FINAL WORK PLAN
REMEDIAL INVESTIGATION/FEASIBILITY STUDY AND INTERIM ACTION WORK PLAN – DAKOTA CREEK INDUSTRIES

APRIL 1, 2008

FOR
WASHINGTON STATE DEPARTMENT OF ECOLOGY ON BEHALF OF PORT OF ANACORTES

GEOENGINEERS

Final Work Plan
Remedial Investigation/Feasibility Study and Interim Dakota Creek Industries
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FINAL WORK PLAN
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1.0 INTRODUCTION

This document presents a Work Plan for the Remedial Investigation/Feasibility Study (RI/FS) and Interim Action at the Dakota Creek Industries (DCI) shipyard facility (Site), located at the 115 Q Avenue in Anacortes, Washington (Figure 1). The Site is owned by the Port of Anacortes (Port) and is currently leased to DCI who uses the property for shipbuilding and repair. Previous environmental investigations have been completed on Site soils, groundwater, and sediments. Data from these studies indicate that historical use of the property may have resulted in adverse environmental impacts at the Site. The Port is performing an RI/FS and interim action under an Agreed Order with Ecology.

The activities described in this Work Plan will be completed to fulfill the requirements set forth in the Agreed Order by:

- Assessing the nature and extent of contamination at the upland and in-water portions of the Site:
- Providing sufficient information to evaluate and select appropriate cleanup actions, as necessary;
- Evaluating existing storm drain systems relative to their potential as ongoing sources to sediment contamination at the Site; and
- Generally describing the planned interim remedial action for the Site.

An interim action is planned to remove contaminated sediments from the offshore area (basin) of the Site prior to in-water redevelopment activities and to restore habitats near the site. The interim action will reduce potential threats to human health or the environment by eliminating known contaminant pathways, provide habitat restoration consistent with Ecology's Puget Sound Initiative, and will correct a problem that may become worse or more costly to address over-time.

This Work Plan was prepared in general accordance with the requirements defined by the Washington Model Toxics Control Act Cleanup (MTCA) Regulation (WAC 173-340-350) for submittal to Ecology. This Work Plan describes the project activities to be performed, the anticipated schedule as described in the Ecology Agreed Order (dated December 2007) for the site and summarized below, and reporting. Appendices to this Work Plan consist of a Public Participation Plan prepared by Ecology for the Site (Appendix A); Soil and Groundwater Sampling and Analysis Plan/Quality Assurance Project Plan (Appendix B); Sediment Sampling and Analysis Plan/Quality Assurance Project Plan (Appendix C); Health and Safety Plan (Appendix D).

The anticipated schedule for major project milestones, as outlined in Appendix B to the Agreed Order, is summarized in the table below.

Project Milestone	Schedule
Submission by Port of Draft RI/FS and Interim Action Work Plan	45 days from effective date of Agreed Order
Submission by Port of Draft Final RI/FS and Interim Action Work Plan for Public Review	30 days from receipt by Port of Ecology comments on Draft RI/FS and Interim Action Work Plan
Submission by Port of Final RI/FS and Interim Action Work Plan	15 days from receipt by Port of Ecology comments on Draft Final RI/FS and Interim Action Work Plan

Project Milestone	Schedule
Interim Action	To be determined based on approval of Work Plan evaluation of existing data and Identification of data gaps. Marine area interim actions well be implemented during allowable in-water work windows (July 15 to January 15)
Field Investigation to fulfill RI data gaps	Initiated 60 days from approval of Work Plan or completion of Interim Action
Submission by Port of Draft RI/FS Report	60 days from receipt by Port of final analytical data package or completion of the Interim Action
Submission by Port of Final RI/FS Report	30 days from receipt by Port of Ecology comments on Draft RI/FS Report
Submission by Port of Draft Cleanup Action Plan	45 days from receipt by Port of Ecology comments on Final RI/FS Report
Submission by Port of Draft Final Cleanup Action Plan	30 days from receipt by Port of Ecology comments on Draft Cleanup Action Report

2.0 BACKGROUND INFORMATION

This section presents background information on the Site, including its history, current uses, existing property features, geology, and previous environmental investigations.

2.1 PROPERTY DESCRIPTION

The Site, located at 115 Q Avenue in Anacortes, Washington, is an active shipyard used for new vessel construction and repair. The property is bounded by Port of Anacortes Pier 1 to the west and Pier 2 to the east, 3rd street on the south, and the Guemes Channel to the north.

Features at the Site include: a pier (part of Pier 1), two outfitting docks (the "L Dock" and the "East Dock"), a dry dock, a marine railway (now defunct), a synchrolift, upland fabrication areas, shops, a sandblast grit storage shed, warehouses and storage areas. Approximate locations of Site features are shown in Figure 2. Vessel construction and maintenance activities at the Site include metal fabrication, abrasive blasting, painting, and pressure washing. Paved areas of the Site include portions of the property south of the synchrolift and main building complex and areas along Pier 1. The remainder of the site is not paved but in most areas is a hard surface that is maintained for fabrication layout and heavy equipment transit. The shipyard property is contained within a secured fence with guarded entrances.

2.1.1 Site Geology and Hydrology

Soil Geology

The Site is relatively flat with a ground surface elevation at approximately +15 feet Mean Lower Low Water (MLLW). Upland soils throughout the Site are generally characterized as fill material overlying native glacial soils. The fill consists primarily of silt, sand, and gravel. Previously completed subsurface explorations at the Site indicate that the fill varies from approximately 2.5 to 6.5 feet in thickness. Glacial deposits consisting of medium dense glaciomarine drift with varying amounts of silt, sand, and gravel over dense, glacially-compacted gravelly sands with siltier interbeds are present throughout the Site.

Subsurface soils observed in the central portion of the Site during the 2002 upland remediation activities (Landau Associates 2002) consisted of silty sand with scattered thin layers of clay, peat, and wood chips. Active utilities were encountered within the remedial excavation along with two abandoned fuel lines, one abandoned water line, and one abandoned unidentified utility line. Several vertical concrete footings (some with visible petroleum staining/contamination) and a horizontal concrete slab were also encountered in the petroleum area excavation at locations consistent with the historical location of above ground storage tanks (ASTs).

Soil observed in the eastern portion of the Site during the 2002 remediation excavation consisted primarily of fine to medium sand. Several wood pilings were encountered within this excavation area.

Soil observed in the southwestern portion of the site during the 2002 investigation consisted of alternating layers of sand with silt and clay, with a layer of wood debris and organic materials extending from approximately 7 feet below ground surface (bgs) to 11 feet bgs in some parts of this known fill area.

Sediment Geology

The elevation of the surface of sediments in the DCI basin ranges from approximately 10 feet MLLW to -35 feet MLLW. Sediment deposits overlie the native glacial deposits within the basin. The basin sediments are generally characterized as sandy silts. Areas of coarse-grained sediments (gravelly sands) are encountered in the nearshore areas and in the northern portion of the basin near the Guemes Channel. Sediment deposits within the basin range from approximately 4 to 5 feet in thickness. The underlying native material is comprised of hard silts and clays.

Groundwater

Groundwater elevations beneath the site are influenced by tidal fluctuations and seasonal variations in recharge. Tidal elevations range from about -3 to 9 feet MLLW with a mean tidal range of 2.6 to 7.4 feet MLLW. Depth to groundwater at the site ranges from approximately 4 to 12 feet bgs. Groundwater flow direction is to the north-northeast (based on Landau Associates groundwater elevation measurements on September 4, 2001) toward Guemes Channel.

2.2 SITE USE HISTORY

The Site has been used for bulk fuel storage, shipping, shipbuilding, ship repairs and other maritime-related industrial purposes since approximately 1879. A ferry dock, which was located near existing Pier 1, was also used at the Site in the early 1900s.

A bulk oil storage and distribution facility with several ASTs was located between the existing "L" Dock and the intersection of Q Avenue and 3rd Street on the upland portion of the Site between at least 1925 and 1969. This portion of the Site was leased to Standard Oil until around 1946 and then sold to the Dillingham Corporation in 1969. The ASTs had been removed from this area of the Site by the time the Port purchased this parcel in 1975.

The "1975 fill area," identified in the southwestern portion of the Site during the 2002 independent cleanup action investigation (Landau Associates 2002), was used for residential purposes from before 1925 until after approximately 1966 based on a review of historical Sanborn maps and aerial photographs. This area was originally about two feet below the surrounding ground surface in 1975 when DCI became a tenant on this parcel. Reportedly, this area was raised to the existing grade using dredged sediments from Guemes Channel. However, no documentation confirming the source of the fill material was identified. DCI began leasing portions of the property from the Port in 1976 and has continued to use the Site as a shipyard since that time.

Contaminated soil located around the uplands portion of the existing marine railway and in the vicinity of the former bulk storage AST locations was removed and treated offsite during the 2002 independent remedial action completed by the Port (Landau Associates 2002).

The DCI basin extends from the shoreline to the outer harbor line and currently contains multiple piers and docks (Figure 2). Two marine railways were located within the basin as shown on Figure 3. Neither of the historic marine railways is currently operational. One marine railway, located between the "L" Dock and the "East" Dock, was removed in the early 1990s. The second marine railway, located between the "East" Dock and Pier 2, still exists but has not been used since the early 1990s and is scheduled for removal with planned redevelopment activities.

The former Scott Paper Mill outfall historically discharged near the mouth of the basin as shown on Figure 3. The outfall was extended into the Guemes Channel in 1970 to take advantage of the dispersive effects and physical characteristics of the current in the channel. The reconstructed outfall extended 680 feet beyond the outer harbor line. Both municipal and Site storm drainage systems have also historically discharged to the basin. DCI's stormwater is discharged under an individual state NPDES industrial stormwater permit.

Known dredging within the basin includes removal of approximately 50,000 CY of sediment as part of the synchrolift construction (Figure 3). Sediment was dredged to a depth of -35 feet MLLW directly beneath the synchrolift and -15 feet MLLW in the area immediately east of the lift.

2.3 Future Site Use

The Port and DCI (tenant) are planning a redevelopment of both the upland and offshore areas of the Site to increase the capacity and efficiency of operations, improve stormwater facilities, and implement public access improvements at the current shipbuilding and repair facility. The redevelopment project, Project Pier 1, includes the installation of a new bulkhead and dredging to approximately -35 MLLW in the basin to allow for more efficient dock-side work and dry-docking within the basin. Clean structural fill will be placed in the area south (shoreward) of a planned bulkhead, the marine railway structures will be removed, and some of the existing upland buildings will be demolished in order to allow for more efficient use of the existing ship fabrication and repair area.

2.4 Previous Investigation of Site Soils

Previous investigations at the Site include the following:

- Excavation and confirmation sampling associated with underground storage tank (UST) removal (A-1 Pump, 1991);
- Phase 2 Environmental Site Assessment (Otten Engineering, 1997);
- Preliminary Site Assessment (Ecology & Environment for the U.S. Environmental Protection Agency, 2000);
- Excavation confirmation sampling for the removal of the marine railway hydraulic winch and associated soils (Landau Associates, 2001);
- EPA site inspection (Weston, 2001);
- VCP-RI/FS, Cleanup Action Plan (VCP-CAP)[1], and Independent Cleanup Action Completion Report (Landau Associates, 2002a, 2002b, and 2002c); and

[1] These reports were performed under Ecology's Voluntary Cleanup Program. The terms "RI/FS and "CAP" were used for purposes of the VCP, and appeared in the VCP documents, but are not to be confused with the remedial investigation, feasibility plan and draft cleanup action plan that are being developed pursuant to this Work Plan and the Agreed Order between the Port and Ecology dated December 2007. For clarity, the earlier documents will be referred to as the VCP-RI/FS and VCP-CAP.

- Groundwater investigation (Floyd Snider, 2006).

The pre-2002 investigations listed above are discussed briefly in this section and in greater detail in the VCP-RI/FS Report (Landau Associates, 2002b).

Soil cleanup levels used for the site cleanup and the rationale for cleanup level development are identified in the VCP-RI/FS (Landau Associates, 2002a). The VCP-RI/FS soil cleanup levels have been re-evaluated as part of this Work Plan and preliminary soil cleanup levels are summarized in Table 1. The soil data from previous investigation are compared to these preliminary cleanup levels and simplified terrestrial ecological evaluation (TEE) industrial soil concentrations in the following sections and in Tables 2 through 5.

2.4.1 UST Closure Report -1991, A-1 Pumping Service

Two USTs (one gasoline and one diesel) were removed from near the south end of "L" dock in 1991. Confirmation soil samples indicated gasoline-range petroleum hydrocarbons at a concentration of 166 milligrams per kilogram (mg/kg), which is greater than the preliminary soil cleanup level of 100 mg/kg. Benzene, ethylbenzene, toluene and total xylenes (BETX) were not detected in the confirmation samples and diesel-range petroleum hydrocarbons were detected in four confirmation samples at concentrations less than the preliminary soil cleanup level of 2,000 mg/kg. Soil analytical results for this investigation are summarized in Table 2.

2.4.2 Phase 2 Assessment – 1997, Otten Engineering

Soil at the site was characterized as part of a Phase 2 Environmental Assessment by Otten Engineering in 1997. Analyses of surface soil samples collected near the synchrolift, in the vicinity of the marine railways and in the 1975 earth fill area (as identified by Landau Associates, 2002) identified the following analytes that were detected at concentrations exceeding preliminary soil cleanup levels:

- Petroleum: gasoline-, diesel- and heavy oil-range petroleum hydrocarbons;
- Metals: arsenic, copper, lead, mercury, nickel, silver, and zinc,;
- Pesticides: endrin and endrin aldehyde;
- Total PCBs; and
- SVOCs: Bis(2-ethylhexyl)phthalate and 2-methylnaphthalene.

Arsenic, copper, lead, mercury, zinc, and diesel were detected at concentrations greater than their respective simplified TEE industrial soil concentrations.

Soil analytical results for this investigation are summarized in Table 2.

2.4.3 EPA Preliminary Assessment -2000

This study evaluated the beneficial water uses within a 4-mile radius of the site, surface water and groundwater migration pathways, soil exposure pathways and air migration pathways. No samples were collected as part of this assessment.

2.4.4 Marine Railway Hydraulic Winch Soil Excavation – 2001 Landau Associates

The marine railway hydraulic winch and its timber frame were removed from their former location southeast of the marine railway. Petroleum hydrocarbon impacted soil was excavated from around the winch and frame and disposed. Diesel- and heavy oil-range petroleum hydrocarbon concentrations in confirmation samples collected from the sidewalls of the excavation ranged from 6.6 mg/kg to 1,900 mg/kg. Soil analytical results for this investigation are summarized in Table 2.

2.4.5 EPA Site Inspection – 2001

Landau Associates and Weston (on behalf of the EPA) collected 20 surface and subsurface soil samples at the Site during the 2001 EPA site inspection. The soil samples collected by Landau Associates consisted of 5 split subsurface samples collected from near the marine railway and southwest of "L" dock. Metals, SVOCs, organotins and pesticides were detected in the samples. Landau Associates interpreted the metals concentrations to be generally representative of background conditions. However, copper, mercury, silver, and zinc were detected at concentrations greater than their respective preliminary soil cleanup levels. Concentrations of SVOCs, organotins and pesticides detected in these soil samples are less than preliminary soil cleanup levels. Soil analytical results for this investigation are summarized in Table 3.

2.4.6 VCP-RI/FS and Independent Cleanup Action – 2002 Landau Associates

Soil and groundwater at the site were characterized as part of the VCP-RI/FS and independent cleanup action completed by the Port in 2002 (Landau Associates, 2002b and 2002c). Soil analytical results for the RI/FS and the Independent Cleanup Action are summarized in Tables 4 and 5, respectively.

Remedial actions at the Site, completed as part of the RI/FS, included soil excavation and groundwater monitoring. The cleanup action was performed under Ecology's Voluntary Cleanup Program (VCP) but the cleanup action was never finalized under the Ecology program. The independent cleanup action focused on three distinct areas identified for remediation activities by the Site RI/FS (see Figures 3 through 5; Landau Associates 2002a). These areas are described below and shown in Figure 4.

- Petroleum Area: extending from the aluminum shop (building formerly identified as the equipment maintenance shed) to the former bulk fuel storage ASTs,
- Marine Railway Area: area near the existing marine railway structure which is no longer in use, and
- 1975 Earth Fill Area: area south of the machine shop and north of 3rd Street.

The RI/FS identified soil chemicals of concern at the three excavation areas as follows (see Table 4):

- Petroleum Area: arsenic, copper, mercury, nickel, zinc, gasoline-, diesel-, and oil-range petroleum hydrocarbons, cPAHs, and PCBs (total PCBs and aroclor 1262) were detected at concentrations greater than preliminary soil cleanup levels. Arsenic and zinc were also detected at concentrations greater than the simplified TEE industrial soil concentration in surface and subsurface soil samples in the Petroleum Area. Contaminated soils within the "petroleum area" were excavated during the Independent Cleanup Action and disposed of at a permitted upland facility.
- Marine Railway Area: arsenic, copper, mercury, nickel, zinc, gasoline- and diesel-range petroleum hydrocarbons were detected at concentrations greater than preliminary soil cleanup levels. Arsenic, copper, lead, mercury, and zinc were also detected in surface soil samples at concentrations greater than the simplified TEE industrial soil concentrations in the Marine Railway Area Contaminated soils at eight areas within the "marine railway area" were excavated during the Independent Cleanup Action, as shown on Figures 4 and 5. Two of the areas were identified in the RI/FS due to elevated arsenic concentrations, four areas were identified due to

detections of petroleum hydrocarbons, and two areas were identified due to elevated PAHs, arsenic and heavy oil- range petroleum hydrocarbons,

- 1975 Earth Fill Area: Arsenic, copper, mercury, nickel, zinc, cPAHs, and methylene chloride were detected in surface and near-surface soil at concentrations greater than preliminary soil cleanup levels. Arsenic, copper, lead, and zinc were also detected in surface and subsurface soil samples at concentrations greater than the simplified TEE industrial soil concentration in the Earth Fill Area.

Areas with soil concentrations greater than the cleanup levels identified in the VCP-RI/FS and VCP-CAP were excavated from the "petroleum area' and "marine railway area." Discrete confirmation samples collected from the excavation sidewalls verified that COCs were either less than analytical detection limits or were less than the preliminary soil cleanup levels identified for those constituents (see Table 5). Confirmation sample locations for the "marine railway area" and "petroleum area" are shown on Figures 5 and 5a, respectively. After the excavations were completed, clean soil was used to backfill the excavations to the original grade. No excavation or other cleanup action was conducted in the 1975 Earth Fill area during the independent cleanup action.

2.4.7 Summary of Soil Quality Conditions

Contaminants of concern identified in soil during historic investigations at the Site include gasoline-, diesel- and heavy oil-range petroleum hydrocarbons, cPAHs, metals (including arsenic, copper, mercury, nickel, silver, and zinc), pesticides (endrin), PCBs (aroclor 1262), methylene chloride, bis(2-ethylhexyl)phthalate, and 2-methylnaphthalene. Table 8 identifies analytes that were detected at concentrations greater than preliminary soil cleanup levels before and after the 2002 remedial excavation. Impacted areas identified near the marine railway and the former ASTs/USTs have been excavated during remedial actions completed in conjunction with historic site investigations, as described above and shown on Figure 5.

Following the remedial excavation, heavy oil-range petroleum hydrocarbons, cPAHs, metals (including arsenic, copper, mercury, nickel, silver, and zinc), and methylene chloride remain in soil at concentrations greater than the preliminary soil cleanup levels. With the exception of heavy oil-range petroleum hydrocarbons, the preliminary soil cleanup levels for these analytes are driven by groundwater protection. However, with the exception of arsenic, these analytes were not detected in groundwater at concentrations greater than preliminary groundwater cleanup levels and were not detected at concentrations greater than the MTCA Method C direct contact soil cleanup level. Therefore, the remaining contaminants of concern for soil are as follows:

- Heavy oil-range petroleum hydrocarbons: Preliminary soil cleanup level is based on accumulation of free product on groundwater. Free product has not been observed in site groundwater; however, a direct contact soil cleanup level for heavy oil-range petroleum hydrocarbons is not available.
- Arsenic: Arsenic has been detected at concentrations greater than the soil background level, the MTCA Method C soil cleanup level based on groundwater protection, and the preliminary groundwater cleanup level. Arsenic was detected at a concentration less than the MTCA Method C direct contact soil cleanup level.

Dioxins/furans have not been investigated in Site soils. Ecology has raised the concern that these contaminants may be present at the Site due to the reported filling of the "1975 fill area" with materials dredged from the Guemes Channel. Guemes Channel sediments may have been impacted by dioxin from the former Scott Paper Mill outfall and other sources which historically discharged into the channel.

Impacted areas and data gaps remaining in Site soils are discussed further in Section 2.8.

2.5 PREVIOUS INVESTIGATION OF SITE GROUNDWATER

Four groundwater monitoring wells were installed as part of the VCP-RI/FS and independent cleanup action. Three groundwater monitoring wells (MW-1 through MW-3) were installed along the shoreline and one well (MW-4) was installed at the south end of the site near 3rd Street, as shown on Figure 5. MW-4 was identified during the RI/FS as the upgradient monitoring well that is representative of upgradient groundwater conditions (Landau Associates, 2002). However, MW-4 is located in close proximity to the southern edge of the petroleum area remediation excavation. The groundwater in this well is likely influenced by the soil contaminants that were present within the petroleum area excavation and therefore, may not be representative of upgradient groundwater conditions at the Site.

Groundwater samples were collected from the four onsite groundwater monitoring wells during five separate monitoring events: in September and October 2001, in June and August 2002 and during a supplemental event on November 17, 2006. The groundwater elevation at the Site was measured at 0.1 feet MLLW during the September 2001 monitoring event, one hour after low tide. Groundwater flow direction was to the north-northeast based on groundwater measurements completed during the 2001 monitoring events (Landau Associates, 2002).

Groundwater cleanup levels used for the site cleanup, and the rationale for cleanup level development, are identified in the RI/FS (Landau Associates, 2002a). The RI/FS groundwater cleanup levels have been reevaluated as part of this Work Plan and preliminary groundwater cleanup levels are summarized in Table 6. The groundwater data from previous investigations are compared to these preliminary cleanup levels in the following sections and in Table 7.

2.5.1 VCP-RI/FS and Independent Cleanup Action – 2002 Landau Associates

Four rounds of groundwater samples were collected during the RI/FS. The following analytes (listed by well) were detected at concentrations greater than the preliminary groundwater cleanup levels:

- MW-1: Arsenic;
- MW-2: Diesel- and oil-range petroleum hydrocarbons;
- MW-3: Diesel-range petroleum hydrocarbons; and
- MW-4: Arsenic and diesel-range petroleum hydrocarbons.

2.5.2 Groundwater Sampling – 2006 Floyd Snider

Groundwater samples were collected from MW-1 through MW-4 on November 17, 2006 to evaluate the post-construction groundwater conditions at the site following the 2002 independent cleanup action. No analytes were detected at concentrations greater than preliminary groundwater cleanup levels in MW-1 through MW-3. Arsenic was detected in MW-4 at a concentration of 0.0116 milligrams per liter (mg/L), which slightly exceeds the preliminary groundwater cleanup level of 0.008 mg/L. TPH, which was the primary contaminant of concern for the 2002 independent cleanup action, was not detected in groundwater samples collected from the four Site monitoring wells.

2.5.3 Summary of Groundwater Quality Conditions

Contaminants of concern in groundwater at the Site identified during historic investigations include arsenic, diesel-range and oil-range petroleum hydrocarbons.

Arsenic was detected at concentrations ranging between 0.0001 and 0.017 mg/L in the groundwater samples collected from each well. The Washington State background level was used during the RI/FS as the arsenic screening level for groundwater. However, the Washington State arsenic background level concentration (0.008 mg/L (PTI 1989)) was only exceeded in samples collected from monitoring wells MW-1 (September 2001) and MW-4 (September and October 2001 and 2006). Arsenic concentrations were equal to or less than the Washington State background level in samples collected from MW-1 and MW-4 during the rest of the monitoring events and in the samples collected from MW-2 and MW-3 during all of the monitoring events.

Diesel- and oil-range petroleum hydrocarbons were detected in groundwater monitoring wells MW-2 through MW-4 during the first three groundwater monitoring events when the analyses did not include the silica gel/sulfuric acid cleanup step. Non-petroleum organic material that is present in a sample is removed from the sample when the silica gel/sulfuric acid cleanup step is used. Petroleum hydrocarbons were not detected during subsequent monitoring events in any of the groundwater samples that were analyzed using the silica gel/sulfuric acid cleanup step. The earlier detections of petroleum hydrocarbons in the groundwater samples collected from the site were attributed to non-petroleum organic material in the subsurface.

Gasoline-range petroleum hydrocarbons, SVOCs/PAHs, pesticides and herbicides were either not detected or were detected at concentrations less than the cleanup levels identified for the RI/FS.

Background groundwater conditions may not have been adequately characterized during the RI/FS because the monitoring well identified as upgradient, MW-4, may have been installed within the area of influence of the "petroleum area" and may not represent background conditions. Groundwater quality data gaps remaining on Site are discussed further in Section 2.8.

2.6 Previous Investigation of Basin Sediments

Several environmental investigations have been completed within the basin to assess sediment quality at the Site. Previous environmental sediment investigations at the Site are described in the following reports:

- Results of Sediment Chemistry Testing (Hart Crowser 1985)
- Phase 2 Environmental Assessment (Otten Engineering 1997)
- Dredge Material Characterization (Hart Crowser 2000)
- U.S. Environmental Protection Agency (EPA) Site Inspection (WESTON 2002).
- Sampling and Analysis Data Report, Supplemental Sediment Characterization, Dakota Creek Industries Shipyard Facility/Pier 1 Redevelopment Area, Anacortes, Washington (Anchor Environmental, LLC, 2004b)
- Sediment Sampling Data Report, Dakota Creek Industries Shipyard Facility (Floyd|Snider, 2007)

These investigations are summarized below. Table 9 and Table 10 provide a summary of COC concentrations greater than the Sediment Management Standards (SMS) Sediment Quality Standards (SQS) and analytical data from these investigations. Historic sediment sample locations are shown on Figure 6.

The six investigations listed above resulted in the collection of samples from 56 locations in or immediately adjacent to the DCI basin and the analysis of 43 sediment samples for a broad set of analytes including SMS metals, SVOCs, PAHs, VOCs, PCBs, pesticides, total organic carbon (TOC), total solids, and grain size. At select locations, samples were collected and analyzed for tributyltin (TBT, bulk and porewater) and dioxins/furans.

The 43 samples collected from within the basin consisted of:

- 32 discrete surface (0 to 10 cm and 10 to 20 cm) sediment samples;
- Seven composite subsurface samples ranging in depth from 0 to 5 feet below the surface of the sediments; and
- Four discrete subsurface samples (from 1 feet to 3 feet below the surface of the sediments).

The sediment sampling locations and summary of SMS criteria exceedances are shown on Figure 7.

2.6.1 Surface Sediment Quality Condition

Surface sediment samples (collected from depths ranging between 0 and 20 cm below the mudline) were collected from locations distributed throughout the basin as shown in Figure 6 and Figure 7.

Investigation of the surface sediments within the basin identified COCs exceeding the SMS criteria as follows:

- Metals were detected in surface sediment at concentrations that are greater than the SMS SQS criteria in two samples collected in 1997 and 2001(Otten Engineering 1997; Weston 2002) from locations near the marine railway. The metals detected at concentrations greater than the SQS criteria included arsenic, copper, mercury and zinc.
- SVOCs were detected at concentrations greater than the SQS criteria in three surface sediment samples; two located near the former marine railway and one located between the "East Dock" and the "L Dock." High molecular weight polycyclic aromatic hydrocarbons (HPAHs) were detected at concentrations greater than the SQS in sediment collected from all three of these sampling locations and low molecular weight polycyclic aromatic hydrocarbons (LPAHs) were detected at concentrations greater than the SQS in one location west of the "East" dock and one location near the marine railway. Bis(2-ethylhexyl)phthalate and dibenzofuran were detected at concentrations greater than SQS in one sediment sample collected from near the marine railway.

Each of the surface sediment samples collected during the 2007 investigation had at least one dioxin/furan congener detected at a concentration greater than the Fidalgo Bay and Padilla Bay reference samples. Comparision to reference areas were made since there are currently no SMS criteria for dioxins/furans. The most frequently detected congeners and those detected at the highest concentrations were HpCDD, HpCDF, OCDD, and OCDF. HpCDD and OCDD were also previously detected in the 2004 reference location samples.

2.6.2 Subsurface Sediment Quality Conditions

Subsurface sediment in the basin was characterized for the purpose of Dredge Material Management Program (DMMP) dredge material disposal characterization. The subsurface samples were collected during sediment investigations completed in 1985 (Hart Crowser), 2000 (Hart Crowser) and 2004 (Anchor Environmental).

