenylamine		
Pentachlorophenol		
Phenol		
PCBs (ug/kg dw)		
Aroclor-1016	46 U	67 U
Aroclor-1221	46 U	67 U
Aroclor-1232	91 U	13 U
Aroclor-1242	46 U	6.7 U
Aroclor-1248	46 U	6.7 U
Aroclor-1254	4.6 U	6.7 U
Aroclor-1260	4.6 U	6.7 U
Aroclor-1262		
Aroclor-1268		
PCB-018		
PCB-028		
PCB-044		

TABLE J-2
SEDIMENT CORE SAMPLE ANALYTICAL RESULTS
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

Location	SD-315-C	SD-315-C
Sample ID	SD-315-0002	SD-315-0003
Sample Date	8/19/04	8/19/04
Depth (ft BGS)	2 to 3	3 to 4
PCB-055		
PCB-066		
PCB-077		
PCB-081		
PCB-101		
PCB-105		
PCB-114		
PCB-118		
PCB-123		
PCB-126		
PCB-128		
PCB-138		
PCB-153		
PCB-156		
PCB-157		
PCB-167		
PCB-169		
PCB-170		
PCB-180		
PCB-187		
PCB-189		
PCB-195		
PCB-206		
PCB-209		
Total PCBs	91 U	67 U
Phthalates (ug/kg dw)		
Bis(2-ethylhexyl)phthalate		
Butyl benzyl phthalate		
Diethyl phthalate		
Dimethyl phthalate		
Di-n-butyl phthalate		
Di-n-octyl phthalate		
Pesticides (ug/kg dw)		
Aldrin		
beta-Chlordane		
Chlordane		
Dieldrin		
Heptachlor epoxide		
Total aldrin/dieldrin		
Total chlordane		
Total DDTs		
VOCs (ug/kg dw)		
Ethylbenzene		
Total xylenes		
Trichloroethene		

CSL = Cleanup Screening Level
mg/kg = milligrams per kilogram
OC = organic carbon
PCBs = polychlorinated biphenyls
SQS = Sediment Quality Standard
TOC = total organic carbon
ft BGS = feet below ground or sediment surface
LAET=Lowest Apparent Effects Threshold
J = Analyte was positively identified and detected; however, concentration is an estimated value because the result is less than the quantitation limit or quality control criteria were not met.
U = Analyte not detected at quantitation limit indicated.
UJ = Analyte not detected at the indicated quantitation limit, which is estimated.

Notes:
1. Organic carbon normalization is performed on samples with TOC between 0.5% and 4%.

2. Organic carbon normalization is performed on samples with TOC between 0.5% and 4%. If TOC is less than 0.5% or greater than 4% then the result is compared to the dry weight equivalent values for the SQS and CSL (typically the Lowest Apparent Effects Threshold (LAET) and the 2nd Lowest Apparent Effects Threshold (2LAET), respectively).

APPENDIX K

Soil and Groundwater Preliminary Screening Levels

TABLE K-1
GROUNDWATER ARAR PRELIMINARY SCREENING LEVEL RATIONALE
ISAACSON-THOMPSON SITE
SEATTLE, WASHINGTON

Media Column Title (a)	Column Letter	Pathway Column Title (a)	Included?		Comments
			Yes	No	
Groundwater Method A	B	Groundwater Method A-HH **Potable** (Table 720-1) WAC 173-340-720(3)(b)(i)	(X)		Use Method A for TPH and lead only
	C	Groundwater Method A-HH **Potable ARARs** WAC 173-340-720(3)(b)(ii)	(X)		Use Method A for TPH and lead only
	D	Groundwater State Quality Criteria WAC 173-340-(3)(b)(ii); WAC 173-200-040(3) **Table 9.1**		X	Not applicable to MTCA cleanup sites
	E	Groundwater Method A-HH Potable Safe Drinking Water Act, 40 CFR 141: WAC 173-290-310; WAC 173-340-720(3)(b)(ii)(A) **MCL**	(X)		Use Method A for TPH and lead only
	F	Groundwater Safe Drinking Water Act, 40 CFR 141: WAC 173-290-310; WAC 173-340-720(3)(b)(ii)(B) **MCLG** **(Non-Zero Goals)**	(X)		Use Method A for TPH and lead only
	G	Groundwater State Board Health, Ch. 246-290 WAC: WAC 173-340-720(3)(b)(ii)(C) **MCL**	(X)		Use Method A for TPH and lead only
	H	Groundwater State Board Health, Ch. 246-290 WAC: WAC 173-340-720(3)(b)(ii)(C) **MCLG**	(X)		Use Method A for TPH and lead only
	I	Groundwater Method A-**Potable** No Table Values WAC 173-340-720(3)(b)(iii)	(X)		Use Method A for TPH and lead only
	J	Groundwater Method A-HH Potable/Protect Surface Water WAC 173-340-720(3)(b)(iv)	(X)		Use Method A for TPH and lead only
Groundwater Method B	K	Groundwater Method B-HH Potable ARARs WAC 173-340-720(4)(b)(i) Safe Drinking Water Standards — **MCLs**	X		Use for preliminary screening levels
	L	Groundwater Method B-HH Potable ARARs WAC 173-340-720(4)(b)(i) Safe Drinking Water Standards — **MCLGs**	X		Use non-zero MCLGs for preliminary screening levels
	M	Groundwater Method B-HH Potable ARARs WAC 173-340-720(4)(b)(i) State Department of Health Standards — **MCLs**	X		Use for preliminary screening levels
	N	Groundwater Method B-HH Potable ARARs WAC 173-340-720(4)(b)(i) State Department of Health Standards — **MCLGs**	X		Use non-zero MCLGs for preliminary screening levels
	O	Groundwater Method B-HH Non-carcinogenic/Potable WAC 173-340-720(4)(b)(iii)(A) CLARC Database	X		Use for preliminary screening levels
	P	Groundwater Method B-HH Carcinogen/Potable WAC 173-340-720(4)(b)(iii)(B) CLARC Database	X		Use for preliminary screening levels
	Q	Groundwater Method B-HH Potable, Petroleum Mixture WAC 173-340-720(4)(b)(iii)(C) EQ. 720-3 (4-Phase Model)		X	Use Method A for TPH

TABLE K-1
GROUNDWATER ARAR PRELIMINARY SCREENING LEVEL RATIONALE
ISAACSON-THOMPSON SITE
SEATTLE, WASHINGTON

Media Column Title (a)	Column Letter	Pathway Column Title (a)	Included?		Comments
			Yes	No	
Groundwater Method C	R	Groundwater Method C-HH Potable ARARs WAC 173-340-720(5)(b)(i)		X	Not applicable; Site groundwater does not meet criteria for Method C
	S	Groundwater Method C-HH Protect Surface Water Highest Beneficial Use WAC 173-340-720(5)(b)(ii)		X	Not applicable; Site groundwater does not meet criteria for Method C
	T	Groundwater Method C-HH Non-carcinogenic/Potable WAC 173-340-720(5)(b)(iii)(A) CLARC Database		X	Not applicable; Site groundwater does not meet criteria for Method C
	U	Groundwater Method C-HH Carcinogen/Potable WAC 173-340-720(5)(b)(iii)(B) CLARC Database		X	Not applicable; Site groundwater does not meet criteria for Method C
	V	Groundwater Method C-HH Potable, Petroleum Mixture WAC 173-340-720(5)(b)(iii)(C) EQ. 720-3 (4-Phase Model)		X	Use Method A for TPH; Site groundwater does not meet criteria for Method C
Groundwater Pathway Evaluation	W	Groundwater Method B-HH Potable/Protect Surface Water WAC 173-340-720(4)(b)(ii)	X		Use for preliminary screening levels
	X	Groundwater Non-Potable Surface Water Protection WAC 173-340-720(6)	X		Use for preliminary screening levels
	Y	Groundwater to Sediment Protection Ecology **CSL** WAC 173-340-720(1)(c)	X		Use for preliminary screening levels
	Z	Groundwater to Sediment Protection Ecology **SQS** WAC 173-340-720(1)(c)	X		Use for preliminary screening levels
ARAR's	AA	EPA CERCLA T-117		X	Not used for preliminary screening levels
	AB	EPA RCRA Plant 2 TMCLs		X	The values in this column are preliminary values from Boeing Plant 2; input parameters different from MTCA; updated toxicity information included in CLARC. Not used for preliminary screening levels.
ARAR's (Not Applied)	AC	EPA Tap Water Residential Screening Levels (5/2010)		X	Not used for preliminary screening levels
Always Applicable	AD	Natural **Background** Levels Ch. 173-340 WAC		X	Not used for preliminary screening levels
	AE	Applicable **DL (MDL)** Ch. 173-340 WAC		X	Not used for preliminary screening levels
	AF	Applicable **PQL (RL)** Ch. 173-340 WAC		X	Not used for preliminary screening levels
EPA Method	AG	Analytical Methods		X	Analytical method, not screening level or ARAR

(X) = used under specific conditions explained in the comment column
ARAR = applicable or relevant and appropriate requirement
CLARC = cleanup level and risk calculation
CSL = cleanup screening level
DL = detection limit
HH = human health
I-T = Boeing Isaacson-Thompson Site
MCL = maximum contaminant level

MCL = maximum contaminant level
MCLG = maximum contaminant level goal
MDL = method detection limit
PQL = practical quantitation limit
Site = Boeing Isaacson-Thompson Site
SQS = sediment quality standard
TMCL = total maximum contaminant load
TPH = Total Petroleum Hydrocarbon
USGS = U.S. Geological Survey

(a) From Ecology's (2010) Draft LDW ARARs & CULs v12-15-2010.

TABLE K-2
SOIL ARAR PRELIMINARY SCREENING LEVEL RATIONALE
ISAACSON-THOMPSON SITE
SEATTLE, WASHINGTON

Media Column Title (a)	Column Letter	Pathway Column Title (a)	Included? Yes	Included? No	Comments
Soil Method A	B	Soil Method A, Unrestricted Land Use-HH WAC 173-340-740(2)(b)(iii) CLARC Database	(X)		Use for TPH, arsenic, and lead only. Site is industrial; use for preliminary screening only
	C	Soil Method A, Unrestricted Land Use-Ecol WAC 173-340-740(2)(b)(ii); Table 749-2	X		Simplified TEE. Use for preliminary screening only. Site is industrial and is expected to meet criteria for TEE exclusion
	D	Soil Method A, Industrial Land Use-HH WAC 173-340-745(3)(b)(i) CLARC Database	(X)		Use for TPH, arsenic, and lead only.
	E	Soil Method A, Industrial Land Use-Ecol, WAC 173-340-745(3)(b)(iii) Table 749-2	X		Simplified TEE. Use for preliminary screening only. Site is industrial and is expected to meet criteria for TEE exclusion
Soil Method B	F	Soil Direct Contact Method B-HH Carcinogen WAC 173-340-740(3)(b)(iii)(B)(II) CLARC Database, Eqn 740-2	X		Site is industrial. Use for preliminary screening only.
	G	Soil Direct Contact Method B-HH Non-carcinogen WAC 173-340-740(3)(b)(iii)(B)(I) CLARC Database, Eqn 740-1	X		Site is industrial. Use for preliminary screening only.
	H	Soil Direct Contact Method B-HH Petroleum Mixture WAC 173-340-740(3)(b)(iii)(B)(III) equation. 740-3 (4-Phase Model)		X	Data for use of Method B not available. Use Method A for preliminary screening level.
	I	Site-Specific Wildlife Exposure Model WAC 173-340-7493(3) Table 749-4 and -5		X	Site-specific TEE not required for Site.
	J	Soil Terrestrial Method B-Ecol WAC 173-340-740(3)(b)(ii); WAC 173-340-7493 Table 749-3 **Plants**		X	Site-specific TEE not required for Site, plant protection not required for commercial or industrial sites.
	K	Soil Terrestrial Method B-Ecol WAC 173-340-740(3)(b)(ii); WAC 173-340-7493 Table 749-3 **Soil Biota**		X	Site-specific TEE not required for Site, biota protection not required for commercial or industrial properties
	L	Soil Terrestrial Method B-Ecol WAC 173-340-740(3)(b)(ii); WAC 173-340-7493 Table 749-3 **Wildlife**		X	Site-specific TEE not required for Site.
Soil Method C	M	Soil Direct Contact Method C-HH Carcinogen WAC 173-340-745(5)(b)(iii)(B)(II) Ingestion Only CLARC Database equation 745-2	X		Use for preliminary screening levels
	N	Soil Direct Contact Method C-HH Non-carcinogen WAC 173-340-745(5)(b)(iii)(B)(I) Ingestion Only CLARC Database equation 745-1	X		Use for preliminary screening levels
	O	Soil Direct Contact Method C-HH Carcinogen WAC 173-340-745(5)(b)(iii)(B)(II) Ingestion + Dermal equation 745-5		X	Not applicable; only applicable if proposed changes to745-2 would result in significantly higher soil cleanup level than would be calculated without the proposed changes
	P	Soil Direct Contact Method C-HH Non-carcinogen WAC 173-340-745(5)(b)(iii)(B)(I) Ingestion + Dermal equation 745-4		X	Not applicable; only applicable if proposed changes to Eqn 745-1 would result in significantly higher soil cleanup level than would be calculated without the proposed changes
	Q	Soil Direct Contact Method C-HH Petroleum Mixture WAC 173-340-745(5)(b)(iii)(B)(III) equation 740-3 (4-Phase Model)		X	Data for use of Method C not available. Use Method A for preliminary screening level.
Soil Pathway Evaluation	R	Soil to Method B-HH Groundwater Protection -NC, WAC 173-340-740(3)(b)(iii)(A) equation 747-1/747-2 Vadose Soil	X		Use for preliminary screening levels
	S	Soil to Method B-HH Groundwater Protection - NC, WAC 173-340-740(3)(b)(iii)(A) equation 747-1/747-2 Saturated Soil	X		Use for preliminary screening levels
	T	Soil to Method B - HH Groundwater Protection - Carc, WAC 173-340-740(3)(b)(iii)(A) equation 747-1/747-2 Vadose Soil	X		Use for preliminary screening levels
	U	Soil to Method B - HH Groundwater Protection - Carc, WAC 173-340-740(3)(b)(iii)(A) equation 747-1/747-2 Saturated Soil	X		Use for preliminary screening levels
	V	Soil to Method C-HH Groundwater Protection - NC, WAC 173-340-740(3)(b)(iii)(A) equation 747-1/747-2 Vadose Soil		X	Use Method A for TPH; Site groundwater does not meet criteria for Method C
	W	Soil to Method C-HH Groundwater Protection - NC, WAC 173-340-740(3)(b)(iii)(A) equation 747-1/747-2 Saturated Soil		X	Site groundwater does not meet criteria for Method C groundwater
	X	Soil to Method C-HH Groundwater Protection - Carc, WAC 173-340-740(3)(b)(iii)(A) equation 747-1/747-2 Vadose Soil		X	Site groundwater does not meet criteria for Method C groundwater
	Y	Soil to Method C-HH Groundwater Protection - Carc, WAC 173-340-740(3)(b)(iii)(A) equation 747-1/747-2 Saturated Soil		X	Site groundwater does not meet criteria for Method C groundwater

TABLE K-2
SOIL ARAR PRELIMINARY SCREENING LEVEL RATIONALE
ISAACSON-THOMPSON SITE
SEATTLE, WASHINGTON

Media Column Title (a)	Column Letter	Pathway Column Title (a)	Included? Yes	No	Comments
	Z	Soil to Sediment Protection Ecology CSL WAC 173-340-740(1)(d) equation 747-1/747-2 Vadose Soil	X		Use for preliminary screening levels, empirical demonstration may be used for cleanup levels
	AA	Soil to Sediment Protection Ecology SQS WAC 173-340-740(1)(d) equation 747-1/747-2 Vadose Soil	X		Use for preliminary screening levels, empirical demonstration may be used for cleanup levels
	AB	Soil to Sediment Protection Ecology CSL WAC 173-340-740(1)(d) equation 747-1/747-2 Saturated Soil	X		Use for preliminary screening levels, empirical demonstration may be used for cleanup levels
	AC	Soil to Sediment Protection Ecology SQS WAC 173-340-740(1)(d) equation 747-1/747-2 Saturated Soil	X		Use for preliminary screening levels, empirical demonstration may be used for cleanup levels
	AD	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Fresh - Acute** Vadose Soil	X		Use MDLs for I-T Site to calculate PQL
	AE	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Fresh - Acute** Saturated Soil	X		Calculate PQLs using MDLs for I-T and use for preliminary screening levels
	AF	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Fresh - Chronic** Vadose Soil	X		Use for preliminary screening levels, empirical demonstration may be used for cleanup levels
	AG	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Fresh - Chronic** Saturated Soil	X		Use for preliminary screening levels, empirical demonstration may be used for cleanup levels
	AH	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Marine - Acute** Vadose Soil	X		Use for preliminary screening levels, empirical demonstration may be used for cleanup levels
	AI	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Marine - Acute** Saturated Soil	X		Use for preliminary screening levels, empirical demonstration may be used for cleanup levels
	AJ	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Marine - Chronic** Vadose Soil	X		Use for preliminary screening levels, empirical demonstration may be used for cleanup levels. Listed numbers for Unocal are not applicable.
	AK	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Marine - Chronic** Saturated Soil	X		Use for preliminary screening levels, empirical demonstration may be used for cleanup levels
	AL	Soil to Surface Water Protection WAC 173-340-740(1)(d) NRWQC Saltwater Acute equation 747-1/747-2 Vadose Soil	X		Use for preliminary screening levels, empirical demonstration may be used for cleanup levels
	AM	Soil to Surface Water Protection WAC 173-340-740(1)(d) NRWQC Saltwater Acute equation 747-1/747-2 Saturated Soil	X		Use for preliminary screening levels, empirical demonstration may be used for cleanup levels
	AN	Soil to Surface Water Protection WAC 173-340-740(1)(d) NRWQC Saltwater Chronic equation 747-1/747-2 Vadose Soil	X		Use for preliminary screening levels, empirical demonstration may be used for cleanup levels
	AO	Soil to Surface Water Protection WAC 173-340-740(1)(d) NRWQC Saltwater Chronic equation 747-1/747-2 Saturated Soil	X		Use for preliminary screening levels, empirical demonstration may be used for cleanup levels
	AP	Soil to Surface Water Protection WAC 173-340-740(1)(d) NRWQC Freshwater Acute equation 747-1/747-2 Vadose Soil	X		Use for preliminary screening levels, empirical demonstration may be used for cleanup levels
	AQ	Soil to Surface Water Protection WAC 173-340-740(1)(d) NRWQC Freshwater Acute equation 747-1/747-2 Saturated Soil	X		Use for preliminary screening levels, empirical demonstration may be used for cleanup levels
	AR	Soil to Surface Water Protection WAC 173-340-740(1)(d) NRWQC Freshwater Chronic equation 747-1/747-2 Vadose Soil	X		Use for preliminary screening levels, empirical demonstration may be used for cleanup levels
	AS	Soil to Surface Water Protection WAC 173-340-740(1)(d) NRWQC Freshwater Chronic equation 747-1/747-2 Saturated Soil	X		Use for preliminary screening levels, empirical demonstration may be used for cleanup levels
	AT	Soil to Surface Water Protection WAC 173-340-740(1)(d) NRWQC HH-Consumption; Water & Organisms equation 747-1/747-2 Vadose Soil		X	LDW not classified as drinking water source (WAC 173-201A-602) so ingestion of water is not applicable.
	AU	Soil to Surface Water Protection WAC 173-340-740(1)(d) NRWQC HH-Consumption; Water & Organisms equation 747-1/747-2 Saturated Soil		X	LDW not classified as drinking water source (WAC 173-201A-602) so ingestion of water is not applicable.
	AV	Soil to Surface Water Protection WAC 173-340-740(1)(d) NRWQC HH-Consumption Organisms equation 747-1/747-2 Vadose Soil	X		Use for preliminary screening levels, empirical demonstration may be used for cleanup levels
	AW	Soil to Surface Water Protection WAC 173-340-740(1)(d) NRWQC HH-Consumption Organisms equation 747-1/747-2 Saturated Soil	X		Use for preliminary screening levels, empirical demonstration may be used for cleanup levels

TABLE K-2
SOIL ARAR PRELIMINARY SCREENING LEVEL RATIONALE
ISAACSON-THOMPSON SITE
SEATTLE, WASHINGTON

Media Column Title (a)	Column Letter	Pathway Column Title (a)	Included? Yes	Included? No	Comments
	AX	Soil to Surface Water Protection Aquatic Life Fresh/Acute, **NTR** - 40 CFR 131.36 Vadose Soil	X		Use for preliminary screening levels, empirical demonstration may be used for cleanup levels
	AY	Soil to Surface Water Protection Aquatic Life Fresh/Acute, **NTR** - 40 CFR 131.36 Saturated Soil	X		Use for preliminary screening levels, empirical demonstration may be used for cleanup levels
	AZ	Soil to Surface Water Protection Aquatic Life Fresh/Chronic, **NTR** - 40 CFR 131.36 Vadose Soil	X		Use for preliminary screening levels, empirical demonstration may be used for cleanup levels
	BA	Soil to Surface Water Protection Aquatic Life Fresh/Chronic, **NTR** - 40 CFR 131.36 Saturated Soil	X		Use for preliminary screening levels, empirical demonstration may be used for cleanup levels
	BB	Soil to Surface Water Protection Aquatic Life Marine/Acute, **NTR** - 40 CFR 131.36 Vadose Soil	X		Use for preliminary screening levels, empirical demonstration may be used for cleanup levels
	BC	Soil to Surface Water Protection Aquatic Life Marine/Acute, **NTR** - 40 CFR 131.36 Saturated Soil	X		Use for preliminary screening levels, empirical demonstration may be used for cleanup levels
	BD	Soil to Surface Water Protection Aquatic Life Marine/Chronic, **NTR** - 40 CFR 131.36 Vadose Soil	X		Use for preliminary screening levels, empirical demonstration may be used for cleanup levels
	BE	Soil to Surface Water Protection Aquatic Life Marine/Chronic, **NTR** - 40 CFR 131.36 Saturated Soil	X		Use for preliminary screening levels, empirical demonstration may be used for cleanup levels
	BF	Soil to Surface Water Protection HH-Fresh Water **Water & Organism Consumption NTR** - 40 CFR 131.36 (WAC 173-201A-040[5]) HH - 10-6 Carc Risk Vadose Soil		X	LDW not classified as drinking water source (WAC 173-201A-602) so ingestion of water is not applicable.
	BG	Soil to Surface Water Protection HH-Fresh Water **Water & Organism Consumption NTR** - 40 CFR 131.36 (WAC 173-201A-040[5]) HH - 10-6 Carc Risk Saturated Soil		X	LDW not classified as drinking water source (WAC 173-201A-602) so ingestion of water is not applicable.
	BH	Soil to Surface Water Protection HH-Fresh Water **Organism Consumption Only NTR** - 40 CFR 131.36 (WAC 173-201A-040[5]) HH - 10-6 Carc Risk Vadose Soil	X		Use for preliminary screening levels, empirical demonstration may be used for cleanup levels
	BI	Soil to Surface Water Protection HH-Fresh Water **Organism Consumption Only NTR** - 40 CFR 131.36 (WAC 173-201A-040[5]) HH - 10-6 Carc Risk Saturated Soil	X		Use for preliminary screening levels, empirical demonstration may be used for cleanup levels
	BJ	Soil Protective of Vapor, Direct Contact, WAC 173-340-740(3)(b)(iii)(C)	X		Use for preliminary screening levels
	BK	Soil Protective of Vapor, Indoor/Ambient Exposure WAC 173-340-740(3)(c)(iv)(B)		X	Not applicable, modified Method B soil screening levels not being used for preliminary screening levels.
Soil Potential ARARs	BL	CERCLA EPA Regional Screening Level (RSL: May, 2010) Residential		X	Input parameters different from MTCA; updated toxicity information included in CLARC. Not used for preliminary screening levels
	BM	CERCLA EPA Regional Screening Level (RSL: May, 2010) Industrial		X	Input parameters different from MTCA; updated toxicity information included in CLARC. Not used for preliminary screening levels
	BN	CERCLA - National Oil & Hazardous Substances Pollution Contingency Plan (NCP) - 40 CFR 300 Preliminary Remediation/Cleanup Goals (2007)		X	Input parameters different from MTCA; updated toxicity information included in CLARC. Not used for preliminary screening levels
	BO	Soil Protection of Surface Water HH-**Organoleptic Effects** CWA §304 **NRWQC** Vadose Soil	X		Use for preliminary screening levels
	BP	Soil Protection of Surface Water HH-**Organoleptic Effects** CWA §304 **NRWQC** Saturated Soil	X		Use for preliminary screening levels
	BQ	CA EPA OEHHA HH-Direct Exposure **Residential** Screening Levels		X	Input parameters different from MTCA; updated toxicity information included in CLARC. Not used for preliminary screening levels
	BR	CA EPA OEHHA HH-Direct Exposure **Industrial** Screening Levels		X	Input parameters different from MTCA; updated toxicity information included in CLARC. Not used for preliminary screening levels
	BS	Soil - Toxic Substances Control Act **(TSCA)** 40 CFR 761.61	X		Use for preliminary screening level for PCBs
	BT	CERCLA EPA Regional Screening Level (RSL: May, 2010) Potable Groundwater Protection (Risk Based) Saturated Soil		X	Input parameters different from MTCA; updated toxicity information included in CLARC. Not used for preliminary screening levels
	BU	EPA LDW Plant 2 TMCL's Groundwater Protection (Risk Based)		X	The values in this column are preliminary values from Boeing Plant 2; input parameters different from MTCA; updated toxicity information included in CLARC. Not used for preliminary screening levels.

TABLE K-2
SOIL ARAR PRELIMINARY SCREENING LEVEL RATIONALE
ISAACSON-THOMPSON SITE
SEATTLE, WASHINGTON

Media Column Title (a)	Column Letter	Pathway Column Title (a)	Included? Yes	Included? No	Comments
Always Applicable	BV	Natural **Background** Levels Ch. 173-340 WAC		X	Not used for preliminary screening levels
	BW	Applicable **DL (MDL)** Ch. 173-340 WAC		X	Not used for preliminary screening levels
	BX	Applicable **PQL (RL)** Ch. 173-340 WAC		X	Not used for preliminary screening levels
EPA Method	BY	Analytical Method		X	Analytical method, not screening level or ARAR

(X) = used under specific conditions explained in the comment column
ARAR = applicable or relevant and appropriate requirement
CA EPA OEHHA = California Environmental Protection Agency Office of Environmental Health Hazard Assessment
CalEPA = California Environmental Protection Agency
Carc = carcinogenic
CLARC = cleanup level and risk calculation
CSL = cleanup screening level
CUL = cleanup level
DL = detection limit
Ecol = ecological
HH = human health
I-T = Boeing Isaacson-Thompson Site
LDW = Lower Duwamish Waterway
MDL = method detection limit
MTCA = Model Toxics Control Act
NC = noncarcinogenic
NRWQC = U.S. Environmental Protection Agency water quality criterion
NTR = national toxics rule
PQL = practical quantitation limit
RL = reporting limit
RSL = regional screening level
Site = Boeing Isaacson-Thompson Site
SQS = sediment quality standard
SWQS = Washington State surface water quality standard
TEE = terrestrial ecological evaluation
TMCL = total maximum contaminant load
TPH = Total Petroleum Hydrocarbons
TSCA = Toxic Substances Control Act

(a) From Ecology's (2010) Draft LDW ARARs & CULs v12-15-2010.

TABLE K-3
SURFACE WATER ARAR PRELIMINARY SCREENING LEVEL RATIONALE
ISAACSON-THOMPSON SITE
SEATTLE, WASHINGTON

Media Column Title (a)	Column Letter	Pathway Column Title (a)	Included?		Comments
			Yes	No	
Surface Water Method A	B	Surface Water Method A-HH ARARs WAC 173-340-730(2)(b)(i) [See Required ARARs]	(X)		Use Method A only for TPH, use ARARs in developing Method B
	C	Surface Water Method A-WAC 173-340-730(2)(b)(i)(A) [See Required ARARs]	(X)		Use Method A only for TPH, use ARARs in developing Method B
	D	Surface Water Method A-HH/Aquatic Organisms: CWA §304 WAC 173-340-730(2)(b)(i)(B) [See Required ARARs]	(X)		Use Method A only for TPH, use ARARs in developing Method B
	E	Surface Water Method A-HH NTR - 40 CFR 131 WAC 173-340-730(2)(b)(i)(C) [See Required ARARs]	(X)		Use Method A only for TPH, use ARARs in developing Method B
	F	Surface Water Method A-HH Potability WAC 173-340-730(2)(b)(ii) [See Required ARARs]	(X)		Use Method A only for TPH, use ARARs in developing Method B
	G	Surface Water Method A-HH No Table Values WAC 173-340-730(2)(b)(iii) [See applicable surface water background or PQL values]	(X)		Use Method A only for TPH
Surface Water Method B	H	Surface Water Method B-HH ARARs WAC 173-340-730(3)(b)(i) [See Required ARARs]	X		Use ARARs for preliminary screening levels
	I	Surface Water Method B-WA WQS: Ch. 173-2101 A WAC 173-340-730(3)(b)(i)(A) [See Required ARARs]	X		Use ARARs for preliminary screening levels
	J	Surface Water Method B-HH/Aquatic Organisms:CWA §304 WAC 173-340-730(3)(b)(i)(B) [See Required ARARs]	X		Use ARARs for preliminary screening levels
	K	Surface Water Method B-HH NTR - 40 CFR 131 WAC 173-340-730(3)(b)(i)(C) [See Required ARARs]	X		Use ARARs for preliminary screening levels
	L	Surface Water Method B, Environmental Effects WAC 173-340-730(3)(b)(ii) [WET TESTING]		X	Data not available, not used for preliminary screening levels
	M	Surface Water Method B-HH Non-carcinogen Fish Consumption WAC 173-340-730(3)(b)(iii)(A) Equation 730-1 CLARC Database	X		Use for preliminary screening levels
	N	Surface Water, Method B-HH, Non-carcinogen, Fish Consumption WAC 173-340-730(3) (c) Equation 730-1 MOD - Tribal Adult	X		Use for preliminary screening levels
	O	Surface Water, Method B-HH, Non-carcinogen, Fish Consumption WAC 173-340-730(3) (c) Equation 730-1 MOD - Tribal Child	X		Use for preliminary screening levels
	P	Surface Water Method B-HH Carcinogen Fish Consumption WAC 173-340-730(3)(b)(iii)(B) Equation 730-2 CLARC Database	X		Use for preliminary screening levels
	Q	Surface Water, Method B-HH, Carcinogen, Fish Consumption WAC 173-340-730(3)(b)(iii)(B) Equation 730-2 MOD - Tribal Adult	X		Use for preliminary screening levels
	R	Surface Water, Method B-HH, Carcinogen, Fish Consumption WAC 173-340-730(3)(b)(iii)(B) Equation 730-2 MOD - Tribal Child	X		Use for preliminary screening levels

TABLE K-3
SURFACE WATER ARAR PRELIMINARY SCREENING LEVEL RATIONALE
ISAACSON-THOMPSON SITE
SEATTLE, WASHINGTON

Media Column Title (a)	Column Letter	Pathway Column Title (a)	Included?		Comments
			Yes	No	
	S	Surface Water Method B-HH Petroleum Mixture WAC 173-340-730(3)(b)(iii)(C)		X	Use Method A for TPH
	T	Surface Water Method B-HH Potability WAC 173-340-730(3)(b)(iv)		X	Lower Duwamish Waterway not classified as drinking water per WAC 173-201A-602
Surface Water Method C	U	Surface Water Method C-HH ARARs WAC 173-340-730(4)(b)(i) [See Required ARARs]		X	Not applicable; Site groundwater does not meet criteria for Method C
	V	Surface Water Method C, Environmental Effects WAC 173-340-730(4)(b)(ii) [WET TESTING]		X	Use Method A for TPH; Site groundwater does not meet criteria for Method C
	W	Surface Water Method C, Non-carcinogen Fish Consumption WAC 173-340-730(4)(b)(iii)(A) Equation 730-1 CLARC Database		X	Surface water does not qualify for Method C
	X	Surface Water Method C, Carcinogen Fish Consumption WAC 173-340-730(4)(b)(iii)(B) Equation 730-2 CLARC Database		X	Surface water does not qualify for Method C
	Y	Surface Water Method C, Petroleum Mixture WAC 173-340-730(4)(b)(iii)(C)		X	Use Method A for TPH
	Z	Surface Water Method C-HH Potability WAC 173-340-730(4)(b)(iv)		X	Lower Duwamish Waterway not classified as drinking water per WAC 173-201A-602
Surface Water MTCA Method A,B,C Required ARARs	AV	Surface Water Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Fresh - Acute**	X		Use for preliminary screening levels
	AW	Surface Water Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Fresh - Chronic**	X		Use for preliminary screening levels
	AX	Surface Water Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Marine - Acute**	X		Use for preliminary screening levels
	AY	Surface Water Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Marine - Chronic**	X		Use MDLs for I-T to calculate PQL
	AZ	Surface Water HH-**Consumption; Water + Organism** CWA §304 **NRWQC**		X	Calculate PQLs using MDLs for I-T and use for preliminary screening levels
	BA	Surface Water HH-**Consumption; Organism Only** CWA §304 **NRWQC**	X		Use for preliminary screening levels
	BB	Surface Water HH-**Organoleptic Effects** CWA §304 **NRWQC**	X		Use for preliminary screening levels
	BC	Surface Water Aquatic Life Fresh/Acute CWA §304 **NRWQC**	X		Use for preliminary screening levels

TABLE K-3
SURFACE WATER ARAR PRELIMINARY SCREENING LEVEL RATIONALE
ISAACSON-THOMPSON SITE
SEATTLE, WASHINGTON

Media Column Title (a)	Column Letter	Pathway Column Title (a)	Included?		Comments
			Yes	No	
	BD	Surface Water Aquatic Life Fresh/Chronic CWA §304 **NRWQC**	X		Use for preliminary screening levels
	BE	Surface Water Aquatic Life Marine/Acute CWA §304 **NRWQC**	X		Use for preliminary screening levels
	BF	Surface Water Aquatic Life Marine/Chronic CWA §304 **NRWQC**	X		Use for preliminary screening levels
	BG	Surface Water Aquatic Life Fresh/Acute **NTR** - 40 CFR 131.36	X		Use for preliminary screening levels
	BH	Surface Water Aquatic Life Fresh/Chronic **NTR** - 40 CFR 131.36	X		Use for preliminary screening levels
	BI	Surface Water Aquatic Life Marine/Acute **NTR** - 40 CFR 131.36	X		Use for preliminary screening levels
	BJ	Surface Water Aquatic Life Marine/Chronic **NTR** - 40 CFR 131.36	X		Use for preliminary screening levels
	BK	Surface Water HH-Fresh Water **Water & Organism Consumption NTR** - 40 CFR 131.36 (WAC 173-201A-040[5]) HH - 10-6 Carc Risk		X	Lower Duwamish Waterway not classified as drinking water per WAC 173-201A-602
	BL	Surface Water HH-Fresh Water **Organism Consumption Only NTR** - 40 CFR 131.36 (WAC 173-201A-040[5]) HH - 10-6 Carc Risk	X		Use for preliminary screening levels
	BM	Surface Water HH-Marine Water **Organism Consumption Only NTR** - 40 CFR 131.36 (WAC 173-201A-040[5]) HH - 10-6 Carc Risk	X		Use for preliminary screening levels
Surface Water ARARs	BN	Surface Water Discharge **(NPDES)** 40 CFR 122, 125/RCW 90-48; WAC 173-216, -220, -122		X	NPDES is not MTCA ARAR for cleanup levels
	BO	Waste Water - Toxics Substances Control Act **(TSCA)** 40 CFR 761.61		X	Applicable to waste water, not groundwater or surface water
	BP	Shoreline Management Act RCW 90-58; WAC 173-16; King County/City Seattle Shoreline Master Plans (KCC Title 25;SMC 23.60)		X	No numbers are included
	BQ	Groundwater to Sediment Protection Ecology **CSL** WAC 173-340-730(1)(d)	X		Use for preliminary screening levels
	BR	Groundwater to Sediment Protection Ecology **SQS** WAC 173-340-730(1)(d)	X		Use for preliminary screening levels
	BS	Surface Water HH - Adult Non-Carcinogen Tribal Fish Consumption without Salmon EPA RCRA (using EQ 730-1)		X	Do not use for preliminary screening levels; use columns N, O, Q, R
	BT	Surface Water HH - Child Non-Carcinogen Tribal Fish Consumption without Salmon EPA RCRA (using EQ 730-1)		X	Do not use for preliminary screening levels; use columns N, O, Q, R
	BU	Surface Water HH - Adult Non-Carcinogen Tribal Fish Consumption without Salmon EPA RCRA (using EQ 730-2)		X	Do not use for preliminary screening levels; use columns N, O, Q, R
	BV	Surface Water HH - Child Non-Carcinogen Tribal Fish Consumption without Salmon EPA RCRA (using EQ 730-2)		X	Do not use for preliminary screening levels; use columns N, O, Q, R

TABLE K-3
SURFACE WATER ARAR PRELIMINARY SCREENING LEVEL RATIONALE
ISAACSON-THOMPSON SITE
SEATTLE, WASHINGTON

Media Column Title (a)	Column Letter	Pathway Column Title (a)	Included? Yes	Included? No	Comments
Always Applicable	BW	Natural **Background** Levels Ch. 173-340 WAC		X	Do not use for preliminary screening levels
	BX	Applicable **DL (MDL)** Ch. 173-340 WAC		X	Use MDLs for I-T to calculate PQL
	BY	Applicable **PQL (RL/RDL)** Ch. 173-340 WAC		X	Do not use for preliminary screening levels
	BZ	Analytical method		X	Analytical method, not screening level or ARAR
	CA	Natural Background Levels, Ch. 173-340 WAC, LDW		X	Do not use for preliminary screening levels

(X) = used under specific conditions explained in the comment column
ARAR = applicable or relevant and appropriate requirement
CLARC = cleanup level and risk calculation
CSL = cleanup screening level
CWA = Clean Water Act
EPA = U.S. Environmental Protection Agency
HH = human health
I-T = Boeing Isaccson-Thompson Site
MDL = method detection limit
NPDES = National Pollution Discharge Elimination System
NRWQC = U.S. Environmental Protection Agency water quality criterion
NTR = national toxics rule
PQL = practical quantitation limit
RCRA = Resource Conservation and Recovery Act
Site = Boeing Isaacson-Thompson Site
SQS = sediment quality standard
SWQS = Washington State surface water quality standard
TSCA = Toxic Substances Control Act
WET = whole effluent toxicity

(a) From Ecology's (2010) Draft LDW ARARs & CULs v12-15-2010

TABLE K-4
GROUNDWATER PRELIMINARY SCREENING LEVELS*
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

MEDIA - MTCA Standard	GW Method A								GW Method B						GW PATHWAY EVALUATION				POTABLE GW MOST STRINGENT
PATHWAYS HH - Human Health Ecol- Ecological	Ground Water, Method A-HH, **Potable** (Table 720-1) WAC 173-340-720(3)(b)(i) (TPH only)	Ground Water Method A - HH **Potable ARAR's** WAC 173-340-720(3)(b)(ii) (TPH only)	Ground Water Method A-HH-**Potable** Safe Drinking Water Act, 40 CFR 141: WAC 173-290-310; WAC 173-340-720(3)(b)(ii)(A) **MCL** (TPH only)	Ground Water Safe Drinking Water Act, 40 CFR 141: WAC 173-290-310; WAC 173-340-720(3)(b)(ii)(B) **MCLG (Non-Zero Goals)** (TPH only)	Ground Water State Board Health, Ch. 246-290 WAC: WAC 173-340-720(3)(b)(ii)(C) **MCL** (TPH only)	Ground Water State Board Health, Ch. 246-290 WAC: WAC 173-340-720(3)(b)(ii)(C) **MCG** (TPH only)	Ground Water Method A - **Potable** No Table Values WAC 173-340-720(3)(b)(iii) (TPH only)	Ground Water, Method A-HH, **Potable**/Protect Surface Water WAC 173-340-720(3)(b)(iv) (TPH only)	Ground Water Method B - HH **Potable** ARAR's WAC 173-340-720(4)(b)(i) *Safe Drinking Water Standards - **MCLs***	Ground Water Method B - HH **Potable** ARAR's WAC 173-340-720(4)(b)(i) *Safe Drinking Water Standards - **MCGs***	Ground Water Method B - HH **Potable** ARAR's WAC 173-340-720(4)(b)(i) *State Department of Health Stanadrds - **MCLs***	Ground Water Method B - HH **Potable** ARAR's WAC 173-340-720(4)(b)(i) *State Department of Health Stanadrds - **MCGs***	Ground Water, Method B-HH, Non-carcinogenic/ **Potable** WAC 173-340-720(4)(b)(iii)(A) **EQ. 720-1** *CLARC Database*	Ground Water, Method B-HH, Carcinogen/ **Potable** WAC 173-340-720(4)(b)(iii)(B) **EQ. 720-2** *CLARC Database*	Ground Water, Method B-HH, Potable/Protect Surface Water WAC 173-340-720(4)(b)(ii)	Ground Water, Non-Potable, Surface Water Protection WAC 173-340-720(6)	Groundwater to Sediment Protection Ecology **CSL** WAC 173-340-720(1)(c)	Groundwater to Sediment Protection Ecology **SQS** WAC 173-340-720(1)(c)	Screening Levels
UNITS	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**
acetone													7200		*	*			7200
acenaphthene													960		*	*	9.31372549	2.614379085	2.614379085
acenaphthylene															*	*	10.78431373	10.78431373	10.78431373
anthracene													4800		*	*	58.82352941	10.78431373	10.78431373
benzene									5	*0	5	*0	32	0.795	*	*			0.795
benzo(g,h,i)perylene															*	*	0.029147982	0.011584454	0.011584454
benzo[a]anthracene														0.12	*	*	0.632911392	0.257852789	0.12
benzo[a]pyrene									0.2	*0	0.2	*0		0.012	*	*	0.266903915	0.125826131	0.012
benzo[b]fluoranthene														0.012	*	*	0.560398506	0.286425903	0.012
benzo[k]fluoranthene														1.2	*	*	0.571791614	0.292249047	0.292249047
bis(2-ethylhexyl) phthalate									6	*0	6	*0	320	6.25	*	*	0.472727273	0.284848485	0.284848485
butyl benzyl phthalate													3200	46	*	*	6.837606838	0.523504274	0.523504274
carbon tetrachloride									5	*0	5	*0	32	0.625	*	*			0.625
chlorobenzene									100	100	100	100	160		*	*			100
chloroethane (ethyl chloride)															*	*			0
chloroform (trichloromethane)													80		*	*			80
chloromethane (methyl chloride)															*	*			0
chrysene														12	*	*	1.949152542	0.466101695	0.466101695
dibenz[a,h]anthracene														0.012	*	*	0.01259542	0.004580153	0.004580153
dibenzofuran													16		*	*	5.132743363	1.327433628	1.327433628
di-butyl phthalate (di-n-butyl phth.)													1600		*	*	1164.383562	150.6849315	150.6849315
dichlorobenzene, 1,2-									600	600	600	600	720		*	*	5.191873589	5.191873589	5.191873589
dichlorobenzene, 1,3-															*	*			0
dichlorobenzene, 1,4-									75	75	75	75			*	*	20.73732719	7.142857143	7.142857143
dichloroethane, 1,1-													800		*	*			800
dichloroethane, 1,2-									5	*0	5	*0	160	0.48	*	*			0.48
dichloroethylene, 1,1-									7	7	7	7	72		*	*			7
diethyl phthalate													13000		*	*	873.015873	484.1269841	484.1269841
dimethyl phthalate															*	*	142.8571429	142.8571429	142.8571429
di-n-octyl phthalate															*	*	22.95918367	0.295918367	0.295918367
ethylbenzene									700	700	700	700	800		*	*			700
fluoranthene													640		*	*	16.92524683	2.256699577	2.256699577
fluorene													640		*	*	6.991150442	2.03539823	2.03539823
hexachlorobenzene									1	*0	1	*0			*	*	0.680473373	0.112426036	0.112426036
hexachlorobutadiene													8		*	*	6.237424547	3.923541247	3.923541247
indeno[1,2,3-cd]pyrene														0.12	*	*	0.032835821	0.012686567	0.012686567
MEK (Methyl Ethyl Ketone;2-Butanone)													4800		*				4800
methylene chloride (dichloromethane)									5	*0	5	*0		5.83	*	*			5
methylnaphthalene, 2-															*	*	30.62200957	18.18181818	18.18181818
MIBK (M-Isobutyl-K;4-M,2-Pentanone)													640		*				640
naphthalene													160		*	*	92.39130435	53.80434783	53.80434783
nitrosodiphenylamine, N-															*	*	1.957295374	1.957295374	1.957295374
pcb mixtures									0.5		0.5	*0		0.044	*	*	1.450892857	0.267857143	0.044
pcb - Aroclor 1016													1.12		*	*	2.398523985	0.442804428	0.442804428
pcb - Aroclor 1221															*	*			0
pcb - Aroclor 1232															*	*			
pcb - Aroclor 1242															*	*			0
pcb - Aroclor 1248															*	*	1.480637813	0.273348519	0.273348519
pcb - Aroclor 1254													0.32		*	*	0.85978836	0.158730159	0.158730159
pcb - Aroclor 1260															*	*	0.314009662	0.057971014	0.057971014
phenanthrene															*	*	23.07692308	4.807692308	4.807692308
pyrene													480		*	*	20.17291066	14.4092219	14.4092219
tetrachloroethylene (perchloroethylene)									5	*0	5	*0	80		*	*			5
trichlorobenzene, 1,2,4-									70	70	70	70		1.51	*	*	2.506963788	1.128133705	1.128133705
trichlorethane, 1,1,1-									200	200	200	200	7200		*	*			200
trichlorethane, 1,1,2-									5	3	5	3		0.768	*	*			0.768
trichloroethylene									5	*0	5	*0	2.4	0.49	*	*			0.49
trimethylbenzene, 1,3,5-													80		*	*			80
toluene									1000	1000	1000	1000	1600		*	*			1000
vinyl chloride (chloroethylene)									2	*0	2	*0	24	0.029	*	*			0.029
xylene (dimethylbenzene)									10000	10000	10000	10000	1600		*	*			1600
benzoic acid															*	*	2242.926156	2242.926156	2242.926156
benzyl alcohol													800		*	*	233.0779055	181.9923372	181.9923372
dimethylphenol, 2,4-															*	*	2.020624303	2.020624303	2.020624303
methylphenol, 2- (o-cresol)															*	*	7.110609481	7.110609481	7.110609481
methylphenol, 4- (p-cresol)															*	*	77.18894009	77.18894009	77.18894009
pentachlorophenol									1	*0	1	*0	80	0.219	*	*	10.20710059	5.325443787	0.219
phenol (total)													2400		*	*	223.880597	78.35820896	78.35820896
styrene (phenylethylene)									100	100	100	100	1600		*	*			100

TABLE K-4
GROUNDWATER PRELIMINARY SCREENING LEVELS*
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

MEDIA - MTCA Standard	GW Method A								GW Method B						GW PATHWAY EVALUATION				POTABLE GW MOST STRINGENT
PATHWAYS HH - Human Health Ecol- Ecological	Ground Water, Method A-HH, **Potable** (Table 720-1) WAC 173-340-720(3)(b)(i) (TPH only)	Ground Water Method A - HH **Potable ARAR's** WAC 173-340-720(3)(b)(ii) (TPH only)	Ground Water Method A-HH-**Potable** Safe Drinking Water Act, 40 CFR 141: WAC 173-290-310; WAC 173-340-720(3)(b)(ii)(A) **MCL** (TPH only)	Ground Water Safe Drinking Water Act, 40 CFR 141: WAC 173-290-310; WAC 173-340-720(3)(b)(ii)(B) **MCLG (Non-Zero Goals)** (TPH only)	Ground Water State Board Health, Ch. 246-290 WAC: WAC 173-340-720(3)(b)(ii)(C) **MCL** (TPH only)	Ground Water State Board Health, Ch. 246-290 WAC: WAC 173-340-720(3)(b)(ii)(C) **MCG** (TPH only)	Ground Water Method A - **Potable** No Table Values WAC 173-340-720(3)(b)(iii) (TPH only)	Ground Water, Method A-HH, **Potable**/Protect Surface Water WAC 173-340-720(3)(b)(iv) (TPH only)	Ground Water Method B - HH **Potable** ARAR's WAC 173-340-720(4)(b)(i) *Safe Drinking Water Standards - **MCLs***	Ground Water Method B - HH **Potable** ARAR's WAC 173-340-720(4)(b)(i) *Safe Drinking Water Standards - **MCGs***	Ground Water Method B - HH **Potable** ARAR's WAC 173-340-720(4)(b)(i) *State Department of Health Stanadrds - **MCLs***	Ground Water Method B - HH **Potable** ARAR's WAC 173-340-720(4)(b)(i) *State Department of Health Stanadrds - **MCGs***	Ground Water, Method B-HH, Non-carcinogenic/ **Potable** WAC 173-340-720(4)(b)(iii)(A) **EQ. 720-1** *CLARC Database*	Ground Water, Method B-HH, Carcinogen/ **Potable** WAC 173-340-720(4)(b)(iii)(B) **EQ. 720-2** *CLARC Database*	Ground Water, Method B-HH, Potable/Protect Surface Water WAC 173-340-720(4)(b)(ii)	Ground Water, Non-Potable, Surface Water Protection WAC 173-340-720(6)	Groundwater to Sediment Protection Ecology **CSL** WAC 173-340-720(1)(c)	Groundwater to Sediment Protection Ecology **SQS** WAC 173-340-720(1)(c)	Screening Levels
UNITS	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**
Tributyltin															*	*			
Trichlorophenol, 2,4,6-													8	4	*	*			4
															*	*			
Aluminum									50				16000		*	*			50
Antimony									6	6	6	6			*	*			6
Arsenic (III)															*	*			
Arsenic (V)															*	*			
Arsenic (total)									10	*0	10	*0	4.8	0.0583	*	*			0.0583
Barium									2000	2000	2	2	560		*	*			2
Beryllium									4	4	4	4	32		*	*			4
Cadmium									5	5	5	5	16		*	*	3.357954465	2.556054891	2.556054891
Chromium (VI)													48		*	*			48
Chromium, total (or III)									100	100	100	100			*	*	317.6470588	305.8823529	100
Cobalt															*	*			
Copper									1000	1300	1300	1300	640		*	*	123.3288287	123.3288287	7.3
Iron									300		300		11200		*	*			300
Lead									15	*0	15	*0			*	*	13.31299809	11.30348894	11.30348894
Manganese									50		50				*	*			50
Mercury									2	2	2	2			*	*	0.00742766	0.005161594	0.005161594
Mercury (organic)															*	*			0
Molybdenum															*	*			0
Nickel											100		320		*	*			100
Selenium									50	50	50	50	80		*	*			50
Silver									100	100	100		80		*	*	1.532250723	1.532250723	1.532250723
Tin															*	*			
Thallium									2	0.5	2	0.5			*	*			0.5
Vanadium													1.12		*	*			1.12
Zinc									5000		5000		4800		*	*	76.25551053	32.56745762	32.56745762
															*	*			
LPAH															*	*			0
HPAH															*	*			0
Total Petroleum Hydrocarbons		*					*	*							*	*			
Gasoline	1000	*					*	*							*	*			1000
Gasoline (w/benzene)	800	*					*	*							*	*			800
Diesel	500	*					*	*							*	*			500
Heavy Oil	500	*					*	*							*	*			500
															*	*			
2,3,7,8-TCDD (Dioxin)									0.0000003	*0	0.0000003	*0		0.00000058	*	*			0.0000003
															*	*			
Aldrin													0.24	0.002573529	*	*			0.002573529
alpha-BHC														0.013888889	*	*			0.013888889
beta-BHC														0.048611111	*	*			0.048611111
gamma-BHC (Lindane)									0.0002	0.0002	0.0002		4.8		*	*			0.0002
Chlordane									0.002	*0	0.002		8	0.25	*	*			0.002
4,4'-DDT													8	0.257352941	*	*			0.257352941
4,4'-DDE														0.257352941	*	*			0.257352941
4,4'-DDD														0.364583333	*	*			0.364583333
Dieldrin													0.8	0.00546875	*	*			0.00546875
alpha-Endosulfan													96		*	*			96
beta-Endosulfan													96		*	*			96
Endosulfan Sulfate													96		*	*			96
Endrin									0.002	0.002	0.002		4.8		*	*			0.002
Endrin Aldehyde									0.002	0.002	0.002		4.8		*	*			0.002
Heptachlor									0.0004	*0	0.0004		8	0.019444444	*	*			0.0004
Heptachlor Epoxide									0.0002	*0	0.0002		0.104	0.004807692	*	*			0.0002
Toxaphene															*	*			
															*	*			

* Adapted from Ecology Spreadsheet Draft Preliminary Screening Levels & ARARs v14R1 in accordance with Ecology comments.

TABLE K-5
SOIL PRELIMINARY SCREENING LEVELS*
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

MEDIA - MTCA Standard	SOIL Method A				SOIL Method B		SOIL Method C		SOIL PATHWAY EVALUATION					
PATHWAYS HH - Human Health Ecol- Ecological	Soil, Method A, Unrestricted Land Use-HH, WAC 173-340-740(2)(b)(iii) *CLARC Database/* ***Table 740-1 (Arsenic, Lead, and TPH only)***	Soil, Method A, Unrestricted Land Use-Ecol, WAC 173-340-740(2)(b)(ii); ***Table 749-2 (Simplified TEE)***	Soil, Method A, Industrial Land Use-HH, WAC 173-340-745(3)(b)(i) *CLARC Database/* ***Table 745-1 (Arsenic, Lead, and TPH only)***	Soil, Method A, Industrial Land Use-Ecol, WAC 173-340-745(3)(b)(iii) ***Table 749-2 (Simplified TEE)***	Soil, Direct Contact Method B-HH, Carcinogen, WAC 173-340-740(3)(b)(iii)(B)(II) ***CLARC Database*** *EQ. 740-2*	Soil, Direct Contact Method B-HH, Non-carcinogen, WAC 173-340-740(3)(b)(iii)(B)(I) ***CLARC Database*** *EQ. 740-1*	Soil, Direct Contact Method C-HH, Carcinogen, WAC 173-340-745(5)(b)(iii)(B)(II) Ingestion Only ***CLARC Database*** *EQ. 745-2*	Soil, Direct Contact Method C-HH, Non-carcinogen, WAC 173-340-745(5)(b)(iii)(B)(I) Ingestion Only ***CLARC Database*** *EQ. 745-1*	Soil to Method B-HH Groundwater Protection - **NC**, WAC 173-340-740(3)(b)(iii)(A) *EQ. 747-1/ 747-2 CLARC Database Vadose Soil*	Soil to Method B-HH Groundwater Protection -**NC** , WAC 173-340-740(3)(b)(iii)(A) *EQ. 747-1/ 747-2 CLARC Database Saturated Soil*	Soil to Method B-HH Groundwater Protection - **Carc**, WAC 173-340-740(3)(b)(iii)(A) EQ. 747-1/ 747-2 CLARC Database Vadose Soil	Soil to Method B-HH Groundwater Protection - **Carc**, WAC 173-340-740(3)(b)(iii)(A) EQ. 747-1/ 747-2 CLARC Database Saturated Soil	Soil to Sediment Protection Ecology **CSL** WAC 173-340-740(1)(d) *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Sediment Protection Ecology **SQS** WAC 173-340-740(1)(d) *EQ. 747-1/ 747-2 Vadose Soil*
UNITS	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
acetone						**72000**		**3150000**	**29.10552946**	**2.0782632**				
acenaphthene (CAS 83-29-9)						**4800**		**210000**	**121.4086308**	**6.15328**			**1.17739349**	**0.330496418**
acenaphthylene (CAS 208-96-8)													**1.363247471**	**1.363247471**
anthracene						**24000**		**1050000**	**1977.618921**	**99.296**			**24.23556118**	**4.443186216**
benzene					**18.18**	**320**	**2386**		**0.246511469**	**0.014469333**	**0.006124269**	**0.000359473**		
benzo(g,h,i)perylene													**1.560116593**	**0.620046338**
benzo[a]anthracene					**1.4**		**180**				**0.102432**	**0.00512264**	**5.402532267**	**2.201031664**
benzo[a]pyrene		**30**		**300**	**0.14**		**18**				**0.18888**	**0.00944504**	**4.201067626**	**1.980503309**
benzo[b]fluoranthene					**14**		**180**				**0.192792001**	**0.00964064**	**9.002241624**	**4.601145719**
benzo[k]fluoranthene					**14**		**1800**				**0.18888**	**0.00944504**	**9.002287194**	**4.60116901**
bis(2-ethylhexyl) phthalate					**71**	**1600**	**9375**	**70000**			**20.70000012**	**1.035541667**	**1.561890919**	**0.9411394**
butyl benzyl phthalate					**526**	**16000**	**69100**	**700000**	**611.7762859**	**30.86613333**			**1.30735747**	**0.100094556**
carbon tetrachloride					**14.3**	**320**	**1880**	**14000**	**0.231236267**	**0.010729813**	**0.004516333**	**0.000209567**		
chlorobenzene						**1600**		**70000**	**1.532878799**	**0.088746667**				
chloroethane (ethyl chloride)														
chloroform (trichloromethane)						**800**								
chloromethane (methyl chloride)														
chrysene					**140**		**18000**				**0.056712004**	**0.00283664**	**9.207797444**	**2.201864606**
dibenz[a,h]anthracene					**0.14**		**17.98**				**0.629328**	**0.03146744**	**0.660050382**	**0.240018321**
dibenzofuran						**80**		**3500**	**3.67704162**	**0.185226667**			**1.180620386**	**0.305332858**
di-butyl phthalate (di-n-butyl phth.)		**200**				**8000**		**350000**	**53.12020532**	**2.794666667**			**38.65770658**	**5.002762027**
dichlorobenzene, 1,2-						**7200**		**315000**	**9.358649269**	**0.525432**			**0.067582619**	**0.067582619**
dichlorobenzene, 1,3-														
dichlorobenzene, 1,4-													**0.267034562**	**0.091978571**
dichloroethane, 1,1-						**16000**		**700000**	**4.079396996**	**0.257365333**				
dichloroethane, 1,2-					**11**	**1600**	**1442**		**0.793513525**	**0.052873067**	**0.002380541**	**0.000158619**		
dichloroethylene, 1,1-						**4000**		**180000**	**0.471688949**	**0.02316288**				
diethyl phthalate								**2800000**					**5.692106968**	**3.156532046**
dimethyl phthalate													**1.631429797**	**1.631429797**
di-n-octyl phthalate													**90.09184156**	**1.161183736**
ethylbenzene						**8000**		**350000**	**11.93174041**	**0.643573333**				
fluoranthene						**3200**		**140000**	**909.440402**	**45.52746667**			**24.06771324**	**3.209028432**
fluorene						**3200**		**140000**	**147.076365**	**7.409066667**			**1.608019552**	**0.468157591**
hexachlorobenzene		**31**		**31**			**82**						**0.048816479**	**0.008065331**
hexachlorobutadiene						**80**		**3500**	**0.775158765**	**0.010241333**			**0.15420161**	**0.096997787**
indeno[1,2,3-cd]pyrene					**1.4**		**180**				**0.642288**	**0.03211544**	**1.760131344**	**0.680050747**

TABLE K-5
SOIL PRELIMINARY SCREENING LEVELS*
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

MEDIA - MTCA Standard		SOIL PATHWAY EVALUATION												
PATHWAYS HH - Human Health Ecol- Ecological	Soil to Sediment Protection Ecology **CSL** WAC 173-340-740(1)(d) *EQ. 747-1/ 747-2 Saturated Soil*	Soil to Sediment Protection Ecology **SQS** WAC 173-340-740(1)(d) *EQ. 747-1/ 747-2 Saturated Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Fresh - Acute** *Vadose Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Fresh - Acute** *Saturated Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Fresh - Chronic** *Vadose Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Fresh - Chronic** *Saturated Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Marine - Acute** *Vadose Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Marine - Acute** *Saturated Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Marine - Chronic** *Vadose Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Marine - Chronic** *Saturated Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Saltwater Acute** *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Saltwater Acute** *EQ. 747-1/ 747-2 Saturated Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Saltwater Chronic** *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Saltwater Chronic** *EQ. 747-1/ 747-2 Saturated Soil*
UNITS	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
acetone														
acenaphthene (CAS 83-29-9)	**0.059669935**	**0.016749455**												
acenaphthylene (CAS 208-96-8)	**0.069091503**	**0.069091503**												
anthracene	**1.216862745**	**0.223091503**												
benzene									**6.23**					
benzo(g,h,i)perylene	**0.078008356**	**0.031003321**												
benzo[a]anthracene	**0.270181435**	**0.110073918**												
benzo[a]pyrene	**0.210076512**	**0.09903607**												
benzo[b]fluoranthene	**0.450160648**	**0.230082109**												
benzo[k]fluoranthene	**0.450163914**	**0.230083778**												
bis(2-ethylhexyl) phthalate	**0.078135515**	**0.047081657**												
butyl benzyl phthalate	**0.065960114**	**0.005050071**												
carbon tetrachloride														
chlorobenzene														
chloroethane (ethyl chloride)														
chloroform (trichloromethane)														
chloromethane (methyl chloride)														
chrysene	**0.460558757**	**0.110133616**							**5.72**					
dibenz[a,h]anthracene	**0.033003611**	**0.012001313**												
dibenzofuran	**0.059471386**	**0.015380531**												
di-butyl phthalate (di-n-butyl phth.)	**2.033789954**	**0.263196347**												
dichlorobenzene, 1,2-	**0.003788337**	**0.003788337**												
dichlorobenzene, 1,3-														
dichlorobenzene, 1,4-	**0.0149447**	**0.005147619**												
dichloroethane, 1,1-														
dichloroethane, 1,2-														
dichloroethylene, 1,1-														
diethyl phthalate	**0.36026455**	**0.199783069**												
dimethyl phthalate	**0.093952381**	**0.093952381**												
di-n-octyl phthalate	**4.506581633**	**0.05808483**												
ethylbenzene														
fluoranthene	**1.204851904**	**0.160646921**												
fluorene	**0.08100413**	**0.023583481**												
hexachlorobenzene	**0.002495069**	**0.000412229**												
hexachlorobutadiene	**0.007988062**	**0.005024748**												
indeno[1,2,3-cd]pyrene	**0.088009413**	**0.034003637**												

TABLE K-5
SOIL PRELIMINARY SCREENING LEVELS*
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

MEDIA - MTCA Standard						SOIL PATHWAY EVALUATION							
PATHWAYS HH - Human Health Ecol- Ecological	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Freshwater Acute** *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Freshwater Acute** *EQ. 747-1/ 747-2 Saturated Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Freshwater Chronic** *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Freshwater Chronic** *EQ. 747-1/ 747-2 Saturated Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC HH-Consumption Organisms** *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC HH-Consumption Organisms** *EQ. 747-1/ 747-2 Saturated Soil*	Soil to Surface Water Protection Aquatic Life Fresh/Acute, **NTR** - 40 CFR 131.36 *Vadose Soil*	Soil to Surface Water Protection Aquatic Life Fresh/Acute, **NTR** - 40 CFR 131.36 *Saturated Soil*	Soil to Surface Water Protection Aquatic Life Fresh/Chronic, **NTR** - 40 CFR 131.36 Vadose Soil	Soil to Surface Water Protection Aquatic Life Fresh/Chronic, **NTR** - 40 CFR 131.36 Saturated Soil	Soil to Surface Water Protection Aquatic Life Marine/Acute, **NTR** - 40 CFR 131.36 *Vadose Soil*	Soil to Surface Water Protection Aquatic Life Marine/Acute, **NTR** - 40 CFR 131.36 *Saturated Soil*	Soil to Surface Water Protection Aquatic Life Marine/Chronic, **NTR** - 40 CFR 131.36 *Vadose Soil*
UNITS	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
acetone													
acenaphthene (CAS 83-29-9)					**125.2026505**	**6.34557**							
acenaphthylene (CAS 208-96-8)													
anthracene					**16480.15768**	**827.4666667**							
benzene					**0.392877653**	**0.0230605**							
benzo(g,h,i)perylene													
benzo[a]anthracene					**0.153648001**	**0.00768396**							
benzo[a]pyrene					**0.283320001**	**0.01416756**							
benzo[b]fluoranthene					**0.289188001**	**0.01446096**							
benzo[k]fluoranthene					**0.283320001**	**0.01416756**							
bis(2-ethylhexyl) phthalate					**7.286400042**	**0.364510667**							
butyl benzyl phthalate					**363.2421697**	**18.32676667**							
carbon tetrachloride					**0.011561813**	**0.000536491**							
chlorobenzene					**15.32878799**	**0.887466667**							
chloroethane (ethyl chloride)													
chloroform (trichloromethane)					**2.331667802**	**0.151202133**							
chloromethane (methyl chloride)													
chrysene					**0.085068007**	**0.00425496**							
dibenz[a,h]anthracene					**0.943992**	**0.04720116**							
dibenzofuran													
di-butyl phthalate (di-n-butyl phth.)					**149.4005775**	**7.86**							
dichlorobenzene, 1,2-					**16.89756118**	**0.948696667**							
dichlorobenzene, 1,3-					**3.84**	**0.2752**							
dichlorobenzene, 1,4-					**2.441804**	**0.136926667**							
dichloroethane, 1,1-													
dichloroethane, 1,2-					**0.183500003**	**0.012226897**							
dichloroethylene, 1,1-					**46.5137714**	**2.284117333**							
diethyl phthalate					**287.0579067**	**18.16613333**							
dimethyl phthalate					**4400**	**315.3333333**							
di-n-octyl phthalate													
ethylbenzene					**31.32081859**	**1.68938**							
fluoranthene					**198.9400879**	**9.959133333**							
fluorene					**1217.976148**	**61.35633333**							
hexachlorobenzene					**2.07992E-05**	**1.06333E-06**							
hexachlorobutadiene					**1.744107221**	**0.023043**							
indeno[1,2,3-cd]pyrene					**0.963432**	**0.04817316**							

TABLE K-5
SOIL PRELIMINARY SCREENING LEVELS*
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

MEDIA - MTCA Standard		SOIL PATHWAY EVALUATION			SOIL POTENTIAL ARAR's			SOIL MOST STRINGENT
PATHWAYS HH - Human Health Ecol- Ecological	Soil to Surface Water Protection Aquatic Life Marine/Chronic, **NTR** - 40 CFR 131.36 *Saturated Soil*	Soil to Surface Water Protection HH - Fresh Water **Organism Consumption Only** **NTR** - 40 CFR 131.36 (WAC 173-201A-040[5]) HH - 10^{-6} Carc Risk *Vadose Soil*	Soil to Surface Water Protection HH - Fresh Water **Organism Consumption Only** **NTR** - 40 CFR 131.36 (WAC 173-201A-040[5]) HH - 10^{-6} Carc Risk *Saturated Soil*	Soil Protective of Vapor, Direct Contact, WAC 173-340-740(3)(b)(iii)C	Soil Protection of Surface Water HH – **Organoleptic Effects** CWA §304 **NRWQC** *Vadose Soil*	Soil Protection of Surface Water HH – **Organoleptic Effects** CWA §304 **NRWQC** *Saturated Soil*	Soil - Toxics Substances Control Act **(TSCA)** 40 CFR 761.61	Screening Level (Includes to Protect Potable GW)
UNITS	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
acetone								**2.0782632**
acenaphthene (CAS 83-29-9)					**2.529346475**	**0.128193333**		**0.016749455**
acenaphthylene (CAS 208-96-8)								**0.069091503**
anthracene		**45320.43361**	**2275.533333**					**0.223091503**
benzene		**0.546947321**	**0.032103833**					**0.000359473**
benzo(g,h,i)perylene								**0.031003321**
benzo[a]anthracene		**0.264616001**	**0.013233487**					**0.00512264**
benzo[a]pyrene		**0.487940001**	**0.024399687**					**0.00944504**
benzo[b]fluoranthene		**0.498046001**	**0.024904987**					**0.00964064**
benzo[k]fluoranthene		**0.487940001**	**0.024399687**					**0.00944504**
bis(2-ethylhexyl) phthalate		**19.54080011**	**0.977551333**					**0.047081657**
butyl benzyl phthalate								**0.005050071**
carbon tetrachloride		**0.031794987**	**0.001475349**					**0.000209567**
chlorobenzene		**201.1903424**	**11.648**		**0.19160985**	**0.011093333**		**0.011093333**
chloroethane (ethyl chloride)		**0.178900071**	**0.010553827**					**0.010553827**
chloroform (trichloromethane)		**2.331667802**	**0.151202133**					**0.151202133**
chloromethane (methyl chloride)								**0**
chrysene		**0.146506011**	**0.007327987**					**0.00283664**
dibenz[a,h]anthracene		**1.625764**	**0.081290887**					**0.012001313**
dibenzofuran								**0.015380531**
di-butyl phthalate (di-n-butyl phth.)		**398.4015399**	**20.96**					**0.263196347**
dichlorobenzene, 1,2-		**220.9681077**	**12.40603333**					**0.003788337**
dichlorobenzene, 1,3-		**10.4**	**0.745333333**					**0.2752**
dichlorobenzene, 1,4-		**33.41416**	**1.873733333**					**0.005147619**
dichloroethane, 1,1-								**0.257365333**
dichloroethane, 1,2-		**0.490986494**	**0.03271521**					**0.000158619**
dichloroethylene, 1,1-		**0.020963953**	**0.001029461**					**0.001029461**
diethyl phthalate		**782.8852**	**49.544**					**0.199783069**
dimethyl phthalate		**11600**	**831.3333333**					**0.093952381**
di-n-octyl phthalate								**0.05808483**
ethylbenzene		**432.52559**	**23.32953333**					**0.643573333**
fluoranthene		**525.7702324**	**26.32056667**					**0.160646921**
fluorene		**3217.295485**	**162.0733333**					**0.023583481**
hexachlorobenzene		**5.52254E-05**	**2.82333E-06**					**1.06333E-06**
hexachlorobutadiene		**4.844742281**	**0.064008333**					**0.005024748**
indeno[1,2,3-cd]pyrene		**1.659244001**	**0.082964887**					**0.03211544**

TABLE K-5
SOIL PRELIMINARY SCREENING LEVELS*
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

MEDIA - MTCA Standard	SOIL Method A				SOIL Method B		SOIL Method C		SOIL PATHWAY EVALUATION					
PATHWAYS HH - Human Health Ecol- Ecological	Soil, Method A, Unrestricted Land Use-HH, WAC 173-340-740(2)(b)(iii) *CLARC Database/* ***Table 740-1 (Arsenic, Lead, and TPH only)***	Soil, Method A, Unrestricted Land Use-Ecol, WAC 173-340-740(2)(b)(ii); ***Table 749-2 (Simplified TEE)***	Soil, Method A, Industrial Land Use-HH, WAC 173-340-745(3)(b)(i) *CLARC Database/* ***Table 745-1 (Arsenic, Lead, and TPH only)***	Soil, Method A, Industrial Land Use-Ecol, WAC 173-340-745(3)(b)(iii) ***Table 749-2 (Simplified TEE)***	Soil, Direct Contact Method B-HH, Carcinogen, WAC 173-340-740(3)(b)(iii)(B)(II) ***CLARC Database*** *EQ. 740-2*	Soil, Direct Contact Method B-HH, Non-carcinogen, WAC 173-340-740(3)(b)(iii)(B)(I) ***CLARC Database*** *EQ. 740-1*	Soil, Direct Contact Method C-HH, Carcinogen, WAC 173-340-745(5)(b)(iii)(B)(II) Ingestion Only ***CLARC Database*** *EQ. 745-2*	Soil, Direct Contact Method C-HH, Non-carcinogen, WAC 173-340-745(5)(b)(iii)(B)(I) Ingestion Only ***CLARC Database*** *EQ. 745-1*	Soil to Method B-HH Groundwater Protection - **NC**, WAC 173-340-740(3)(b)(iii)(A) *EQ. 747-1/ 747-2 CLARC Database Vadose Soil*	Soil to Method B-HH Groundwater Protection -**NC** , WAC 173-340-740(3)(b)(iii)(A) *EQ. 747-1/ 747-2 CLARC Database Saturated Soil*	Soil to Method B-HH Groundwater Protection - **Carc**, WAC 173-340-740(3)(b)(iii)(A) EQ. 747-1/ 747-2 CLARC Database Vadose Soil	Soil to Method B-HH Groundwater Protection - **Carc**, WAC 173-340-740(3)(b)(iii)(A) EQ. 747-1/ 747-2 CLARC Database Saturated Soil	Soil to Sediment Protection Ecology **CSL** WAC 173-340-740(1)(d) *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Sediment Protection Ecology **SQS** WAC 173-340-740(1)(d) *EQ. 747-1/ 747-2 Vadose Soil*
UNITS	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
MEK (Methyl Ethyl Ketone;2-Butanone)						48000		2100000	19.2	1.376				
methylene chloride (dichloromethane)					130	4800	18000				0.028229158	0.001809671		
methylnaphthalene, 2-						320							1.403786411	0.833498182
MIBK (M-Isobutyl-K;4-M,2-Pentanone)						6400		280000	2.56	0.183466667				
naphthalene						1600		70000	6.523391213	0.339786667			3.772891304	2.197154348
nitrosodiphenylamine, N-							26786						0.227829375	0.227829375
pcb mixtures		2		2	0.5		65.63				0.039618668	0.001984693	1.305844196	0.241078929
pcb - Aroclor 1016						5.6		250	0.611759881	0.030684267			1.309661255	0.241783616
pcb - Aroclor 1221														
pcb - Aroclor 1232														
pcb - Aroclor 1242														
pcb - Aroclor 1248													1.305964009	0.241101048
pcb - Aroclor 1254						1.6		70	0.485382421	0.024296533			1.303463228	0.240639365
pcb - Aroclor 1260													1.301264831	0.240233507
phenanthrene													9.692387538	2.019247404
pyrene						2400		105000	668.256405	33.4544			28.08071129	20.05765092
tetrachloroethylene (perchloroethylene)						800		35000	0.848554667	0.044133333				
trichlorobenzene, 1,2,4-					34.5	800	4530	35000			0.008172744	0.000535094	0.046319164	0.020843624
trichlorethane, 1,1,1-						72000			44.58415697	2.414208				
trichlorethane, 1,1,2-					18	320	2302				0.004156738	0.000272154		
trichloroethylene					11		1050		0.01586752	0.0009136	0.003239619	0.000186527		
trimethylbenzene, 1,3,5-						800		35000	1.494541973	0.079173333				
toluene						6400			15.56360186	0.887466667				
vinyl chloride (chloroethylene)					0.67	240	87.5		0.151296	0.007336	0.000182816	8.86433E-06		
xylene (dimethylbenzene)						16000		700000	20.94786912	1.167626667				
benzoic acid						320000							9.621710689	9.621710689
benzyl alcohol						8000		350000	3.450579114	0.241861333			1.005317197	0.784973702
dimethylphenol, 2,4-								70000					0.037082633	0.037082633
methylphenol, 2- (o-cresol)						4000							0.091443043	0.091443043
methylphenol, 4- (p-cresol)						400							0.978761233	0.978761233
pentachlorophenol		11		11	2.5	400	328	17500	5.728000139	0.293333333	0.0156804	0.000803	0.73082842	0.381301784
phenol (total)						24000		1050000	10.47014422	0.73144			2.095527666	0.733434683
styrene (phenylethylene)						16000			23.2815508	1.287146667				
Tributyltin (oxide)						24		1050						
Trichlorophenol, 2,4,6-					91	80		3500	0.221761475	0.011781333	0.110880737	0.005890667		

TABLE K-5
SOIL PRELIMINARY SCREENING LEVELS*
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

MEDIA - MTCA Standard		SOIL PATHWAY EVALUATION												
PATHWAYS HH - Human Health Ecol- Ecological	Soil to Sediment Protection Ecology **CSL** WAC 173-340-740(1)(d) *EQ. 747-1/ 747-2 Saturated Soil*	Soil to Sediment Protection Ecology **SQS** WAC 173-340-740(1)(d) *EQ. 747-1/ 747-2 Saturated Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Fresh - Acute** *Vadose Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Fresh - Acute** *Saturated Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Fresh - Chronic** *Vadose Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Fresh - Chronic** *Saturated Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Marine - Acute** *Vadose Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Marine - Acute** *Saturated Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Marine - Chronic** *Vadose Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Marine - Chronic** *Saturated Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Saltwater Acute** *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Saltwater Acute** *EQ. 747-1/ 747-2 Saturated Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Saltwater Chronic** *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Saltwater Chronic** *EQ. 747-1/ 747-2 Saturated Soil*
UNITS	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
MEK (Methyl Ethyl Ketone;2-Butanone)														
methylene chloride (dichloromethane)														
methylnaphthalene, 2-	**0.072778309**	**0.043212121**												
MIBK (M-Isobutyl-K;4-M,2-Pentanone)														
naphthalene	**0.196485507**	**0.114423913**												
nitrosodiphenylamine, N-	**0.011561091**	**0.011561091**												
pcb mixtures	**0.065415923**	**0.012076786**	**1.800848533**	**0.090213333**	**0.01260594**	**0.000631493**	**9.004242667**	**0.451066667**	**0.027012728**	**0.0013532**			**0.027012728**	**0.0013532**
pcb - Aroclor 1016	**0.065687577**	**0.012126937**												
pcb - Aroclor 1221														
pcb - Aroclor 1232														
pcb - Aroclor 1242														
pcb - Aroclor 1248	**0.06542445**	**0.01207836**												
pcb - Aroclor 1254	**0.065246473**	**0.012045503**												
pcb - Aroclor 1260	**0.065090016**	**0.012016618**												
phenanthrene	**0.486615385**	**0.101378205**												
pyrene	**1.405782901**	**1.004130644**												
tetrachloroethylene (perchloroethylene)														
trichlorobenzene, 1,2,4-	**0.002518663**	**0.001133398**												
trichlorethane, 1,1,1-														
trichlorethane, 1,1,2-														
trichloroethylene														
trimethylbenzene, 1,3,5-														
toluene														
vinyl chloride (chloroethylene)														
xylene (dimethylbenzene)														
benzoic acid	**0.675472165**	**0.675472165**												
benzyl alcohol	**0.070465666**	**0.055021137**												
dimethylphenol, 2,4-	**0.002029246**	**0.002029246**												
methylphenol, 2- (o-cresol)	**0.005188375**	**0.005188375**												
methylphenol, 4- (p-cresol)	**0.055627496**	**0.055627496**												
pentachlorophenol	**0.037426036**	**0.019526627**					**0.930800023**	**0.047666667**	**0.565640014**	**0.028966667**	**0.930800023**	**0.047666667**	**0.565640014**	**0.028966667**
phenol (total)	**0.124179104**	**0.043462687**												
styrene (phenylethylene)														
Tributyltin (oxide)											**0.00168**	**0.0001204**	**0.0000296**	**2.12133E-06**
Trichlorophenol, 2,4,6-														

TABLE K-5
SOIL PRELIMINARY SCREENING LEVELS*
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

MEDIA - MTCA Standard		SOIL PATHWAY EVALUATION											
PATHWAYS HH - Human Health Ecol- Ecological	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Freshwater Acute** *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Freshwater Acute** *EQ. 747-1/ 747-2 Saturated Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Freshwater Chronic** *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Freshwater Chronic** *EQ. 747-1/ 747-2 Saturated Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC HH-Consumption Organisms** *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC HH-Consumption Organisms** *EQ. 747-1/ 747-2 Saturated Soil*	Soil to Surface Water Protection Aquatic Life Fresh/Acute, **NTR** - 40 CFR 131.36 *Vadose Soil*	Soil to Surface Water Protection Aquatic Life Fresh/Acute, **NTR** - 40 CFR 131.36 *Saturated Soil*	Soil to Surface Water Protection Aquatic Life Fresh/Chronic, **NTR** - 40 CFR 131.36 Vadose Soil	Soil to Surface Water Protection Aquatic Life Fresh/Chronic, **NTR** - 40 CFR 131.36 Saturated Soil	Soil to Surface Water Protection Aquatic Life Marine/Acute, **NTR** - 40 CFR 131.36 *Vadose Soil*	Soil to Surface Water Protection Aquatic Life Marine/Acute, **NTR** - 40 CFR 131.36 *Saturated Soil*	Soil to Surface Water Protection Aquatic Life Marine/Chronic, **NTR** - 40 CFR 131.36 *Vadose Soil*
UNITS	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
MEK (Methyl Ethyl Ketone;2-Butanone)													
methylene chloride (dichloromethane)					**2.856810188**	**0.183139933**							
methylnaphthalene, 2-													
MIBK (M-Isobutyl-K;4-M,2-Pentanone)													
naphthalene													
nitrosodiphenylamine, N-					**0.76248051**	**0.038644**							
pcb mixtures			**0.01260594**	**0.000631493**	**5.76272E-05**	**2.88683E-06**							
pcb - Aroclor 1016									**0.007646999**	**0.000383553**			**0.016386425**
pcb - Aroclor 1221									**0.002949131**	**0.000148633**			**0.006319565**
pcb - Aroclor 1232									**0.002949131**	**0.000148633**			**0.006319565**
pcb - Aroclor 1242									**0.000181685**	**1.02881E-05**			**0.000389324**
pcb - Aroclor 1248									**0.012348437**	**0.000618613**			**0.026460936**
pcb - Aroclor 1254									**0.021235481**	**0.001062973**			**0.045504602**
pcb - Aroclor 1260									**0.058016334**	**0.002902013**			**0.124320715**
phenanthrene													
pyrene					**5568.803375**	**278.7866667**							
tetrachloroethylene (perchloroethylene)					**0.024389947**	**0.00129844**							
trichlorobenzene, 1,2,4-					**0.378868933**	**0.024805667**							
trichlorethane, 1,1,1-													
trichlorethane, 1,1,2-					**0.086598718**	**0.005669867**							
trichloroethylene					**0.181570332**	**0.010631**							
trimethylbenzene, 1,3,5-													
toluene					**145.9087675**	**8.32**							
vinyl chloride (chloroethylene)					**0.015469828**	**0.000744976**							
xylene (dimethylbenzene)													
benzoic acid													
benzyl alcohol													
dimethylphenol, 2,4-					**15.57205746**	**0.852266667**							
methylphenol, 2- (o-cresol)													
methylphenol, 4- (p-cresol)													
pentachlorophenol	**1.360400033**	**0.069666667**	**1.074000026**	**0.055**	**0.214800005**	**0.011**	**1.432000035**	**0.073333333**	**0.930800023**	**0.047666667**	**0.930800023**	**0.047666667**	**0.565640014**
phenol (total)					**3751.80168**	**262.0993333**							
styrene (phenylethylene)													
Tributyltin (oxide)	**0.00184**	**0.000131867**	**0.000288**	**0.00002064**									
Trichlorophenol, 2,4,6-					**0.066528442**	**0.0035344**							

TABLE K-5
SOIL PRELIMINARY SCREENING LEVELS*
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

MEDIA - MTCA Standard		SOIL PATHWAY EVALUATION			SOIL POTENTIAL ARAR's			SOIL MOST STRINGENT
PATHWAYS HH - Human Health Ecol- Ecological	Soil to Surface Water Protection Aquatic Life Marine/Chronic, **NTR** - 40 CFR 131.36 *Saturated Soil*	Soil to Surface Water Protection HH - Fresh Water **Organism Consumption Only NTR** - 40 CFR 131.36 (WAC 173-201A-040[5]) HH - 10^{-6} Carc Risk *Vadose Soil*	Soil to Surface Water Protection HH - Fresh Water **Organism Consumption Only NTR** - 40 CFR 131.36 (WAC 173-201A-040[5]) HH - 10^{-6} Carc Risk *Saturated Soil*	Soil Protective of Vapor, Direct Contact, WAC 173-340-740(3)(b)(iii)C	Soil Protection of Surface Water HH – **Organoleptic Effects** CWA §304 **NRWQC** *Vadose Soil*	Soil Protection of Surface Water HH – **Organoleptic Effects** CWA §304 **NRWQC** *Saturated Soil*	Soil - Toxics Substances Control Act **(TSCA)** 40 CFR 761.61	Screening Level (Includes to Protect Potable GW)
UNITS	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
MEK (Methyl Ethyl Ketone;2-Butanone)								**1.376**
methylene chloride (dichloromethane)		**7.747281865**	**0.496650667**					**0.001809671**
methylnaphthalene, 2-								**0.043212121**
MIBK (M-Isobutyl-K;4-M,2-Pentanone)								**0.183466667**
naphthalene								**0.114423913**
nitrosodiphenylamine, N-		**2.033281359**	**0.103050667**					**0.011561091**
pcb mixtures		**0.000153072**	**7.66813E-06**				**1**	**2.88683E-06**
pcb - Aroclor 1016	**0.0008219**							**0.000383553**
pcb - Aroclor 1221	**0.0003185**							**0.000148633**
pcb - Aroclor 1232	**0.0003185**							**0.000148633**
pcb - Aroclor 1242	**0.000022046**							**1.02881E-05**
pcb - Aroclor 1248	**0.0013256**							**0.000618613**
pcb - Aroclor 1254	**0.0022778**							**0.001062973**
pcb - Aroclor 1260	**0.0062186**							**0.002902013**
phenanthrene								**0.101378205**
pyrene		**15314.20928**	**766.6633333**					**1.004130644**
tetrachloroethylene (perchloroethylene)		**0.065409403**	**0.00348218**					**0.00129844**
trichlorobenzene, 1,2,4-								**0.000535094**
trichlorethane, 1,1,1-								**2.414208**
trichlorethane, 1,1,2-		**0.227321635**	**0.0148834**					**0.000272154**
trichloroethylene		**0.490239896**	**0.0287037**					**0.000186527**
trimethylbenzene, 1,3,5-								**0.079173333**
toluene		**1945.450233**	**110.9333333**					**0.887466667**
vinyl chloride (chloroethylene)		**3.384024973**	**0.1629635**					**8.86433E-06**
xylene (dimethylbenzene)								**1.167626667**
benzoic acid								**0.675472165**
benzyl alcohol								**0.055021137**
dimethylphenol, 2,4-					**7.32802704**	**0.401066667**		**0.002029246**
methylphenol, 2- (o-cresol)								**0.005188375**
methylphenol, 4- (p-cresol)								**0.055627496**
pentachlorophenol	**0.028966667**	**0.587120014**	**0.030066667**		**2.148000052**	**0.11**		**0.000803**
phenol (total)		**20067.77643**	**1401.926667**		**1.308768028**	**0.09143**		**0.043462687**
styrene (phenylethylene)								**1.287146667**
Tributyltin (oxide)								**2.12133E-06**
Trichlorophenol, 2,4,6-		**0.180181198**	**0.009572333**		**0.055440369**	**0.002945333**		**0.002945333**

TABLE K-5
SOIL PRELIMINARY SCREENING LEVELS*
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

MEDIA - MTCA Standard	**SOIL Method A**				**SOIL Method B**		**SOIL Method C**		**SOIL PATHWAY EVALUATION**					
PATHWAYS HH - Human Health Ecol- Ecological	Soil, Method A, Unrestricted Land Use-HH, WAC 173-340-740(2)(b)(iii) *CLARC Database/* ***Table 740-1 (Arsenic, Lead, and TPH only)***	Soil, Method A, Unrestricted Land Use-Ecol, WAC 173-340-740(2)(b)(ii); ***Table 749-2 (Simplified TEE)***	Soil, Method A, Industrial Land Use-HH, WAC 173-340-745(3)(b)(i) *CLARC Database/* ***Table 745-1 (Arsenic, Lead, and TPH only)***	Soil, Method A, Industrial Land Use-Ecol, WAC 173-340-745(3)(b)(iii) ***Table 749-2 (Simplified TEE)***	Soil, Direct Contact Method B-HH, Carcinogen, WAC 173-340-740(3)(b)(iii)(B)(II) ***CLARC Database*** *EQ. 740-2*	Soil, Direct Contact Method B-HH, Non-carcinogen, WAC 173-340-740(3)(b)(iii)(B)(I) ***CLARC Database*** *EQ. 740-1*	Soil, Direct Contact Method C-HH, Carcinogen, WAC 173-340-745(5)(b)(iii)(B)(II) Ingestion Only ***CLARC Database*** *EQ. 745-2*	Soil, Direct Contact Method C-HH, Non-carcinogen, WAC 173-340-745(5)(b)(iii)(B)(I) Ingestion Only ***CLARC Database*** *EQ. 745-1*	Soil to Method B-HH Groundwater Protection - **NC**, WAC 173-340-740(3)(b)(iii)(A) *EQ. 747-1/ 747-2 CLARC Database Vadose Soil*	Soil to Method B-HH Groundwater Protection -**NC** , WAC 173-340-740(3)(b)(iii)(A) *EQ. 747-1/ 747-2 CLARC Database Saturated Soil*	Soil to Method B-HH Groundwater Protection - **Carc**, WAC 173-340-740(3)(b)(iii)(A) EQ. 747-1/ 747-2 CLARC Database Vadose Soil	Soil to Method B-HH Groundwater Protection - **Carc**, WAC 173-340-740(3)(b)(iii)(A) EQ. 747-1/ 747-2 CLARC Database Saturated Soil	Soil to Sediment Protection Ecology **CSL** WAC 173-340-740(1)(d) *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Sediment Protection Ecology **SQS** WAC 173-340-740(1)(d) *EQ. 747-1/ 747-2 Vadose Soil*
UNITS	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Aluminum						**80000**		**3500000**	**64**	**4.586666667**				
Antimony														
Arsenic (III)		**20**		**20**										
Arsenic (V)		**95**		**260**										
Arsenic (total)	**20**	**20**	**20**	**20**	**0.67**	**24**	**87.5**	**1050**	**2.8032**	**0.140576**	**0.0340472**	**0.001707413**		
Barium		**1250**		**1320**		**16000**		**700000**	**461.44**	**23.12053333**				
Beryllium		**25**				**160**	**700**	**7000**	**505.728**	**25.28917333**				
Cadmium		**25**		**36**					**2.208**	**0.111786667**			**33.67271**	**25.63146582**
Chromium (VI)						**240**		**10500**	**18.432**	**0.92576**				
Chromium, total (or III)		**42**		**135**		**120000**		**5250000**					**5401.270588**	**5201.223529**
Cobalt														
Copper		**100**		**550**		**3200**		**140000**	**284.16**	**14.26346667**			**780.4933153**	**780.4933153**
Iron						**56000**		**2450000**	**44.8**	**3.210666667**				
Lead	**250**	**220**	**1000**	**220**									**1334.514188**	**1133.078085**
Manganese				**23500**										
Mercury		**9**		**9**									**0.591436697**	**0.410998383**
Mercury (organic)		**0.7**		**0.7**										
Molybdenum				**71**										
Nickel		**100**		**1850**		**1600**		**70000**	**417.28**	**20.89173333**				
Selenium		**0.8**		**0.8**		**400**		**17500**	**8.32**	**0.422933333**				
Silver						**400**		**17500**	**13.6**	**0.686933333**			**12.206129**	**12.206129**
Tin		**275**												
Thallium														
Vanadium		**26**				**5.6**		**245**	**22.40448**	**1.120321067**				
Zinc		**270**		**570**		**24000**		**1000000**	**5971.2**	**298.976**			**764.6707895**	**326.5781497**
LPAH														
HPAH														
Total Petroleum Hydrocarbons														
Gasoline	**100**	**200**	**100**	**12000**										
Gasoline (w/benzene)	**30**		**30**											
Diesel	**2000**	**460**	**2000**	**15000**										
Heavy Oil	**2000**		**2000**											
2,3,7,8-TCDD (Dioxin)		**0.000005**				**0.000011**	**0.0015**				**1.6994E-06**	**8.50203E-08**		
Aldrin					**0.058823529**	**2.4**	**7.720588235**	**105**	**0.2346509**	**0.0117532**	**0.00251617**	**0.00012603**		

TABLE K-5
SOIL PRELIMINARY SCREENING LEVELS*
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

MEDIA - MTCA Standard		SOIL PATHWAY EVALUATION												
PATHWAYS HH - Human Health Ecol- Ecological	Soil to Sediment Protection Ecology **CSL** WAC 173-340-740(1)(d) *EQ. 747-1/ 747-2 Saturated Soil*	Soil to Sediment Protection Ecology **SQS** WAC 173-340-740(1)(d) *EQ. 747-1/ 747-2 Saturated Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Fresh - Acute** *Vadose Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Fresh - Acute** *Saturated Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Fresh - Chronic** *Vadose Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Fresh - Chronic** *Saturated Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Marine - Acute** *Vadose Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Marine - Acute** *Saturated Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Marine - Chronic** *Vadose Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Marine - Chronic** *Saturated Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Saltwater Acute** *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Saltwater Acute** *EQ. 747-1/ 747-2 Saturated Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Saltwater Chronic** *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Saltwater Chronic** *EQ. 747-1/ 747-2 Saturated Soil*
UNITS	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Aluminum														
Antimony														
Arsenic (III)														
Arsenic (V)														
Arsenic (total)			210.24	10.5432	110.96	5.564466667	40.296	2.02078	21.024	1.05432	40.296	2.02078	21.024	1.05432
Barium														
Beryllium														
Cadmium	1.683926523	1.281794816					5.796	0.29344	1.2834	0.064976	5.52	0.279466667	1.2144	0.061482667
Chromium (VI)			5.76	0.2893	3.84	0.192866667	422.4	21.21533333	19.2	0.964333333	422.4	21.21533333	19.2	0.964333333
Chromium, total (or III)	270.0910588	260.0876863												
Cobalt														
Copper	39.03535426	39.03535426			5.0616	0.254068	2.1312	0.106976	1.3764	0.069088667	2.1312	0.106976	1.3764	0.069088667
Iron														
Lead	66.72686322	56.65488386			500.01	25.00071667	42000.84	2100.0602	1620.0324	81.002322	42000.84	2100.0602	1620.0324	81.002322
Manganese														
Mercury	0.029572176	0.020550156	2.1924	0.109802	0.012528	0.00062744	1.8792	0.094116	0.0261	0.001307167	1.8792	0.094116	0.98136	0.049149467
Mercury (organic)														
Molybdenum														
Nickel							96.496	4.831213333	10.6928	0.535350667	96.496	4.831213333	10.6928	0.535350667
Selenium			2.08	0.105733333	0.52	0.026433333	30.16	1.533133333	7.384	0.375353333	30.16	1.533133333	7.384	0.375353333
Silver	0.610439245	0.610439245					0.323	0.016314667			0.323	0.016314667		
Tin														
Thallium														
Vanadium														
Zinc	38.24014829	16.33173			129.376	6.477813333	111.96	5.6058	100.764	5.04522	111.96	5.6058	100.764	5.04522
LPAH														
HPAH														
Total Petroleum Hydrocarbons														
Gasoline														
Gasoline (w/benzene)														
Diesel														
Heavy Oil														
2,3,7,8-TCDD (Dioxin)														
Aldrin			2.444280203	0.122429167	0.001857653	9.30462E-05	0.694175578	0.034769883	0.001857653	9.30462E-05	1.271025706	0.063663167		

TABLE K-5
SOIL PRELIMINARY SCREENING LEVELS*
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

MEDIA - MTCA Standard	**SOIL PATHWAY EVALUATION**												
PATHWAYS HH - Human Health Ecol- Ecological	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Freshwater Acute** *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Freshwater Acute** *EQ. 747-1/ 747-2 Saturated Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Freshwater Chronic** *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Freshwater Chronic** *EQ. 747-1/ 747-2 Saturated Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC HH-Consumption Organisms** *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC HH-Consumption Organisms** *EQ. 747-1/ 747-2 Saturated Soil*	Soil to Surface Water Protection Aquatic Life Fresh/Acute, **NTR** - 40 CFR 131.36 *Vadose Soil*	Soil to Surface Water Protection Aquatic Life Fresh/Acute, **NTR** - 40 CFR 131.36 *Saturated Soil*	Soil to Surface Water Protection Aquatic Life Fresh/Chronic, **NTR** - 40 CFR 131.36 Vadose Soil	Soil to Surface Water Protection Aquatic Life Fresh/Chronic, **NTR** - 40 CFR 131.36 Saturated Soil	Soil to Surface Water Protection Aquatic Life Marine/Acute, **NTR** - 40 CFR 131.36 *Vadose Soil*	Soil to Surface Water Protection Aquatic Life Marine/Acute, **NTR** - 40 CFR 131.36 *Saturated Soil*	Soil to Surface Water Protection Aquatic Life Marine/Chronic, **NTR** - 40 CFR 131.36 *Vadose Soil*
UNITS	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Aluminum													
Antimony					578.56	28.98346667							
Arsenic (III)													
Arsenic (V)													
Arsenic (total)	198.56	9.957466667	87.6	4.393	0.08176	0.004100133	210.24	10.5432	110.96	5.564466667	40.296	2.02078	21.024
Barium													
Beryllium													
Cadmium	0.276	0.013973333	0.0345	0.001746667			0.5106	0.025850667	0.138	0.006986667	5.796	0.29344	1.2834
Chromium (VI)	6.144	0.308586667	4.224	0.212153333			5.76	0.2893	3.84	0.192866667	422.4	21.21533333	19.2
Chromium, total (or III)	11402.28	570.1634	1480.296	74.02121333			11002.2	550.1576667	3600.72	180.0516			
Cobalt													
Copper	5.772	0.289726667	3.996	0.20058			7.548	0.378873333	4.884	0.245153333	1.0656	0.053488	1.0656
Iron			4	0.286666667									
Lead	13000.26	650.0186333	500.01	25.00071667			13000.26	650.0186333	500.01	25.00071667	42000.84	2100.0602	1620.0324
Manganese					0.4	0.028666667							
Mercury	1.4616	0.073201333	0.80388	0.040260733			2.1924	0.109802	167.04	8.365866667	1.8792	0.094116	0.0261
Mercury (organic)					0.0012	0.000086							
Molybdenum													
Nickel	612.88	30.68473333	67.808	3.394906667	5998.4	300.3186667	1825.6	91.40133333	6.52	0.326433333	96.496	4.831213333	10.6928
Selenium			0.52	0.026433333	436.8	22.204	2.08	0.105733333			30.16	1.533133333	7.384
Silver	0.544	0.027477333					0.578	0.029194667			0.323	0.016314667	
Tin													
Thallium					0.66928	0.033504733							
Vanadium													
Zinc	149.28	7.4744	149.28	7.4744	32344	1619.453333	136.84	6.851533333	124.4	6.228666667	111.96	5.6058	100.764
LPAH													
HPAH													
Total Petroleum Hydrocarbons													
Gasoline													
Gasoline (w/benzene)													
Diesel													
Heavy Oil													
2,3,7,8-TCDD (Dioxin)					1.4943E-08	7.47592E-10							
Aldrin	2.933136244	0.146915			4.88856E-05	2.44858E-06	2.933136244	0.146915			1.271025706	0.063663167	

TABLE K-5
SOIL PRELIMINARY SCREENING LEVELS*
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

MEDIA - MTCA Standard		SOIL PATHWAY EVALUATION			SOIL POTENTIAL ARAR's			SOIL MOST STRINGENT
PATHWAYS HH - Human Health Ecol- Ecological	Soil to Surface Water Protection Aquatic Life Marine/Chronic, **NTR** - 40 CFR 131.36 *Saturated Soil*	Soil to Surface Water Protection HH - Fresh Water **Organism Consumption Only** **NTR** - 40 CFR 131.36 (WAC 173-201A-040[5]) HH - 10^{-6} Carc Risk *Vadose Soil*	Soil to Surface Water Protection HH - Fresh Water **Organism Consumption Only** **NTR** - 40 CFR 131.36 (WAC 173-201A-040[5]) HH - 10^{-6} Carc Risk *Saturated Soil*	Soil Protective of Vapor, Direct Contact, WAC 173-340-740(3)(b)(iii)C	Soil Protection of Surface Water HH – **Organoleptic Effects** CWA §304 **NRWQC** *Vadose Soil*	Soil Protection of Surface Water HH – **Organoleptic Effects** CWA §304 **NRWQC** *Saturated Soil*	Soil - Toxics Substances Control Act **(TSCA)** 40 CFR 761.61	Screening Level (Includes to Protect Potable GW)
UNITS	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
Aluminum								**4.586666667**
Antimony		**3887.2**	**194.7326667**					**28.98346667**
Arsenic (III)								**20**
Arsenic (V)								**95**
Arsenic (total)	**1.05432**	**0.08176**	**0.004100133**					**0.001707413**
Barium								**23.12053333**
Beryllium								**25**
Cadmium	**0.064976**							**0.001746667**
Chromium (VI)	**0.964333333**							**0.192866667**
Chromium, total (or III)								**42**
Cobalt								**0**
Copper	**0.053488**				**444**	**22.28666667**		**0.053488**
Iron								**0.286666667**
Lead	**81.002322**							**25.00071667**
Manganese								**0.028666667**
Mercury	**0.001307167**	**0.1566**	**0.007843**					**0.00062744**
Mercury (organic)								**0.000086**
Molybdenum								**71**
Nickel	**0.535350667**	**5998.4**	**300.3186667**					**0.326433333**
Selenium	**0.375353333**							**0.026433333**
Silver								**0.016314667**
Tin								**275**
Thallium		**8.9712**	**0.449106**					**0.033504733**
Vanadium								**1.120321067**
Zinc	**5.04522**				**6220**	**311.4333333**		**5.04522**
LPAH								
HPAH								
Total Petroleum Hydrocarbons								
Gasoline								**100**
Gasoline (w/benzene)								**30**
Diesel								**460**
Heavy Oil								**2000**
2,3,7,8-TCDD (Dioxin)		**4.102E-08**	**2.05221E-09**					**7.47592E-10**
Aldrin		**0.00013688**	**6.85603E-06**					**2.44858E-06**

TABLE K-5
SOIL PRELIMINARY SCREENING LEVELS*
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

MEDIA - MTCA Standard	SOIL Method A				SOIL Method B		SOIL Method C		SOIL PATHWAY EVALUATION					
PATHWAYS HH - Human Health Ecol- Ecological	Soil, Method A, Unrestricted Land Use-HH, WAC 173-340-740(2)(b)(iii) *CLARC Database/* ***Table 740-1 (Arsenic, Lead, and TPH only)***	Soil, Method A, Unrestricted Land Use-Ecol, WAC 173-340-740(2)(b)(ii); ***Table 749-2 (Simplified TEE)***	Soil, Method A, Industrial Land Use-HH, WAC 173-340-745(3)(b)(i) *CLARC Database/* ***Table 745-1 (Arsenic, Lead, and TPH only)***	Soil, Method A, Industrial Land Use-Ecol, WAC 173-340-745(3)(b)(iii) ***Table 749-2 (Simplified TEE)***	Soil, Direct Contact Method B-HH, Carcinogen, WAC 173-340-740(3)(b)(iii)(B)(II) ***CLARC Database*** *EQ. 740-2*	Soil, Direct Contact Method B-HH, Non-carcinogen, WAC 173-340-740(3)(b)(iii)(B)(I) ***CLARC Database*** *EQ. 740-1*	Soil, Direct Contact Method C-HH, Carcinogen, WAC 173-340-745(5)(b)(iii)(B)(II) Ingestion Only ***CLARC Database*** *EQ. 745-2*	Soil, Direct Contact Method C-HH, Non-carcinogen, WAC 173-340-745(5)(b)(iii)(B)(I) Ingestion Only ***CLARC Database*** *EQ. 745-1*	Soil to Method B-HH Groundwater Protection - **NC**, WAC 173-340-740(3)(b)(iii)(A) *EQ. 747-1/ 747-2 CLARC Database Vadose Soil*	Soil to Method B-HH Groundwater Protection -**NC** , WAC 173-340-740(3)(b)(iii)(A) *EQ. 747-1/ 747-2 CLARC Database Saturated Soil*	Soil to Method B-HH Groundwater Protection - **Carc**, WAC 173-340-740(3)(b)(iii)(A) EQ. 747-1/ 747-2 CLARC Database Vadose Soil	Soil to Method B-HH Groundwater Protection - **Carc**, WAC 173-340-740(3)(b)(iii)(A) EQ. 747-1/ 747-2 CLARC Database Saturated Soil	Soil to Sediment Protection Ecology **CSL** WAC 173-340-740(1)(d) *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Sediment Protection Ecology **SQS** WAC 173-340-740(1)(d) *EQ. 747-1/ 747-2 Vadose Soil*
UNITS	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
alpha-BHC (Benzene HexaChloride)		**10**			**0.158730159**		**20.83333333**				**0.00054501**	**2.84537E-05**		
beta-BHC		**10**			**0.555555556**		**72.91666667**				**0.00227403**	**0.000117914**		
gamma-BHC (Lindane)		**10**				**24**		**1050**	**0.148996776**	**0.0078656**				
Chlordane		**1**			**2.857142857**	**40**	**375**	**1750**	**8.241627595**	**0.412773333**	**0.257550862**	**0.012899167**		
4,4'-DDT		**1**			**2.941176471**	**40**	**386.0294118**	**1750**	**108.5014446**	**5.425765333**	**3.490395734**	**0.174542083**		
4,4'-DDE		**1**			**2.941176471**		**386.0294118**				**0.445761413**	**0.022310355**		
4,4'-DDD		**1**			**4.1667**		**546.875**				**0.33541677**	**0.016802431**		
Dieldrin		**0.17**			**0.0625**	**4**	**8.203125**	**175**	**0.411936858**	**0.020666133**	**0.002815975**	**0.000141272**		
alpha-Endosulfan						**480**		**21000**	**4.300876378**	**0.22336**				
beta-Endosulfan						**480**		**21000**	**4.300876378**	**0.22336**				
Endosulfan Sulfate						**480**		**21000**	**4.300876378**	**0.22336**				
Endrin		**0.4**				**24**		**1050**	**1.057058563**	**0.0532688**				
Endrin Aldehyde									**1.057058563**	**0.0532688**				
Heptachlor		**0.6**			**0.2222222**	**40**	**29.1666667**	**1750**	**1.55709984**	**0.078517333**	**0.003784618**	**0.000190841**		
Heptachlor Epoxide		**0.6**			**0.10989011**	**1.04**	**14.42307692**	**45.5**	**0.17347207**	**0.008682613**	**0.008019234**	**0.000401378**		
Toxaphene					**0.9090909**		**119.3181818**							

TABLE K-5
SOIL PRELIMINARY SCREENING LEVELS[*]
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

MEDIA - MTCA Standard		**SOIL PATHWAY EVALUATION**												
PATHWAYS HH - Human Health Ecol- Ecological	Soil to Sediment Protection Ecology **CSL** WAC 173-340-740(1)(d) *EQ. 747-1/ 747-2 Saturated Soil*	Soil to Sediment Protection Ecology **SQS** WAC 173-340-740(1)(d) *EQ. 747-1/ 747-2 Saturated Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Fresh - Acute** *Vadose Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Fresh - Acute** *Saturated Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Fresh - Chronic** *Vadose Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Fresh - Chronic** *Saturated Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Marine - Acute** *Vadose Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Marine - Acute** *Saturated Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Marine - Chronic** *Vadose Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Marine - Chronic** *Saturated Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Saltwater Acute** *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Saltwater Acute** *EQ. 747-1/ 747-2 Saturated Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Saltwater Chronic** *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Saltwater Chronic** *EQ. 747-1/ 747-2 Saturated Soil*
UNITS	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
alpha-BHC (Benzene HexaChloride)														
beta-BHC														
gamma-BHC (Lindane)			**0.06208199**	**0.003277333**	**0.00248328**	**0.000131093**	**0.004966559**	**0.000262187**			**0.004966559**	**0.000262187**		
Chlordane			**2.472488278**	**0.123832**	**0.004429875**	**0.000221866**	**0.09271831**	**0.0046437**	**0.004120814**	**0.000206387**	**0.09271831**	**0.0046437**	**0.004120814**	**0.000206387**
4,4'-DDT			**14.91894863**	**0.746042733**	**0.013562681**	**0.000678221**	**1.763148475**	**0.088168687**	**0.013562681**	**0.000678221**	**1.763148475**	**0.088168687**	**0.013562681**	**0.000678221**
4,4'-DDE			**1.905311642**	**0.095360833**	**0.001732101**	**8.66917E-05**	**0.225173194**	**0.011269917**	**0.001732101**	**8.66917E-05**				
4,4'-DDD			**1.012000313**	**0.050695333**	**0.00092**	**4.60867E-05**	**0.119600037**	**0.005991267**	**0.00092**	**4.60867E-05**				
Dieldrin			**1.287302682**	**0.064581667**	**0.00097835**	**4.90821E-05**	**0.365593962**	**0.018341193**	**0.00097835**	**4.90821E-05**	**0.365593962**	**0.018341193**	**0.00097835**	**4.90821E-05**
alpha-Endosulfan			**0.009856175**	**0.000511867**	**0.002508845**	**0.000130293**	**0.001523227**	**7.91067E-05**	**0.000389767**	**0.000020242**	**0.001523227**	**7.91067E-05**	**0.000389767**	**0.000020242**
beta-Endosulfan			**0.009856175**	**0.000511867**	**0.002508845**	**0.000130293**	**0.001523227**	**7.91067E-05**	**0.000389767**	**0.000020242**	**0.001523227**	**7.91067E-05**	**0.000389767**	**0.000020242**
Endosulfan Sulfate			**0.009856175**	**0.000511867**	**0.002508845**	**0.000130293**	**0.001523227**	**7.91067E-05**	**0.000389767**	**0.000020242**	**0.001523227**	**7.91067E-05**	**0.000389767**	**0.000020242**
Endrin			**0.039639696**	**0.00199758**	**0.000506507**	**2.55246E-05**	**0.00814816**	**0.000410614**	**0.000506507**	**2.55246E-05**	**0.00814816**	**0.000410614**	**0.000506507**	**2.55246E-05**
Endrin Aldehyde			**0.039639696**	**0.00199758**	**0.000506507**	**2.55246E-05**	**0.00814816**	**0.000410614**	**0.000506507**	**2.55246E-05**	**0.00814816**	**0.000410614**	**0.000506507**	**2.55246E-05**
Heptachlor			**0.10121149**	**0.005103627**	**0.000739622**	**3.72957E-05**	**0.010315786**	**0.000520177**	**0.000700695**	**3.53328E-05**	**0.010315786**	**0.000520177**	**0.000700695**	**3.53328E-05**
Heptachlor Epoxide											**0.088404036**	**0.004424793**	**0.006004802**	**0.000300552**
Toxaphene											**0.00084**	**0.0000602**	**0.0000008**	**5.73333E-08**

TABLE K-5
SOIL PRELIMINARY SCREENING LEVELS*
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

MEDIA - MTCA Standard		SOIL PATHWAY EVALUATION											
PATHWAYS HH - Human Health Ecol- Ecological	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Freshwater Acute** *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Freshwater Acute** *EQ. 747-1/ 747-2 Saturated Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Freshwater Chronic** *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Freshwater Chronic** *EQ. 747-1/ 747-2 Saturated Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC HH-Consumption Organisms** *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC HH-Consumption Organisms** *EQ. 747-1/ 747-2 Saturated Soil*	Soil to Surface Water Protection Aquatic Life Fresh/Acute, **NTR** - 40 CFR 131.36 *Vadose Soil*	Soil to Surface Water Protection Aquatic Life Fresh/Acute, **NTR** - 40 CFR 131.36 *Saturated Soil*	Soil to Surface Water Protection Aquatic Life Fresh/Chronic, **NTR** - 40 CFR 131.36 Vadose Soil	Soil to Surface Water Protection Aquatic Life Fresh/Chronic, **NTR** - 40 CFR 131.36 Saturated Soil	Soil to Surface Water Protection Aquatic Life Marine/Acute, **NTR** - 40 CFR 131.36 *Vadose Soil*	Soil to Surface Water Protection Aquatic Life Marine/Acute, **NTR** - 40 CFR 131.36 *Saturated Soil*	Soil to Surface Water Protection Aquatic Life Marine/Chronic, **NTR** - 40 CFR 131.36 *Vadose Soil*
UNITS	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
alpha-BHC (Benzene HexaChloride)					**0.00019228**	**1.00385E-05**							
beta-BHC					**0.000795261**	**4.12363E-05**							
gamma-BHC (Lindane)	**0.029488945**	**0.001556733**			**0.055873791**	**0.0029496**	**0.06208199**	**0.003277333**	**0.00248328**	**0.000131093**	**0.004966559**	**0.000262187**	
Chlordane	**2.472488278**	**0.123832**	**0.004429875**	**0.000221866**	**0.000834465**	**4.17933E-05**	**2.472488278**	**0.123832**	**0.004429875**	**0.000221866**	**0.09271831**	**0.0046437**	**0.004120814**
4,4'-DDT	**14.91894863**	**0.746042733**	**0.013562681**	**0.000678221**	**0.00298379**	**0.000149209**	**14.91894863**	**0.746042733**	**0.013562681**	**0.000678221**	**1.763148475**	**0.088168687**	**0.013562681**
4,4'-DDE					**0.000381062**	**1.90722E-05**							
4,4'-DDD					**0.0002852**	**1.42869E-05**							
Dieldrin	**0.123581058**	**0.00619984**	**0.02883558**	**0.001446629**	**2.78057E-05**	**1.39496E-06**	**1.287302682**	**0.064581667**	**0.00097835**	**4.90821E-05**	**0.365593962**	**0.018341193**	**0.00097835**
alpha-Endosulfan	**0.009856175**	**0.000511867**	**0.002508845**	**0.000130293**	**3.987270808**	**0.207073333**	**0.009856175**	**0.000511867**	**0.002508845**	**0.000130293**	**0.001523227**	**7.91067E-05**	**0.000389767**
beta-Endosulfan	**0.009856175**	**0.000511867**	**0.002508845**	**0.000130293**	**3.987270808**	**0.207073333**	**0.009856175**	**0.000511867**	**0.002508845**	**0.000130293**	**0.001523227**	**7.91067E-05**	**0.000389767**
Endosulfan Sulfate	**0.009856175**	**0.000511867**	**0.002508845**	**0.000130293**	**3.987270808**	**0.207073333**	**0.009856175**	**0.000511867**	**0.002508845**	**0.000130293**	**0.001523227**	**7.91067E-05**	**0.000389767**
Endrin	**0.018938966**	**0.000954399**	**0.007927939**	**0.000399516**	**0.013213232**	**0.00066586**	**0.039639696**	**0.00199758**	**0.000506507**	**2.55246E-05**	**0.00814816**	**0.000410614**	**0.000506507**
Endrin Aldehyde	**0.018938966**	**0.000954399**	**0.007927939**	**0.000399516**	**0.06606616**	**0.0033293**	**0.039639696**	**0.00199758**	**0.000506507**	**2.55246E-05**	**0.00814816**	**0.000410614**	**0.000506507**
Heptachlor	**0.10121149**	**0.005103627**	**0.000739622**	**3.72957E-05**	**1.53764E-05**	**7.75359E-07**	**0.10121149**	**0.005103627**	**0.000739622**	**3.72957E-05**	**0.010315786**	**0.000520177**	**0.000700695**
Heptachlor Epoxide	**0.867360352**	**0.043413067**	**0.006338403**	**0.000317249**	**6.5052E-05**	**3.25598E-06**	**0.867360352**	**0.043413067**	**0.006338403**	**0.000317249**	**0.088404036**	**0.004424793**	**0.006004802**
Toxaphene	**0.00292**	**0.000209267**	**0.0000008**	**5.73333E-08**	**0.00000112**	**8.02667E-08**	**0.00292**	**0.000209267**	**0.0000008**	**5.73333E-08**	**0.00084**	**0.0000602**	**0.0000008**

TABLE K-5
SOIL PRELIMINARY SCREENING LEVELS*
BOEING ISAACSON-THOMPSON SITE
TUKWILA, WASHINGTON

MEDIA - MTCA Standard		SOIL PATHWAY EVALUATION			SOIL POTENTIAL ARAR's			SOIL MOST STRINGENT
PATHWAYS HH - Human Health Ecol- Ecological	Soil to Surface Water Protection Aquatic Life Marine/Chronic, **NTR** - 40 CFR 131.36 *Saturated Soil*	Soil to Surface Water Protection HH - Fresh Water **Organism Consumption Only NTR** - 40 CFR 131.36 (WAC 173-201A-040[5]) HH - 10^{-6} Carc Risk *Vadose Soil*	Soil to Surface Water Protection HH - Fresh Water **Organism Consumption Only NTR** - 40 CFR 131.36 (WAC 173-201A-040[5]) HH - 10^{-6} Carc Risk *Saturated Soil*	Soil Protective of Vapor, Direct Contact, WAC 173-340-740(3)(b)(iii)C	Soil Protection of Surface Water HH – **Organoleptic Effects** CWA §304 **NRWQC** *Vadose Soil*	Soil Protection of Surface Water HH – **Organoleptic Effects** CWA §304 **NRWQC** *Saturated Soil*	Soil - Toxics Substances Control Act **(TSCA)** 40 CFR 761.61	Screening Level (Includes to Protect Potable GW)
UNITS	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
alpha-BHC (Benzene HexaChloride)		**0.00051013**	**2.66327E-05**					**1.00385E-05**
beta-BHC		**0.002151882**	**0.000111581**					**4.12363E-05**
gamma-BHC (Lindane)		**0.001955583**	**0.000103236**					**0.000103236**
Chlordane	**0.000206387**	**0.00060782**	**3.0442E-05**					**3.0442E-05**
4,4'-DDT	**0.000678221**	**0.008001982**	**0.00040015**					**0.000149209**
4,4'-DDE		**0.00102194**	**5.11481E-05**					**1.90722E-05**
4,4'-DDD		**0.0007728**	**3.87128E-05**					**1.42869E-05**
Dieldrin	**4.90821E-05**	**7.2089E-05**	**3.61657E-06**					**1.39496E-06**
alpha-Endosulfan	**0.000020242**							**0.000020242**
beta-Endosulfan	**0.000020242**							**0.000020242**
Endosulfan Sulfate	**0.000020242**							**0.000020242**
Endrin	**2.55246E-05**	**0.178378632**	**0.00898911**					**2.55246E-05**
Endrin Aldehyde	**2.55246E-05**	**0.178378632**	**0.00898911**					**2.55246E-05**
Heptachlor	**3.53328E-05**	**4.08739E-05**	**2.06108E-06**					**7.75359E-07**
Heptachlor Epoxide	**0.000300552**	**0.00018348**	**9.18353E-06**					**3.25598E-06**
Toxaphene	**5.73333E-08**							**5.73333E-08**

* Adapted from Ecology Spreadsheet Draft Preliminary Screening Levels & ARARs v14R1 in accordance with Ecology comments.