For the purposes of the dredge material characterization study the basin was divided into two Dredge Material Management Units (DMMUs). One DMMU encompasses the outer half of the basin (near the mouth of the basin, identified as DMMU-1 [DCI-1 on Figures 6 through 8]) and the other DMMU encompasses the nearshore half of the basin (DMMU-2 [DCI-2 on Figures 6-8]). Subsurface sediment (collected from depths ranging between 0 and 5 feet below the mudline) were collected from locations distributed throughout the basin as shown on Figure 6 and composited into samples representative of the individual DMMUs. The subsurface sediment composite samples were analyzed for DMMP COCs which encompass the SMS parameters.

Investigation of the subsurface sediments within the basin identified COCs exceeding the SMS criteria as follows:

- Individual PAHs were detected in the DMMU-2 composite sample at concentrations greater than the SMS SQS but less than the CSL.
- Total HPAHs were detected in the DMMU-2 composite sample at concentrations greater than the SMS SQS but less than the CSL.

Based on a comparison of these contaminant concentrations against open water disposal criteria, sediments located in DMMU-2 above the contact with the hard glacially compacted sediments were determined to be unacceptable for open water disposal.

Dioxins/furans were detected within both of the Site DMMU subsurface composite samples at concentrations less then the Fidalgo Bay and Padilla Bay reference samples. The DMMP determined that the dioxin concentrations in the representative composite samples for both DMMUs are acceptable for open water disposal.

2.6.3 Summary of Sediment Quality Conditions

Areas of metals and SVOC contamination have been identified in the nearshore surface sediments within the basin. Subsurface sediment sampling and analysis indicate that the SVOC contamination in the nearshore area is not limited to the surface sediments.

Where data exists, the offshore sediments within the basin (as represented by DMMU-1) meet SMS criteria and have been deemed suitable for open water disposal by the DMMP.

No SMS criteria have been established for dioxins/furan compounds. Sediment testing within the basin has identified that the concentrations of dioxins/furans are below levels of concern for open water disposal of dredged material.

2.7 PREVIOUS INVESTIGATION OF SITE OUTFALLS AND CATCH BASINS

One sample was collected from the solids in an onsite stormwater catch basin during the 2001 EPA Site Investigation conducted by Weston. The data from this sample was not available at the time of this report.

2.8 DATA GAP ASSESSMENT

Based on evaluation of existing data, the following data gaps have been identified for completion of the Site RI/FS.

2.8.1 Upland Area Data Gaps

The primary upland data gaps are as follows:

- **Arsenic in soil and groundwater:** Soil samples obtained near MW-4 will be submitted for analysis of arsenic. The analytical results from these soil samples will help to assess whether soil in the vicinity of MW-4 may be the source of arsenic in groundwater at MW-4. Groundwater samples will also be collected from monitoring wells MW-1 through MW-3 and MW-5 for analysis of arsenic. If this data gap is not resolved based on the soil and groundwater samples proposed in this Work Plan, an additional upgradient monitoring well may be required to evaluate if the elevated arsenic concentrations in MW-4 groundwater are the result of arsenic from an upgradient source. This potential upgradient monitoring well would be installed south of MW-4, likely along Q Avenue.
- **TPH in groundwater in the Petroleum Area:** A new monitoring well (MW-5) will be installed in the Petroleum Area. The groundwater sample collected from MW-5 will be submitted to an accredited analytical laboratory for analysis of gasoline-, diesel-, and heavy oil-range petroleum hydrocarbons.
- **Heavy oil-range petroleum hydrocarbons in surface soil in the 1975 Earth Fill Area:** A site-specific MTCA Method C direct contact soil cleanup level will be calculated using historical data.
- **The potential presence of dioxins and furans in the 1975 Earth Fill Area:** Soil samples will be obtained in the 1975 Earth Fill Area and submitted to an accredited analytical laboratory for analysis of dioxins and furans.
- **The soil to groundwater exposure pathway:** The results from historical soil samples show that some analytes are present in soil at concentrations greater than their respective MTCA Method A or C soil to groundwater cleanup levels. However, with the exception of arsenic, these analytes are not present in groundwater at concentrations greater than the preliminary groundwater cleanup levels. Therefore, for these analytes, the soil to groundwater exposure pathway is not a pathway of concern. Rather, the soil direct contact is the primary exposure pathway of concern on the upland portion of the Site. The results of the RI groundwater sampling event will be used to evaluate the significance of the soil to groundwater exposure pathway.

  The following discussion describes the Site areas where analytes were detected in samples representing post-2002 remedial excavation conditions (see Figures 5 and 5a) at concentrations greater than the MTCA Method A or C soil to groundwater cleanup levels:

  - **TPH:** Heavy oil-range petroleum hydrocarbons were detected at two locations in the 1975 Earth Fill Area (see Figure 5b). The MTCA Method A soil cleanup level for heavy oil-range petroleum hydrocarbons is based on the accumulation of free product on groundwater. Gasoline-range petroleum hydrocarbons were detected at one location in the Earth Fill Area (see Figure 5b). The MTCA Method A soil cleanup level for gasoline-range petroleum hydrocarbons is based on protection of drinking water.
  - **Metals:** Arsenic, copper, mercury, nickel, silver, and zinc were detected at concentrations greater than the preliminary soil cleanup level based on protection of groundwater throughout the Site.
  - **cPAHs:** Benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, and benzo(a)pyrene were detected at elevated concentrations in one sample near the Petroleum Area (S-6-TPH at a depth of 0 to 1 foot) and three samples in the Earth Fill Area (S-3-EFA at a depth of 0 to 1 foot, S-4-EFA at a depth of 4 to 7 feet, and S-5-EFA at a depth of 0 to 1 foot).

- **Methylene chloride** was detected at elevated concentrations in two samples in the 1975 Earth Fill Area (S-3-EFA at depths of 0 to 1 foot and 1 to 4 feet).

- **Terrestrial ecological evaluation:** Arsenic, copper, lead, and zinc were detected at concentrations greater than their respective simplified TEE industrial soil concentrations at locations shown on Figure 5c. A simplified TEE will be conducted as part of the RI to evaluate whether TEE soil criteria need to be considered during the identification of site soil cleanup levels.

2.8.2 Basin Area Data Gaps

The primary basin area data gaps, as shown on Figure 8 and summarized in Table 11, are as follows:

- **Metals** in surface sediment in the nearshore portion of the basin that will remain after redevelopment dredging is completed. The vertical extent of metals contamination in these areas is unknown. Subsurface sediment samples will be obtained in these areas to more completely characterize the nature and extent of contamination.
- **SVOCs/PAHs** in surface and subsurface sediment in the nearshore portion of the basin that will remain in-place after redevelopment dredging is completed. The vertical extent of SVOC/PAHs contamination in these areas is unknown. Subsurface sediment samples will be obtained in these areas to more completely characterize the nature and extent of contamination.
- There are limited sediment areas located outside of the planned redevelopment dredging footprint that have not been characterized relative to the SMS, as shown on Figure 8. Surface and subsurface sediment samples will be obtained in these areas to more completely characterize the nature and extent of contamination.

2.8.3 Site Outfalls and Catch Basins

Currently, there are no available data on the quality of sediments in outfalls and catch basins discharging to the basin. Data will be obtained to evaluate potential sources of sediment contamination.

2.9 SITE CHEMICALS OF POTENTIAL CONCERN

Chemicals of potential concern (COPCs) at the Site for upland soil, groundwater and sediments include those associated with the historic and current uses of the site as summarized in the tables below.

Upland Soil and Groundwater COPCs

COPC	Rationale
Gasoline-range petroleum hydrocarbons	Historical bulk fuel storage; shipbuilding/shipyard activities
Diesel-range petroleum hydrocarbons	Historical bulk fuel storage; shipbuilding/shipyard activities
Methyl tertiary-butyl ether (MTBE)	Historical bulk fuel storage; shipbuilding/shipyard activities
Dibromoethane, 1-2 (EDB)/Dichloroethane, 1-2 (EDC)	Historical bulk fuel storage; shipbuilding/shipyard activities
SVOCs (including PAHs)	Historical bulk fuel storage; shipbuilding/shipyard activities
Metals	Historical bulk fuel storage; Waste oil storage; shipbuilding/shipyard activities
Dioxins/Furans	Historical filling of the upland with sediment potentially impacted by historical stormwater/wastewater outfall discharges

COPCs for DCI basin sediment include the SMS suite of COCs. These COCs specifically include the SMS parameters as shown in the table below.

Sediment COPCs

COPCs	Rationale
Metals	Waste oil storage, shipyard activities/shipbuilding and stormwater/wastewater outfall discharge
SVOCs/PAHs	Bulk fuel storage, shipyard activities/shipbuilding and stormwater/wastewater outfall discharge
Chlorinated benzenes	Bulk fuel storage, shipyard activities/shipbuilding and stormwater/wastewater outfall discharge
Phthalate esters	Bulk fuel storage, shipyard activities/shipbuilding and stormwater/wastewater outfall discharge
Miscellaneous extractables (dibenzofuran, hexachlorobutadiene, hexachloroethane, n-nitrosodiphenylamine)	Bulk fuel storage, shipyard activities/shipbuilding and stormwater/wastewater outfall discharge
PCBs	Waste oil storage, shipyard activities/shipbuilding and stormwater/wastewater outfall discharge
Ionizable organic compounds	Bulk fuel storage, shipyard activities/shipbuilding and stormwater/wastewater outfall discharge

Previous investigations at the Site focused on identifying the nature and extent of these COPCs. Further investigation of the Site will fill data gaps left by previous investigations.

3.0 REMEDIAL INVESTIGATION

The RI will evaluate new and existing soil, groundwater, and sediment quality data from the Site to delineate the nature and extent of contamination. Additional information will be collected, as needed, to complete the characterization of the Site for the purpose of developing and evaluating cleanup action alternatives, completing an interim action and selecting a cleanup action. Although cleanup levels will be developed for soil and groundwater as part of the FS (discussed further in Section 5.0), preliminary soil and groundwater cleanup levels are established during the RI to evaluate the nature and extent of contamination and to select analytical methods with reporting limits at or below the cleanup levels to the extent possible. The preliminary cleanup levels developed for this RI/FS have been compared with existing soil and groundwater data to determine where data gaps exist and where additional remedial actions are necessary. This section presents preliminary cleanup levels, the rationale for the preliminary cleanup levels, and the activities associated with each investigation.

3.1 PRELIMINARY CLEANUP LEVELS

In accordance with MTCA, the development of preliminary soil and groundwater cleanup levels includes identifying potential exposure pathways for human and environmental impacts based on the planned land use. The Site is zoned industrial – manufacturing/shipping, and as discussed previously in this report, the Site is currently used as a shipyard. The Port plans to continue use of the Site for shipbuilding.

3.1.1 Preliminary Groundwater Cleanup Levels

Groundwater at, or potentially affected by, the Site is not used for drinking water at this time and is not a reasonable future source of drinking water due the availability of a municipal water supply and, in accordance with WAC 173-340-720(2)(d), due to its proximity to marine surface water. The potential exposure pathways for Site groundwater include:

- Human ingestion of marine organisms contaminated by releases of affected Site groundwater to adjacent marine surface water
- Acute or chronic effects to aquatic organisms resulting from exposure to constituents in groundwater discharging to adjacent marine surface water.

Preliminary groundwater cleanup levels were selected from available state and federal surface water criteria according to WAC 173-340-730(3). The most conservative (lowest) published values were selected from the following regulatory criteria:

- Water Quality Standards for Surface Waters of the State of Washington (Chapter 173-201A)
- National Recommended Water Quality Criteria (Section 304 of the Clean Water Act)
- National Toxics Rule (40 CFR Part 131.36)
- MTCA Method B Surface Water Cleanup Levels (WAC 173-340-730[3][b][iii])

In addition to the criteria listed above, Washington State groundwater background concentrations for metals (PTI, 1989) and method reporting limits were considered. For each analyte, the lowest published regulatory criterion was identified as the preliminary groundwater cleanup level with the following exceptions:

- **Background:** If the lowest published regulatory criterion is less than the background concentration, the preliminary groundwater cleanup level was set at the background concentration.
- **Method Reporting Limit:** If the lowest published regulatory criterion is less than the method reporting limit, the preliminary groundwater cleanup level was set at the method reporting limit, unless the method reporting limit is less than the background concentration. In that case, the preliminary groundwater cleanup level was set at the background concentration.

Surface water criteria are not available for gasoline-, diesel, and oil-range petroleum hydrocarbons. Therefore, as recommended in WAC 173-340-730(3)(b)(iii)(C), the MTCA Method A groundwater cleanup levels for gasoline-, diesel, and oil-range petroleum hydrocarbons were used as the MTCA Method B surface water cleanup levels for these analytes.

3.1.2 Preliminary Soil Cleanup Levels

The Site is zoned industrial (manufacturing/shipping), is currently used as a shipyard, and the Port plans to continue use of the Site for shipbuilding. Therefore, MTCA Method A (Industrial Land Use) and MTCA Method C cleanup levels will be used as preliminary soil cleanup levels. During the FS, cleanup levels and/or risk-based remediation levels for specific land uses and associated institutional controls may be considered as a component of cleanup alternative development and evaluation.

The most conservative (lowest) published values were selected from the following regulatory criteria:

- MTCA Method A Industrial Soil Cleanup Levels [WAC 173-340-745[3])
- MTCA Method C Industrial Soil Cleanup Levels – Soil Direct Contact (WAC 173-340-745(5)(b)(iii)(B)

- MTCA Method C Industrial Soil Cleanup Levels – Groundwater Protection (WAC 173-340-745(5)(b)(iii)(A)

In addition to the criteria listed above, Washington State soil background concentrations for metals (Ecology, 1994) and method reporting limits were considered. For each analyte, the lowest published regulatory criterion was identified as the preliminary soil cleanup level with the following exceptions:

- Background: If the lowest regulatory criterion is less than the background concentration, the preliminary soil cleanup level was set at the background concentration.
- Method Reporting Limit: If the lowest regulatory criterion or background is less than the method reporting limit, the preliminary soil cleanup level was set at the method reporting limit, unless the method reporting limit is less than the background concentration. In that case, the preliminary soil cleanup level was set at the background concentration.

A simplified terrestrial ecological evaluation will likely be required for the site. The terrestrial ecological evaluation will follow the evaluation process outlined in WAC 173-340-7490. Based on the industrial nature of the Site and the lack of habitat, it is unlikely that the analytes detected in soil will pose an unacceptable risk to terrestrial ecological receptors. However, if the results of the TEE indicate that analytes detected in soil may pose an unacceptable risk to terrestrial ecological receptors, TEE cleanup levels will be considered will be considered in developing the preliminary soil cleanup levels for the site.

The preliminary soil cleanup level for benzo(a)pyrene will be used for the sum of cPAHs using toxicity equivalency factors (TEFs) in accordance with WAC 173-340-708(8)(e) and Ecology guidance (Ecology 2007).

3.1.3 Preliminary Sediment Cleanup Levels

The Sediment Quality Standard and Cleanup Screening Level criteria established under the SMS (WAC 173-204) will be used as the sediment cleanup levels for the Site. No cleanup levels have been established for dioxin.

3.2 SEDIMENT INVESTIGATION

The objective of the sediment investigation is to collect data necessary to address the sediment data gaps identified in Section 2.8 and to characterize the Site adequately for the purpose of developing and evaluating cleanup action alternatives in compliance with MTCA. These data will also be used to develop a remedial design to be implemented as an interim action. Sediment core samples will be the principal method used to explore the subsurface. Exploration methods are described in Appendix C. In addition to analytical testing, data will also be collected by field observation.

Samples will be analyzed for the following SMS COCs:

- Metals using EPA 6000/7000 series methodology;
- Ionizable and nonionizable organic compounds (including SVOCs/PAHs) using EPA Method 8270 SIM;
- PCBs using EPA 8082 methodology;
- Butyl Tins using Krone Method.

Samples will also be analyzed for conventional parameters including total organic carbon, total solids, total volatile solids, ammonia, total sulfides and grain size.

Analytical results will be compared to SMS criteria.

3.2.1 Existing Data Summary

Sediment data have been collected during six previous investigations. Sediments located in the waterward (north) half of the basin within the identified DMMU (Hart Crowser, 2000) and the native hard silt and clay deposits encountered approximately 4 to 5 feet below the sediment surface throughout the basin meet SMS criteria based on the results of sediment analyses. The sediments located above the contact with the native hard silts and clays in the nearshore portion of the basin have been shown to exceed SMS criteria. Immediately adjacent to the DMMU boundaries there are areas of the Site where sediments have not yet been characterized by chemical testing.

3.2.2 Data Objectives

Areas of sediment that will remain after redevelopment dredging is completed are located along the east, west and south (behind the planned bulkhead) shorelines of the basin as shown on Figure 8. The sediment investigation will be performed in these areas prior to the interim action in the basin. This investigation will enable focused dredging of impacted sediment throughout the basin. Specifically, additional sampling will be performed to:

- Delineate the vertical extent of sediment contamination in areas previously identified as exceeding SMS criteria.
- Evaluate sediment quality in areas of the basin where no data exists.

3.2.3 Proposed Sampling

The sediment in the areas described in section 3.2.2 will be characterized by collecting surface and subsurface sediment samples at seven locations. Subsurface samples will be collected at 1-foot depth intervals from the material overlying the native contact. Sediment sample core locations G-1 through G-7 are shown on Figure 8.

Sediment sampling for this investigation is summarized in Table 11a and described further in Appendix C.

3.3 SOURCE CONTROL INVESTIGATION

Ecology identified sediment in Site catch basins as a potential source of contaminants to the basin sediments.

3.3.1 Existing Data Summary

Currently, there are no available data on the quality of sediments in outfalls and catch basins discharging to the Basin.

3.3.2 Data Objectives

Sediment samples collected from catch basins that drain directly to the Basin will be analyzed for the SMS chemicals of concern and dioxins/furans to evaluate potential sources of sediment contamination. Catch basin sediments are assumed to be representative of the materials that discharge into the basins.

3.3.3 Proposed Sampling

Catch basin sediments will be collected and analyzed for the purposes of evaluating source control at the site. Sampling locations will be based on review of the existing drainage systems and inspection of accessible catch basins. In consultation with Ecology, catch basins that are determined to be representative of the potential source discharges to the Site, and contain adequate quantities of sediment, will be selected for sampling and analysis. Catch basin sediment sampling is described in more detail in the SAP, included as Appendix C of this report.

3.4 Soil Investigation

The objective of the soil investigation is to collect data necessary to address the soil data gaps identified in Section 2.8 and to characterize the Site adequately for the purpose of developing and evaluating cleanup action alternatives in compliance with MTCA. Sixteen soil borings will be installed by direct-push drilling methods. Exploration methods are described in Appendix B (SAP). Surface samples will also be collected at four locations east of the aluminum shop (as shown on Figure 5c). In addition to analytical testing, data will also be collected by field screening of soil samples for petroleum hydrocarbons.

Soil samples obtained during this study will be submitted to an Ecology-certified laboratory for analysis of the COCs. Table 8a outlines the analyte list and chemical analytical testing rationale. Soil samples obtained from the Site will be submitted for analysis of one or more of the following:

- Arsenic by SW-846 6010;
- PAHs by SW-846 8270-SIM;
- Gasoline and BETX by NWTPH-Gx;
- Diesel- and oil-range petroleum hydrocarbons by NWTPH-Dx with silica gel cleanup;
- Volatile petroleum hydrocarbons (VPHs) and extractable petroleum hydrocarbons (EPH) by WDOE-VPH and WDOE-EPH, respectively;
- Methyl tertiary-butyl ether (MTBE) by EPA Method 8260B;
- Dibromoethane, 1-2 (EDB)/dichloroethane, 1-2 (EDC) by EPA Method 8260B/8011;
- Dioxins and Furans using EPA Method 8290 or EPA Method 1613B (high resolution gas chromatographs/high resolution mass spectrometry [HRGC/HRMS]).

Analytical results for polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) will be presented in the RI report two different ways: as individual congeners and as toxicity equivalencies (TEQ). EPA's recommended TEQ approach will be used to evaluate potential effects associated with complex mixtures of chlorinated dioxins and furans. This approach is based on the use of toxicity equivalency factors (TEFs), which convert congener-specific concentrations into 2,3,7,8-TCDD equivalent concentrations (Ecology, 2007). This approach requires multiplying dioxin and furan congener results by their respective TEFs to obtain a total 2,3,7,8-TCDD equivalent concentration in each sample. TEQ values will be calculated for individual samples using only those congeners that are detected, as recommended by Ecology (2007). The total concentration for chemical groups that are expressed as the sum of individual compounds will be derived by adding the concentrations of only those individual compounds that are detected. The TEFs developed by the World Health Organization (WHO) in the June 1997 Stockholm meeting (updated in 2005), and as summarized in Van den Berg, et al. (1998), will be used to calculate TEQ concentrations.

3.4.1 Arsenic at MW-4

Existing Data Summary

As noted in Section 2.8, the source of arsenic in the groundwater at MW-4 is a data gap. Dissolved arsenic was detected in groundwater in September and October 2001 and June 2002 at concentrations greater than the preliminary groundwater cleanup level. Total arsenic was detected in groundwater in August 2002 and November 2006 at concentrations greater than the preliminary groundwater cleanup level. Soil samples were not collected during drilling of MW-4.

Data Objectives

- Soil samples will be collected in the vicinity of MW-4 to characterize arsenic soil concentrations in that area and to evaluate whether the arsenic in soil could be a source of the arsenic detected in groundwater in MW-4.
- Arsenic analytical results from the soil samples will be used to evaluate if arsenic is present at concentrations that could pose a risk to human health and the environment.

Proposed Sampling

Two soil borings will be completed using direct push drilling equipment in the vicinity of MW-4. SB-1 and SB-2 will be located approximately 10-feet east and 10-feet west of MW-4 as shown on Figures 5b and 5c. The borings will extend to a depth of approximately 10-feet. The depth to groundwater in MW-4 is expected to be between 3 feet and 6 feet below ground surface (bgs).

Soil samples will be collected continuously so that soil and groundwater conditions can be observed and to allow evaluation of the potential presence of petroleum hydrocarbon-related and volatile chemical-related contamination using visual, water sheen and headspace vapor field screening techniques. At least two soil samples from each boring (one from the vadose zone and one from below the water table) will be submitted for chemical analysis of arsenic (see Table 8a for details). Soil samples not submitted for chemical analysis will be stored at the laboratory so they can be analyzed at a later date if necessary.

3.4.2 Dioxin at the 1975 Earth Fill Area

Existing Data Summary

As noted previously, dioxins and furans have not been investigated in Site soils. Ecology has asked the Port to evaluate whether dioxins and furans are present at the Site as a result of the reported filling of the "1975 Earth Fill Area" with materials dredged from Guemes Channel. Guemes Channel sediments may have been impacted by the Scott Paper Mill outfall and other sources, which historically discharged into the channel.

Data Objectives

- Soil samples will be collected in the 1975 Earth Fill Area to characterize dioxin and furan soil concentrations.
- Dioxins/furans analytical results will be used to evaluate if dioxins and furans are present at concentrations that could pose a risk to human health and the environment in this area.

Proposed Sampling

Five soil borings will be completed in and adjacent to the 1975 Earth Fill Area using direct-push drilling equipment. Borings SB-3 through SB-7 will be completed at the locations shown on Figure 5b. Borings SB-4, and SB-5 and SB-7 will be completed within the Earth Fill Area, while borings SB-3 and SB-6 will be completed northeast and southwest of the Earth Fill Area, respectively. Samples from SB-4, SB-5 and SB-7 that are representative of the fill soil, and deeper samples that are representative of the underlying native soil, will be submitted for analysis of dioxins and furans. The purpose of borings SB-3 and SB-6 is to evaluate the lateral extent of the earth fill area based on soil conditions encountered during drilling. Samples from SB-3 and SB-6 will be stored at the laboratory, and will only be tested for dioxins and furans if there are exceedances in the samples obtained from SB-4, SB-5 and SB-7. The borings will extend to a depth of approximately 10 feet. According to the 2002 RI/FS report, fill thicknesses range between 1 and 10-feet across the Site. Fill was identified to depths of 1 to 2 feet in soil borings S-3-EFA, S-4-EFA, and S-5-EFA. In addition, wood debris was noted at a depth of 7 to 10 feet in soil boring S-3-EFA.

Soil samples will be collected continuously so that soil and groundwater conditions can be observed and to allow evaluation of the potential presence of hydrocarbon-related and volatile chemical-related contamination using visual, water sheen and headspace vapor field screening techniques. At least two soil samples from boring SB-4, SB-5 and SB-7 (one sample of fill, if present, and one sample of native material below the fill) will be submitted for chemical analysis of dioxins and furans and TPH-related constituents (see Table 8a for details). Soil samples not submitted for chemical analysis will be stored at the laboratory so that they can be analyzed at a later date if necessary.

3.4.3 Total Petroleum Hydrocarbons at MW-5

Existing Data Summary

Ecology has raised the concern that residual petroleum, if present in the Petroleum Area, could be an ongoing source of groundwater contamination. As noted previously, a remedial excavation was completed in the Petroleum Area in 2002. Confirmation samples collected following completion of the 2002 remedial excavation showed that TPH concentrations in soil were less than preliminary soil cleanup levels.

Data Objectives

- Collect soil samples to characterize TPH, PAHs, and BETX soil concentrations in the Petroleum Area.
- Results of the TPH, PAH, and BETX analyses will be used to evaluate if these COCs are present at concentrations that could pose a risk to human health and the environment.

Proposed Sampling

Monitoring well MW-5 will be installed in the Petroleum Area at the location shown on Figures 5b and 5c. The depth to groundwater at MW-5 is expected to be approximately 7 feet bgs. The two-inch diameter (per Ecology request) well will be completed with hollow-stem auger drilling equipment to a depth of approximately 12 feet bgs (or 5 feet below where groundwater is encountered during drilling).

Soil samples will be collected continuously from the MW-5 boring so that soil and groundwater conditions can be observed and to allow evaluation of the potential presence of hydrocarbon-related and volatile chemical-related contamination using visual, water sheen and headspace vapor field screening techniques. At least two soil samples from the boring will be submitted for chemical analysis of TPH-related constituents (see Table 8a for details). Soil samples not submitted for chemical analysis will be stored at the laboratory so that they can be analyzed at a later date if necessary.

3.4.4 Metals at Locations Exceeding Simplified TEE Soil Concentrations

Existing Data Summary

Metals (arsenic, copper, lead, and zinc) were detected in soil at concentrations greater than the MTCA simplified industrial Terrestrial Ecological Evaluation (TEE) soil concentrations at seven locations shown on Figure 5c.

Data Objectives

- Soil samples will be collected in the vicinity of previous sample locations DC-UPLD-SS-3, S-9-CPH-0, and DC-UPLD-SS-13A to characterize arsenic, copper, lead, and/or zinc soil concentrations in these areas.
- Soil samples will not be collected in the vicinity of previous sample locations DC-UPLD-SS-1A and DC-UPLD-SS-2A because these locations are covered with a thick concrete pad (apparently area has been covered since historical sampling event).
- Results of the arsenic, copper, lead, and zinc soil analyses will be used to evaluate if these metals are present at concentrations that could pose a risk to human health and the environment.

Proposed Sampling

Soil samples will be collected in the vicinity of DC-UPLD-SS-3, S-9-CPH-0, and DC-UPLD-SS-13A as follows:

- **DC-UPLD-SS-3:** Soil borings SB-8 through SB-11 will be completed in this area. SB-8 will be completed at the former location of DC-UPLD-SS-3 because subsurface samples were not collected at this location. Soil boring locations SB-9 through SB-11 will surround SB-8 and will be completed approximately 25 feet from SB-8. Soil samples obtained from these additional borings will be submitted for analysis of zinc.
- **S-9-CPH-0:** Subsurface samples were collected at this location and metals concentrations did not exceed the MTCA TEE soil cleanup levels. Therefore, only surface soil samples will be collected and analyzed in this area. SS-1 through SS-4 sample locations will surround the former S-9-CPH-0 sample location and will be completed approximately 25 feet from S-9-CPH-0. Soil samples obtained from these borings will be submitted for analysis of zinc.
- **DC-UPLD-13A.** Soil borings SB-12 through SB-15 will be completed in this area. SB-12 will be completed at the former location of DC-UPLD-13A because subsurface samples were not collected at this location. Soil boring locations SB-13 through SB-15 will surround SB-12 and will be completed approximately 25 feet from SB-12. Soil samples obtained from these additional borings will be submitted for analysis of arsenic, copper, and zinc.

Soil samples from the borings will be collected continuously so that soil and groundwater conditions can be observed and to allow evaluation of the potential presence of petroleum hydrocarbon-related and volatile chemical-related contamination using visual, water sheen and headspace vapor field screening techniques. At least two soil samples from each boring and one soil sample from each surface sampling location will be submitted for chemical analysis of arsenic, copper, lead, and/or zinc (see Table 8a for details). Soil samples not submitted for chemical analysis will be stored at the laboratory so that they can be analyzed at a later date if necessary.