Draft Preliminary Screening Levels And ARARs (v14RI)

WORKSHEET NAME	NAME DESCRIPTION
Most Stringent Screening Levels	**Most Stringent Screening Levels**
Most Stringent Levels W-O PGW	**Most Stringent** Screening **Levels W**ith**O**ut **P**otable **G**round**W**ater in Site
Most Stringent Levels W-O PSW	**Most Stringent** Screening **Levels W**ith**O**ut **P**otable **S**urface **W**ater in Site
Most Stringent Levels W-O PW	**Most Stringent** Screening **Levels W**ith**O**ut any **P**otable **W**aters in Site
Soil	**Soil**
Groundwater	**Groundwater**
Surface Water	**Surface Water**
Air	**Air**
EQ 730-1 Non-Carc-SW CUL	**EQ 730-1 Non-Carc-SW CUL**
EQ 730-2 Carc-SW CUL	**EQ 730-2 Carc-SW CUL**
EQ 747-1 Soil to Protect Water	**EQ 747-1 Soil to Protect Water**
Most String Soil to Protect PGW	**Most String Soil to Protect P**otable **GW**
Most String Soil to Protect NGW	**Most String Soil to Protect N**on-potable **GW**
Most String Soil to Protect PSW	**Most String Soil to Protect P**otable/Fresh **SW**
Most String Soil to Protect NSW	**Most String Soil to Protect N**on-potable/Fresh **SW**

INFORMATION

Assumes all waters (SW & GW) are potable in Site

Assumes GW at the Site is NOT potable, but SW is fresh/marine and potentially potable

Assumes SW at the Site is Fresh/Marine, but NOT potable, and GW is potable

Assumes both GW and SW at the Site is NOT potable, but surface water is fresh/marine

Provides all ARARs, including protection of GW, SW & Sediments

Provides all ARARs, including protection of SW & Sediments

Provides all ARARs, including protection of Sediments & potable GW standards (for potable SW comparison)

Provides all ARARs, including dusts/fumes/gases

Shows how HH protection Cleanup Levels for SW were calculated using MTCA equation 730-1

Shows how HH protection Cleanup Levels for SW were calculated using MTCA equation 730-2

Shows how to calcualate chemical equilibrium partitioning from soil to water using MTCA equation 747-1

Uses EQ 747-1 to calculate most stringent protective soil values when potable groundwater exists at Site

Uses EQ 747-1 to calculate most stringent protective soil values when NO potable groundwater exists at Site

Uses EQ 747-1 to calculate most stringent protective soil values when potable surfacewater exists at Site

Uses EQ 747-1 to calculate most stringent protective soil values when fresh non-potable surface water exists

MEDIA - MTCA Standard	Soil Standard to Protect ALL Waters for Potability	GW MOST STRINGENT	SW MOST STRINGENT	SEDIMENT MOST STRINGENT**	AIR MOST STRINGENT
Note: Natural Background and PQL's Have Not Been Incorporated Into These Screening Levels Because They Are Site Specific And Have Not Been Determined By Ecology	***Screening Levels***	***Screening Levels***	***Screening Levels***	***Screening Levels****	***Screening Levels***
UNITS	**mg/kg**	**µg/L**	**µg/L**	**mg/kg DW**	**ppbv**
acetone	1.731886	6000	6000		13658.27586
acenaphthene	0.016749455	2.614379085	2.614379085	0.5	
acenaphthylene	0.069091503	10.78431373	10.78431373	0.56	
anthracene	0.223091503	10.78431373	10.78431373	0.96	200
benzene	0.00021	0.795	0.795		0.026297055
benzo(g,h,i)perylene	0.031003321	0.011584454	0.011584454	0.67	
benzo[a]anthracene	4.78776E-05	0.000112155	0.000258331	0.062	0.000931735
benzo[a]pyrene	5.18596E-06	6.5888E-06	1.51762E-05	0.062	0.000085086
benzo[b]fluoranthene	4.23316E-05	5.26914E-05	0.000121366	0.062	
benzo[k]fluoranthene	4.34357E-05	5.51854E-05	0.00012711	0.062	
bis(2-ethylhexyl) phthalate	0.047081657	0.284848485	0.284848485	1.3	
butyl benzyl phthalate	0.003954085	0.523504274	0.409933862	0.063	
carbon tetrachloride	7.71205E-05	0.247823653	0.23		0.009204519
chlorobenzene	0.011093333	100	20		4.972513321
chloroethane	0.000127267	21000	0.41		236.4
chloroform (trichloromethane)	0.000053	4.3	4.2952095		0.022320352
chloromethane	0.005688476	190	18.90068394		19.89891089
chrysene	0.000264903	0.001120636	0.002581193	0.062	0.009317346
dibenz[a,h]anthracene	7.1198E-05	2.71511E-05	6.25379E-05	0.062	7.02586E-05
dibenzofuran	0.015367257	1.327433628	1.327433628	0.54	624
di-butyl phthalate (di-n-butyl phth.)	0.081356353	46.57806484	46.57806484	1.4	439.7482014
dichlorobenzene, 1,2-	0.003788337	5.191873589	5.191873589	0.035	15.2022449
dichlorobenzene, 1,3-	0.091733333	600	320	0.17	
dichlorobenzene, 1,4-	0.00041	4	4	0.11	0.036591837
dichloroethane, 1,1-	0.000321707	1	1		0.370454545
dichloroethane, 1,2-	0.000042	0.48	0.38		0.023215152
dichloroethylene, 1,1-	1.83373E-05	0.729	0.057		0.012616099
diethyl phthalate	0.199783069	484.1269841	484.1269841	0.2	550.6756757
dimethyl phthalate	0.093952381	142.8571429	142.8571429	0.071	630.1546392
di-n-octyl phthalate	0.000548534	0.295918367	0.295918367	6.2	
ethylbenzene	0.0017	700	2.233717193	0.01	0.223403353
fluoranthene	0.160534086	2.256699577	2.256699577	1.7	
fluorene	0.023563127	2.03539823	2.03539823	0.54	
hexachlorobenzene	2.42708E-07	0.05	6.61931E-05	0.022	0.000455004
hexachlorobutadiene	0.000563273	0.9	0.44	0.011	0.0103125
indeno[1,2,3-cd]pyrene	6.0854E-05	2.27382E-05	5.23736E-05	0.062	
MEK (Methyl Ethyl Ketone;2-Butanone)	1.376	4800	4800		
methylene chloride (dichloromethane)	0.0012	5	4.6		0.748763251
methylnaphthalene, 2-	0.043212121	18.18181818	18.18181818	0.67	3015
MIBK (M-Isobutyl-K;4-M,2-Pentanone)	0.183466667	640			
naphthalene	0.00047	53.80434783	53.80434783	2.1	0.013731669
nitrosodiphenylamine, N-	0.008905288	1.593580667	1.382665579	0.028	
pcb mixtures	6.66052E-07	2.30915E-05	1.47662E-05	0.0000039	0.000291233
pcb - Aroclor 1016	1.75613E-06	0.0000641	0.00042189		
pcb - Aroclor 1221	2.44557E-07	2.30915E-05	2.30352E-05		
pcb - Aroclor 1232	0.00012		0.014		
pcb - Aroclor 1242	1.69278E-08	2.30915E-05	2.30352E-05		
pcb - Aroclor 1248	1.01785E-06	2.30915E-05	2.30352E-05		
pcb - Aroclor 1254	4.16425E-07	5.49145E-06	5.48457E-06		
pcb - Aroclor 1260	4.77489E-06	2.30915E-05	2.30352E-05		
phenanthrene	0.101378205	4.807692308	4.807692308	1.5	200
pyrene	0.683027333	9.8	9.828761139	2.6	200
tetrachloroethylene (perchloroethylene)	1.13219E-05	0.020523086	0.02060763	0.057	0.060461399
trichlorobenzene, 1,2,4-	5.02642E-05	1.128133705	0.141842417	0.031	0.12312562
trichlorethane, 1,1,1-	0.067061333	200	200		419.7188906
trichlorethane, 1,1,2-	0.000078	0.768	0.59		0.027492504
trichloroethylene	0.000186527	0.49	0.49	0.16	0.223287671
trimethylbenzene, 1,3,5-	0.044535	45	45.21613312		295.6
toluene	0.554666667	1000	1000		48.58143322
vinyl chloride (chloroethylene)	0.0000056	0.02	0.02		0.01216632
xylene (dimethylbenzene)	0.2	1000	1000	0.04	10.59039548
benzoic acid	0.64431792	2242.926156	2242.926156	0.65	
benzyl alcohol	0.055021137	181.9923372	181.9923372	0.057	
dimethylphenol, 2,4-	0.002026013	2.020624303	2.020624303	0.029	
methylphenol, 2- (o-cresol)	0.00268544	7.110609481	7.110609481	0.063	119.7783826
methylphenol, 4- (p-cresol)	0.022127496	77.18894009	77.18894009	0.67	119.7783826
pentachlorophenol	0.00076784	0.219	0.209410987	0.36	0.044054054
phenol (total)	0.02388097	78.35820896	78.35820896	0.42	54.62234043
styrene (phenylethylene)	0.080446667	100	100		1.073357349
Tributyltin	2.12133E-06		0.072	0.073	100
Trichlorophenol, 2,4,6-	0.00082238	3	0.558429298		0.096562025

MEDIA - MTCA Standard	Soil Standard to Protect ALL Waters for Potability	GW MOST STRINGENT	SW MOST STRINGENT	SEDIMENT MOST STRINGENT**	AIR MOST STRINGENT
Note: Natural Background and PQL's Have Not Been Incorporated Into These Screening Levels Because They Are Site Specific And Have Not Been Determined By Ecology	***Screening Levels***	***Screening Levels***	***Screening Levels***	***Screening Levels*****	***Screening Levels***
UNITS	**mg/kg**	**µg/L**	**µg/L**	**mg/kg DW**	**ppbv**
Aluminum	0.014333333	50	50	7600	2.075259451
Antimony	0.17507732	3.865979381	3.865979381	3.1	0.018314908
Arsenic (III)	7				
Arsenic (V)	10				
Arsenic (total)	0.000157807	0.05	0.005388353	0.39	0.000186018
Barium	0.082573333	2	2	540	0.040770771
Beryllium	3.161146667	4	4		0.000193143
Cadmium	0.0014672	0.21	0.25	3.7	0.00030451
Chromium (VI)	0.00083	0.58	0.115176043		5.17251E-06
Chromium, total (or III)	42	50	50	1.6	235.1142396
Cobalt	0.49				0.000112023
Copper	0.028972667	7.3	2.4	310	38.4736428
Iron	0.086	300	300	2300	437.803284
Lead	5.4001548	2.5	0.54	40	0.002088668
Manganese	0.014333333	50	50	180	0.01019158
Mercury	0.000269883	0.005161594	0.005161594	0.41	0.003656713
Mercury (organic)	0.0000018	0.00045	0.000454821		1.133914621
Molybdenum	0.011466667	40	40	39	1274.233896
Nickel	0.326433333	8.2	8.2	140	0.004164538
Selenium	0.026433333	5	5	3	6.502659574
Silver	0.013156926	1.532250723	1.532250723	6.1	2.26665925
Tin	50				411.9976409
Thallium	0.0171088	0.47	0.24	0.52	11.96301008
Vanadium	0.000321067	1.12	1.12	7.8	0.047996231
Zinc	2.028518377	32.56745762	32.56745762	410	
LPAH		0.01	0.01	5.2	
HPAH		0.01	0.01	12	
Total Petroleum Hydrocarbons	Site Specific	No Sheen	No Sheen		
Gasoline	100	1000	1000		300000
Gasoline (w/benzene)	30	800	800		
Diesel	200	500	500		
Heavy Oil	2000	500	500		
2,3,7,8-TCDD (Dioxin)	3.02026E-11	2.06039E-10	2.06039E-10	0.0000039	4.42682E-09
Aldrin	5.6837E-07	0.002573529	1.16061E-05	0.0095	3.35014E-05
alpha-BHC	2.30483E-06	0.013888889	0.001125041		0.000116768
beta-BHC	9.55141E-06	0.048611111	0.003937642		0.000386734
gamma-BHC	3.27733E-07	0.0002	0.019	0.01	
Chlordane	9.63356E-06	0.002	0.000186709	0.0028	0.001431918
4,4'-DDT	3.42909E-05	0.257352941	5.05602E-05	0.0012	0.001677047
4,4'-DDE	4.38314E-06	0.257352941	5.05602E-05	0.009	
4,4'-DDD	3.30104E-06	0.364583333	7.16269E-05	0.016	0.002673885
Dieldrin	3.18555E-07	0.00546875	1.23315E-05	0.0019	3.40198E-05
alpha-Endosulfan	0.000020242	96	0.056		
beta-Endosulfan	0.000020242	96	0.056		
Endosulfan Sulfate	0.000020242	96	0.056		
Endrin	2.21953E-05	0.002	0.002		
Endrin Aldehyde	2.21953E-05	0.002	0.002		
Heptachlor	1.79431E-07	0.0004	1.82819E-05	0.0015	0.000124431
Heptachlor Epoxide	7.54762E-07	0.0002	9.04051E-06		5.90345E-05
Toxaphene	5.73333E-08		6.39423E-05	0.44	0.000448841

MEDIA - MTCA Standard	Soil Standard to Protect Potable Surface Waters	GW MOST STRINGENT Non-Potable	SW MOST STRINGENT Potable	SEDIMENT MOST STRINGENT**	AIR MOST STRINGENT
Note: Natural Background and PQL's Have Not Been Incorporated Into These Screening Levels Because They Are Site Specific And Have Not Been Determined By Ecology	***Screening Levels***	***Screening Levels***	**Screening Levels**	***Screening Levels****	***Screening Levels***
UNITS	**mg/kg**	**µg/L**	**µg/L**	**mg/kg DW**	**ppbv**
acetone	1.731886	110107	6000		13658.27586
acenaphthene	0.016749455	2.614379085	2.614379085	0.5	
acenaphthylene	0.069091503	10.78431373	10.78431373	0.56	
anthracene	0.223091503	10.78431373	10.78431373	0.96	200
benzene	0.000359473	2.02819	0.795		0.026297055
benzo(g,h,i)perylene	0.031003321	0.011584454	0.011584454	0.67	
benzo[a]anthracene	4.78776E-05	0.000112155	0.000258331	0.062	0.000931735
benzo[a]pyrene	5.18596E-06	6.5888E-06	1.51762E-05	0.062	0.000085086
benzo[b]fluoranthene	4.23316E-05	5.26914E-05	0.000121366	0.062	
benzo[k]fluoranthene	4.34357E-05	5.51854E-05	0.00012711	0.062	
bis(2-ethylhexyl) phthalate	0.047081657	0.284848485	0.284848485	1.3	
butyl benzyl phthalate	0.003954085	0.523504274	0.409933862	0.063	
carbon tetrachloride	7.71205E-05	0.247823653	0.23		0.009204519
chlorobenzene	0.011093333	270	20		4.972513321
chloroethane			0.41		236.4
chloroform (trichloromethane)	0.001381798	4.3	4.2952095		0.022320352
chloromethane			18.90068394		19.89891089
chrysene	0.000264903	0.001120636	0.002581193	0.062	0.009317346
dibenz[a,h]anthracene	7.1198E-05	2.71511E-05	6.25379E-05	0.062	7.02586E-05
dibenzofuran	0.015367257	1.327433628	1.327433628	0.54	624
di-butyl phthalate (di-n-butyl phth.)	0.081356353	46.57806484	46.57806484	1.4	439.7482014
dichlorobenzene, 1,2-	0.003788337	5.191873589	5.191873589	0.035	15.2022449
dichlorobenzene, 1,3-			320	0.17	
dichlorobenzene, 1,4-	0.002882667	7.142857143	4	0.11	0.036591837
dichloroethane, 1,1-	0.000321707	33.26143751	1		0.370454545
dichloroethane, 1,2-	0.000125574	3.6	0.38		0.023215152
dichloroethylene, 1,1-	1.83373E-05	2300	0.057		0.012616099
diethyl phthalate	0.199783069	484.1269841	484.1269841	0.2	550.6756757
dimethyl phthalate	0.093952381	142.8571429	142.8571429	0.071	630.1546392
di-n-octyl phthalate	0.000548534	0.295918367	0.295918367	6.2	
ethylbenzene	0.001796951	800	2.233717193	0.01	0.223403353
fluoranthene	0.160534086	2.256699577	2.256699577	1.7	
fluorene	0.023563127	2.03539823	2.03539823	0.54	
hexachlorobenzene	2.42708E-07	0.112426036	6.61931E-05	0.022	0.000455004
hexachlorobutadiene	0.000563273	3.923541247	0.44	0.011	0.0103125
indeno[1,2,3-cd]pyrene	6.0854E-05	2.27382E-05	5.23736E-05	0.062	
MEK (Methyl Ethyl Ketone;2-Butanone)		73000	4800		
methylene chloride (dichloromethane)	0.001427871	61	4.6		0.748763251
methylnaphthalene, 2-	0.043212121	18.18181818	18.18181818	0.67	3015
MIBK (M-Isobutyl-K;4-M,2-Pentanone)					
naphthalene	0.1142625	53.80434783	53.80434783	2.1	0.013731669
nitrosodiphenylamine, N-	0.008905288	1.593580667	1.382665579	0.028	
pcb mixtures	6.66052E-07	2.30915E-05	1.47662E-05	0.0000039	0.000291233
pcb - Aroclor 1016	1.75613E-06	0.0000641	0.00042189		
pcb - Aroclor 1221		2.30915E-05	2.30352E-05		
pcb - Aroclor 1232			0.014		
pcb - Aroclor 1242		2.30915E-05	2.30352E-05		
pcb - Aroclor 1248	1.01785E-06	2.30915E-05	2.30352E-05		
pcb - Aroclor 1254	4.16425E-07	5.49145E-06	5.48457E-06		
pcb - Aroclor 1260	4.77489E-06	2.30915E-05	2.30352E-05		
phenanthrene	0.101378205	4.807692308	4.807692308	1.5	200
pyrene	0.683027333	9.8	9.828761139	2.6	200
tetrachloroethylene (perchloroethylene)	1.13219E-05	0.020523086	0.02060763	0.057	0.060461399
trichlorobenzene, 1,2,4-	5.02642E-05	1.128133705	0.141842417	0.031	0.12312562
trichlorethane, 1,1,1-	0.067061333	46000	200		419.7188906
trichlorethane, 1,1,2-	0.000209076	2.326407578	0.59		0.027492504
trichloroethylene	0.0002815	0.74	0.49	0.16	0.223287671
trimethylbenzene, 1,3,5-	0.044535	45	45.21613312		295.6
toluene	0.554666667	1300	1000		48.58143322
vinyl chloride (chloroethylene)	6.11333E-06	2.4	0.02		0.01216632
xylene (dimethylbenzene)	0.729766667	1300	1000	0.04	10.59039548

MEDIA - MTCA Standard	Soil Standard to Protect Potable Surface Waters	GW MOST STRINGENT Non-Potable	SW MOST STRINGENT Potable	SEDIMENT MOST STRINGENT**	AIR MOST STRINGENT
Note: Natural Background and PQL's Have Not Been Incorporated Into These Screening Levels Because They Are Site Specific And Have Not Been Determined By Ecology	*Screening Levels*	*Screening Levels*	Screening Levels	*Screening Levels***	*Screening Levels*
UNITS	**mg/kg**	**µg/L**	**µg/L**	**mg/kg DW**	**ppbv**
benzoic acid	0.64431792	2242.926156	2242.926156	0.65	
benzyl alcohol	0.055021137	181.9923372	181.9923372	0.057	
dimethylphenol, 2,4-	0.002026013	2.020624303	2.020624303	0.029	
methylphenol, 2- (o-cresol)	0.00268544	7.110609481	7.110609481	0.063	119.7783826
methylphenol, 4- (p-cresol)	0.022127496	77.18894009	77.18894009	0.67	119.7783826
pentachlorophenol	0.00076784	5.325443787	0.209410987	0.36	0.044054054
phenol (total)	0.02388097	78.35820896	78.35820896	0.42	54.62234043
styrene (phenylethylene)			100		1.073357349
Tributyltin			0.072	0.073	100
Trichlorophenol, 2,4,6-			0.558429298		0.096562025
Aluminum			50	7600	2.075259451
Antimony	0.17507732	3.865979381	3.865979381	3.1	0.018314908
Arsenic (III)					
Arsenic (V)					
Arsenic (total)	0.000157807	7.3	0.005388353	0.39	0.000186018
Barium	0.082573333	120	2	540	0.040770771
Beryllium	3.161146667	120	4		0.000193143
Cadmium	0.0014672	0.21	0.25	3.7	0.00030451
Chromium (VI)	0.002221362	0.58	0.115176043		5.17251E-06
Chromium, total (or III)	42	305.8823529	50	1.6	235.1142396
Cobalt					0.000112023
Copper	0.028972667	7.3	2.4	310	38.4736428
Iron			300	2300	437.803284
Lead	5.4001548	2.5	0.54	40	0.002088668
Manganese	0.014333333	2000	50	180	0.01019158
Mercury	0.000269883	0.005161594	0.005161594	0.41	0.003656713
Mercury (organic)		0.00045	0.000454821		1.133914621
Molybdenum			40	39	1274.233896
Nickel	0.326433333	8.2	8.2	140	0.004164538
Selenium	0.026433333	5	5	3	6.502659574
Silver	0.013156926	1.532250723	1.532250723	6.1	2.26665925
Tin					411.9976409
Thallium	0.0171088	0.47	0.24	0.52	11.96301008
Vanadium			1.12	7.8	0.047996231
Zinc	2.028518377	32.56745762	32.56745762	410	
LPAH			0.01	5.2	
HPAH			0.01	12	
Total Petroleum Hydrocarbons	Site Specific	No Sheen	No Sheen		
Gasoline	100		1000		300000
Gasoline (w/benzene)	30		800		
Diesel	2000		500		
Heavy Oil	2000		500		
2,3,7,8-TCDD (Dioxin)	3.02026E-11	2.06039E-10	2.06039E-10	0.0000039	4.42682E-09

MEDIA - MTCA Standard	Soil Standard to Protect Potable Ground Waters	GW MOST STRINGENT POTABLE	SW MOST STRINGENT Non-Potable	SEDIMENT MOST STRINGENT**	AIR MOST STRINGENT
Note: Natural Background and PQL's Have Not Been Incorporated Into These Screening Levels Because They Are Site Specific And Have Not Been Determined By Ecology	***Screening Levels***	***Screening Levels***	***Screening Levels***	***Screening Levels****	***Screening Levels***
UNITS	**mg/kg**	**µg/L**	**µg/L**	**mg/kg DW**	**ppbv**
acetone	1.731886	6000	110107.0077		13658.27586
acenaphthene	0.016749455	2.614379085	2.614379085	0.5	
acenaphthylene	0.069091503	10.78431373	10.78431373	0.56	
anthracene	0.223091503	10.78431373	10.78431373	0.96	200
benzene	0.00021	0.795	2.028193577		0.026297055
benzo(g,h,i)perylene	0.031003321	0.011584454	0.011584454	0.67	
benzo[a]anthracene	4.78776E-05	0.000112155	0.000258331	0.062	0.000931735
benzo[a]pyrene	5.18596E-06	6.5888E-06	1.51762E-05	0.062	0.000085086
benzo[b]fluoranthene	4.23316E-05	5.26914E-05	0.000121366	0.062	
benzo[k]fluoranthene	4.34357E-05	5.51854E-05	0.00012711	0.062	
bis(2-ethylhexyl) phthalate	0.047081657	0.284848485	0.284848485	1.3	
butyl benzyl phthalate	0.003954085	0.523504274	0.409933862	0.063	
carbon tetrachloride	8.30969E-05	0.247823653	0.247823653		0.009204519
chlorobenzene	0.011093333	100	20		4.972513321
chloroethane	0.010553827	21000	34		236.4
chloroform (trichloromethane)	0.000053	4.3	4.2952095		0.022320352
chloromethane	0.006094796	190	20.25073279		19.89891089
chrysene	0.000264903	0.001120636	0.002581193	0.062	0.009317346
dibenz[a,h]anthracene	7.1198E-05	2.71511E-05	6.25379E-05	0.062	7.02586E-05
dibenzofuran	0.015367257	1.327433628	1.327433628	0.54	624
di-butyl phthalate (di-n-butyl phth.)	0.081356353	46.57806484	46.57806484	1.4	439.7482014
dichlorobenzene, 1,2-	0.003788337	5.191873589	5.191873589	0.035	15.2022449
dichlorobenzene, 1,3-	0.2752	600	960	0.17	
dichlorobenzene, 1,4-	0.00041	4	4	0.11	0.036591837
dichloroethane, 1,1-	0.000321707	1	33.26143751		0.370454545
dichloroethane, 1,2-	0.000042	0.48	3.552760138		0.023215152
dichloroethylene, 1,1-	0.000234524	0.729	3.2		0.012616099
diethyl phthalate	0.199783069	484.1269841	484.1269841	0.2	550.6756757
dimethyl phthalate	0.093952381	142.8571429	142.8571429	0.071	630.1546392
di-n-octyl phthalate	0.000548534	0.295918367	0.295918367	6.2	
ethylbenzene	0.0017	700	2.233717193	0.01	0.223403353
fluoranthene	0.160534086	2.256699577	2.256699577	1.7	
fluorene	0.023563127	2.03539823	2.03539823	0.54	
hexachlorobenzene	2.42708E-07	0.05	6.61931E-05	0.022	0.000455004
hexachlorobutadiene	0.00115215	0.9	3.923541247	0.011	0.0103125
indeno[1,2,3-cd]pyrene	6.0854E-05	2.27382E-05	5.23736E-05	0.062	
MEK (Methyl Ethyl Ketone;2-Butanone)	1.376	4800	4800		
methylene chloride (dichloromethane)	0.0012	5	61.42722279		0.748763251
methylnaphthalene, 2-	0.043212121	18.18181818	18.18181818	0.67	3015
MIBK (M-Isobutyl-K;4-M,2-Pentanone)	0.183466667	640			
naphthalene	0.00047	53.80434783	53.80434783	2.1	0.013731669
nitrosodiphenylamine, N-	0.008905288	1.593580667	1.382665579	0.028	
pcb mixtures	6.66052E-07	2.30915E-05	1.47662E-05	0.0000039	0.000291233
pcb - Aroclor 1016	1.75613E-06	0.0000641	0.00042189		
pcb - Aroclor 1221	2.44557E-07	2.30915E-05	2.30352E-05		
pcb - Aroclor 1232	0.00012		0.014		
pcb - Aroclor 1242	1.69278E-08	2.30915E-05	2.30352E-05		
pcb - Aroclor 1248	1.01785E-06	2.30915E-05	2.30352E-05		
pcb - Aroclor 1254	4.16425E-07	5.49145E-06	5.48457E-06		
pcb - Aroclor 1260	4.77489E-06	2.30915E-05	2.30352E-05		
phenanthrene	0.101378205	4.807692308	4.807692308	1.5	200
pyrene	0.683027333	9.8	9.828761139	2.6	200
tetrachloroethylene (perchloroethylene)	1.13219E-05	0.020523086	0.02060763	0.057	0.060461399
trichlorobenzene, 1,2,4-	5.02642E-05	1.128133705	0.141842417	0.031	0.12312562

MEDIA - MTCA Standard	Soil Standard to Protect Potable Ground Waters	GW MOST STRINGENT POTABLE	SW MOST STRINGENT Non-Potable	SEDIMENT MOST STRINGENT**	AIR MOST STRINGENT
Note: Natural Background and PQL's Have Not Been Incorporated Into These Screening Levels Because They Are Site Specific And Have Not Been Determined By Ecology	***Screening Levels***	***Screening Levels***	***Screening Levels***	***Screening Levels*** **	***Screening Levels***
UNITS	**mg/kg**	**µg/L**	**µg/L**	**mg/kg DW**	**ppbv**
trichlorethane, 1,1,1-	0.067061333	200	46023.56406		419.7188906
trichlorethane, 1,1,2-	0.000078	0.768	2.335991132		0.027492504
trichloroethylene	0.000186527	0.49	0.739493051	0.16	0.223287671
trimethylbenzene, 1,3,5-	0.044535	45	45.21613312		295.6
toluene	0.554666667	1000	1294.051676		48.58143322
vinyl chloride (chloroethylene)	0.0000056	0.02	0.53322242		0.01216632
xylene (dimethylbenzene)	0.2	1000	1577.950768	0.04	10.59039548
benzoic acid	0.64431792	2242.926156	2242.926156	0.65	
benzyl alcohol	0.055021137	181.9923372	181.9923372	0.057	
dimethylphenol, 2,4-	0.002026013	2.020624303	2.020624303	0.029	
methylphenol, 2- (o-cresol)	0.00268544	7.110609481	7.110609481	0.063	119.7783826
methylphenol, 4- (p-cresol)	0.050166667	77.18894009	77.18894009	0.67	119.7783826
pentachlorophenol	0.000803	0.219	0.698036623	0.36	0.044054054
phenol (total)	0.02388097	78.35820896	78.35820896	0.42	54.62234043
styrene (phenylethylene)	0.080446667	100			1.073357349
Tributyltin			0.0074	0.073	100
Trichlorophenol, 2,4,6-	0.00082238	3	0.558429298		0.096562025
Aluminum	4.586666667	50		7600	2.075259451
Antimony	0.17507732	3.865979381	3.865979381	3.1	0.018314908
Arsenic (III)	7				
Arsenic (V)	10				
Arsenic (total)	0.000157807	0.05	0.005388353	0.39	0.000186018
Barium	0.082573333	2	122.1478478	540	0.040770771
Beryllium	3.161146667	4	12.47090123		0.000193143
Cadmium	0.0014672	0.21	0.25	3.7	0.00030451
Chromium (VI)	0.00083	0.58	0.115176043		5.17251E-06
Chromium, total (or III)	42	50	74	1.6	235.1142396
Cobalt	0.49				0.000112023
Copper	0.053488	7.3	3.1	310	38.4736428
Iron	0.086	300		2300	437.803284
Lead	5.4001548	2.5	0.54	40	0.002088668
Manganese	0.014333333	50	100	180	0.01019158
Mercury	0.000269883	0.005161594	0.005161594	0.41	0.003656713
Mercury (organic)	0.0000018	0.00045	0.000454821		1.133914621
Molybdenum	0.011466667	40		39	1274.233896
Nickel	0.326433333	8.2	8.2	140	0.004164538
Selenium	0.026433333	5	5	3	6.502659574
Silver	0.013156926	1.532250723	1.532250723	6.1	2.26665925
Tin	50				411.9976409
Thallium	0.033504733	0.47	0.47	0.52	11.96301008
Vanadium	0.000321067	1.12		7.8	0.047996231
Zinc	2.028518377	32.56745762	32.56745762	410	
LPAH		0.01	0.01	5.2	
HPAH		0.01	0.01	12	
Total Petroleum Hydrocarbons	Site Specific	No Sheen	No Sheen		
Gasoline	100	1000	1000		300000
Gasoline (w/benzene)	30	800	800		
Diesel	200	500	500		
Heavy Oil	2000	500	500		
2,3,7,8-TCDD (Dioxin)	3.02026E-11	2.06039E-10	2.06039E-10	0.0000039	4.42682E-09

MEDIA - MTCA Standard	Soil Standard to Protect Potable Ground Waters	GW MOST STRINGENT POTABLE	SW MOST STRINGENT Non-Potable	SEDIMENT MOST STRINGENT**	AIR MOST STRINGENT
Note: Natural Background and PQL's Have Not Been Incorporated Into These Screening Levels Because They Are Site Specific And Have Not Been Determined By Ecology	***Screening Levels***	***Screening Levels***	***Screening Levels***	***Screening Levels****	***Screening Levels***
UNITS	**mg/kg**	**µg/L**	**µg/L**	**mg/kg DW**	**ppbv**
Aldrin	5.6837E-07	0.002573529	1.16061E-05	0.0095	3.35014E-05
alpha-BHC	2.30483E-06	0.013888889	0.001125041		0.000116768
beta-BHC	9.55141E-06	0.048611111	0.003937642		0.000386734
gamma-BHC	3.27733E-07	0.0002	0.063	0.01	
Chlordane	9.63356E-06	0.002	0.000186709	0.0028	0.001431918
4,4'-DDT	3.42909E-05	0.257352941	5.05602E-05	0.0012	0.001677047
4,4'-DDE	4.38314E-06	0.257352941	5.05602E-05	0.009	
4,4'-DDD	3.30104E-06	0.364583333	7.16269E-05	0.016	0.002673885
Dieldrin	3.18555E-07	0.00546875	1.23315E-05	0.0019	3.40198E-05
alpha-Endosulfan	0.000020242	96	0.0087		
beta-Endosulfan	0.000020242	96	0.0087		
Endosulfan Sulfate	0.000020242	96	0.0087		
Endrin	2.21953E-05	0.002	0.002		
Endrin Aldehyde	2.21953E-05	0.002	0.002		
Heptachlor	1.79431E-07	0.0004	1.82819E-05	0.0015	0.000124431
Heptachlor Epoxide	7.54762E-07	0.0002	9.04051E-06		5.90345E-05
Toxaphene	5.73333E-08		6.39423E-05	0.44	0.000448841

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MEDIA - MTCA Standard	Soil Standard - Do Not Protect Any Potable Waters	GW MOST STRINGENT Non-Potable	SW MOST STRINGENT Non-Potable	SEDIMENT MOST STRINGENT**	AIR MOST STRINGENT
Note: Natural Background and PQL's Have Not Been Incorporated Into These Screening Levels Because They Are Site Specific And Have Not Been Determined By Ecology	***Screening Levels***	***Screening Levels***	***Screening Levels***	***Screening Levels****	***Screening Levels***
UNITS	**mg/kg**	**µg/L**	**µg/L**	**mg/kg DW**	**ppbv**
acetone	31.78212863	110107	110107.0077		13658.27586
acenaphthene	0.016749455	2.614379085	2.614379085	0.5	
acenaphthylene	0.069091503	10.78431373	10.78431373	0.56	
anthracene	0.223091503	10.78431373	10.78431373	0.96	200
benzene	0.00091708	2.02819	2.028193577		0.026297055
benzo(g,h,i)perylene	0.031003321	0.011584454	0.011584454	0.67	
benzo[a]anthracene	4.78776E-05	0.000112155	0.000258331	0.062	0.000931735
benzo[a]pyrene	5.18596E-06	6.5888E-06	1.51762E-05	0.062	0.000085086
benzo[b]fluoranthene	4.23316E-05	5.26914E-05	0.000121366	0.062	
benzo[k]fluoranthene	4.34357E-05	5.51854E-05	0.00012711	0.062	
bis(2-ethylhexyl) phthalate	0.047081657	0.284848485	0.284848485	1.3	
butyl benzyl phthalate	0.003954085	0.523504274	0.409933862	0.063	
carbon tetrachloride	8.30969E-05	0.247823653	0.247823653		0.009204519
chlorobenzene	0.011093333	270	20		4.972513321
chloroethane	0.010553827		34		236.4
chloroform (trichloromethane)	0.001381798	4.3	4.2952095		0.022320352
chloromethane	0.006094796		20.25073279		19.89891089
chrysene	0.000264903	0.001120636	0.002581193	0.062	0.009317346
dibenz[a,h]anthracene	7.1198E-05	2.71511E-05	6.25379E-05	0.062	7.02586E-05
dibenzofuran	0.015367257	1.327433628	1.327433628	0.54	624
di-butyl phthalate (di-n-butyl phth.)	0.081356353	46.57806484	46.57806484	1.4	439.7482014
dichlorobenzene, 1,2-	0.003788337	5.191873589	5.191873589	0.035	15.2022449
dichlorobenzene, 1,3-	0.2752		960	0.17	
dichlorobenzene, 1,4-	0.002882667	7.142857143	4	0.11	0.036591837
dichloroethane, 1,1-	0.010700426	33.26143751	33.26143751		0.370454545
dichloroethane, 1,2-	0.001174033	3.6	3.552760138		0.023215152
dichloroethylene, 1,1-	0.001029461	2300	3.2		0.012616099
diethyl phthalate	0.199783069	484.1269841	484.1269841	0.2	550.6756757
dimethyl phthalate	0.093952381	142.8571429	142.8571429	0.071	630.1546392
di-n-octyl phthalate	0.000548534	0.295918367	0.295918367	6.2	
ethylbenzene	0.001796951	800	2.233717193	0.01	0.223403353
fluoranthene	0.160534086	2.256699577	2.256699577	1.7	
fluorene	0.023563127	2.03539823	2.03539823	0.54	
hexachlorobenzene	2.42708E-07	0.112426036	6.61931E-05	0.022	0.000455004
hexachlorobutadiene	0.005022787	3.923541247	3.923541247	0.011	0.0103125
indeno[1,2,3-cd]pyrene	6.0854E-05	2.27382E-05	5.23736E-05	0.062	
MEK (Methyl Ethyl Ketone;2-Butanone)	300	73000	4800		
methylene chloride (dichloromethane)	0.018934807	61	61.42722279		0.748763251
methylnaphthalene, 2-	0.043212121	18.18181818	18.18181818	0.67	3015
MIBK (M-Isobutyl-K;4-M,2-Pentanone)					
naphthalene	0.1142625	53.80434783	53.80434783	2.1	0.013731669
nitrosodiphenylamine, N-	0.008905288	1.593580667	1.382665579	0.028	
pcb mixtures	6.66052E-07	2.30915E-05	1.47662E-05	0.0000039	0.000291233
pcb - Aroclor 1016	1.75613E-06	0.0000641	0.00042189		
pcb - Aroclor 1221	2.44557E-07	2.30915E-05	2.30352E-05		
pcb - Aroclor 1232	0.000148633		0.014		
pcb - Aroclor 1242	1.69278E-08	2.30915E-05	2.30352E-05		
pcb - Aroclor 1248	1.01785E-06	2.30915E-05	2.30352E-05		
pcb - Aroclor 1254	4.16425E-07	5.49145E-06	5.48457E-06		
pcb - Aroclor 1260	4.77489E-06	2.30915E-05	2.30352E-05		
phenanthrene	0.101378205	4.807692308	4.807692308	1.5	200
pyrene	0.683027333	9.8	9.828761139	2.6	200
tetrachloroethylene (perchloroethylene)	1.13219E-05	0.020523086	0.02060763	0.057	0.060461399
trichlorobenzene, 1,2,4-	5.02642E-05	1.128133705	0.141842417	0.031	0.12312562
trichlorethane, 1,1,1-	2	46000	46023.56406		419.7188906
trichlorethane, 1,1,2-	0.000824401	2.326407578	2.335991132		0.027492504
trichloroethylene	0.0002815	0.74	0.739493051	0.16	0.223287671

MEDIA - MTCA Standard	Soil Standard - Do Not Protect Any Potable Waters	GW MOST STRINGENT Non-Potable	SW MOST STRINGENT Non-Potable	SEDIMENT MOST STRINGENT**	AIR MOST STRINGENT
Note: Natural Background and PQL's Have Not Been Incorporated Into These Screening Levels Because They Are Site Specific And Have Not Been Determined By Ecology	***Screening Levels***	***Screening Levels***	***Screening Levels***	***Screening Levels*****	***Screening Levels***
UNITS	**mg/kg**	**µg/L**	**µg/L**	**mg/kg DW**	**ppbv**
trimethylbenzene, 1,3,5-	0.044535	45	45.21613312		295.6
toluene	0.71776733	1300	1294.051676		48.58143322
vinyl chloride (chloroethylene)	0.000162988	2.4	0.53322242		0.01216632
xylene (dimethylbenzene)	0.948696667	1300	1577.950768	0.04	10.59039548
benzoic acid	0.64431792	2242.926156	2242.926156	0.65	
benzyl alcohol	0.055021137	181.9923372	181.9923372	0.057	
dimethylphenol, 2,4-	0.002026013	2.020624303	2.020624303	0.029	
methylphenol, 2- (o-cresol)	0.00268544	7.110609481	7.110609481	0.063	119.7783826
methylphenol, 4- (p-cresol)	0.022127496	77.18894009	77.18894009	0.67	119.7783826
pentachlorophenol	0.002559468	5.325443787	0.698036623	0.36	0.044054054
phenol (total)	0.02388097	78.35820896	78.35820896	0.42	54.62234043
styrene (phenylethylene)	33				1.073357349
Tributyltin	2.12133E-06		0.0074	0.073	100
Trichlorophenol, 2,4,6-	0.00082238		0.558429298		0.096562025
Aluminum	77000			7600	2.075259451
Antimony	0.17507732	3.865979381	3.865979381	3.1	0.018314908
Arsenic (III)	7				
Arsenic (V)	10				
Arsenic (total)	0.000157807	7.3	0.005388353	0.39	0.000186018
Barium	4.9544	120	122.1478478	540	0.040770771
Beryllium	9.855586963	120	12.47090123		0.000193143
Cadmium	0.0014672	0.21	0.25	3.7	0.00030451
Chromium (VI)	0.002221362	0.58	0.115176043		5.17251E-06
Chromium, total (or III)	42	305.8823529	74	1.6	235.1142396
Cobalt	2.3				0.000112023
Copper	0.053488	7.3	3.1	310	38.4736428
Iron	0.086			2300	437.803284
Lead	5.4001548	2.5	0.54	40	0.002088668
Manganese	0.014333333	2000	100	180	0.01019158
Mercury	0.000269883	0.005161594	0.005161594	0.41	0.003656713
Mercury (organic)	0.0000018	0.00045	0.000454821		1.133914621
Molybdenum	2			39	1274.233896
Nickel	0.326433333	8.2	8.2	140	0.004164538
Selenium	0.026433333	5	5	3	6.502659574
Silver	0.013156926	1.532250723	1.532250723	6.1	2.26665925
Tin	50				411.9976409
Thallium	0.033504733	0.47	0.47	0.52	11.96301008
Vanadium	2			7.8	0.047996231
Zinc	2.028518377	32.56745762	32.56745762	410	
LPAH				5.2	
HPAH				12	
Total Petroleum Hydrocarbons	Site Specific	No Sheen	No Sheen		
Gasoline	100	1000	1000		300000
Gasoline (w/benzene)	30	800	800		
Diesel	200	500	500		
Heavy Oil	2000	500	500		
2,3,7,8-TCDD (Dioxin)	3.02026E-11	2.06039E-10	2.06039E-10	0.0000039	4.42682E-09
Aldrin	5.6837E-07	1.16061E-05	1.16061E-05	0.0095	3.35014E-05
alpha-BHC	2.30483E-06	0.001125041	0.001125041		0.000116768
beta-BHC	9.55141E-06	0.003937642	0.003937642		0.000386734
gamma-BHC	3.11347E-05	0.019	0.063	0.01	
Chlordane	9.63356E-06	0.000186709	0.000186709	0.0028	0.001431918
4,4'-DDT	3.42909E-05	5.05602E-05	5.05602E-05	0.0012	0.001677047

MEDIA - MTCA Standard	Soil Standard - Do Not Protect Any Potable Waters	GW MOST STRINGENT Non-Potable	SW MOST STRINGENT Non-Potable	SEDIMENT MOST STRINGENT**	AIR MOST STRINGENT
Note: Natural Background and PQL's Have Not Been Incorporated Into These Screening Levels Because They Are Site Specific And Have Not Been Determined By Ecology	***Screening Levels***	***Screening Levels***	***Screening Levels***	***Screening Levels****	***Screening Levels***
UNITS	**mg/kg**	**µg/L**	**µg/L**	**mg/kg DW**	**ppbv**
4,4'-DDE	**4.38314E-06**	**5.05602E-05**	**5.05602E-05**	**0.009**	
4,4'-DDD	**3.30104E-06**	**7.16269E-05**	**7.16269E-05**	**0.016**	**0.002673885**
Dieldrin	**3.18555E-07**	**1.23315E-05**	**1.23315E-05**	**0.0019**	**3.40198E-05**
alpha-Endosulfan	**0.000020242**	**0.056**	**0.0087**		
beta-Endosulfan	**0.000020242**	**0.056**	**0.0087**		
Endosulfan Sulfate	**0.000020242**	**0.056**	**0.0087**		
Endrin	**2.21953E-05**	**0.002**	**0.002**		
Endrin Aldehyde	**2.21953E-05**	**0.002**	**0.002**		
Heptachlor	**1.79431E-07**	**1.82819E-05**	**1.82819E-05**	**0.0015**	**0.000124431**
Heptachlor Epoxide	**7.54762E-07**	**9.04051E-06**	**9.04051E-06**		**5.90345E-05**
Toxaphene	**5.73333E-08**	**6.39423E-05**	**6.39423E-05**	**0.44**	**0.000448841**

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** Sediment 'Most Stringent' values may include HH-direct contact and DMMP open-water disposal values that may not apply to every site. Therefore, the values in this column were not used when calculating the soil and water concentrations that are protective of sediments; only SQS/CSL values were used when calculating the soil and water concentrations that are protective of sediments within the respective worksheets. After comparing these values to SMS SQS/CSL values, additional calculations to be protective of these 'Most Stringent' values may be appropriate.

MEDIA - MTCA Standard	SOIL Method A				SOIL Method B							SOIL Method C				
PATHWAYS HH - Human Health Ecol- Ecological	Soil, Method A, Unrestricted Land Use-HH, WAC 173-340-740(2)(b)(iii) *CLARC Database/* ***Table 740-1***	Soil, Method A, Unrestricted Land Use-Ecol, WAC 173-340-740(2)(b)(ii); ***Table 749-2 (Simplified TEE)***	Soil, Method A, Industrial Land Use-HH, WAC 173-340-745(3)(b)(i) *CLARC Database/* ***Table 745-1***	Soil, Method A, Industrial Land Use-Ecol, WAC 173-340-745(3)(b)(iii) ***Table 749-2 (Simplified TEE)***	Soil, Direct Contact Method B-HH, Carcinogen, WAC 173-340-740(3)(b)(iii)(B)(II) ***CLARC Database*** *EQ. 740-2*	Soil, Direct Contact Method B-HH, Non-carcinogen, WAC 173-340-740(3)(b)(iii)(B)(I) ***CLARC Database*** *EQ. 740-1*	Soil, Direct Contact Method B-HH, Petroleum Mixture, WAC 173-340-740(3)(b)(iii)(B)(III) ***EQ. 740-3*** *(4-Phase Model)*	Site Specific Wildlife Exposure Model WAC 173-340-7493(3) *Table 749-4 & 5*	Soil Terrestrial Method B-Ecol, WAC 173-340-740(3)(b)(ii); WAC 173-340-7493 ***Table 749-3 PLANTS (Site-Specific TEE)***	Soil Terrestrial Method B-Ecol, WAC 173-340-740(3)(b)(ii); WAC 173-340-7493 ***Table 749-3 Soil Biota (Site-Specific TEE)***	Soil Terrestrial Method B-Ecol, WAC 173-340-740(3)(b)(ii); WAC 173-340-7493 ***Table 749-3 Wildlife (Site-Specific TEE)***	Soil, Direct Contact Method C-HH, Carcinogen, WAC 173-340-745(5)(b)(iii)(B)(II) Ingestion Only ***CLARC Database*** *EQ. 745-2*	Soil, Direct Contact Method C-HH, Non-carcinogen, WAC 173-340-745(5)(b)(iii)(B)(I) Ingestion Only ***CLARC Database*** *EQ. 745-1*	Soil, Direct Contact Method C-HH, Carcinogen, WAC 173-340-745(5)(c)(iii)(B) Ingestion + Dermal *EQ. 745-5*	Soil, Direct Contact Method C-HH, Non-carcinogen, WAC 173-340-745(5)(c)(iii)(A) Ingestion + Dermal *EQ. 745-4*	Soil, Direct Contact Method C-HH, Petroleum Mixture, WAC 173-340-745(5)(b)(iii)(B)(III) *EQ. 740-3 (4-Phase Model)*
UNITS	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
acetone						72000	*	*					3150000			*
acenaphthene (CAS 83-29-9)						4800	*	*	20				210000		40000	*
acenaphthylene (CAS 208-96-8)							*	*								*
anthracene						24000	*	*					1050000		200000	*
benzene	0.03		0.03		18.18	320	*	*				2386				*
benzo(g,h,i)perylene							*	*								*
benzo[a]anthracene					1.4		*	*			12	180		3.42465753		*
benzo[a]pyrene	0.1	30	2	300	0.14		*	*			12	18		0.342465753		*
benzo[b]fluoranthene					14		*	*			12	180		3.42465753		*
benzo[k]fluoranthene					14		*	*			12	1800		34.2465753		*
bis(2-ethylhexyl) phthalate					71	1600	*	*				9375	70000	178.5714286	13333	*
butyl benzyl phthalate					526	16000	*	*				69100	700000	178.57	133333	*
carbon tetrachloride					14.3	320	*	*				1880	14000			*
chlorobenzene						1600	*	*		40			70000			*
chloroethane (ethyl chloride)							*	*								*
chloroform (trichloromethane)						800	*	*								*
chloromethane (methyl chloride)							*	*								*
chrysene					140		*	*			12	18000		342.4657534		*
dibenz[a,h]anthracene					0.14		*	*			12	17.98		0.342465753		*
dibenzofuran						80	*	*	600				3500			*
di-butyl phthalate (di-n-butyl phth.)		200				8000	*	*					350000			*
dichlorobenzene, 1,2-						7200	*	*					315000			*
dichlorobenzene, 1,3-							*	*								*
dichlorobenzene, 1,4-							*	*		20						*
dichloroethane, 1,1-						16000	*	*					700000			*
dichloroethane, 1,2-					11	1600	*	*				1442				*
dichloroethylene, 1,1-						4000	*	*					180000			*
diethyl phthalate							*	*					2800000			*
dimethyl phthalate							*	*								*
di-n-octyl phthalate							*	*								*
ethylbenzene	6		6			8000	*	*					350000			*
fluoranthene						3200	*	*					140000		26667	*
fluorene						3200	*	*		30			140000		26667	*
hexachlorobenzene		31		31			*	*				82				*
hexachlorobutadiene						80	*	*					3500			*
indeno[1,2,3-cd]pyrene					1.4		*	*			12	180		3.42465753		*
MEK (Methyl Ethyl Ketone;2-Butanone)						48000							2100000			
methylene chloride (dichloromethane)	0.02		0.02		130	4800	*	*				18000				*
methylnaphthalene, 2-						320	*	*								*
MIBK (M-Isobutyl-K;4-M,2-Pentanone)						6400							280000			
naphthalene	5		5			1600	*	*					70000		13333	*
nitrosodiphenylamine, N-							*	*				26786				*
pcb mixtures	1	2	10	2	0.5		*	*	40		0.65	65.63		1.25		*
pcb - Aroclor 1016						5.6	*	*					250			*
pcb - Aroclor 1221							*	*								*
pcb - Aroclor 1232							*	*								*
pcb - Aroclor 1242							*	*								*
pcb - Aroclor 1248							*	*								*
pcb - Aroclor 1254						1.6	*	*					70			*
pcb - Aroclor 1260							*	*								*
phenanthrene							*	*								*
pyrene						2400	*	*					105000		20000	*
tetrachloroethylene (perchloroethylene)	0.05		0.05			800	*	*					35000			*
trichlorobenzene, 1,2,4-					34.5	800	*	*		20		4530	35000			*
trichlorethane, 1,1,1-	2		2			72000	*	*								*
trichlorethane, 1,1,2-					18	320	*	*				2302				*
trichloroethylene	0.03		0.03		11		*	*				1050				*
trimethylbenzene, 1,3,5-						800	*	*					35000			*
toluene	7		7			6400	*	*	200							*
vinyl chloride (chloroethylene)					0.67	240	*	*				87.5				*
xylene (dimethylbenzene)	9		9			16000	*	*					700000			*
benzoic acid						320000	*	*								*
benzyl alcohol						8000	*	*					350000			*
dimethylphenol, 2,4-							*	*					70000			*
methylphenol, 2- (o-cresol)						4000	*	*								*
methylphenol, 4- (p-cresol)						400	*	*								*
pentachlorophenol		11		11	2.5	400	*	*	3	6	4.5	328	17500			*
phenol (total)						24000	*	*	70	30			1050000			*
styrene (phenylethylene)						16000	*	*	300							*
Tributyltin (oxide)						24	*	*					1050			*
Trichlorophenol, 2,4,6-					91	80	*	*		10			3500	227.3		*
							*	*								*
Aluminum						80000	*	*					3500000			*
Antimony							*	*	5						533	*
Arsenic (III)		20		20			*	*			7					*
Arsenic (V)		95		260			*	*	10	60	132					*
Arsenic (total)	20	20	20	20	0.67	24	*	*				87.5	1050	3.33	400	*
Barium		1250		1320		16000	*	*	500		102		700000		266667	*
Beryllium		25				160	*	*	10			700	7000		2667	*
Cadmium	2	25	2	36			*	*	4	20	14				667	*
Chromium (VI)	19					240	*	*					10500		4000	*
Chromium, total (or III)	2000	42	2000	135		120000	*	*	42	42	67		5250000			*
Cobalt							*	*								*
Copper		100		550		3200	*	*	100	50	217		140000		49333	*
Iron						56000	*	*					2450000			*
Lead	250	220	1000	220			*	*	50	500	118					*
Manganese				23500			*	*	1100		1500					*
Mercury	2	9	2	9			*	*	0.3	0.1	5.5				400	*
Mercury (organic)		0.7		0.7			*	*			0.4					*
Molybdenum				71			*	*	2		7					*
Nickel		100		1850		1600	*	*	30	200	980		70000		26667	*
Selenium		0.8		0.8		400	*	*	1	70	0.3		17500		6667	*
Silver						400	*	*	2				17500		6667	*
Tin		275					*	*	50							*
Thallium							*	*	1						93.3	*
Vanadium		26				5.6	*	*	2				245			*
Zinc		270		570		24000	*	*	86	200	360		1000000		400000	*
							*	*								*
LPAH							*	*								*
HPAH							*	*								*
Total Petroleum Hydrocarbons							*	*								*
Gasoline	100	200	100	12000			*	*		100	5000					*
Gasoline (w/benzene)	30		30				*	*								*
Diesel	2000	460	2000	15000			*	*		200	6000					*
Heavy Oil	2000		2000				*	*								*
							*	*								*
2,3,7,8-TCDD (Dioxin)		0.000005				0.000011	*	*		0.000002		0.0015		0.0000167		*
																*
Aldrin					0.058823529	2.4	*	*			0.1	7.720588235	105			*
alpha-BHC (Benzene HexaChloride)		10			0.158730159		*	*			6	20.83333333				*
beta-BHC		10			0.555555556		*	*			6	72.91666667				*
gamma-BHC (Lindane)	0.01	10	0.01			24	*	*			6		1050			*
Chlordane		1			2.857142857	40	*	*		1	2.7	375	1750			*
4,4'-DDT	3	1	4		2.941176471	40	*	*			0.75	386.0294118	1750			*
4,4'-DDE		1			2.941176471		*	*			0.75	386.0294118				*
4,4'-DDD		1			4.1667		*	*			0.75	546.875				*
Dieldrin		0.17			0.0625	4	*	*			0.07	8.203125	175			*
alpha-Endosulfan						480	*	*					21000			*
beta-Endosulfan						480	*	*					21000			*
Endosulfan Sulfate						480	*	*					21000			*
Endrin		0.4				24	*	*			0.2		1050			*
Endrin Aldehyde							*	*			0.2					*
Heptachlor		0.6			0.2222222	40	*	*			0.4	29.1666667	1750			*
Heptachlor Epoxide		0.6			0.10989011	1.04	*	*			0.4	14.42307692	45.5			*
Toxaphene					0.9090909		*	*				119.3181818				*
							*	*								*

MEDIA - MTCA Standard	SOIL PATHWAY EVALUATION											
PATHWAYS HH - Human Health Ecol- Ecological	Soil to Method B-HH Groundwater Protection - **NC**, WAC 173-340-740(3)(b)(iii)(A) *EQ. 747-1/ 747-2* CLARC Database *Vadose Soil*	Soil to Method B-HH Groundwater Protection -**NC**, WAC 173-340-740(3)(b)(iii)(A) *EQ. 747-1/ 747-2* CLARC Database *Saturated Soil*	Soil to Method B-HH Groundwater Protection - **Carc**, WAC 173-340-740(3)(b)(iii)(A) EQ. 747-1/ 747-2 CLARC Database Vadose Soil	Soil to Method B-HH Groundwater Protection - **Carc**, WAC 173-340-740(3)(b)(iii)(A) EQ. 747-1/ 747-2 CLARC Database Saturated Soil	Soil to Method C-HH Groundwater Protection - **NC**, WAC 173-340-740(3)(b)(iii)(A) *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Method C-HH Groundwater Protection - **NC**, WAC 173-340-740(3)(b)(iii)(A) *EQ. 747-1/ 747-2 Saturated Soil*	Soil to Method C-HH Groundwater Protection - **Carc**, WAC 173-340-740(3)(b)(iii)(A) *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Method C-HH Groundwater Protection - **Carc**, WAC 173-340-740(3)(b)(iii)(A) *EQ. 747-1/ 747-2 Saturated Soil*	Soil to Sediment Protection Ecology **CSL** WAC 173-340-740(1)(d) *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Sediment Protection Ecology **SQS** WAC 173-340-740(1)(d) *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Sediment Protection Ecology **CSL** WAC 173-340-740(1)(d) *EQ. 747-1/ 747-2 Saturated Soil*	Soil to Sediment Protection Ecology **SQS** WAC 173-340-740(1)(d) *EQ. 747-1/ 747-2 Saturated Soil*
UNITS	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
acetone	29.10552946	2.0782632			63.87046742	4.560633133						
acenaphthene (CAS 83-29-9)	121.4086308	6.15328			265.5813799	13.4603			1.17739349	0.330496418	0.059669935	0.016749455
acenaphthylene (CAS 208-96-8)									1.363247471	1.363247471	0.069091503	0.069091503
anthracene	1977.618921	99.296			4532.043361	227.5533333			24.23556118	4.443186216	1.216862745	0.223091503
benzene	0.246511469	0.014469333	0.006124269	0.000359473	0.539243837	0.031651667	0.061242693	0.003594725				
benzo(g,h,i)perylene							6.422880003	0.3211544	1.560116593	0.620046338	0.078008356	0.031003321
benzo[a]anthracene			0.102432	0.00512264			1.024320004	0.0512264	5.402532267	2.201031664	0.270181435	0.110073918
benzo[a]pyrene			0.18888	0.00944504			1.888800004	0.0944504	4.201067626	1.980503309	0.210076512	0.09903607
benzo[b]fluoranthene			0.192792001	0.00964064			1.927920006	0.0964064	9.002241624	4.601145719	0.450160648	0.230082109
benzo[k]fluoranthene			0.18888	0.00944504			1.888800005	0.0944504	9.002287194	4.60116901	0.450163914	0.230083778
bis(2-ethylhexyl) phthalate			20.70000012	1.035541667	2318.400013	115.9806667	207.0000012	10.35541667	1.561890919	0.9411394	0.078135515	0.047081657
butyl benzyl phthalate	611.7762859	30.86613333			1338.260625	67.51966667			1.30735747	0.100094556	0.065960114	0.005050071
carbon tetrachloride	0.231236267	0.010729813	0.004516333	0.000209567	0.505829333	0.023471467	0.045163333	0.002095667				
chlorobenzene	1.532878799	0.088746667			3.353172373	0.194133333						
chloroethane (ethyl chloride)												
chloroform (trichloromethane)					0.868174182	0.056298667						
chloromethane (methyl chloride)												
chrysene			0.056712004	0.00283664	0.567120044	0.0283664	0.567120044	0.0283664	9.207797444	2.201864606	0.460558757	0.110133616
dibenz[a,h]anthracene			0.629328	0.03146744			6.293280001	0.3146744	0.660050382	0.240018321	0.033003611	0.012001313
dibenzofuran	3.67704162	0.185226667			8.043528544	0.405183333			1.180620386	0.305332858	0.059471386	0.015380531
di-butyl phthalate (di-n-butyl phth.)	53.12020532	2.794666667			116.2004491	6.113333333			38.65770658	5.002762027	2.033789954	0.263196347
dichlorobenzene, 1,2-	9.358649269	0.525432			20.53703589	1.153031333			0.067582619	0.067582619	0.003788337	0.003788337
dichlorobenzene, 1,3-												
dichlorobenzene, 1,4-									0.267034562	0.091978571	0.0149447	0.005147619
dichloroethane, 1,1-	4.079396996	0.257365333			8.923680929	0.562986667						
dichloroethane, 1,2-	0.793513525	0.052873067	0.002380541	0.000158619	1.735810836	0.115659833	0.023855	0.001589497				
dichloroethylene, 1,1-	0.471688949	0.02316288			1.035095195	0.050829653	0.004775851	0.000234524				
diethyl phthalate					182.6732133	11.56026667			5.692106968	3.156532046	0.36026455	0.199783069
dimethyl phthalate									1.631429797	1.631429797	0.093952381	0.093952381
di-n-octyl phthalate									90.09184156	1.161183736	4.506581633	0.05808483
ethylbenzene	11.93174041	0.643573333			26.10068216	1.407816667						
fluoranthene	909.440402	45.52746667			1989.400879	99.59133333			24.06771324	3.209028432	1.204851904	0.160646921
fluorene	147.076365	7.409066667			321.7295485	16.20733333			1.608019552	0.468157591	0.08100413	0.023583481
hexachlorobenzene					2.008197333	0.102666667	0.039231569	0.002005667	0.048816479	0.008065331	0.002495069	0.000412229
hexachlorobutadiene	0.775158765	0.010241333			1.695659798	0.022402917	0.543580084	0.007181735	0.15420161	0.096997787	0.007988062	0.005024748
indeno[1,2,3-cd]pyrene			0.642288	0.03211544			6.422880003	0.3211544	1.760131344	0.680050747	0.088009413	0.034003637
MEK (Methyl Ethyl Ketone;2-Butanone)	19.2	1.376			44	3.153333333						
methylene chloride (dichloromethane)			0.028229158	0.001809671			0.282291583	0.018096709				
methylnaphthalene, 2-									1.403786411	0.833498182	0.072778309	0.043212121
MIBK (M-Isobutyl-K;4-M,2-Pentanone)	2.56	0.183466667			5.6	0.401333333						
naphthalene	6.523391213	0.339786667			14.26991828	0.743283333			3.772891304	2.197154348	0.196485507	0.114423913
nitrosodiphenylamine, N-							0.227473352	0.011528793	0.227829375	0.227829375	0.011561091	0.011561091
pcb mixtures			0.039618668	0.001984693			0.396186677	0.019846933	1.305844196	0.241078929	0.065415923	0.012076786
pcb - Aroclor 1016	0.611759881	0.030684267			1.33822474	0.067121833			1.309661255	0.241783616	0.065687577	0.012126937
pcb - Aroclor 1221												
pcb - Aroclor 1232												
pcb - Aroclor 1242												
pcb - Aroclor 1248									1.305964009	0.241101048	0.06542445	0.01207836
pcb - Aroclor 1254	0.485382421	0.024296533			1.061774045	0.053148667			1.303463228	0.240639365	0.065246473	0.012045503
pcb - Aroclor 1260									1.301264831	0.240233507	0.065090016	0.012016618
phenanthrene									9.692387538	2.019247404	0.486615385	0.101378205
pyrene	668.256405	33.4544			1461.810886	73.1815			28.08071129	20.05765092	1.405782901	1.004130644
tetrachloroethylene (perchloroethylene)	0.848554667	0.044133333			1.909248	0.0993						
trichlorobenzene, 1,2,4-			0.008172744	0.000535094	0.947172333	0.062014167	0.081727441	0.005350937	0.046319164	0.020843624	0.002518663	0.001133398
trichlorethane, 1,1,1-	44.58415697	2.414208			97.83745558	5.297845333						
trichlorethane, 1,1,2-			0.004156738	0.000272154	0.378869391	0.024805667	0.041567385	0.002721536				
trichloroethylene	0.01586752	0.0009136	0.003239619	0.000186527	0.035040773	0.002017533	0.033057333	0.001903333				
trimethylbenzene, 1,3,5-	1.494541973	0.079173333			3.269310565	0.173191667						
toluene	15.56360186	0.887466667			13.61815163	0.776533333						
vinyl chloride (chloroethylene)	0.151296	0.007336	0.000182816	8.86433E-06	0.334112	0.016200333	0.00182816	8.86433E-05				
xylene (dimethylbenzene)	20.94786912	1.167626667			45.82346371	2.554183333						
benzoic acid									9.621710689	9.621710689	0.675472165	0.675472165
benzyl alcohol	3.450579114	0.241861333			7.548141812	0.529071667			1.005317197	0.784973702	0.070465666	0.055021137
dimethylphenol, 2,4-									0.037082633	0.037082633	0.002029246	0.002029246
methylphenol, 2- (o-cresol)					10.18514863	0.660916667			0.091443043	0.091443043	0.005188375	0.005188375
methylphenol, 4- (p-cresol)					0.7	0.050166667			0.978761233	0.978761233	0.055627496	0.055627496
pentachlorophenol	5.728000139	0.293333333	0.0156804	0.000803	12.5300003	0.641666667	0.156804004	0.00803	0.73082842	0.381301784	0.037426036	0.019526627
phenol (total)	10.47014422	0.73144			22.90344049	1.600025			2.095527666	0.733434683	0.124179104	0.043462687
styrene (phenylethylene)	23.2815508	1.287146667			50.92839237	2.815633333						
Tributyltin (oxide)												
Trichlorophenol, 2,4,6-	0.221761475	0.011781333	0.110880737	0.005890667	0.485103226	0.025771667	1.108807373	0.058906667				
Aluminum	64	4.586666667			140	10.03333333						
Antimony												
Arsenic (III)												
Arsenic (V)												
Arsenic (total)	2.8032	0.140576	0.0340472	0.001707413	6.424	0.322153333	0.340472	0.017074127				
Barium	461.44	23.12053333			5768	289.0066667						
Beryllium	505.728	25.28917333			1106.28	55.32006667						
Cadmium	2.208	0.111786667			4.83	0.244533333			33.67271	25.63146582	1.683926523	1.281794816
Chromium (VI)	18.432	0.92576			40.32	2.0251						
Chromium, total (or III)									5401.270588	5201.223529	270.0910588	260.0876863
Cobalt												
Copper	284.16	14.26346667			621.6	31.20133333			780.4933153	780.4933153	39.03535426	39.03535426
Iron	44.8	3.210666667			98	7.023333333						
Lead									1334.514188	1133.078085	66.72686322	56.65488386
Manganese					6389.6	319.9046667						
Mercury									0.591436697	0.410998383	0.029572176	0.020550156
Mercury (organic)												
Molybdenum					0.7	0.050166667						
Nickel	417.28	20.89173333			912.8	45.70066667						
Selenium	8.32	0.422933333			18.2	0.925166667						
Silver	13.6	0.686933333			29.75	1.502666667			12.206129	12.206129	0.610439245	0.610439245
Tin												
Thallium												
Vanadium	22.40448	1.120321067			49.0098	2.450702333						
Zinc	5971.2	298.976			13062	654.01			764.6707895	326.5781497	38.24014829	16.33173
LPAH												
HPAH												
Total Petroleum Hydrocarbons												
Gasoline												
Gasoline (w/benzene)												
Diesel												
Heavy Oil												
2,3,7,8-TCDD (Dioxin)			1.6994E-06	8.50203E-08			1.6994E-05	8.50203E-07				
Aldrin	0.2346509	0.0117532	0.00251617	0.00012603	0.513298843	0.025710125	0.025161708	0.0012603				
alpha-BHC (Benzene HexaChloride)			0.00054501	2.84537E-05			0.005450105	0.000284537				
beta-BHC			0.00227403	0.000117914			0.022740303	0.001179144				
gamma-BHC (Lindane)	0.148996776	0.0078656			0.325930447	0.017206						
Chlordane	8.241627595	0.412773333	0.257550862	0.012899167	18.02856036	0.902941667	2.575508623	0.128991667				
4,4'-DDT	108.5014446	5.425765333	3.490395734	0.174542083	237.3469101	11.86886167	34.90395737	1.745420833				
4,4'-DDE			0.445761413	0.022310355			4.457614135	0.223103554				
4,4'-DDD			0.33541677	0.016802431			3.354167703	0.168024306				
Dieldrin	0.411936858	0.020666133	0.002815975	0.000141272	0.901111878	0.045207167	0.028159746	0.001412724				
alpha-Endosulfan	4.300876378	0.22336			9.408167076	0.4886						
beta-Endosulfan	4.300876378	0.22336			9.408167076	0.4886						
Endosulfan Sulfate	4.300876378	0.22336			9.408167076	0.4886						
Endrin	1.057058563	0.0532688			2.312315606	0.1165255						
Endrin Aldehyde	1.057058563	0.0532688			2.312315606	0.1165255						
Heptachlor	1.55709984	0.078517333	0.003784618	0.000190841	3.4061559	0.171756667	0.037846177	0.001908407				
Heptachlor Epoxide	0.17347207	0.008682613	0.008019234	0.000401378	0.379470154	0.018993217	0.08019234	0.004013782				
Toxaphene												

MEDIA - MTCA Standard	SOIL PATHWAY EVALUATION																		
PATHWAYS HH - Human Health Ecol- Ecological	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Fresh - Acute** *Vadose Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Fresh - Acute** *Saturated Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Fresh - Chronic** *Vadose Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Fresh - Chronic** *Saturated Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Marine - Acute** *Vadose Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Marine - Acute** *Saturated Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Marine - Chronic** *Vadose Soil*	Soil to Surface Water Protection Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Marine - Chronic** *Saturated Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Saltwater Acute** *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Saltwater Acute** *EQ. 747-1/ 747-2 Saturated Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Saltwater Chronic** *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Saltwater Chronic** *EQ. 747-1/ 747-2 Saturated Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Freshwater Acute** *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Freshwater Acute** *EQ. 747-1/ 747-2 Saturated Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Freshwater Chronic** *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC Freshwater Chronic** *EQ. 747-1/ 747-2 Saturated Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC HH-Consumption; Water & Organisms** *EQ. 747-1/ 747-2 Vadose Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC HH-Consumption: Water & Organisms** *EQ. 747-1/ 747-2 Saturated Soil*	Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC HH-Consumption Organisms** *EQ. 747-1/ 747-2 Vadose Soil*
UNITS	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**	**mg/kg**
acetone																			
acenaphthene (CAS 83-29-9)																	84.73310692	4.294476667	125.2026505
acenaphthylene (CAS 208-96-8)																			
anthracene																	3419.632718	171.6993333	16480.15768
benzene							6.23										0.016947663	0.000994767	0.392877653
benzo(g,h,i)perylene																			
benzo[a]anthracene																	0.0324368	0.001622169	0.153648001
benzo[a]pyrene																	0.059812	0.002990929	0.283320001
benzo[b]fluoranthene																	0.0610508	0.003052869	0.289188001
benzo[k]fluoranthene																	0.059812	0.002990929	0.283320001
bis(2-ethylhexyl) phthalate																	3.974400023	0.198824	7.286400042
butyl benzyl phthalate																	286.770134	14.4685	363.2421697
carbon tetrachloride																	0.001662011	7.71205E-05	0.011561813
chlorobenzene																	1.245464024	0.072106667	15.32878799
chloroethane (ethyl chloride)																			
chloroform (trichloromethane)																	0.028277673	0.001833728	2.331667802
chloromethane (methyl chloride)																			
chrysene							5.72										0.017958801	0.000898269	0.085068007
dibenz[a,h]anthracene																	0.1992872	0.009964689	0.943992
dibenzofuran																			
di-butyl phthalate (di-n-butyl phth.)																	66.40025665	3.493333333	149.4005775
dichlorobenzene, 1,2-																	5.459212073	0.306502	16.89756118
dichlorobenzene, 1,3-																	1.28	0.091733333	3.84
dichlorobenzene, 1,4-																	0.8096508	0.045402	2.441804
dichloroethane, 1,1-																			
dichloroethane, 1,2-																	0.001884595	0.000125574	0.183500003
dichloroethylene, 1,1-																	2.161907685	0.1061632	46.5137714
diethyl phthalate																	110.9087367	7.018733333	287.0579067
dimethyl phthalate																	1080	77.4	4400
di-n-octyl phthalate																			
ethylbenzene																	7.904778025	0.426367333	31.32081859
fluoranthene																	184.7300817	9.247766667	198.9400879
fluorene																	252.7875024	12.73433333	1217.976148
hexachlorobenzene																	2.0082E-05	1.02667E-06	2.07992E-05
hexachlorobutadiene																	0.042633732	0.000563273	1.744107221
indeno[1,2,3-cd]pyrene																	0.2033912	0.010169889	0.963432
MEK (Methyl Ethyl Ketone;2-Butanone)																			
methylene chloride (dichloromethane)																	0.022273435	0.001427871	2.856810188
methylnaphthalene, 2-																			
MIBK (M-Isobutyl-K;4-M,2-Pentanone)																			
naphthalene																			
nitrosodiphenylamine, N-																	0.41936428	0.0212542	0.76248051
pcb mixtures	1.800848533	0.090213333	0.01260594	0.000631493	9.004242667	0.451066667	0.027012728	0.0013532			0.027012728	0.0013532			0.01260594	0.000631493	5.76272E-05	2.88683E-06	5.76272E-05
pcb - Aroclor 1016																			
pcb - Aroclor 1221																			
pcb - Aroclor 1232																			
pcb - Aroclor 1242																			
pcb - Aroclor 1248																			
pcb - Aroclor 1254																			
pcb - Aroclor 1260																			
phenanthrene																			
pyrene																	1155.5267	57.84823333	5568.803375
tetrachloroethylene (perchloroethylene)																	0.005099716	0.000271492	0.024389947
trichlorobenzene, 1,2,4-																	0.189434467	0.012402833	0.378868933
trichlorethane, 1,1,1-																			
trichlorethane, 1,1,2-																	0.003193328	0.000209076	0.086598718
trichloroethylene																	0.015130861	0.000885917	0.181570332
trimethylbenzene, 1,3,5-																			
toluene																	12.64542651	0.721066667	145.9087675
vinyl chloride (chloroethylene)																	0.000161144	7.76017E-06	0.015469828
xylene (dimethylbenzene)																			
benzoic acid																			
benzyl alcohol																			
dimethylphenol, 2,4-																	6.961625688	0.381013333	15.57205746
methylphenol, 2- (o-cresol)																			
methylphenol, 4- (p-cresol)																			
pentachlorophenol					0.930800023	0.047666667	0.565640014	0.028966667	0.930800023	0.047666667	0.565640014	0.028966667	1.360400033	0.069666667	1.074000026	0.055	0.019332	0.00099	0.214800005
phenol (total)																	43.62560094	3.047666667	3751.80168
styrene (phenylethylene)																			
Tributyltin (oxide)									0.00168	0.0001204	0.0000296	2.12133E-06	0.00184	0.000131867	0.000288	0.00002064			
Trichlorophenol, 2,4,6-																	0.038808258	0.002061733	0.066528442
Aluminum																			
Antimony																	5.0624	0.253605333	578.56
Arsenic (III)																			
Arsenic (V)																			
Arsenic (total)	210.24	10.5432	110.96	5.564466667	40.296	2.02078	21.024	1.05432	40.296	2.02078	21.024	1.05432	198.56	9.957466667	87.6	4.393	0.010512	0.00052716	0.08176
Barium																	824	41.28666667	
Beryllium																			
Cadmium					5.796	0.29344	1.2834	0.064976	5.52	0.279466667	1.2144	0.061482667	0.276	0.013973333	0.0345	0.001746667			
Chromium (VI)	5.76	0.2893	3.84	0.192866667	422.4	21.21533333	19.2	0.964333333	422.4	21.21533333	19.2	0.964333333	6.144	0.308586667	4.224	0.212153333			
Chromium, total (or III)													11402.28	570.1634	1480.296	74.02121333			
Cobalt																			
Copper			5.0616	0.254068	2.1312	0.106976	1.3764	0.069088667	2.1312	0.106976	1.3764	0.069088667	5.772	0.289726667	3.996	0.20058	577.2	28.97266667	
Iron															4	0.286666667	1.2	0.086	
Lead			500.01	25.00071667	42000.84	2100.0602	1620.0324	81.002322	42000.84	2100.0602	1620.0324	81.002322	13000.26	650.0186333	500.01	25.00071667			
Manganese																	0.2	0.014333333	0.4
Mercury	2.1924	0.109802	0.012528	0.00062744	1.8792	0.094116	0.0261	0.001307167	1.8792	0.094116	0.98136	0.049149467	1.4616	0.073201333	0.80388	0.040260733			
Mercury (organic)																			0.0012
Molybdenum																			
Nickel					96.496	4.831213333	10.6928	0.535350667	96.496	4.831213333	10.6928	0.535350667	612.88	30.68473333	67.808	3.394906667	795.44	39.82486667	5998.4
Selenium	2.08	0.105733333	0.52	0.026433333	30.16	1.533133333	7.384	0.375353333	30.16	1.533133333	7.384	0.375353333			0.52	0.026433333	17.68	0.898733333	436.8
Silver					0.323	0.016314667			0.323	0.016314667			0.544	0.027477333					
Tin																			
Thallium																	0.34176	0.0171088	0.66928
Vanadium																			
Zinc			129.376	6.477813333	111.96	5.6058	100.764	5.04522	111.96	5.6058	100.764	5.04522	149.28	7.4744	149.28	7.4744	9205.6	460.9213333	32344
LPAH																			
HPAH																			
Total Petroleum Hydrocarbons																			
Gasoline																			
Gasoline (w/benzene)																			
Diesel																			
Heavy Oil																			
2,3,7,8-TCDD (Dioxin)																	1.465E-08	7.32933E-10	1.4943E-08
Aldrin	2.444280203	0.122429167	0.001857653	9.30462E-05	0.694175578	0.034769883	0.001857653	9.30462E-05	1.271025706	0.063663167			2.933136244	0.146915			4.79079E-05	2.39961E-06	4.88856E-05
alpha-BHC (Benzene HexaChloride)																	0.000102026	5.32653E-06	0.00019228
beta-BHC																	0.000425698	2.20736E-05	0.000795261
gamma-BHC (Lindane)	0.06208199	0.003277333	0.00248328	0.000131093	0.004966559	0.000262187			0.004966559	0.000262187			0.029488945	0.001556733			0.030420175	0.001605893	0.055873791
Chlordane	2.472488278	0.123832	0.004429875	0.000221866	0.09271831	0.0046437	0.004120814	0.000206387	0.09271831	0.0046437	0.004120814	0.000206387	2.472488278	0.123832	0.004429875	0.000221866	0.000824163	4.12773E-05	0.000834465
4,4'-DDT	14.91894863	0.746042733	0.013562681	0.000678221	1.763148475	0.088168687	0.013562681	0.000678221	1.763148475	0.088168687	0.013562681	0.000678221	14.91894863	0.746042733	0.013562681	0.000678221	0.00298379	0.000149209	0.00298379
4,4'-DDE	1.905311642	0.095360833	0.001732101	8.66917E-05	0.225173194	0.011269917	0.001732101	8.66917E-05									0.000381062	1.90722E-05	0.000381062
4,4'-DDD	1.012000313	0.050695333	0.00092	4.60867E-05	0.119600037	0.005991267	0.00092	4.60867E-05									0.0002852	1.42869E-05	0.0002852
Dieldrin	1.287302682	0.064581667	0.00097835	4.90821E-05	0.365593962	0.018341193	0.00097835	4.90821E-05	0.365593962	0.018341193	0.00097835	4.90821E-05	0.123581058	0.00619984	0.02883558	0.001446629	2.67759E-05	1.3433E-06	2.78057E-05
alpha-Endosulfan	0.009856175	0.000511867	0.002508845	0.000130293	0.001523227	7.91067E-05	0.000389767	0.000020242	0.001523227	7.91067E-05	0.000389767	0.000020242	0.009856175	0.000511867	0.002508845	0.000130293	2.777649327	0.144253333	3.987270808
beta-Endosulfan	0.009856175	0.000511867	0.002508845	0.000130293	0.001523227	7.91067E-05	0.000389767	0.000020242	0.001523227	7.91067E-05	0.000389767	0.000020242	0.009856175	0.000511867	0.002508845	0.000130293	2.777649327	0.144253333	3.987270808
Endosulfan Sulfate	0.009856175	0.000511867	0.002508845	0.000130293	0.001523227	7.91067E-05	0.000389767	0.000020242	0.001523227	7.91067E-05	0.000389767	0.000020242	0.009856175	0.000511867	0.002508845	0.000130293	2.777649327	0.144253333	3.987270808
Endrin	0.039639696	0.00199758	0.000506507	2.55246E-05	0.00814816	0.000410614	0.000506507	2.55246E-05	0.00814816	0.000410614	0.000506507	2.55246E-05	0.018938966	0.000954399	0.007927939	0.000399516	0.012993011	0.000654762	0.013213232
Endrin Aldehyde	0.039639696	0.00199758	0.000506507	2.55246E-05	0.00814816	0.000410614	0.000506507	2.55246E-05	0.00814816	0.000410614	0.000506507	2.55246E-05	0.018938966	0.000954399	0.007927939	0.000399516	0.063863955	0.003218323	0.06606616
Heptachlor	0.10121149	0.005103627	0.000739622	3.72957E-05	0.010315786	0.000520177	0.000700695	3.53328E-05	0.010315786	0.000520177	0.000700695	3.53328E-05	0.10121149	0.005103627	0.000739622	3.72957E-05	1.53764E-05	7.75359E-07	1.53764E-05
Heptachlor Epoxide									0.088404036	0.004424793	0.006004802	0.000300552	0.867360352	0.043413067	0.006338403	0.000317249	6.5052E-05	3.25598E-06	6.5052E-05
Toxaphene									0.00084	0.0000602	0.0000008	5.73333E-08	0.00292	0.000209267	0.0000008	5.73333E-08	0.00000112	8.02667E-08	0.00000112

															SOIL POTENTIAL ARAR's										Always Applicable			EPA METHOD	SOIL MOST STRINGENT	
Soil to Surface Water Protection WAC 173-340-740(1)(d) **NRWQC HH-Consumption Organisms** EQ. 747-1/ 747-2 *Saturated Soil*	Soil to Surface Water Protection Aquatic Life Fresh/Acute, **NTR** - 40 CFR 131.36 *Vadose Soil*	Soil to Surface Water Protection Aquatic Life Fresh/Acute, **NTR** - 40 CFR 131.36 *Saturated Soil*	Soil to Surface Water Protection Aquatic Life Fresh/Chronic, **NTR** - 40 CFR 131.36 Vadose Soil	Soil to Surface Water Protection Aquatic Life Fresh/Chronic, **NTR** - 40 CFR 131.36 Saturated Soil	Soil to Surface Water Protection Aquatic Life Marine/Acute, **NTR** - 40 CFR 131.36 *Vadose Soil*	Soil to Surface Water Protection Aquatic Life Marine/Acute, **NTR** - 40 CFR 131.36 *Saturated Soil*	Soil to Surface Water Protection Aquatic Life Marine/Chronic, **NTR** - 40 CFR 131.36 *Vadose Soil*	Soil to Surface Water Protection Aquatic Life Marine/Chronic, **NTR** - 40 CFR 131.36 *Saturated Soil*	Soil to Surface Water Protection HH -Fresh Water **Water & Organism Consumption NTR** - 40 CFR 131.36 (WAC 173-201A-040[5]) HH - 10^{-6} Carc Risk *Vadose Soil*	Soil to Surface Water Protection HH -Fresh Water **Water & Organism Consumption NTR** - 40 CFR 131.36 (WAC 173-201A-040[5]) HH - 10^{-6} Carc Risk *Saturated Soil*	Soil to Surface Water Protection HH - Fresh Water **Organism Consumption Only NTR** - 40 CFR 131.36 (WAC 173-201A-040[5]) HH - 10^{-6} Carc Risk *Vadose Soil*	Soil to Surface Water Protection HH - Fresh Water **Organism Consumption Only NTR** - 40 CFR 131.36 (WAC 173-201A-040[5]) HH - 10^{-6} Carc Risk *Saturated Soil*	Soil Protective of Vapor, Direct Contact, WAC 173-340-740(3)(b)(iii)C	Soil Protective of Vapor, Indoor/Ambient Exposure WAC 173-340-740(3)(c)(iv)(B)	CERCLA EPA Regional Screening Level (RSL; May, 2010) ***Residential***	CERCLA EPA Regional Screening Level (RSL; May, 2010) ***Industrial***	CERCLA - National Oil & Hazardous Substances Pollution Contingency Plan (NCP) - 40 CFR 300 Preliminary Remediation/ Cleanup Goals (PRG's) (2007)	Soil Protection of Surface Water HH – **Organoleptic Effects** CWA §304 **NRWQC** *Vadose Soil*	Soil Protection of Surface Water HH – **Organoleptic Effects** CWA §304 **NRWQC** *Saturated Soil*	CA EPA OEHHA HH-Direct Exposure **Residential** Screening Levels	CA EPA OEHHA HH-Direct Exposure **Industrial** Screening Levels	Soil - Toxics Substances Control Act **(TSCA)** 40 CFR 761.61	CERCLA EPA Regional Screening Level (RSL; May, 2010) ***Potable Groundwater Protection (Risk Based)*** *Saturated Soil*	EPA LDW Plant 2 TMCL's ***Groundwater Protection (Risk Based)***	Natural **Background** Levels Ch. 173-340 WAC	Applicable **DL (MDL)** Ch. 173-340 WAC	Applicable **PQL** Ch. 173-340 WAC	Analytical Method	Screening Level (Includes to Protect Potable GW & SW)	**(Groundwater Standards are Highlighted When Most Applicable)**
mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	METHOD	mg/kg	**Regulatory Framework For Most Stringent Criteria**
															61000	630000							4.5	445.50396		0.00203	0.02	8260B-Low Soil	2.0782632	Protect Groundwater Method B-HH WAC 173-340-740(3)(b)(iii)(A) EQ. 747-1/ 747-2 Saturated Soil
6.34557															3400	33000		2.529346475	0.128193333				22	12.06543591		0.0005		8270D-SIM	0.016749455	Protect Sediment SQS WAC 173-340-740(1)(d) EQ. 747-1/ 747-2 Saturated Soil
																								66		0.0003		8270D-SIM	0.069091503	Protect Sediment SQS WAC 173-340-740(1)(d) EQ. 747-1/ 747-2 Saturated Soil
827.4666667									3955.237842	198.592	45320.43361	2275.533333			17000	170000							360	66.2409256		0.0023		8270D-SIM	0.223091503	Protect Sediment SQS WAC 173-340-740(1)(d) EQ. 747-1/ 747-2 Saturated Soil
0.0230605									0.00924418	0.0005426	0.546947321	0.032103833			1.1	5.4							0.00021	0.0146224		0.00022	0.001	8260B-Low Soil	0.00021	EPA RSL - Groundwater Protection
																										0.0013		8270D-SIM	0.031003321	Protect Sediment SQS WAC 173-340-740(1)(d) EQ. 747-1/ 747-2 Saturated Soil
0.00768396									0.0239008	0.001195283	0.264616001	0.013233487			0.15	2.1							0.01	0.00039655		0.002		8270D-SIM	0.00039655	Protect Groundwater to Surface Water -Tribal HH - EPA Plant 2 TMCL (MTCA EQ 747-1)
0.01416756									0.044072	0.002203843	0.487940001	0.024399687			0.015	0.21				0.038	0.13		0.0035	7.72944E-05		0.0003		8270D-SIM	7.72944E-05	Protect Groundwater to Surface Water -Tribal HH - EPA Plant 2 TMCL (MTCA EQ 747-1)
0.01446096									0.0449848	0.002249483	0.498046001	0.024904987			0.15	2.1							0.035	0.000630756		0.003		8270D-SIM	0.000630756	Protect Groundwater to Surface Water -Tribal HH - EPA Plant 2 TMCL (MTCA EQ 747-1)
0.01416756									0.044072	0.002203843	0.487940001	0.024399687			1.5	21							0.35	0.000647389		0.02		8270D-SIM	0.000647389	Protect Groundwater to Surface Water -Tribal HH - EPA Plant 2 TMCL (MTCA EQ 747-1)
0.364510667									5.961600034	0.298236	19.54080011	0.977551333			35	120							1.1	2.875200009		0.004	0.02	8270D-SIM	0.047081657	Protect Sediment SQS WAC 173-340-740(1)(d) EQ. 747-1/ 747-2 Saturated Soil
18.32676667															260	910							0.51	0.060311037		0.004	0.02	8270D-SIM	0.005050071	Protect Sediment SQS WAC 173-340-740(1)(d) EQ. 747-1/ 747-2 Saturated Soil
0.000536491									0.001806533	8.38267E-05	0.031794987	0.001475349			0.61	3							0.00017	0.001717233		0.00039	0.001	8260B-Low Soil	7.71205E-05	Protect Surface Water HH-Consumption: Water & Organisms NRWQC (WAC 173-340-740(1)(d)) EQ. 747-1/ 747-2 Saturated Soil
0.887466667									6.514734897	0.377173333	201.1903424	11.648			290	1400		0.19160985	0.011093333				0.062	2.414196		0.00054	0.001	8260B-Low Soil	0.011093333	Protect Surface Water HH – Organoleptic Effects CWA §304 NRWQC Saturated Soil
									0.002157324	0.000127267	0.178900071	0.010553827			15000	610000							5.9	106.25972		0.00047	0.004	8260B-Low Soil	0.000127267	Protect Surface Water; HH -Fresh Water Water & Organism Consumption NTR - 40 CFR 131.36 (WAC 173-201A-040[5]) HH - 10-6 Carc Risk Saturated Soil
0.151202133									0.028277673	0.001833728	2.331667802	0.151202133			0.29	1.5							0.000053	0.02105452		0.00035	0.001	8260B-Low Soil	0.000053	EPA RSL - Groundwater Protection
															120	500							0.049	9.29059E-01		0.00041	0.002	8260B-Low Soil	0.049	EPA RSL - Groundwater Protection
0.00425496									0.013232801	0.000661883	0.146506011	0.007327987			15	210							1.1	0.004042807		0.0003		8270D-SIM	0.000661883	Protect Surface Water; HH -Fresh Water Water & Organism Consumption NTR - 40 CFR 131.36 (WAC 173-201A-040[5]) HH - 10-6 Carc Risk Saturated Soil
0.04720116									0.1468432	0.007342403	1.625764	0.081290887			0.015	0.21							0.011	0.001036527		0.0004		8270D-SIM	0.001036527	Protect Groundwater to Surface Water -Tribal HH - EPA Plant 2 TMCL (MTCA EQ 747-1)
															78	1000							0.68	15		0.004	0.02	8270D-SIM	0.015380531	Protect Sediment SQS WAC 173-340-740(1)(d) EQ. 747-1/ 747-2 Saturated Soil
7.86									89.64034648	4.716	398.4015399	20.96			6100	62000							9.2	1.646068814		0.004	0.02	8270D-SIM	0.263196347	Protect Sediment SQS WAC 173-340-740(1)(d) EQ. 747-1/ 747-2 Saturated Soil
0.948696667									35.09493476	1.97037	220.9681077	12.40603333			1900	9800							0.36	5.188931733		0.00059	0.001	8260B-Low Soil	0.003788337	Protect Sediment SQS WAC 173-340-740(1)(d) EQ. 747-1/ 747-2 Saturated Soil
0.2752									1.6	0.114666667	10.4	0.745333333														0.00055	0.001	8260B-Low Soil	0.091733333	Protect Surface Water HH-Consumption: Water & Organisms NRWQC (WAC 173-340-740(1)(d)) EQ. 747-1/ 747-2 Saturated Soil
0.136926667									5.14064	0.288266667	33.41416	1.873733333			2.4	12							0.00041			0.00058	0.001	8260B-Low Soil	0.00041	EPA RSL - Groundwater Protection
															3.3	17							0.00069	0.166786484		0.00051	0.001	8260B-Low Soil	0.00069	EPA RSL - Groundwater Protection
0.012226897									0.001884595	0.000125574	0.490986494	0.03271521			0.43	2.2							0.000042	0.017271767		0.00035	0.001	8260B-Low Soil	0.000042	EPA RSL - Groundwater Protection
2.284117333									0.00037342	1.83373E-05	0.020963953	0.001029461			240	1100							0.12	14.92945333		0.00051	0.001	8260B-Low Soil	1.83373E-05	Protect Surface Water HH-Consumption: Water & Organisms NRWQC (WAC 173-340-740(1)(d)) EQ. 747-1/ 747-2 Saturated Soil
18.16613333									150.0529967	9.495933333	782.8852	49.544			49000	490000							12	112.2612678		0.008	0.02	8270D-SIM	0.199783069	Protect Sediment SQS WAC 173-340-740(1)(d) EQ. 747-1/ 747-2 Saturated Soil
315.3333333									1252	89.72666667	11600	831.3333333														0.005	0.02	8270D-SIM	0.093952381	Protect Sediment SQS WAC 173-340-740(1)(d) EQ. 747-1/ 747-2 Saturated Soil
																										0.003	0.02	8270D-SIM	0.05808483	Protect Sediment SQS WAC 173-340-740(1)(d) EQ. 747-1/ 747-2 Saturated Soil
1.68938									46.23549411	2.493846667	432.52559	23.32953333			5.4	27							0.0017	5.4		0.00009	0.001	8260B-Low Soil	0.0017	EPA RSL - Groundwater Protection
9.959133333									426.3001884	21.341	525.7702324	26.32056667			2300	22000							160	12.24301258		0.0003		8270D-SIM	0.160646921	Protect Sediment SQS WAC 173-340-740(1)(d) EQ. 747-1/ 747-2 Saturated Soil
61.35633333									298.7488665	15.04966667	3217.295485	162.0733333			2300	22000							27	8.42420358		0.0005		8270D-SIM	0.023583481	Protect Sediment SQS WAC 173-340-740(1)(d) EQ. 747-1/ 747-2 Saturated Soil
1.06333E-06									0.000053791	0.00000275	5.52254E-05	2.82333E-06			0.3	1.1							0.00053			0.0005		8270D-SIM	1.02667E-06	Protect Surface Water HH-Consumption: Water & Organisms NRWQC (WAC 173-340-740(1)(d)) EQ. 747-1/ 747-2 Saturated Soil
0.023043									0.042633732	0.000563273	4.844742281	0.064008333			6.2	22							0.0017			0.004	0.02	8270D-SIM	0.000563273	Protect Surface Water HH-Consumption: Water & Organisms NRWQC (WAC 173-340-740(1)(d)) EQ. 747-1/ 747-2 Saturated Soil
0.04817316									0.1498672	0.007493603	1.659244001	0.082964887			0.15	2.1							0.12	0.000885763		0.0003		8270D-SIM	0.000885763	Protect Groundwater to Surface Water -Tribal HH - EPA Plant 2 TMCL (MTCA EQ 747-1)
															28000	200000							1.5	300		0.005	0.01	8260	1.376	Protect Groundwater Method B-HH WAC 173-340-740(3)(b)(iii)(A) EQ. 747-1/ 747-2 Saturated Soil
0.183139933									0.02275764	0.001458911	7.747281865	0.496650667			11	53							0.0012	0.280005453		0.00051	0.0035	8260B-Low Soil	0.0012	EPA RSL - Groundwater Protection
															310	4100							0.75	222.2222222		0.0007	0.01	8270D-SIM	0.043212121	Protect Sediment SQS WAC 173-340-740(1)(d) EQ. 747-1/ 747-2 Saturated Soil
															5300	53000							0.45			0.005	0.01	8260	0.183466667	Protect Groundwater Method B-HH WAC 173-340-740(3)(b)(iii)(A) EQ. 747-1/ 747-2 Saturated Soil
															3.6	18							0.00047	3.912406992		0.0008	0.002	8260B-Low Soil	0.00047	EPA RSL - Groundwater Protection
0.038644									0.635400425	0.032203333	2.033281359	0.103050667			99	350							0.075	0.090354028		0.012		8270D-SIM	0.011528793	Protect Groundwater Method C-HH WAC 173-340-740(3)(b)(iii)(A) EQ. 747-1/ 747-2 Saturated Soil
2.88683E-06									0.000153072	7.66813E-06	0.000153072	7.66813E-06			0.22	0.74				0.089	0.3	1	0.00012	6.03617E-05				8082/1668A	2.88683E-06	Protect Surface Water HH-Consumption: Water & Organisms NRWQC (WAC 173-340-740(1)(d)) EQ. 747-1/ 747-2 Saturated Soil
			0.007646999	0.000383553			0.016386425	0.0008219							3.9	21							0.092	6.14091E-05		0.00202	0.1	8082	6.14091E-05	Protect Groundwater to Surface Water -AWQC HH - EPA Plant 2 TMCL (MTCA EQ 747-1)
			0.002949131	0.000148633			0.006319565	0.0003185							0.14	0.54							0.00012	3.97083E-06		0.033	0.1	8082	3.97083E-06	Protect Groundwater to Surface Water -Tribal Adult HH - EPA Plant 2 TMCL (MTCA EQ 747-1)
			0.002949131	0.000148633			0.006319565	0.0003185							0.14	0.54							0.00012			0.033	0.1	8082	0.00012	EPA RSL - Groundwater Protection
			0.000181685	1.02881E-05			0.000389324	0.000022046							0.22	0.74							0.0053	3.61618E-05		0.033	0.1	8082	1.02881E-05	
			0.012348437	0.000618613			0.026460936	0.0013256							0.22	0.74							0.0052	0.22		0.0033	0.1	8082	0.000618613	Protect Surface Water Aquatic Life Fresh/Chronic NTR - 40 CFR 131.36 Saturated Soil
			0.021235481	0.001062973			0.045504602	0.0022778							0.22	0.74							0.0088	1.43548E-05		0.00209	0.1	8082	1.43548E-05	Protect Groundwater to Surface Water -Tribal Adult HH - EPA Plant 2 TMCL (MTCA EQ 747-1)
			0.058016334	0.002902013			0.124320715	0.0062186							0.22	0.74							0.024	0.000161595		0.00234	0.1	8082	0.000161595	Protect Groundwater to Surface Water -Tribal HH - EPA Plant 2 TMCL (MTCA EQ 747-1)
																								100		0.003	0.02	8270	0.101378205	Protect Sediment SQS WAC 173-340-740(1)(d) EQ. 747-1/ 747-2 Saturated Soil
278.7866667									1336.51281	66.9088	15314.20928	766.6633333			1700	17000							120	10.68984766		0.0028		8270	1.004130644	Protect Sediment SQS WAC 173-340-740(1)(d) EQ. 747-1/ 747-2 Saturated Soil
0.00129844									0.005912714	0.000314773	0.065409403	0.00348218			0.55	2.6							0.000049	0.000147884		0.0004	0.001	8260B-Low Soil	0.000049	EPA RSL - Groundwater Protection
0.024805667															22	99							0.0068	0.499528533		0.00058	0.002	8260B-Low Soil	0.000535094	Protect Sediment SQS WAC 173-340-740(1)(d) EQ. 747-1/ 747-2 Saturated Soil
															8700	38000							3.2	280.5908		0.00055	0.001	8260B-Low Soil	2	Soil, HH-Method A, Unrestricted Land Use WAC 173-340-740(2)(b)(iii) CLARC Database
0.005669867									0.003247452	0.00021262	0.227321635	0.0148834			1.1	5.3							0.000078	0.012279089		0.00056	0.001	8260B-Low Soil	0.000078	EPA RSL - Groundwater Protection
0.010631									0.01634133	0.00095679	0.490239896	0.0287037			2.8	14							0.00072	0.004399645		0.00053	0.001	8260B-Low Soil	0.000186527	EPA RSL - Groundwater Protection
															780	10000							0.52	0.74685		0.00055	0.001	8260B-Low Soil	0.079173333	Protect Groundwater Method B-HH WAC 173-340-740(3)(b)(iii)(A) EQ. 747-1/ 747-2 Saturated Soil
8.32									66.14530792	3.771733333	1945.450233	110.9333333			5000	45000							1.6	11.89430667		0.00054	0.001	8260B-Low Soil	0.721066667	Protect Surface Water HH-Consumption: Water & Organisms NRWQC (WAC 173-340-740(1)(d)) EQ. 747-1/ 747-2 Saturated Soil
0.000744976									0.012891524	0.000620813	3.384024973	0.1629635			0.06	1.7							0.0000056	0.01526064		0.00016	0.001	8260B-Low Soil	0.0000056	EPA RSL - Groundwater Protection
															630	2700							0.2	15.63605333		0.00168	0.002	8260B-Low Soil	0.2	EPA RSL - Groundwater Protection
															240000	2500000							34			0.047	0.2	8270D-SIM	0.675472165	Protect Sediment SQS WAC 173-340-740(1)(d) EQ. 747-1/ 747-2 Saturated Soil
															6100	62000							0.89			0.001		8270D-SIM	0.055021137	Protect Sediment SQS WAC 173-340-740(1)(d) EQ. 747-1/ 747-2 Saturated Soil
0.852266667															1200	12000		7.32802704	0.401066667				0.86	9.066142408		0.02		8270D-SIM	0.002029246	Protect Sediment SQS WAC 173-340-740(1)(d) EQ. 747-1/ 747-2 Saturated Soil
															3100	31000							1.5	30.93420286		0.004	0.02	8270D-SIM	0.005188375	Protect Sediment SQS WAC 173-340-740(1)(d) EQ. 747-1/ 747-2 Saturated Soil
															310	3100							0.15	3.341186422		0.004	0.02	8270D-SIM	0.050166667	Protect Groundwater Method C-HH WAC 173-340-740(3)(b)(iii)(A) EQ. 747-1/ 747-2 Saturated Soil
0.011	1.432000035	0.073333333	0.930800023	0.047666667	0.930800023	0.047666667	0.565640014	0.028966667	0.020048	0.001026667	0.587120014	0.030066667			3	9		2.148000052	0.11	4.4	13		0.0057			0.061	0.1	8270D-SIM	0.000803	Protect Surface Water HH-Consumption: Water & Organisms NRWQC (WAC 173-340-740(1)(d)) EQ. 747-1/ 747-2 Saturated Soil
262.0993333									91.61376196	6.4001	20067.77643	1401.926667			18000	180000		1.308768028	0.09143				6.3	315.1395111		0.002	0.02	8270D-SIM	0.043462687	Protect Sediment SQS WAC 173-340-740(1)(d) EQ. 747-1/ 747-2 Saturated Soil
															6300	36000							1.8			0.00055	0.001	8260B-Low Soil	1.287146667	Protect Groundwater Method B-HH WAC 173-340-740(3)(b)(iii)(A) EQ. 747-1/ 747-2 Saturated Soil
															18	180							0.024					Krone et al	2.12133E-06	
0.0035344									0.058212387	0.0030926	0.180181198	0.009572333			44	160		0.055440369	0.002945333				0.023			0.016	0.1	8270C	0.002061733	Protect Surface Water HH-Consumption: Water & Organisms NRWQC (WAC 173-340-740(1)(d)) EQ. 747-1/ 747-2 Saturated Soil
															77000	990000							55000						4.586666667	Protect Groundwater Method B-HH WAC 173-340-740(3)(b)(iii)(A) EQ. 747-1/ 747-2 Saturated Soil
28.98346667									12.656	0.634013333	3887.2	194.7326667			31	410				30	380		0.66	3.494845361	5			6010B/6020	0.253605333	Protect Surface Water; HH -Fresh Water Water & Organism Consumption NTR - 40 CFR 131.36 (WAC 173-201A-040[5]) HH - 10-6 Carc Risk Saturated Soil
																													7	Soil, Method B-Terrestrial Ecological WAC 173-340-740(3)(b)(ii); WAC 173-340-7493 Table 749-3 Wildlife
																													10	Soil, Method B-Terrestrial Ecological WAC 173-340-740(3)(b)(ii); WAC 173-340-7493 Table 749-3 Plants
0.004100133	210.24	10.5432	110.96	5.564466667	40.296	2.02078	21.024	1.05432	0.010512	0.00052716	0.08176	0.004100133			0.39	1.6				0.07	0.24		0.0013	7.3	7	0.07	0.5	6010B/6020	0.00052716	Protect Surface Water HH-Consumption: Water & Organisms NRWQC (WAC 173-340-740(1)(d)) EQ. 747-1/ 747-2 Saturated Soil
															15000	190000				5200	63000		300	100.6498266					23.12053333	Protect Groundwater Method B-HH WAC 173-340-740(3)(b)(iii)(A) EQ. 747-1/ 747-2 Saturated Soil
															160	2000				150	1700		58	140					10	Soil, Method B-Terrestrial Ecological WAC 173-340-740(3)(b)(ii); WAC 173-340-7493 Table 749-3 Plants
	0.5106	0.025850667	0.138	0.006986667	5.796	0.29344	1.2834	0.064976							70	800				1.7	7.5		1.4	0.77	1	0.039	0.2	6010B/6020	0.001746667	Protect Surface Water WAC 173-340-740(1)(d) NRWQC Freshwater Chronic EQ. 747-1/ 747-2 Saturated Soil
	5.76	0.2893	3.84	0.192866667	422.4	21.21533333	19.2	0.964333333							0.29	5.6				17	37		0.00083	0.22	117	0.003	0.1		0.00083	EPA RSL - Groundwater Protection
	11002.2	550.1576667	3600.72	180.0516											120000	1500000				100000	100000		77000000		117	0.04	0.5	6010B/6020	42	Soil, Method B-Terrestrial Ecological WAC 173-340-740(3)(b)(ii); WAC 173-340-7493 Table 749-3 Plants/Soil Biota
															2.3	300				660	3200		0.49						0.49	EPA RSL - Groundwater Protection
	7.548	0.378873333	4.884	0.245153333	1.0656	0.053488	1.0656	0.053488							3100	41000		444	22.28666667	3000	38000		51	36	36	0.063	0.2	6010B/6020	0.053488	Protect Surface Water WAC 173-340-740(1)(d) NRWQC Saltwater Chronic EQ. 747-1/ 747-2 Saturated Soil
															55000	720000							640						0.086	
	13000.26	650.0186333	500.01	25.00071667	42000.84	2100.0602	1620.0324	81.002322							400	800				150	3500			250	17	0.15	0.5	6010B/6020	25.00071667	Protect Surface Water Aquatic Life SWQS:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) Marine - Acute Saturated Soil
0.028666667															1800	23000							57	1700					0.014333333	Soil, Method B-Terrestrial Ecological WAC 173-340-740(3)(b)(ii); WAC 173-340-7493 Table 749-3 Plants
	2.1924	0.109802	167.04	8.365866667	1.8792	0.094116	0.0261	0.001307167	0.14616	0.007320133	0.1566	0.007843			5.6	34							0.03	0.07	0.07	0.005	0.05	7470A/7471A	0.00062744	Protect Surface Water Aquatic Life SWQS:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) Fresh - Chronic Saturated Soil
0.000086															7.8	34								0.0000018					0.0000018	Protect Groundwater to Surface Water -Tribal HH - EPA Plant 2 TMCL (MTCA EQ 747-1)
															390	5100							3.7						0.050166667	Protect Groundwater Method B-HH WAC 173-340-740(3)(b)(iii)(A) EQ. 747-1/ 747-2 Saturated Soil
300.3186667	1825.6	91.40133333	6.52	0.326433333	96.496	4.831213333	10.6928	0.535350667	795.44	39.82486667	5998.4	300.3186667			3700	44000				1600	16000		48	38	38	0.1	0.5		0.326433333	Protect Surface Water Aquatic Life SWQS:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) Marine - Chronic Saturated Soil
22.204	2.08	0.105733333			30.16	1.533133333	7.384	0.375353333							390	5100				380	4800		0.95	0.52					0.026433333	Protect Surface Water Aquatic Life SWQS:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) Fresh - Chronic Saturated Soil
	0.578	0.029194667			0.323	0.016314667									390	5100				380	4800		1.6	3.7		0.1	0.5	6010B/6020	0.016314667	Protect Surface Water Aquatic Life SWQS:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) Marine - Chronic Saturated Soil
															47000	610000							5500						50	Soil, Method B-Terrestrial Ecological WAC 173-340-740(3)(b)(ii); WAC 173-340-7493 Table 749-3 Plants
0.033504733									2.4208	0.121187333	8.9712	0.449106								5	63								0.0171088	Protect Surface Water HH-Consumption: Water & Organisms NRWQC (WAC 173-340-740(1)(d)) EQ. 747-1/ 747-2 Saturated Soil
															390	5200				530	6700		180	5					1.120321067	Protect Groundwater Method B-HH WAC 173-340-740(3)(b)(iii)(A) EQ. 747-1/ 747-2 Saturated Soil
1619.453333	136.84	6.851533333	124.4	6.228666667	111.96	5.6058	100.764	5.04522							23000	310000		6220	311.4333333	23000	100000		680	85	86	0.66		6010B/6020	5.04522	Protect Surface Water Aquatic Life SWQS:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) Marine - Chronic Saturated Soil
																													100	Soil, HH-Method A, Unrestricted Land Use WAC 173-340-740(2)(b)(iii) CLARC Database/Method B-Terrestrial Ecological Table 749-3 Soil Biota
																													30	Soil, HH-Method A, Unrestricted Land Use WAC 173-340-740(2)(b)(iii) CLARC Database
																										1.6	10		200	Soil, Method B-Terrestrial Ecological WAC 173-340-740(3)(b)(ii); WAC 173-340-7493 Table 749-3 Soil Biota
																										3.19	25		2000	Soil, HH-Method A, Unrestricted Land Use WAC 173-340-740(2)(b)(iii) CLARC Database
7.47592E-10									3.809E-08	1.90563E-09	4.102E-08	2.05221E-09			0.0000045	0.000018	0.000072			0.0000046	0.000019		0.00000026	0.0000045	0.0000052	0.000000008		1613B	7.32933E-10	Protect Surface Water HH-Consumption: Water & Organisms NRWQC (WAC 173-340-740(1)(d)) EQ. 747-1/ 747-2 Saturated Soil
2.44858E-06	2.933136244	0.146915			1.271025706	0.063663167			0.000127103	6.36632E-06	0.00013688	6.85603E-06			0.029	0.1				0.033	0.13		0.00065			0.000012	0.0001	8081B	2.39961E-06	Protect Surface Water HH-Consumption: Water & Organisms NRWQC (WAC 173-340-740(1)(d)) EQ. 747-1/ 747-2 Saturated Soil
1.00385E-05									0.000153039	7.9898E-06	0.00051013	2.66327E-05			0.077	0.27							0.000062			0.0000069	0.00005	8081B	5.32653E-06	Protect Surface Water HH-Consumption: Water & Organisms NRWQC (WAC 173-340-740(1)(d)) EQ. 747-1/ 747-2 Saturated Soil
4.12363E-05									0.000654921	3.39593E-05	0.002151882	0.000111581			0.27	0.96							0.00022			0.000012	0.00005	8081B	2.20736E-05	Protect Surface Water HH-Consumption: Water & Organisms NRWQC (WAC 173-340-740(1)(d)) EQ. 747-1/ 747-2 Saturated Soil
0.0029496	0.06208199	0.003277333	0.00248328	0.000131093	0.004966559	0.000262187			0.000589779	3.11347E-05	0.001955583	0.000103236			0.52	2.1				0.5	2		0.00036			0.000011	0.00005	8081B	3.11347E-05	Protect Surface Water; HH -Fresh Water Water & Organism Consumption NTR - 40 CFR 131.36 (WAC 173-201A-040[5]) HH - 10-6 Carc Risk Saturated Soil
4.17933E-05	2.472488278	0.123832	0.004429875	0.000221866	0.09271831	0.0046437	0.004120814	0.000206387	0.000587216	2.94101E-05	0.00060782	3.0442E-05			1.6	6.5				0.038	1.7		0.013			0.0000066	0.00005	8081B	2.94101E-05	Protect Surface Water; HH -Fresh Water Water & Organism Consumption NTR - 40 CFR 131.36 (WAC 173-201A-040[5]) HH - 10-6 Carc Risk Saturated Soil
0.000149209	14.91894863	0.746042733	0.013562681	0.000678221	1.763148475	0.088168687	0.013562681	0.000678221	0.008001982	0.00040015	0.008001982	0.00040015			1.7	7				1.6	6.3		0.067			0.000014	0.00005	8081B	0.000149209	Protect Surface Water HH-Consumption: Water & Organisms NRWQC (WAC 173-340-740(1)(d)) EQ. 747-1/ 747-2 Saturated Soil
1.90722E-05									0.00102194	5.11481E-05	0.00102194	5.11481E-05			1.4	5.1				1.6	6.3		0.047			0.0000055	0.00005	8081B	1.90722E-05	Protect Surface Water HH-Consumption: Water & Organisms NRWQC (WAC 173-340-740(1)(d)) EQ. 747-1/ 747-2 Saturated Soil
1.42869E-05									0.0007636	3.82519E-05	0.0007728	3.87128E-05			2	7.2				2.3	9		0.066			0.0000094	0.00005	8081B	1.42869E-05	Protect Surface Water HH-Consumption: Water & Organisms NRWQC (WAC 173-340-740(1)(d)) EQ. 747-1/ 747-2 Saturated Soil
1.39496E-06	1.287302682	0.064581667	0.00097835	4.90821E-05	0.365593962	0.018341193	0.00097835	4.90821E-05	7.2089E-05	3.61657E-06	7.2089E-05	3.61657E-06			0.03	0.11				0.035	0.13		0.00017			0.000098	0.0005	8081B	1.3433E-06	Protect Surface Water HH-Consumption: Water & Organisms NRWQC (WAC 173-340-740(1)(d)) EQ. 747-1/ 747-2 Saturated Soil
0.207073333	0.009856175	0.000511867	0.002508845	0.000130293	0.001523227	7.91067E-05	0.000389767	0.000020242							370	3700							3			0.000043	0.0002	8081B	0.000020242	Protect Surface Water Aquatic Life Marine/Chronic NTR - 40 CFR 131.36 Saturated Soil
0.207073333	0.009856175	0.000511867	0.002508845	0.000130293	0.001523227	7.91067E-05	0.000389767	0.000020242							370	3700							3			0.000043	0.0001	8081B	0.000020242	Protect Surface Water Aquatic Life Marine/Chronic NTR - 40 CFR 131.36 Saturated Soil
0.207073333	0.009856175	0.000511867	0.002508845	0.000130293	0.001523227	7.91067E-05	0.000389767	0.000020242							370	3700							3			0.000017	0.00005	8081B	0.000020242	Protect Surface Water Aquatic Life Marine/Chronic NTR - 40 CFR 131.36 Saturated Soil
0.00066586	0.039639696	0.00199758	0.000506507	2.55246E-05	0.00814816	0.000410614	0.000506507	2.55246E-05	0.016736761	0.000843423	0.178378632	0.00898911			18	180				21	230		0.44			0.000045	0.0002	8081B	2.55246E-05	Protect Surface Water Aquatic Life Marine/Chronic NTR - 40 CFR 131.36 Saturated Soil
0.0033293	0.039639696	0.00199758	0.000506507	2.55246E-05	0.00814816	0.000410614	0.000506507	2.55246E-05	0.016736761	0.000843423	0.178378632	0.00898911			18	180				21	230		0.44			0.000051	0.0001	8081B	2.55246E-05	Protect Surface Water Aquatic Life Marine/Chronic NTR - 40 CFR 131.36 Saturated Soil
7.75359E-07	0.10121149	0.005103627	0.000739622	3.72957E-05	0.010315786	0.000520177	0.000700695	3.53328E-05	4.08739E-05	2.06108E-06	4.08739E-05	2.06108E-06			0.11	0.38				0.13	0.52		0.0012			0.0000091	0.0001	8081B	7.75359E-07	Protect Surface Water HH-Consumption: Organisms NRWQC (WAC 173-340-740(1)(d)) EQ. 747-1/ 747-2 Saturated Soil
3.25598E-06	0.867360352	0.043413067	0.006338403	0.000317249	0.088404036	0.004424793	0.006004802	0.000300552	0.0001668	8.34867E-06	0.00018348	9.18353E-06			0.053	0.19				0.13	0.52		0.00015			0.001	0.00001	8081B	3.25598E-06	Protect Surface Water HH-Consumption: Organisms NRWQC (WAC 173-340-740(1)(d)) EQ. 747-1/ 747-2 Saturated Soil
8.02667E-08	0.00292	0.000209267	0.0000008	5.73333E-08	0.00084	0.0000602	0.0000008	5.73333E-08							0.44	1.6				0.46	1.8		0.0094					8081B	5.73333E-08	Protect Surface Water Aquatic Life Marine/Chronic NTR - 40 CFR 131.36 Saturated Soil