3.5 GROUNDWATER INVESTIGATION

Groundwater samples will be obtained from the four existing monitoring wells (MW-1 through MW-4) and from the new monitoring well (MW-5) that will be installed during this RI. The groundwater samples will be collected using the methods described in Appendix B.

Groundwater samples collected from MW-1 through MW-5 will be submitted to an Ecology-certified laboratory for analysis of the following COCs (see Table 8a for details).

- Priority Pollutant Metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc) using EPA Methods 6020 and 7470;
- VOCs using EPA Method 8260;
- SVOCs using EPA Method 8270C;
- PAHs using EPA Method 8270-SIM;
- Diesel- and heavy oil-range petroleum hydrocarbons using Ecology Method NWTPH-Dx (with silica gel cleanup);
- Gasoline-range hydrocarbons using Ecology Method NWTPH-G;
- MTBE by EPA Method 8260B;
- EDB/EDC by EPA Method 8260B/8011;
- Organochlorine pesticides (including carbaryl) using EPA Method 8081; and
- Herbicides using EPA Method 8151.

Existing Data Summary

As noted previously, total arsenic in MW-4 was the only analyte detected at concentrations greater than preliminary groundwater cleanup levels in the November 2006 groundwater sampling event (Floyd/Snider 2006). New monitoring well MW-5 will be installed during the RI so that groundwater samples can be collected in the Petroleum Area. Groundwater samples have not been collected in the Petroleum Area during previous studies.

Data Objectives

- Samples will be collected to characterize groundwater adjacent to Guemes Channel (MW-1 through MW-3) and to evaluate whether analytes are present at concentrations greater than preliminary groundwater cleanup levels.
- Samples will be collected from new monitoring well MW-5 to characterize groundwater within the Petroleum Area.
- Samples will be collected from MW-4 to characterize groundwater and evaluate whether arsenic is present at a concentration greater than the preliminary groundwater cleanup level in this area.
- A tidal study will be completed to evaluate tidal influence on the shallow aquifer.
- Slug tests will be completed to estimate the hydraulic conductivity of the shallow aquifer.

Proposed Sampling and Data Collection

Monitoring well MW-5 will be installed within the boundary of the Petroleum Area and downgradient of MW-4 where arsenic was detected at concentrations exceeding MTCA cleanup levels during previous investigations. Groundwater samples will be collected from new well MW-5 and from the four existing wells at the Site. Groundwater depths will be measured, groundwater elevations will be calculated and groundwater flow direction will be estimated during each sampling event.

A 72-hour tidal study will be conducted to further evaluate tidal influence on groundwater at the Site. Data collection will include continuous (every 15 minutes) water level measurements using electronic data loggers and pressure transducers that will be installed in monitoring wells MW-1 through MW-5 and in the harbor. Manual water levels will also be collected to confirm results of the electronic data collection. Net groundwater flow direction determined from the tidal study will be used along with the groundwater chemical analytical results to more accurately define the nature and extent of potential COCs in groundwater at the Site. Slug tests will be conducted to estimate hydraulic conductivities of the shallow aquifer at the Site. Hydraulic conductivities can be used to estimate groundwater flow velocities.

Procedures for well installation, well development, water level monitoring, groundwater sample collection, slug tests, and the tidal study are provided in the SAP (Appendix B).

4.0 INTERIM ACTION

As described in the DCI Basin History and Sediment Quality sections of this report, the likely sources of COCs in the nearshore portion of the basin sediment were the historic bulk fuel and oil storage, shipyard activities on the upland and offshore portion of the Site and the outfall discharges to the Site The purpose of an interim action at the DCI Site is to remove contaminated sediment from the basin to reduce potential exposure to marine animals and the environment. The extent of contaminated sediment to be removed will be identified based on the sample results from previous investigations and the supplemental sediment investigation described in this report. Sediments in the basin with concentrations of COCs greater than the SMS criteria will be considered contaminated and will be dredged and disposed at an appropriate upland landfill facility.

As required by the Agreed Order, the interim action will integrate Site cleanup and habitat restoration objectives as determined appropriate by Ecology. Given the heavy industrial use of the site and the future configuration of the shipyard resulting from the redevelopment, opportunities for habitat restoration in the vicinity of the Site appear to be limited to the shoreline along O Avenue.

Because the interim action will involve removal, handling, and disposal of known contaminated materials to an upland facility, MTCA compliance monitoring requirements specified in WAC 173-340-410 will be considered appropriate for this interim action. MTCA compliance monitoring activities will include the following:

- Protection monitoring to confirm that human health and the environment are adequately protected during implementation of the interim action, as described in a health and safety plan
- Performance monitoring to confirm that the interim action has attained the cleanup standards established for the interim action and other performance standards (such as construction quality control monitoring necessary to demonstrate compliance with project permits)
- Performance monitoring to assess the effectiveness of the interim action subsequent to the completion of the interim action but prior to selection of the final remedy for the Site.

A compliance monitoring program for the interim action will be submitted for approval to Ecology and documented in an addendum to this work plan prior to conducting the interim action. However, in general, compliance monitoring will consist of collecting sediment samples at the base of the dredge cut to determine that sediment cleanup levels have been achieved

In accordance with MTCA, all cleanup actions conducted under MTCA will 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. A brief overview of potential ARARs for the interim action is provided in the bullets below; however, the primary ARAR is the MTCA cleanup regulation (Chapter 173-340 WAC), especially with respect to the development of cleanup levels and procedures for development and implementation of a cleanup under MTCA. The ARARs that may be applicable to the interim action include the following:

- Washington Water Pollution Control Act and the following implementing regulation: Water Quality Standards for Surface Waters (Chapter 173-201A WAC). These regulations establish water quality standards for surface waters of the State of Washington consistent with public health and the propagation and protection of fish, shellfish, and wildlife. These standards will be used to develop groundwater cleanup levels for the Site.
- Washington Hazardous Waste Management Act (Chapter 70.105 RCW) and the following implementing regulation: Dangerous Waste Regulations (Chapter 173-303 WAC). These regulations establish a comprehensive statewide framework for the planning, regulation, control, and management of dangerous waste. The regulation designates those solid wastes that are dangerous or extremely hazardous to the public health and environment. The management of excavated contaminated soil from the Site will be conducted in accordance with these regulations to the extent that any dangerous wastes are discovered or generated during the cleanup action.
- Washington Solid Waste Management Act (Chapter 70.95 RCW) and the following implementing regulations: Solid Waste Handling Standards (Chapter 173-350 WAC) and Criteria for Municipal Solid Waste Landfills (Chapter 173-351 WAC). These regulations establish a comprehensive statewide program for solid waste management, including proper handling and disposal. The management of excavated contaminated sediment (and soil, as necessary) from the Site will be conducted in accordance with these regulations to the extent that the sediment (soil) can be managed as inert or solid waste instead of dangerous waste.
- Shoreline Management Act (SMA; Chapter 90.58 RCW). The SMA establishes permitting and other requirements for substantial development occurring within waters of the U.S. or within 200 feet of a shoreline, and requires that the activities in coastal zones be consistent with local regulations. MTCA exempts cleanup projects being conducted under an enforceable order or consent decree from the requirement of obtaining the shoreline permit; however, the interim action must be conducted in accordance with the substantive requirements of the regulation.
- Hazardous Waste Operations (Chapter 296-843 WAC). This establishes safety requirements for workers providing investigation and cleanup operations at sites containing hazardous materials. These requirements would be applicable to onsite cleanup activities and would be addressed in a site health and safety plan prepared specifically for these activities.
- Washington Clean Air Act (WCAA, Chapter 70.94 RCW). The WCAA establishes permitting and other requirements for air emission controls.
- State Water Pollution Control Act (Chapter 90.48 RCW). This Act establishes permitting and other requirements for discharge to state surface waters. The procedural requirements of this chapter do not apply to any person conducting a remedial action at a facility pursuant to a consent decree, order, or agreed order issued pursuant to chapter 70.105D RCW. Ecology is required to ensure compliance with the substantive requirements of this chapter through the agreed order issued pursuant to chapter 70.105D RCW.

- Occupational Safety and Health Act (OSHA), 29 CFR Subpart 1910.120. OSHA establishes worker health and safety requirements for hazardous waste operations and emergency response.
- Washington State Industrial Safety and Health Act (WISHA). WISHA establishes standards governing workplace safety and health conditions in the State of Washington.
- National Toxics Rule (40 CFR Subpart 131.36). This Rule establishes federal water quality standards.
- Clean Water Act (CWA, 33 U.S.C 1251 et seq). The CWA establishes wastewater standards for industry and water quality standards for contaminants in surface waters.
- Sections 401 and 404 of the Clean Water Act – Water Quality Certification and Dredge and Fill requirements (USC 1340, 1344; 33 CFR Parts 320 through 330, and 40 CFR Parts 230 and 231) also state program under WAC 173-225.
- Section 10 of the Rivers and Harbors Appropriations Act (33 USC 403; 33 CFR Part 320 and 322)
- Federal Endangered Species Act (16 USC 1802 et seq., 50 CFR Part 600).
- Federal CZMA (16 USC 145 1 et seq., 33 CFR Part 325)
- Fishery Conservation and Management Act (Magnuson FCMA), 16 USC 1801 et seq.)
- Resource Conservation Recovery Act (RCRA), 42 USC 321 et seq.
- National Historic Preservation Act (NHPA) 16 USC 470 et seq.
- State Hydraulic Code 77.20 RCW; WAC 2210-110.
- City of Anacortes Engineering Standards. This establishes grading, filling, and other construction requirements.
- State Environmental Policy Act (SEPA). This policy requires consideration of likely environmental consequences of a proposed construction project.
- Sediment Management Standards (SMS, Chapter 173-204 WAC). The SMS establishes standards for the quality of surface sediments.

Prior to implementation of the interim action, an addendum to this work plan describing the specifics of the interim action will be prepared for Ecology review and approval. This addendum will identify the sustentative requirements of federal, state or local requirements as provided in RCW 70.105D.090. The addendum will also delineate the anticipated area and depth of the dredge material removal based on data obtained during the RI and previous investigations, dredging methods, methods of disposal for the contaminated sediment and other wastes generated during the interim action, and a compliance monitoring program.

5.0 FEASIBILITY STUDY

The RI/FS will develop cleanup levels for the Site and evaluate hazardous substances in soil, groundwater and sediments by comparing analytical results to appropriate cleanup levels. Site-specific soil and groundwater cleanup criteria will be developed and used in accordance with MTCA. Sediment quality data will be evaluated by comparing data with SMS criteria. If the RI data do not exceed cleanup levels, the FS will be limited to establishment of cleanup levels and points of compliance. If the RI data does exceed cleanup levels, then the FS will develop and evaluate cleanup action alternatives for contaminated media so that cleanup actions may be selected. The FS will:

- Develop cleanup levels and points of compliance and, as necessary, establish remediation levels.
- Delineate affected media where evaluation of remedial action is appropriate.
- Develop remedial action objectives.
- Screen and evaluate specific cleanup alternatives and recommend a preferred alternative.
- Identify opportunities for shoreline restoration.
- Be presented in a written report along with the results of the RI (the RI/FS report).

The following sections provide the details of the FS process that will be completed, if necessary, for the Site.

5.1 Establishment of Cleanup Levels, Points of Compliance, and Remediation Levels

Cleanup standards, including cleanup levels and points of compliance, will be developed for soil and groundwater in accordance with MTCA requirements. Cleanup standards and cleanup levels for sediments at the Site will be in accordance with Ecology's SMS program. Exposure pathways and receptors will be identified as part of cleanup level development. As needed, remediation levels may also be established for specific cleanup alternatives.

Cleanup levels for soil will be protective of human health, terrestrial ecological receptors, groundwater, and sediment based on current and likely future uses of the property. The point of compliance for soil will also be established.

Cleanup levels for groundwater will be based on protection of marine surface water and sediment. Groundwater at or potentially affected by the property is not a current or reasonable future source of drinking water. It is expected that information developed during the RI will be used to demonstrate that groundwater at the property meets the requirements of WAC 173-340-720 for non-potable groundwater. A groundwater point of compliance will be developed. The point of compliance is likely to be conditional, located at or near the groundwater/surface water interface.

SMS sediment standards are based on the protection of biological resources from the potentially adverse effects of existing sediment conditions and the condition of the newly exposed sediment surface after redevelopment dredging is completed. The sediment point of compliance will be the (0 to 10 cm) sediment surface that is exposed after Interim Action and redevelopment dredging is completed.

5.2 Delineation of Media Requiring Remedial Action

The RI process will determine if soil, sediment, and groundwater sample 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 extent or volume of soil, sediment, or groundwater that requires remedial action.

5.3 Development of Remedial Action Objectives

Remedial action objectives (RAOs) that define the goals of the cleanup that must be achieved to adequately protect human health and the environment will be developed for each medium and area identified as requiring remedial action. These 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 developed 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.

5.4 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 applicable or relevant and appropriate requirements (ARARs). The primary ARARs will likely be the MTCA cleanup levels and regulations that address implementation of a cleanup under MTCA and Sediment Management Standards (SMS, Chapter 173-204 WAC). Other potential ARARs may include the following:

- 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;
- The federal Clean Water Act and the surface water quality criteria promulgated there under;
- Washington's Shoreline Management Act with respect to construction activities conducted near the shoreline during the cleanup action.

The FS will identify ARARs for the Site cleanup.

5.5 SCREENING OF CLEANUP ALTERNATIVES

Cleanup alternatives will be developed for each medium of concern. Initially, general remediation technologies will be identified for the purpose of meeting RAOs for each medium. General remediation technologies consist of specific remedial action technologies and process options. General remediation technologies will be considered and evaluated based on the media type and the properties of any contaminant(s) and may include institutional controls, containment or other engineering controls, removal, *in situ* treatment, and natural attenuation.

Specific remedial action technologies are the engineering components of a general remediation technology. Examples include horizontal barriers, groundwater extraction, groundwater treatment, *in situ* oxidation, *in situ* bioremediation, and capping. Process options are those specific processes within each specific technology. For example, groundwater treatment technology could include process options such as air stripping, activated carbon, and UV/chemical oxidation. Several specific technologies may be identified for each general remediation technology and multiple process options may exist within each specific technology.

Specific remedial action technologies and representative process options will be selected for evaluation based on documented development or documented successful use for the particular medium and COPCs. Cleanup alternatives will be developed from the general and specific remedial technologies and process options consistent with Ecology expectations identified in WAC 173-340-370 using best professional judgment and guidance documents as appropriate [e.g., WAC 173-340-350 (Remedial Investigations/Feasibility Study)].

During the development of cleanup alternatives, both the current and planned future land use will be considered. For example, where property is already developed for industrial use, containment alternatives may be given preferential consideration over soil cleanup alternatives that would be more disruptive to Site use.

The development of remediation alternatives will also include a review of habitat restoration opportunities that could be carried out in conjunction with each remediation option, in compliance with requirements of the Agreed Order related to habitat restoration objectives.

5.6 Evaluation of Cleanup Alternatives

MTCA requires that cleanup 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.

6.0 PUBLIC PARTICIPATION

Under the terms of the Agreed Order, a Public Participation Plan (PPP; presented in Appendix A) was prepared for the project that summarizes the RI/FS activities and potential Interim Action to be conducted at the DCI Site. The PPP will be provided to the public to present the opportunity for the public to learn about and provide input on the potential Interim Action, remedial investigation, and remedial alternatives as required under MTCA (WAC) 173-340-600.

7.0 SCHEDULE AND REPORTING

The Agreed Order establishes the RI/FS schedule and reporting requirements, which are summarized in this section. Following completion of all field activities and receipt of the analytical data, a RI/FS report will be prepared and submitted to Ecology. All sampling data will be submitted to Ecology in both printed and electronic formats in accordance with Ecology's Toxics Cleanup Program Policy 840.

If an interim action is planned, a work plan supplement for this action will be prepared in accordance with WAC 173-340-430(7) and submitted to Ecology for approval. Following completion of the interim action, a report will be prepared in accordance with WAC 173-340-515(4).

8.0 REFERENCES

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TABLE 1

PRELIMINARY SOIL CLEANUP LEVELS

RI/FS WORK PLAN

DAKOTA CREEK SITE

		Soil Criteria						Analytical Laboratory Criteria[6]		Preliminary Soil Cleanup Level[7]	
				MTCA Method C Industrial Land Use[3]							
Analytes	Units	Washington State Background[1]	MTCA Method A Industrial Land Use[2]	Carcinogen	Noncarcinogen	MTCA Method C Protection of Surface Water[4]	Simplified TEE Industrial Soil Concentration[5]	Reporting Limits	Analytical Method	Unsauturated	Source
Total Petroleum Hydrocarbons											
Gasoline-Range	mg/kg	--	30/100	--	--	--	1.2E+04	5.0E+00	NW-TPH-Gx	30/100	2
Diesel-Range	mg/kg	--	2,000	--	--	--	1.5E+04	5.0E+00	NW-TPH-Dx	2,000	2
Oil-Range	mg/kg	--	2,000	--	--	--	--	1.0E+01	NW-TPH-Dx	2,000	2
Mineral Oil	mg/kg	--	4,000	--	--	--	--	1.0E+01	NW-TPH-Dx	4,000	2
Metals											
Arsenic	mg/kg	7.0E+00	2.0E+01	8.8E+01	1.1E+03	5.7E-02	2.0E+01	5.0E+00	6010B ICP	7.0E+00	1
Barium	mg/kg	--	--	--	7.0E+05	--	1.3E+03	3.0E-01	6010B ICP	7.0E+05	3
Cadmium	mg/kg	1.0E+00	2.0E+00	--	3.5E+03	1.2E+00	3.6E+01	2.0E-01	6010B ICP	1.2E+00	4
Chromium	mg/kg	4.8E+01	2.0E+03	--	5.3E+06	4.8E+06	1.4E+02	5.0E-01	6010B ICP	2.0E+03	2
Copper	mg/kg	3.6E+01	--	--	1.3E+05	1.4E+00	5.5E+02	2.0E-01	6010B ICP	3.6E+01	1
Lead	mg/kg	2.4E+01	1.0E+03	--	--	1.6E+03	2.2E+02	2.0E+00	6010B ICP	1.0E+03	2
Mercury	mg/kg	7.0E-02	2.0E+00	--	1.1E+03	2.6E-02	9.0E+00	5.0E-02	7471A GFAA & CVAA	7.2E-02	1
Nickel	mg/kg	4.8E+01	--	--	7.0E+04	1.1E+01	1.9E+03	1.0E+00	6010B ICP	4.8E+01	1
Selenium	mg/kg	--	--	--	1.8E+04	7.4E+00	8.0E-01	5.0E+00	6010B ICP	7.4E+00	4
Silver	mg/kg	--	--	--	1.8E+04	3.2E-01	--	3.0E-01	6010B ICP	3.2E-01	4
Zinc	mg/kg	8.5E+01	--	--	1.1E+06	1.0E+02	5.7E+02	1.0E+00	6010B ICP	1.0E+02	4
Volatile Organic Compounds											
Benzene	mg/kg	--	3.0E-02	2.4E+03	1.4E+04	1.3E-01	--	1.0E-03	EPA 8260B	3.0E-02	2
Ethylbenzene	mg/kg	--	6.0E+00	--	3.5E+05	2.1E+01	--	1.0E-03	EPA 8260B	6.0E+00	2
Toluene	mg/kg	--	7.0E+00	--	2.8E+05	1.1E+02	--	1.0E-03	EPA 8260B	7.0E+00	2
Xylene	mg/kg	--	9.0E+00	--	7.0E+05	--	--	1.0E-03	EPA 8260B	9.0E+00	2
1,2,4-Trimethylbenzene	mg/kg	--	--	--	1.8E+05	--	--	1.0E-03	EPA 8260B	1.8E+05	3
1,2-Dichlorobenzene	mg/kg	--	--	--	3.2E+05	1.5E+01	--	1.0E-03	EPA 8260B	1.5E+01	4
1,3,5-Trimethylbenzene	mg/kg	--	--	--	1.8E+05	--	--	1.0E-03	EPA 8260B	1.8E+05	3
1,4-Dichlorobenzene	mg/kg	--	--	5.5E+03	--	8.1E-02	--	1.0E-03	EPA 8260B	8.1E-02	4
2-Butanone	mg/kg	--	--	--	2.1E+05	--	--	5.0E-03	EPA 8260B	2.1E+05	3
4-Isopropyltoluene	mg/kg	--	--	--	--	--	--	1.0E-03	EPA 8260B	--	--
Acetone	mg/kg	--	--	--	3.5E+05	--	--	1.0E-03	EPA 8260B	3.5E+05	3
Carbon disulfide	mg/kg	--	--	--	3.5E+05	--	--	1.0E-03	EPA 8260B	3.5E+05	3
Isopropylbenzene	mg/kg	--	--	--	3.5E+05	--	--	1.0E-03	EPA 8260B	3.5E+05	3
Methylene chloride	mg/kg	--	2.0E-02	1.8E+04	2.1E+05	2.6E+00	--	2.0E-03	EPA 8260B	2.0E-02	2
n-Butylbenzene	mg/kg	--	--	--	--	--	--	1.0E-03	EPA 8260B	--	--
n-Propylbenzene	mg/kg	--	--	--	--	--	--	1.0E-03	EPA 8260B	--	--
sec-Butylbenzene	mg/kg	--	--	--	--	--	--	1.0E-03	EPA 8260B	--	--
Semivolatile Organic Compounds											
Dibenzofuran	mg/kg	--	--	--	7.0E+03	--	--	6.7E-02	EPA 8270	7.0E+03	3
Carbazole	mg/kg	--	--	6.6E+03	--	--	--	6.7E-02	EPA 8270	6.6E+03	3
Di-n-butylphthalate	mg/kg	--	--	--	3.5E+05	1.0E+02	--	6.7E-02	EPA 8270	1.0E+02	4
Bis(2-ethylhexyl)phthalate	mg/kg	--	--	9.4E+03	7.0E+04	4.8E+00	--	6.7E-02	EPA 8270	4.8E+00	4
Phenol	mg/kg	--	--	--	2.1E+06	5.0E+03	--	6.7E-02	EPA 8270	5.0E+03	4
4-Chloro-3-methylphenol	mg/kg	--	--	--	--	--	--	3.3E-01	EPA 8270	--	--
Butylbenzyphthalate	mg/kg	--	--	--	2.1E+06	3.7E+02	--	6.7E-02	EPA 8270	3.7E+02	4

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		Washington State Background[1]	MTCA Method A Industrial Land Use[2]	Carcinogen	Noncarcinogen	MTCA Method C Protection of Surface Water[4]	Simplified TEE Industrial Soil Concentration[5]	Reporting Limits	Analytical Method	Unsauturated	Source
Polycyclic Aromatic Hydrocarbons											
1-Methylnaphthalene	mg/kg	--	5.0E+00	--	1.1E+03	--	--	5.0E-03	EPA 8270D SIM	5.0E+00	2
2-Methylnaphthalene	mg/kg	--	5.0E+00	--	1.4E+04	--	--	5.0E-03	EPA 8270D SIM	5.0E+00	2
Acenaphthene	mg/kg	--	--	--	2.1E+05	6.5E+01	--	5.0E-03	EPA 8270D SIM	6.5E+01	4
Acenaphthylene	mg/kg	--	--	--	--	--	--	5.0E-03	EPA 8270D SIM	--	--
Anthracene	mg/kg	--	--	--	1.1E+06	1.2E+04	--	5.0E-03	EPA 8270D SIM	1.2E+04	4
Benzo(a)anthracene	mg/kg	--	--	1.8E+01	--	1.3E-01	--	5.0E-03	EPA 8270D SIM	1.3E-01	4
Benzo(a)pyrene	mg/kg	--	2.0E+00	1.8E+01	--	3.5E-01	3.0E+02	5.0E-03	EPA 8270D SIM	3.5E-01	4
Benzo(b)fluoranthene	mg/kg	--	--	1.8E+01	--	4.3E-01	--	5.0E-03	EPA 8270D SIM	4.3E-01	4
Benzo(g,h,i)perylene	mg/kg	--	--	--	--	--	--	5.0E-03	EPA 8270D SIM	--	--
Benzo(k)fluoranthene	mg/kg	--	--	1.8E+01	--	4.3E-01	--	5.0E-03	EPA 8270D SIM	4.3E-01	4
Chrysene	mg/kg	--	--	1.8E+01	--	1.4E-01	--	5.0E-03	EPA 8270D SIM	1.4E-01	4
Polycyclic Aromatic Hydrocarbons (continued)											
Dibenz(a,h)anthracene	mg/kg	--	--	1.8E+01	--	6.5E-01	--	5.0E-03	EPA 8270D SIM	6.5E-01	4
Fluoranthene	mg/kg	--	--	--	1.4E+05	8.9E+01	--	5.0E-03	EPA 8270D SIM	8.9E+01	4
Fluorene	mg/kg	--	--	--	1.4E+05	5.5E+02	--	5.0E-03	EPA 8270D SIM	5.5E+02	4
Indeno(1,2,3-cd)pyrene	mg/kg	--	--	1.8E+01	--	1.3E+00	--	5.0E-03	EPA 8270D SIM	1.3E+00	4
Naphthalene	mg/kg	--	5.0E+00	--	7.0E+04	1.4E+02	--	5.0E-03	EPA 8270D SIM	5.0E+00	2
Phenanthrene	mg/kg	--	--	--	--	--	--	5.0E-03	EPA 8270D SIM	--	--
Pyrene	mg/kg	--	--	--	1.1E+05	3.5E+03	--	5.0E-03	EPA 8270D SIM	3.5E+03	4
Pesticides											
alpha-BHC	mg/kg	--	--	2.1E+01	--	2.0E-03	1.0E+01	1.7E-03	EPA 8081	2.0E-03	4
beta-BHC	mg/kg	--	--	3.0E+00	--	2.0E-03	1.0E+01	1.7E-03	EPA 8081	2.0E-03	4
delta-BHC	mg/kg	--	--	--	--	--	1.0E+01	1.7E-03	EPA 8081	-	-
gamma-BHC (Lindane)	mg/kg	--	1.0E-02	1.0E+02	1.1E+03	1.6E-03	1.0E+01	1.7E-03	EPA 8081	1.7E-03	5
Heptachlor	mg/kg	--	--	2.9E+01	1.8E+03	9.7E-03	6.0E-01	1.7E-03	EPA 8081	9.7E-03	4
Aldrin	mg/kg	--	--	7.7E+00	1.1E+02	4.9E-02	1.7E-01	1.7E-03	EPA 8081	4.9E-02	4
Heptachlor Epoxide	mg/kg	--	--	1.4E+01	4.6E+01	8.3E-02	6.0E-01	1.7E-03	EPA 8081	8.3E-02	4
Endosulfan I	mg/kg	--	--	--	2.1E+04	2.2E-03	--	1.7E-03	EPA 8081	2.2E-03	4
Dieldrin	mg/kg	--	--	8.2E+00	1.8E+02	2.6E-02	1.7E-01	3.3E-03	EPA 8081	2.6E-02	4
4,4'-DDE	mg/kg	--	--	3.9E+02	--	8.6E-02	1.0E+00	3.3E-03	EPA 8081	8.6E-02	4
Endrin	mg/kg	--	--	--	1.1E+03	1.1E-02	4.0E-01	3.3E-03	EPA 8081	1.1E-02	4
Endosulfan II	mg/kg	--	--	--	2.1E+04	2.2E-03	--	3.3E-03	EPA 8081	3.3E-03	5
4,4'-DDD	mg/kg	--	--	5.5E+02	--	4.6E-02	1.0E+00	3.3E-03	EPA 8081	4.6E-02	4
Endosulfan Sulfate	mg/kg	--	--	--	2.1E+04	2.2E-03	--	3.3E-03	EPA 8081	3.3E-03	5
4,4'-DDT	mg/kg	--	4.0E+00	3.9E+02	1.8E+03	6.8E-01	1.0E+00	3.3E-03	EPA 8081	6.8E-01	4
Methoxychlor	mg/kg	--	--	--	1.8E+04	8.0E-02	--	1.7E-02	EPA 8081	8.0E-02	4
Endrin Ketone	mg/kg	--	--	--	1.1E+03	1.1E-02	--	3.3E-03	EPA 8081	1.1E-02	4
Endrin Aldehyde	mg/kg	--	--	--	1.1E+03	1.1E-02	--	3.3E-03	EPA 8081	1.1E-02	4
gamma Chlordane	mg/kg	--	--	3.8E+02	1.8E+03	5.1E-02	7.0E+00	1.7E-03	EPA 8081	5.1E-02	4
alpha Chlordane	mg/kg	--	--	3.8E+02	1.8E+03	5.1E-02	7.0E+00	1.7E-03	EPA 8081	5.1E-02	4
Toxaphene	mg/kg	--	--	1.2E+02	--	9.6E+00	--	1.7E-01	EPA 8081	9.6E+00	4

TABLE 1

PRELIMINARY SOIL CLEANUP LEVELS

RI/FS WORK PLAN

DAKOTA CREEK SITE

Analytes	Units	Soil Criteria: Washington State Background[1]	Soil Criteria: MTCA Method A Industrial Land Use[2]	Soil Criteria: MTCA Method C Industrial Land Use[3]: Carcinogen	Soil Criteria: MTCA Method C Industrial Land Use[3]: Noncarcinogen	Soil Criteria: MTCA Method C Protection of Surface Water[4]	Soil Criteria: Simplified TEE Industrial Soil Concentration[5]	Analytical Laboratory Criteria[6]: Reporting Limits	Analytical Laboratory Criteria[6]: Analytical Method	Preliminary Soil Cleanup Level[7]: Unsaturated	Preliminary Soil Cleanup Level[7]: Source
Polychlorinated Biphenyls											
Aroclor 1016	mg/kg	--	--	--	2.5E+02	1.4E-04	2.0E+00	4.0E-03	8082 Low Level	4.0E-03	5
Aroclor 1221	mg/kg	--	--	--	--	1.3E-05	2.0E+00	4.0E-03	8082 Low Level	4.0E-03	5
Aroclor 1232	mg/kg	--	--	--	--	1.3E-05	2.0E+00	4.0E-03	8082 Low Level	4.0E-03	5
Aroclor 1242	mg/kg	--	--	--	--	5.8E-05	2.0E+00	4.0E-03	8082 Low Level	4.0E-03	5
Aroclor 1248	mg/kg	--	--	--	--	5.6E-05	2.0E+00	4.0E-03	8082 Low Level	4.0E-03	5
Aroclor 1254	mg/kg	--	--	--	7.0E+01	9.7E-05	2.0E+00	4.0E-03	8082 Low Level	4.0E-03	5
Aroclor 1260	mg/kg	--	--	--	--	1.0E-03	2.0E+00	4.0E-03	8082 Low Level	4.0E-03	5
Total PCBs	mg/kg	--	10 (capped soil); 1 (non-capped soil)	6.6E+01	--	4.0E-04	2.0E+00	4.0E-03	8082 Low Level	4.0E-03	5
Dioxins and Furans											
2,3,7,8-TCDD	mg/kg	--	--	8.8E-04	--	1.5E-08	5.0E-06	5.0E-07	1613/8290	5.0E-07	5
2,3,7,8-TCDF	mg/kg	--	--	8.8E-04	--	8.3E-09	--	5.0E-07	1613/8290	5.0E-07	5
-Penta, Hexa, Hepta	mg/kg	--	--	--	--	--	--	2.0E-06	1613/8290	2.0E-06	5
-Octa	mg/kg	--	--	--	--	--	--	5.0E-06	1613/8290	5.0E-06	5

Notes:

[1] Natural Background Soil Metals Concentrations in Washington State, Puget Sound Region. October 1994.

[2] MTCA Method A Soil Cleanup Levels [WAC 173-340-745(3) and Chapter 173-340 WAC Table 745-1].

[3] MTCA Method C Industrial Soil Cleanup Levels; Direct Contact ([WAC 173-340-745(5)(b)(iii)(B)].

[4] Chapter 173-340 WAC; Table 749-2 (Simplified Terrestrial Ecological Evaluation: Industrial or Commercial Site)

[5] MTCA Method C Industrial Soil Cleanup Levels; Groundwater Protection ([WAC 173-340-745(5)(b)(iii)(A)]. Based on unsaturated soil.

[6] Reporting limits (TPH, metals, PAHs, and PCBs) and minimum levels (TCDD) for ARI and Frontier Analytical, respectively.

[7] Preliminary Soil Cleanup Level is the lowest soil criteria as indicated by shading; adjusted based on Washington State background. Additional adjustments were made based on reporting limits or minimum levels per WAC 173-340-720(7)(c). Simplified TEE soil concentrations were not considered in the identification of the Preliminary Soil Cleanup Level due to the nature of the site. However, the TEE criteria were used to identify data gaps and will be used to identify site cleanup levels if required based on the simplified terrestrial ecological evaluation to be conducted as part of the RI.

Shading indacates values was selected as the Applicable Soil Cleanup Level.

-- Cleanup levels not developed for constituent.

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TABLE 2
HISTORICAL SOIL ANALYTICAL RESULTS (PRE-2002 RI SAMPLES)
RI/FS WORK PLAN
DAKOTA CREEK SITE

Analytes	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[2]	A-1 Pump 1991 North Wall #2 10/2/91	A-1 Pump 1991 South Wall #4 10/2/91	A-1 Pump 1991 East Wall #8 10/2/91	A-1 Pump 1991 North Wall #7 10/2/91	A-1 Pump 1991 West Wall #6 10/2/91
Total Petroleum Hydrocarbons (mg/kg)							
Method Silica gel/Acid Cleaned NWTPH-Dx							
Diesel Range Petroleum Hydrocarbons	2000	15,000	NA	NA	NA	NA	NA
Heavy Oil Range Petroleum Hydrocarbons	2000	--	NA	NA	NA	NA	NA
TPH/BTEX (mg/kg)							
Method SW8413/8021/8015 modified							
TPH-G	100	12,000	166	59	--	10 U	--
TPH-D	2000	15,000	--	--	36	10 U	136
Benzene	0.03	--	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
Toluene	7.0	--	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
Ethylbenzene	6.0	--	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
Xylenes (Total)	9.0	--	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
Total Petroleum Hydrocarbons (mg/kg)							
Method NWTPH-Dx and NWTPH-G							
DIesel Range Petroleum Hydrocarbons	2000	15,000	NA	NA	NA	NA	NA
Heavy Oil Range Petroleum Hydrocarbons	2000	--	NA	NA	NA	NA	NA
Gasoline Range Petroleum Hydrocarbons	100	12,000	NA	NA	NA	NA	NA
Total Metals (mg/kg)							
Method 6010B							
Antimony	--	--	NA	NA	NA	NA	NA
Arsenic	7	20	NA	NA	NA	NA	NA
Cadmium	1.2	36	NA	NA	NA	NA	NA
Chromium	2000	135	NA	NA	NA	NA	NA
Copper	36	550	NA	NA	NA	NA	NA
Lead	1000	220	NA	NA	NA	NA	NA
Mercury	0.072	9	NA	NA	NA	NA	NA
Nickel	48	1,850	NA	NA	NA	NA	NA
Silver	0.32	--	NA	NA	NA	NA	NA
Zinc	100	570	NA	NA	NA	NA	NA
Pesticides (mg/kg)							
Endrin aldehyde+A6	0.011	--	NA	NA	NA	NA	NA
beta-BHC	0.002	10	NA	NA	NA	NA	NA
Endrin	0.011	0.4	NA	NA	NA	NA	NA
Polychlorinated Biphenyls (mg/kg)							
Total PCBs	0.004	2	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (mg/kg)							
Anthracene	12000	--	NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	4.8	--	NA	NA	NA	NA	NA
2-Methylnaphthalene	5	--	NA	NA	NA	NA	NA
Pyrene	3500	--	NA	NA	NA	NA	NA
n-Butylbenzene	--	--	NA	NA	NA	NA	NA
p-isopropyltoluene	--	--	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	180000	--	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	180000	--	NA	NA	NA	NA	NA
2-Chlorotoluene	--	--	NA	NA	NA	NA	NA
Phenanthrene	--	--	NA	NA	NA	NA	NA
Volatile Organic Compounds (mg/kg)							
Ethylbenzene	6.0	--	NA	NA	NA	NA	NA
m,p-Xylene	9.0	--	NA	NA	NA	NA	NA
o-Xylene	9.0	--	NA	NA	NA	NA	NA

TABLE 2
HISTORICAL SOIL ANALYTICAL RESULTS (PRE-2002 RI SAMPLES)
RI/FS WORK PLAN
DAKOTA CREEK SITE

Analytes	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[2]	A-1 Pump 1991 South Wall #9 10/2/91	A-1 Pump 1991 Bottom Center #10 10/2/91	A-1 Pump 1991 Tank Hole #1A 10/3/91	A-1 Pump 1991 Tank Hole #3A 10/3/91	A-1 Pump 1991 Tank Hole #5A 10/3/91	Otten, 1997 *DC*-B-1 S-1 7/14/97
Total Petroleum Hydrocarbons (mg/kg) Method Silica gel/Acid Cleaned NWTPH-Dx								
Diesel Range Petroleum Hydrocarbons	2000	15,000	NA	NA	NA	NA	NA	NA
Heavy Oil Range Petroleum Hydrocarbons	2000	--	NA	NA	NA	NA	NA	NA
TPH/BTEX (mg/kg) Method SW8413/8021/8015 modified								
TPH-G	100	12,000	10 U	--	--	10 U	10 U	NA
TPH-D	2000	15,000	10 U	41	48	10 U	10 U	NA
Benzene	0.03	--	0.025 U	0.025 U	0.01 U	0.01 U	0.01 U	NA
Toluene	7.0	--	0.025 U	0.025 U	0.01 U	0.01 U	0.01 U	NA
Ethylbenzene	6.0	--	0.025 U	0.025 U	0.01 U	0.01 U	0.01 U	NA
Xylenes (Total)	9.0	--	0.025 U	0.025 U	0.01 U	0.01 U	0.01 U	NA
Total Petroleum Hydrocarbons (mg/kg) Method NWTPH-Dx and NWTPH-G								
DIesel Range Petroleum Hydrocarbons	2000	15,000	NA	NA	NA	NA	NA	NA
Heavy Oil Range Petroleum Hydrocarbons	2000	--	NA	NA	NA	NA	NA	NA
Gasoline Range Petroleum Hydrocarbons	100	12,000	NA	NA	NA	NA	NA	NA
Total Metals (mg/kg) Method 6010B								
Antimony	--	--	NA	NA	NA	NA	NA	ND
Arsenic	7	20	NA	NA	NA	NA	NA	5.24
Cadmium	1.2	36	NA	NA	NA	NA	NA	ND
Chromium	2000	135	NA	NA	NA	NA	NA	17.3 J
Copper	36	550	NA	NA	NA	NA	NA	102
Lead	1000	220	NA	NA	NA	NA	NA	22.6 J
Mercury	0.072	9	NA	NA	NA	NA	NA	0.279
Nickel	48	1,850	NA	NA	NA	NA	NA	32.7
Silver	0.32	--	NA	NA	NA	NA	NA	ND
Zinc	100	570	NA	NA	NA	NA	NA	103
Pesticides (mg/kg)								
Endrin aldehyde+A6	0.011	--	NA	NA	NA	NA	NA	NA
beta-BHC	0.002	10	NA	NA	NA	NA	NA	NA
Endrin	0.011	0.4	NA	NA	NA	NA	NA	NA
Polychlorinated Biphenyls (mg/kg)								
Total PCBs	0.004	2	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds (mg/kg)								
Anthracene	12000	--	NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl)phthalate	4.8	--	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	5	--	NA	NA	NA	NA	NA	NA
Pyrene	3500	--	NA	NA	NA	NA	NA	NA
n-Butylbenzene	--	--	NA	NA	NA	NA	NA	NA
p-isopropyltoluene	--	--	NA	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	180000	--	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	180000	--	NA	NA	NA	NA	NA	NA
2-Chlorotoluene	--	--	NA	NA	NA	NA	NA	NA
Phenanthrene	--	--	NA	NA	NA	NA	NA	NA
Volatile Organic Compounds (mg/kg)								
Ethylbenzene	6.0	--	NA	NA	NA	NA	NA	NA
m,p-Xylene	9.0	--	NA	NA	NA	NA	NA	NA
o-Xylene	9.0	--	NA	NA	NA	NA	NA	NA

TABLE 2
HISTORICAL SOIL ANALYTICAL RESULTS (PRE-2002 RI SAMPLES)
RI/FS WORK PLAN
DAKOTA CREEK SITE

Analytes	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[2]	Otten, 1997 DC-B-1B S-1 7/14/97	Otten, 1997 DC-B-2 S-2 7/14/97	Otten, 1997 DC-B-2A S-1 7/14/97	Otten, 1997 DC-UPLD SS-1A 7/3/97	Otten, 1997 DC-UPLD SS-1B 7/3/97	Otten, 1997 DC-UPLD SS-2A 7/3/97
Total Petroleum Hydrocarbons (mg/kg) Method Silica gel/Acid Cleaned NWTPH-Dx								
Diesel Range Petroleum Hydrocarbons	2000	15,000	NA	NA	NA	NA	NA	NA
Heavy Oil Range Petroleum Hydrocarbons	2000	--	NA	NA	NA	NA	NA	NA
TPH/BTEX (mg/kg) Method SW8413/8021/8015 modified								
TPH-G	100	12,000	NA	NA	NA	NA	NA	NA
TPH-D	2000	15,000	NA	NA	NA	NA	NA	NA
Benzene	0.03	--	NA	NA	NA	NA	NA	NA
Toluene	7.0	--	NA	NA	NA	NA	NA	NA
Ethylbenzene	6.0	--	NA	NA	NA	NA	NA	NA
Xylenes (Total)	9.0	--	NA	NA	NA	NA	NA	NA
Total Petroleum Hydrocarbons (mg/kg) Method NWTPH-Dx and NWTPH-G								
DIesel Range Petroleum Hydrocarbons	2000	15,000	NA	NA	NA	NA	NA	NA
Heavy Oil Range Petroleum Hydrocarbons	2000	--	NA	NA	NA	NA	NA	NA
Gasoline Range Petroleum Hydrocarbons	100	12,000	NA	NA	NA	NA	NA	NA
Total Metals (mg/kg) Method 6010B								
Antimony	--	--	ND	ND	ND	ND	ND	ND
Arsenic	7	20	8.85	2.11	1	**32.1 J**	1.74 J	15 J
Cadmium	1.2	36	ND	ND	ND	ND	ND	ND
Chromium	2000	135	20 J	15.2 J	10.3 J	49.9 J	19.2 J	45.5 J
Copper	36	550	183	98.4	7.26	**1740 J**	14.8 J	**7780 J**
Lead	1000	220	56 J	28.4 J	29.8 J	24.4 J	2.59 J	23.6 J
Mercury	0.072	9	0.577	0.38	0.113	ND	ND	ND
Nickel	48	1,850	25.6	22.9	5.75	20.9 J	45.7 J	27.9 J
Silver	0.32	--	0.134	0.157 J	ND	0.574	ND	0.534
Zinc	100	570	186	58.5	ND	**828 J**	27.4 J	**1150 J**
Pesticides (mg/kg)								
Endrin aldehyde+A6	0.011	--	NA	NA	0.113	NA	NA	NA
beta-BHC	0.002	10	NA	NA	ND	NA	NA	NA
Endrin	0.011	0.4	NA	NA	ND	NA	NA	NA
Polychlorinated Biphenyls (mg/kg)								
Total PCBs	0.004	2	NA	NA	ND	NA	NA	NA
Semivolatile Organic Compounds (mg/kg)								
Anthracene	12000	--	NA	NA	ND	NA	NA	NA
Bis(2-ethylhexyl)phthalate	4.8	--	NA	NA	ND	NA	NA	NA
2-Methylnaphthalene	5	--	NA	NA	ND	NA	NA	NA
Pyrene	3500	--	NA	NA	ND	NA	NA	NA
n-Butylbenzene	--	--	NA	NA	ND	NA	NA	NA
p-isopropyltoluene	--	--	NA	NA	ND	NA	NA	NA
1,2,4-Trimethylbenzene	180000	--	NA	NA	ND	NA	NA	NA
1,3,5-Trimethylbenzene	180000	--	NA	NA	ND	NA	NA	NA
2-Chlorotoluene	--	--	NA	NA	ND	NA	NA	NA
Phenanthrene	--	--	NA	NA	ND	NA	NA	NA
Volatile Organic Compounds (mg/kg)								
Ethylbenzene	6.0	--	NA	NA	ND	NA	NA	NA
m,p-Xylene	9.0	--	NA	NA	ND	NA	NA	NA
o-Xylene	9.0	--	NA	NA	ND	NA	NA	NA

TABLE 2
HISTORICAL SOIL ANALYTICAL RESULTS (PRE-2002 RI SAMPLES)
RI/FS WORK PLAN
DAKOTA CREEK SITE

Analytes	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[2]	Otten, 1997 DC-UPLD SS-2B 7/3/97	Otten, 1997 DC-UPLD SS-3 7/30/97	Otten, 1997 DC-UPLD SS-4 7/30/97	Otten, 1997 DC-UPLD SS-6 7/30/97	*Otten, 1997 DC-UPLD SS-9 7/30/97*	*Otten, 1997 DC-UPLD SS-11 7/30/97*
Total Petroleum Hydrocarbons (mg/kg) Method Silica gel/Acid Cleaned NWTPH-Dx								
Diesel Range Petroleum Hydrocarbons	2000	15,000	NA	NA	NA	NA	NA	NA
Heavy Oil Range Petroleum Hydrocarbons	2000	--	NA	NA	NA	NA	NA	NA
TPH/BTEX (mg/kg) Method SW8413/8021/8015 modified								
TPH-G	100	12,000	NA	NA	NA	NA	NA	NA
TPH-D	2000	15,000	NA	NA	NA	NA	NA	NA
Benzene	0.03	--	NA	NA	ND	ND	ND	ND
Toluene	7.0	--	NA	NA	ND	ND	ND	ND
Ethylbenzene	6.0	--	NA	NA	ND	ND	ND	ND
Xylenes (Total)	9.0	--	NA	NA	1.78	ND	4.12	ND
Total Petroleum Hydrocarbons (mg/kg) Method NWTPH-Dx and NWTPH-G								
DIesel Range Petroleum Hydrocarbons	2000	15,000	NA	10.9	203	492	8360	**16300**
Heavy Oil Range Petroleum Hydrocarbons	2000	--	NA	63.9	2220	2100	4470	1980
Gasoline Range Petroleum Hydrocarbons	100	12,000	NA	ND	ND	ND	233	126
Total Metals (mg/kg) Method 6010B								
Antimony	--	--	ND	ND	ND	NA	NA	NA
Arsenic	7	20	1.44 J	2.98	7.26	NA	NA	NA
Cadmium	1.2	36	ND	0.152 J	0.322 J	NA	NA	NA
Chromium	2000	135	22.8 J	26.8J	25.7 J	NA	NA	NA
Copper	36	550	14.4 J	147	416	NA	NA	NA
Lead	1000	220	2.19 J	2.04 J	57.5 J	NA	NA	NA
Mercury	0.072	9	ND	ND	ND	NA	NA	NA
Nickel	48	1,850	52.6 J	35.7 J	21.7 J	NA	NA	NA
Silver	0.32	--	ND	0.611 J	1.36 J	NA	NA	NA
Zinc	100	570	30.7 J	**1110**	**802**	NA	NA	NA
Pesticides (mg/kg)								
Endrin aldehyde+A6	0.011	--	NA	NA	NA	NA	ND	ND
beta-BHC	0.002	10	NA	NA	NA	NA	ND	ND
Endrin	0.011	0.4	NA	NA	NA	NA	0.015	ND
Polychlorinated Biphenyls (mg/kg)								
Total PCBs	0.004	2	NA	NA	NA	NA	0.107	0.073
Semivolatile Organic Compounds (mg/kg)								
Anthracene	12000	--	NA	NA	NA	NA	ND	11
Bis(2-ethylhexyl)phthalate	4.8	--	NA	NA	NA	NA	ND	5.5
2-Methylnaphthalene	5	--	NA	NA	NA	NA	ND	5.1
Pyrene	3500	--	NA	NA	NA	NA	ND	2.7
n-Butylbenzene	--	--	NA	NA	NA	NA	ND	0.294
p-isopropyltoluene	--	--	NA	NA	NA	NA	ND	0.274
1,2,4-Trimethylbenzene	180000	--	NA	NA	NA	NA	0.233	ND
1,3,5-Trimethylbenzene	180000	--	NA	NA	NA	NA	0.208	ND
2-Chlorotoluene	--	--	NA	NA	NA	NA	0.731	ND
Phenanthrene	--	--	NA	NA	NA	NA	6.9 J	ND
Volatile Organic Compounds (mg/kg)								
Ethylbenzene	6.0	--	NA	NA	NA	NA	0.31	ND
m,p-Xylene	9.0	--	NA	NA	NA	NA	0.722	ND
o-Xylene	9.0	--	NA	NA	NA	NA	1.73	ND

TABLE 2
HISTORICAL SOIL ANALYTICAL RESULTS (PRE-2002 RI SAMPLES)
RI/FS WORK PLAN
DAKOTA CREEK SITE

Analytes	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[2]	Otten, 1997 DC-UPLD SS-13A 7/30/97	*Otten, 1997 DC-UPLD SS-14A 7/30/97*	*Otten, 1997 DC-UPLD SS-14B 7/30/97*	Landau, 2001 VS-1 DH66A 6/28/01	Landau, 2001 VS-2 DH66B 6/28/01	Landau, 2001 VS-3 DH66C 6/28/01
Total Petroleum Hydrocarbons (mg/kg) Method Silica gel/Acid Cleaned NWTPH-Dx								
Diesel Range Petroleum Hydrocarbons	2000	15,000	9.3	NA	NA	6.6	55	44
Heavy Oil Range Petroleum Hydrocarbons	2000	--	31	NA	NA	13	180	140
TPH/BTEX (mg/kg) Method SW8413/8021/8015 modified								
TPH-G	100	12,000	NA	NA	NA	NA	NA	NA
TPH-D	2000	15,000	NA	NA	NA	NA	NA	NA
Benzene	0.03	--	ND	ND	ND	NA	NA	NA
Toluene	7.0	--	ND	0.0559	ND	NA	NA	NA
Ethylbenzene	6.0	--	0.292	0.174	ND	NA	NA	NA
Xylenes (Total)	9.0	--	2.08	1.56	0.106	NA	NA	NA
Total Petroleum Hydrocarbons (mg/kg) Method NWTPH-Dx and NWTPH-G								
DIesel Range Petroleum Hydrocarbons	2000	15,000	421	1590	2900	NA	NA	NA
Heavy Oil Range Petroleum Hydrocarbons	2000	--	843	18500	2820	NA	NA	NA
Gasoline Range Petroleum Hydrocarbons	100	12,000	26.7	22.9	23.1	NA	NA	NA
Total Metals (mg/kg) Method 6010B								
Antimony	--	--	ND	ND	2.88	NA	NA	NA
Arsenic	7	20	**22.6**	**27**	1.97	NA	NA	NA
Cadmium	1.2	36	0.252 J	0.866 J	0.444 J	NA	NA	NA
Chromium	2000	135	27.9 J	31.9 J	52.2	NA	NA	NA
Copper	36	550	**6150**	**7520**	**2240**	NA	NA	NA
Lead	1000	220	52.4 J	92.6 J	**559 J**	NA	NA	NA
Mercury	0.072	9	ND	0.287	**30.9 J**	NA	NA	NA
Nickel	48	1,850	15.1 J	16.5 J	23.3 J	NA	NA	NA
Silver	0.32	--	2.76 J	2.69 J	0.812 J	NA	NA	NA
Zinc	100	570	**1220**	**1600**	**643**	NA	NA	NA
Pesticides (mg/kg)								
Endrin aldehyde+A6	0.011	--	NA	ND	ND	NA	NA	NA
beta-BHC	0.002	10	NA	ND	0.017	NA	NA	NA
Endrin	0.011	0.4	NA	ND	ND	NA	NA	NA
Polychlorinated Biphenyls (mg/kg)								
Total PCBs	0.004	2	NA	0.067	ND	NA	NA	NA
Semivolatile Organic Compounds (mg/kg)								
Anthracene	12000	--	NA	ND	ND	NA	NA	NA
Bis(2-ethylhexyl)phthalate	4.8	--	NA	ND	ND	NA	NA	NA
2-Methylnaphthalene	5	--	NA	ND	ND	NA	NA	NA
Pyrene	3500	--	NA	ND	5.1 J	NA	NA	NA
n-Butylbenzene	--	--	NA	ND	ND	NA	NA	NA
p-isopropyltoluene	--	--	NA	ND	ND	NA	NA	NA
1,2,4-Trimethylbenzene	180000	--	NA	1.31	ND	NA	NA	NA
1,3,5-Trimethylbenzene	180000	--	NA	1.03	ND	NA	NA	NA
2-Chlorotoluene	--	--	NA	0.214	ND	NA	NA	NA
Phenanthrene	--	--	NA	ND	ND	NA	NA	NA
Volatile Organic Compounds (mg/kg)								NA
Ethylbenzene	6.0	--	NA	0.371	ND	NA	NA	NA
m,p-Xylene	9.0	--	NA	1.55	ND	NA	NA	NA
o-Xylene	9.0	--	NA	1.6	ND	NA	NA	NA

TABLE 2
HISTORICAL SOIL ANALYTICAL RESULTS (PRE-2002 RI SAMPLES)
RI/FS WORK PLAN
DAKOTA CREEK SITE

Analytes	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[2]	Landau, 2001 VS-6 DL 19A 7/3/01	Landau, 2001 VS-7 DL 19B 7/3/01	*Landau, 2001 VS-8 DL 19C 7/3/01*
Total Petroleum Hydrocarbons (mg/kg) Method Silica gel/Acid Cleaned NWTPH-Dx					
Diesel Range Petroleum Hydrocarbons	2000	15,000	9.3	190	1100
Heavy Oil Range Petroleum Hydrocarbons	2000	--	31	320	1900
TPH/BTEX (mg/kg) Method SW8413/8021/8015 modified					
TPH-G	100	12,000	NA	NA	NA
TPH-D	2000	15,000	NA	NA	NA
Benzene	0.03	--	NA	NA	NA
Toluene	7.0	--	NA	NA	NA
Ethylbenzene	6.0	--	NA	NA	NA
Xylenes (Total)	9.0	--	NA	NA	NA
Total Petroleum Hydrocarbons (mg/kg) Method NWTPH-Dx and NWTPH-G					
DIesel Range Petroleum Hydrocarbons	2000	15,000	NA	NA	NA
Heavy Oil Range Petroleum Hydrocarbons	2000	--	NA	NA	NA
Gasoline Range Petroleum Hydrocarbons	100	12,000	NA	NA	NA
Total Metals (mg/kg) Method 6010B					
Antimony	--	--	NA	NA	NA
Arsenic	7	20	NA	NA	NA
Cadmium	1.2	36	NA	NA	NA
Chromium	2000	135	NA	NA	NA
Copper	36	550	NA	NA	NA
Lead	1000	220	NA	NA	NA
Mercury	0.072	9	NA	NA	NA
Nickel	48	1,850	NA	NA	NA
Silver	0.32	--	NA	NA	NA
Zinc	100	570	NA	NA	NA
Pesticides (mg/kg)					
Endrin aldehyde+A6	0.011	--	NA	NA	NA
beta-BHC	0.002	10	NA	NA	NA
Endrin	0.011	0.4	NA	NA	NA
Polychlorinated Biphenyls (mg/kg)	--				
Total PCBs	0.004	2	NA	NA	NA
Semivolatile Organic Compounds (mg/kg)					
Anthracene	12000	--	NA	NA	NA
Bis(2-ethylhexyl)phthalate	4.8	--	NA	NA	NA
2-Methylnaphthalene	5	--	NA	NA	NA
Pyrene	3500	--	NA	NA	NA
n-Butylbenzene	--	--	NA	NA	NA
p-isopropyltoluene	--	--	NA	NA	NA
1,2,4-Trimethylbenzene	180000	--	NA	NA	NA
1,3,5-Trimethylbenzene	180000	--	NA	NA	NA
2-Chlorotoluene	--	--	NA	NA	NA
Phenanthrene	--	--	NA	NA	NA

TABLE 2
HISTORICAL SOIL ANALYTICAL RESULTS (PRE-2002 RI SAMPLES)
RI/FS WORK PLAN
DAKOTA CREEK SITE

Analytes	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[2]	Landau, 2001 VS-6 DL 19A 7/3/01	Landau, 2001 VS-7 DL 19B 7/3/01	*Landau, 2001 VS-8 DL 19C 7/3/01*
Volatile Organic Compounds (mg/kg)					
Ethylbenzene	6.0	--	NA	NA	NA
m,p-Xylene	9.0	--	NA	NA	NA
o-Xylene	9.0	--	NA	NA	NA

Notes:
[1] See Table 3 for derivation of Preliminary Soil Cleanup Levels
[2] Chapter 173-340 WAC; Table 749-2 (Simplified Terrestrial Ecological Evaluation: Industrial or Commercial Site)
Data were obtained from Table B-1 (Landau, 2002a)
Italics indicates that the sample represented soil that was removed during the 2002 Independent Cleanup Action (Landau, 2002b)
Shading indicates that the analyte was detected at a concentration greater than the Preliminary Soil Cleanup Level.
Bold and underline indicates that the analyte was detected at a concentration greater than the Simplified TEE Industrial Soil Concentration.
-- = Preliminary Soil Cleanup Level not available or analyte was either not detected or soil sample was not analyzed for the analyte
NA = Not analyzed.
ND = Not detected (reportling limit not reported in RI/FS report)
J = Estimated delected value.
(a) Cleanup level based on MTCA Method A industrial soil deanup levels.
(b) Cleanup level based on MTCA Method C industrial soil cleanup levels protecting of direct contact; no
surface water criteria are available
(c) Cleanup level based on MTCA Method C industrial soil cleanup levels protective of direct contact and surface water
(d) Cleanup level for gasoline-range petroleum hydrocarbons with no detectable benzene present
(e) Cleanup level for chromium Ill; chromium VI is not known or expected to be present.