MEDIA - MTCA Standard	GW Method A									GW Method B								GW	
PATHWAYS HH - Human Health Ecol- Ecological	Ground Water, Method A-HH, **Potable** (Table 720-1) WAC 173-340-720(3)(b)(i)	Ground Water Method A - HH **Potable ARAR's** WAC 173-340-720(3)(b)(ii)	Groundwater State Quality Criteria WAC 173-340-720(3)(b)(ii); *WAC 173-200-040(3) Table 9.1*	Ground Water Method A-HH-**Potable** Safe Drinking Water Act, 40 CFR 141: WAC 173-290-310; WAC 173-340-720(3)(b)(ii)(A) **MCL**	Ground Water Safe Drinking Water Act, 40 CFR 141: WAC 173-290-310; WAC 173-340-720(3)(b)(ii)(B) **MCLG (Non-Zero Goals)**	Ground Water State Board Health, Ch. 246-290 WAC: WAC 173-340-720(3)(b)(ii)(C) **MCL**	Ground Water State Board Health, Ch. 246-290 WAC: WAC 173-340-720(3)(b)(ii)(C) **MCG**	Ground Water Method A - **Potable** No Table Values WAC 173-340-720(3)(b)(iii)	Ground Water, Method A-HH, **Potable**/Protect Surface Water WAC 173-340-720(3)(b)(iv)	Ground Water Method B - HH **Potable** ARAR's WAC 173-340-720(4)(b)(i) *Safe Drinking Water Standards - **MCLs***	Ground Water Method B - HH **Potable** ARAR's WAC 173-340-720(4)(b)(i) *Safe Drinking Water Standards - **MCGs***	Ground Water Method B - HH **Potable** ARAR's WAC 173-340-720(4)(b)(i) *State Department of Health Stanadrds - **MCLs***	Ground Water Method B - HH **Potable** ARAR's WAC 173-340-720(4)(b)(i) *State Department of Health Stanadrds - **MCGs***	Ground Water, Method B-HH, Non-carcinogenic/ **Potable** WAC 173-340-720(4)(b)(iii)(A) **EQ. 720-1** *CLARC Database*	Ground Water, Method B-HH, Carcinogen/ **Potable** WAC 173-340-720(4)(b)(iii)(B) **EQ. 720-2** *CLARC Database*	Ground Water, Method B-HH, **Potable**, Petroleum Mixture WAC 173-340-720(4)(b)(iii)(C) ***EQ. 720-3*** *(4-Phase Model)*	Ground Water Method C - HH **Potable** ARAR's WAC 173-340-720(5)(b)(i)	Ground Water, Method C-HH, Protect Surface Water Highest Beneficial Use WAC 173-340-720(5)(b)(ii)	Ground Water, Method C-HH, Non-carcinogenic/ **Potable** WAC 173-340-720(5)(b)(iii)(A) *CLARC Database*
UNITS	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
acetone		6000						*	*					7200		*	*	*	15800
acenaphthene		400						*	*					960		*	*	*	2100
acenaphthylene		*						*	*							*	*	*	
anthracene		2000						*	*					4800		*	*	*	11000
benzene	5	*	1	5	*0	5	*0	*	*	5	*0	5	*0	32	0.795	*	*	*	70
benzo(g,h,i)perylene		*						*	*							*	*	*	
benzo[a]anthracene		*						*	*						0.12	*	*	*	
benzo[a]pyrene		*	0.008	0.2	*0	0.2	*0	*	*	0.2	*0	0.2	*0		0.012	*	*	*	
benzo[b]fluoranthene		*						*	*						0.012	*	*	*	
benzo[k]fluoranthene		*						*	*						1.2	*	*	*	
bis(2-ethylhexyl) phthalate		*	6	6	*0	6	*0	*	*	6	*0	6	*0	320	6.25	*	*	*	700
butyl benzyl phthalate		100						*	*					3200	46	*	*	*	7000
carbon tetrachloride		*	0.3	5	*0	5	*0	*	*	5	*0	5	*0	32	0.625	*	*	*	70
chlorobenzene		*		100	100	100	100	*	*	100	100	100	100	160		*	*	*	350
chloroethane (ethyl chloride)		*						*	*							*	*	*	
chloroform (trichloromethane)		*	7					*	*					80		*	*	*	175
chloromethane (methyl chloride)		*						*	*							*	*	*	
chrysene		*						*	*						12	*	*	*	
dibenz[a,h]anthracene		*						*	*						0.012	*	*	*	
dibenzofuran		*						*	*					16		*	*	*	35
di-butyl phthalate (di-n-butyl phth.)		700						*	*					1600		*	*	*	3500
dichlorobenzene, 1,2-		*		600	600	600	600	*	*	600	600	600	600	720		*	*	*	1580
dichlorobenzene, 1,3-		600						*	*							*	*	*	
dichlorobenzene, 1,4-		*	4	75	75	75	75	*	*	75	75	75	75			*	*	*	
dichloroethane, 1,1-		*	1					*	*					800		*	*	*	1750
dichloroethane, 1,2-	5	*	0.5	5	*0	5	*0	*	*	5	*0	5	*0	160	0.48	*	*	*	350
dichloroethylene, 1,1-		*		7	7	7	7	*	*	7	7	7	7	72		*	*	*	158
diethyl phthalate		6000						*	*					13000		*	*	*	28000
dimethyl phthalate		*						*	*							*	*	*	
di-n-octyl phthalate		*						*	*							*	*	*	
ethylbenzene	700	*		700	700	700	700	*	*	700	700	700	700	800		*	*	*	1750
fluoranthene		300						*	*					640		*	*	*	1400
fluorene		300						*	*					640		*	*	*	1400
hexachlorobenzene		*	0.05	1	*0	1	*0	*	*	1	*0	1	*0			*	*	*	28
hexachlorobutadiene		0.9						*	*					8		*	*	*	17.5
indeno[1,2,3-cd]pyrene		*						*	*						0.12	*	*	*	
MEK (Methyl Ethyl Ketone;2-Butanone)														4800					11000
methylene chloride (dichloromethane)	5	30	5	5	*0	5	*0	*	*	5	*0	5	*0		5.83	*	*	*	
methylnaphthalene, 2-		30						*	*							*	*	*	
MIBK (M-Isobutyl-K;4-M,2-Pentanone)														640					1400
naphthalene	160	100						*	*					160		*	*	*	350
nitrosodiphenylamine, N-		7						*	*							*	*	*	
pcb mixtures	0.1	*	0.01	0.5		0.5	*0	*		0.5		0.5	*0		0.044	*	*	*	
pcb - Aroclor 1016		0.5						*	*					1.12		*	*	*	2.45
pcb - Aroclor 1221		*						*	*							*	*	*	
pcb - Aroclor 1232		*						*	*							*	*	*	
pcb - Aroclor 1242		*						*	*							*	*	*	
pcb - Aroclor 1248		*						*	*							*	*	*	
pcb - Aroclor 1254		0.1						*	*					0.32		*	*	*	0.7
pcb - Aroclor 1260		*						*	*							*	*	*	
phenanthrene		*						*	*							*	*	*	
pyrene		*						*	*					480		*	*	*	1050
tetrachloroethylene (perchloroethylene)	5	70	0.8	5	*0	5	*0	*	*	5	*0	5	*0	80		*	*	*	180
trichlorobenzene, 1,2,4-		*		70	70	70	70	*	*	70	70	70	70		1.51	*	*	*	175
trichlorethane, 1,1,1-	200	*	200	200	200	200	200	*	*	200	200	200	200	7200		*	*	*	15800
trichlorethane, 1,1,2-		*		5	3	5	3	*	*	5	3	5	3		0.768	*	*	*	70
trichloroethylene	5	*	3	5	*0	5	*0	*	*	5	*0	5	*0	2.4	0.49	*	*	*	5.3
trimethylbenzene, 1,3,5-		*						*	*					80		*	*	*	175
toluene	1000	*		1000	1000	1000	1000	*	*	1000	1000	1000	1000	1600		*	*	*	1400
vinyl chloride (chloroethylene)	0.2	*	0.02	2	*0	2	*0	*	*	2	*0	2	*0	24	0.029	*	*	*	53
xylene (dimethylbenzene)	1000	*		10000	10000	10000	10000	*	*	10000	10000	10000	10000	1600		*	*	*	3500

Method C		GW PATHWAY EVALUATION				ARAR's		ARAR's (Not Applied)	Always Applicable			EPA Method	POTABLE GW MOST STRINGENT	
Ground Water, Method C-HH, Carcinogen/ **Potable** WAC 173-340-720(5)(b)(iii)(B) *CLARC Database*	Ground Water, Method C-HH, **Potable**, Petroleum Mixture WAC 173-340-720(5)(b)(iii)(C) *EQ. 720-3 (4-Phase Model)*	Ground Water, Method B-HH, Potable/Protect Surface Water WAC 173-340-720(4)(b)(ii)	Ground Water, Non-Potable, Surface Water Protection WAC 173-340-720(6)	Groundwater to Sediment Protection Ecology **CSL** WAC 173-340-720(1)(c)	Groundwater to Sediment Protection Ecology **SQS** WAC 173-340-720(1)(c)	EPA CERCLA **LDW/T-117**	EPA RCRA **LDW/Plant 2** TMCLs	EPA Tap Water Residential Screening Levels (RSL's, 5/2010)	Natural **Background** Levels Ch. 173-340 WAC	Applicable **DL (MDL)** Ch. 173-340 WAC	Applicable **PQL (RL)** Ch. 173-340 WAC	Analytical Methods	Screening Levels	POTABLE GROUNDWATER (Screening Levels Including Potable Groundwater Regulations When Applicable)
µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L		µg/L	**Regulatory Framework For Most Stringent Criteria**
	*	*	*				110107	22000		2.954	10	8260B	6000	HH -Method A, Non-carcinogenic/Potable WAC 173-340-720(4)(b)(iii)(A); CLARC Database
	*	*	*	9.31372549	2.614379085		115.4023696	2200		0.0205	0.1	8270D-SIM	2.614379085	Protection -Groundwater to Sediment {Ecology SQS}; WAC 173-340-720(1)(c)
	*	*	*	10.78431373	10.78431373					0.0153	0.1	8270D-SIM	10.78431373	Protection -Groundwater to Sediment {Ecology SQS}; WAC 173-340-720(1)(c)
	*	*	*	58.82352941	10.78431373		200	11000		0.0333	0.1	8270D-SIM	10.78431373	Protection -Groundwater to Sediment {Ecology SQS}; WAC 173-340-720(1)(c)
7.95	*	*	*				2.02819	0.41		0.252	1	8260B	0.795	HH -Method B, Carcinogen/Potable WAC 173-340-720(4)(b)(iii)(B); CLARC Database
0.12	*	*	*	0.029147982	0.011584454					0.0492	0.1	8270D-SIM	0.011584454	Protection -Groundwater to Sediment {Ecology SQS}; WAC 173-340-720(1)(c)
1.2	*	*	*	0.632911392	0.257852789	0.018	0.000112155			0.004	0.01	8270D-SIM	0.000112155	HH - Total Tribal Fish (w/o Salmon) Consumption including Early Life, Carc - Adult, EPA RCRA
0.12	*	*	*	0.266903915	0.125826131	0.018	6.5888E-06			0.032	0.1	8270D-SIM	6.5888E-06	HH - Total Tribal Fish (w/o Salmon) Consumption including Early Life, Carc - Adult, EPA RCRA
1.2	*	*	*	0.560398506	0.286425903	0.018	5.26914E-05			0.006	0.01	8270D-SIM	5.26914E-05	HH - Total Tribal Fish (w/o Salmon) Consumption including Early Life, Carc - Adult, EPA RCRA
12	*	*	*	0.571791614	0.292249047	0.018	5.51854E-05			0.003	0.01	8270D-SIM	5.51854E-05	HH - Total Tribal Fish (w/o Salmon) Consumption including Early Life, Carc - Adult, EPA RCRA
62.5	*	*	*	0.472727273	0.284848485	2.2	1.2	4.8		0.451	1	8270D-SIM	0.284848485	Protection -Groundwater to Sediment {Ecology SQS}; WAC 173-340-720(1)(c)
460	*	*	*	6.837606838	0.523504274			35		0.025		8270D-SIM	0.523504274	Protection -Groundwater to Sediment {Ecology SQS}; WAC 173-340-720(1)(c)
6.25	*	*	*				0.247823653	0.2		0.233	1	8260B	0.247823653	HH - Tribal Fish (w/o Salmon) Consumption, Carc - Adult, EPA RCRA
	*	*	*				270	91		0.145	1	8260B	100	HH -Method B Potable WAC 173-340-720(4)(b)(i); Safe Drinking Water Standards - MCLs
	*	*	*				21000	21000		0.186	1	8260B	21000	EPA Tap Water RSL
	*	*	*				4.3	0.19		0.192	1	8260B	4.3	HH - Tribal Fish (w/o Salmon) Consumption, Carc - Adult, EPA RCRA
	*	*	*				190	190		0.134	1	8260B	190	HH -Method B, Carcinogen/Potable WAC 173-340-720(4)(b)(iii)(B) CLARC Database
120	*	*	*	1.949152542	0.466101695	0.018	0.001120636			0.0314	0.01	8270D-SIM	0.001120636	HH - Total Tribal Fish (w/o Salmon) Consumption including Early Life, Carc - Adult, EPA RCRA
0.12	*	*	*	0.01259542	0.004580153	0.018	2.71511E-05			0.0064	0.1	8270D-SIM	2.71511E-05	HH - Total Tribal Fish (w/o Salmon) Consumption including Early Life, Carc - Adult, EPA RCRA
	*	*	*	5.132743363	1.327433628					0.0366	0.1	8270D-SIM	1.327433628	Protection -Groundwater to Sediment {Ecology SQS}; WAC 173-340-720(1)(c)
	*	*	*	1164.383562	150.6849315		46.57806484	3700		0.458	1	8260B	46.57806484	HH - Tribal Fish (w/o Salmon) Consumption, Non-Carc - Child, EPA RCRA
	*	*	*	5.191873589	5.191873589		440	370		0.02	1	8260B	5.191873589	Protection -Groundwater to Sediment {Ecology SQS}; WAC 173-340-720(1)(c)
	*	*	*							0.285	1	8260B	600	HH -Method A Potable ARAR's WAC 173-340-720(3)(b)(ii)
	*	*	*	20.73732719	7.142857143					0.281	1	8260B	4	State Water Quality Criteria WAC 173-340-720(3)(b)(ii); WAC 173-200-040(3) Table 9.1
	*	*	*				33.26143751	2.4			0.2	8260B	1	State Water Quality Criteria WAC 173-340-720(3)(b)(ii); WAC 173-200-040(3) Table 9.1
4.81	*	*	*				3.6	0.15		0.244	0.2	8260B	0.48	HH -Method B, Carcinogen/Potable WAC 173-340-720(4)(b)(iii)(B) CLARC Database
0.729	*	*	*				2300	340			0.2	8260B	0.729	HH -Method C, Carcinogen/Potable WAC 173-340-720(5)(b)(iii)(B); CLARC Database
	*	*	*	873.015873	484.1269841		18409.42563	29000		0.496	1	8270D-SIM	484.1269841	Protection -Groundwater to Sediment {Ecology SQS}; WAC 173-340-720(1)(c)
	*	*	*	142.8571429	142.8571429		1100000			0.486	1	8270D-SIM	142.8571429	Protection -Groundwater to Sediment {Ecology SQS}; WAC 173-340-720(1)(c)
	*	*	*	22.95918367	0.295918367					0.513	1	8270D-SIM	0.295918367	Protection -Groundwater to Sediment {Ecology SQS}; WAC 173-340-720(1)(c)
	*	*	*				800	1.5		0.182	1	8260B	700	HH -Method A Potable Safe Drinking Water Act, 40 CFR 141: WAC 173-340-720(3)(b)(ii)(A); MCL
	*	*	*	16.92524683	2.256699577		11	1500		0.029	0.1	8270D-SIM	2.256699577	Protection -Groundwater to Sediment {Ecology SQS}; WAC 173-340-720(1)(c)
	*	*	*	6.991150442	2.03539823		45	1500		0.0218	0.1	8270D-SIM	2.03539823	Protection -Groundwater to Sediment {Ecology SQS}; WAC 173-340-720(1)(c)
0.547	*	*	*	0.680473373	0.112426036					0.001		8270D-SIM	0.05	State Water Quality Criteria WAC 173-340-720(3)(b)(ii); WAC 173-200-040(3) Table 9.1
5.61	*	*	*	6.237424547	3.923541247					0.02		8260B	0.9	HH -Method A Potable ARAR's WAC 173-340-720(3)(b)(ii)
1.2	*	*	*	0.032835821	0.012686567	0.018	2.27382E-05			0.011	0.1	8270D-SIM	2.27382E-05	HH - Total Tribal Fish (w/o Salmon) Consumption including Early Life, Carc - Adult, EPA RCRA
		*					73000	7100				8260B	4800	HH -Method B, Non-Carc/Potable WAC 173-340-720(4)(b)(iii)(A); CLARC Database
58.3	*	*	*				61	4.8		0.19	2	8260B	5	HH -Method B Potable WAC 173-340-720(4)(b)(i); Safe Drinking Water Standards - MCLs
	*	*	*	30.62200957	18.18181818		150	150		0.0244	0.1	8260B	18.18181818	Protection -Groundwater to Sediment {Ecology SQS}; WAC 173-340-720(1)(c)
		*										8260B	640	HH -Method B, Non-Carc/Potable WAC 173-340-720(4)(b)(iii)(A); CLARC Database
	*	*	*	92.39130435	53.80434783		112.0573734	0.14		0.0377	0.1	8270D-SIM	53.80434783	Protection -Groundwater to Sediment {Ecology SQS}; WAC 173-340-720(1)(c)
1.79	*	*	*	1.957295374	1.957295374		1.593580667	14		0.46	1	8270D-SIM	1.593580667	HH - Tribal Fish (w/o Salmon) Consumption, Carc - Adult, EPA RCRA
0.44	*	*	*	1.450892857	0.267857143	0.000064	2.30915E-05			0.1	0.01	8082/8270/1668	2.30915E-05	HH - Tribal Fish (w/o Salmon) Consumption, Carc - Adult, EPA RCRA
	*	*	*	2.398523985	0.442804428		0.0000641	0.96		0.0036	0.01	8082	0.0000641	Protection -Groundwater to Sediment {Ecology SQS}; WAC 173-340-720(1)(c)
	*	*	*				2.30915E-05	0.0068			0.01	8082	2.30915E-05	HH - Tribal Fish (w/o Salmon) Consumption, Carc - Adult, EPA RCRA
	*	*	*								0.01	8082		
	*	*	*				2.30915E-05	0.034			0.01	8082	2.30915E-05	HH - Tribal Fish (w/o Salmon) Consumption, Carc - Adult, EPA RCRA
	*	*	*	1.480637813	0.273348519		2.30915E-05	0.034		0.1	0.01	8082	2.30915E-05	HH - Tribal Fish (w/o Salmon) Consumption, Carc - Adult, EPA RCRA
	*	*	*	0.85978836	0.158730159		5.49145E-06	0.034		0.1	0.01	8082	5.49145E-06	HH - Tribal Fish (w/o Salmon) Consumption, Carc - Adult, EPA RCRA
	*	*	*	0.314009662	0.057971014		2.30915E-05	0.034		0.0046	0.01	8082	2.30915E-05	HH - Tribal Fish (w/o Salmon) Consumption, Carc - Adult, EPA RCRA
	*	*	*	23.07692308	4.807692308					0.453	1	8270D-SIM	4.807692308	Protection -Groundwater to Sediment {Ecology SQS}; WAC 173-340-720(1)(c)
	*	*	*	20.17291066	14.4092219		9.8	1100		0.344	1	8270D-SIM	9.8	HH - Tribal Fish (w/o Salmon) Consumption, Non-Carc - Child, EPA RCRA
	*	*	*				0.020523086	0.1		0.091	0.2	8260B	0.020523086	HH - Tribal Fish (w/o Salmon) Consumption, Carc - Adult, EPA RCRA
15.1	*	*	*	2.506963788	1.128133705		16	2.3		0.02		8260B	1.128133705	Protection -Groundwater to Sediment {Ecology SQS}; WAC 173-340-720(1)(c)
	*	*	*				46000	9100		0.183	0.2	8260B	200	HH -Method B Potable WAC 173-340-720(4)(b)(i); Safe Drinking Water Standards - MCLs
7.68	*	*	*				2.326407578	0.24			0.2	8260B	0.768	HH -Method B, Carcinogen/Potable WAC 173-340-720(4)(b)(iii)(B) CLARC Database
5	*	*	*				0.74	2			0.2	8260B	0.49	HH -Method B, Carcinogen/Potable WAC 173-340-720(4)(b)(iii)(B) CLARC Database
	*	*	*				45	370				8260B	45	HH - Tribal Fish (w/o Salmon) Consumption, Non-Carc - Child, EPA RCRA
	*	*	*				1300	2300				8260B	1000	HH -Method B Potable WAC 173-340-720(4)(b)(i); Safe Drinking Water Standards - MCLs
0.29	*	*	*				2.4	0.016		0.249	0.2	8260B	0.02	State Water Quality Criteria WAC 173-340-(3)(b)(ii); WAC 173-200-040(3) Table 9.1
	*	*	*				1300	200		0.357	2	8260B	1000	HH -Method A, Potable (Table 720-1) WAC 173-340-720(3)(b)(i)

GW MOST STRINGENT
Adjusted Screening Levels
µg/L
110107
2.614379085
10.78431373
10.78431373
2.02819
0.011584454
0.000112155
6.5888E-06
5.26914E-05
5.51854E-05
0.284848485
0.523504274
0.247823653
270
NA
4.3
0.001120636
2.71511E-05
1.327433628
46.57806484
5.191873589
7.142857143
33.26143751
3.6
2300
484.1269841
142.8571429
0.295918367
800
2.256699577
2.03539823
0.112426036
3.923541247
2.27382E-05
73000
61
18.18181818
53.80434783
1.593580667
2.30915E-05
0.0000641
2.30915E-05
2.30915E-05
2.30915E-05
5.49145E-06
2.30915E-05
4.807692308
9.8
0.020523086
1.128133705
46000
2.326407578
0.74
45
1300
2.4
1300

MEDIA - MTCA Standard	GW Method A									GW Method B								GW	
PATHWAYS HH - Human Health Ecol- Ecological	Ground Water, Method A-HH, **Potable** (Table 720-1) WAC 173-340-720(3)(b)(i)	Ground Water Method A - HH **Potable ARAR's** WAC 173-340-720(3)(b)(ii)	Groundwater State Quality Criteria WAC 173-340-720(3)(b)(ii); *WAC 173-200-040(3)* ***Table 9.1***	Ground Water Method A-HH-**Potable** Safe Drinking Water Act, 40 CFR 141: WAC 173-290-310; WAC 173-340-720(3)(b)(ii)(A) **MCL**	Ground Water Safe Drinking Water Act, 40 CFR 141: WAC 173-290-310; WAC 173-340-720(3)(b)(ii)(B) **MCLG (Non-Zero Goals)**	Ground Water State Board Health, Ch. 246-290 WAC: WAC 173-340-720(3)(b)(ii)(C) **MCL**	Ground Water State Board Health, Ch. 246-290 WAC: WAC 173-340-720(3)(b)(ii)(C) **MCG**	Ground Water Method A - **Potable** No Table Values WAC 173-340-720(3)(b)(iii)	Ground Water, Method A-HH, **Potable**/Protect Surface Water WAC 173-340-720(3)(b)(iv)	Ground Water Method B - HH **Potable** ARAR's WAC 173-340-720(4)(b)(i) *Safe Drinking Water Standards -* ***MCLs***	Ground Water Method B - HH **Potable** ARAR's WAC 173-340-720(4)(b)(i) *Safe Drinking Water Standards -* ***MCGs***	Ground Water Method B - HH **Potable** ARAR's WAC 173-340-720(4)(b)(i) *State Department of Health Stanadrds -* ***MCLs***	Ground Water Method B - HH **Potable** ARAR's WAC 173-340-720(4)(b)(i) *State Department of Health Stanadrds -* ***MCGs***	Ground Water, Method B-HH, Non-carcinogenic/ **Potable** WAC 173-340-720(4)(b)(iii)(A) **EQ. 720-1** *CLARC Database*	Ground Water, Method B-HH, Carcinogen/ **Potable** WAC 173-340-720(4)(b)(iii)(B) **EQ. 720-2** *CLARC Database*	Ground Water, Method B-HH, **Potable**, Petroleum Mixture WAC 173-340-720(4)(b)(iii)(C) ***EQ. 720-3*** *(4-Phase Model)*	Ground Water Method C - HH **Potable** ARAR's WAC 173-340-720(5)(b)(i)	Ground Water, Method C-HH, Protect Surface Water Highest Beneficial Use WAC 173-340-720(5)(b)(ii)	Ground Water, Method C-HH, Non-carcinogenic/ **Potable** WAC 173-340-720(5)(b)(iii)(A) *CLARC Database*
UNITS	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**
benzoic acid		*						*	*							*	*	*	
benzyl alcohol		*						*	*					800		*	*	*	1750
dimethylphenol, 2,4-		100						*	*							*	*	*	
methylphenol, 2- (o-cresol)		*						*	*							*	*	*	1750
methylphenol, 4- (p-cresol)		*						*	*							*	*	*	175
pentachlorophenol		*		1	*0	1	*0	*	*	1	*0	1	*0	80	0.219	*	*	*	175
phenol (total)		2000						*	*					2400		*	*	*	5250
styrene (phenylethylene)		*		100	100	100	100	*	*	100	100	100	100	1600		*	*	*	3500
Tributyltin		*						*	*							*	*	*	
Trichlorophenol, 2,4,6-		3	4					*	*					8	4	*	*	*	17.5
		*						*	*							*	*	*	
Aluminum		*		50				*	*	50				16000		*	*	*	35000
Antimony		*		6	6	6	6	*	*	6	6	6	6			*	*	*	
Arsenic (III)		*						*	*							*	*	*	
Arsenic (V)		*						*	*							*	*	*	
Arsenic (total)	5	*	0.05	10	*0	10	*0	*	*	10	*0	10	*0	4.8	0.0583	*	*	*	11
Barium		*	1000	2000	2000	2	2	*	*	2000	2000	2	2	560		*	*	*	7000
Beryllium		*		4	4	4	4	*	*	4	4	4	4	32		*	*	*	70
Cadmium	5	*	10	5	5	5	5	*	*	5	5	5	5	16		*	*	*	35
Chromium (VI)		20						*	*					48		*	*	*	105
Chromium, total (or III)	50	10000	50	100	100	100	100	*	*	100	100	100	100			*	*	*	
Cobalt		*						*	*							*	*	*	
Copper		*	1000	1000	1300	1300	1300	*	*	1000	1300	1300	1300	640		*	*	*	1400
Iron		*	300	300		300		*	*	300		300		11200		*	*	*	24500
Lead	15	*	50	15	*0	15	*0	*	*	15	*0	15	*0			*	*	*	
Manganese		300	50	50		50		*	*	50		50				*	*	*	4900
Mercury	2	*	2	2	2	2	2	*	*	2	2	2	2			*	*	*	
Mercury (organic)		*						*	*							*	*	*	
Molybdenum		40						*	*							*	*	*	175
Nickel		100				100		*	*			100		320		*	*	*	700
Selenium		*	10	50	50	50	50	*	*	50	50	50	50	80		*	*	*	175
Silver		100	50	100	100	100		*	*	100	100	100		80		*	*	*	175
Tin		*						*	*							*	*	*	
Thallium		*		2	0.5	2	0.5	*	*	2	0.5	2	0.5			*	*	*	
Vanadium		*						*	*					1.12		*	*	*	2.45
Zinc		2000	5000	5000		5000		*	*	5000		5000		4800		*	*	*	10500
		*						*	*							*	*	*	
LPAH		*	0.01					*	*							*	*	*	
HPAH		*	0.01					*	*							*	*	*	
Total Petroleum Hydrocarbons		*						*	*							*	*	*	
Gasoline	1000	*						*	*							*	*	*	
Gasoline (w/benzene)	800	*						*	*							*	*	*	
Diesel	500	*						*	*							*	*	*	
Heavy Oil	500	*						*	*							*	*	*	
		*						*	*							*	*	*	
2,3,7,8-TCDD (Dioxin)		*	0.0000006	0.0000003	*0	0.0000003	*0	*	*	0.0000003	*0	0.0000003	*0		0.00000058	*	*	*	
		*						*	*							*	*	*	
Aldrin		*						*	*					0.24	0.002573529	*	*	*	0.525
alpha-BHC		*						*	*						0.013888889	*	*	*	
beta-BHC		*						*	*						0.048611111	*	*	*	
gamma-BHC (Lindane)	0.1	*		0.0002	0.0002	0.0002		*	*	0.0002	0.0002	0.0002		4.8		*	*	*	10.5
Chlordane		*		0.002	*0	0.002		*	*	0.002	*0	0.002		8	0.25	*	*	*	17.5
4,4'-DDT	0.3	*						*	*					8	0.257352941	*	*	*	17.5
4,4'-DDE		*						*	*						0.257352941	*	*	*	
4,4'-DDD		*						*	*						0.364583333	*	*	*	
Dieldrin		*						*	*					0.8	0.00546875	*	*	*	1.75
alpha-Endosulfan		*						*	*					96		*	*	*	210
beta-Endosulfan		*						*	*					96		*	*	*	210
Endosulfan Sulfate		*						*	*					96		*	*	*	210
Endrin		*		0.002	0.002	0.002		*	*	0.002	0.002	0.002		4.8		*	*	*	10.5
Endrin Aldehyde		*		0.002	0.002	0.002		*	*	0.002	0.002	0.002		4.8		*	*	*	10.5

Method C		GW PATHWAY EVALUATION				ARAR's		ARAR's (Not Applied)	Always Applicable			EPA Method	POTABLE GW MOST STRINGENT	
Ground Water, Method C-HH, Carcinogen/ **Potable** WAC 173-340-720(5)(b)(iii)(B) *CLARC Database*	Ground Water, Method C-HH, **Potable**, Petroleum Mixture WAC 173-340-720(5)(b)(iii)(C) *EQ. 720-3 (4-Phase Model)*	Ground Water, Method B-HH, Potable/Protect Surface Water WAC 173-340-720(4)(b)(ii)	Ground Water, Non-Potable, Surface Water Protection WAC 173-340-720(6)	Groundwater to Sediment Protection Ecology **CSL** WAC 173-340-720(1)(c)	Groundwater to Sediment Protection Ecology **SQS** WAC 173-340-720(1)(c)	EPA CERCLA **LDW/T-117**	EPA RCRA **LDW/Plant 2** TMCLs	EPA Tap Water Residential Screening Levels (RSL's, 5/2010)	Natural **Background** Levels Ch. 173-340 WAC	Applicable **DL (MDL)** Ch. 173-340 WAC	Applicable **PQL (RL)** Ch. 173-340 WAC	Analytical Methods	Screening Levels	POTABLE GROUNDWATER (Screening Levels Including Potable Groundwater Regulations When Applicable)
µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L		µg/L	**Regulatory Framework For Most Stringent Criteria**
	*	*	*	2242.926156	2242.926156					3.69	10	8260B	2242.926156	Protection -Groundwater to Sediment {Ecology SQS}; WAC 173-340-720(1)(c)
	*	*	*	233.0779055	181.9923372					1.31	5	8260B	181.9923372	Protection -Groundwater to Sediment {Ecology SQS}; WAC 173-340-720(1)(c)
	*	*	*	2.020624303	2.020624303		655.2507426	730		0.32		8270D-SIM	2.020624303	Protection -Groundwater to Sediment {Ecology SQS}; WAC 173-340-720(1)(c)
	*	*	*	7.110609481	7.110609481		3053.696194	1800		0.026		8270D-SIM	7.110609481	Protection -Groundwater to Sediment {Ecology SQS}; WAC 173-340-720(1)(c)
	*	*	*	77.18894009	77.18894009		333.8496875	180		0.345	1	8270D-SIM	77.18894009	Protection -Groundwater to Sediment {Ecology SQS}; WAC 173-340-720(1)(c)
2.19	*	*	*	10.20710059	5.325443787					0.032		8270D-SIM	0.219	HH -Method B, Carcinogen/Potable WAC 173-340-720(4)(b)(iii)(B) CLARC Database
	*	*	*	223.880597	78.35820896		40694.5198	11000		0.388	1	8270D-SIM	78.35820896	Protection -Groundwater to Sediment {Ecology SQS}; WAC 173-340-720(1)(c)
	*	*	*							0.121	1	8270D-SIM	100	HH -Method B, Carcinogen/Potable WAC 173-340-720(4)(b)(iii)(B) CLARC Database
	*	*	*									Krone, 1988		
40	*	*	*							2.1	5	8270D-SIM	3	HH -Method A Potable ARAR's WAC 173-340-720(3)(b)(ii)
	*	*	*											
	*	*	*										50	HH -Method A Potable Safe Drinking Water Act, 40 CFR 141: WAC 173-340-720(3)(b)(ii)(A); MCL
	*	*	*				3.865979381	15				200.8	3.865979381	HH - Tribal Fish (w/o Salmon) Consumption, Non-Carc - Child, EPA RCRA
	*	*	*											
	*	*	*											
0.583	*	*	*			0.71	7.3	0.045	5	0.18	0.2	200.8	0.05	State Water Quality Criteria WAC 173-340-(3)(b)(ii); WAC 173-200-040(3) Table 9.1
	*	*	*				120	7300					2	State Board Health, Ch. 246-290 WAC: WAC 173-340-720(3)(b)(ii)(C); MCL
	*	*	*				120	73					4	State Board Health, Ch. 246-290 WAC: WAC 173-340-720(3)(b)(ii)(C); MCL
	*	*	*	3.357954465	2.556054891		0.21	18		0.008	0.2		0.21	HH - Tribal Fish (w/o Salmon) Consumption, Non-Carc - Child, EPA RCRA
	*	*	*				0.58	0.043		3	10	7196A	0.58	HH - Tribal Fish (w/o Salmon) Consumption, Carc - Adult, EPA RCRA
	*	*	*	317.6470588	305.8823529					0.032	0.5	200.8	50	State Water Quality Criteria WAC 173-340-(3)(b)(ii); WAC 173-200-040(3) Table 9.1
	*	*	*											
	*	*	*	123.3288287	123.3288287		7.3	1500		0.059	0.5	200.8	7.3	EPA RCRA Plant II - LDWG Groundwater Background
	*	*	*										300	HH -Method B Potable WAC 173-340-720(4)(b)(i); Safe Drinking Water Standards - MCLs
	*	*	*	13.31299809	11.30348894		2.5			0.127	1	200.8	2.5	Aquatic Life Fresh/Chronic, CWA §304, NRWQC
	*	*	*				2000	880					50	State Water Quality Criteria WAC 173-340-(3)(b)(ii); WAC 173-200-040(3) Table 9.1
	*	*	*	0.00742766	0.005161594		0.012	0.57		0.0002	0.1	7470	0.005161594	Protection -Groundwater to Sediment {Ecology SQS}; WAC 173-340-720(1)(c)
	*	*	*				0.00045	3.7					0.00045	HH - Tribal Fish (w/o Salmon) Consumption, Non-Carc - Child, EPA RCRA
	*	*	*										40	HH -Method A Potable ARAR's WAC 173-340-720(3)(b)(ii)
	*	*	*				8.2	730			2	200.8	8.2	Aquatic Life Fresh/Chronic, NTR - 40 CFR 131.36
	*	*	*				5	180					5	Aquatic Life Fresh/Chronic, NTR - 40 CFR 131.36
	*	*	*	1.532250723	1.532250723	1.9	22	180		0.5	0.02		1.532250723	Protection -Groundwater to Sediment {Ecology SQS}; WAC 173-340-720(1)(c)
	*	*	*											
	*	*	*				0.47						0.47	HH -Consumption Organisms Only; Marine; CWA §304, NWRQC
	*	*	*				260	2.6					1.12	HH -Method C, Non-carcinogenic/ Potable WAC 173-340-720(5)(b)(iii)(A); CLARC Database
	*	*	*	76.25551053	32.56745762		56	11000		0.4	4		32.56745762	Protection -Groundwater to Sediment {Ecology SQS}; WAC 173-340-720(1)(c)
	*	*	*											
	*	*	*										0.01	State Water Quality Criteria WAC 173-340-(3)(b)(ii); WAC 173-200-040(3) Table 9.1
	*	*	*										0.01	State Water Quality Criteria WAC 173-340-(3)(b)(ii); WAC 173-200-040(3) Table 9.1
	*	*	*									NWTPH-Dx		
	*	*	*									NWTPH-G	1000	HH -Method A Potable (Table 720-1) WAC 173-340-720(3)(b)(i)
	*	*	*									NWTPH-G	800	HH -Method A Potable (Table 720-1) WAC 173-340-720(3)(b)(i)
	*	*	*							40	100	NWTPH-D	500	HH -Method A Potable (Table 720-1) WAC 173-340-720(3)(b)(i)
	*	*	*			500				90	100	NWTPH-Dx	500	HH -Method A Potable (Table 720-1) WAC 173-340-720(3)(b)(i)
	*	*	*											
0.0000058	*	*	*				2.06039E-10	0.00000052					2.06039E-10	HH - Tribal Fish (w/o Salmon) Consumption, Carc - Adult, EPA RCRA
	*	*	*											
0.025735294	*	*	*							4.7E-08	0.000001	8081B	0.002573529	HH -Method B, Carc/Potable WAC 173-340-720(4)(b)(iii)(B); CLARC Database
0.138888889	*	*	*							0.00000027	0.0000005	8081B	0.013888889	HH -Method B, Carc/Potable WAC 173-340-720(4)(b)(iii)(B); CLARC Database
0.486111111	*	*	*							0.00000031	0.0000005	8081B	0.048611111	HH -Method B, Carc/Potable WAC 173-340-720(4)(b)(iii)(B); CLARC Database
	*	*	*							0.00000015	0.0000005	8081B	0.0002	HH -Method B, Non-Carc/Potable WAC 173-340-720(4)(b)(iii)(A); CLARC Database
2.5	*	*	*							0.00000015	0.0000005	8081B	0.002	HH -Method B, Non-Carc/Potable WAC 173-340-720(4)(b)(iii)(A); CLARC Database
2.573529412	*	*	*							0.00000023	0.0000005	8081B	0.257352941	HH -Method B, Carc/Potable WAC 173-340-720(4)(b)(iii)(B); CLARC Database
2.573529412	*	*	*							0.00000013	0.0000005	8081B	0.257352941	HH -Method B, Carc/Potable WAC 173-340-720(4)(b)(iii)(B); CLARC Database
3.645833333	*	*	*							0.00000011	0.0000005	8081B	0.364583333	HH -Method B, Carc/Potable WAC 173-340-720(4)(b)(iii)(B); CLARC Database
0.0546875	*	*	*							0.0000023	0.000005	8081B	0.00546875	HH -Method B, Carc/Potable WAC 173-340-720(4)(b)(iii)(B); CLARC Database
	*	*	*							0.0000012	0.000002	8081B	96	HH -Method B, Non-Carc/Potable WAC 173-340-720(4)(b)(iii)(A); CLARC Database
	*	*	*							0.00000051	0.000002	8081B	96	HH -Method B, Non-Carc/Potable WAC 173-340-720(4)(b)(iii)(A); CLARC Database
	*	*	*							0.00000012	0.0000005	8081B	96	HH -Method B, Non-Carc/Potable WAC 173-340-720(4)(b)(iii)(A); CLARC Database
	*	*	*							0.00000084	0.000002	8081B	0.002	MCL
	*	*	*							0.00000067	0.000002	8081B	0.002	MCL

GW MOST STRINGENT
Adjusted Screening Levels
µg/L
2242.926156
181.9923372
2.020624303
7.110609481
77.18894009
5.325443787
78.35820896
3.865979381
7.3
120
120
0.21
0.58
305.8823529
7.3
2.5
2000
0.005161594
0.00045
8.2
5
1.532250723
0.47
32.56745762
1000
800
500
500
2.06039E-10
1.16061E-05
0.001125041
0.003937642
0.019
0.000186709
5.05602E-05
5.05602E-05
7.16269E-05
1.23315E-05
0.056
0.056
0.056
0.002
0.002

MEDIA - MTCA Standard	GW Method A									GW Method B								GW	
PATHWAYS HH - Human Health Ecol- Ecological	Ground Water, Method A-HH, **Potable** (Table 720-1) WAC 173-340-720(3)(b)(i)	Ground Water Method A - HH **Potable ARAR's** WAC 173-340-720(3)(b)(ii)	Groundwater State Quality Criteria WAC 173-340-720(3)(b)(ii); *WAC 173-200-040(3)* ***Table 9.1***	Ground Water Method A-HH-**Potable** Safe Drinking Water Act, 40 CFR 141: WAC 173-290-310; WAC 173-340-720(3)(b)(ii)(A) **MCL**	Ground Water Safe Drinking Water Act, 40 CFR 141: WAC 173-290-310; WAC 173-340-720(3)(b)(ii)(B) **MCLG (Non-Zero Goals)**	Ground Water State Board Health, Ch. 246-290 WAC: WAC 173-340-720(3)(b)(ii)(C) **MCL**	Ground Water State Board Health, Ch. 246-290 WAC: WAC 173-340-720(3)(b)(ii)(C) **MCG**	Ground Water Method A - **Potable** No Table Values WAC 173-340-720(3)(b)(iii)	Ground Water, Method A-HH, **Potable**/Protect Surface Water WAC 173-340-720(3)(b)(iv)	Ground Water Method B - HH **Potable** ARAR's WAC 173-340-720(4)(b)(i) *Safe Drinking Water Standards -* ***MCLs***	Ground Water Method B - HH **Potable** ARAR's WAC 173-340-720(4)(b)(i) *Safe Drinking Water Standards -* ***MCGs***	Ground Water Method B - HH **Potable** ARAR's WAC 173-340-720(4)(b)(i) *State Department of Health Stanadrds -* ***MCLs***	Ground Water Method B - HH **Potable** ARAR's WAC 173-340-720(4)(b)(i) *State Department of Health Stanadrds -* ***MCGs***	Ground Water, Method B-HH, Non-carcinogenic/ **Potable** WAC 173-340-720(4)(b)(iii)(A) **EQ. 720-1** *CLARC Database*	Ground Water, Method B-HH, Carcinogen/ **Potable** WAC 173-340-720(4)(b)(iii)(B) **EQ. 720-2** *CLARC Database*	Ground Water, Method B-HH, **Potable**, Petroleum Mixture WAC 173-340-720(4)(b)(iii)(C) ***EQ. 720-3*** *(4-Phase Model)*	Ground Water Method C - HH **Potable** ARAR's WAC 173-340-720(5)(b)(i)	Ground Water, Method C-HH, Protect Surface Water Highest Beneficial Use WAC 173-340-720(5)(b)(ii)	Ground Water, Method C-HH, Non-carcinogenic/ **Potable** WAC 173-340-720(5)(b)(iii)(A) *CLARC Database*
UNITS	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**
Heptachlor		*		**0.0004**	***0**	**0.0004**		*	*	**0.0004**	***0**	**0.0004**		**8**	**0.019444444**	*	*	*	**17.5**
Heptachlor Epoxide		*		**0.0002**	***0**	**0.0002**		*	*	**0.0002**	***0**	**0.0002**		**0.104**	**0.004807692**	*	*	*	**0.2275**
Toxaphene		*						*	*							*	*	*	
		*						*	*							*	*	*	

Method C		GW PATHWAY EVALUATION				ARAR's		ARAR's (Not Applied)	Always Applicable			EPA Method	POTABLE GW MOST STRINGENT	
Ground Water, Method C-HH, Carcinogen/ **Potable** WAC 173-340-720(5)(b)(iii)(B) *CLARC Database*	Ground Water, Method C-HH, **Potable**, Petroleum Mixture WAC 173-340-720(5)(b)(iii)(C) *EQ. 720-3 (4-Phase Model)*	Ground Water, Method B-HH, Potable/Protect Surface Water WAC 173-340-720(4)(b)(ii)	Ground Water, Non-Potable, Surface Water Protection WAC 173-340-720(6)	Groundwater to Sediment Protection Ecology **CSL** WAC 173-340-720(1)(c)	Groundwater to Sediment Protection Ecology **SQS** WAC 173-340-720(1)(c)	EPA CERCLA **LDW/T-117**	EPA RCRA **LDW/Plant 2** TMCLs	EPA Tap Water Residential Screening Levels (RSL's, 5/2010)	Natural **Background** Levels Ch. 173-340 WAC	Applicable **DL (MDL)** Ch. 173-340 WAC	Applicable **PQL (RL)** Ch. 173-340 WAC	Analytical Methods	Screening Levels	POTABLE GROUNDWATER (Screening Levels Including Potable Groundwater Regulations When Applicable)
µg/L	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**		**µg/L**	**Regulatory Framework For Most Stringent Criteria**
0.194444444	*	*	*							**0.00000017**	**0.0000005**	**8081B**	**0.0004**	MCL
0.048076923	*	*	*							**0.00000047**	**0.000001**	**8081B**	**0.0002**	MCL
	*	*	*									**8081B**		
	*	*	*											

GW MOST STRINGENT
Adjusted Screening Levels
µg/L
1.82819E-05
9.04051E-06
6.39423E-05

MEDIA - MTCA Standard	SW Method A						SW Method B													SW Method C						HIDDEN GW ARAR's		
PATHWAYS HH - Human Health Ecol- Ecological	Surface Water, Method A - HH ARAR's WAC 173-340-730(2)(b)(i) **[See Required ARAR's]**	Surface Water, Method A - WAC 173-340-730(2)(b)(i)(A) **[See Required ARAR's]**	Surface Water, Method A - HH/ Aquatic Organisms: CWA §304 WAC 173-340-730(2)(b)(i)(B) **[See Required ARAR's]**	Surface Water, Method A - HH NTR - 40 CFR 131 WAC 173-340-730(2)(b)(i)(C) **[See Required ARAR's]**	Surface Water, Method A - HH Potability WAC 173-340-730(2)(b)(ii) **[See Required ARAR's]**	Surface Water, Method A - HH No Table Values WAC 173-340-730(2)(b)(iii) **[See applicable SW background or PQL values]**	Surface Water, Method B - HH ARAR's WAC 173-340-730(3)(b)(i) [See **Required ARAR's]**	Surface Water, Method B - WA WQS:Ch. 173-2101 A WAC 173-340-730(3)(b)(i)(A) **[See Required ARAR's]**	Surface Water, Method B - HH/ Aquatic Organisms: CWA §304 WAC 173-340-730(3)(b)(i)(B) **[See Required ARAR's]**	Surface Water, Method B - HH NTR - 40 CFR 131 WAC 173-340-730(3)(b)(i)(C) **[See Required ARAR's]**	Surface Water, Method B, Environmental Effects, WAC 173-340-730(3)(b)(ii) **[WET TESTING]**	Surface Water, Method B-HH, Non-carcinogen, Fish Consumption WAC 173-340-730(3)(b)(iii)(A) ***EQ. 730-1*** *CLARC Database*	Surface Water, Method B-HH, Non-carcinogen, Fish Consumption WAC 173-340-730(3)(c) ***EQ. 730-1 MOD - Tribal Adult***	Surface Water, Method B-HH, Non-carcinogen, Fish Consumption WAC 173-340-730(3)(c) ***EQ. 730-1 MOD - Tribal Child***	Surface Water, Method B-HH, Carcinogen, Fish Consumption WAC 173-340-730(3)(b)(iii)(B) ***EQ. 730-2*** *CLARC Database*	Surface Water, Method B-HH, Carcinogen, Fish Consumption WAC 173-340-730(3)(b)(iii)(B) ***EQ. 730-2 MOD - Tribal Adult***	Surface Water, Method B-HH, Carcinogen, Fish Consumption WAC 173-340-730(3)(b)(iii)(B) ***EQ. 730-2 MOD - Tribal Child***	Surface Water, Method B-HH Petroleum Mixture WAC 173-340-730(3)(b)(iii)(C)	Surface Water, Method B-HH Potability WAC 173-340-730(3)(b)(iv)	Surface Water, Method C - HH ARAR's WAC 173-340-730(4)(b)(i) **[See Required ARAR's]**	Surface Water, Method C, Environmental Effects, WAC 173-340-730(4)(b)(ii) **[WET TESTING]**	Surface Water, Method C, Non-carcinogen, Fish Consumtion WAC 173-340-730(4)(b)(iii)(A) **EQ. 730-1** *CLARC Database*	Surface Water, Method C, Carcinogen, Fish Consumption WAC 173-340-730(4)(b)(iii)(B) **EQ. 730-2** *CLARC Database*	Surface Water, Method C, Petroleum Mixture WAC 173-340-730(4)(b)(iii)(C)	Surface Water, Method C-HH Potability WAC 173-340-730(4)(b)(iv)	Ground Water, Method A-HH, **Potable** (Table 720-1) WAC 173-340-720(3)(b)(i)	Surface Water Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Fresh - Acute**	Surface Water Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Fresh - Chronic**
UNITS	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**	**µg/L**
acetone	*	*	*	*	*	*	*	*	*	*	*	738396.6245	239932.7328	110107.0077					*	*	*			*	*			
acenaphthene	*	*	*	*	*	*	*	*	*	*	*	642.7915519	208.8670622	95.85072847					*	*	*	1606.97888		*	*			
acenaphthylene	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
anthracene	*	*	*	*	*	*	*	*	*	*	*	25925.92593	8424.30484	3865.979381					*	*	*	64814.81481		*	*			
benzene	*	*	*	*	*	*	*	*	*	*	*	1994.301994	648.0234493	297.3830293	22.66252266	3.221707489	15.77031216		*	*	*	4985.754986	567	*	*	5		
benzo(g,h,i)perylene	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
benzo[a]anthracene	*	*	*	*	*	*	*	*	*	*	*				0.295958059	0.04207344	0.205950195	0.018	*	*	*		0.74	*	*			
benzo[a]pyrene	*	*	*	*	*	*	*	*	*	*	*				0.029595806	0.004207344	0.02059502	0.018	*	*	*		0.74	*	*			
benzo[b]fluoranthene	*	*	*	*	*	*	*	*	*	*	*				0.295958059	0.04207344	0.205950195	0.018	*	*	*		0.74	*	*			
benzo[k]fluoranthene	*	*	*	*	*	*	*	*	*	*	*				0.295958059	0.04207344	0.205950195	0.018	*	*	*		0.74	*	*			
bis(2-ethylhexyl) phthalate	*	*	*	*	*	*	*	*	*	*	*	398.8603989	129.6046899	59.47660587	3.561253561	0.50626832	2.478191911	2.2	*	*	*	997.1509972	89	*	*			
butyl benzyl phthalate	*	*	*	*	*	*	*	*	*	*	*	1252.46019	406.9712483	186.762289	8.239869669	1.17138106	5.733929924		*	*	*	3131.150474	206	*	*			
carbon tetrachloride	*	*	*	*	*	*	*	*	*	*	*	553.0864198	179.7185033	82.4742268	4.938271605	0.702025403	3.436426117		*	*	*	1380	123	*	*			
chlorobenzene	*	*	*	*	*	*	*	*	*	*	*	1813.001813	589.1122266	270.3482085					*	*	*			*	*			
chloroethane (ethyl chloride)	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
chloroform (trichloromethane)	*	*	*	*	*	*	*	*	*	*	*	6913.580247	2246.481291	1030.927835	55.75467941	7.926093264	38.79835938		*	*	*	17283.95062		*	*			
chloromethane (methyl chloride)	*	*	*	*	*	*	*	*	*	*	*				132.9534663	18.90068394	92.51916468		*	*	*			*	*			
chrysene	*	*	*	*	*	*	*	*	*	*	*				2.959580585	0.420734403	2.059501954	0.018	*	*	*		0.74	*	*			
dibenz[a,h]anthracene	*	*	*	*	*	*	*	*	*	*	*				0.295958059	0.04207344	0.205950195	0.018	*	*	*		0.74	*	*			
dibenzofuran	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
di-butyl phthalate (di-n-butyl phth.)	*	*	*	*	*	*	*	*	*	*	*	2913.025385	946.5511057	434.3797058					*	*	*	7282.563462		*	*			
dichlorobenzene, 1,2-	*	*	*	*	*	*	*	*	*	*	*	4196.642686	1363.646467	625.7880294					*	*	*	10491.60671		*	*			
dichlorobenzene, 1,3-	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
dichlorobenzene, 1,4-	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
dichloroethane, 1,1-	*	*	*	*	*	*	*	*	*	*	*	106691.0532	34667.92115	15909.38017	233.9716079	33.26143751	162.8152941		*	*	*			*	*			
dichloroethane, 1,2-	*	*	*	*	*	*	*	*	*	*	*	43209.87654	14040.50807	6443.298969	59.35422602	8.437805329	41.30319852		*	*	*	108024.6914	1480	*	*	5		
dichloroethylene, 1,1-	*	*	*	*	*	*	*	*	*	*	*	23148.14815	7521.70075	3451.767305					*	*	*	57870.37037	48.2	*	*			
diethyl phthalate	*	*	*	*	*	*	*	*	*	*	*	28411.97362	9232.114894	4236.689733					*	*	*	71029.93404		*	*			
dimethyl phthalate	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
di-n-octyl phthalate	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
ethylbenzene	*	*	*	*	*	*	*	*	*	*	*	6913.580247	2246.481291	1030.927835		2.233717193	10.9340831		*	*	*	17283.95062		*	*	700		
fluoranthene	*	*	*	*	*	*	*	*	*	*	*	90.17713366	29.30192988	13.44688481					*	*	*	225.4428341		*	*			
fluorene	*	*	*	*	*	*	*	*	*	*	*	3456.790123	1123.240645	515.4639175					*	*	*	8641.975309		*	*			
hexachlorobenzene	*	*	*	*	*	*	*	*	*	*	*	0.238399319	0.077464872	0.035549236	0.000465624	6.61931E-05	0.000324016		*	*	*	0.595998297	0.0117	*	*			
hexachlorobutadiene	*	*	*	*	*	*	*	*	*	*	*	925.9259259	300.86803	138.0706922	29.67711301	4.218902664	20.65159926		*	*	*	2330	747	*	*			
indeno[1,2,3-cd]pyrene	*	*	*	*	*	*	*	*	*	*	*				0.029595806	0.004207344	0.02059502	0.018	*	*	*		0.74	*	*			
MEK (Methyl Ethyl Ketone;2-Butanone)												492264.4163	159955.1552	73404.6718														
methylene chloride (dichloromethane)	*	*	*	*	*	*	*	*	*	*	*	172839.5062	56162.03227	25773.19588	960.2194787	136.5049395	668.1939672		*	*	*	432098.7654	24000	*	*	5		
methylnaphthalene, 2-	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
MIBK (M-Isobutyl-K;4-M,2-Pentanone)																												
naphthalene	*	*	*	*	*	*	*	*	*	*	*	4938.271605	1604.629493	736.377025					*	*	*	12345.67901		*	*	160		
nitrosodiphenylamine, N-	*	*	*	*	*	*	*	*	*	*	*				9.726112667	1.382665579	6.768171186		*	*	*	1990	243	*	*			
pcb mixtures	*	*	*	*	*	*	*	*	*	*	*				0.00010387	1.47662E-05	7.22806E-05		*	*	*	2.077397911	0.0026	*	*	0.1	2	0.014
pcb - Aroclor 1016	*	*	*	*	*	*	*	*	*	*	*	0.005816714	0.001890068	0.000867367	0.002967711	0.00042189	0.00206516		*	*	*	0.014541785		*	*			
pcb - Aroclor 1221	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
pcb - Aroclor 1232	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
pcb - Aroclor 1242	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
pcb - Aroclor 1248	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
pcb - Aroclor 1254	*	*	*	*	*	*	*	*	*	*	*	0.001661918	0.00054002	0.000247819	0.00010387	1.47662E-05	7.22806E-05		*	*	*	0.004154796		*	*			
pcb - Aroclor 1260	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
phenanthrene	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
pyrene	*	*	*	*	*	*	*	*	*	*	*	65.913371	21.41772417	9.828761139					*	*	*			*	*			
tetrachloroethylene (perchloroethylene)	*	*	*	*	*	*	*	*	*	*	*	836.3201912	271.751769	124.7090123	0.387185274	0.055042314	0.022079603		*	*	*	2090.800478	104	*	*	5		
trichlorobenzene, 1,2,4-	*	*	*	*	*	*	*	*	*	*	*	227.4204029	73.89741088	33.91209984	1.960520714	0.278707907	0.141842417		*	*	*	568.5510071	49	*	*			
trichlorethane, 1,1,1-	*	*	*	*	*	*	*	*	*	*	*	925925.9259	300868.03	138070.6922					*	*	*	2314814.815		*	*	200		
trichlorethane, 1,1,2-	*	*	*	*	*	*	*	*	*	*	*	2304.526749	748.8270969	343.6426117	25.26893365	3.592235251	17.58405177		*	*	*	5761.316872	632	*	*			
trichloroethylene	*	*	*	*	*	*	*	*	*	*	*	70.70707071	22.97537684	10.54358013	6.620512238	0.941172974	4.607057486		*	*	*	176.7676768	166	*	*	5		
trimethylbenzene, 1,3,5-	*	*	*	*	*	*	*	*	*	*	*	303.2272038	98.52988117	45.21613312					*	*	*			*	*			
toluene	*	*	*	*	*	*	*	*	*	*	*	19383.86985	6298.545675	2890.451874					*	*	*	48459.67463		*	*	1000		
vinyl chloride (chloroethylene)	*	*	*	*	*	*	*	*	*	*	*	6647.673314	2160.078164	991.2767645	3.693151841	0.525018998	2.569976797		*	*	*	16619.18329	92.3	*	*	0.2		
xylene (dimethylbenzene)	*	*	*	*	*	*	*	*	*	*	*	10582.01058	3438.491772	1577.950768					*	*	*			*	*	1000		
benzoic acid	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
benzyl alcohol	*	*	*	*	*	*	*	*	*	*	*								*	*	*		10500	*	*			
dimethylphenol, 2,4-	*	*	*	*	*	*	*	*	*	*	*	552.7915976	179.6227045	82.430264					*	*	*	1381.978994		*	*			
methylphenol, 2- (o-cresol)	*	*	*	*	*	*	*	*	*	*	*	20478.61448	6654.269226	3053.696194					*	*	*			*	*			
methylphenol, 4- (p-cresol)	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
pentachlorophenol	*	*	*	*	*	*	*	*	*	*	*	1178.451178	382.9229473	175.7263355	1.473063973	0.209410987	1.025070291		*	*	*	2950	36.8	*	*			
phenol (total)	*	*	*	*	*	*	*	*	*	*	*	555555.5556	180520.818	82842.41532					*	*	*	1390000		*	*			
styrene (phenylethylene)	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
Tributyltin	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
Trichlorophenol, 2,4,6-	*	*	*	*	*	*	*	*	*	*	*				3.928170595	0.558429298	2.733520775		*	*	*	43.2	98.2	*	*			
	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			

SW MCTA Method A,B,C Required ARAR's																Surface Water ARAR									ALWAYS APPLICABLE	SW MOST STRINGENT
Surface Water Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Marine - Acute**	Surface Water Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Marine - Chronic**	Surface Water HH - **Consumption; Water + Organism (Fresh)** CWA §304 **NRWQC**	Surface Water HH – **Consumption; Organism Only (Marine)** CWA §304 **NRWQC**	Surface Water HH – **Organoleptic Effects** CWA §304 **NRWQC**	Surface Water Aquatic Life Fresh/Acute, CWA §304, **NRWQC**	Surface Water Aquatic Life Fresh/Chronic, CWA §304, **NRWQC**	Surface Water Aquatic Life Marine/Acute, CWA §304, **NRWQC**	Surface Water Aquatic Life Marine/Chronic, CWA §304, **NRWQC**	Surface Water Aquatic Life Fresh/Acute, **NTR** - 40 CFR 131.36	Surface Water Aquatic Life Fresh/Chronic, **NTR** - 40 CFR 131.36	Surface Water Aquatic Life Marine/Acute, **NTR** - 40 CFR 131.36	Surface Water Aquatic Life Marine/Chronic, **NTR** - 40 CFR 131.36	Surface Water HH - Fresh Water **Water & Organism Consumption NTR** - 40 CFR 131.36 (WAC 173-201A-040[5]) HH - 10^{-6} Carc Risk	Surface Water HH - Fresh Water **Organism Consumption Only NTR** - 40 CFR 131.36 (WAC 173-201A-040[5]) HH - 10^{-6} Carc Risk	Surface Water HH - Marine Water **Organism Consumption Only NTR** - 40 CFR 131.36 (WAC 173-201A-040[5]) HH - 10^{-6} Carc Risk	Surface Water Discharge (**NPDES**) 40 CFR 122,125/ RCW 90-48; WAC 173-216, 220, -122	Waste Water - Toxics Substances Control Act **(TSCA)** 40 CFR 761.61	Shoreline Management Act RCW 90-58; WAC 173-16; King County/City Seattle Shoreline Master Plans (KCC Title 25;SMC 23.60)	Groundwater to Sediment Protection Ecology **CSL** WAC 173-340-730(1)(d)	Groundwater to Sediment Protection Ecology **SQS** WAC 173-340-730(1)(d)	Surface Water HH - **Adult** Non-Carcinogen Tribal Fish Consumption w/o Salmon **EPA RCRA** (using **EQ 730-1**)	Surface Water HH - **Child** Non-Carcinogen Tribal Fish Consumption w/o Salmon **EPA RCRA** (using **EQ 730-1**)	Surface Water HH - **Adult** Carcinogen Tribal Fish Consumption w/o Salmon **EPA RCRA** (using **EQ 730-2**)	Surface Water HH - **Child** Carcinogen Tribal Fish Consumption w/o Salmon **EPA RCRA** (using **EQ 730-2**)	Natural **Background** Levels Ch. 173-340 WAC **LDW**	Partial Screening Level
µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
																					239932.7328	110107.0077				6000
		670	990	20												643			9.31372549	2.614379085	251.4717863	115.4023696				2.614379085
																			10.78431373	10.78431373						10.78431373
		8300	40000										9600	110000	110000	2400			58.82352941	10.78431373	434.2425175	199.2772877				10.78431373
		2.2	51										1.2	71	71	1.2					407.9566509	187.2144979	2.028193577	9.928041555		0.795
																			0.029147982	0.011584454						0.011584454
		0.0038	0.018										0.0028	0.031	0.031	0.0028			0.632911392	0.257852789			0.000258331	0.001264533	0.0032	0.000258331
		0.0038	0.018										0.0028	0.031	0.031	0.0028			0.266903915	0.125826131			1.51762E-05	7.42877E-05	0.0032	1.51762E-05
		0.0038	0.018										0.0028	0.031	0.031	0.0028			0.560398506	0.286425903			0.000121366	0.000594087	0.0032	0.000121366
		0.0038	0.018										0.0028	0.031	0.031	0.0028			0.571791614	0.292249047			0.00012711	0.000622206		0.00012711
		1.2	2.2										1.8	5.9	5.9				0.472727273	0.284848485	316.1089996	145.0648924	1.23480078	6.044370515		0.284848485
		1500	1900																6.837606838	0.523504274	142.4227361	65.35890755	0.409933862	2.006633126		0.409933862
		0.23	1.6										0.25	4.4	4.4						117.8224453	54.0696417	0.247823653	1.213100936		0.23
		130	1600	20									680	21000	21000						589.1122266	270.3482085				20
													0.41	34	34											0.41
		5.7	470										5.7	470	470						1217.385093	558.6675407	4.2952095	21.0251225		4.2952095
																							22.4296091	109.7933125		18.90068394
		0.0038	0.018										0.0028	0.031	0.031	0.0028			1.949152542	0.466101695			0.002581193	0.012634981	0.0032	0.002581193
		0.0038	0.018										0.0028	0.031	0.031	0.0028			0.01259542	0.004580153			6.25379E-05	0.000306124	0.0032	6.25379E-05
																			5.132743363	1.327433628						1.327433628
		2000	4500										2700	12000	12000				1164.383562	150.6849315	101.4976487	46.57806484				46.57806484
		420	1300										2700	17000	17000				5.191873589	5.191873589	948.9204451	435.4670142				5.191873589
		320	960										400	2600	2600											320
		63	190										400	2600	2600				20.73732719	7.142857143						4
																					34667.92115	15909.38017	33.26143751	162.8152941		1
		0.38	37										0.38	99	99						5911.79287	2712.967987	3.552760138	17.39082043		0.38
		330	7100										0.057	3.2	3.2						5099.458136	2340.181224				0.057
		17000	44000										23000	120000	120000				873.015873	484.1269841						484.1269841
		270000	1100000										313000	2900000	2900000				142.8571429	142.8571429						142.8571429
																			22.95918367	0.295918367						0.295918367
		530	2100										3100	29000	29000						1733.396058	795.4690085				2.233717193
		130	140										300	370	370	90.2			16.92524683	2.256699577	23.89873714	10.96731739				2.256699577
		1100	5300										1300	14000	14000	640			6.991150442	2.03539823	98.52988117	45.21613312				2.03539823
		0.00028	0.00029										0.00075	0.00077	0.00077				0.680473373	0.112426036			6.61931E-05	0.000324016		6.61931E-05
		0.44	18										0.44	50	50				6.237424547	3.923541247			4.218902664	20.65159926		0.44
		0.0038	0.018										0.0028	0.031	0.031	0.0028			0.032835821	0.012686567			5.23736E-05	0.00025637	0.0032	5.23736E-05
																					159955.1552	73404.6718				4800
		4.6	590										4.7	1600	1600						25272.91452	11597.93814	61.42722279	300.6872852		4.6
											`								30.62200957	18.18181818						18.18181818
																160			92.39130435	53.80434783	244.182749	112.0573734				53.80434783
		3.3	6										5	16	16				1.957295374	1.957295374			1.593580667	7.800604079		1.382665579
10	0.03	0.000064	0.000064			0.014		0.03		0.014		0.03	0.00017	0.00017	0.00017		0.5		1.450892857	0.267857143			2.30352E-05	0.000112758	0.00153	1.47662E-05
										0.014		0.03							2.398523985	0.442804428	0.002948507	0.001353093	0.000658149	0.003221649	0.00153	0.00042189
										0.014		0.03											2.30352E-05	0.000112758	0.00153	2.30352E-05
										0.014		0.03													0.00153	0.014
										0.014		0.03											2.30352E-05	0.000112758	0.00153	2.30352E-05
										0.014		0.03							1.480637813	0.273348519			2.30352E-05	0.000112758	0.00153	2.30352E-05
										0.014		0.03							0.85978836	0.158730159	0.000200579	9.20471E-05	5.48457E-06	2.68471E-05	0.00153	5.48457E-06
										0.014		0.03							0.314009662	0.057971014			2.30352E-05	0.000112758	0.00153	2.30352E-05
																			23.07692308	4.807692308						4.807692308
		830	4000										960	11000	11000	480			20.17291066	14.4092219	21.41772417	9.828761139				9.828761139
		0.69	3.3										0.8	8.85	8.85						101.7428121	46.69057224	0.02060763	0.100874693		0.02060763
		35	70																2.506963788	1.128133705	35.10127017	16.10824742				0.141842417
																					100289.3433	46023.56406				200
		0.59	16										0.6	42	42						486.954037	223.4670163	2.335991132	11.43471574		0.59
		2.5	30										2.7	81	81						18.0520818	8.284241532	0.739493051	3.619830882		0.49
																					98.52988117	45.21613312				45.21613312
		1300	15000										6800	200000	200000						2819.850993	1294.051676				1000
		0.025	2.4										2	525	525						1053.038105	483.2474227	0.53322242	2.610132684		0.02
																					3438.491772	1577.950768				1000
																			2242.926156	2242.926156						2242.926156
																			233.0779055	181.9923372						181.9923372
		380	850	400															2.020624303	2.020624303	1427.848278	655.2507426				2.020624303
																			7.110609481	7.110609481	6654.269226	3053.696194				7.110609481
																			77.18894009	77.18894009	727.4874646	333.8496875				77.18894009
13	7.9	0.27	3	30	19	15	13	7.9	20	13	13	7.9	0.28	8.2	8.2				10.20710059	5.325443787			0.698036623	3.416900968		0.209410987
		10000	860000	300									21000	4600000	4600000				223.880597	78.35820896	88676.89306	40694.5198				78.35820896
																										100
					0.46	0.072	0.42	0.0074																		0.072
		1.4	2.4	2									2.1	6.5	6.5								0.558429298	2.733520775		0.558429298

MEDIA - MTCA Standard	SW Method A						SW Method B													SW Method C						HIDDEN GW ARAR's		
PATHWAYS HH - Human Health Ecol- Ecological	Surface Water, Method A - HH ARAR's WAC 173-340-730(2)(b)(i) **[See Required ARAR's]**	Surface Water, Method A - WAC 173-340-730(2)(b)(i)(A) **[See Required ARAR's]**	Surface Water, Method A - HH/ Aquatic Organisms: CWA §304 WAC 173-340-730(2)(b)(i)(B) **[See Required ARAR's]**	Surface Water, Method A - HH NTR - 40 CFR 131 WAC 173-340-730(2)(b)(i)(C) **[See Required ARAR's]**	Surface Water, Method A - HH Potability WAC 173-340-730(2)(b)(ii) **[See Required ARAR's]**	Surface Water, Method A - HH No Table Values WAC 173-340-730(2)(b)(iii) **[See applicable SW background or PQL values]**	Surface Water, Method B - HH ARAR's WAC 173-340-730(3)(b)(i) [See **Required ARAR's]**	Surface Water, Method B - WA WQS:Ch. 173-2101 A WAC 173-340-730(3)(b)(i)(A) **[See Required ARAR's]**	Surface Water, Method B - HH/ Aquatic Organisms: CWA §304 WAC 173-340-730(3)(b)(i)(B) **[See Required ARAR's]**	Surface Water, Method B - HH NTR - 40 CFR 131 WAC 173-340-730(3)(b)(i)(C) **[See Required ARAR's]**	Surface Water, Method B, Environmental Effects, WAC 173-340-730(3)(b)(ii) **[WET TESTING]**	Surface Water, Method B-HH, Non-carcinogen, Fish Consumption WAC 173-340-730(3)(b)(iii)(A) ***EQ. 730-1*** *CLARC Database*	Surface Water, Method B-HH, Non-carcinogen, Fish Consumption WAC 173-340-730(3)(c) ***EQ. 730-1 MOD - Tribal Adult***	Surface Water, Method B-HH, Non-carcinogen, Fish Consumption WAC 173-340-730(3)(c) ***EQ. 730-1 MOD - Tribal Child***	Surface Water, Method B-HH, Carcinogen, Fish Consumption WAC 173-340-730(3)(b)(iii)(B) ***EQ. 730-2*** *CLARC Database*	Surface Water, Method B-HH, Carcinogen, Fish Consumption WAC 173-340-730(3)(b)(iii)(B) ***EQ. 730-2 MOD - Tribal Adult***	Surface Water, Method B-HH, Carcinogen, Fish Consumption WAC 173-340-730(3)(b)(iii)(B) ***EQ. 730-2 MOD - Tribal Child***	Surface Water, Method B-HH Petroleum Mixture WAC 173-340-730(3)(b)(iii)(C)	Surface Water, Method B-HH Potability WAC 173-340-730(3)(b)(iv)	Surface Water, Method C - HH ARAR's WAC 173-340-730(4)(b)(i) **[See Required ARAR's]**	Surface Water, Method C, Environmental Effects, WAC 173-340-730(4)(b)(ii) **[WET TESTING]**	Surface Water, Method C, Non-carcinogen, Fish Consumtion WAC 173-340-730(4)(b)(iii)(A) **EQ. 730-1** *CLARC Database*	Surface Water, Method C, Carcinogen, Fish Consumption WAC 173-340-730(4)(b)(iii)(B) **EQ. 730-2** *CLARC Database*	Surface Water, Method C, Petroleum Mixture WAC 173-340-730(4)(b)(iii)(C)	Surface Water, Method C-HH Potability WAC 173-340-730(4)(b)(iv)	Ground Water, Method A-HH, **Potable** (Table 720-1) WAC 173-340-720(3)(b)(i)	Surface Water Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Fresh - Acute**	Surface Water Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Fresh - Chronic**
UNITS	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Aluminum	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
Antimony	*	*	*	*	*	*	*	*	*	*	*	1037.037037	336.9721936	154.6391753					*	*	*	2592.592593		*	*			
Arsenic (III)	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
Arsenic (V)	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
Arsenic (total)	*	*	*	*	*	*	*	*	*	*	*	17.67676768	5.743844209	2.635895033	0.098204265	0.013960732	0.068338019		*	*	*	44.19191919	2.46	*	*	5	360	190
Barium	*	*	*	*	*	*	*	*	*	*	*	819.144579	266.170769	122.1478478					*	*	*			*	*			
Beryllium	*	*	*	*	*	*	*	*	*	*	*	272.9044834	88.67689306	40.6945198					*	*	*	682.2612086	682	*	*			
Cadmium	*	*	*	*	*	*	*	*	*	*	*	40.50925926	13.16297631	6.040592784					*	*	*	101		*	*	5		
Chromium (VI)	*	*	*	*	*	*	*	*	*	*	*	486.1111111	157.9557158	72.4871134	0.810185185	0.115176043	0.56378866		*	*	*	1215.277778		*	*		15	10
Chromium, total (or III)	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*	50		
Cobalt	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
Copper	*	*	*	*	*	*	*	*	*	*	*	2880.658436	936.0338712	429.5532646					*	*	*	7200		*	*			11.4
Iron	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
Lead	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*	15		0.54
Manganese	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
Mercury	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*	2	2.1	0.012
Mercury (organic)	*	*	*	*	*	*	*	*	*	*	*	0.003050109	0.000991095	0.000454821					*	*	*			*	*			
Molybdenum	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
Nickel	*	*	*	*	*	*	*	*	*	*	*	1103.23089	358.481057	164.5097609					*	*	*	2758.077226		*	*			
Selenium	*	*	*	*	*	*	*	*	*	*	*	2700.617284	877.5317542	402.7061856					*	*	*	6751.54321		*	*		20	5
Silver	*	*	*	*	*	*	*	*	*	*	*	25925.92593	8424.30484	3865.979381				1.9	*	*	*	64814.81481		*	*			
Tin	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
Thallium	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
Vanadium	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
Zinc	*	*	*	*	*	*	*	*	*	*	*	16548.46336	5377.215856	2467.646414					*	*	*	41371.15839		*	*		35.4	104
	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
LPAH	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
HPAH	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
Total Petroleum Hydrocarbons	*	*	*	*	*	*	*	*	*	*	0.7								*	*	*			*	*		0.208	
Gasoline	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*	1000		
Gasoline (w/benzene)	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*	800		
Diesel	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*	500		
Heavy Oil	*	*	*	*	*	*	*	*	*	*	*							500	*	*	*			*	*	500		
	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
2,3,7,8-TCDD (Dioxin)	*	*	*	*	*	*	*	*	*	*	*	5.18519E-07	1.68486E-07	7.73196E-08	8.64198E-09	1.22854E-09	6.01375E-09		*	*	*		0.000000216	*	*			
	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			
Aldrin	*	*	*	*	*	*	*	*	*	*	*	0.01665477	0.005411759	0.002483499	8.1641E-05	1.16061E-05	5.68121E-05		*	*	*	0.041636926	0.002041026	*	*		2.5	0.0019
alpha-BHC	*	*	*	*	*	*	*	*	*	*	*				0.007913897	0.001125041	0.005507093		*	*	*		0.19784742	*	*			
beta-BHC	*	*	*	*	*	*	*	*	*	*	*				0.027698639	0.003937642	0.019274826		*	*	*		0.69246597	*	*			
gamma-BHC (Lindane)	*	*	*	*	*	*	*	*	*	*	*	5.982905983	1.944070348	0.892149088					*	*	*	14.95726496		*	*	0.1	2	0.08
Chlordane	*	*	*	*	*	*	*	*	*	*	*	0.091935908	0.029873421	0.013709147	0.00131337	0.000186709	0.000913943		*	*	*	0.229839769	0.032834253	*	*		2.4	0.0043
4,4'-DDT	*	*	*	*	*	*	*	*	*	*	*	0.024184632	0.007858493	0.003606324	0.000355656	5.05602E-05	0.000247493		*	*	*	0.060461581	0.008891409	*	*	0.3	1.1	0.001
4,4'-DDE	*	*	*	*	*	*	*	*	*	*	*				0.000355656	5.05602E-05	0.000247493		*	*	*		0.008891409	*	*		1.1	0.001
4,4'-DDD	*	*	*	*	*	*	*	*	*	*	*				0.000503847	7.16269E-05	0.000350615		*	*	*		0.012596163	*	*		1.1	0.001
Dieldrin	*	*	*	*	*	*	*	*	*	*	*	0.027757951	0.009019598	0.004139164	8.67436E-05	1.23315E-05	6.03628E-05		*	*	*	0.069394877	0.00216859	*	*		2.5	0.0019
alpha-Endosulfan	*	*	*	*	*	*	*	*	*	*	*	57.61316872	18.72067742	8.591065292					*	*	*	144.0329218		*	*		0.22	0.056
beta-Endosulfan	*	*	*	*	*	*	*	*	*	*	*	57.61316872	18.72067742	8.591065292					*	*	*	144.0329218		*	*		0.22	0.056
Endosulfan Sulfate	*	*	*	*	*	*	*	*	*	*	*	57.61316872	18.72067742	8.591065292					*	*	*	144.0329218		*	*		0.22	0.056
Endrin	*	*	*	*	*	*	*	*	*	*	*	0.195913798	0.063659734	0.02921395					*	*	*	0.489784495		*	*		0.18	0.0023
Endrin Aldehyde	*	*	*	*	*	*	*	*	*	*	*	0.195913798	0.063659734	0.02921395					*	*	*	0.489784495		*	*		0.18	0.0023
Heptachlor	*	*	*	*	*	*	*	*	*	*	*	0.115740741	0.037608504	0.017258837	0.000128601	1.82819E-05	8.94903E-05		*	*	*	0.289351852	0.003215021	*	*		0.52	0.0038
Heptachlor Epoxide	*	*	*	*	*	*	*	*	*	*	*	0.003009259	0.000977821	0.00044873	6.35938E-05	9.04051E-06	4.42534E-05		*	*	*	0.007523148	0.001589845	*	*			
Toxaphene	*	*	*	*	*	*	*	*	*	*	*				0.000449791	6.39423E-05	0.000312999		*	*	*			*	*			
	*	*	*	*	*	*	*	*	*	*	*								*	*	*			*	*			

SW MCTA Method A,B,C Required ARAR's																Surface Water ARAR									ALWAYS APPLICABLE	SW MOST STRINGENT
Surface Water Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Marine - Acute**	Surface Water Aquatic Life **SWQS**:RCW 90-48; Ch. 173-201A-240 per MTCA WAC 173-340-730(2)(b)(i)(A) **Marine - Chronic**	Surface Water HH - **Consumption; Water + Organism (Fresh)** CWA §304 **NRWQC**	Surface Water HH – **Consumption; Organism Only (Marine)** CWA §304 **NRWQC**	Surface Water HH – **Organoleptic Effects** CWA §304 **NRWQC**	Surface Water Aquatic Life Fresh/Acute, CWA §304, **NRWQC**	Surface Water Aquatic Life Fresh/Chronic, CWA §304, **NRWQC**	Surface Water Aquatic Life Marine/Acute, CWA §304, **NRWQC**	Surface Water Aquatic Life Marine/Chronic, CWA §304, **NRWQC**	Surface Water Aquatic Life Fresh/Acute, **NTR** - 40 CFR 131.36	Surface Water Aquatic Life Fresh/Chronic, **NTR** - 40 CFR 131.36	Surface Water Aquatic Life Marine/Acute, **NTR** - 40 CFR 131.36	Surface Water Aquatic Life Marine/Chronic, **NTR** - 40 CFR 131.36	Surface Water HH - Fresh Water **Water & Organism Consumption NTR** - 40 CFR 131.36 (WAC 173-201A-040[5]) HH - 10^{-6} Carc Risk	Surface Water HH - Fresh Water **Organism Consumption Only NTR** - 40 CFR 131.36 (WAC 173-201A-040[5]) HH - 10^{-6} Carc Risk	Surface Water HH - Marine Water **Organism Consumption Only NTR** - 40 CFR 131.36 (WAC 173-201A-040[5]) HH - 10^{-6} Carc Risk	Surface Water Discharge (**NPDES**) 40 CFR 122,125/ RCW 90-48; WAC 173-216, 220, -122	Waste Water - Toxics Substances Control Act **(TSCA)** 40 CFR 761.61	Shoreline Management Act RCW 90-58; WAC 173-16; King County/City Seattle Shoreline Master Plans (KCC Title 25;SMC 23.60)	Groundwater to Sediment Protection Ecology **CSL** WAC 173-340-730(1)(d)	Groundwater to Sediment Protection Ecology **SQS** WAC 173-340-730(1)(d)	Surface Water HH - **Adult** Non-Carcinogen Tribal Fish Consumption w/o Salmon **EPA RCRA** (using **EQ 730-1**)	Surface Water HH - **Child** Non-Carcinogen Tribal Fish Consumption w/o Salmon **EPA RCRA** (using **EQ 730-1**)	Surface Water HH - **Adult** Carcinogen Tribal Fish Consumption w/o Salmon **EPA RCRA** (using **EQ 730-2**)	Surface Water HH - **Child** Carcinogen Tribal Fish Consumption w/o Salmon **EPA RCRA** (using **EQ 730-2**)	Natural **Background** Levels Ch. 173-340 WAC **LDW**	Partial Screening Level
µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
																750										50
		5.6	640										14	4300	4300						8.42430484	3.865979381				3.865979381
69	36	0.018	0.14		340	150	69	36	360	190	69	36	0.018	0.14	0.14	168.54					2.216922326	1.017362995	0.005388353	0.026376078	0.87	0.005388353
		1000																			266.170769	122.1478478				2
																					27.1751769	12.47090123				4
42	9.3				2	0.25	40	8.8	3.7	1	42	9.3				15.9			3.357954465	2.556054891	0.928809795	0.42623808				0.25
1100	50				16	11	1100	50	15	10	1100	50									789.7785788	362.435567	0.575880214	2.818943299		0.115176043
					570	74			550	180									317.6470588	305.8823529						50
4.8	3.1	1300		1000	13	9	4.8	3.1	17	11	2.4	2.4				63.6			123.3288287	123.3288287	936.0338712	429.5532646				2.4
		300				1000										1000										300
210	8.1				65	2.5	210	8.1	65	2.5	210	8.1				81.6			13.31299809	11.30348894						0.54
		50	100																							50
1.8	0.025				1.4	0.77	1.8	0.94	2.1	0.012	1.8	0.025	0.14	0.15	0.15	2.4			0.00742766	0.005161594	0.026957775	0.012371134				0.005161594
			0.3																		0.000991095	0.000454821				0.000454821
																										40
74	8.2	610	4600		470	52	74	8.2	1400	160	74	8.2	610	4600	4600						216.0078164	99.12767645				8.2
290	71	170	4200			5	290	71	20	5	290	71				238.5					32.65234434	14.98441621				5
1.9					3.2		1.9		3.4		1.9					38.18			1.532250723	1.532250723	47.86536841	21.96579194				1.532250723
		0.24	0.47										1.7	6.3	6.3											0.24
																										1.12
90	81	7400	26000	5000	120	120	90	81	110	100	90	81				117			76.25551053	32.56745762	122.7436354	56.3280143				32.56745762
																										0.01
																										0.01
																1000										1000
																										800
																10000										500
																10000										500
		0.000000005	5.1E-09										0.000000013	0.000000014	0.000000014						2.44893E-08	1.12383E-08	2.06039E-10	1.00857E-09		2.06039E-10
0.71	0.0019	0.000049	0.00005		3		1.3		3		1.3		0.00013	0.00014	0.00014											1.16061E-05
		0.0026	0.0049										0.0039	0.013	0.013											0.001125041
		0.0091	0.017										0.014	0.046	0.046											0.003937642
0.16		0.98	1.8		0.95		0.16		2	0.08	0.16		0.019	0.063	0.063											0.019
0.09	0.004	0.0008	0.00081		2.4	0.0043	0.09	0.004	2.4	0.0043	0.09	0.004	0.00057	0.00059	0.00059											0.000186709
0.13	0.001	0.00022	0.00022		1.1	0.001	0.13	0.001	1.1	0.001	0.13	0.001	0.00059	0.00059	0.00059											5.05602E-05
0.13	0.001	0.00022	0.00022										0.00059	0.00059	0.00059											5.05602E-05
0.13	0.001	0.00031	0.00031										0.00083	0.00084	0.00084											7.16269E-05
0.71	0.0019	0.000052	0.000054		0.24	0.056	0.71	0.0019	2.5	0.0019	0.71	0.0019	0.00014	0.00014	0.00014											1.23315E-05
0.034	0.0087	62	89		0.22	0.056	0.034	0.0087	0.22	0.056	0.034	0.0087														0.056
0.034	0.0087	62	89		0.22	0.056	0.034	0.0087	0.22	0.056	0.034	0.0087														0.056
0.034	0.0087	62	89		0.22	0.056	0.034	0.0087	0.22	0.056	0.034	0.0087														0.056
0.037	0.0023	0.059	0.06		0.086	0.036	0.037	0.0023	0.18	0.0023	0.037	0.0023	0.076	0.81	0.81											0.002
0.037	0.0023	0.29	0.3		0.086	0.036	0.037	0.0023	0.18	0.0023	0.037	0.0023	0.076	0.81	0.81											0.002
0.053	0.0036	0.000079	0.000079		0.52	0.0038	0.053	0.0036	0.52	0.0038	0.053	0.0036	0.00021	0.00021	0.00021											1.82819E-05
		0.000039	0.000039		0.52	0.0038	0.053	0.0036	0.52	0.0038	0.053	0.0036	0.0001	0.00011	0.00011											9.04051E-06
		0.00028	0.00028		0.73	0.0002	0.21	0.0002	0.73	0.0002	0.21	0.0002														6.39423E-05

MEDIA - MTCA Standard	SEDIMENT Required ARAR (Marine Waters)				SEDIMENT Apparent Effect Thresholds (Marine Waters)																				SEDIMENT AET's (Fresh Water)				Puget Sound Dredge Disposal Analysis (PSDDA) (Marine Waters)										
PATHWAYS HH - Human Health Ecol- Ecological	SMS **SQS** WAC 173-340-760	SMS **SQS** WAC 173-340-760	SMS **CSL** WAC 173-340-760	SMS **CSL** WAC 173-340-760	Amphipod (1994)	Echinoderm (1994)	Benthic (1988)	Amphipod (1986)	Oyster (1986)	Benthic (1986)	Microtox (1986)	*SMS LAET WAC 173-340-760 (1988)*	*SMS 2LAET WAC 173-340-760 (1988)*	*SMS HAET WAC 173-340-760 (1988)*	Amphipod (1994)	*Echinoderm (1994)*	Benthic (1988)	Amphipod (1988)	Oyster (1988)	Microtox (1988)	Oyster (1986)	Microtox (1986)	SMS LAET WAC 173-340-760 (1988)	SMS 2LAET WAC 173-340-760 (1988)	Ecology (2003) (Draft Freshwater) LAET	Ecology (2003) (Draft Freshwater) 2LAET	Sediment Evaluation Framework/PSDDA (ECY03 /RSET07) (SL1) **Interim Freshwater** (2007)	Sediment Evaluation Framework/PSDDA (ECY03 /RSET07) (SL2) **Interim Freshwater** (2007)	Sediment Evaluation Framework (SEF) Screening Level (SL1) **Marine** (2005)	Sediment Evaluation Framework (SEF) Screening Level (SL2) **Marine** (2005)	Sediment Evaluation Framework (SEF) Screening Level (SL1) **Marine** (2005)	Sediment Evaluation Framework (SEF) Screening Level (SL2) **Marine** (2005)	PSDDA /DMMP Screening Level **Marine** (2011)	PSDDA /DMMP Bioaccum-ulation Trigger (BT) **Marine** (2003)	PSDDA /DMMP Maximum Level (ML) **Marine** (1998)	CERCLA/MTCA HH Risk Based Threshold Concentrations 40 CFR 160 **LDW**	CERCLA/MTCA HH Risk Based Threshold Concentrations 40 CFR 160 **LDW (Netfishing)**	CERCLA/MTCA HH Risk Based Threshold Concentrations 40 CFR 160 **LDW (Beach Play & Clam Fishing)**	CERCLA/MTCA HH Risk Based Threshold Concentrations 40 CFR 160 **LDW (Natural Area Background)**
UNITS	**mg/kg OC**	**mg/kg DW**	**mg/kg OC**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg OC**	**mg/kg OC**	**mg/kg OC**	**mg/kg OC**	**mg/kg OC**	**mg/kg OC**	**mg/kg OC**	**mg/kg OC**	**mg/kg OC**	**mg/kg OC**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg OC**	**mg/kg OC**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**
acetone																																							
acenaphthene	16	0.5	57	0.5	2	0.13	0.73	0.63	0.5	0.5	0.5	0.5	0.5	2	200	110	57	200	16	57	16	57	16	32	1.06	1.32	1.1	1.3	0.5	0.5	16	57	0.5		2				
acenaphthylene	66	1.3	66	1.3	1.3	0.071	1.3	0.56	0.56	0.64	0.56	0.56	1.3	1.3	66	18	66	66	27	27	27	27	66	132	0.47	0.64	0.47	0.64	0.56	1.3	66	66	0.56		1.3				
anthracene	220	0.96	1200	0.96	13	0.28	4.4	1.9	0.96	1.3	0.96	0.96	0.96	13	1200	93	220	1200	79	79	79	79	220	440	1.23	1.58	1.2	1.6	0.96	0.96	220	1200	0.96		13				
benzene																								2															
benzo(g,h,i)perylene	31	0.67	78	0.72	3.2	0.92	2.6	0.74	0.72	5.4	0.67	0.67	0.72	2.6	100	240	1200	78	31	67	31	67	31	62	4.02	5.2	4	5.2	0.67	0.72	31	78	0.67		3.2				
benzo[a]anthracene	110	1.3	270	1.6	5.1	0.96	5.1	1.6	1.6	4.5	1.3	1.3	1.6	5.1	270	170	650	270	110	160	110	160	110	220	4.26	5.8	4.3	5.8	1.3	1.6	110	270	1.3		5.1	0.15	0.21	0.062	0.009
benzo[a]pyrene	99	1.6	210	1.6	3.5	1.1	3.6	2.4	1.6	6.8	1.6	1.6	1.6	3.6	210	230	1300	210	99	140	99	140	99	198	3.3	4.81	3.3	4.8	1.6	1.6	99	210	1.6		3.6	0.15	0.21	0.062	0.009
benzo[b]fluoranthene	230	3.2	450	3.6	9.1	1.8	9.9	3.7	3.6	8	3.2	3.2	3.6	9.9	450	310	1500	450	230	430	230	430			11	13.8	0.6	4	3.2	3.6	230	450	3.2		9.9	0.15	0.21	0.062	0.009
benzo[k]fluoranthene	230	3.2	450	3.6	9.1	1.8	9.9	3.7	3.6	8	3.2	3.2	3.6	9.9	450	310	1500	450	230	430	230	430			11	13.8	0.6	4	3.2	3.6	230	450	3.2		9.9	0.15	0.21	0.062	0.009
bis(2-ethylhexyl) phthalate	47	1.3	78	3.1	8.3	1.7	1.3	3.1	1.9	1.9	1.9	1.3	1.9	3.1	550	130	60	78	60	47	60	47	47	94	2.52	6.38	0.22	0.32	1.3	1.9	47	78	1.3		8.3				
butyl benzyl phthalate	4.9	0.063	64	0.9	0.97	0.2	0.9	0.47	0.47	0.47	0.063	0.063	0.9	0.9	49	5.2	64	42	9.2	4.9	9.2	4.9	4.9	9.8	0.26	0.366	0.26	0.37	0.063	0.9	4.9	64	0.063		0.97				
carbon tetrachloride																																							
chlorobenzene																																							
chloroethane																																							
chloroform (trichloromethane)																																							
chloromethane																																							
chrysene	110	1.4	460	2.8	21	0.95	9.2	2.8	2.8	6.7	1.4	1.4	2.8	9.2	840	220	850	460	110	200	110	200	110	220	5.94	6.4	5.9	6.4	1.4	2.8	110	460	1.4		21	0.15	0.21	0.062	0.009
dibenz[a,h]anthracene	12	0.23	33	0.23	1.9	0.24	0.97	0.26	0.23	1.2	0.23	0.23	0.23	0.97	50	48	89	47	120	33	120	33	12	24	0.8	0.839	0.8	0.84	0.23	0.23	12	33	0.23		1.9	0.15	0.21	0.062	0.009
dibenzofuran	15	0.54	58	0.54	1.7	0.11	0.7	0.54	0.54	0.54	0.54	0.54	0.54	1.7	170	57	58	170	15	58	15	58	15	30	0.399	0.443	0.4	0.44	0.54	0.54	15	58	0.54		1.7		160	15	
di-butyl phthalate (di-n-butyl phth.)	220	1.4	1700	5.1	1.4	0.031	5.1	5.1	1.4	5.1	1.4	1.4	5.1	5.1	260	0.88	1700	260	260	220	260	220	220	440	0.103				1.4	1.4	220	1700	1.4		5.1				
dichlorobenzene, 1,2-	2.3	0.035	2.3	0.05	0.11		0.05	0.35	0.05	0.05	0.035	0.035	0.05	0.11	5.8		2.3	5.8	2.3	2.3	2.3	2.3	2.3	4.6					0.035	0.05	2.3	2.3	0.035		0.11				
dichlorobenzene, 1,3-					0.17	0.0044	0.17	0.17	0.17	0.17	0.17	0.17			15	0.26	15	15	15	15	15	15							0.17										
dichlorobenzene, 1,4-	3.1	0.11	9	0.11	0.12		0.11	0.26	0.12	0.12	0.11	0.11	0.11	0.12	9		16	9	3.1	16	3.1	16	3.1	6.2					0.11	0.11	3.1	9	0.11		0.12				
dichloroethane, 1,1-																																							
dichloroethane, 1,2-																																							
dichloroethylene, 1,1-																																							
diethyl phthalate	61	0.2	110	1.2	1.2	0.062	0.2	0.073	0.073	0.097	0.048	0.048	1.2	1.2	110	0.27	61	110	5.3	5.3	5.3	5.3	61	122					0.2	0.2	61	110	0.2		1.2				
dimethyl phthalate	53	0.071	53	0.16	1.4	0.085	1.4	0.16	0.16	0.16	0.071	0.071	0.16	1.4	53		53	53	22	19	22	19	53	106	0.311	0.436	0.046	0.44	0.071	0.16	53	53	0.071		1.4				
di-n-octyl phthalate	58	6.2	4500	6.2	2.1	0.098	6.2	0.59	0.42	69		0.42	6.2	6.2	58	57	4500	58	57		57		58	116	0.011	0.201	0.026	0.045	6.2	6.2	58	4500	6.2		6.2				
ethylbenzene					0.05	0.004	0.01	0.05	0.037	0.037	0.033	0.01		0.05	3.8		3.8	3.8	3.8	3.8	3.8	3.8							0.01						0.05				
fluoranthene	160	1.7	1200	2.5	30	1.3	24	3.9	2.5	6.3	1.7	1.7	2.5	30	3000	320	1200	3000	160	190	160	190	160	320	11.1	15	11	15	1.7	2.5	160	1200	1.7	4.6	30				
fluorene	23	0.54	79	0.54	3.6	0.12	1	0.54	0.54	0.64	0.54	0.54	0.54	3.6	360	73	79	360	23	71	23	71	23	46	1.07	3.85	1	3	0.54	0.54	23	79	0.54		3.6				
hexachlorobenzene (HCB)	0.38	0.022	2.3	0.07	0.13		0.022	0.13	0.23	0.23	0.07	0.022	0.07	0.23	4.5		0.38	4.5	9.6	2.3	9.6	2.3	0.38	0.76					0.022	0.07	0.38	2.3	0.022	0.168	0.23				
hexachlorobutadiene	3.9	0.011	6.2	0.12	0.18	0.0013	0.011	0.29	0.27	0.27	0.12	0.011	0.12	0.27	6.2		6.9	6.2	11	3.9	11	3.9	3.9	7.8					0.011	0.12	3.9	6.2	0.011		0.27				
indeno[1,2,3-cd]pyrene	34	0.6	88	0.69	4.4	0.76	2.6	0.69	0.69	5.2	0.6	0.6	0.69	2.6	120	190	900	88	33	87	33	87	34	68	4.12	5.3	4.1	5.3	0.6	0.69	34	88	0.6		4.4	0.15	0.21	0.062	0.009
MEK (Methyl Ethyl Ketone;2-Butanone)																																							
methylene chloride (dichloromethane)																																							
methylnaphthalene, 2-	38	0.67	64	0.67	1.9	0.064	1.4	0.67	0.67	0.67	0.67	0.67	0.67	1.9	120	53	64	120					38	76	0.469		0.47	0.56	0.67	0.67	38	64	0.67		1.9				
MIK (M-Isobutyl-K;4-M,2-Pentanone)																																							
naphthalene	99	2.1	170	2.1	2.4	0.23	2.7	2.1	2.1	2.1	2.1	2.1	2.1	2.7	220	190	170	220	99	170	99	170	99	198	0.529	1.31	0.5	1.3	2.1	2.1	99	170	2.1		2.4				
nitrosodiphenylamine, N-	11	0.028	11	0.04	0.048	0.025	0.028	0.22	0.13	0.074	0.04	0.028	0.04	0.13	11	6.4	11	11	11	11	11	11	11	22					0.028	0.04	11	11	0.028		0.13				
pcb mixtures	12	0.13	65	1	3.1	0.45		2.5	1.1	1.1	0.13	0.13	1	3.1	190	18	65	190	46	12	46	12	12	24	0.062	0.354	0.06	0.12	0.13	1	12	65	0.13	0.038	3.1	0.5	0.000016	0.0000039	0.002
pcb - Aroclor 1016	12		65																																				
pcb - Aroclor 1221																																							
pcb - Aroclor 1232																																							
pcb - Aroclor 1242																																							
pcb - Aroclor 1248	12		65																																				
pcb - Aroclor 1254	12		65																						0.23	0.294													
pcb - Aroclor 1260	12		65																						0.138	0.14													
phenanthrene	100	1.5	480	1.5	21	0.66	5.4	5.4	1.5	3.2	1.5	1.5	1.5	6.9	840	140	480	690	120	160	120	160	100	200	6.1	7.57	6.1	7.6	1.5	1.5	100	480	1.5		21				
pyrene	1000	2.6	1400	3.3	16	2.4	16	4.3	3.3	7.3	2.6	2.6	3.3	16	1000	520	1400	1000	210	210	210	210	1000	2000	8.79	16	8.8	16	2.6	3.3	1000	1400	2.6	11.98	16				
tetrachloroethylene (perchloroethylene)					0.21	0.001	0.057	0.12	0.14	0.14	0.14	0.057		0.21	22		22	22	22	22	22	22							0.057						0.21				
trichlorobenzene, 1,2,4-	0.81	0.031	1.8	0.051	0.051	0.0048		0.051	0.064	0.064	0.031	0.031	0.051	0.064	1.8	2.4		1.8	2.7	0.81	2.7	0.81	0.81	1.62					0.031	0.05	0.81	1.8	0.031		0.064				
trichlorethane, 1,1,1-																																							
trichlorethane, 1,1,2-																																							
trichloroethylene																													0.16						1.6				
trimethylbenzene, 1,3,5-																																							
toluene																																							
vinyl chloride (chloroethylene)																																							
xylene (dimethylbenzene)					0.16	0.021	0.04	0.16	0.12	0.12	0.1	0.04		0.16	12	0.15	12	12	12	12	12	12							0.04						0.16				
benzoic acid	32.5	0.65	32.5	0.65	0.76	0.031	0.65	0.69	0.65	0.65	0.65	0.65	0.65	0.76	170	2	170	170	170	170	170	170	0.65	1.3	2.91	3.79			0.65	0.65			0.65		0.76				
benzyl alcohol	2.85	0.057	3.65	0.073	0.073	0.012	0.87	0.073	0.073	0.073	0.057	0.057	0.073	0.87	5	0.71	73	73	5	5	5	5	0.057	0.114					0.057	0.073			0.057		0.87				
dimethylphenol, 2,4-	1.45	0.029	1.45	0.029	0.077	0.055	0.21	0.05	0.029	0.029	0.029	0.029	0.029	0.21	6.5		2.6	6.5	1.3	0.63	1.3	0.63	0.029	0.058					0.029	0.029			0.029		0.21				
methylphenol, 2- (o-cresol)	3.15	0.063	3.15	0.063	0.077	0.055	0.072	0.063	0.063	0.072	0.072	0.063	0.063	0.072	3.1	2.1	10	3.1	3.1	10	3.1	10	0.063	0.126					0.063	0.063			0.063		0.077				
methylphenol, 4- (p-cresol)	33.5	0.67	33.5	0.67	3.6	0.11	1.8	1.2	0.67	0.67	0.67	0.67	0.67	3.6	780	4.7	250	780	37	81	37	81	0.67	1.34	0.76	2.36			0.67	0.67			0.67		3.6				
pentachlorophenol	18	0.36	34.5	0.69	0.4	0.15	0.69	0.14	0.14	0.14	0.14	0.14	0.69	0.69	24	9.3	66	24	11	11	11	11	0.36	0.72					0.4	0.69			0.4	0.504	0.69				
phenol (total)	21	0.42	60	1.2	1.2	0.22	1.2	0.67	0.42	1.2	1.2	0.42	1.2	1.2	440	3.2	140	440	39	33	39	33	0.42	0.84					0.42	1.2			0.42		1.2				
styrene (phenylethylene)																																							
Tributyltin			0.073																								0.075	0.075	0.15				0.073						
Trichlorophenol, 2,4,6-																																							

SEDIMENT POTENTIAL ARAR's													Always Applicable			EPA Method	SEDIMENT MOST STRINGENT	SEDIMENT MOST STRINGENT
CERCLA HH Risk Based Threshold Concentrations 40 CFR 160 **Lockheed West**	CERCLA HH Risk Based Threshold Concentrations 40 CFR 160 **Hylebos Waterway**	CERCLA HH Risk Based Threshold Concentrations 40 CFR 160 Data Quality Objectives **Commencement Bay**	MTCA Sediment to protect Surface Water Upriver Dam PCB Site **Spokane River**	CERCLA SMS/SQS ARAR WAC 173-340-760 **T-117**	CERCLA Sediment Screening Level (Based on Soil equivalency) **T-117**	CERCLA Sediment Screening Level - *Recreational Scenario* **T-117**	**"Bold Study"** (EPA OSV Bold Survey, 2009, conducted by DMMP agencies)	**"Elliot Bay"** (Ecology, 2009, combined 2007 data from Basin, Urban, and Harbor areas in Bay)	SMS **SQS** WAC 173-340-760	SMS **CSL** WAC 173-340-760	CERCLA HH Risk Based Threshold Concentrations 40 CFR 160 **(SITE-SPECIFIC)**	CERCLA Ecol Risk Based Threshold Concentrations 40 CFR 160 **(SITE-SPECIFIC)**	Natural **Background** Levels Ch. 173-340 WAC	Applicable **DL (MDL)** Ch. 173-340 WAC	Applicable **PQL (RL)** Ch. 173-340 WAC	Analytical Methods	Screening Levels (Marine Waters)	Screening Levels (Marine Waters)
mg/kg DW	mg/kg DW	mg/kg DW	mg/kg DW	mg/kg DW (1.55%)	mg/kg DW (1.55%)	mg/kg DW (1.55%)	mg/kg DW	mg/kg DW	mg/kg Dw (2%)	mg/kg Dw (2%)	mg/kg	mg/kg	mg/kg DW	mg/kg DW	mg/kg DW		mg/kg DW	mg/kg OC
											*							
16		0.5		0.25	340	0.25			0.32	1.14	*	*		0.02	0.0012	8270D-SIM/1625C	0.5	16
		1.3		1					1.3	1.32	*	*		0.02	0.0018	8270D-SIM/1625C	0.56	66
		0.96		3.4	1700	3.4			4.4	24	*	*		0.02	0.0018	8270D-SIM/1625C	0.96	220
											*	*						
31		0.72		0.48					0.62	1.56	*	*		0.02	0.003	8270D-SIM/1625C	0.67	31
0.00022		1.6		1.7	0.015	0.09	0.00797	0.125	2.2	5.4	*	*	0.00797	0.02	0.0033	8270D-SIM/1625C	0.062	110
0.00022		1.6		1.5	0.015	0.09	0.00797	0.125	2	4.2	*	*	0.00797	0.02	0.0033	8270D-SIM/1625C	0.062	99
0.00022		3.6		3.6	0.015	0.09	0.00797	0.125	4.6	9	*	*	0.00797	0.02	0.0033	8270D-SIM/1625C	0.062	230
0.00022		3.6		3.6	0.015	0.09	0.00797	0.125	4.6	9	*	*	0.00797	0.02	0.0032	8270D-SIM/1625C	0.062	230
47	1.3	1.3		0.73	35				0.94	1.56	*	*		0.02	0.0108/0.02	8270D-SIM/1625C	1.3	47
	0.063	0.9		0.076	260				0.1	1.28	*	*		0.02	0.0018	8270D-SIM/1625C	0.063	4.9
											*	*						
											*	*						
											*	*						
											*	*						
											*	*						
0.00022		2.8		1.7	0.015	0.09	0.00797	0.125	2.2	9.2	*	*	0.00797	0.02	0.0019	8270D-SIM/1625C	0.062	110
0.00022		0.23		0.19	0.015	0.09	0.00797	0.125	0.24	0.66	*	*	0.00797	0.02	0.0027	8270D-SIM/1625C	0.062	12
		0.54		0.23		0.23			0.3	1.16	*	*		0.02	0.0015	8270D-SIM/1625C	0.54	15
		1.4		3.4					4.4	34	*	*		0.02	0.0033	8270D-SIM/1625C	1.4	220
	0.035	0.05		0.036	200				0.046	0.046	*	*		0.0032	0.0015	8270D-SIM/1625C	0.035	2.3
	0.021	0.17									*	*			0.0019		0.17	
		0.11		0.048	2.6				0.062	0.18	*	*		0.0032	0.0022	8270D-SIM/1625C	0.11	3.1
											*	*						
											*	*						
											*	*						
	0.006	0.2		0.95	4900				1.2	2.2	*	*		0.02	0.0041	8270D-SIM/1625C	0.2	61
	0.071	0.16		0.82					1.1	1.06	*	*		0.02	0.0021	8270D-SIM/1625C	0.071	53
	0.061	6.2		0.9					1.2	90	*	*		0.02	0.0014	8270D-SIM/1625C	6.2	58
											*	*					0.01	
160		2.5		2.5	230	2.5			3.2	24	*	*		0.02	0.0029	8270D-SIM/1625C	1.7	160
		0.54		0.36	230	0.36			0.46	1.58	*	*		0.02	0.002	8270D-SIM/1625C	0.54	23
	0.022	0.022		0.0059	0.3				0.0076	0.046	*	*		0.012		8270D-SIM/1625C	0.022	0.38
	*11	0.011							0.078	0.124	*	*		0.02	0.00057	8270D-SIM/1625C	0.011	3.9
0.00022		0.69		0.53	0.015	0.09	0.00797	0.125	0.68	1.76	*	*	0.00797	0.02	0.0025	8270D-SIM/1625C	0.062	34
											*	*						
		0.67		0.59	31	0.59			0.76	1.28	*	*		0.02		8270D-SIM/1625C	0.67	38
		2.1		1.5	3.9				2	3.4	*	*		0.02	0.0015	8270D-SIM/1625C	2.1	99
		0.028		0.17	99				0.22	0.22	*	*		0.005		8270D-SIM/1625C	0.028	11
0.00011	0.13	0.3	0.048	0.19	0.22	0.19	0.0014	0.048	0.24	1.3	*	*	0.002	0.067	0.0022	8082	0.0000039	12
									0.24	1.3	*	*						12
											*	*						
											*	*						
											*	*						
									0.24	1.3	*	*						12
									0.24	1.3	*	*						12
									0.24	1.3	*	*						12
100		1.5		1.6		1.6			2	9.6	*	*		0.02	0.0017	8270D-SIM/1625C	1.5	100
		3.3		16	170				20	28	*	*		0.02	0.0017	8270D-SIM/1625C	2.6	1000
											*	*					0.057	
	0.031	0.051		0.013	8.7				0.016	0.036	*	*		0.006	0.0018	8270D-SIM/1625C	0.031	0.81
											*	*						
											*	*						
											*	*					0.16	
											*	*						
											*	*						
											*	*						
											*	*					0.04	
		0.54		0.65	24000				0.65	0.65	*	*		0.1	0.12	8270D-SIM/1625C	0.65	32.5
		0.073		0.057	3100				0.057	0.073	*	*		0.006	0.0043	8270D-SIM/1625C	0.057	2.85
	0.029	0.029		0.029	120				0.029	0.029	*	*		0.005	0.0064	8270D-SIM/1625C	0.029	1.45
	0.055	0.063							0.063	0.063	*	*		0.006	0.004	8270D-SIM/1625C	0.063	3.15
	0.11	0.67		0.67					0.67	0.67	*	*		0.02	0.0034	8270D-SIM/1625C	0.67	33.5
0.058	0.012	0.36		0.36	3				0.36	0.69	*	*		0.061		8270D-SIM/1625C	0.36	18
	0.18	0.42		0.42	1800	0.42			0.42	1.2	*	*		0.02	0.0022	8270D-SIM/1625C	0.42	21
											*	*						
0.017	0.138	0.7									*	*		0.001	0.0028/0.006	Krone 1989	0.073	0.073
											*	*						
											*	*						

MEDIA - MTCA Standard	SEDIMENT Required ARAR (Marine Waters)				SEDIMENT Apparent Effect Thresholds (Marine Waters)																			
PATHWAYS HH - Human Health Ecol- Ecological	SMS **SQS** WAC 173-340-760	SMS **SQS** WAC 173-340-760	SMS **CSL** WAC 173-340-760	SMS **CSL** WAC 173-340-760	Amphipod (1994)	Echinoderm (1994)	Benthic (1988)	Amphipod (1986)	Oyster (1986)	Benthic (1986)	Microtox (1986)	*SMS LAET WAC 173-340-760 (1988)*	*SMS 2LAET WAC 173-340-760 (1988)*	*SMS HAET WAC 173-340-760 (1988)*	Amphipod (1994)	*Echinoderm (1994)*	Benthic (1988)	Amphipod (1988)	Oyster (1988)	Microtox (1988)	Oyster (1986)	Microtox (1986)	SMS LAET WAC 173-340-760 (1988)	SMS 2LAET WAC 173-340-760 (1988)
UNITS	**mg/kg OC**	**mg/kg DW**	**mg/kg OC**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg OC**	**mg/kg OC**	**mg/kg OC**	**mg/kg OC**	**mg/kg OC**	**mg/kg OC**	**mg/kg OC**	**mg/kg OC**	**mg/kg OC**	**mg/kg OC**
Aluminum																								
Antimony					200	9.3	150	200		150		150		200	15000	2100	5500	55000	3300	3300	3300	3300		
Arsenic (III)																								
Arsenic (V)																								
Arsenic (total)	2850	57	4650	93	450	130	57	93	700	57	700	57	93	700	32000	5800	4400	32000	88000	88000	88000	88000	57	114
Barium																								
Beryllium																								
Cadmium	255	5.1	335	6.7	14	2.7	5.1	6.7	9.6	5.1	9.6	5.1	6.7	9.6	1100	430	580	1100	1200	1200	1200	1200	5.1	10.2
Chromium (VI)																								
Chromium, total (or III)	13000	260	13500	270	1100	96	260					260	270	270	130000	5400	65000	150000					260	520
Cobalt																								
Copper	19500	390	19500	390	1300	390	530	1300	390	530	390	390	390	1300	100000	30000	13000	100000	49000	48000	49000	48000	390	780
Iron																								
Lead	22500	450	26500	530	1200	430	450	660	660	450	530	450	530	660	48000	22000	18000	110000	66000	66000	66000	66000	450	900
Manganese																								
Mercury	20.5	0.41	29.5	0.59	2.3	1.4	2.1	2.1	0.59	2.1	0.41	0.41	0.59	2.1	300	71	120	210	210	77	210	77	0.41	0.82
Mercury (organic)																								
Molybdenum																								
Nickel					370	110	140	140		140		140			20000	49000	31000	41000						
Selenium																								
Silver	305	6.1	305	6.1	6.1	8.4	6.1	6.1	0.56	6.1	0.56	6.1	6.1		270	270	490	170	100	100	100	100	6.1	12.2
Tin																								
Thallium																								
Vanadium																								
Zinc	20500	410	48000	960	3800	460	410	960	1600	410	1600	410	960	1600	150000	60000	48000	210000	200000	200000	200000	200000	410	820
LPAH	370	5.2	780	5.2	29	1.2	13	5.2	5.2	6.1	5.2	5.2	5.2	24	2200	22	780	2200	370	530	370	530	370	740
HPAH	960	12	5300	17	69	7.9	69	18	17	51	12	12	17	69	5300	150	7600	5300	960	1500	960	1500	960	1920
Total Petroleum Hydrocarbons																								
Gasoline																								
Gasoline (w/benzene)																								
Diesel																								
Heavy Oil																								
2,3,7,8-TCDD (Dioxin)																								
Aldrin					0.0095	0.0095									0.56	0.56								
alpha-BHC																								
beta-BHC																								
gamma-BHC (Lindane)																								
Chlordane					0.0028	0.0045									0.16	0.26								
4,4'-DDT					0.024	0.037						0.006		0.034	1.4	8.8	3.7	16					3.7	
4,4'-DDE					0.062	0.0093						0.009		0.015	6	7.3	0.31	0.81					0.31	
4,4'-DDD					0.063	0.028						0.016		0.043	3.1	1.6	1	2.2					1	
Dieldrin					0.0035	0.0019									0.13	0.28								
alpha-Endosulfan																								
beta-Endosulfan																								
Endosulfan Sulfate																								
Endrin																								
Endrin Aldehyde																								
Heptachlor					0.0015	0.002									0.11	0.4								
Heptachlor Epoxide																								
Toxaphene																								

MEDIA - MTCA Standard	SEDIMENT AET's (Fresh Water)				Puget Sound Dredge Disposal Analysis (PSDDA) (Marine Waters)										
PATHWAYS HH - Human Health Ecol- Ecological	Ecology (2003) (Draft Freshwater) LAET	Ecology (2003) (Draft Freshwater) 2LAET	Sediment Evaluation Framework/PSDDA (ECY03 /RSET07) (SL1) **Interim Freshwater** (2007)	Sediment Evaluation Framework/PSDDA (ECY03 /RSET07) (SL2) **Interim Freshwater** (2007)	Sediment Evaluation Framework (SEF) Screening Level (SL1) **Marine** (2005)	Sediment Evaluation Framework (SEF) Screening Level (SL2) **Marine** (2005)	Sediment Evaluation Framework (SEF) Screening Level (SL1) **Marine** (2005)	Sediment Evaluation Framework (SEF) Screening Level (SL2) **Marine** (2005)	PSDDA /DMMP Screening Level **Marine** (2011)	PSDDA /DMMP Bioaccum-ulation Trigger (BT) **Marine** (2003)	PSDDA /DMMP Maximum Level (ML) **Marine** (1998)	CERCLA/MTCA HH Risk Based Threshold Concentrations 40 CFR 160 **LDW**	CERCLA/MTCA HH Risk Based Threshold Concentrations 40 CFR 160 **LDW (Netfishing)**	CERCLA/MTCA HH Risk Based Threshold Concentrations 40 CFR 160 **LDW (Beach Play & Clam Fishing)**	CERCLA/MTCA HH Risk Based Threshold Concentrations 40 CFR 160 **LDW (Natural Area Background)**
UNITS	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg OC**	**mg/kg OC**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**	**mg/kg DW**
Aluminum													10000	7600	
Antimony	0.6	1.9			150	150			150	150	200		41	3.1	
Arsenic (III)															
Arsenic (V)															
Arsenic (total)	31.4	50.9	20	51	57	93			57	507.1	700	1.3	1.6	0.39	7
Barium													6700	540	
Beryllium	0.46														
Cadmium	2.39	2.9	1.1	1.5	5.1	6.7			5.1	11.3	14		45	3.7	
Chromium (VI)															
Chromium, total (or III)	95	133	95	100	260	270			260	267			6.5	1.6	
Cobalt															
Copper	619	829	80	830	390	390			390	1027	1300		4100	310	
Iron													10000	2300	
Lead	335	431	340	430	450	530			450	975	1200		80	40	
Manganese													1900	180	
Mercury	0.8	3.04	0.28	0.75	0.41	0.59			0.41	1.5	2.3		31	2.3	
Mercury (organic)															
Molybdenum													510	39	
Nickel	53.1	113	60	70	140					370	370		2000	160	
Selenium										3					
Silver	0.545	3.5	2	2.5	6.1	6.1			6.1	6.1	8.4		510	39	
Tin															
Thallium													6.7	0.52	
Vanadium													100	7.8	
Zinc	683	1080	130	400	410	960			410	2783	3800		10000	2300	
LPAH	6.59	9.2	6.6	9.2	5.2	5.2	370	780	5.2		29				
HPAH	31.64	54.8	31	55	12	17	960	5300	12		69				
Total Petroleum Hydrocarbons															
Gasoline															
Gasoline (w/benzene)															
Diesel															
Heavy Oil															
2,3,7,8-TCDD (Dioxin)									0.000004			0.000013	0.000016	0.0000039	0.000002
Aldrin					0.0095	0.0095			0.0095						
alpha-BHC															
beta-BHC															
gamma-BHC (Lindane)					0.01										
Chlordane					0.0028	0.0045			0.0028	0.037					
4,4'-DDT	0.019				0.0012	0.0034			0.012	0.05	0.069		7	1.7	
4,4'-DDE	0.021				0.009	0.0093			0.009						
4,4'-DDD	0.096				0.016	0.028			0.016						
Dieldrin					0.0019	0.0035			0.0019				0.11	0.03	
alpha-Endosulfan															
beta-Endosulfan															
Endosulfan Sulfate															
Endrin															
Endrin Aldehyde															
Heptachlor					0.0015	0.002			0.0015						
Heptachlor Epoxide															
Toxaphene													1.6	0.44	