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TABLE 3
HISTORICAL SOIL ANALYTICAL RESULTS (EPA 2001 SI SPLIT SAMPLES)
RI/FS WORK PLAN
DAKOTA CREEK SITE

Analyte	Units	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[3]	DCI-SB-UL01-0020-LAI 7/17/01	DCI-SB-UL01-0040-LAI 7/17/01	DCI-SB-UL01-0070-LAI 7/17/01	DCI-SB-UL03-0020-LAI 7/17/01	DCI-SB-UL03-0060-LAI 7/17/01
Conventionals								
Total Solids	percent	--	--	87.4	82.4	59.4	88.7	79.9
pH	none	--	--	8.05	7.3	7.52	7.14	7.11
Metals								
Aluminum[2]	mg/kg	32,600	--	19,500	17,300	18,800	5,500	9,110
Antimony	mg/kg	--	--	4.2 UJ	4.5 UJ	3.5 UJ	4.1 UJ	3.8 UJ
Arsenic	mg/kg	7	20	5	6.5	5.3	2.7	3
Barium	mg/kg	700,000	1,320	109	120	48.4	16.1 J	18.7 J
Beryllium[2]	mg/kg	0.6	--	0.34 J	0.31 J	0.36 J	0.11 J	0.15 J
Cadmium	mg/kg	1.2	36	0.5 J	0.51 J	0.36 J	0.21 J	0.25 J
Calcium	mg/kg	--	--	8,850	6,250	4,530	2,630	3,950
Chromium	mg/kg	2,000	135	51.1	37.1	48.7	24.7	29.1
Cobalt	mg/kg	70,000	--	14.3	10.8 J	7.3 J	2.9 J	4.5 J
Copper	mg/kg	36	550	69.4	38.2	28.4	13.1	11.6
Iron[2]	mg/kg	58,700	--	32,900	25,900	17,300	9,060	12,600
Lead	mg/kg	1000	220	10.3 J	66.7	8.4 J	6.2 J	2.5 J
Magnesium	mg/kg	--	--	9,900	7,740	6,590	2,820	4,490
Manganese[2]	mg/kg	1,200	23,500	606	502	174	111	155
Mercury	mg/kg	0.072	9	0.06 U	0.29	0.08 U	0.05 U	0.1 J
Nickel	mg/kg	48	1,850	46.7	35.4	42.9	17.7	21.8
Potassium	mg/kg	--	--	1,830	1,790	1,900	481 J	756 J
Selenium	mg/kg	7.4	0.8	0.22 UJ	0.22 UJ	0.53 J	0.22 UJ	0.25 J
Silver	mg/kg	0.32	--	1.3 U	1.4 J	1.1 U	1.9 J	1.2 U
Sodium	mg/kg	--	--	636 J	851 J	1,020 J	149 J	265 J
Thailium	mg/kg	--	--	0.22 U	0.22 U	0.19 U	0.22 U	0.2 U
Vanadium	mg/kg	18,000	--	69.2	59.8	49.6	21	35.3
Zinc	mg/kg	100	570	94.9	426	45.1	60.9	32
Semivolatile Organic Compounds								
Benzaldehyde	µg/kg	--	--	380 U	410 U	560 U	380 U	420 U
Bis(2-chloroethyl) Ether	µg/kg	--	--	380 U	410 U	560 U	380 U	420 U
Phenol	µg/kg	5,000,000	--	5.3 J	4.4 J	560 U	380 U	420 U
2-Chlorophenol	µg/kg	--	--	380 U	410 U	560 U	380 U	420 U
2,2'-Oxybis(1-chloropropane)	µg/kg	--	--	380 U	410 U	560 U	380 U	420 U
2-Methylphenol	µg/kg	--	--	380 U	410 U	560 U	380 U	420 U
Acetophenone	µg/kg	--	--	380 U	410 U	560 U	380 U	420 U
Hexachloroethane	µg/kg	--	--	380 U	410 U	560 U	380 U	420 11
N-Nitrso-di-n-propylamine	µg/kg	--	--	380 U	410 U	560 U	380 U	420 U
4-Methylphenol	µg/kg	--	--	950 U	1100 U	1400 U	940 U	1,100 U
Nitrobenzene	µg/kg	--	--	380 U	410 U	560 U	380 U	420 U
Isophorone	µg/kg	--	--	380 U	410 U	560 U	380 U	420 U
2-Nitrophenol	µg/kg	--	--	380 U	410 U	560 U	380 U	420 U
2.4-Dimethylphenol	µg/kg	--	--	380 U	410 U	560 U	380 U	420 U
Bls(2-chloroethoxy)methane	µg/kg	--	--	380 U	410 U	560 U	380 U	420 U
2.4-Dichlorophenol	µg/kg	--	--	380 U	410 U	560 U	380 U	420 U
Naphthalene	µg/kg	5,000	--	380 U	16 J	560 U	380 U	420 U
4-Chloroaniline	µg/kg	--	--	380 U	410 U	560 U	380 U	420 U
Hexachlorobutadiene	µg/kg	--	--	380 U	410 U	560 U	380 U	380 U
Caprolactam	µg/kg	--	--	380 U	410 U	560 U	380 U	380 U
4-Chloro-3-methylphenol	µg/kg	--	--	380 U	410 U	560 U	380 U	380 U

TABLE 3
HISTORICAL SOIL ANALYTICAL RESULTS (EPA 2001 SI SPLIT SAMPLES)
RI/FS WORK PLAN
DAKOTA CREEK SITE

Analyte	Units	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[3]	DCI-SB-UL01-0020-LAI 7/17/01	DCI-SB-UL01-0040-LAI 7/17/01	DCI-SB-UL01-0070-LAI 7/17/01	DCI-SB-UL03-0020-LAI 7/17/01	DCI-SB-UL03-0060-LAI 7/17/01
2-Methylnaphthalene	µg/kg	5,000	--	1.9 J	6.9 J	560 U	380 U	2.9 J
Hexachlorocyclopentadiene	µg/kg	--	--	380 U	410 U	560 U	380 U	420 U
2,4,6-Trichlorophenol	µg/kg	--	--	380 U	410 U	560 U	380 U	420 U
2.4,5-Trichlorophenol	µg/kg	--	--	950 U	1,100 U	1,400 U	940 U	1,100 U
2-Chloronaphthalene	µg/kg	--	--	380 U	410 U	560 U	380 U	420 U
Biphenyl	µg/kg	--	--	380 U	410 U	560 U	380 U	420 U
2-Nitroaniline	µg/kg	--	--	950 U	1,100 U	1,400 U	940 U	1,100 U
Acenaphthylene	µg/kg	--	--	380 U	6.1 J	580 U	380 U	420 U
Dimethyl Phthalate	µg/kg	--	--	380 U	410 U	560 U	380 U	420 U
2.6-Dinitrotoluene	µg/kg	--	--	380 U	410 U	560 U	380 U	420 U
Acenaphthene	µg/kg	--	--	380 U	410 U	560 U	380 U	420 U
3-Nitroaniline	µg/kg	--	--	950 U	1,100 U	1.400 U	940 U	1,100 U
2.4-Dinitrophenol	µg/kg	--	--	950 U	1,100 U	1.400 U	940 U	1,100 U
Dibenzofuran	µg/kg	7,000	--	1.9 J	2.8 J	560 U	380 U	420 U
4-Nitrophenol	µg/kg	--	--	380 U	410 U	560 U	380 U	420 U
2,4-Dinotroluene	µg/kg	--	--	380 U	410 U	560. U	380 U	420 U
Fluorene	µg/kg	550,000	--	380 U	4 J	560 U	360 U	420 U
4-Chlorophenyl Phenyl Ether	µg/kg	--	--	380 U	410 U	560 U	380 U	420 U
Diethyl Phthalate	µg/kg	--	--	380 U	410 U	580 U	380 U	420 U
4-Nitroaniline	µg/kg	--	--	950 U	1,100 U	1.400 U	940 U	1,100 U
2-Methyl-4,6-dinitraphenol	µg/kg	--	--	950 U	1,100 U	1.400 U	940 U	1,100 U
N-Nitrosodiphenylamine	µg/kg	--	--	380 U	410 U	560 U	380 U	420 U
4-Bromophenyl Phenyl Ether	µg/kg	--	--	380 U	410 U	560 U	380 U	420 U
Hexachlorobenzene	µg/kg	--	--	380 U	410 U	560 U	380 U	420 U
Atrazine	µg/kg	--	--	380 u	410 U	560 U	380 U	420 U
Pentachlorophenol	µg/kg	--	11,000	950 U	1,100 U	1,400 U	940 U	1,100 U
Phenanthrene	µg/kg	--	--	25 J	79 J	33 J	14 J	5.8 J
Anthracene	µg/kg	12,000,000	--	3 J	13 J	3.9 J	360 U	420 U
Carbazole	µg/kg	6,600,000	--	380 U	4.9 J	560 U	380 U	420 U
Di-n-butyl Phthalate	µg/kg	100,000	--	380 U	10 J	560 U	380 U	420 U
Fluoranthene	µg/kg	89,000	--	16 J	150 J	13 J	14 J	4.6 J
Pyrene	µg/kg	3,500,000	--	17 J	170 J	11 J	15 J	5.4 J
Butyl Benzyl Phthalate	µg/kg	370,000	--	380 U	410 U	560 U	380 U	420 U
3,3'-Dichlorobenzidine	µg/kg	--	--	380 U	410 U	560 U	380 U	420 U
Benz(a)anthracene	µg/kg	130	--	6.9 J	78 J	560 U	380 U	420 U
Chrysene	µg/kg	140	--	11 J	97 J	560 U	7.5 J	2.5 J
Bis(2-ethylhexyl) Phthalate	µg/kg	4,800	--	200 J	470	49 J	440	68 J
Di-n-octyl Phthalate	µg/kg	--	--	380 U	410 U	560 U	380 U	420 U
Benzo(b)fluoranthene	µg/kg	430	--	380 U	67 J	560 U	380 U	420 U
Benzo(k)fluoranthene	µg/kg	430	--	380 U	71 J	580 U	380 U	420 U
Benzo(a)pyrene	µg/kg	350	300,000	380 U	81 J	580 U	380 U	420 U
Indeno(I,2,3-cd)pyrene	µg/kg	1,300	--	380 U	70 J	560 U	380 U	420 U
Dibenz(a,h)anthracene	µg/kg	650	--	380U	410 U	560 U	380 U	420 U
Benzo(g,h,i)perylene	µg/kg	--	--	380 U	78 J	560 U	380 U	420 U
Organotins								
Tetra-n-butyltin	µg/kg	--	--	0.45 UJ	1.3 U	1.7 U	R	1.3 U
Tri-n-butyltin	µg/kg	--	--	7.4 J	0.72 J	1.7 U	R	1.3 U
Di-n-butyltin	µg/kg	--	--	5.1 J	0.4 J	1.7 U	R	1.3 U
n-butyltin	µg/kg	--	--	4.4 J	5.6	1.7 U	R	1.3 U

TABLE 3
HISTORICAL SOIL ANALYTICAL RESULTS (EPA 2001 SI SPLIT SAMPLES)
RI/FS WORK PLAN
DAKOTA CREEK SITE

Analyte	Units	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[3]	DCI-SB-UL01-0020-LAI 7/17/01	DCI-SB-UL01-0040-LAI 7/17/01	DCI-SB-UL01-0070-LAI 7/17/01	DCI-SB-UL03-0020-LAI 7/17/01	DCI-SB-UL03-0060-LAI 7/17/01
PCBs/Pesticides								
alpha-BHC	µg/kg	2	10,000	1.9 U	2.1 U	2.9 U	1.9 U	2.1 U
beta-BHC	µg/kg	2	10,000	1.9 U	2.1 U	2.9 U	1.9 U	2.1 U
delta-BHC	µg/kg	--	10,000	1.9 U	2.1 U	2.9 U	1.9 U	2.1 U
gamma-BHC (Lindane)	µg/kg	1.7	10,000	1.9 U	2.1 U	2.9 U	1.9 U	2.1 U
Heptachlor	µg/kg	9.7	600	0.094 J	0.14 J	2.9 U	0.042 J	2.1 U
Aldrin	µg/kg	49	170	1.9 U	2.1 U	0.12 J	1.9 U	2.1 U
Heptachlor Epoxide	µg/kg	830	600	0.038 J	0.058 J	2.9 U	1.9 U	2.1 U
Endosulfan	µg/kg	2.2	--	1.9 U	1 J	0.11 J	1.9 U	2.1 U
Dieldrin	µg/kg	26	170	0.21 J	4 U	5.6 U	3.7 U	4.1 U
4,4'-DDE	µg/kg	86	1,000	3.8 U	0.16 J	5.6 U	3.7 U	4.1 U
Endrin	µg/kg	11	400	3.8 U	4 U	5.6 U	3.7 U	4.1 U
Endosulfan II	µg/kg	3.3	--	3.8 U	4 U	5.6 U	3.7 U	4.1 U
4,4'-DDD	µg/kg	3.3	1,000	0.05 J	0.4 J	5.6 U	3.7 U	4.1 U
Ednosulfan Sulfate	µg/kg	3.3	--	3.8 U	4 U	5.6 U	3.7 U	4.1 U
4,4'-DDT	µg/kg	680	1,000	0.048 J	0.11 J	0.099 J	3.7 U	4.1 U
Methoxychlor	µg/kg	80	--	19 U	21 U	29 U	19 U	21 U
Endrin Ketone	µg/kg	11	--	3.8 U	4 U	5.6 U	3.7 U	4.1 U
Endrin Aldehyde	µg/kg	11	--	3.8 U	4 U	5.6 U	3.7 U	4.1 U
alpha-Chlordane	µg/kg	51	7,000	0.034 J	2.1 U	2.9 U	1.9 U	2.1 U
gamma-Chlordane	µg/kg	51	7,000	0.2 J	0.21 J	2.9 U	0.05 U	2.1 U
Toxaphene	µg/kg	9,600	--	190 U	210 U	290 U	190 U	210 U
Aroclor 1016	µg/kg	4	2,000	38 U	40 U	56 U	37 U	41 U
Aroclor 1221	µg/kg	4	2,000	77 U	81 U	110 U	76 U	84 U
Aroclor 1232	µg/kg	4	2,000	38 U	40 U	56 U	37 U	41 U
Aroclor 1242	µg/kg	4	2,000	38 U	40 U	56 U	37 U	41 U
Aroclor 1248	µg/kg	4	2,000	38 U	40 U	56 U	37 U	41 U
Aroclor 1254	µg/kg	4	2,000	38 U	40 U	56 U	37 U	41 U
Aroclor 1260	µg/kg	4	2,000	38 U	40 U	56 U	37 U	41 U
Total PCBs	µg/kg	4	2,000	77 U	81 U	110 U	76 U	84 U

Notes:
[1] See Table 3 for derivation of Preliminary Soil Cleanup Levels
[2] Puget Sound background concentrations obtained from Natural Background Soil Metals Concentrations in Washington State (Ecology, 1994)
[3] Chapter 173-340 WAC; Table 749-2 (Simplified Terrestrial Ecological Evaluation: Industrial or Commercial Site)
Data were obtained from Table B-1 (Landau, 2002a)
Shading indicates that the analyte was detected at a concentration greater than the Preliminary Soil Cleanup Level.
'-- = Preliminary Soil Cleanup Level not available or analyte was either not detected or soil sample was not analyzed for the analyte
U = indicates the compound was undetected at the listed concentration.
J = Estimated detected value.

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TABLE 4
HISTORICAL SOIL ANALYTICAL RESULTS (2002 RI)
RI/FS WORK PLAN
DAKOTA CREEK SITE

Analyte	Units	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[2]	S-1-WS-0 0.5-1 ft bgs	S-1-WS-1 1-4 ft bgs	S-1-WS-2 4-7 ft bgs	S-1-WS-3 7-10 ft bgs	S-2-MS-0 0.5-1 ft bgs	S-2-MS-1 1-4 ft bgs	S-2-MS-2 4-7 ft bgs	S-3-EFA-0 0-1 ft bgs	S-3-EFA-1 1-4 ft bgs
Metals												
Arsenic	mg/kg	7	20	3.4	3.8	3.1	2.2	3.8	5.3	1.5	**25**	4.3
Cadmium	mg/kg	1.2	36	0.2 U	0.2 U	0.2 U	0.3 U	0.2 U	0.2 U	0.2 U	1.1	0.2
Chromium	mg/kg	2,000	135	38.1	44.3	48.7	22	17.9	28.7	26.5	69	38.9
Copper	mg/kg	36	550	29.8	22.3	24.7	6.7	16.1	21.4	9.2	**889**	44.7
Lead	mg/kg	1,000	220	6	6	4	3	5	8	4	71	15
Mercury	mg/kg	0.072	9	0.05 U	0.05 U	0.05 U	0.07 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Nickel	mg/kg	48	1,850	58	52	59	16	17	20	12	63	32
Zinc	mg/kg	100	570	49.4	43.3	50.7	28.5	47.6	58.4	31.1	**1080**	92.9
Volatile Organic Compounds												
Chloromethane	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
Bromomethane	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
Vinyl Chloride	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
Chloroethane	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
Methylene Chloride	µg/kg	20	--	NA	NA	NA	NA	NA	NA	NA	43	47
Acetone	µg/kg	350,000,000	--	NA	NA	NA	NA	NA	NA	NA	57 U	150
Carbon Disulfide	µg/kg	350,000,000	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
1,1-Dichlromethene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
1,1-Dichlromethene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
Trans-1,2-Dichloroethene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
cis-1,2-Dichloroethene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
Chloroform	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
1,2-Dichloroethane	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
2-Butanone	µg/kg	210,000,000	--	NA	NA	NA	NA	NA	NA	NA	57 U	58 U
1,1,1-Trichloroethane	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
Carbon Tetrachloride	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
Vinyl Acetate	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	57 U	58 U
Bromodichloromethane	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
1,2-Dichloropropane	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
cis-1,3-Dlchloropropane	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
Trichloroethene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
Dibromochloromethane	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
1,1,2-Trichloroethane	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
Benzene	µg/kg	30	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
trans-1,3-Dichloropropene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
Bromoform	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
4-Methyl-2-Pentanone	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	57 U	58 U
2-Hexanone	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	57 U	58 U
Tetrachloroethene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
1,1,2,2-Tetrachloroethane	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	120 U
Toluene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
Chlorobenzene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
Ethylbenzene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
Styrene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
Trichlorofluoromethane	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
1,1,2-Trichlorotrifluoroethane	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
m,p-Xylene	µg/kg	9,000	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
o-Xylene	µg/kg	9,000	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
1,2-Dichlorobenzene	µg/kg	15,000	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
1,3-Dichlorobenzene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
1,4-Dichlorobenzene	µg/kg	81	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
Acrolein	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	570 U	580 U
Methyl Iodide	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
Bromoethane	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	23 U	23 U
Acrylonitrite	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	57 U	58 U
1,1-Dichloropropene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
Dibromomethane	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
1,1,1,2-Tetrachloroethane	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
1,2-Dibromo-3-Chloropropane	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	57 U	58 U
2,2,3-Trichlompropane	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	23 U	23 U
trans-1,4-Dichloro-2-Butene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	37 U	58 U
1,3,5-Trimethylbenzene	µg/kg	180,000,000	--	NA	NA	NA	NA	NA	NA	NA	21 M	12 U
1,2,4-Trimethylbenzene	µg/kg	180,000,000	--	NA	NA	NA	NA	NA	NA	NA	11 U	16 M
Hexachlorobuladiene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	57 U	58 U
Ethylene Dibromide	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
Bromochloromethane	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U

TABLE 4
HISTORICAL SOIL ANALYTICAL RESULTS (2002 RI)
RI/FS WORK PLAN
DAKOTA CREEK SITE

Analyte	Units	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[2]	S-1-WS-0 0.5-1 ft bgs	S-1-WS-1 1-4 ft bgs	S-1-WS-2 4-7 ft bgs	S-1-WS-3 7-10 ft bgs	S-2-MS-0 0.5-1 ft bgs	S-2-MS-1 1-4 ft bgs	S-2-MS-2 4-7 ft bgs	S-3-EFA-0 0-1 ft bgs	S-3-EFA-1 1-4 ft bgs
2,2-Dichloropropane	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
1,3-Dichloropropane	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
Isopropylbenzene	µg/kg	350,000,000	--	NA	NA	NA	NA	NA	NA	NA	14	38
n-Propyl Benzene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	20	74
Bromobenzene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
2-Chlorotoluene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
4-Chlorotoluene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
tert-Butylbenzene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	11 U	12 U
sec-Butylbenzene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	50	220
4-Isopropyltoluene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	47	210
n-Butylbenzene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	49 M	250
1,2,4-Trichlorobenzene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	57 U	58 U
Naphthalene	µg/kg	5,000	--	NA	NA	NA	NA	NA	NA	NA	63 U	330 U
1,2,3-Trichlorobenzene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	57 U	58 U
Semivolatile Organic Compounds												
Phenol	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	280 U	150 U
Bis(chloroethyl) Ether	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	280 U	150 U
2-Chlorophenol	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	140 U	75 U
1,3-Dichlorobenzene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	140 U	75 U
1,4-Dichlorobenzene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	140 U	75 U
Benzyl Alcohol	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	700 U	380 U
1,2-Dichlorobenzene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	140 U	75 U
Benzaldehyde	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	140 U	75 U
2-Methylphenol	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	140 U	75 U
2,2'-Oxybis(1-chloropropane)	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	140 U	75 U
4-Methylphenol	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	280 U	150 U
N-Nitroso-di-n-propylamine	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	280 U	150 U
Hexachloroethane	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	140 U	75 U
Nitrobenzene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	140 U	75 U
Isophorone	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	700 U	380 U
2-Nitrophenol	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	420 U	230 U
2,4-Dimethylphenol	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	1400 U	750 U
Benzoic Acid	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	140 U	75 U
Bis(2-chloroethoxy)methane	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	420 U	230 U
2,4-Dichlorophenol	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	140 U	75 U
1,2,4-Trichlorobenzene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	140 U	75 U
Naphthalene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	420 U	230 U
4-Chloroanline	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	280 U	150 U
Hexachlorobutadlene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	280 U	150 U
4-Chloro-3-methylphenol	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	140 U	260
2-Methylnaphthalene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	700 U	380 U
Hexachlorocydopentadiene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	700 U	380 U
2,4,6-Trichlorophenol	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	700 U	380 U
2,4,5-Trichlorophenol	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	140 U	75 U
2-Chloronaphthalene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	700 U	380 U
2-Nitroaniline	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	140 U	75 U
Acenaphthylene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	140 U	75 U
3-Nitroaniline	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	840 U	450 U
Acenaphthene	µg/kg	65,000	--	NA	NA	NA	NA	NA	NA	NA	140 U	120
2,4-Dinitrophenol	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	1,400 U	750 U
4-Nitrophenol	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	700 U	380 U
Dibenzofuran	µg/kg	7,000,000	--	NA	NA	NA	NA	NA	NA	NA	140 U	150
2,6-Dinitrotoluene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	700 U	380 U
2,4-Dinitrotoluene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	700 U	380 U
Diethyl Phthalate	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	140 U	75 U
4-Chlorophenyl Phenyl Ether	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	140 U	75 U
Fluorene	µg/kg	550,000	--	NA	NA	NA	NA	NA	NA	NA	150	250
4-Nitroaniline	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	700 U	380 U
2-Methyl-4,6-dinotrophenol	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	1,400 U	750 U
N-Nitrosodiphenylamine	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	140 U	75 U
4-Bromophenyl Phenyl Ether	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	140 U	75 U
Hexachlorobenzene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	140 U	75 U
Pentachlorophenol	µg/kg	--	11,000	NA	NA	NA	NA	NA	NA	NA	700 U	389 U
Phenanthrene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	340	620
Carbazole	µg/kg	6,600,000	--	NA	NA	NA	NA	NA	NA	NA	140 U	75 U
Anthracene	µg/kg	12,000,000	--	NA	NA	NA	NA	NA	NA	NA	140 U	75 U

TABLE 4
HISTORICAL SOIL ANALYTICAL RESULTS (2002 RI)
RI/FS WORK PLAN
DAKOTA CREEK SITE

Analyte	Units	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[2]	S-1-WS-0 0.5-1 ft bgs	S-1-WS-1 1-4 ft bgs	S-1-WS-2 4-7 ft bgs	S-1-WS-3 7-10 ft bgs	S-2-MS-0 0.5-1 ft bgs	S-2-MS-1 1-4 ft bgs	S-2-MS-2 4-7 ft bgs	S-3-EFA-0 0-1 ft bgs	S-3-EFA-1 1-4 ft bgs
Di-n-butyl Phthalate	µg/kg	100,000	--	NA	NA	NA	NA	NA	NA	NA	140 U	75 U
Fluoranthene	µg/kg	89,000	--	NA	NA	NA	NA	NA	NA	NA	380	140
Pyrene	µg/kg	3,500,000	--	NA	NA	NA	NA	NA	NA	NA	360	100
Butyl Benzyl Phthalate	µg/kg	370	--	NA	NA	NA	NA	NA	NA	NA	140 U	75 U
3,3'-Dichlorobenzidine	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	700 U	380 U
Benz(a)anthracene	µg/kg	130	--	NA	NA	NA	NA	NA	NA	NA	180	75 U
Bis(2-ethylhexyl) Phthalate	µg/kg	4,800	--	NA	NA	NA	NA	NA	NA	NA	1000	75 U
Chrysene	µg/kg	140	--	NA	NA	NA	NA	NA	NA	NA	270	75 U
Di-n-octyl Phthalate	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	140 U	75 U
Benzo(b)fluoranthene	µg/kg	430	--	NA	NA	NA	NA	NA	NA	NA	210	75 U
Benzo(k)fluoranthene	µg/kg	430	--	NA	NA	NA	NA	NA	NA	NA	260	75 U
Benzo(a)pyrene	µg/kg	350	300,000	NA	NA	NA	NA	NA	NA	NA	190	75 U
Indeno(1,2,3-cd)pyrene	µg/kg	1,300	--	NA	NA	NA	NA	NA	NA	NA	200	75 U
Dibenz(a,h)anthracene	µg/kg	650	--	NA	NA	NA	NA	NA	NA	NA	140 U	75 U
Benzo(g,h,i)perylene	µg/kg	--	--	NA	NA	NA	NA	NA	NA	NA	200	75 U
Petroleum Hydrocarbons												
TPH-G	mg/kg	100	12,000	NA	NA	NA	NA	5.8 U	6 U	7.3 U	200	250
TPH-D	mg/kg	2,000	15,000	NA	NA	NA	NA	8.1 J	5.9 J	5.4 J	990	370
TPH-O	mg/kg	2,000	--	NA	NA	NA	NA	18 J	10 U	10 U	620	50 U

Analyte	Units	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[2]	S-3-EFA-2 4-7 ft bgs	S-3-EFA-3 10-13 ft bgs	S-4-EFA-0 0-1 ft bgs	S-4-EFA-1 1-4 ft bgs	S-4-EFA-2 4-7 ft bgs	S-5-EFA-0 0-1 ft bgs	S-5-EFA-1 1-4 ft bgs	S-5-EFA-2 4-7 ft bgs	S-5-EFA-3 7-10 ft bgs
Metals												
Arsenic	mg/kg	7	20	3.6	6.5	13.6	5.4	6.3	**21**	6.1	6.5	4.5
Cadmium	mg/kg	1.2	36	0.3	1	0.6 U	0.2 U	0.5	0.6	0.2 U	0.5	0.3 U
Chromium	mg/kg	2,000	135	31.9	45.5	65	43.1	55.8	83	44	46.5	108
Copper	mg/kg	36	550	50.5	38.2	**1080**	51.9	**1090**	701	41	58.1	29.2
Lead	mg/kg	1,000	220	25	74	33	8	**685**	96	6	172	50
Mercury	mg/kg	0.072	9	0.06 U	0.09 U	0.13	0.06	3.18	0.06	0.06 U	0.54	0.16
Nickel	mg/kg	48	1,850	30	38	52	42	72	63	39	37	54
Zinc	mg/kg	100	570	90.8	134	**677**	83.7	**626**	651	62.6	201	75
Volatile Organic Compounds												
Chloromethane	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
Bromomethane	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
Vinyl Chloride	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
Chloroethane	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
Methylene Chloride	µg/kg	20	--	3.7 U	6.5 U	3.2 U	3.5 U	3.9 U	3.4 U	3.7 U	4.1 U	4.5
Acetone	µg/kg	350,000,000	--	7.4 U	140	5.3 U	13 U	38 U	5.6 U	38 U	220	100
Carbon Disulfide	µg/kg	350,000,000	--	1.2 U	4.9	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
1,1-Dichlomethene	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
1,1-Dichlomethene	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
Trans-1,2-Dichloroethene	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
cis-1,2-Dichloroethene	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
Chloroform	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
1,2-Dichloroethane	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
2-Butanone	µg/kg	210,000,000	--	6.1 U	30	5.3 U	5.8 U	6.4 U	5.6 U	6.1 U	32	18
1,1,1-Trichloroethane	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
Carbon Tetrachloride	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
Vinyl Acetate	µg/kg	--	--	R	R	R	R	R	5.6 U	6.1 U	6.9 U	6.6 U
Bromodichloromethane	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
1,2-Dichloropropane	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
cis-1,3-Dlchloropropane	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
Trichloroethene	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
Dibromochloromethane	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
1,1,2-Trichloroethane	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
Benzene	µg/kg	30	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	3.3	1.3 U
trans-1,3-Dichlorapropene	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
Bromoform	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
4-Methyl-2-Pentanone	µg/kg	--	--	6.1 U	11 U	5.3 U	5.8 U	6.4 U	5.6 U	6.1 U	6.9 U	6.6 U
2-Hexanone	µg/kg	--	--	6.1 U	11 U	5.3 U	5.8 U	6.4 U	5.6 U	6.1 U	6.9 U	6.6 U
Tetrachloroethene	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
1,1,2,2-Tetrachloroethane	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
Toluene	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
Chlorobenzene	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
Ethylbenzene	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
Styrene	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
Trichlorofluoromethane	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U

TABLE 4
HISTORICAL SOIL ANALYTICAL RESULTS (2002 RI)
RI/FS WORK PLAN
DAKOTA CREEK SITE

Analyte	Units	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[2]	S-3-EFA-2 4-7 ft bgs	S-3-EFA-3 10-13 ft bgs	S-4-EFA-0 0-1 ft bgs	S-4-EFA-1 1-4 ft bgs	S-4-EFA-2 4-7 ft bgs	S-5-EFA-0 0-1 ft bgs	S-5-EFA-1 1-4 ft bgs	S-5-EFA-2 4-7 ft bgs	S-5-EFA-3 7-10 ft bgs
1,1,2-Trichlorotrifluoroethane	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
m,p-Xylene	µg/kg	9	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
o-Xylene	µg/kg	9	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
1,2-Dichlorobenzene	µg/kg	15,000	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
1,3-Dichlorobenzene	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
1,4-Dichlorobenzene	µg/kg	81	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
Acrolein	µg/kg	--	--	61 U	110 U	53 U	58 U	64 U	56 U	61 U	69 U	66 U
Methyl Iodide	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
Bromoethane	µg/kg	--	--	2.4 U	4.3 U	2.1 U	2.3 U	2.6 U	2.2 U	2.4 U	2.8 U	2.7 U
Acrylonitrite	µg/kg	--	--	6.1 U	11 U	5.3 U	5.8 U	6.4 U	5.6 U	6.1 U	6.9 U	6.6 U
1,1-Dichloropropene	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
Dibromomethane	µg/kg	--	--	1.2 U	4.3 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
1,1,1,2-Tetrachloroethane	µg/kg	--	--	1.2 U	11 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
1,2-Dibromo-3-Chloropropane	µg/kg	--	--	6.1 U	2.2 U	5.3 U	5.8 U	6.4 U	5.6 U	6.1 U	6.9 U	6.6 U
1,2,3-Trichlompropane	µg/kg	--	--	1.2 U	2.2 U	2.1 U	2.3 U	2.6 U	2.2 U	2.4 U	2.8 U	2.7 U
trans-1,4-Dichloro-2-Butene	µg/kg	--	--	1.2 U	2.2 U	5.3 U	5.8 U	1.3 U	5.6 U	6.1 U	6.9 U	6.6 U
1,3,5-Trimethylbenzene	µg/kg	180,000,000	--	6.1 U	11 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
1,2,4-Trimethylbenzene	µg/kg	180,000,000	--	1.2 U	4.3 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
Hexachlorobuladiene	µg/kg	--	--	1.2 U	11 U	5.3 U	5.8 U	6.4 U	5.6 U	6.1 U	6.9 U	6.6 U
Ethylene Dibromide	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
Bromochloromethane	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
Analyte	**Units**	**Preliminary Soil Cleanup Level[1]**	**Simplified TEE Industrial Soil Concentration[2]**	**S-3-EFA-2 4-7 ft bgs**	**S-3-EFA-3 10-13 ft bgs**	**S-4-EFA-0 0-1 ft bgs**	**S-4-EFA-1 1-4 ft bgs**	**S-4-EFA-2 4-7 ft bgs**	**S-5-EFA-0 0-1 ft bgs**	**S-5-EFA-1 1-4 ft bgs**	**S-5-EFA-2 4-7 ft bgs**	**S-5-EFA-3 7-10 ft bgs**
2,2-Dichloropropane	µg/kg	--	--	1.2 U	11 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
1,3-Dichloropropane	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
Isopropylbenzene	µg/kg	350,000,000	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
n-Propyl Benzene	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
Bromobenzene	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
2-Chlorotoluene	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
4-Chlorotoluene	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
tert-Butylbenzene	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
sec-Butylbenzene	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
4-Isoprapyltoluene	µg/kg	--	--	1.2 U	2.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.2 U	1.4 U	1.3 U
n-Butylbenzene	µg/kg	--	--	2.4 U	4.3 U	2.1 U	2.3 U	2.8 U	2.2 U	2.4 U	2.8 U	2.7 U
1,2,4-Trichlorobenzene	µg/kg	--	--	6.1 U	11 U	5.3 U	5.8 U	6.4 U	5.6 U	6.1 U	6.9 U	6.6 U
Naphthalene	µg/kg	5,000	--	6.1 U	11 U	5.3 U	5.8 U	6.4 U	5.6 U	6.1 U	6.9 U	6.6 U
1,2,3-Trichlorobenzene	µg/kg	--	--	6.1 U	11 U	5.3 U	5.8 U	6.4 U	5.6 U	6.1 U	6.9 U	6.6 U
Semivolatile Organic Compounds		--										
Phenol	µg/kg	--	--	160 U	210 U	140 U	160 U	160 U	140 U	160 U	190 U	200 U
Bis(chloroethyl) Ether	µg/kg	--	--	160 U	210 U	140 U	160 U	160 U	140 U	160 U	190 U	200 U
2-Chlorophenol	µg/kg	--	--	80 U	110 U	71 U	82 U	82 U	70 U	82 U	96 U	99 U
1,3-Dichlorobenzene	µg/kg	--	--	80 U	110 U	71 U	82 U	82 U	70 U	82 U	96 U	99 U
1,4-Dichlorobenzene	µg/kg	--	--	80 U	110 U	71 U	82 U	82 U	70 U	82 U	96 U	99 U
Benzyl Alcohol	µg/kg	--	--	400 U	530 U	350 U	410 U	410 U	350 U	410 U	480 U	500 U
1,2-Dichlorobenzene	µg/kg	--	--	80 U	110 U	71 U	82 U	82 U	70 U	82 U	96 U	99 U
Benzaldehyde	µg/kg	--	--	80 U	110 U	71 U	82 U	82 U	70 U	82 U	96 U	99 U
2-Methyiphenol	µg/kg	--	--	80 U	110 U	71 U	82 U	82 U	70 U	82 U	96 U	99 U
2,2'-Oxybis(1-chloropropane)	µg/kg	--	--	80 U	110 U	71 U	82 U	82 U	70 U	82 U	96 U	99 U
4-Methylphenol	µg/kg	--	--	160 U	210 U	140 U	160 U	160 U	140 U	160 U	190 U	200 U
N-Nitroso-di-n-propylamene	µg/kg	--	--	160 U	210 U	140 U	160 U	160 U	140 U	160 U	190 U	200 U
Hexachloroethane	µg/kg	--	--	80 U	110 U	71 U	82 U	82 U	70 U	82 U	96 U	99 U
Nitrobenzene	µg/kg	--	--	80 U	110 U	71 U	82 U	82 U	70 U	82 U	96 U	99 U
Isophorone	µg/kg	--	--	400 U	530 U	350 U	410 U	410 U	350 U	410 U	480 U	500 U
2-Nitrophenol	µg/kg	--	--	240 U	320 U	210 U	240 U	240 U	210 U	240 U	290 U	300 U
2,4-Dimethylphenol	µg/kg	--	--	800 U	1100 U	710 U	620 U	820 U	700 U	820 U	960 U	990 U
Benzoic Acid	µg/kg	--	--	80 U	110 U	71 U	62 U	62 U	70 U	62 U	96 U	99 U
Bis(2-chloroethoxy)methane	µg/kg	--	--	240 U	320 U	210 U	240 U	250 U	210 U	240 U	290 U	99 U
2,4-Dichlorophenol	µg/kg	--	--	80 U	110 U	71 U	62 U	62 U	70 U	62 U	96 U	99 U
1,2,4-Trichlorobenzene	µg/kg	--	--	80 U	110 U	71 U	62 U	62 U	70 U	62 U	96 U	99 U
Naphthalene	µg/kg	--	--	240 U	320 U	210 U	160 U	160 U	210 U	240 U	290 U	300 U
4-Chloroanline	µg/kg	--	--	160 U	210 U	140 U	160 U	160 U	140 U	160 U	190 U	200 U

TABLE 4
HISTORICAL SOIL ANALYTICAL RESULTS (2002 RI)
RI/FS WORK PLAN
DAKOTA CREEK SITE

Analyte	Units	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[2]	S-3-EFA-2 4-7 ft bgs	S-3-EFA-3 10-13 ft bgs	S-4-EFA-0 0-1 ft bgs	S-4-EFA-1 1-4 ft bgs	S-4-EFA-2 4-7 ft bgs	S-5-EFA-0 0-1 ft bgs	S-5-EFA-1 1-4 ft bgs	S-5-EFA-2 4-7 ft bgs	S-5-EFA-3 7-10 ft bgs
Hexachlorobutadlene	µg/kg	--	--	160 U	210 U	140 U	82 U	82 U	140 U	160 U	190 U	200 U
4-Chloro-3-methylphenol	µg/kg	--	--	80 U	110 U	71 U	410 U	410 U	70 U	82 U	96 U	99 U
2-Methylnaphthalene	µg/kg	--	--	400 U	530 U	350 U	410 U	410 U	350 U	410 U	480 U	500 U
Hexachlorocydopentadiene	µg/kg	--	--	400 U	530 U	350 U	410 U	410 U	350 U	410 U	480 U	500 U
2,4,6-Trichlorophenol	µg/kg	--	--	400 U	530 U	350 U	82 U	82 U	350 U	410 U	480 U	500 U
2,4,5-Trichlorophenol	µg/kg	--	--	80 U	110 U	71 U	410 U	410 U	70 U	82 U	96 U	99 U
2-Chloronaphthalene	µg/kg	--	--	400 U	530 U	350 U	82 U	82 U	350 U	410 U	480 U	500 U
2-Nitroaniline	µg/kg	--	--	80 U	110 U	71 U	82 U	82 U	70 U	82 U	96 U	99 U
Acenaphthylene	µg/kg	--	--	80 U	110 U	71 U	490 U	490 U	70 U	82 U	960 U	590 U
3-Nitroaniline	µg/kg	--	--	480 U	640 U	420 U	82 U	82 U	420 U	490 U	580 U	500 U
Acenaphthene	µg/kg	65,000	--	80 U	110 U	71 U	820 U	820 U	70 U	82 U	96 U	99 U
2,4-Dinitrophenol	µg/kg	--	--	800 U	1100 U	710 U	410 U	410 U	700 U	820 U	960 U	99 U
4-Nitrophenol	µg/kg	--	--	400 U	530 U	350 U	82 U	82 U	350 U	410 U	480 U	590 U
Dibenzofuran	µg/kg	7,000,000	--	80 U	110 U	71 U	820 U	820 U	70 U	82 U	96 U	99 U
2,6-Dinitrotoluene	µg/kg	--	--	400 U	530 U	350 U	410 U	410 U	350 U	410 U	480 U	500 U
2,4-Dinitrotoluene	µg/kg	--	--	400 U	530 U	350 U	410 U	410 U	350 U	410 U	480 U	500 U
Diethyl Phthalate	µg/kg	--	--	80 U	110 U	71 U	82 U	82 U	70 U	82 U	96 U	99 U
4-Chlorophenyl Phenyl Ether	µg/kg	--	--	80 U	110 U	71 U	82 U	82 U	70 U	82 U	96 U	99 U
Fluorene	µg/kg	550,000	--	80 U	110 U	71 U	82 U	82 U	70 U	82 U	96 U	99 U
4-Nitroaniline	µg/kg	--	--	400 U	530 U	350 U	410 U	410 U	350 U	410 U	480 U	500 U
2-Methyl-4,6-dinotrophenol	µg/kg	--	--	800 U	1100 U	710 U	820 U	820 U	700 U	820 U	960 U	990 U
N-Nitrosodiphenylamine	µg/kg	--	--	80 U	110 U	71 U	82 U	82 U	70 U	82 U	96 U	99 U
4-Bromophenyl Phenyl Ether	µg/kg	--	--	80 U	110 U	71 U	82 U	82 U	70 U	82 U	96 U	99 U
Hexachlorobenzene	µg/kg	--	--	80 U	110 U	71 U	82 U	82 U	70 U	82 U	96 U	99 U
Pentachlorophenol	µg/kg	--	11,000	400 U	530 U	350 U	410 U	410 U	350 U	410 U	480 U	500 U
Phenanthrene	µg/kg	--	--	80 U	110 U	83	82 U	450	120	82 U	96 U	99 U
Carbazole	µg/kg	6,600,000	--	80 U	110 U	71 U	82 U	82 U	70 U	82 U	96 U	99 U
Anthracene	µg/kg	12,000,000	--	80 U	110 U	71 U	82 U	120	70 U	82 U	96 U	99 U
Analyte	**Units**	**Preliminary Soil Cleanup Level[1]**	**Simplified TEE Industrial Soil Concentration[2]**	**S-3-EFA-2 4-7 ft bgs**	**S-3-EFA-3 10-13 ft bgs**	**S-4-EFA-0 0-1 ft bgs**	**S-4-EFA-1 1-4 ft bgs**	**S-4-EFA-2 4-7 ft bgs**	**S-5-EFA-0 0-1 ft bgs**	**S-5-EFA-1 1-4 ft bgs**	**S-5-EFA-2 4-7 ft bgs**	**S-5-EFA-3 7-10 ft bgs**
Di-n-butyl Phthalate	µg/kg	100,000	--	80 U	110 U	71 U	82 U	82 U	70 U	82 U	96 U	99 U
Fluoranthene	µg/kg	89,000	--	80 U	110 U	120	82 U	2000	330	82 U	190	99 U
Pyrene	µg/kg	3,500,000	--	80 U	110 U	100	82 U	1800 J	250	82 U	200	99 U
Butyl Benzyl Phthalate	µg/kg	370	--	80 U	110 U	120	82 U	82 U	70 U	82 U	96 U	99 U
3,3'-Dichlorobenzidine	µg/kg	--	--	400 U	530 U	350 U	410 U	410 U	350 U	410 U	480 U	500 U
Benz(a)anthracene	µg/kg	130	--	80 U	110 U	71 U	82 U	940	150	82 U	96 U	99 U
Bis(2-ethylhexyl) Phthalate	µg/kg	4,800	--	80 U	110 U	130	82 U	150	4300	82 U	96 U	99 U
Chrysene	µg/kg	140	--	80 U	110 U	77	82 U	1100	190	82 U	96 U	99 U
Di-n-octyl Phthalate	µg/kg	--	--	80 U	110 U	71 U	82 U	82 U	70 U	82 U	96 U	99 U
Benzo(b)Fluoranthene	µg/kg	430	--	80 U	110 U	71 U	82 U	920	190	82 U	96 U	99 U
Benzo(k)fluoranthene	µg/kg	430	--	80 U	110 U	71	82 U	1100	240	82 U	96 U	99 U
Benzo(a)pyrene	µg/kg	350	300,000	80 U	110 U	71 U	82 U	1000	180	82 U	99	99 U
Indeno(1,2,3-cd)pyrene	µg/kg	1,300	--	80 U	110 U	71 U	82 U	640	210	82 U	96 U	99 U
Dibenz(a,h)anthracene	µg/kg	650	--	80 U	110 U	71 U	82 U	130	70 U	82 U	96 U	99 U
Benzo(g,h,i)perylene	µg/kg	--	--	80 U	110 U	71 U	82 U	560	220	82 U	96 U	99 U
Petroleum Hydrocarbons												
TPH-G	mg/kg	100	12,000	7.2 U	17 U	5.5 U	6.4 U	7.8 U	6.3 U	6.7 U	8.4 U	7.8 U
TPH-D	mg/kg	2,000	15,000	19	19 J	97	6.6 J	130 J	68	9.3	10	8.2 J
TPH-O	mg/kg	2,000	--	22	55 J	340	24 J	220	220	15	23	35 J

Analyte	Units	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[2]	S-5-EFA-4 10-13 ft BGS	S-6-TPH-0 0-1 ft BGS	S-6-TPH-1 1-4 ft BGS	Duplicate of S-6-TPH-1	S-6-TPH-2 4-7 ft BGS	S-7-TPH-0 0-1 ft BGS	S-7-TPH-1 1-4 ft BGS	S-7-TPH-2 4-7 ft BGS	S-7-TPH-3 7-10 ft BGS
Metals												
Arsenic	mg/kg	7	20	3.1	8	3.9	3.8	4.1	**74**	**45**	6.2	1.8
Cadmium	mg/kg	1.2	36	0.3	0.3	0.3	0.3	1	0.4	0.4	1.1	0.3
Chromium	mg/kg	2,000	135	43.4	94.3	36.9	40.9	26.1	62	36.2	27.2	18.8
Copper	mg/kg	36	550	40.8	492	30.7	25.1	131	411	189	63	6.2
Lead	mg/kg	1,000	220	4	26	25 J	16 J	160	58	78	94	4
Mercury	mg/kg	0.072	9	0.06	0.27	0.12	0.09	0.17	0.29	0.52	0.18	0.05 U
Nickel	mg/kg	48	1,850	43	105	36	41	22	66.3	39	28	12
Zinc	mg/kg	100	570	51.2	227	65.9	73.1	166	364	277	**606**	28.1
Volatile Organic Compounds												
Chloromethane	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
Bromomethane	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl Chloride	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
Chloroethane	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
Methylene Chloride	ug/kg	20	--	3.4 U	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	ug/kg	350,000,000	--	27	NA	NA	NA	NA	NA	NA	NA	NA
Carbon Disulfide	ug/kg	350,000,000	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
1, 1-Dichloroethane	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
1, 1-Dichloroethane	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
trans-1,2-Dichloroethane	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,2-Dicholoroethane	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
Chloroform	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethane	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
2-Butanone	ug/kg	210,000,000	--	5.7 U	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1-Trichlorethane	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
Carbon Tetrachloride	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl Acetate	ug/kg	--	--	5.7 U	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloropropane	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,3-Dichloropropane	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethane	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
Dibromochloromethane	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichloroethane	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
Benzene	ug/kg	30	--	1.1 U	57 U	66 U	71 U	93 U	54 U	61 U	84 U	78 U
trans-1,3-Dichloropropane	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
Bromoform	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
4-Methyl-2Pentanone	ug/kg	--	--	5.7 U	NA	NA	NA	NA	NA	NA	NA	NA
2-Hexanone	ug/kg	--	--	5.7 U	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethane	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	ug/kg	7,000	--	1.1 U	57 U	66 U	71 U	93 U	54 U	61 U	84 U	78 U
Chlorobenzena	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	ug/kg	6,000	--	1.1 U	57 U	66 U	71 U	93 U	54 U	61 U	84 U	78 U
Styrene	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
Trichlorofluoromethane	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
1,1,2-Trichlorofluoroethane	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
m,p-Xylene	ug/kg	9,000	--	1.1 U	57 U	66 U	71 U	93 U	54 U	61 U	84 U	78 U
o-Xylene	ug/kg	9,000	--	1.1 U	57 U	66 U	71 U	93 U	54 U	61 U	90	78 U
1,2-Dichlorobenzene	ug/kg	15,000	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	ug/kg	81	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
Acrolein	ug/kg	--	--	57 U	NA	NA	NA	NA	NA	NA	NA	NA
Methyl Iodide	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
Bromoethane	ug/kg	--	--	2.3 U	NA	NA	NA	NA	NA	NA	NA	NA
Acrylonitrille	ug/kg	--	--	5.7 U	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloropropane	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
Dibromomethane	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
1,1,1,2-Tetrachloroethane	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dibromo-3-Cholorpropane	ug/kg	--	--	5.7 U	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichloropropane	ug/kg	--	--	2.3 U	NA	NA	NA	NA	NA	NA	NA	NA
trans-1,4-Dichloro-2-Butene	ug/kg	--	--	5.7 U	NA	NA	NA	NA	NA	NA	NA	NA
1,3,5-Trimethylbenzene	ug/kg	180,000,000	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	ug/kg	180,000,000	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadiene	ug/kg	--	--	5.7 U	NA	NA	NA	NA	NA	NA	NA	NA
Ethylene Dibromide	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
Bromochloromethane	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
2,2-Dichloropropane	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA

TABLE 4
HISTORICAL SOIL ANALYTICAL RESULTS (2002 RI)
RI/FS WORK PLAN
DAKOTA CREEK SITE

Analyte	Units	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[2]	S-5-EFA-4 10-13 ft BGS	S-6-TPH-0 0-1 ft BGS	S-6-TPH-1 1-4 ft BGS	Duplicate of S-6-TPH-1	S-6-TPH-2 4-7 ft BGS	S-7-TPH-0 0-1 ft BGS	S-7-TPH-1 1-4 ft BGS	S-7-TPH-2 4-7 ft BGS	S-7-TPH-3 7-10 ft BGS
1,3-Dichloropropane	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	ug/kg	350,000,000	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
n-Propyl Benzene	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
Bromobenzene	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorotuluene	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
4-Chlorotuluene	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
tert-Butylbenzene	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
4-Isopropyltoluene	ug/kg	--	--	1.1 U	NA	NA	NA	NA	NA	NA	NA	NA
n-Butylbenzene	ug/kg	--	--	2.3 U	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichloronbenzene	ug/kg	--	--	5.7 U	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	ug/kg	5,000	--	5.7 U	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	ug/kg	--	--	5.7 U	NA	NA	NA	NA	NA	NA	NA	NA
Semivolatile Organic Compounds		--										
Phenol	µg/kg	--	--	160 U	NA	NA	NA	NA	NA	NA	NA	NA
Bis(chloroethyl) Ether	µg/kg	--	--	160 U	NA	NA	NA	NA	NA	NA	NA	NA
2-Chlorophenol	µg/kg	--	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
1,3-Dichlorobenzene	µg/kg	--	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	µg/kg	--	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
Benzyl Alcohol	µg/kg	--	--	400 U	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	µg/kg	--	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
Benzaldehyde	µg/kg	--	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
2-Methyiphenol	µg/kg	--	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
2,2'-Oxybis(1-chloropropane)	µg/kg	--	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
4-Methylphenol	µg/kg	--	--	160 U	NA	NA	NA	NA	NA	NA	NA	NA
N-Nitroso-di-n-propylamene	µg/kg	--	--	160 U	NA	NA	NA	NA	NA	NA	NA	NA
Hexachloroethane	µg/kg	--	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
Nitrobenzene	µg/kg	--	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
Isophorone	µg/kg	--	--	400 U	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitrophenol	µg/kg	--	--	240 U	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dimethylphenol	µg/kg	--	--	800 U	NA	NA	NA	NA	NA	NA	NA	NA
Benzoic Acid	µg/kg	--	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
Bis(2-chloroethoxy)methane	µg/kg	--	--	240 U	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dichlorophenol	µg/kg	--	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	µg/kg	--	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	µg/kg	--	--	240 U	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloroanline	µg/kg	--	--	160 U	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobutadlene	µg/kg	--	--	160 U	NA	NA	NA	NA	NA	NA	NA	NA
4-Chloro-3-methylphenol	µg/kg	--	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	µg/kg	--	--	400 U	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorocydopentadiene	µg/kg	--	--	400 U	NA	NA	NA	NA	NA	NA	NA	NA
2,4,6-Trichlorophenol	µg/kg	--	--	400 U	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	µg/kg	--	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	µg/kg	--	--	400 U	NA	NA	NA	NA	NA	NA	NA	NA
2-Nitroaniline	µg/kg	--	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	µg/kg	--	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
3-Nitroaniline	µg/kg	--	--	480 U	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	µg/kg	65,000	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrophenol	µg/kg	--	--	800 U	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitrophenol	µg/kg	--	--	400 U	NA	NA	NA	NA	NA	NA	NA	NA

Analyte	Units	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[2]	S-5-EFA-4 10-13 ft BGS	S-6-TPH-0 0-1 ft BGS	S-6-TPH-1 1-4 ft BGS	Duplicate of S-6-TPH-1	S-6-TPH-2 4-7 ft BGS	S-7-TPH-0 0-1 ft BGS	S-7-TPH-1 1-4 ft BGS	S-7-TPH-2 4-7 ft BGS	S-7-TPH-3 7-10 ft BGS
Dibenzofuran	µg/kg	7,000,000	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
2,6-Dinitrotoluene	µg/kg	--	--	400 U	NA	NA	NA	NA	NA	NA	NA	NA
2,4-Dinitrotoluene	µg/kg	--	--	400 U	NA	NA	NA	NA	NA	NA	NA	NA
Diethyl Phthalate	µg/kg	--	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
4-Chlorophenyl Phenyl Ether	µg/kg	--	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	µg/kg	550,000	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
4-Nitroaniline	µg/kg	--	--	400 U	NA	NA	NA	NA	NA	NA	NA	NA
2-Methyl-4,6-dinotrophenol	µg/kg	--	--	800 U	NA	NA	NA	NA	NA	NA	NA	NA
N-Nitrosodiphenylamine	µg/kg	--	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
4-Bromophenyl Phenyl Ether	µg/kg	--	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene	µg/kg	--	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
Pentachlorophenol	µg/kg	--	11,000	400 U	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	µg/kg	--	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
Carbazole	µg/kg	6,600,000	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	µg/kg	12,000,000	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-butyl Phthalate	µg/kg	100,000	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	µg/kg	89,000	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
Analyte	Units	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[2]	S-5-EFA-4 10-13 ft BGS	S-6-TPH-0 0-1 ft BGS	S-6-TPH-1 1-4 ft BGS	Duplicate of S-6-TPH-1	S-6-TPH-2 4-7 ft BGS	S-7-TPH-0 0-1 ft BGS	S-7-TPH-1 1-4 ft BGS	S-7-TPH-2 4-7 ft BGS	S-7-TPH-3 7-10 ft BGS
Pyrene	µg/kg	3,500,000	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
Butyl Benzyl Phthalate	µg/kg	370	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
3,3'-Dichlorobenzidine	µg/kg	--	--	400 U	NA	NA	NA	NA	NA	NA	NA	NA
Benz(a)anthracene	µg/kg	130	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
Bis(2-ethylhexyl) Phthalate	µg/kg	4,800	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	µg/kg	140	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-octyl Phthalate	µg/kg	--	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)Fluoranthene	µg/kg	430	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	µg/kg	430	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	µg/kg	350	300,000	80 U	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	µg/kg	1,300	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	µg/kg	650	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	µg/kg	--	--	80 U	NA	NA	NA	NA	NA	NA	NA	NA
PAHs		--										
Naphthalene	µg/kg	5,000	--	NA	36 U	8.1 U	14	12	7.6 U	220 U	120	8.3 U
2-Methylnaphthalene	µg/kg	5,000	--	NA	36 U	8.1 U	53 J	9.8	9.9	220 U	1300	110
Acenaphthylene	µg/kg	--	--	NA	36 U	8.1 U	8 U	120	8.4 M	220 U	110 U	8.3 U
Acenaphthene	µg/kg	65,000	--	NA	36 U	8.1 U	12 M	11	7.6 U	220 U	95 M	9.1 M
Fluorene	µg/kg	550,000	--	NA	36 U	8.1 U	43 J	37	7.6 U	220 U	490	41
Phenanthrene	µg/kg	--	--	NA	100	11 J	59 J	370	84	300	820	54
Anthracene	µg/kg	12,000,000	--	NA	36 U	8.1 U	8 U	110 M	18 M	220 U	54 U	8.3 U
Fluoranthene	µg/kg	89,000	--	NA	260	10	22	1200 D	200	220 U	68 M	8.3 U
Pyrene	µg/kg	3,500,000	--	NA	250	13 J	30 J	1100 D	180	220 U	160	8.3 U
Benzo(a)anthracene	µg/kg	130	--	NA	130	8.1 U	8	670	89	220 U	45	8.3 U
Chrysene	µg/kg	140	--	NA	180	8.1 U	11 M	600	150	220 U	90 M	8.3 U
Benzo(b)fluoranthene	µg/kg	430	--	NA	160	8.1 U	8.8	510	160	220 U	59	8.3 U
Benzo(k)Fluoranthene	µg/kg	430	--	NA	150 m	8.1 U	8 U	470	120	220 U	63	8.3 U
Benzo(a)pyrene	µg/kg	350	300,000	NA	150	8.1 U	8 U	570	110	220 U	68	8.3 U
Indeno(l,2,3-cd)pyrene	µg/kg	1,300	--	NA	94	8.1 U	8 U	390	130	220 U	77	8.3 U
Dibenz(a,h)anthracene	µg/kg	650	--	NA	36 U	8.1 U	8 U	81	27	220 U	45 U	8.3 U
Benzo(g,h,i)perylene	µg/kg	--	--	NA	94	8.1 U	8	320	120	220 U	77	8.3 U
Dibenzofuran	µg/kg	7,000,000	--	NA	36 U	8.1 U	8 U	11	7.6 U	220 U	81	8.3 U
Petroleum Hydrocarbons												
TPH-G	mg/kg	100	12,000	6.8 U	5.7 U	6.6 U	7.1 U	9.3 U	5.4 U	68	560	7.8 U
TPH-D	mg/kg	2,000	15,000	5 U	46 J	65 J	330 J	68 J	48	4400	7600 J	360 J
TPH-O	mg/kg	2,000	--	10 U	230	42 J	100 J	91	76	500 U	500 U	40 U
PCBs												
Aroclor 1016	µg/kg	4	2,000	NA	36 U	40 U	40 U	45 U	35 U	37 UJ	46 U	41 U
Aroclor 1242	µg/kg	4	2,000	NA	36 U	40 U	40 U	45 U	35 U	37 UJ	46 U	41 U
Aroclor 1248	µg/kg	4	2,000	NA	36 U	40 U	40 U	45 U	35 U	37 UJ	46 U	41 U
Aroclor 1254	µg/kg	4	2,000	NA	36 U	40 U	40 U	45 U	35 U	37 UJ	46 U	41 U
Aroclor 1260	µg/kg	4	2,000	NA	36 U	40 U	40 U	45 U	35 U	37 UJ	46 U	41 U
Aroclor 1221	µg/kg	4	2,000	NA	36 U	40 U	40 U	45 U	69 U	74 UJ	46 U	41 U
Aroclor 1232	µg/kg	4	2,000	NA	72 U	81 U	80 U	90 U	35 U	37 UJ	92 U	83 U
Aroclor 1262	µg/kg	4	2,000	NA	36 U	40 U	40 U	45 U	42 U	120 J	46 U	41 U
Total PCBs	µg/kg	4	2,000	NA	ND	ND	ND	ND	ND	120 J	ND	ND