SEDIMENT POTENTIAL ARAR's													Always Applicable			EPA Method	SEDIMENT MOST STRINGENT	SEDIMENT MOST STRINGENT
CERCLA HH Risk Based Threshold Concentrations 40 CFR 160 **Lockheed West**	CERCLA HH Risk Based Threshold Concentrations 40 CFR 160 **Hylebos Waterway**	CERCLA HH Risk Based Threshold Concentrations 40 CFR 160 Data Quality Objectives **Commencement Bay**	MTCA Sediment to protect Surface Water Upriver Dam PCB Site **Spokane River**	CERCLA SMS/SQS ARAR WAC 173-340-760 **T-117**	CERCLA Sediment Screening Level (Based on Soil equivalency) **T-117**	CERCLA Sediment Screening Level - *Recreational Scenario* **T-117**	**"Bold Study"** (EPA OSV Bold Survey, 2009, conducted by DMMP agencies)	**"Elliot Bay"** (Ecology, 2009, combined 2007 data from Basin, Urban, and Harbor areas in Bay)	SMS **SQS** WAC 173-340-760	SMS **CSL** WAC 173-340-760	CERCLA HH Risk Based Threshold Concentrations 40 CFR 160 **(SITE-SPECIFIC)**	CERCLA Ecol Risk Based Threshold Concentrations 40 CFR 160 **(SITE-SPECIFIC)**	Natural **Background** Levels Ch. 173-340 WAC	Applicable **DL (MDL)** Ch. 173-340 WAC	Applicable **PQL (RL)** Ch. 173-340 WAC	Analytical Methods	Screening Levels (Marine Waters)	Screening Levels (Marine Waters)
mg/kg DW	mg/kg DW	mg/kg DW	mg/kg DW	mg/kg DW (1.55%)	mg/kg DW (1.55%)	mg/kg DW (1.55%)	mg/kg DW	mg/kg DW	mg/kg Dw (2%)	mg/kg Dw (2%)	mg/kg	mg/kg	mg/kg DW	mg/kg DW	mg/kg DW		mg/kg DW	mg/kg OC
					7700						*	*					7600	
150	5.9	150			3.1						*	*			0.11/1.0	6010B/6020	3.1	
											*	*						
											*	*						
0.000023	57	57		57	0.39	12	7.3	8.44	57	93	*	*	7.3	19	0.02/0.2	6010B/6020	0.39	2850
					1500						*	*					540	
											*	*						
0.33	2.7	5.1		5.1	7				5.1	6.7	*	*	0.398	1.7	0.02/0.2	6010B/6020	3.7	255
											*	*						
260	63.5			260	39				260	270	*	*	35.6	87	0.09/0.5	6010B/6020	1.6	13000
10											*	*	9.6		0.03/0.3	6010B/6020		
35	270	390		390	310		24.9	41.1	390	390	*	*	24.9	130	0.04/0.2	6010B/6020	310	19500
					5500						*	*					2300	
10	360	450		450	40		10.9	26.9	450	530	*	*	10.9	150	0.0019	6010B/6020	40	22500
					180						*	*					180	
0.41	0.41	0.59		0.41	2.3		0.101	0.175	0.41	0.59	*	*	0.1	0.14	0.003/0.05	7471A/245.5	0.41	20.5
											*	*						
					39						*	*					39	
140	110	140									*	*	36.6		0.38/1.0	6020	140	
1											*	*	0.575		0.3/5.0	6020	3	
	3	6.1		6.1	39				6.1	6.1	*	*		2		6010B/6020	6.1	305
											*	*						
					0.51						*	*					0.52	
57					39						*	*	43.3		0.03/0.3	6010B	7.8	
410	410	410		410	2300				410	960	*	*	59.7	137	0.29/0.6	6010B/6020	410	20500
											*	*						
		5.2									*	*			0.0022		5.2	370
960		17		15							*	*			0.0033	8270C	12	960
				5.7							*	*						
											*	*						
											*	*						
											*	*						
											*	*						
											*	*						
0.000000141					0.0000045	0.000013					*	*	0.000000141	0.000000065		1613B	0.0000039	
											*	*						
											*	*					0.0095	
											*	*						
											*	*						
											*	*					0.01	
											*	*					0.0028	
		0.034									*	*					0.0012	
		0.009									*	*					0.009	
		0.016									*	*					0.016	
											*	*					0.0019	
											*	*						
											*	*						
											*	*						
											*	*						
											*	*						
											*	*					0.0015	
											*	*						
											*	*					0.44	
											*	*						

MEDIA - MTCA Standard	AIR Method B						AIR Method C																		
PATHWAYS HH - Human Health Ecol- Ecological	Air, Method B-HH, ARAR's WAC 173-340-750(3)(b)(i)	Air, Method B-HH, Carcinogen WAC 173-340-750(3)(b)(ii)(B)	Air, Method B-HH, Carcinogen WAC 173-340-750(3)(b)(ii)(B)	Air, Method B-HH, Non-carcinogen WAC 173-340-750(3)(b)(ii)(A)	Air, Method B-HH, Non-carcinogen WAC 173-340-750(3)(b)(ii)(A)	Air, Method B-HH, Petroleum Mixture WAC 173-340-750(3)(b)(ii)(C)	Air, Method C-HH, ARAR's WAC 173-340-750(4)(b)(i)	Air, Method C-HH, Carcinogen WAC 173-340-750(4)(b)(ii)(B)	Air, Method C-HH, Carcinogen WAC 173-340-750(4)(b)(ii)(B)	Air, Method C-HH, Non-carcinogen WAC 173-340-750(4)(b)(ii)(A)	Air, Method C-HH, Non-carcinogen WAC 173-340-750(4)(b)(ii)(A)	Air, Method C-HH, Petroleum Mixture WAC 173-340-750(4)(b)(ii)(C)	Air, Lower Explosive Limit (LEL) WAC 173-340-750(4)(b)(iii)	Air, Ambient, Puget Sound Clean Air Authority (PSCAA) Ch. 70.94 RCW	J&E Less Protective	J&E Best Protective	J&E More Protective	CA EPA OEHHA HH-Indoor Air **Residential** Screening Levels	CA EPA OEHHA HH-Indoor Air **Commercial/ Industrial** Screening Levels	CA EPA OEHHA HH-Indoor Air **Residential** Screening Levels	CA EPA OEHHA HH-Indoor Air **Commercial/ Industrial** Screening Levels	CA EPA OEHHA HH-Shallow Soil Gas (Vapor Intrusion) **Residential** Screening Levels	CA EPA OEHHA HH-Shallow Soil Gas (Vapor Intrusion) **Residential** Screening Levels	CA EPA OEHHA HH-Shallow Soil Gas (Vapor Intrusion) **Commercial/Industrial** Screening Levels	CA EPA OEHHA HH-Shallow Soil Gas (Vapor Intrusion) **Commercial/Industrial** Screening Levels
UNITS	**ppbv**	**µg/m³**	**ppbv**	**µg/m³**	**ppbv**	**ppbv**	**ppbv**	**µg/m³**	**ppbv**	**µg/m³**	**ppbv**	**ppbv**	**ppbv**	**ppbv**	**ppbv**	**ppbv**	**ppbv**	**mg/m³**	**mg/m³**	**ppbv**	**ppbv**	**µg/m³**	**ppbv**	**µg/m³**	**ppbv**
acetone						*						*	26000000		71120	41430	32890								
acenaphthene						*						*													
acenaphthylene						*						*													
anthracene						*						*													
benzene		0.321	0.100492318	13.7	4.288924456	*		3.21	1.004923175	30	9.391805378	*	13500000		59.25	30.59	22.59	0.000084	0.000141	0.026297055	0.044141485	36.2	11.33277849	122	38.19334187
benzo(g,h,i)perylene						*						*													
benzo[a]anthracene						*						*													
benzo[a]pyrene						*						*													
benzo[b]fluoranthene						*						*			Saturation	Saturation	Saturation								
benzo[k]fluoranthene						*						*													
bis(2-ethylhexyl) phthalate						*						*													
butyl benzyl phthalate						*						*													
carbon tetrachloride		0.417	0.066291612	45.7	7.265052016	*		4.17	0.662916125	100	15.89726918	*						0.0000579	0.0000973	0.009204519	0.015468043	25.1	3.990214564	84.6	13.44908973
chlorobenzene				22.9	4.972513321	*				50	10.85701599	*			8911	4340	3064								
chloroethane (ethyl chloride)						*						*			372.1	266	236.4								
chloroform (trichloromethane)		0.109	0.022320352			*		1.09	0.223203518			*			11.8	6.421	4.92								
chloromethane (methyl chloride)				41.1	19.89891089	*				90	43.57425743	*													
chrysene						*						*			Saturation	Saturation	Saturation								
dibenz[a,h]anthracene						*						*													
dibenzofuran						*						*			3411	1239	624								
di-butyl phthalate (di-n-butyl phth.)						*						*													
dichlorobenzene, 1,2-				91.4	15.2022449	*				200	33.26530612	*			23870	11420	7952								
dichlorobenzene, 1,3-						*						*													
dichlorobenzene, 1,4-				366	60.8755102	*				800	133.0612245	*													
dichloroethane, 1,1-						*						*			84210	41220	29220								
dichloroethane, 1,2-		0.0962	0.023758485			*		0.932	0.230175758			*			12.59	6.852	5.25	0.000116	0.000195	0.028648485	0.048159091	49.6	12.24969697	167	41.24393939
dichloroethylene, 1,1-		0.05	0.012616099	91.4	23.0622291	*		0.5	0.126160991			*			30160	15680	11640	0.000365	0.0511	0.092097523	12.89365325	15900	4011.919505	44400	11203.09598
diethyl phthalate						*						*													
dimethyl phthalate						*						*													
di-n-octyl phthalate						*						*													
ethylbenzene		460	105.9438583	4570	1052.529201	*		1000	230.3127355	10000	2303.127355	*			344.7	169.3	120.3	*	*			*			
fluoranthene						*						*													
fluorene						*						*			Solubility	Solubility	Solubility								
hexachlorobenzene		0.00543	0.000466164			*		0.0543	0.00466164			*			0.3883	0.1733	0.113								
hexachlorobutadiene		0.114	0.0106875			*		1.14	0.106875			*													
indeno[1,2,3-cd]pyrene						*						*													
MEK (Methyl Ethyl Ketone;2-Butanone)				2290	776.4595756					5000	1695.326584														
methylene chloride (dichloromethane)		5.32	1.532084806			*		53.2	15.32084806			*			826.8	445.8	339.5								
methylnaphthalene, 2-						*						*			10610	4675	3015								
MIBK (M-Isobutyl-K;4-M,2-Pentanone)				1370	334.4299121					3000	732.3282748														
naphthalene		1.37	0.261283151	1.37	0.261283151	*		3	0.572152886	3000	572.1528861	*	9000000		459.6	210.1	140.2	0.000072	0.00012	0.013731669	0.022886115	31.9	6.083892356	106	20.21606864
nitrosodiphenylamine, N-						*						*													
pcb mixtures		0.00439	0.000297328			*		0.0439	0.002973283			*		2000											
pcb - Aroclor 1016						*						*													
pcb - Aroclor 1221						*						*													
pcb - Aroclor 1232						*						*													
pcb - Aroclor 1242						*						*													
pcb - Aroclor 1248						*						*													
pcb - Aroclor 1254						*						*													
pcb - Aroclor 1260						*						*													
phenanthrene						*						*													
pyrene						*						*			Solubility	Solubility	Solubility								
tetrachloroethylene (perchloroethylene)						*						*			83.28	40.38	28.41	0.000412	0.000693	0.060756333	0.102194511	180	26.54402895	603	88.92249698
trichlorobenzene, 1,2,4-				0.914	0.12312562	*				2	0.269421488	*													
trichlorethane, 1,1,1-				2290	419.7188906	*				5000	916.4167916	*			265500	132000	94730	2.29	3.21	419.7188906	588.3395802	991000	181633.8081	2790000	511360.5697
trichlorethane, 1,1,2-		0.156	0.028592204			*		1.56	0.285922039			*			18.34	9.122	6.548								
trichloroethylene						*						*			2.687	1.341	0.9655	0.00122	0.00204	0.227009132	0.379589041	528	98.24657534	1770	329.3493151
trimethylbenzene, 1,3,5-						*						*			959.7	440.4	295.6								
toluene		2200	584.0390879	183	48.58143322	*		4900	1300.814332	400	106.1889251	*	12700000		64890	33380	24590	0.313	0.438	83.09283388	116.276873	135000	35838.76221	378000	100348.5342
vinyl chloride (chloroethylene)		0.568	0.2222016	45.7	17.87784	*		5.68	2.222016	100	39.12	*			58.23	31.87	24.51	0.0000311	0.0000524	0.01216632	0.02049888	13.3	5.20296	44.8	17.52576
xylene (dimethylbenzene)		46	10.59039548	46.4	10.68248588	*		100	23.02259887	100	23.02259887	*	10000000		1145000	550400	384500	0.73	1.02	168.0649718	234.8305085	319000	73442.0904	887000	204210.452
benzoic acid						*						*													
benzyl alcohol						*						*													
dimethylphenol, 2,4-						*						*													
methylphenol, 2- (o-cresol)						*						*													
methylphenol, 4- (p-cresol)						*						*													
pentachlorophenol						*						*													
phenol (total)						*						*													
styrene (phenylethylene)				4.57	1.073357349	*				1000	234.870317	*	11000000												
Tributyltin						*						*													
Trichlorophenol, 2,4,6-		0.806	0.099780759			*		8.06	0.997807595			*													

AIR Potential ARAR's														Conversion Tables		Always Applicable				EPA Method	AIR MOST STRINGENT
CERCLA EPA Regional Screening Level (RSL; May, 2010) ***Residential (mixed Carc & NC)***	CERCLA EPA Regional Screening Level (RSL; May, 2010) ***Residential (mixed Carc & NC)***	CERCLA EPA Regional Screening Level (RSL; May, 2010) ***Industrial (mixed Carc & NC)***	CERCLA EPA Regional Screening Level (RSL; May, 2010) ***Industrial (mixed Carc & NC)***	NIOSH PEL **TWA**	NIOSH PEL **STEL**	American Conference Of Governmental Industrial Hygenists (ACGIH) Threshold Limit Values **TLV**	EPA National Ambient Air Quality Standards (NAAQS) Clean Air ACT 40 CFR part 50	Air, L&I DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC TWA	Air, L&I DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC TWA	Air, L&I DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC TWA - **LESS**	Air, L&I DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC TWA - **LESS**	Air, L&I DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC **TWA**	Air, L&I DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC **STEL**	Molecular Weight	Convert µg/m^3 or mg/m^3 to ppbv	Natural **Background** Levels Ch. 173-340 WAC	Applicable **DL (MDL)** Ch. 173-340 WAC	Applicable **RL (MRL/PQL)** Ch. 173-340 WAC	Applicable **RL (MRL/PQL)** Ch. 173-340 WAC	Analytical Method	Screening Levels
µg/m^3	ppbv	µg/m^3	ppbv	ppbv	ppbv	mg/m^3	ppbv	mg/m^3	ppbv	mg/m^3	ppbv	ppbv	ppbv	Unitless	Unitless	ppbv	ppbv	ug/m^3	ppbv		ppbv
32400	13658.27586	140000	59017.24138	750000	1000000							750000	1000000	58	0.421/421			5	2.10775862	TO-15	13658.27586
														154.2							
														152.2							
												200	600	178							200
0.31	0.097048656	1.6	0.500896287									1000	5000	78.1	0.313/313		0.223	1	0.31306018	WA APH	0.026297055
														276.34							
0.0087	0.000931735	0.11	0.011780552					0.2	21.41918528	0.6	64.25755585			228.3							0.000931735
0.00087	0.000085086	0.011	0.0010758					0.2	19.56	0.6	58.68			250							0.000085086
0.0087	0.000843037	0.11	0.010659084											252.32							
0.0087	0.000843037	0.11	0.010659084											252.32							
1	0.062531969	5.1	0.318913043											391							
														312.36							
0.41	0.065178804	2	0.317945384	10000	25000							2000	4000	153.8	0.158/158			1	0.15897269	TO-15	0.009204519
52	11.29129663	220	47.77087034									75000	113000	112.6	0.217/217						4.972513321
10000	3790.697674	44000	16679.06977											64.5	0.379/379						236.4
0.11	0.022525126	0.53	0.108530151	2000								2000	4000	119.4	0.204/204						0.022320352
94	45.51089109	390	188.8217822											50.5	0.484/484						19.89891089
0.087	0.009317346	1.1	0.117805519					0.2	21.41918528	0.6	64.25755585			228.3							0.009317346
0.0008	7.02586E-05	0.01	0.000878233					0.2	17.56465517	0.6	52.69396552			278.4							7.02586E-05
														168.18							624
								5	439.7482014	10	879.4964029			278							439.7482014
210	34.92857143	880	146.3673469											147	0.166/166			1	0.16632653	TO-15	15.2022449
														147	0.166/166			1	0.16632653	TO-15	
0.22	0.036591837	1.1	0.182959184	75000	110000							75000	110000	147	0.166/166			1	0.16632653	TO-15	0.036591837
1.5	0.370454545	7.7	1.901666667	100000	250000							100000	150000	99	0.247/247			1	0.2469697	TO-15	0.370454545
0.094	0.023215152	0.47	0.116075758									1000	2000	99	0.247/247			1	0.2469697	TO-15	0.023215152
210	52.9876161	880	222.0433437	5000	20000							1000	3000	96.9	0.252/252			1	0.25232198	TO-15	0.012616099
								5	550.6756757	10	1101.351351			222							550.6756757
								5	630.1546392	10	1260.309278			194							630.1546392
														390.56							
0.97	0.223403353	4.9	1.128532404	100000	125000							100000	125000	106.16	0.230/230		2	1	0.23031274	TO-15/WA APH	0.223403353
														202.26							
														166.22							
0.0053	0.000455004	0.027	0.002317942											284.8							0.000455004
0.11	0.0103125	0.56	0.0525	20								20	60	260.8	0.094/94						0.0103125
0.0087	0.00076987	0.11	0.009733985											276.3							
5200	1763.139648	22000	7459.436971											72.11				1	0.33906532	TO-15	
5.2	1.497526502	2.6	0.748763251									25000	125000	84.9	0.288/288			1	0.28798587	TO-15	0.748763251
														142.21							3015
3100	756.7392173	13000	3173.422524											100.16				1	0.24410942	TO-15	
0.072	0.013731669	0.36	0.068658346	10000	15000							10000	15000	128.2	0.190/190		0.262			WA APH	0.013731669
														198.2							
0.0043	0.000291233	0.021	0.001422299					0.5	33.86426593	1.5	101.5927978			361							0.000291233
0.12	0.011376503	0.61	0.057830554											257.9							
0.0043	0.000523842	0.021	0.002558296											200.7							
0.0043	0.000452778	0.021	0.00221124											232.2							
0.0043	0.000394503	0.021	0.001926642											266.5							
0.0043	0.00035045	0.021	0.0017115											300							
0.0043	0.000320534	0.021	0.001565396											328							
0.0043	0.000293919	0.021	0.001435421											357.7							
												200	600	178.2							200
												200	600	202							200
0.41	0.060461399	2.1	0.309680338	25000								25000	38000	165.8	0.147/147			1	0.14746683	TO-15	0.060461399
2.1	0.282892562	8.8	1.185454545											181.5	0.135/135						0.12312562
5200	953.0734633	22000	4032.233883									350000	450000	133.4	0.183/183			1	0.18328336	TO-15	419.7188906
0.15	0.027492504	0.77	0.141128186									10000	20000	133.4	0.183/183			1	0.18328336	TO-15	0.027492504
1.2	0.223287671	6.1	1.135045662	50000	200000							50000	200000	131.4	186/186000			1	0.18607306	TO-15	0.223287671
				25000								25000	38000	120.186	0.203/203						295.6
5200	1380.456026	22000	5840.390879									100000	150000	92.1	0.265/265		1	1	0.26547231	TO-15/WA APH	48.58143322
0.16	0.062592	2.8	1.09536									1000	5000	62.5	0.391/391			1	0.3912	TO-15	0.01216632
100	23.02259887	440	101.299435	100000	150000							100000	150000	106.2	0.230/230		1	1	0.23022599	TO-15/WA APH	10.59039548
														122							
														108.14							
														122.2							
630	119.7783826	2600	494.3234837									5000	10000	128.6							119.7783826
630	119.7783826	2600	494.3234837									5000	10000	128.6							119.7783826
0.48	0.044054054	2.4	0.22027027					0.5	45.88963964	1.5	137.6689189			266.4							0.044054054
210	54.62234043	880	228.893617									5000	10000	94							54.62234043
1000	234.870317	4400	1033.429395	50000	100000							50000	100000	104.1				1	0.23487032	TO-15	1.073357349
												100	300	595.62							100
0.78	0.096562025	4	0.495189873											197.5							0.096562025

MEDIA - MTCA Standard	AIR Method B						AIR Method C																		
PATHWAYS HH - Human Health Ecol- Ecological	Air, Method B-HH, ARAR's WAC 173-340-750(3)(b)(i)	Air, Method B-HH, Carcinogen WAC 173-340-750(3)(b)(ii)(B)	Air, Method B-HH, Carcinogen WAC 173-340-750(3)(b)(ii)(B)	Air, Method B-HH, Non-carcinogen WAC 173-340-750(3)(b)(ii)(A)	Air, Method B-HH, Non-carcinogen WAC 173-340-750(3)(b)(ii)(A)	Air, Method B-HH, Petroleum Mixture WAC 173-340-750(3)(b)(ii)(C)	Air, Method C-HH, ARAR's WAC 173-340-750(4)(b)(i)	Air, Method C-HH, Carcinogen WAC 173-340-750(4)(b)(ii)(B)	Air, Method C-HH, Carcinogen WAC 173-340-750(4)(b)(ii)(B)	Air, Method C-HH, Non-carcinogen WAC 173-340-750(4)(b)(ii)(A)	Air, Method C-HH, Non-carcinogen WAC 173-340-750(4)(b)(ii)(A)	Air, Method C-HH, Petroleum Mixture WAC 173-340-750(4)(b)(ii)(C)	Air, Lower Explosive Limit (LEL) WAC 173-340-750(4)(b)(iii)	Air, Ambient, Puget Sound Clean Air Authority (PSCAA) Ch. 70.94 RCW	J&E Less Protective	J&E Best Protective	J&E More Protective	CA EPA OEHHA HH-Indoor Air **Residential** Screening Levels	CA EPA OEHHA HH-Indoor Air **Commercial/ Industrial** Screening Levels	CA EPA OEHHA HH-Indoor Air **Residential** Screening Levels	CA EPA OEHHA HH-Indoor Air **Commercial/ Industrial** Screening Levels	CA EPA OEHHA HH-Shallow Soil Gas (Vapor Intrusion) **Residential** Screening Levels	CA EPA OEHHA HH-Shallow Soil Gas (Vapor Intrusion) **Residential** Screening Levels	CA EPA OEHHA HH-Shallow Soil Gas (Vapor Intrusion) **Commercial/Industrial** Screening Levels	CA EPA OEHHA HH-Shallow Soil Gas (Vapor Intrusion) **Commercial/Industrial** Screening Levels
UNITS	**ppbv**	**µg/m³**	**ppbv**	**µg/m³**	**ppbv**	**ppbv**	**ppbv**	**µg/m³**	**ppbv**	**µg/m³**	**ppbv**	**ppbv**	**ppbv**	**ppbv**	**ppbv**	**ppbv**	**ppbv**	**mg/m³**	**mg/m³**	**ppbv**	**ppbv**	**µg/m³**	**ppbv**	**µg/m³**	**ppbv**
						*						*													
Aluminum				2.29	2.075259451	*				5	4.531134173	*													
Antimony				0.0912	0.018314908	*						*													
Arsenic (III)						*						*													
Arsenic (V)						*						*													
Arsenic (total)		0.000581	0.000189608			*		0.00581	0.001896082			*		5000				0.000015		0.004895222					
Barium				0.229	0.040770771	*				0.501	0.089197189	*													
Beryllium		0.00104	0.000200869	0.00914	0.001765329	*		0.0104	0.002008689	0.02	0.003862864	*													
Cadmium						*						*		2000											
Chromium (VI)				0.0458	0.021536464	*				0.1	0.047022848	*													
Chromium, total (or III)						*						*		10000											
Cobalt						*						*													
Copper						*						*													
Iron						*						*													
Lead						*						*		100000											
Manganese				0.0229	0.01019158	*				0.0501	0.022296862	*						0.00009		0.040054243					
Mercury				0.137	0.016698988	*				0.3	0.036567127	*						0.00003	0.000131	0.003656713	0.015967645	44.5	5.424123835	125	15.23630291
Mercury (organic)						*						*													
Molybdenum						*						*													
Nickel						*		0.104	0.043311191			*													
Selenium						*						*													
Silver						*						*													
Tin						*						*													
Thallium						*						*													
Vanadium						*						*													
Zinc						*						*													
						*						*													
LPAH						*						*													
HPAH						*						*													
Total Petroleum Hydrocarbons						*						*													
Gasoline						*						*	14000000												
Gasoline (w/benzene)						*						*													
Diesel						*						*													
Heavy Oil						*						*													
						*						*													
2,3,7,8-TCDD (Dioxin)		5.83E-08	4.42682E-09			*		0.000000583	4.42682E-08			*													
						*						*													
Aldrin		0.000510204	3.41851E-05			*		0.005102041	0.000341851			*													
alpha-BHC		0.001388889	0.000116768			*		0.013888889	0.001167675			*													
beta-BHC		0.004716981	0.000396569			*		0.047169811	0.00396569			*													
gamma-BHC (Lindane)						*						*													
Chlordane		0.025	0.001491581	0.32	0.01909224	*		0.25	0.014915813	0.7	0.041764275	*													
4,4'-DDT		0.025773196	0.001728914			*		0.025773196	0.001728914			*													
4,4'-DDE						*						*													
4,4'-DDD						*						*													
Dieldrin		0.000543478	3.4885E-05			*		0.005434783	0.00034885			*													
alpha-Endosulfan						*						*													
beta-Endosulfan						*						*													
Endosulfan Sulfate						*						*													
Endrin						*						*													
Endrin Aldehyde						*						*													
Heptachlor		0.001923077	0.000125942			*		0.019230769	0.001259421			*													
Heptachlor Epoxide		0.000961538	6.03871E-05			*		0.009615385	0.000603871			*													
Toxaphene		0.0078125	0.00046139			*		0.078125	0.004613904			*													
						*						*													

AIR Potential ARAR's														Conversion Tables		Always Applicable				EPA Method	AIR MOST STRINGENT
CERCLA EPA Regional Screening Level (RSL; May, 2010) ***Residential (mixed Carc & NC)***	CERCLA EPA Regional Screening Level (RSL; May, 2010) ***Residential (mixed Carc & NC)***	CERCLA EPA Regional Screening Level (RSL; May, 2010) ***Industrial (mixed Carc & NC)***	CERCLA EPA Regional Screening Level (RSL; May, 2010) ***Industrial (mixed Carc & NC)***	NIOSH PEL **TWA**	NIOSH PEL **STEL**	American Conference Of Governmental Industrial Hygenists (ACGIH) Threshold Limit Values **TLV**	EPA National Ambient Air Quality Standards (NAAQS) Clean Air ACT 40 CFR part 50	Air, L&I-DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC TWA	Air, L&I-DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC TWA	Air, L&I-DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC TWA - **LESS**	Air, L&I-DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC TWA - **LESS**	Air, L&I-DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC **TWA**	Air, L&I-DOSH Worker Safety (PEL's) 29 CFR/Ch. 296-841 WAC **STEL**	Molecular Weight	Convert µg/m3 or mg/m3 to ppbv	Natural **Background** Levels Ch. 173-340 WAC	Applicable **DL (MDL)** Ch. 173-340 WAC	Applicable **RL (MRL/PQL)** Ch. 173-340 WAC	Applicable **RL (MRL/PQL)** Ch. 173-340 WAC	Analytical Method	Screening Levels
µg/m3	ppbv	µg/m3	ppbv	ppbv	ppbv	mg/m3	ppbv	mg/m3	ppbv	mg/m3	ppbv	ppbv	ppbv	Unitless	Unitless	ppbv	ppbv	ug/m3	ppbv		ppbv
5.2	4.71237954	22	19.93699036	13593.40252				10	9062.268347	20	18124.53669			26.98							2.075259451
								0.5	100.4106776	1.5	301.2320329			121.75							0.018314908
														74.92							
														74.92							
0.00057	0.000186018	0.0029	0.00094641			5		0.01	3.263481046	0.6	195.8088628			74.92							0.000186018
0.52	0.092579917	2.2	0.391684264					0.5	89.01915095	1.5	267.0574529			137.33							0.040770771
0.001	0.000193143	0.0051	0.00098503	0.386286437	0.965716091	0.00005		0.002	0.386286437	0.005	0.965716091			126.59							0.000193143
0.0014	0.00030451	0.0068	0.00147905					0.005	1.087536696					112.41							0.00030451
0.000011	5.17251E-06	0.00015	7.05343E-05					0.005	2.351142396					51.996							5.17251E-06
				470.2284791				0.5	235.1142396					51.996							235.1142396
0.00027	0.000112023	0.0014	0.000580859	20.74495164				0.05	20.74495164	0.15	62.23485491			58.93							0.000112023
				38.4736428				0.1	38.4736428	0.3	115.4209284			63.55							38.4736428
				437.803284				1	437.803284	3	1313.409852			55.847							437.803284
					0.002088668	30	0.01770029	0.05	5.900096525					207.2							0.002088668
0.052	0.023142451	0.22	0.097910372	445.0471441	1335.141432									54.938							0.01019158
0.31	0.037786031	1.3	0.15845755	6.094521163				0.1	12.18904233	0.3	36.56712698			200.59							0.003656713
								0.01	1.133914621	0.03	3.401743863			215.6247							1.133914621
				2548.467792				5	1274.233896	10	2548.467792			95.94							1274.233896
0.01	0.004164538	0.051	0.021239142	41.64537557				1	416.4537557	3	1249.361267			58.71							0.004164538
21	6.502659574	88	27.24924012					0.2	61.93009119	0.6	185.7902736			78.96							6.502659574
				2.26665925				0.01	2.26665925	0.03	6.799977751			107.868							2.26665925
								2	411.9976409	4	823.9952818			118.69							411.9976409
								0.1	11.96301008	0.3	35.88903024			204.38							11.96301008
0.1	0.047996231	0.44	0.211183416	23.99811549										50.9415							0.047996231
														65.38							
																	235.32			WA APH	
												300000	500000								300000
						100															
0.000000064	4.85963E-09	0.00000032	2.42981E-08											322							4.42682E-09
0.0005	3.35014E-05	0.0025	0.000167507											364.91							3.35014E-05
0.0014	0.000117702	0.0068	0.000571694											290.82							0.000116768
0.0046	0.000386734	0.023	0.00193367											290.82							0.000386734
0.0078	0.000655744	0.04	0.003362789											290.83							
0.024	0.001431918	0.12	0.00715959											409.8							0.001431918
0.025	0.001677047	0.13	0.008720643											364.48							0.001677047
0.025	0.001922024	0.13	0.009994526											318.0241							
0.035	0.002673885	0.18	0.013751406											320.04							0.002673885
0.00053	3.40198E-05	0.0027	0.000173309											380.91							3.40198E-05
														406.95							
														406.95							
														422.95							
														380.909							
														380.909							
0.0019	0.000124431	0.0094	0.000615605											373.34							0.000124431
0.00094	5.90345E-05	0.0047	0.000295172											389.315							5.90345E-05
0.0076	0.000448841	0.038	0.002244203											414							0.000448841

Chemical	BCF***	RfD***	BCF$$$	RfD$$$	Non-Carc SW CUL*
Units	L/kg	mg/kg-day	L/kg	mg/kg-day	µg/L
Acetone	3.16	0.9	3.16	0.9	738396.6245
Acenaphthene	242	0.06	201	0.06	642.7915519
Acenaphthylene					
Anthracene	30	0.3	582	0.3	25925.92593
Benzene	5.2	0.004	8.26	0.004	1994.301994
Benzo(g,h,i)perylene					
Benzo(a)anthracene	30		4886		
Benzo(a)pyrene	30		8317		
Benzo(b)fluoranthene	30		10400		
Benzo(k)fluoranthene	30		9930		
bis(2-Ethylhexyl)phthalate	130	0.02	53.3	0.02	398.8603989
Butyl benzyl phthalate	414	0.2	1183	0.2	1252.46019
Carbon Tetrachloride	18.75	0.004	28.6	0.004	553.0864198
Chlorobenzene	28.6	0.02	28.6	0.02	1813.001813
Chloroethane			2.39		
Chloroform	3.75	0.01	6.92	0.01	6913.580247
Chloromethane (methyl chloride)	3.75		3.16		
Chrysene	30		4890		
Dibenz[a,h]anthracene	30		20183		
Dibenzofuran		0.001			
Di-n-butylphthalate	89	0.1	830	0.1	2913.025385
1,2-Dichlorobenzene	55.6	0.09	79.9	0.09	4196.642686
1,3-Dichlorobenzene					
1,4-Dichlorobenzene	55.6				
1,1-Dichloroethane	4.86	0.2	4.86	0.2	106691.0532
1,2-Dichloroethane	1.2	0.02	2.85	0.02	43209.87654
1,1-Dichloroethene	5.6	0.05	8.26	0.05	23148.14815
diethyl phthalate	73	0.8	16.8		28411.97362
dimethyl phthalate	36		3.17		
di-n-octyl phthalate			63.5		
Ethylbenzene	37.5	0.1	48.6	0.1	6913.580247
Fluoranthene	1150	0.04	1410	0.04	90.17713366
Fluorene	30	0.04	342	0.04	3456.790123
hexachlorobenzene	8700	0.0008			0.238399319
Hexachlorobutadiene	2.8	0.001			925.9259259
Indeno(1,2,3-cd)pyrene	30		24100		
MEK (Methyl Ethyl Ketone;2-Butanone)	3.16	0.6	3.16	0.6	492264.4163
Methylene Chloride	0.9	0.06	2	0.06	172839.5062
2-Methylnaphthalene		0.004		0.004	
MIBK (M-Isobutyl-K;4-M,2-Pentanone)		0.08			
Naphthalene	10.5	0.02	69	0.02	4938.271605
nitrosodiphenylamine, N-	136		118		
Polychlorinated biphenyls (PCBs)	31200		20000		
Aroclor 1016	31200	0.00007	20000	0.00007	0.005816714
Aroclor 1221			20000		
Aroclor 1232					
Aroclor 1242			20000		
Aroclor 1248			20000		
Aroclor 1254	31200	0.00002	84000	0.00002	0.001661918
Aroclor 1260			20000		
Phenanthrene			582		

Pyrene	1180	0.03	1180	0.03	65.913371
Tetrachloroethene	31	0.01	82.8	0.01	836.3201912
1,2,4-Trichlorobenzene	114	0.01	240	0.01	227.4204029
1,1,1-Trichloroethane	5.6	2	16.8	2	925925.9259
1,1,2-Trichloroethane	4.5	0.004	6.92	0.004	2304.526749
Trichloroethene	11	0.0003	14	0.0003	70.70707071
1,3,5-Trimethylbenzene	85.5	0.01	85.5	0.01	303.2272038
Toluene	10.7	0.08	23.9	0.08	19383.86985
Vinyl Chloride	1.17	0.003	2.4	0.003	6647.673314
Xylene	49	0.2	49	0.2	10582.01058
benzoic acid		4			
Benzyl Alcohol		0.1			
2,4-Dimethylphenol	93.8	0.02	11.8	0.02	552.7915976
2-Methylphenol (o-cresol)	6.33	0.05	6.33	0.05	20478.61448
4-Methylphenol (p-cresol)		0.005	5.79	0.005	
Pentachlorophenol	11	0.005			1178.451178
Total Phenol	1.4	0.3	2.85	0.3	555555.5556
Styrene		0.2			
Tributyltin		0.0003			
2,4,6-Trichlorophenol	150				
Aluminum					
Antimony	1	0.0004	40	0.0004	1037.037037
Arsenic (III)					
Arsenic (V)					
Arsenic	44	0.0003	114	0.0003	17.67676768
Barium	633	0.2	633	0.2	819.144579
Beryllium	19	0.002	62	0.002	272.9044834
Cadmium	64	0.001	907	0.001	40.50925926
Chromium (VI)	16	0.003	3.2	0.003	486.1111111
Chromium					
Cobalt					
Copper	36	0.04	36	0.04	2880.658436
Iron		0.7			
Lead			0.09		
Manganese		0.14		0.024	
Mercury			5000	0.00016	
Mercury (organic)	85000	0.0001	85000	0.0001	0.003050109
Molybdenum		0.005			
Nickel	47	0.02	78	0.02	1103.23089
Selenium	4.8	0.005	129	0.005	2700.617284
Silver	0.5	0.005	88	0.005	25925.92593
Tin			10000		
Thallium	116				
Vanadium		0.00007		0.00007	
Zinc	47	0.3	2059	0.3	16548.46336
LPAH					
HPAH					
Total Petroleum Hydrocarbons					
Gasoline					
Gasoline (w/benzene)					
Diesel					
Heavy Oil					

2,3,7,8-TCDD	5000	1E-09	34400	1.0E-09	5.18519E-07
Aldrin	4670	0.00003			0.01665477
alpha-BHC	130				
beta-BHC	130				
gamma-BHC (Lindane)	130	0.0003			5.982905983
Chlordane	14100	0.0005			0.091935908
4,4'-DDT	53600	0.0005			0.024184632
4,4'-DDE	53600				
4,4'-DDD	53600				
Dieldrin	4670	0.00005			0.027757951
alpha-Endosulfan (959-98-8)	270	0.006			57.61316872
beta-Endosulfan (891-86-1)	270	0.006			57.61316872
Endosulfan Sulfate (1031-07-8)	270	0.006			57.61316872
Endrin	3970	0.0003			0.195913798
Endrin Aldehyde	3970	0.0003			0.195913798
Heptachlor	11200	0.0005			0.115740741
Heptachlor Epoxide	11200	0.000013			0.003009259
Toxaphene	13100				

Mod (Tribal Adult - w/o Salmon) Non-Carc** µg/L	Mod (Tribal Child - w/o Salmon) Non-Carc** µg/L	EPA Tribal Adult w/o Salmon $$$ µg/L	EPA Tribal Child w/o Salmon $$$ µg/L
239932.7328	110107.0077	239932.7328	110107.0077
208.8670622	95.85072847	251.4717863	115.4023696
8424.30484	3865.979381	434.2425175	199.2772877
648.0234493	297.3830293	407.9566509	187.2144979
129.6046899	59.47660587	316.1089996	145.0648924
406.9712483	186.762289	142.4227361	65.35890755
179.7185033	82.4742268	117.8224453	54.0696417
589.1122266	270.3482085	589.1122266	270.3482085
2246.481291	1030.927835	1217.385093	558.6675407
946.5511057	434.3797058	101.4976487	46.57806484
1363.646467	625.7880294	948.9204451	435.4670142
34667.92115	15909.38017	34667.92115	15909.38017
14040.50807	6443.298969	5911.79287	2712.967987
7521.70075	3451.767305	5099.458136	2340.181224
9232.114894	4236.689733		
2246.481291	1030.927835	1733.396058	795.4690085
29.30192988	13.44688481	23.89873714	10.96731739
1123.240645	515.4639175	98.52988117	45.21613312
0.077464872	0.035549236		
300.86803	138.0706922		
159955.1552	73404.6718	159955.1552	73404.6718
56162.03227	25773.19588	25272.91452	11597.93814
1604.629493	736.377025	244.182749	112.0573734
0.001890068	0.000867367	0.002948507	0.001353093
0.00054002	0.000247819	0.000200579	9.20471E-05

21.41772417	9.828761139	21.41772417	9.828761139
271.751769	124.7090123	101.7428121	46.69057224
73.89741088	33.91209984	35.10127017	16.10824742
300868.03	138070.6922	100289.3433	46023.56406
748.8270969	343.6426117	486.954037	223.4670163
22.97537684	10.54358013	18.0520818	8.284241532
98.52988117	45.21613312	98.52988117	45.21613312
6298.545675	2890.451874	2819.850993	1294.051676
2160.078164	991.2767645	1053.038105	483.2474227
3438.491772	1577.950768	3438.491772	1577.950768
179.6227045	82.430264	1427.848278	655.2507426
6654.269226	3053.696194	6654.269226	3053.696194
		727.4874646	333.8496875
382.9229473	175.7263355		
180520.818	82842.41532	88676.89306	40694.5198
336.9721936	154.6391753	8.42430484	3.865979381
5.743844209	2.635895033	2.216922326	1.017362995
266.170769	122.1478478	266.170769	122.1478478
88.67689306	40.6945198	27.1751769	12.47090123
13.16297631	6.040592784	0.928809795	0.42623808
157.9557158	72.4871134	789.7785788	362.435567
936.0338712	429.5532646	936.0338712	429.5532646
		0.026957775	0.012371134
0.000991095	0.000454821	0.000991095	0.000454821
358.481057	164.5097609	216.0078164	99.12767645
877.5317542	402.7061856	32.65234434	14.98441621
8424.30484	3865.979381	47.86536841	21.96579194
5377.215856	2467.646414	122.7436354	56.3280143

1.68486E-07	7.73196E-08	2.44893E-08	1.12383E-08
0.005411759	0.002483499		
1.944070348	0.892149088		
0.029873421	0.013709147		
0.007858493	0.003606324		
0.009019598	0.004139164		
18.72067742	8.591065292		
18.72067742	8.591065292		
18.72067742	8.591065292		
0.063659734	0.02921395		
0.063659734	0.02921395		
0.037608504	0.017258837		
0.000977821	0.00044873		

Non-Carcinogenic Surface Water Cleanup Level*

* See Surface Water CUL Sheet - Method B, Carc, CLARC Database
** Modified EQ 730-1 parameters to match EPA LDW-Tribal Consumption Rates Using CLARC BCF
*** From CLARC (unless not available, then from EPA) $$$ BCF/RfD from EPA Plar

MTCA EQ. 730-1 CUL (ug/L) = (RfD*ABW*AT*HQ*UCF1*

Parameter	Symbol	Value
Reference Dose(Oral)	*RfD*	*Chemical Specific*
Risk	*Risk*	*0.000001*
Average body weight over the exposure duration (Adult)	*ABW*	*70 (81.8) (63)*
Average body weight over the exposure duration (Child)	*ABW*	*(15) (15)*
Average time	*AT*	*30 (64) (24)*
Unit Conversion Factor 1	*UCF1*	*1000*
Unit Conversion Factor 2	*UCF2*	*1000*
Bioconcentration factor	*BCF*	*Chemical Specific*
Fish consumption rate [w/o Salmon](Adult)	*FCR*	*54 (97.1) (57.1)*
Fish consumption rate [w/o Salmon](Child)	*FCR*	*(38.8) (23)*
Fish Diet Fraction	*FDF*	*0.5 (1.0) (1.0)*
Exposure Duration (Adult)	*ED*	*30 (64) (24)*
Exposure Duration (Child)	*ED*	*(6) (6)*

(Tribal) = Tulalip Tribe (EPA, 2008)
(API) = Asian & Pacific Islander (EPA, 2005)

=/Rfd When Available
ıt 2 TMCL Documents

UCF2)/(BCF*FCR*FDF*ED)

Units	Source
mg/kg-day	Chemical Specific
unitless	MTCA Default
kg	MTCA Default (Tribal) (API)
kg	MTCA Default (Tribal) (API)
years	MTCA Default
ug/mg	MTCA Eq. 730-2
g/L	MTCA Eq. 730-2
L/kg	Chemical Specific
g/day	MTCA Default (Tribal) (API)
g/day	MTCA Default (Tribal) (API)
unitless	MTCA Default (Tribal) (API)
years	MTCA Default (Tribal) (API)
years	MTCA Default (Tribal) (API)

Chemical Units	BCF*** L/kg	CPFo kg-day/mg	BCF$^{\$\$\$}$ L/kg	CPFo$^{\$\$\$}$ mg/kg-day	Carc SW CUL* µg/L
Acetone			3.16		
Acenaphthene	242		201		
Acenaphthylene					
Anthracene	30		582		
Benzene	5.2	0.055	8.26	0.055	22.66252266
Benzo(g,h,i)perylene					
Benzo(a)anthracene	30	0.73	4886	0.73	0.295958059
Benzo(a)pyrene	30	7.3	8317	7.3	0.029595806
Benzo(b)fluoranthene	30	0.73	10400	0.73	0.295958059
Benzo(k)fluoranthene	30	0.73	9930	0.73	0.295958059
bis(2-Ethylhexyl)phthalate	130	0.014	53.3	0.014	3.561253561
Butyl benzyl phthalate	414	0.0019	1183	0.0019	8.239869669
Carbon Tetrachloride	18.75	0.07	28.6	0.13	4.938271605
Chlorobenzene			28.6		
Chloroethane			2.39		
Chloroform	3.75	0.031	6.92	0.031	55.75467941
Chloromethane (methyl chloride)	3.75	0.013	3.16	0.013	132.9534663
Chrysene	30	0.073	4890	0.073	2.959580585
Dibenz[a,h]anthracene	30	0.73	20183	0.73	0.295958059
Dibenzofuran					
Di-n-butylphthalate	89		830		
1,2-Dichlorobenzene	55.6		79.9		
1,3-Dichlorobenzene					
1,4-Dichlorobenzene	55.6				
1,1-Dichloroethane	4.86	0.0057	4.86	0.0057	233.9716079
1,2-Dichloroethane	1.2	0.091	2.85	0.091	59.35422602
1,1-Dichloroethene	5.6		8.26		
diethyl phthalate	73		16.8		
dimethyl phthalate	36		3.17		
di-n-octyl phthalate			63.5		
Ethylbenzene	37.5	0.011	48.6	0.011	
Fluoranthene	1150		1410		
Fluorene	30		342		
hexachlorobenzene	8700	1.6	8700	1.6	0.000465624
Hexachlorobutadiene	2.8	0.078	2.8	0.078	29.67711301
Indeno(1,2,3-cd)pyrene	30	7.3	24100	0.73	0.029595806
MEK (Methyl Ethyl Ketone;2-Butanone)			3.16		
Methylene Chloride	0.9	0.0075	2	0.0075	960.2194787
2-Methylnaphthalene					
MIBK (M-Isobutyl-K;4-M,2-Pentanone)					
Naphthalene	10.5		69		
nitrosodiphenylamine, N-	136	0.0049	118	0.0049	9.726112667
Polychlorinated biphenyls (PCBs)	31200	2	20000	2	0.00010387
Aroclor 1016	31200	0.07	20000	0.07	0.002967711
Aroclor 1221		2	20000	2	
Aroclor 1232		2		2	
Aroclor 1242		2	20000	2	
Aroclor 1248		2	20000	2	
Aroclor 1254	31200	2	84000	2	0.00010387
Aroclor 1260		2	20000	2	
Phenanthrene			582		

Pyrene			1180		
Tetrachloroethene	31	0.54	82.8	0.54	0.387185274
1,2,4-Trichlorobenzene	114	0.029	240		1.960520714
1,1,1-Trichloroethane	5.6		16.8		
1,1,2-Trichloroethane	4.5	0.057	6.92	0.057	25.26893365
Trichloroethene	11	0.089	14	0.089	6.620512238
1,3,5-Trimethylbenzene			85.5		
Toluene	10.7		23.9		
Vinyl Chloride	1.17	1.5	2.4	0.72	3.693151841
Xylene			49		
benzoic acid					
Benzyl Alcohol					
2,4-Dimethylphenol	93.8		11.8		
2-Methylphenol (o-cresol)			6.33		
4-Methylphenol (p-cresol)			5.79		
Pentachlorophenol	11	0.4	11	0.12	1.473063973
Total Phenol	1.4		2.85		
Styrene					
Tributyltin					
2,4,6-Trichlorophenol	150	0.011	150	0.011	3.928170595
Aluminum					
Antimony	1		40		
Arsenic (III)					
Arsenic (V)					
Arsenic	44	1.5	114	1.5	0.098204265
Barium			633		
Beryllium	19		62		
Cadmium	64		907		
Chromium (VI)	16	0.5	3.2	0.5	0.810185185
Chromium					
Cobalt					
Copper	36		36		
Iron					
Lead			0.09		
Manganese					
Mercury			5000		
Mercury (organic)			85000		
Molybdenum					
Nickel	47		78		
Selenium	4.8		129		
Silver	0.5		88		
Tin			10000		
Thallium	116				
Vanadium					
Zinc	47		2059		
LPAH					
HPAH					
Total Petroleum Hydrocarbons					
Gasoline					
Gasoline (w/benzene)					
Diesel					
Heavy Oil					

2,3,7,8-TCDD	5000	150000	34400	1.3E+05	8.64198E-09
Aldrin	4670	17			8.1641E-05
alpha-BHC	130	6.3			0.007913897
beta-BHC	130	1.8			0.027698639
gamma-BHC (Lindane)	130				
Chlordane	14100	0.35			0.00131337
4,4'-DDT	53600	0.34			0.000355656
4,4'-DDE	53600	0.34			0.000355656
4,4'-DDD	53600	0.24			0.000503847
Dieldrin	4670	16			8.67436E-05
alpha-Endosulfan (959-98-8)	270				
beta-Endosulfan (891-86-1)	270				
Endosulfan Sulfate (1031-07-8)	270				
Endrin	3970				
Endrin Aldehyde	3970				
Heptachlor	11200	4.5			0.000128601
Heptachlor Epoxide	11200	9.1			6.35938E-05
Toxaphene	13100	1.1			0.000449791

Mod (Tribal Adult - w/o Salmon) Carc** µg/L	Mod (Tribal Child - w/o Salmon) Carc** µg/L	EPA Tribal Adult w/o Salmon $$$ µg/L	EPA Tribal Child w/o Salmon $$$ µg/L
3.221707489	15.77031216	2.028193577	9.928041555
0.04207344	0.205950195	0.000258331	0.001264533
0.004207344	0.02059502	1.51762E-05	7.42877E-05
0.04207344	0.205950195	0.000121366	0.000594087
0.04207344	0.205950195	0.00012711	0.000622206
0.50626832	2.478191911	1.23480078	6.044370515
1.17138106	5.733929924	0.409933862	2.006633126
0.702025403	3.436426117	0.247823653	1.213100936
7.926093264	38.79835938	4.2952095	21.0251225
18.90068394	92.51916468	22.4296091	109.7933125
0.420734403	2.059501954	0.002581193	0.012634981
0.04207344	0.205950195	6.25379E-05	0.000306124
33.26143751	162.8152941	33.26143751	162.8152941
8.437805329	41.30319852	3.552760138	17.39082043
2.233717193	10.9340831		
6.61931E-05	0.000324016	6.61931E-05	0.000324016
4.218902664	20.65159926	4.218902664	20.65159926
0.004207344	0.02059502	5.23736E-05	0.00025637
136.5049395	668.1939672	61.42722279	300.6872852
1.382665579	6.768171186	1.593580667	7.800604079
1.47662E-05	7.22806E-05	2.30352E-05	0.000112758
0.00042189	0.00206516	0.000658149	0.003221649
		2.30352E-05	0.000112758
		2.30352E-05	0.000112758
		2.30352E-05	0.000112758
1.47662E-05	7.22806E-05	5.48457E-06	2.68471E-05
		2.30352E-05	0.000112758

0.055042314	0.022079603	0.02060763	0.100874693
0.278707907	0.141842417		
3.592235251	17.58405177	2.335991132	11.43471574
0.941172974	4.607057486	0.739493051	3.619830882
0.525018998	2.569976797	0.53322242	2.610132684
0.209410987	1.025070291	0.698036623	3.416900968
0.558429298	2.733520775	0.558429298	2.733520775
0.013960732	0.068338019	0.005388353	0.026376078
0.115176043	0.56378866	0.575880214	2.818943299

1.22854E-09	6.01375E-09	2.06039E-10	1.00857E-09
1.16061E-05	5.68121E-05		
0.001125041	0.005507093		
0.003937642	0.019274826		
0.000186709	0.000913943		
5.05602E-05	0.000247493		
5.05602E-05	0.000247493		
7.16269E-05	0.000350615		
1.23315E-05	6.03628E-05		
1.82819E-05	8.94903E-05		
9.04051E-06	4.42534E-05		
6.39423E-05	0.000312999		

Carcinogenic Surface Water Cleanup Level*

* See Surface Water CUL Sheet - Method B, Carc, CLARC Database
** Modified EQ 730-2 parameters to match EPA LDW-Tribal Consumption Rates Using CLARC BCF/CPFo when
*** From CLARC (unless not available, then from EPA) $$$ BCF/CPFo from EPA Plant 2 TMCL D

MTCA EQ. 730-2 CUL (ug/L) = (Risk*ABW*AT*UCF1*UCF2)/(CPF*BCI

Parameter	Symbol	Value	Units
Cancer Potency Factor (Oral)	*CPFo*	*Chemical Specific*	*kg-day/mg*
Risk	*Risk*	*0.000001*	*unitless*
Average body weight over the exposure duration (Adult)	*ABW*	*70 (81.8) (63)*	*kg*
Average body weight over the exposure duration (Child)	*ABW*	*(15) (15)*	*kg*
Average time	*AT*	*75 (70) (70)*	*years*
Unit Conversion Factor 1	*UCF1*	*1000*	*ug/mg*
Unit Conversion Factor 2	*UCF2*	*1000*	*g/L*
Bioconcentration factor	*BCF*	*Chemical Specific*	*L/kg*
Fish consumption rate [w/o Salmon](Adult)	*FCR*	*54 (97.1) (57.1)*	*g/day*
Fish consumption rate [w/o Salmon](Child)	*FCR*	*(38.8) (23)*	*g/day*
Fish Diet Fraction	*FDF*	*0.5 (1.0) (1.0)*	*unitless*
Exposure Duration (Adult)	*ED*	*30 (64) (24)*	*years*
Exposure Duration (Child)	*ED*	*(6) (6)*	*years*

(Tribal) = Tulalip Tribe (EPA, 2008)
(API) = Asian & Pacific Islander (EPA, 2005)

available
)ocuments (10/2010)

=*FCR*FDF*ED)

Source
Chemical Specific
MTCA Default
MTCA Default (Tribal) (API)
MTCA Default (Tribal) (API)
MTCA Default
MTCA Eq. 730-2
MTCA Eq. 730-2
Chemical Specific
MTCA Default (Tribal) (API)
MTCA Default (Tribal) (API)
MTCA Default (Tribal) (API)
MTCA Default (Tribal) (API)
MTCA Default (Tribal) (API)

Chemical		**Koc*** **	**Koc$$$**	**Koc****	**Kd**	**Henry's Law*** **	**Henry's Law$$$**
	GW/SW CUL	**L/kg**	**L/kg**	**L/kg**	**ml/g**	**Dimensionless**	**Dimensionless**
Acetone			2.364	1.981	0.001981	0.001623835	0.00159
Acenaphthene		**4898**	5027	6123	6.123	0.004225243	0.00636
Acenaphthylene			2759	6123	6.123	0.00511283	0.00451
Anthracene		**23000**	16360	20400	20.4	0.002274187	0.00267
Benzene		**62**	145.8	165.5	0.1655	0.227009649	0.228
Benzo(g,h,i)perylene				2676000	2676	1.35388E-05	
Benzo(a)anthracene		**357537**	176900	426600	426.6	1.73836E-05	0.00014
Benzo(a)pyrene		**968774**	587400	786800	786.8	1.86925E-05	0.000046
Benzo(b)fluoranthene		**1200000**	599400	803100	803.1	2.6873E-05	0.0046
Benzo(k)fluoranthene			587400	786800	786.8	2.38871E-05	0.000034
bis(2-Ethylhexyl)phthalate		**111123**	119600	165400	165.4	1.10437E-05	0.00000418
Butyl benzyl phthalate		**13746**	7155	9359	9.359	5.15373E-05	0.0000517
Carbon Tetrachloride		**152**	43.89	48.64	0.04864	1.3	1.2
Chlorobenzene		**224**	233.9	268	0.268	0.127207209	0.152
Chloroethane			21.73	23.74	0.02374	0.454019298	0.3608
Chloroform		**53**	31.82	35.04	0.03504	0.150112687	0.15
Chloromethane			13.22	14.3	0.0143	0.36076128	0.3608
Chrysene			180500	236100	236.1	0.000213921	0.0039
Dibenz[a,h]anthracene		**1789101**	1912000	2622000	2622	5.03102E-06	0.0000006
Dibenzofuran			9161	11290	11.29	0.008712262	
Di-n-butylphthalate		**1600**	1157	1460	1.46	7.40338E-05	3.85E-08
1,2-Dichlorobenzene		**379**	382.9	443.1	0.4431	0.078533068	0.0779
1,3-Dichlorobenzene							
1,4-Dichlorobenzene		**616**		434	0.434	0.099	
1,1-Dichloroethane		**53**	31.82	35.04	0.03504	0.229872834	0.23
1,2-Dichloroethane		**38**	39.6	43.79	0.04379	0.048265115	0.0401
1,1-Dichloroethene		**65**	31.82	35.04	0.03504	1.06755889	1.07
diethyl phthalate		**82**	104.9	126.2	0.1262	0.000025	0.0000185
dimethyl phthalate							
di-n-octyl phthalate		**1567**			**1.567**	0.0027	
Ethylbenzene		**204**	446.1	517.8	0.5178	0.322312799	0.323
Fluoranthene		**49096**	55450	70850	70.85	0.000362397	0.00066
Fluorene		**7707**	9160	11290	11.29	0.003934834	0.00261
hexachlorobenzene		**80000**		3380	3.38	0.07	
Hexachlorobutadiene				993.5	0.9935	42.12971863	
Indeno(1,2,3-cd)pyrene		**3,500,000**	1951000	2676000	2676	1.42341E-05	0.000066
MEK (Methyl Ethyl Ketone;2-Butanone)			4.51				0.002296
Methylene Chloride		**10**	21.73	23.74	0.02374	0.211875672	0.0898
2-Methylnaphthalene				2976	2.976	0.021187567	
MIBK (M-Isobutyl-K;4-M,2-Pentanone)							
Naphthalene		**1191**	1544	1837	1.837	0.017997161	0.0198
nitrosodiphenylamine, N-		**1290**	2632	6154	6.154	0.000049	0.000205
Polychlorinated biphenyls (PCBs)		**310000**	130500	44820	44.82	0.014	
Aroclor 1016		**107285**	47700	27110	27.11	0.008180528	0.0119
Aroclor 1221			8397	10330	10.33	0.030104343	0.0119
Aroclor 1232				10330	10.33	0.030104343	0.0119
Aroclor 1242			78100	448.2	0.4482	0.007771501	0.0119