TABLE 4
HISTORICAL SOIL ANALYTICAL RESULTS (2002 RI)
RI/FS WORK PLAN
DAKOTA CREEK SITE

Analyte	Units	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[2]	*S-8-TPH-0 0-1 FT BGS*	*S-8-TPH-1 1-4 FT BGS*	*S-8-TPH-2 4-7 FT BGS*	*S-8-TPH-3 7-10 FT BGS*	S-9-CPH-0 0-1 FT BGS	Duplicate of S-9-CPH-0	S-9-CPH-1 1-4 FT BGS	S-9-CPH-2 4-7 FT BGS	S-9-CPH-3 7-9 FT BGS
Metals												
Arsenic	mg/kg	7	20	NA	NA	NA	NA	5.3	5.9	2.3	2.6	7.2
Cadmium	mg/kg	1.2	36	NA	NA	NA	NA	0.6	0.5	0.2 U	0.2 U	0.5
Chromium	mg/kg	2,000	135	NA	NA	NA	NA	46.9	58.9	16.4	21.1	23
Copper	mg/kg	36	550	NA	NA	NA	NA	141	201	12.2	17.5	39.1
Lead	mg/kg	1,000	220	NA	NA	NA	NA	14 J	21 J	2	21	270
Mercury	mg/kg	0.072	9	NA	NA	NA	NA	0.11	0.11	0.05 U	0.05 U	0.39
Nickel	mg/kg	48	1,850	NA	NA	NA	NA	59	70	28	31	24
Zinc	mg/kg	100	570	NA	NA	NA	NA	**806**	**1090**	26.6	56.8	219
Volatile Organic Compounds												
Chloromethane	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
Bromomethane	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
Vinyl Chloride	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
Chloroethane	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
Methylene Chloride	ug/kg	20	--	NA	NA	NA	NA	3.2 U	8.1 U	3.4 U	3.5 U	56 U
Acetone	ug/kg	350,000,000	--	NA	NA	NA	NA	5.3 U	5.4 U	5.6 U	7.4 U	320 U
Carbon Disulfide	ug/kg	350,000,000	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	70
1, 1-Dichloroethane	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
1, 1-Dichloroethane	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
trans-1,2-Dichloroethane	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
cis-1,2-Dicholoroethane	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
Chloroform	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
1,2-Dichloroethane	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
2-Butanone	ug/kg	210,000,000	--	NA	NA	NA	NA	5.3 U	5.4 U	5.6 U	5.8 U	81 U
1,1,1-Trichlorethane	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
Carbon Tetrachloride	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
Vinyl Acetate	ug/kg	--	--	NA	NA	NA	NA	5.3 U	5.4 U	5.6 U	5.8 U	81 U
Bromodichloromethane	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
1,2-Dichloropropane	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
cis-1,3-Dichloropropane	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
Trichloroethane	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
Dibromochloromethane	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
1,1,2-Trichloroethane	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
Benzene	ug/kg	30	--	60 U	61 U	82 U	350 U	1.1 U	1.1 U	1.1 U	1.2 U	16 U
trans-1,3-Dichloropropane	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
Bromoform	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
4-Methyl-2Pentanone	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
2-Hexanone	ug/kg	--	--	NA	NA	NA	NA	5.3 U	5.4 U	5.6 U	5.8 U	81 U
Tetrachloroethane	ug/kg	--	--	NA	NA	NA	NA	5.3 U	5.4 U	5.6 U	5.8 U	81 U
1,1,2,2-Tetrachloroethane	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
Toluene	ug/kg	7,000	--	110	130	82 U	350 U	1.1 U	1.2	1.1 U	1.2 U	16 U
Chlorobenzena	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
Ethylbenzene	ug/kg	6,000	--	67	70	82 U	350 U	1.1 U	1.1 U	1.1 U	1.2 U	28
Styrene	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
Trichlorofluoromethane	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
1,1,2-Trichlorofluoroethane	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
m,p-Xylene	ug/kg	9,000	--	60 U	61 U	82 U	350 U	1.1 U	1.1 U	1.1 U	1.2 U	66
o-Xylene	ug/kg	9,000	--	130	140	82 U	350 U	1.1 U	1.1 U	1.1 U	1.2 U	58
1,2-Dichlorobenzene	ug/kg	15,000	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	110
1,3-Dichlorobenzene	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
1,4-Dichlorobenzene	ug/kg	81	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	38 M
Acrolein	ug/kg	--	--	NA	NA	NA	NA	53 U	54 U	56 U	58 U	810 U
Methyl Iodide	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
Bromoethane	ug/kg	--	--	NA	NA	NA	NA	2.1 U	2.1 U	2.1 U	2.3 U	32 U
Acrylonitrille	ug/kg	--	--	NA	NA	NA	NA	5.3 U	5.4 U	5.6 U	5.8 U	81 U
1,1-Dichloropropane	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
Dibromomethane	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
1,1,1,2-Tetrachloroethane	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
1,2-Dibromo-3-Cholorpropane	ug/kg	--	--	NA	NA	NA	NA	5.3 U	5.4 U	5.6 U	5.8 U	81 U
1,2,3-Trichloropropane	ug/kg	--	--	NA	NA	NA	NA	2.1 U	2.1 U	2.1 U	2.3 U	32 U
trans-1,4-Dichloro-2-Butene	ug/kg	--	--	NA	NA	NA	NA	5.3 U	5.4 U	5.6 U	5.8 U	81 U
1,3,5-Trimethylbenzene	ug/kg	180,000,000	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	130
1,2,4-Trimethylbenzene	ug/kg	180,000,000	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	430
Hexachlorobutadiene	ug/kg	--	--	NA	NA	NA	NA	5.3 U	5.4 U	5.6 U	5.8 U	81 U
Ethylene Dibromide	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
Bromochloromethane	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U

Analyte	Units	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[2]	*S-8-TPH-0 0-1 FT BGS*	*S-8-TPH-1 1-4 FT BGS*	*S-8-TPH-2 4-7 FT BGS*	*S-8-TPH-3 7-10 FT BGS*	S-9-CPH-0 0-1 FT BGS	Duplicate of S-9-CPH-0	S-9-CPH-1 1-4 FT BGS	S-9-CPH-2 4-7 FT BGS	S-9-CPH-3 7-9 FT BGS
2,2-Dichloropropane	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
1,3-Dichloropropane	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
Isopropylbenzene	ug/kg	350,000,000	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	22
n-Propyl Benzene	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	30 M
Bromobenzene	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
2-Chlorotuluene	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
4-Chlorotuluene	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
tert-Butylbenzene	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	16 U
sec-Butylbenzene	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	31 M
4-Isopropyltoluene	ug/kg	--	--	NA	NA	NA	NA	1.1 U	1.1 U	1.1 U	1.2 U	110
n-Butylbenzene	ug/kg	--	--	NA	NA	NA	NA	2.1 U	2.1 U	2.2 U	2.3 U	90 M
1,2,4-Trichloronbenzene	ug/kg	--	--	NA	NA	NA	NA	5.3 U	5.4 U	5.6 U	5.8 U	81 U
Naphthalene	ug/kg	5,000	--	NA	NA	NA	NA	5.3 U	5.4 U	5.6 U	5.8 U	1,800
1,2,3-Trichlorobenzene	ug/kg	--	--	NA	NA	NA	NA	5.3 U	5.4 U	5.6 U	5.8 U	81 U
Petroleum Hydrocarbons		--										
TPH-G	mg/kg	100	12,000	130	310	50	35	5.6 U	5.6 U	6 U	6.5 U	47
TPH-D	mg/kg	2,000	15,000	970 J	1100 J	74 J	13 J	14 J	18 J	5.5 J	25 J	420 J
TPH-O	mg/kg	2,000	--	4100	780	76	26	52 J	60 J	10 U	23 J	330 J
Analyte	**Units**	**Preliminary Soil Cleanup Level[1]**	**Simplified TEE Industrial Soil Concentration[2]**	**S-9-CPH-3A 9-10 ft BGS**	**S-10-MR-0 0-1 ft BGS**	**S-10-MR-1 1-4 ft BGS**	**S-10-MR-2 4-7 ft BGS**	**S-10-MR-3 7-10 ft bgs**	***S-11-MR 0-1 ft BGS***	***S-12-MR-0 0-1 ft BGS***	***Dup of S-12-MR-0 0.7 ft BGS***	***S-13-MR 0-0.5 ft BGS***
Metals												
Arsenic	mg/kg	7	20	4.7	10.5	5.1	4.5	4.2	**39**	**124 J**	**240 J**	**270**
Cadmium	mg/kg	1.2	36	0.6	0.5 U	0.3	0.2 U	0.2 U	1 U	1	1 U	0.5 U
Chromium	mg/kg	2,000	135	28.3	104	26.9	39.6	30.6	81 J	122 J	134 J	52 J
Copper	mg/kg	36	550	17.5	120	132	36.8	23.2	**8200**	**2270 J**	**2260**	**1180**
Lead	mg/kg	1,000	220	84	74	47	9	8	**700 J**	**650 J**	**770 J**	220 J
Mercury	mg/kg	0.072	9	0.14	0.14	0.15	0.06	0.05 U	**22.4**	1.91	1.54	0.58
Nickel	mg/kg	48	1,850	24	173	26	42	28	67 J	56 J	65 J	22 J
Zinc	mg/kg	100	570	142	114	302	54.8	45.5	**2530**	**4320**	**4220**	**1520**
Volatile Organic Compounds												
Chloromethane	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
Bromomethane	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
Vinyl Chloride	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
Chloroethane	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
Methylene Chloride	ug/kg	20	--	4.3 U	3.1 U	3.5 U	37 U	17 U	NA	NA	NA	NA
Acetone	ug/kg	350,000,000	--	20 U	5.2 U	5.8 U	10 U	320	NA	NA	NA	NA
Carbon Disulfide	ug/kg	350,000,000	--	5.8	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
1, 1-Dichloroethane	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
1, 1-Dichloroethane	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
trans-1,2-Dichloroethane	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
cis-1,2-Dicholoroethane	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
Chloroform	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
1,2-Dichloroethane	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
2-Butanone	ug/kg	210,000,000	--	7.2 U	5.2 U	5.8 U	6.2 U	28 U	NA	NA	NA	NA
1,1,1-Trichlorethane	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
Carbon Tetrachloride	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
Vinyl Acetate	ug/kg	--	--	7.2 U	5.2 U	5.8 U	6.2 U	28 U	NA	NA	NA	NA
Bromodichloromethane	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
1,2-Dichloropropane	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
cis-1,3-Dichloropropane	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
Trichloroethane	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
Dibromochloromethane	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
1,1,2-Trichloroethane	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
Benzene	ug/kg	30	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
trans-1,3-Dichloropropane	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
Bromoform	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
4-Methyl-2Pentanone	ug/kg	--	--	7.2 U	5.2 U	5.8 U	6.2 U	28 U	NA	NA	NA	NA
2-Hexanone	ug/kg	--	--	7.2 U	5.2 U	5.8 U	6.2 U	28 U	NA	NA	NA	NA
Tetrachloroethane	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
Toluene	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA

TABLE 4
HISTORICAL SOIL ANALYTICAL RESULTS (2002 RI)
RI/FS WORK PLAN
DAKOTA CREEK SITE

Analyte	Units	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[2]	S-9-CPH-3A 9-10 ft BGS	S-10-MR-0 0-1 ft BGS	S-10-MR-1 1-4 ft BGS	S-10-MR-2 4-7 ft BGS	S-10-MR-3 7-10 ft bgs	*S-11-MR 0-1 ft BGS*	*S-12-MR-0 0-1 ft BGS*	*Dup of S-12-MR-0 0.7 ft BGS*	*S-13-MR 0-0.5 ft BGS*
Chlorobenzena	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
Ethylbenzene	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
Styrene	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
Trichlorofluoromethane	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
1,1,2-Trichlorofluoroethane	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
m,p-Xylene	ug/kg	9	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
o-Xylene	ug/kg	9	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
1,2-Dichlorobenzene	ug/kg	15,000	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
1,3-Dichlorobenzene	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
1,4-Dichlorobenzene	ug/kg	81	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
Acrolein	ug/kg	--	--	72 U	52 U	58 U	62 U	280 U	NA	NA	NA	NA
Methyl Iodide	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
Bromoethane	ug/kg	--	--	2.9 U	2.1 U	2.3 U	2.5 U	11 U	NA	NA	NA	NA
Acrylonitrille	ug/kg	--	--	7.2 U	5.2 U	5.8 U	6.2 U	28 U	NA	NA	NA	NA
1,1-Dichloropropane	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
Dibromomethane	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
1,1,1,2-Tetrachloroethane	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
1,2-Dibromo-3-Cholorpropane	ug/kg	--	--	7.2 U	5.2 U	5.8 U	6.2 U	28 U	NA	NA	NA	NA
1,2,3-Trichloropropane	ug/kg	--	--	2.9 U	2.1 U	2.3 U	2.5 U	11 U	NA	NA	NA	NA
trans-1,4-Dichloro-2-Butene	ug/kg	--	--	7.2 U	5.2 U	5.8 U	6.2 U	28 U	NA	NA	NA	NA
1,3,5-Trimethylbenzene	ug/kg	180,000,000	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
1,2,4-Trimethylbenzene	ug/kg	180,000,000	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
Hexachlorobutadiene	ug/kg	--	--	7.2 U	5.2 U	5.8 U	6.2 U	28 U	NA	NA	NA	NA
Ethylene Dibromide	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
Bromochloromethane	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
2,2-Dichloropropane	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
Analyte	**Units**	**Preliminary Soil Cleanup Level[1]**	**Simplified TEE Industrial Soil Concentration[2]**	**S-9-CPH-3A 9-10 ft BGS**	**S-10-MR-0 0-1 ft BGS**	**S-10-MR-1 1-4 ft BGS**	**S-10-MR-2 4-7 ft BGS**	**S-10-MR-3 7-10 ft bgs**	***S-11-MR 0-1 ft BGS***	***S-12-MR-0 0-1 ft BGS***	***Dup of S-12-MR-0 0.7 ft BGS***	***S-13-MR 0-0.5 ft BGS***
1,3-Dichloropropane	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
Isopropylbenzene	ug/kg	350,000,000	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
n-Propyl Benzene	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
Bromobenzene	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
2-Chlorotuluene	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
4-Chlorotuluene	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
tert-Butylbenzene	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
sec-Butylbenzene	ug/kg	--	--	1.4 U	1 U	1.2 U	1.2 U	5.6 U	NA	NA	NA	NA
4-Isopropyltoluene	ug/kg	--	--	2.2	1 U	1.2 U	1.2 U	850	NA	NA	NA	NA
n-Butylbenzene	ug/kg	--	--	2.9 U	2.1 U	2.3 U	2.5 U	11 U	NA	NA	NA	NA
1,2,4-Trichloronbenzene	ug/kg	--	--	7.2 U	5.2 U	5.8 U	6.2 U	28 U	NA	NA	NA	NA
Naphthalene	ug/kg	5,000	--	7.2 U	5.2 U	5.8 U	6.2 U	28 U	NA	NA	NA	NA
1,2,3-Trichlorobenzene	ug/kg	--	--	7.2 U	5.2 U	5.8 U	6.2 U	28 U	NA	NA	NA	NA
Petroleum Hydrocarbons												
TPH-G	mg/kg	100	12,000	9 U	5.6 U	6.1 U	6.7 U	8.2	470	5.9 U	6 U	6.8
TPH-D	mg/kg	2,000	15,000	94 J	35 J	22 J	8.3 J	8.0 J	2600	1900	1900	120
TPH-O	mg/kg	2,000	--	82 J	200 J	70 J	25 J	29 J	1300	790	720	340

Analyte	Units	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[2]	S-14-TPH-1 1-3.1 ft BGS	S-14-TPH-4 4-6.4 ft BGS	S-14-TPH-7 7-10 ft BGS	S-15-TPH-1 1-3.8 ft BGS	S-15-TPH-4 4-6.1 ft BGS	S-15-TPH-7 7-9.9 ft BGS	*S-16-TPH-1 1-3.7 ft BGS*
Petroleum Hydrocarbons										
TPH-G	mg/kg	100	12,000	5.8 U	6.4 U	7.9 U	5.5 U	6.8 U	7.6 U	120
TPH-D	mg/kg	2,000	15,000	72	5 U	5 U	15	6.5	5 U	730
TPH-O	mg/kg	2,000	--	100	10 U	10 U	32	10 U	10 U	730
Analyte	**Units**	**Preliminary Soil Cleanup Level[1]**	**Simplified TEE Industrial Soil Concentration[2]**	***S-16-TPH-4 4-6.3 ft BGS***	***S-16-TPH-7 7-10 ft BGS***	**S-17-TPH-1 1-3.7 ft BGS**	**S-17-TPH-4A 4-4.4 ft BGS**	**S-17-TPH-4B 4.4-6.3 ft BGS**	**S-17-TPH-7 7-9.8 ft BGS**	**S-18-TPH-1 1-3.4 ft BGS**
Petroleum Hydrocarbons										
TPH-G	mg/kg	100	12,000	2000	7.2 U	6.6 U	9.3 U	7.3 U	7.6 U	5.9 UJ
TPH-D	mg/kg	2,000	15,000	**40000**	21	51	500	5.5	5 U	48 J
TPH-O	mg/kg	2,000	--	1300	10 U	130	100 U	10 U	10 U	150

TABLE 4
HISTORICAL SOIL ANALYTICAL RESULTS (2002 RI)
RI/FS WORK PLAN
DAKOTA CREEK SITE

Analyte	Units	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[2]	S-18-TPH-4 4-6.7 ft BGS	S-18-TPH-7 7-9.9 ft BGS	S-19-TPH-1 1-3.6 ft BGS	S-19-TPH-4 4-6.4 ft BGS	S-19-TPH-7 7-9.9 ft BGS	*S-20-TPH-1 1-3.9 ft BGS*	*S-20-TPH-4 4-6.5 ft BGS*
Petroleum Hydrocarbons										
TPH-G	mg/kg	100	12,000	6.2 U	6.8 U	6.1 U	69	7.5 U	5.8 U	210
TPH-D	mg/kg	2,000	15,000	8.5	5 U	350	1700 J	190	9.3	2600
TPH-O	mg/kg	2,000	--	10 U	10 U	100 U	36 J	10 U	15	140 J

Analyte	Units	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[2]	*S-20-TPH-7 7-10 ft BGS*	*S-21-TPH-1 1-2.2 ft BGS*	*S-21-TPH-4 4-4.1 ft BGS*	*S-21-TPH-7 7-9.4 ft BGS*	*S-22-TPH-1A 1-2.5 ft BGS*	*S-22-TPH-1B 2.5-4 ft BGS*	*S-22-TPH-4 4-5 ft BGS*
Petroleum Hydrocarbons										
TPH-G	mg/kg	100	12,000	9 U	5.5 U	5.7 U	8 U	6.9 U	700	360
TPH-D	mg/kg	2,000	15,000	12	12	140	7.9	1600	6700	380
TPH-O	mg/kg	2,000	--	18	10 U	35	10U	960	110 J	39

Analyte	Units	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[2]	*S-22-TPH-7 7-9.5 ft BGS*	*S-23-TPH-1 1-3.4 ft BGS*	*S-23-TPH-4 4-6.7 ft BGS*	*S-23-TPH-7 7-9.6 ft BGS*
Petroleum Hydrocarbons							
TPH-G	mg/kg	100	12,000	34	5.9 U	6.9 U	8.9 U
TPH-D	mg/kg	2,000	15,000	9.6	5 U	3800	8.8
TPH-O	mg/kg	2,000	--	11	10 U	210J	10 U

Notes:
[1] See Table 3 for derivation of Preliminary Soil Cleanup Levels
[2] Chapter 173-340 WAC; Table 749-2 (Simplified Terrestrial Ecological Evaluation: Industrial or Commercial Site)
Data were obtained from Table B-1 (Landau, 2002a)
Shading indicates that the analyte was detected at a concentration greater than the Preliminary Soil Cleanup Level.
Bold and underline indicates that the analyte was detected at a concentration greater than the Simplified TEE Industrial Soil Concentration.
-- = Preliminary Soil Cleanup Level not available or analyte was either not detected or soil sample was not analyzed for the analyte
U = indicates the compound was undetected at the listed concentration.
J = Estimated detected value.

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TABLE 5
HISTORICAL SOIL ANALYTICAL RESULTS (2002 CONFIRMATION SAMPLES)
RI/FS WORK PLAN
DAKOTA CREEK SITE

Analytes	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[3]	CS-1 8-20/2002	CS-2 8-20/2002	CS-3 8-20/2002	CS-4 8-20/2002	CS-5 8-20/2002	CS-6 8-20/2002	CS-7 8-20/2002
Gasoline Hydrocarbons (mg/kg) NWTPH-Gx									
Gasoline	100	12,000	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Diesel Range Hydrocarbons (mg/kg) NWTPH-Dx									
Diesel	2,000	15,000	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Oil	2,000	--	40 U	40 U	40 U	40 U	40 U	40 U	40 U
Mineral Oil	4,000	--	40 U	40 U	40 U	40 U	40 U	40 U	40 U
Total Metals (mg/kg) EPA 7000 series									
Lead	1,000	220	NA	NA	NA	NA	NA	NA	NA
Cadmium	1.2	36	NA	NA	NA	NA	NA	NA	NA
Chromium	2,000	135	NA	NA	NA	NA	NA	NA	NA
Arsenic	7	20	NA	NA	NA	NA	NA	NA	NA
Silver	0.32	--	NA	NA	NA	NA	NA	NA	NA
Barium	700,000	1,320	NA	NA	NA	NA	NA	NA	NA
Selenium	7.4	0.8	NA	NA	NA	NA	NA	NA	NA
Mercury	0.072	9	NA	NA	NA	NA	NA	NA	NA
Polycyclic Aromatic Hydrocarbons (mg/kg) Method 8270									
Acenaphthene	65	--	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	--	--	NA	NA	NA	NA	NA	NA	NA
Anthracene	12,000	--	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	0.13	--	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	0.35	300	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	0.43	--	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	--	--	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	0.43	--	NA	NA	NA	NA	NA	NA	NA
Chrysene	0.14	--	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	0.65	--	NA	NA	NA	NA	NA	NA	NA
Fluorene	550	--	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	89	--	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	1.3	--	NA	NA	NA	NA	NA	NA	NA
Naphthalene	5	--	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	--	--	NA	NA	NA	NA	NA	NA	NA
Pyrene	3,500	--	NA	NA	NA	NA	NA	NA	NA
Polychlorinated Biphenyls (mg/kg) Method 8082									
PCB-1016	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1221	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1232	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1242	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1248	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1254	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1260	0.004	2	NA	NA	NA	NA	NA	NA	NA
Total	0.004	2	NA	NA	NA	NA	NA	NA	NA

Analytes	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[3]	CS-8 8-20/2002	CS-9 8-20/2002	CS-10 8-20/2002	CS-11 8-20/2002	CS-12 8-20/2002	CS-13 8-20/2002	CS-14 8-20/2002
GASOLINE RANGE HYDROCARBONS (mg/kg) NWTPH-Gx									
Gasoline	100	12,000	10 U	10 U	10 U	10 U	10 U	10 U	10 U
DIESEL RANGE HYDROCARBONS (mg/kg) NWTPH-Dx									
Diesel	2,000	15,000	20 U	20 U	20 U	120	20 U	20 U	20 U
Oil	2,000	--	45	40 U	40 U	40 U	40 U	40 U	40 U
Mineral Oil	4,000	--	40 U	40 U	40 U	40 U	40 U	40 U	40 U
TOTAL METALS (mg/kg) EPA 7000 series									
Lead	1,000	220	NA	NA	NA	NA	NA	NA	NA
Cadmium	1.2	36	NA	NA	NA	NA	NA	NA	NA
Chromium	2,000	135	NA	NA	NA	NA	NA	NA	NA
Arsenic	7	20	NA	NA	NA	NA	NA	NA	NA
Silver	0.32	--	NA	NA	NA	NA	NA	NA	NA
Barium	700,000	1,320	NA	NA	NA	NA	NA	NA	NA
Selenium	7.4	0.8	NA	NA	NA	NA	NA	NA	NA
Mercury	0.072	9	NA	NA	NA	NA	NA	NA	NA
Polycyclic Aromatic Hydrocarbons (mg/kg) Method 8270									
Acenaphthene	65	--	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	--	--	NA	NA	NA	NA	NA	NA	NA
Anthracene	12,000	--	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	0.13	--	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	0.35	300	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	0.43	--	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	--	--	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	0.43	--	NA	NA	NA	NA	NA	NA	NA
Chrysene	0.14	--	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	0.65	--	NA	NA	NA	NA	NA	NA	NA
Fluorene	550	--	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	89	--	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	1.3	--	NA	NA	NA	NA	NA	NA	NA
Naphthalene	5	--	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	--	--	NA	NA	NA	NA	NA	NA	NA
Pyrene	3,500	--	NA	NA	NA	NA	NA	NA	NA
Polychlorinated Biphenyls (mg/kg) Method 8082									
PCB-1016	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1221	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1232	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1242	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1248	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1254	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1260	0.004	2	NA	NA	NA	NA	NA	NA	NA
Total	0.004	2	NA	NA	NA	NA	NA	NA	NA