Aroclor 1248				43900	43.9	0.017997161	0.0119
Aroclor 1254			130500	75640	75.64	0.011575447	0.0119
Aroclor 1260		**822422**	349700	207000	207	0.013743287	0.0119
Phenanthrene				20830	20.83	0.001730182	
Pyrene		**67992**	54340	69410	69.41	0.000486741	0.000451
Tetrachloroethene		**265**	94.94	106.8	0.265	0.754	0.754
1,2,4-Trichlorobenzene		**1659**		67.7	0.0677	0.0337	
1,1,1-Trichloroethane		**135**	43.89	48.64	0.04864	0.703525398	0.705
1,1,2-Trichloroethane		**75**	60.7	67.7	0.0677	0.033703775	0.037
Trichloroethene		**94**	60.7	67.7	0.094	0.422	0.422
1,3,5-Trimethylbenzene			602.1	703	0.703	0.358716148	0.32
Toluene		**140**	233.9	268	0.268	0.211875672	0.272
Vinyl Chloride		**19**	21.73	23.74	0.019	1.11	1.11
Xylene		**241**	375.3	443.1	0.4431	0.132933578	0.301
benzoic acid		**0.6**			**0.0006**	0.000063	
Benzyl Alcohol				15.66	0.01566	1.37842E-05	
2,4-Dimethylphenol			491.8	717.6	0.716	0.000039	0.000082
2-Methylphenol (o-cresol)			306.5	91	0.091	0.000049	0.0000492
4-Methylphenol (p-cresol)			300.4				0.0000324
Pentachlorophenol		**592**		3380	3.38	1.00211E-06	
Total Phenol		**29**	187.2	18.1	0.0181	0.000323131	0.0000163
Styrene		**912**		517.8	0.5178	0.112482258	
Tributyltin							
2,4,6-Trichlorophenol		**381**		1186	1.186	0.000106347	
Aluminum							
Antimony					45	0	
Arsenic (III)							
Arsenic (V)							
Arsenic					29	0	
Barium					41	0	
Beryllium					790	0	
Cadmium					6.7	0	
Chromium (VI)					19	0	
Chromium					1000	0	
Cobalt							
Copper					22	0	
Iron							
Lead					10000	0	
Manganese					65		
Mercury					52	0	0.47
Mercury (organic)							
Molybdenum							
Nickel					65	0	
Selenium					5	0	
Silver					8.3	0	
Tin							
Thallium					71	0	
Vanadium					1000		
Zinc					62	0	
LPAH							

HPAH		**157213**		157.213			
Total Petroleum Hydrocarbons							
Gasoline							
Gasoline (w/benzene)							
Diesel							
Heavy Oil							
2,3,7,8-TCDD				146300	146.3	0.002045132	
Aldrin		**48685**		96000	**48.685**	0.00697	
alpha-BHC		**1762**		3800	**1.762**	0.000435	
beta-BHC		**2139**		3800	**2.139**	0.0000305	
gamma-BHC (Lindane)		**1352**		1080	**1.352**	0.000574	
Chlordane		**51310**		21305	**51.31**	0.00199	
4,4'-DDT		**677934**		243000	**677.934**	0.000332	
4,4'-DDE		**86405**		440000	**86.405**	0.000861	
4,4'-DDD		**45800**		770000	**45.8**	0.000164	
Dieldrin		**25546**		10700	**25.546**	0.000619	
alpha-Endosulfan (959-98-8)		**2040**		8168	**2.04**	0.000459	
beta-Endosulfan (891-86-1)		**2040**		8031	**2.04**	0.000459	
Endosulfan Sulfate (1031-07-8)		**2040**		10038	**2.04**	0.000459	
Endrin		**10811**		9157	**10.811**	0.000308	
Endrin Aldehyde		**10811**			**10.811**	0.000308	
Heptachlor		**9528**		12000	**9.528**	0.0447	
Heptachlor Epoxide		**83200**		220	**83.2**	0.00039	
Toxaphene							

VADOSE Soil to Water Protection (mg/kg)	SATURATED Soil to Water Protection (mg/kg)
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0
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Insert GW or SW screening criteria to determine

** Note that the EPA Koc values (column D), not MTCA

*** From CLARC (unless not available, then from EPA)

MTCA EQ. 747-1

$$C_s = C_w(UCF)DF * \left[K_d + \frac{(\theta}{} \right.$$

MTCA EQ. 747-2

$$K_d = K_{oc} \; x \; f_{oc}$$

Parameter	Symbol
Soil concentration	C_S
Groundwater/Surfacewater screening level	*Cw*
UCF	*Unit coversion factor*
Dilution faction	*DF*
Distribution coefficient	*Kd*
Soil organic carbon-water partitioning coefficient	*Koc*
Soil fraction of organic carbon - for silty sands	*foc*
Water-filled soil porosity	*θw*
Air-filled soil porosity	*θa*
Henry's law constant	*Hcc*
Dry soil bulk density	*ρb*

*** The dilution factor is 20 for Vad**

***** The Default Porosity for Water/Air Fill is 0.3/**

0	0
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0	0
0	0

vadose soil concentration that is protective**

(column C), are default values used to determine Kd

$$$ From EPA Plant 2 TMCL Documents

$$C_w(UCF)DF*\left[K_d+\frac{(\theta_w+\theta_a H_{cc})}{\rho_b}\right]$$

(For NonIonic & Ionizing Organic Substances)

Value	Units	Source
Calculated Value	mg/kg	Calculated Value
Chemical Specific	ug/l	Pathway Specific
0.001	mg/ug	MTCA
20*	dimensionless	**Vadose Soil**
Chemical Specific	L/kg	Chemical Specific
Chemical Specific	ml/g	Chemical Specific
0.001	g/g	Site Specific -**Default**
0.3***	ml water/ml soil	Site Specific -**Default**
0.13***	ml air/ml soil	Site Specific -**Default**
Chemical Specific	dimensionless	Chemical Specific
1.5	kg/L	Site Specific -**Default**

ose soil, or 1 for Saturated Soil

/0.13 for Vadose Soil & 0.43/0 Saturated Soils

Chemical	GW Screening Level	Koc	Kd	Henry's Law
	ug/l	L/kg	ml/g	Dimensionless
Acetone	**6000**	1.981	0.001981	0.001623835
Acenaphthene	**2.614379085**	6123	6.123	0.004225243
Acenaphthylene	**10.78431373**	6123	6.123	0.00511283
Anthracene	**10.78431373**	20400	20.4	0.002274187
Benzene	**0.795**	165.5	0.1655	0.227009649
Benzo(g,h,i)perylene	**0.011584454**	2676000	2676	1.35388E-05
Benzo(a)anthracene	**0.000112155**	426600	426.6	1.73836E-05
Benzo(a)pyrene	**6.5888E-06**	786800	786.8	1.86925E-05
Benzo(b)fluoranthene	**5.26914E-05**	803100	803.1	2.6873E-05
Benzo(k)fluoranthene	**5.51854E-05**	786800	786.8	2.38871E-05
bis(2-Ethylhexyl)phthalate	**0.284848485**	165400	165.4	1.10437E-05
Butyl benzyl phthalate	**0.523504274**	9359	9.359	5.15373E-05
Carbon Tetrachloride	**0.247823653**	48.64	0.04864	1.3
Chlorobenzene	**100**	268	0.268	0.127207209
Chloroethane	**21000**	23.74	0.02374	0.454019298
Chloroform	**4.3**	35.04	0.03504	0.150112687
Chloromethane	**190**	14.3	0.0143	0.36076128
Chrysene	**0.001120636**	236100	236.1	0.000213921
Dibenz[a,h]anthracene	**2.71511E-05**	2622000	2622	5.03102E-06
Dibenzofuran	**1.327433628**	11290	11.29	0.008712262
Di-n-butylphthalate	**46.57806484**	1460	1.46	7.40338E-05
1,2-Dichlorobenzene	**5.191873589**	443.1	0.4431	0.078533068
1,3-Dichlorobenzene	**600**			
1,4-Dichlorobenzene	**4**	434	0.434	0.099
1,1-Dichloroethane	**1**	35.04	0.03504	0.229872834
1,2-Dichloroethane	**0.48**	43.79	0.04379	0.048265115
1,1-Dichloroethene	**0.729**	35.04	0.03504	1.06755889
diethyl phthalate	**484.1269841**	126.2.	0.1262	0.000025
dimethyl phthalate	**142.8571429**			
di-n-octyl phthalate	**0.295918367**		1.567	0.0027
Ethylbenzene	**700**	517.8	0.5178	0.322312799
Fluoranthene	**2.256699577**	70850	70.85	0.000362397
Fluorene	**2.03539823**	11290	11.29	0.003934834
hexachlorobenzene	**0.05**	3380	3.38	0.07
Hexachlorobutadiene	**0.9**	993.5	0.9935	42.12971863
Indeno(1,2,3-cd)pyrene	**2.27382E-05**	2676000	2676	1.42341E-05
MEK (Methyl Ethyl Ketone;2-Butanone)	**4800**			
Methylene Chloride	**5**	23.74	0.02374	0.211875672
2-Methylnaphthalene	**18.18181818**	2976	2.976	0.021187567
MIBK (M-Isobutyl-K;4-M,2-Pentanone)	**640**			
Naphthalene	**53.80434783**	1837	1.837	0.017997161
nitrosodiphenylamine, N-	**1.593580667**	6154	6.154	0.000049
Polychlorinated biphenyls (PCBs)	**2.30915E-05**	44820	44.82	0.014
Aroclor 1016	**0.0000641**	27110	27.11	0.008180528
Aroclor 1221	**2.30915E-05**	10330	10.33	0.030104343
Aroclor 1232		10330	10.33	0.030104343
Aroclor 1242	**2.30915E-05**	448.2	0.4482	0.007771501

Aroclor 1248	**2.30915E-05**	43900	43.9	0.017997161
Aroclor 1254	**5.49145E-06**	75640	75.64	0.011575447
Aroclor 1260	**2.30915E-05**	207000	207	0.013743287
Phenanthrene	**4.807692308**	20830	20.83	0.001730182
Pyrene	**9.8**	69410	69.41	0.000486741
Tetrachloroethene	**0.020523086**	265	0.265	0.754
1,2,4-Trichlorobenzene	**1.128133705**	67.7	0.0677	0.0337
1,1,1-Trichloroethane	**200**	48.64	0.04864	0.703525398
1,1,2-Trichloroethane	**0.768**	67.7	0.0677	0.033703775
Trichloroethene	**0.74**	94	0.094	0.422
1,3,5-Trimethylbenzene	**45**	703	0.703	0.358716148
Toluene	**1000**	268	0.268	0.211875672
Vinyl Chloride	**0.02**	19	0.019	1.11
Xylene	**1000**	443.1	0.4431	0.132933578
benzoic acid	**2242.926156**		0.0006	0.000063
Benzyl Alcohol	**181.9923372**	15.66	0.01566	1.37842E-05
2,4-Dimethylphenol	**2.020624303**	717.6	0.716	0.000039
2-Methylphenol (o-cresol)	**7.110609481**	91	0.091	0.000049
4-Methylphenol (p-cresol)	**77.18894009**			
Pentachlorophenol	**0.219**	3380	3.38	1.00211E-06
Total Phenol	**78.35820896**	18.1	0.0181	0.000323131
Styrene	**100**	517.8	0.5178	0.112482258
Tributyltin				
2,4,6-Trichlorophenol	**3**	1186	1.186	0.000106347
Aluminum	**50**			
Antimony	**3.865979381**	NA	45	0
Arsenic (III)				
Arsenic (V)				
Arsenic	**0.05**	NA	29	0
Barium	**2**	NA	41	0
Beryllium	**4**	NA	790	0
Cadmium	**0.21**	NA	6.7	0
Chromium (VI)	**0.58**	NA	19	0
Chromium	**50**	NA	1000	0
Cobalt				
Copper	**7.3**	NA	22	0
Iron	**300**			
Lead	**2.5**	NA	10000	0
Manganese	**50**			
Mercury	**0.005161594**	NA	52	0
Mercury (organic)	**0.00045**			
Molybdenum	**40**			
Nickel	**8.2**	NA	65	0
Selenium	**5**	NA	5	0
Silver	**1.532250723**	NA	8.3	0
Tin				
Thallium	**0.47**	NA	71	0
Vanadium	**1.12**			
Zinc	**32.56745762**	NA	62	0
LPAH	**0.01**			

HPAH	**0.01**	157213	157.213	
Total Petroleum Hydrocarbons				
Gasoline	**1000**			
Gasoline (w/benzene)	**800**			
Diesel	**500**			
Heavy Oil	**500**			
2,3,7,8-TCDD	**2.06039E-10**	146300	146.3	0.002045132
Aldrin	**0.002573529**	**48685**	**48.685**	0.00697
alpha-BHC	**0.013888889**	**1762**	**1.762**	0.000435
beta-BHC	**0.048611111**	**2139**	**2.139**	0.0000305
gamma-BHC	**0.0002**	**1352**	**1.352**	0.000574
Chlordane	**0.002**	**51310**	**51.31**	0.00199
4,4'-DDT	**0.257352941**	**677934**	**677.934**	0.000332
4,4'-DDE	**0.257352941**	**86405**	**86.405**	0.000861
4,4'-DDD	**0.364583333**	**45800**	**45.8**	0.000164
Dieldrin	**0.00546875**	**25546**	**25.546**	0.000619
alpha-Endosulfan	**96**	**2040**	**2.04**	0.000459
beta-Endosulfan	**96**	**2040**	**2.04**	0.000459
Endosulfan Sulfate	**96**	**2040**	**2.04**	0.000459
Endrin	**0.002**	**10811**	**10.811**	0.000308
Endrin Aldehyde	**0.002**	**10811**	**10.811**	0.000308
Heptachlor	**0.0004**	**9528**	**9.528**	0.0447
Heptachlor Epoxide	**0.0002**	**83200**	**83.2**	0.00039
Toxaphene				

Most Stringent VADOSE Soil to Water Protection (mg/kg)	Most Stringent SATURATED Soil to Water Protection (mg/kg)
24.25460788	1.731886
0.330633526	0.016757298
1.363879887	0.069123856
4.443179766	0.223091503
0.006124269	0.000359473
0.620046338	0.031003321
0.000957358	4.78776E-05
0.000103708	5.18596E-06
0.00084654	4.23316E-05
0.000868618	4.34357E-05
0.943418187	0.047195596
0.100083594	0.005049548
0.001790807	8.30969E-05
0.95804925	0.055466667
110.4971024	6.51854
0.02133228	0.001383339
0.933150715	0.057183667
0.005296124	0.000264903
0.001423913	7.1198E-05
0.305064294	0.015367257
1.54639773	0.081356353
0.067484617	0.003788856
0.0514064	0.002882667
0.005099246	0.000321707
0.002380541	0.000158619
0.004775851	0.000234524
3.158465423	0.199879894
0.01045914	0.000548534
10.44027286	0.563126667
3.206771516	0.160534086
0.467748395	0.023563127
0.003586067	0.000183333
0.087205361	0.00115215
0.00121704	6.0854E-05
0.024210256	0.001552033
1.15557682	0.059321212
2.193667561	0.1142625
0.202512367	0.010263722
2.07922E-05	1.04158E-06
3.50123E-05	1.75613E-06
4.86428E-06	2.45155E-07
2.9967E-07	1.69692E-08

MTCA EQ. 747-1

$$C_s = C_w(UCF)DF$$

MTCA EQ. 747-2

Parameter
Soil concentration
Groundwater/Surfacewater screening level
UCF
Dilution faction
Distribution coefficient
Soil organic carbon-water partitioning coefficient
Soil fraction of organic carbon - for silty sands
Water-filled soil porosity
Air-filled soil porosity
Henry's law constant
Dry soil bulk density

*** The dilutio**

** Note that the EPA Koc v

***** The Default Porosity fo**

2.03674E-05	1.02034E-06
8.32954E-06	4.16947E-07
9.56918E-05	4.78657E-06
2.022129803	0.101522436
13.64356827	0.683027333
0.000217687	1.13219E-05
0.006105926	0.000399773
1.238448805	0.067061333
0.004156738	0.000272154
0.004892485	0.000281693
0.84067986	0.044535
9.727251165	0.554666667
0.00012608	6.11333E-06
13.0924182	0.729766667
8.998864665	0.64431792
0.784973697	0.055021137
0.037017974	0.002026013
0.041384351	0.00268544
0.0156804	0.000803
0.341842395	0.02388097
1.455096925	0.080446667
0.083160553	0.004418
3.494845361	0.17507732
	0
	0
0.0292	0.001464333
1.648	0.082573333
63.216	3.161146667
0.02898	0.0014672
0.22272	0.011186267
1000.2	50.01433333
	0
3.2412	0.162692667
500.01	25.00071667
0.005388704	0.000269883
0.16	0.011466667
10.6928	0.535350667
0.52	0.026433333
0.260482623	0.013156926
0.66928	0.033504733
0.00448	0.000321067
40.51391728	2.028518377

6.03696E-10	3.02026E-11
0.00251617	0.00012603
0.00054501	2.84537E-05
0.00227403	0.000117914
6.2082E-06	3.27733E-07
0.002060407	0.000103193
3.490395734	0.174542083
0.445761413	0.022310355
0.33541677	0.016802431
0.002815975	0.000141272
4.300876378	0.22336
4.300876378	0.22336
4.300876378	0.22336
0.000440441	2.21953E-05
0.000440441	2.21953E-05
7.7855E-05	3.92587E-06
0.0003336	1.66973E-05

$$C_s = C_w(UCF)DF\left[K_d + \frac{(\theta_w + \theta_a H_{cc})}{\rho_b}\right]$$

$K_d = K_{oc} \; x \; f_{oc}$ *(For NonIonic & Ionizing Organic Substances)*

Symbol	Value	Units	Source
C_S	Calculated Value	mg/kg	Calculated Value
Cw	Chemical Specific	ug/l	Pathway Specific
Unit coversion factor	0.001	mg/ug	MTCA
DF	**20***	dimensionless	**Vadose Soil**
Kd	Chemical Specific	L/kg	Chemical Specific
*Koc***	Chemical Specific	ml/g	Chemical Specific
foc	0.001	g/g	Site Specific -**Default**
θw	**0.3*****	ml water/ml soil	Site Specific -**Default**
θa	**0.13*****	ml air/ml soil	Site Specific -**Default**
Hcc	Chemical Specific	dimensionless	Chemical Specific
ρb	1.5	kg/L	Site Specific -**Default**

n factor is 20 for Vadose soil, or 1 for Saturated Soil
/alues, not MTCA Tables, maybe default values used to determine Kd
ı Water/Air Fill is 0.3/0.13 for Vadose Soil & 0.43/0 Saturated Soils

Chemical	GW Screening Level	Koc	Kd	Henry's Law
	ug/l	L/kg	ml/g	Dimensionless
Acetone	**110107**	1.981	0.001981	0.001623835
Acenaphthene	**2.614379085**	6123	6.123	0.004225243
Acenaphthylene	**10.78431373**	6123	6.123	0.00511283
Anthracene	**10.78431373**	20400	20.4	0.002274187
Benzene	**2.02819**	165.5	0.1655	0.227009649
Benzo(g,h,i)perylene	**0.011584454**	2676000	2676	1.35388E-05
Benzo(a)anthracene	**0.000112155**	426600	426.6	1.73836E-05
Benzo(a)pyrene	**6.5888E-06**	786800	786.8	1.86925E-05
Benzo(b)fluoranthene	**5.26914E-05**	803100	803.1	2.6873E-05
Benzo(k)fluoranthene	**5.51854E-05**	786800	786.8	2.38871E-05
bis(2-Ethylhexyl)phthalate	**0.284848485**	165400	165.4	1.10437E-05
Butyl benzyl phthalate	**0.523504274**	9359	9.359	5.15373E-05
Carbon Tetrachloride	**0.247823653**	48.64	0.04864	1.3
Chlorobenzene	**270**	268	0.268	0.127207209
Chloroethane		23.74	0.02374	0.454019298
Chloroform	**4.3**	35.04	0.03504	0.150112687
Chloromethane		14.3	0.0143	0.36076128
Chrysene	**0.001120636**	236100	236.1	0.000213921
Dibenz[a,h]anthracene	**2.71511E-05**	2622000	2622	5.03102E-06
Dibenzofuran	**1.327433628**	11290	11.29	0.008712262
Di-n-butylphthalate	**46.57806484**	1460	1.46	7.40338E-05
1,2-Dichlorobenzene	**5.191873589**	443.1	0.4431	0.078533068
1,3-Dichlorobenzene				
1,4-Dichlorobenzene	**7.142857143**	434	0.434	0.099
1,1-Dichloroethane	**33.26143751**	35.04	0.03504	0.229872834
1,2-Dichloroethane	**3.6**	43.79	0.04379	0.048265115
1,1-Dichloroethene	**2300**	35.04	0.03504	1.06755889
diethyl phthalate	**484.1269841**	126.2.	0.1262	0.000025
dimethyl phthalate	**142.8571429**			
di-n-octyl phthalate	**0.295918367**		1.567	0.0027
Ethylbenzene	**800**	517.8	0.5178	0.322312799
Fluoranthene	**2.256699577**	70850	70.85	0.000362397
Fluorene	**2.03539823**	11290	11.29	0.003934834
hexachlorobenzene	**0.112426036**	3380	3.38	0.07
Hexachlorobutadiene	**3.923541247**	993.5	0.9935	42.12971863
Indeno(1,2,3-cd)pyrene	**2.27382E-05**	2676000	2676	1.42341E-05
MEK (Methyl Ethyl Ketone;2-Butanone)	**73000**			
Methylene Chloride	**61**	23.74	0.02374	0.211875672
2-Methylnaphthalene	**18.18181818**	2976	2.976	0.021187567
MIBK (M-Isobutyl-K;4-M,2-Pentanone)				
Naphthalene	**53.80434783**	1837	1.837	0.017997161
nitrosodiphenylamine, N-	**1.593580667**	6154	6.154	0.000049
Polychlorinated biphenyls (PCBs)	**2.30915E-05**	44820	44.82	0.014
Aroclor 1016	**0.0000641**	27110	27.11	0.008180528
Aroclor 1221	**2.30915E-05**	10330	10.33	0.030104343
Aroclor 1232		10330	10.33	0.030104343
Aroclor 1242	**2.30915E-05**	448.2	0.4482	0.007771501

Aroclor 1248	**2.30915E-05**	43900	43.9	0.017997161
Aroclor 1254	**5.49145E-06**	75640	75.64	0.011575447
Aroclor 1260	**2.30915E-05**	207000	207	0.013743287
Phenanthrene	**4.807692308**	20830	20.83	0.001730182
Pyrene	**9.8**	69410	69.41	0.000486741
Tetrachloroethene	**0.020523086**	265	0.265	0.754
1,2,4-Trichlorobenzene	**1.128133705**	67.7	0.0677	0.0337
1,1,1-Trichloroethane	**46000**	48.64	0.04864	0.703525398
1,1,2-Trichloroethane	**2.326407578**	67.7	0.0677	0.033703775
Trichloroethene	**0.74**	94	0.094	0.422
1,3,5-Trimethylbenzene	**45**	703	0.703	0.358716148
Toluene	**1300**	268	0.268	0.211875672
Vinyl Chloride	**2.4**	19	0.019	1.11
Xylene	**1300**	443.1	0.4431	0.132933578
benzoic acid	**2242.926156**		0.0006	0.000063
Benzyl Alcohol	**181.9923372**	15.66	0.01566	1.37842E-05
2,4-Dimethylphenol	**2.020624303**	717.6	0.716	0.000039
2-Methylphenol (o-cresol)	**7.110609481**	91	0.091	0.000049
4-Methylphenol (p-cresol)	**77.18894009**			
Pentachlorophenol	**5.325443787**	3380	3.38	1.00211E-06
Total Phenol	**78.35820896**	18.1	0.0181	0.000323131
Styrene		517.8	0.5178	0.112482258
Tributyltin				
2,4,6-Trichlorophenol	**8**	1186	1.186	0.000106347
Aluminum				
Antimony	**3.865979381**	NA	45	0
Arsenic (III)				
Arsenic (V)				
Arsenic	**7.3**	NA	29	0
Barium	**120**	NA	41	0
Beryllium	**120**	NA	790	0
Cadmium	**0.21**	NA	6.7	0
Chromium (VI)	**0.58**	NA	19	0
Chromium	**305.8823529**	NA	1000	0
Cobalt				
Copper	**7.3**	NA	22	0
Iron				
Lead	**2.5**	NA	10000	0
Manganese	**2000**			
Mercury	**0.005161594**	NA	52	0
Mercury (organic)	**0.00045**			
Molybdenum				
Nickel	**8.2**	NA	65	0
Selenium	**5**	NA	5	0
Silver	**1.532250723**	NA	8.3	0
Tin				
Thallium	**0.47**	NA	71	0
Vanadium				
Zinc	**32.56745762**	NA	62	0
LPAH				

HPAH		157213	157.213	
Total Petroleum Hydrocarbons				
Gasoline	**1000**			
Gasoline (w/benzene)	**800**			
Diesel	**500**			
Heavy Oil	**500**			
2,3,7,8-TCDD	**2.06039E-10**	146300	146.3	0.002045132
Aldrin	**1.16061E-05**	**48685**	**48.685**	0.00697
alpha-BHC	**0.001125041**	**1762**	**1.762**	0.000435
beta-BHC	**0.003937642**	**2139**	**2.139**	0.0000305
gamma-BHC	**0.019**	**1352**	**1.352**	0.000574
Chlordane	**0.000186709**	**51310**	**51.31**	0.00199
4,4'-DDT	**5.05602E-05**	**677934**	**677.934**	0.000332
4,4'-DDE	**5.05602E-05**	**86405**	**86.405**	0.000861
4,4'-DDD	**7.16269E-05**	**45800**	**45.8**	0.000164
Dieldrin	**1.23315E-05**	**25546**	**25.546**	0.000619
alpha-Endosulfan	**0.056**	**2040**	**2.04**	0.000459
beta-Endosulfan	**0.056**	**2040**	**2.04**	0.000459
Endosulfan Sulfate	**0.056**	**2040**	**2.04**	0.000459
Endrin	**0.002**	**10811**	**10.811**	0.000308
Endrin Aldehyde	**0.002**	**10811**	**10.811**	0.000308
Heptachlor	**1.82819E-05**	**9528**	**9.528**	0.0447
Heptachlor Epoxide	**9.04051E-06**	**83200**	**83.2**	0.00039
Toxaphene	**6.39423E-05**			

Most Stringent VADOSE Soil to Water Protection (mg/kg)	Most Stringent SATURATED Soil to Water Protection (mg/kg)
445.1003517	31.78212863
0.330633526	0.016757298
1.363879887	0.069123856
4.443179766	0.223091503
0.015624128	0.00091708
0.620046338	0.031003321
0.000957358	4.78776E-05
0.000103708	5.18596E-06
0.00084654	4.23316E-05
0.000868618	4.34357E-05
0.943418187	0.047195596
0.100083594	0.005049548
0.001790807	8.30969E-05
2.586732974	0.14976
0.02133228	0.001383339
0.005296124	0.000264903
0.001423913	7.1198E-05
0.305064294	0.015367257
1.54639773	0.081356353
0.067484617	0.003788856
0.091797143	0.005147619
0.16960826	0.010700426
0.017854054	0.001189644
15.06784144	0.739925333
3.158465423	0.199879894
0.01045914	0.000548534
11.93174041	0.643573333
3.206771516	0.160534086
0.467748395	0.023563127
0.008063345	0.000412229
0.380170923	0.005022787
0.00121704	6.0854E-05
0.295365121	0.018934807
1.15557682	0.059321212
2.193667561	0.1142625
0.202512367	0.010263722
2.07922E-05	1.04158E-06
3.50123E-05	1.75613E-06
4.86428E-06	2.45155E-07
2.9967E-07	1.69692E-08

MTCA EQ. 747-1

$$C_s = C_w(UCF)DF$$

MTCA EQ. 747-2

Parameter
Soil concentration
Groundwater/Surfacewater screening level
UCF
Dilution faction
Distribution coefficient
Soil organic carbon-water partitioning coefficient
Soil fraction of organic carbon - for silty sands
Water-filled soil porosity
Air-filled soil porosity
Henry's law constant
Dry soil bulk density

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** Note that the EPA Koc v

***** The Default Porosity fo**

2.03674E-05	1.02034E-06
8.32954E-06	4.16947E-07
9.56918E-05	4.78657E-06
2.022129803	0.101522436
13.64356827	0.683027333
0.000217687	1.13219E-05
0.006105926	0.000399773
284.8432251	15.42410667
0.012591495	0.000824401
0.004892485	0.000281693
0.84067986	0.044535
12.64542651	0.721066667
0.0151296	0.0007336
17.02014366	0.948696667
8.998864665	0.64431792
0.784973697	0.055021137
0.037017974	0.002026013
0.041384351	0.00268544
0.30875576	0.022127496
0.381301784	0.019526627
0.341842395	0.02388097
3.494845361	0.17507732
4.2632	0.213792667
98.88	4.9544
1896.48	94.8344
0.02898	0.0014672
0.22272	0.011186267
6118.870588	305.9700392
3.2412	0.162692667
500.01	25.00071667
0.005388704	0.000269883
10.6928	0.535350667
0.52	0.026433333
0.260482623	0.013156926
0.66928	0.033504733
40.51391728	2.028518377

6.03696E-10	3.02026E-11
1.13474E-05	5.6837E-07
4.41474E-05	2.30483E-06
0.000184203	9.55141E-06
0.000589779	3.11347E-05
0.000192348	9.63356E-06
0.000685731	3.42909E-05
8.75753E-05	4.38314E-06
6.58968E-05	3.30104E-06
6.34974E-06	3.18555E-07
0.002508845	0.000130293
0.002508845	0.000130293
0.002508845	0.000130293
0.000440441	2.21953E-05
0.000440441	2.21953E-05
3.55835E-06	1.79431E-07
1.50796E-05	7.54762E-07

$$C_s = C_w(UCF)DF\left[K_d + \frac{(\theta_w + \theta_a H_{cc})}{\rho_b}\right]$$

$K_d = K_{oc} \; x \; f_{oc}$ *(For NonIonic & Ionizing Organic Substances)*

Symbol	Value	Units	Source
C_S	Calculated Value	mg/kg	Calculated Value
Cw	Chemical Specific	ug/l	Pathway Specific
Unit coversion factor	0.001	mg/ug	MTCA
DF	**20***	dimensionless	**Vadose Soil**
Kd	Chemical Specific	L/kg	Chemical Specific
*Koc***	Chemical Specific	ml/g	Chemical Specific
foc	0.001	g/g	Site Specific -**Default**
θw	**0.3*****	ml water/ml soil	Site Specific -**Default**
θa	**0.13*****	ml air/ml soil	Site Specific -**Default**
Hcc	Chemical Specific	dimensionless	Chemical Specific
ρb	1.5	kg/L	Site Specific -**Default**

n factor is 20 for Vadose soil, or 1 for Saturated Soil
alues, not MTCA Tables, maybe default values used to determine Kd
r Water/Air Fill is 0.3/0.13 for Vadose Soil & 0.43/0 Saturated Soils

Chemical	SW Screening Level	Koc	Kd	Henry's Law
	ug/l	L/kg	ml/g	Dimensionless
Acetone	**6000**	1.981	0.001981	0.001623835
Acenaphthene	**2.614379085**	6123	6.123	0.004225243
Acenaphthylene	**10.78431373**	6123	6.123	0.00511283
Anthracene	**10.78431373**	20400	20.4	0.002274187
Benzene	**0.795**	165.5	0.1655	0.227009649
Benzo(g,h,i)perylene	**0.011584454**	2676000	2676	1.35388E-05
Benzo(a)anthracene	**0.000258331**	426600	426.6	1.73836E-05
Benzo(a)pyrene	**1.51762E-05**	786800	786.8	1.86925E-05
Benzo(b)fluoranthene	**0.000121366**	803100	803.1	2.6873E-05
Benzo(k)fluoranthene	**0.00012711**	786800	786.8	2.38871E-05
bis(2-Ethylhexyl)phthalate	**0.284848485**	165400	165.4	1.10437E-05
Butyl benzyl phthalate	**0.409933862**	9359	9.359	5.15373E-05
Carbon Tetrachloride	**0.23**	48.64	0.04864	1.3
Chlorobenzene	**20**	268	0.268	0.127207209
Chloroethane	**0.41**	23.74	0.02374	0.454019298
Chloroform	**4.2952095**	35.04	0.03504	0.150112687
Chloromethane	**18.90068394**	14.3	0.0143	0.36076128
Chrysene	**0.002581193**	236100	236.1	0.000213921
Dibenz[a,h]anthracene	**6.25379E-05**	2622000	2622	5.03102E-06
Dibenzofuran	**1.327433628**	11290	11.29	0.008712262
Di-n-butylphthalate	**46.57806484**	1460	1.46	7.40338E-05
1,2-Dichlorobenzene	**5.191873589**	443.1	0.4431	0.078533068
1,3-Dichlorobenzene	**320**			
1,4-Dichlorobenzene	**4**	434	0.434	0.099
1,1-Dichloroethane	**1**	35.04	0.03504	0.229872834
1,2-Dichloroethane	**0.38**	43.79	0.04379	0.048265115
1,1-Dichloroethene	**0.057**	35.04	0.03504	1.06755889
diethyl phthalate	**484.1269841**	126.2.	0.1262	0.000025
dimethyl phthalate	**142.8571429**			
di-n-octyl phthalate	**0.295918367**		1.567	0.0027
Ethylbenzene	**2.233717193**	517.8	0.5178	0.322312799
Fluoranthene	**2.256699577**	70850	70.85	0.000362397
Fluorene	**2.03539823**	11290	11.29	0.003934834
hexachlorobenzene	**6.61931E-05**	3380	3.38	0.07
Hexachlorobutadiene	**0.44**	993.5	0.9935	42.12971863
Indeno(1,2,3-cd)pyrene	**5.23736E-05**	2676000	2676	1.42341E-05
MEK (Methyl Ethyl Ketone;2-Butanone)	**4800**			
Methylene Chloride	**4.6**	23.74	0.02374	0.211875672
2-Methylnaphthalene	**18.18181818**	2976	2.976	0.021187567
MIBK (M-Isobutyl-K;4-M,2-Pentanone)				
Naphthalene	**53.80434783**	1837	1.837	0.017997161
nitrosodiphenylamine, N-	**1.382665579**	6154	6.154	0.000049
Polychlorinated biphenyls (PCBs)	**1.47662E-05**	44820	44.82	0.014
Aroclor 1016	**0.00042189**	27110	27.11	0.008180528
Aroclor 1221	**2.30352E-05**	10330	10.33	0.030104343
Aroclor 1232	**0.014**	10330	10.33	0.030104343
Aroclor 1242	**2.30352E-05**	448.2	0.4482	0.007771501

Aroclor 1248	**2.30352E-05**	43900	43.9	0.017997161
Aroclor 1254	**5.48457E-06**	75640	75.64	0.011575447
Aroclor 1260	**2.30352E-05**	207000	207	0.013743287
Phenanthrene	**4.807692308**	20830	20.83	0.001730182
Pyrene	**9.828761139**	69410	69.41	0.000486741
Tetrachloroethene	**0.02060763**	265	0.265	0.754
1,2,4-Trichlorobenzene	**0.141842417**	67.7	0.0677	0.0337
1,1,1-Trichloroethane	**200**	48.64	0.04864	0.703525398
1,1,2-Trichloroethane	**0.59**	67.7	0.0677	0.033703775
Trichloroethene	**0.739493051**	94	0.094	0.422
1,3,5-Trimethylbenzene	**45.21613312**	703	0.703	0.358716148
Toluene	**1000**	268	0.268	0.211875672
Vinyl Chloride	**0.02**	19	0.019	1.11
Xylene	**1000**	443.1	0.4431	0.132933578
benzoic acid	**2242.926156**		0.0006	0.000063
Benzyl Alcohol	**181.9923372**	15.66	0.01566	1.37842E-05
2,4-Dimethylphenol	**2.020624303**	717.6	0.716	0.000039
2-Methylphenol (o-cresol)	**7.110609481**	91	0.091	0.000049
4-Methylphenol (p-cresol)	**77.18894009**			
Pentachlorophenol	**0.209410987**	3380	3.38	1.00211E-06
Total Phenol	**78.35820896**	18.1	0.0181	0.000323131
Styrene	**100**	517.8	0.5178	0.112482258
Tributyltin	**0.072**			
2,4,6-Trichlorophenol	**0.558429298**	1186	1.186	0.000106347
Aluminum	**50**			
Antimony	**3.865979381**	NA	45	
Arsenic (III)				
Arsenic (V)				
Arsenic	**0.005388353**	NA	29	
Barium	**2**	NA	41	
Beryllium	**4**	NA	790	
Cadmium	**0.25**	NA	6.7	
Chromium (VI)	**0.115176043**	NA	19	
Chromium	**50**	NA	1000	
Cobalt				
Copper	**1.3**	NA	22	
Iron	**300**			
Lead	**0.54**	NA	10000	
Manganese	**50**			
Mercury	**0.005161594**	NA	52	
Mercury (organic)	**0.000454821**			
Molybdenum	**40**			
Nickel	**8.2**	NA	65	
Selenium	**5**	NA	5	
Silver	**1.532250723**	NA	8.3	
Tin				
Thallium	**0.24**	NA	71	
Vanadium	**1.12**			
Zinc	**32.56745762**	NA	62	
LPAH	**0.01**			

HPAH	**0.01**	157213	157.213	
Total Petroleum Hydrocarbons				
Gasoline	**1000**			
Gasoline (w/benzene)	**800**			
Diesel	**500**			
Heavy Oil	**500**			
2,3,7,8-TCDD	**2.06039E-10**	146300	146.3	0.002045132
Aldrin	**1.16061E-05**	**48685**	**48.685**	0.00697
alpha-BHC	**0.001125041**	**1762**	**1.762**	0.000435
beta-BHC	**0.003937642**	**2139**	**2.139**	0.0000305
gamma-BHC	**0.019**	**1352**	**1.352**	0.000574
Chlordane	**0.000186709**	**51310**	**51.31**	0.00199
4,4'-DDT	**5.05602E-05**	**677934**	**677.934**	0.000332
4,4'-DDE	**5.05602E-05**	**86405**	**86.405**	0.000861
4,4'-DDD	**7.16269E-05**	**45800**	**45.8**	0.000164
Dieldrin	**1.23315E-05**	**25546**	**25.546**	0.000619
alpha-Endosulfan	**0.056**	**2040**	**2.04**	0.000459
beta-Endosulfan	**0.056**	**2040**	**2.04**	0.000459
Endosulfan Sulfate	**0.056**	**2040**	**2.04**	0.000459
Endrin	**0.002**	**10811**	**10.811**	0.000308
Endrin Aldehyde	**0.002**	**10811**	**10.811**	0.000308
Heptachlor	**1.82819E-05**	**9528**	**9.528**	0.0447
Heptachlor Epoxide	**9.04051E-06**	**83200**	**83.2**	0.00039
Toxaphene	**6.39423E-05**			

Most Stringent VADOSE Soil to Water Protection (mg/kg)	Most Stringent SATURATED Soil to Water Protection (mg/kg)
24.25460788	1.731886
0.330633526	0.016757298
1.363879887	0.069123856
4.443179766	0.223091503
0.006124269	0.000359473
0.620046338	0.031003321
0.00220511	0.000110278
0.000238873	1.1945E-05
0.001949861	9.75036E-05
0.002000713	0.000100047
0.943418187	0.047195596
0.078371192	0.003954085
0.001662011	7.71205E-05
0.19160985	0.011093333
0.002157324	0.000127267
0.021308514	0.001381798
0.092827299	0.005688476
0.012198717	0.00061016
0.00327974	0.000163992
0.305064294	0.015367257
1.54639773	0.081356353
0.067484617	0.003788856
0.0514064	0.002882667
0.005099246	0.000321707
0.001884595	0.000125574
0.00037342	1.83373E-05
3.158465423	0.199879894
0.01045914	0.000548534
0.033315167	0.001796951
3.206771516	0.160534086
0.467748395	0.023563127
4.74746E-06	2.42708E-07
0.042633732	0.000563273
0.002803243	0.000140167
0.022273435	0.001427871
1.15557682	0.059321212
2.193667561	0.1142625
0.175709259	0.008905288
1.32958E-05	6.66052E-07
0.000230442	1.15584E-05
4.85242E-06	2.44557E-07
0.002949131	0.000148633
2.98939E-07	1.69278E-08

MTCA EQ. 747-1 $C_s = C_w(UCF)DF\Big[$

MTCA EQ. 747-2

Parameter
Soil concentration
Groundwater/Surfacewater screening level
UCF
Dilution faction
Distribution coefficient
Soil organic carbon-water partitioning coefficient
Soil fraction of organic carbon - for silty sands
Water-filled soil porosity
Air-filled soil porosity
Henry's law constant
Dry soil bulk density

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** Note that the EPA Koc va

***** The Default Porosity for**

2.03178E-05	1.01785E-06
8.31911E-06	4.16425E-07
9.54585E-05	4.77489E-06
2.022129803	0.101522436
13.68360955	0.685031889
0.000218584	1.13685E-05
0.00076771	5.02642E-05
1.238448805	0.067061333
0.003193328	0.000209076
0.004889134	0.0002815
0.84471761	0.0447489
9.727251165	0.554666667
0.00012608	6.11333E-06
13.0924182	0.729766667
8.998864665	0.64431792
0.784973697	0.055021137
0.037017974	0.002026013
0.041384351	0.00268544
0.30875576	0.022127496
0.014993827	0.00076784
0.341842395	0.02388097
1.455096925	0.080446667
0.015479763	0.00082238
0.2	0.014333333
3.494845361	0.17507732
0.003146798	0.000157807
1.648	0.082573333
63.216	3.161146667
0.0345	0.001746667
0.0442276	0.002221362
1000.2	50.01433333
0.5772	0.028972667
1.2	0.086
108.00216	5.4001548
0.2	0.014333333
0.005388704	0.000269883
0.16	0.011466667
10.6928	0.535350667
0.52	0.026433333
0.260482623	0.013156926
0.34176	0.0171088
0.00448	0.000321067
40.51391728	2.028518377

6.03696E-10	3.02026E-11
1.13474E-05	5.6837E-07
4.41474E-05	2.30483E-06
0.000184203	9.55141E-06
0.000589779	3.11347E-05
0.000192348	9.63356E-06
0.000685731	3.42909E-05
8.75753E-05	4.38314E-06
6.58968E-05	3.30104E-06
6.34974E-06	3.18555E-07
0.002508845	0.000130293
0.002508845	0.000130293
0.002508845	0.000130293
0.000440441	2.21953E-05
0.000440441	2.21953E-05
3.55835E-06	1.79431E-07
1.50796E-05	7.54762E-07

$$C_s = C_w(UCF)DF\left[K_d + \frac{(\theta_w + \theta_a H_{cc})}{\rho_b}\right]$$

$K_d = K_{oc} \ x \ f_{oc}$ *(For NonIonic & Ionizing Organic Substances)*

Symbol	Value	Units	Source
C_S	Calculated Value	mg/kg	Calculated Value
Cw	Chemical Specific	ug/l	Pathway Specific
Unit coversion factor	0.001	mg/ug	MTCA
DF	**20***	dimensionless	**Vadose Soil**
Kd	Chemical Specific	L/kg	Chemical Specific
*Koc***	Chemical Specific	ml/g	Chemical Specific
foc	0.001	g/g	Site Specific -**Default**
θw	**0.3*****	ml water/ml soil	Site Specific -**Default**
θa	**0.13*****	ml air/ml soil	Site Specific -**Default**
Hcc	Chemical Specific	dimensionless	Chemical Specific
ρb	1.5	kg/L	Site Specific -**Default**

ı factor is 20 for Vadose soil, or 1 for Saturated Soil
ılues, not MTCA Tables, maybe default values used to determine Kd
r Water/Air Fill is 0.3/0.13 for Vadose Soil & 0.43/0 Saturated Soils

Chemical	SW Screening Level	Koc	Kd	Henry's Law
	ug/l	L/kg	ml/g	Dimensionless
Acetone	**110107.0077**	1.981	0.001981	0.001623835
Acenaphthene	**2.614379085**	6123	6.123	0.004225243
Acenaphthylene	**10.78431373**	6123	6.123	0.00511283
Anthracene	**10.78431373**	20400	20.4	0.002274187
Benzene	**2.028193577**	165.5	0.1655	0.227009649
Benzo(g,h,i)perylene	**0.011584454**	2676000	2676	1.35388E-05
Benzo(a)anthracene	**0.000258331**	426600	426.6	1.73836E-05
Benzo(a)pyrene	**1.51762E-05**	786800	786.8	1.86925E-05
Benzo(b)fluoranthene	**0.000121366**	803100	803.1	2.6873E-05
Benzo(k)fluoranthene	**0.00012711**	786800	786.8	2.38871E-05
bis(2-Ethylhexyl)phthalate	**0.284848485**	165400	165.4	1.10437E-05
Butyl benzyl phthalate	**0.409933862**	9359	9.359	5.15373E-05
Carbon Tetrachloride	**0.247823653**	48.64	0.04864	1.3
Chlorobenzene	**20**	268	0.268	0.127207209
Chloroethane	**34**	23.74	0.02374	0.454019298
Chloroform	**4.2952095**	35.04	0.03504	0.150112687
Chloromethane	**20.25073279**	14.3	0.0143	0.36076128
Chrysene	**0.002581193**	236100	236.1	0.000213921
Dibenz[a,h]anthracene	**6.25379E-05**	2622000	2622	5.03102E-06
Dibenzofuran	**1.327433628**	11290	11.29	0.008712262
Di-n-butylphthalate	**46.57806484**	1460	1.46	7.40338E-05
1,2-Dichlorobenzene	**5.191873589**	443.1	0.4431	0.078533068
1,3-Dichlorobenzene	**960**			
1,4-Dichlorobenzene	**4**	434	0.434	0.099
1,1-Dichloroethane	**33.26143751**	35.04	0.03504	0.229872834
1,2-Dichloroethane	**3.552760138**	43.79	0.04379	0.048265115
1,1-Dichloroethene	**3.2**	35.04	0.03504	1.06755889
diethyl phthalate	**484.1269841**	126.2.	0.1262	0.000025
dimethyl phthalate	**142.8571429**			
di-n-octyl phthalate	**0.295918367**		1.567	0.0027
Ethylbenzene	**2.233717193**	517.8	0.5178	0.322312799
Fluoranthene	**2.256699577**	70850	70.85	0.000362397
Fluorene	**2.03539823**	11290	11.29	0.003934834
hexachlorobenzene	**6.61931E-05**	3380	3.38	0.07
Hexachlorobutadiene	**3.923541247**	993.5	0.9935	42.12971863
Indeno(1,2,3-cd)pyrene	**5.23736E-05**	2676000	2676	1.42341E-05
MEK (Methyl Ethyl Ketone;2-Butanone)	**4800**			
Methylene Chloride	**61.42722279**	23.74	0.02374	0.211875672
2-Methylnaphthalene	**18.18181818**	2976	2.976	0.021187567
MIBK (M-Isobutyl-K;4-M,2-Pentanone)				
Naphthalene	**53.80434783**	1837	1.837	0.017997161
nitrosodiphenylamine, N-	**1.382665579**	6154	6.154	0.000049
Polychlorinated biphenyls (PCBs)	**1.47662E-05**	44820	44.82	0.014
Aroclor 1016	**0.00042189**	27110	27.11	0.008180528
Aroclor 1221	**2.30352E-05**	10330	10.33	0.030104343
Aroclor 1232	**0.014**	10330	10.33	0.030104343
Aroclor 1242	**2.30352E-05**	448.2	0.4482	0.007771501

Aroclor 1248	**2.30352E-05**	43900	43.9	0.017997161
Aroclor 1254	**5.48457E-06**	75640	75.64	0.011575447
Aroclor 1260	**2.30352E-05**	207000	207	0.013743287
Phenanthrene	**4.807692308**	20830	20.83	0.001730182
Pyrene	**9.828761139**	69410	69.41	0.000486741
Tetrachloroethene	**0.02060763**	265	0.265	0.754
1,2,4-Trichlorobenzene	**0.141842417**	67.7	0.0677	0.0337
1,1,1-Trichloroethane	**46023.56406**	48.64	0.04864	0.703525398
1,1,2-Trichloroethane	**2.335991132**	67.7	0.0677	0.033703775
Trichloroethene	**0.739493051**	94	0.094	0.422
1,3,5-Trimethylbenzene	**45.21613312**	703	0.703	0.358716148
Toluene	**1294.051676**	268	0.268	0.211875672
Vinyl Chloride	**0.53322242**	19	0.019	1.11
Xylene	**1577.950768**	443.1	0.4431	0.132933578
benzoic acid	**2242.926156**		0.0006	0.000063
Benzyl Alcohol	**181.9923372**	15.66	0.01566	1.37842E-05
2,4-Dimethylphenol	**2.020624303**	717.6	0.716	0.000039
2-Methylphenol (o-cresol)	**7.110609481**	91	0.091	0.000049
4-Methylphenol (p-cresol)	**77.18894009**			
Pentachlorophenol	**0.698036623**	3380	3.38	1.00211E-06
Total Phenol	**78.35820896**	18.1	0.0181	0.000323131
Styrene		517.8	0.5178	0.112482258
Tributyltin	**0.0074**			
2,4,6-Trichlorophenol	**0.558429298**	1186	1.186	0.000106347
Aluminum				
Antimony	**3.865979381**	NA	45	
Arsenic (III)				
Arsenic (V)				
Arsenic	**0.005388353**	NA	29	
Barium	**122.1478478**	NA	41	
Beryllium	**12.47090123**	NA	790	
Cadmium	**0.25**	NA	6.7	
Chromium (VI)	**0.115176043**	NA	19	
Chromium	**74**	NA	1000	
Cobalt				
Copper	**3.1**	NA	22	
Iron				
Lead	**0.54**	NA	10000	
Manganese	**100**			
Mercury	**0.005161594**	NA	52	
Mercury (organic)	**0.000454821**			
Molybdenum				
Nickel	**8.2**	NA	65	
Selenium	**5**	NA	5	
Silver	**1.532250723**	NA	8.3	
Tin				
Thallium	**0.47**	NA	71	
Vanadium				
Zinc	**32.56745762**	NA	62	
LPAH	**0.01**			

HPAH	**0.01**	157213	157.213	
Total Petroleum Hydrocarbons				
Gasoline	**1000**			
Gasoline (w/benzene)	**800**			
Diesel	**500**			
Heavy Oil	**500**			
2,3,7,8-TCDD	**2.06039E-10**	146300	146.3	0.002045132
Aldrin	**1.16061E-05**	**48685**	**48.685**	0.00697
alpha-BHC	**0.001125041**	**1762**	**1.762**	0.000435
beta-BHC	**0.003937642**	**2139**	**2.139**	0.0000305
gamma-BHC	**0.063**	**1352**	**1.352**	0.000574
Chlordane	**0.000186709**	**51310**	**51.31**	0.00199
4,4'-DDT	**5.05602E-05**	**677934**	**677.934**	0.000332
4,4'-DDE	**5.05602E-05**	**86405**	**86.405**	0.000861
4,4'-DDD	**7.16269E-05**	**45800**	**45.8**	0.000164
Dieldrin	**1.23315E-05**	**25546**	**25.546**	0.000619
alpha-Endosulfan	**0.0087**	**2040**	**2.04**	0.000459
beta-Endosulfan	**0.0087**	**2040**	**2.04**	0.000459
Endosulfan Sulfate	**0.0087**	**2040**	**2.04**	0.000459
Endrin	**0.002**	**10811**	**10.811**	0.000308
Endrin Aldehyde	**0.002**	**10811**	**10.811**	0.000308
Heptachlor	**1.82819E-05**	**9528**	**9.528**	0.0447
Heptachlor Epoxide	**9.04051E-06**	**83200**	**83.2**	0.00039
Toxaphene	**6.39423E-05**			

Most Stringent VADOSE Soil to Water Protection (mg/kg)	Most Stringent SATURATED Soil to Water Protection (mg/kg)
445.1003828	31.78213086
0.330633526	0.016757298
1.363879887	0.069123856
4.443179766	0.223091503
0.015624156	0.000917082
0.620046338	0.031003321
0.00220511	0.000110278
0.000238873	1.1945E-05
0.001949861	9.75036E-05
0.002000713	0.000100047
0.943418187	0.047195596
0.078371192	0.003954085
0.001790807	8.30969E-05
0.19160985	0.011093333
0.178900071	0.010553827
0.021308514	0.001381798
0.09945782	0.006094796
0.012198717	0.00061016
0.00327974	0.000163992
0.305064294	0.015367257
1.54639773	0.081356353
0.067484617	0.003788856
0.0514064	0.002882667
0.16960826	0.010700426
0.01761977	0.001174033
0.020963953	0.001029461
3.158465423	0.199879894
0.01045914	0.000548534
0.033315167	0.001796951
3.206771516	0.160534086
0.467748395	0.023563127
4.74746E-06	2.42708E-07
0.380170923	0.005022787
0.002803243	0.000140167
0.297433756	0.019067419
1.15557682	0.059321212
2.193667561	0.1142625
0.175709259	0.008905288
1.32958E-05	6.66052E-07
0.000230442	1.15584E-05
4.85242E-06	2.44557E-07
0.002949131	0.000148633
2.98939E-07	1.69278E-08

MTCA EQ. 747-1 $C_s = C_w (UCF) DF$

MTCA EQ. 747-2

Parameter
Soil concentration
Groundwater/Surfacewater screening level
UCF
Dilution faction
Distribution coefficient
Soil organic carbon-water partitioning coefficient
Soil fraction of organic carbon - for silty sands
Water-filled soil porosity
Air-filled soil porosity
Henry's law constant
Dry soil bulk density

*** The dilutior**

** Note that the EPA Koc va

***** The Default Porosity fo**

2.03178E-05	1.01785E-06
8.31911E-06	4.16425E-07
9.54585E-05	4.77489E-06
2.022129803	0.101522436
13.68360955	0.685031889
0.000218584	1.13685E-05
0.00076771	5.02642E-05
284.9891395	15.43200785
0.012643365	0.000827797
0.004889134	0.0002815
0.84471761	0.0447489
12.58756567	0.71776733
0.003361434	0.000162988
20.65919136	1.151535872
8.998864665	0.64431792
0.784973697	0.055021137
0.037017974	0.002026013
0.041384351	0.00268544
0.049979423	0.002559468
0.341842395	0.02388097
0.015479763	0.00082238
3.494845361	0.17507732
0.003146798	0.000157807
197.090123	9.855586963
0.0345	0.001746667
0.0442276	0.002221362
1480.296	74.02121333
1.3764	0.069088667
108.00216	5.4001548
0.005388704	0.000269883
10.6928	0.535350667
0.52	0.026433333
0.260482623	0.013156926
0.66928	0.033504733
40.51391728	2.028518377

0.0314826	0.001574997
6.03696E-10	3.02026E-11
1.13474E-05	5.6837E-07
4.41474E-05	2.30483E-06
0.000184203	9.55141E-06
0.001955583	0.000103236
0.000192348	9.63356E-06
0.000685731	3.42909E-05
8.75753E-05	4.38314E-06
6.58968E-05	3.30104E-06
6.34974E-06	3.18555E-07
0.000389767	0.000020242
0.000389767	0.000020242
0.000389767	0.000020242
0.000440441	2.21953E-05
0.000440441	2.21953E-05
3.55835E-06	1.79431E-07
1.50796E-05	7.54762E-07

$$C_s = C_w (UCF) DF \left[K_d + \frac{(\theta_w + \theta_a H_{cc})}{\rho_b} \right]$$

$K_d = K_{oc} \ x \ f_{oc}$ *(For NonIonic & Ionizing Organic Substances)*

Symbol	Value	Units	Source
C_S	Calculated Value	mg/kg	Calculated Value
Cw	Chemical Specific	ug/l	Pathway Specific
Unit coversion factor	0.001	mg/ug	MTCA
DF	**20***	dimensionless	**Vadose Soil**
Kd	Chemical Specific	L/kg	Chemical Specific
*Koc***	Chemical Specific	ml/g	Chemical Specific
foc	0.001	g/g	Site Specific -**Default**
θw	**0.3*****	ml water/ml soil	Site Specific -**Default**
θa	**0.13*****	ml air/ml soil	Site Specific -**Default**
Hcc	Chemical Specific	dimensionless	Chemical Specific
ρb	1.5	kg/L	Site Specific -**Default**

ı factor is 20 for Vadose soil, or 1 for Saturated Soil
alues, not MTCA Tables, maybe default values used to determine Kd
r Water/Air Fill is 0.3/0.13 for Vadose Soil & 0.43/0 Saturated Soils