Analytes	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[3]	CS-15 8-20/2002	CS-16 8-20/2002	CS-17 8-20/2002 see Note 2	CS-18 8-20/2002	CS-19 8-20/2002 see Note 2	CS-20 8-20/2002 see Note 2	CS-21 8-20/2002
GASOLINE RANGE HYDROCARBONS (mg/kg) NWTPH-Gx									
Gasoline	100	12,000	10 U	10 U	10 U	10 U	10 U	10 U	10 U
DIESEL RANGE HYDROCARBONS (mg/kg) NWTPH-Dx									
Diesel	2,000	15,000	20 U	20 U	4900	20 U	**29000**	5100	20 U
Oil	2,000	--	40 U	40 U	40 U	40 U	40 U	40 U	40 U
Mineral Oil	4,000	--	40 U	40 U	40 U	40 U	40 U	40 U	40 U
TOTAL METALS (mg/kg) EPA 7000 series									
Lead	1,000	220	NA	NA	NA	NA	NA	NA	NA
Cadmium	1.2	36	NA	NA	NA	NA	NA	NA	NA
Chromium	2,000	135	NA	NA	NA	NA	NA	NA	NA
Arsenic	7	20	NA	NA	NA	NA	NA	NA	NA
Silver	0.32	--	NA	NA	NA	NA	NA	NA	NA
Barium	700,000	1,320	NA	NA	NA	NA	NA	NA	NA
Selenium	7.4	0.8	NA	NA	NA	NA	NA	NA	NA
Mercury	0.072	9	NA	NA	NA	NA	NA	NA	NA
Polycyclic Aromatic Hydrocarbons (mg/kg) Method 8270									
Acenaphthene	65	--	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	--	--	NA	NA	NA	NA	NA	NA	NA
Anthracene	12,000	--	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	0.13	--	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	0.35	300	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	0.43	--	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	--	--	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	0.43	--	NA	NA	NA	NA	NA	NA	NA
Chrysene	0.14	--	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	0.65	--	NA	NA	NA	NA	NA	NA	NA
Fluorene	550	--	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	89	--	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	1.3	--	NA	NA	NA	NA	NA	NA	NA
Naphthalene	5	--	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	--	--	NA	NA	NA	NA	NA	NA	NA
Pyrene	3,500	--	NA	NA	NA	NA	NA	NA	NA
Polychlorinated Biphenyls (mg/kg) Method 8082									
PCB-1016	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1221	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1232	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1242	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1248	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1254	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1260	0.004	2	NA	NA	NA	NA	NA	NA	NA
Total	0.004	2	NA	NA	NA	NA	NA	NA	NA

Analytes	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[3]	CS-22 8-20/2002	CS-23 8-20/2002	CS-24 8-20/2002	CS-25 8-20/2002	CS-26 8-20/2002 see Note 2	CS-27 8-20/2002	CS-28 8-20/2002
GASOLINE RANGE HYDROCARBONS (mg/kg) NWTPH-Gx									
Gasoline	100	12,000	10 U	10 U	10 U	10 U	810	10 U	10 U
DIESEL RANGE HYDROCARBONS (mg/kg) NWTPH-Dx									
Diesel	2,000	15,000	20 U	20 U	20 U	20 U	**16000**	20 U	20 U
Oil	2,000	--	40 U	40 U	40 U	40 U	40 U	40 U	40 U
Mineral Oil	4,000	--	40 U	40 U	40 U	40 U	40 U	40 U	40 U
TOTAL METALS (mg/kg) EPA 7000 series									
Lead	1,000	220	NA	NA	NA	NA	NA	NA	NA
Cadmium	1.2	36	NA	NA	NA	NA	NA	NA	NA
Chromium	2,000	135	NA	NA	NA	NA	NA	NA	NA
Arsenic	7	20	NA	NA	NA	NA	NA	NA	NA
Silver	0.32	--	NA	NA	NA	NA	NA	NA	NA
Barium	700,000	1,320	NA	NA	NA	NA	NA	NA	NA
Selenium	7.4	0.8	NA	NA	NA	NA	NA	NA	NA
Mercury	0.072	9	NA	NA	NA	NA	NA	NA	NA
Polycyclic Aromatic Hydrocarbons (mg/kg) Method 8270									
Acenaphthene	65	--	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	--	--	NA	NA	NA	NA	NA	NA	NA
Anthracene	12,000	--	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	0.13	--	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	0.35	300	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	0.43	--	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	--	--	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	0.43	--	NA	NA	NA	NA	NA	NA	NA
Chrysene	0.14	--	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	0.65	--	NA	NA	NA	NA	NA	NA	NA
Fluorene	550	--	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	89	--	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	1.3	--	NA	NA	NA	NA	NA	NA	NA
Naphthalene	5	--	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	--	--	NA	NA	NA	NA	NA	NA	NA
Pyrene	3,500	--	NA	NA	NA	NA	NA	NA	NA
Polychlorinated Biphenyls (mg/kg) Method 8082									
PCB-1016	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1221	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1232	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1242	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1248	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1254	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1260	0.004	2	NA	NA	NA	NA	NA	NA	NA
Total	0.004	2	NA	NA	NA	NA	NA	NA	NA

TABLE 5
HISTORICAL SOIL ANALYTICAL RESULTS (2002 CONFIRMATION SAMPLES)
RI/FS WORK PLAN
DAKOTA CREEK SITE

Analytes	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[3]	CS-29 8-20/2002	CS-30 8-20/2002	CS-31 8-20/2002	CS-32 8-20/2002	CS-33 8-20/2002	CS-34 8-20/2002	CS-35 8-20/2002
GASOLINE RANGE HYDROCARBONS (mg/kg) NWTPH-Gx									
Gasoline	100	12,000	10 U	10 U	10 U	10 U	10 U	10 U	10 U
DIESEL RANGE HYDROCARBONS (mg/kg) NWTPH-Dx									
Diesel	2,000	15,000	20 U	20 U	20 U	20 U	770	260	20 U
Oil	2,000	--	40 U	40 U	40 U	40 U	40 U	40 U	40 U
Mineral Oil	4,000	--	40 U	1200	140	40 U	40 U	40 U	40 U
TOTAL METALS (mg/kg) EPA 7000 series									
Lead	1,000	220	NA	8	NA	NA	5 U	NA	NA
Cadmium	1.2	36	NA	1 U	NA	NA	1 U	NA	NA
Chromium	2,000	135	NA	5 U	NA	NA	5 U	NA	NA
Arsenic	7	20	NA	5 U	NA	NA	5 U	NA	NA
Silver	0.32	--	NA	20 U	NA	NA	20 U	NA	NA
Barium	700,000	1,320	NA	20 U	NA	NA	20 U	NA	NA
Selenium	7.4	0.8	NA	50 U	NA	NA	50 U	NA	NA
Mercury	0.072	9	NA	0.5 U	NA	NA	0.5 U	NA	NA
Polycyclic Aromatic Hydrocarbons (mg/kg) Method 8270									
Acenaphthene	65	--	NA	0.10 U	NA	NA	0.10 U	NA	NA
Acenaphthylene	--	--	NA	0.10 U	NA	NA	0.10 U	NA	NA
Anthracene	12,000	--	NA	0.10 U	NA	NA	0.56	NA	NA
Benzo(a)anthracene	0.13	--	NA	0.10 U	NA	NA	0.10 U	NA	NA
Benzo(a)pyrene	0.35	300	NA	0.10 U	NA	NA	0.10 U	NA	NA
Benzo(b)fluoranthene	0.43	--	NA	0.10 U	NA	NA	0.10 U	NA	NA
Benzo(g,h,i)perylene	--	--	NA	0.10 U	NA	NA	0.10 U	NA	NA
Benzo(k)fluoranthene	0.43	--	NA	0.10 U	NA	NA	0.10 U	NA	NA
Chrysene	0.14	--	NA	0.10 U	NA	NA	0.10 U	NA	NA
Dibenz(a,h)anthracene	0.65	--	NA	0.10 U	NA	NA	0.10 U	NA	NA
Fluorene	550	--	NA	0.10 U	NA	NA	0.3	NA	NA
Fluoranthene	89	--	NA	0.10 U	NA	NA	0.10 U	NA	NA
Indeno(1,2,3-cd)pyrene	1.3	--	NA	0.10 U	NA	NA	0.10 U	NA	NA
Naphthalene	5	--	NA	0.10 U	NA	NA	0.10 U	NA	NA
Phenanthrene	--	--	NA	0.10 U	NA	NA	0.54	NA	NA
Pyrene	3,500	--	NA	0.10 U	NA	NA	0.09	NA	NA
Polychlorinated Biphenyls (mg/kg) Method 8082									
PCB-1016	0.004	2	NA	2.00 U	NA	NA	2.00 U	NA	NA
PCB-1221	0.004	2	NA	2.00 U	NA	NA	2.00 U	NA	NA
PCB-1232	0.004	2	NA	2.00 U	NA	NA	2.00 U	NA	NA
PCB-1242	0.004	2	NA	0.50 U	NA	NA	0.50 U	NA	NA
PCB-1248	0.004	2	NA	0.50 U	NA	NA	0.50 U	NA	NA
PCB-1254	0.004	2	NA	0.50 U	NA	NA	0.50 U	NA	NA
PCB-1260	0.004	2	NA	0.50 U	NA	NA	0.50 U	NA	NA
Total	0.004	2	NA	0.50 U	NA	NA	0.50 U	NA	NA

Analytes	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[3]	CS-36 8-20/2002	CS-37 8-20/2002	CS-38 8-20/2002 see Note 2	CS-39 8-20/2002	CS-40 8-20/2002	CS-41 8-20/2002	CS-42 8-20/2002
GASOLINE RANGE HYDROCARBONS (mg/kg) NWTPH-Gx									
Gasoline	100	12,000	10 U	10 U	4000	10 U	10 U	10 U	10 U
DIESEL RANGE HYDROCARBONS (mg/kg) NWTPH-Dx									
Diesel	2,000	15,000	20 U	20 U	**23000**	20 U	20 U	20 U	20 U
Oil	2,000	--	40 U	40 U	40 U	40 U	720	320	40 U
Mineral Oil	4,000	--	40 U	40 U	40 U	40 U	40 U	40 U	40 U
TOTAL METALS (mg/kg) EPA 7000 series									
Lead	1,000	220	NA	NA	NA	NA	NA	NA	NA
Cadmium	1.2	36	NA	NA	NA	NA	NA	NA	NA
Chromium	2,000	135	NA	NA	NA	NA	NA	NA	NA
Arsenic	7	20	NA	NA	NA	NA	NA	NA	NA
Silver	0.32	--	NA	NA	NA	NA	NA	NA	NA
Barium	700,000	1,320	NA	NA	NA	NA	NA	NA	NA
Selenium	7.4	0.8	NA	NA	NA	NA	NA	NA	NA
Mercury	0.072	9	NA	NA	NA	NA	NA	NA	NA
Polycyclic Aromatic Hydrocarbons (mg/kg) Method 8270									
Acenaphthene	65	--	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	--	--	NA	NA	NA	NA	NA	NA	NA
Anthracene	12,000	--	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	0.13	--	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	0.35	300	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	0.43	--	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	--	--	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	0.43	--	NA	NA	NA	NA	NA	NA	NA
Chrysene	0.14	--	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	0.65	--	NA	NA	NA	NA	NA	NA	NA
Fluorene	550	--	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	89	--	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	1.3	--	NA	NA	NA	NA	NA	NA	NA
Naphthalene	5	--	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	--	--	NA	NA	NA	NA	NA	NA	NA
Pyrene	3,500	--	NA	NA	NA	NA	NA	NA	NA
Polychlorinated Biphenyls (mg/kg) Method 8082									
PCB-1016	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1221	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1232	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1242	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1248	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1254	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1260	0.004	2	NA	NA	NA	NA	NA	NA	NA
Total	0.004	2	NA	NA	NA	NA	NA	NA	NA

TABLE 5

HISTORICAL SOIL ANALYTICAL RESULTS (2002 CONFIRMATION SAMPLES)

RI/FS WORK PLAN

DAKOTA CREEK SITE

Analytes	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[3]	CS-43 8-20/2002	CS-44 8-20/2002	CS-45 8-20/2002	CS-46 8-20/2002	CS-47 8-20/2002	CS-48 8-20/2002	CS-49 8-20/2002
GASOLINE RANGE HYDROCARBONS (mg/kg) NWTPH-Gx									
Gasoline	100	12,000	10 U	10 U	NA	10 U	10 U	10 U	10 U
DIESEL RANGE HYDROCARBONS (mg/kg) NWTPH-Dx									
Diesel	2,000	15,000	20 U	20 U	NA	20 U	20 U	20 U	20 U
Oil	2,000	--	40 U	40 U	NA	40 U	40 U	40 U	40 U
Mineral Oil	4,000	--	40 U	40 U	NA	40 U	40 U	40 U	40 U
TOTAL METALS (mg/kg) EPA 7000 series									
Lead	1,000	220	NA	NA	NA	NA	NA	NA	NA
Cadmium	1.2	36	NA	NA	NA	NA	NA	NA	NA
Chromium	2,000	135	NA	NA	NA	NA	NA	NA	NA
Arsenic	7	20	NA	5 U	5 U	NA	NA	NA	NA
Silver	0.32	--	NA	NA	NA	NA	NA	NA	NA
Barium	700,000	1,320	NA	NA	NA	NA	NA	NA	NA
Selenium	7.4	0.8	NA	NA	NA	NA	NA	NA	NA
Mercury	0.072	9	NA	NA	NA	NA	NA	NA	NA
Polycyclic Aromatic Hydrocarbons (mg/kg) Method 8270									
Acenaphthene	65	--	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	--	--	NA	NA	NA	NA	NA	NA	NA
Anthracene	12,000	--	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	0.13	--	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	0.35	300	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	0.43	--	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	--	--	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	0.43	--	NA	NA	NA	NA	NA	NA	NA
Chrysene	0.14	--	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	0.65	--	NA	NA	NA	NA	NA	NA	NA
Fluorene	550	--	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	89	--	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	1.3	--	NA	NA	NA	NA	NA	NA	NA
Naphthalene	5	--	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	--	--	NA	NA	NA	NA	NA	NA	NA
Pyrene	3,500	--	NA	NA	NA	NA	NA	NA	NA
Polychlorinated Biphenyls (mg/kg) Method 8082									
PCB-1016	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1221	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1232	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1242	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1248	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1254	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1260	0.004	2	NA	NA	NA	NA	NA	NA	NA
Total	0.004	2	NA	NA	NA	NA	NA	NA	NA

Analytes	Preliminary Soil Cleanup Level[1]	Simplified TEE Industrial Soil Concentration[3]	CS-50 8-20/2002	CS-51 8-20/2002	CS-52 8-20/2002	CS-53 8-20/2002	CS-54 8-20/2002	CS-55 8-20/2002	CS-56 8-20/2002
GASOLINE RANGE HYDROCARBONS (mg/kg) NWTPH-Gx									
Gasoline	100	12,000	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
DIESEL RANGE HYDROCARBONS (mg/kg) NWTPH-Dx									
Diesel	2,000	15,000	20 U	20 U	20 U	20 U	20 U	20 U	20 U
Oil	2,000	--	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Mineral Oil	4,000	--	NA	NA	NA	NA	NA	NA	NA
TOTAL METALS (mg/kg) EPA 7000 series									
Lead	1,000	220	NA	NA	NA	NA	NA	NA	NA
Cadmium	1.2	36	NA	NA	NA	NA	NA	NA	NA
Chromium	2,000	135	NA	NA	NA	NA	NA	NA	NA
Arsenic	7	20	NA	NA	NA	NA	NA	NA	NA
Silver	0.32	--	NA	NA	NA	NA	NA	NA	NA
Barium	700,000	1,320	NA	NA	NA	NA	NA	NA	NA
Selenium	7.4	0.8	NA	NA	NA	NA	NA	NA	NA
Mercury	0.072	9	NA	NA	NA	NA	NA	NA	NA
Polycyclic Aromatic Hydrocarbons (mg/kg) Method 8270									
Acenaphthene	65	--	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	--	--	NA	NA	NA	NA	NA	NA	NA
Anthracene	12,000	--	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	0.13	--	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	0.35	300	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	0.43	--	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)perylene	--	--	NA	NA	NA	NA	NA	NA	NA
Benzo(k)fluoranthene	0.43	--	NA	NA	NA	NA	NA	NA	NA
Chrysene	0.14	--	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	0.65	--	NA	NA	NA	NA	NA	NA	NA
Fluorene	550	--	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	89	--	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	1.3	--	NA	NA	NA	NA	NA	NA	NA
Naphthalene	5	--	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	--	--	NA	NA	NA	NA	NA	NA	NA
Pyrene	3,500	--	NA	NA	NA	NA	NA	NA	NA
Polychlorinated Biphenyls (mg/kg) Method 8082									
PCB-1016	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1221	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1232	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1242	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1248	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1254	0.004	2	NA	NA	NA	NA	NA	NA	NA
PCB-1260	0.004	2	NA	NA	NA	NA	NA	NA	NA
Total	0.004	2	NA	NA	NA	NA	NA	NA	NA

Notes:

[1] See Table 3 for derivation of Preliminary Soil Cleanup Levels

[2] Soil in this area was overexcavated due to elevated TPH concentrations

[3] Chapter 173-340 WAC; Table 749-2 (Simplified Terrestrial Ecological Evaluation: Industrial or Commercial Site)

Data were obtained from Table B-1 (Landau, 2002a)

Shading indicates that the analyte was detected at a concentration greater than the Preliminary Soil Cleanup Level.

Bold and underline indicates that the analyte was detected at a concentration greater than the Simplified TEE Industrial Soil Concentration.

-- = Preliminary Soil Cleanup Level not available or analyte was either not detected or soil sample was not analyzed for the analyte

U = indicates the compound was undetected at the listed concentration.

NA = not analyzed

TABLE 6

PRELIMINARY GROUNDWATER CLEANUP LEVELS

RI/FS WORK PLAN

DAKOTA CREEK SITE

		Groundwater Criteria		Surface Water Criteria							Analytical Laboratory Criteria[1]		
				Ch. 173-201A WAC[5]	Section 304 of the Clean Water Act[6]		40 CFR Part 131[7]		WAC 173-340-730[8]				
Analytes	Units	Washington State Groundwater Background Concentrations[3]	Petroleum Hydrocarbons Method A Cleanup Levels for Groundwater[4]	Surface Water ARAR Protection of Aquatic Life - Marine/Chronic	Surface Water ARAR Protection of Aquatic Life - Marine/Chronic	Surface Water ARAR Protection of Human Health for Consumption of Organisms	Surface Water ARAR Protection of Aquatic Life - Marine/Chronic	Surface Water ARAR Protection of Human Health for Consumption of Organisms	Surface Water ARAR MTCA Method B Carcinogen Standard Formula Value	Surface Water ARAR MTCA Method B Non-Carcinogen Standard Formula Value	Reporting Limit	Analytical Method	Preliminary Groundwater Cleanup Level[2]
Metals *(Total or Dissolved)*													
Arsenic	mg/L	0.008	--	0.036	0.036	0.00014	0.036	0.00014	0.000098	0.018	0.0002	EPA 6020/200.8 ICP-MS	0.008
Cadmium	mg/L	0.002	--	0.0093	0.0088	--	0.0093	--	--	0.020	0.0002	EPA 6020/200.8 ICP-MS	0.0088
Chromium	mg/L	0.01	--	--	--	--	--	--	--	240	0.0005	EPA 6020/200.8 ICP-MS	240
Copper	mg/L	0.020	--	0.0031	0.0031	--	0.0024	--	--	2.700	0.0005	EPA 6020/200.8 ICP-MS	0.02
Lead	mg/L	0.010	--	0.0081	0.0081	--	0.0081	--	--	--	0.001	EPA 6020/200.8 ICP-MS	0.01
Mercury	mg/L	--	--	0.000025	0.00094	--	0.000025	0.00015	--	--	0.00002	EPA 7470 GFAA & CVAA	0.000025
Nickel	mg/L	--	--	0.0082	0.0082	4.6	0.0082	4.6	--	1.100	0.0005	EPA 6020/200.8 ICP-MS	0.0082
Zinc	mg/L	0.160	--	0.081	0.081	26	0.081	--	--	17	0.004	EPA 6020/200.8 ICP-MS	0.16
Volatile Organic Compounds													
Chloromethane	µg/L	--	--	--	--	--	--	--	130	--	1.0	EPA 8260B (5 mL purge)	130
Bromomethane	µg/L	--	--	--	--	1500	--	4000	--	970	1.0	EPA 8260B (5 mL purge)	970
Vinyl Chloride	µg/L	--	--	--	--	2.4	--	530	3.7	6600	1.0	EPA 8260B (5 mL purge)	2.4
Chloroethane	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8260B (5 mL purge)	--
Methylene Chloride	µg/L	--	--	--	--	590	--	1600	960	170000	2.0	EPA 8260B (5 mL purge)	590
Acetone	µg/L	--	--	--	--	--	--	--	--	--	5.0	EPA 8260B (5 mL purge)	--
Carbon Disulfide	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8260B (5 mL purge)	--
1,1-Dichloroethene	µg/L	--	--	--	--	7100	--	3.2	1.9	23000	1.0	EPA 8260B (5 mL purge)	1.9
1,1-Dichloroethane	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8260B (5 mL purge)	--
trans-1,2-Dichloroethene	µg/L	--	--	--	--	10000	--	--	--	33000	1.0	EPA 8260B (5 mL purge)	10000
cis-1,2-Dichloroethene	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8260B (5 mL purge)	--
Chloroform	µg/L	--	--	--	--	470	--	470	280	6900	1.0	EPA 8260B (5 mL purge)	280
1,2-Dichloroethane	µg/L	--	--	--	--	37	--	99	59	43000	1.0	EPA 8260B (5 mL purge)	37
2-Butanone	µg/L	--	--	--	--	--	--	--	--	--	5.0	EPA 8260B (5 mL purge)	--
1,1,1-Trichloroethane	µg/L	--	--	--	--	--	--	--	--	420000	1.0	EPA 8260B (5 mL purge)	420000
Carbon Tetrachloride	µg/L	--	--	--	--	1.6	--	4.4	2.7	97	1.0	EPA 8260B (5 mL purge)	1.6
Vinyl Acetate	µg/L	--	--	--	--	--	--	--	--	--	5.0	EPA 8260B (5 mL purge)	--
Bromodichloromethane	µg/L	--	--	--	--	17	--	22	28	14000	1.0	EPA 8260B (5 mL purge)	17
1,2-Dichloropropane	µg/L	--	--	--	--	15	--	--	23	--	1.0	EPA 8260B (5 mL purge)	15
cis-1,3-Dichloropropene	µg/L	--	--	--	--	21	--	1700	19	41000	1.0	EPA 8260B (5 mL purge)	19
Trichloroethene	µg/L	--	--	--	--	30	--	81	1.5	71	1.0	EPA 8260B (5 mL purge)	1.5
Dibromochloromethane	µg/L	--	--	--	--	13	--	34	21	14000	1.0	EPA 8260B (5 mL purge)	13
1,1,2-Trichloroethane	µg/L	--	--	--	--	16	--	42	25	2300	1.0	EPA 8260B (5 mL purge)	16
Benzene	µg/L	--	--	--	--	51	--	71	23	2000	1.0	EPA 8260B (5 mL purge)	23
trans-1,3-Dichloropropene	µg/L	--	--	--	--	21	--	1700	19	41000	1.0	EPA 8260B (5 mL purge)	19
Bromoform	µg/L	--	--	--	--	140	--	360	220	14000	1.0	EPA 8260B (5 mL purge)	140
4-Methyl-2-Pentanone	µg/L	--	--	--	--	--	--	--	--	--	5.0	EPA 8260B (5 mL purge)	--
2-Hexanone	µg/L	--	--	--	--	--	--	--	--	--	5.0	EPA 8260B (5 mL purge)	--
Tetrachloroethene	µg/L	--	--	--	--	3.3	--	8.9	0.39	840	0.2	EPA 8260B (20 mL purge)	0.39
1,1,2,2-Tetrachloroethane	µg/L	--	--	--	--	4.0	--	11	6.5	--	1.0	EPA 8260B (5 mL purge)	4
Toluene	µg/L	--	--	--	--	15000	--	200000	--	19000	1.0	EPA 8260B (5 mL purge)	15000
Chlorobenzene	µg/L	--	--	--	--	1600	--	21000	--	5000	1.0	EPA 8260B (5 mL purge)	1600
Ethylbenzene	µg/L	--	--	--	--	2100	--	29000	--	6900	1.0	EPA 8260B (5 mL purge)	2100
Styrene	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8260B (5 mL purge)	--
Trichlorofluoromethane	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8260B (5 mL purge)	--
1,1,2-Trichlorotrifluoroethane	µg/L	--	--	--	--	--	--	--	--	--	2.0	EPA 8260B (5 mL purge)	--
m,p-Xylene	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8260B (5 mL purge)	--
o-Xylene	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8260B (5 mL purge)	--
1,2-Dichlorobenzene	µg/L	--	--	--	--	1300	--	17000	--	4200	1.0	EPA 8260B (5 mL purge)	1300
1,3-Dichlorobenzene	µg/L	--	--	--	--	960	--	2600	--	--	1.0	EPA 8260B (5 mL purge)	960
1,4-Dichlorobenzene	µg/L	--	--	--	--	190	--	2600	4.9	--	1.0	EPA 8260B (5 mL purge)	4.9
Acrolein	µg/L	--	--	--	--	--	--	--	--	--	50	EPA 8260B (5 mL purge)	--
Methyl Iodide	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8260B (5 mL purge)	--
Bromoethane	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8260B (5 mL purge)	--
Acrylonitrile	µg/L	--	--	--	--	0.25	--	0.66	0.4	86	1.0	EPA 8260B (20 mL purge)	1.0
1,1-Dichloropropene	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8260B (5 mL purge)	--
Dibromomethane	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8260B (5 mL purge)	--
1,1,1,2-Tetrachloroethane	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8260B (5 mL purge)	--
1,2-Dibromo-3-Chloropropane	µg/L	--	--	--	--	--	--	--	--	--	5.0	EPA 8260B (5 mL purge)	--
1,2,3-Trichloropropane	µg/L	--	--	--	--	--	--	--	--	--	2.0	EPA 8260B (5 mL purge)	--
trans-1,4-Dichloro-2-Butene	µg/L	--	--	--	--	--	--	--	--	--	5.0	EPA 8260B (5 mL purge)	--
1,3,5-Trimethylbenzene	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8260B (5 mL purge)	--
1,2,4-Trimethylbenzene	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8260B (5 mL purge)	--
Hexachlorobutadiene	µg/L	--	--	--	--	18	--	50	30	190	5.0	EPA 8260B (5 mL purge)	18
Ethylene Dibromide	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8260B (5 mL purge)	--
Bromochloromethane	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8260B (5 mL purge)	--
2,2-Dichloropropane	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8260B (5 mL purge)	--

TABLE 6

PRELIMINARY GROUNDWATER CLEANUP LEVELS

RI/FS WORK PLAN

DAKOTA CREEK SITE

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Volatile Organic Compounds (continued)													
1,3-Dichloropropane	µg/L	--	--	--	--	21	--	1700	19	41000	1.0	EPA 8260B (5 mL purge)	19
Isopropylbenzene	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8260B (5 mL purge)	--
n-Propyl Benzene	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8260B (5 mL purge)	--
Bromobenzene	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8260B (5 mL purge)	--
2-Chlorotoluene	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8260B (5 mL purge)	--
4-Chlorotoluene	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8260B (5 mL purge)	--
tert-Butylbenzene	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8260B (5 mL purge)	--
sec-Butylbenzene	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8260B (5 mL purge)	--
4-Isopropyltoluene	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8260B (5 mL purge)	--
n-Butylbenzene	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8260B (5 mL purge)	--
1,2,4-Trichlorobenzene	µg/L	--	--	--	--	70	--	--	--	230	5.0	EPA 8260B (5 mL purge)	70
Naphthalene	µg/L	--	--	--	--	--	--	--	--	4900	5.0	EPA 8260B (5 mL purge)	4900
1,2,3-Trichlorobenzene	µg/L	--	--	--	--	--	--	--	--	--	5.0	EPA 8260B (5 mL purge)	--
Petroleum Hydrocarbons													
TPH-G	mg/L	--	**1.0**	--	--	--	--	--	--	--	0.03	NWTPH-G	1.0
TPH-D	mg/L	--	**0.5**	--	--	--	--	--	--	--	0.25	NW-TPH-Dx	0.5
TPH-O	mg/L	--	**0.5**	--	--	--	--	--	--	--	0.50	NW-TPH-Dx	0.5
Si/Acid Cleaned TPH-D	mg/L	--	**0.5**	--	--	--	--	--	--	--	0.25	NW-TPH-Dx	0.5
Si/Acid Cleaned TPH-O	mg/L	--	**0.5**	--	--	--	--	--	--	--	0.50	NW-TPH-Dx	0.5
Semivolatile Organic Compounds													
Phenol	µg/L	--	--	--	--	1700000	--	4600000	--	1100000	1.0	EPA 8270D	1100000
Bis-(2-Chloroethyl) Ether	µg/L	--	--	--	--	0.53	--	1.4	0.85	--	1.0	EPA 8270D	0.53
2-Chlorophenol	µg/L	--	--	--	--	--	--	--	--	97	1.0	EPA 8270D	97
1,3-Dichlorobenzene	µg/L	--	--	--	--	960	--	2600	--	--	1.0	EPA 8270D	960
1,4-Dichlorobenzene	µg/L	--	--	--	--	190	--	2600	4.9	--	1.0	EPA 8270D	4.9
Benzyl Alcohol	µg/L	--	--	--	--	--	--	--	--	--	5.0	EPA 8270D	--
1,2-Dichlorobenzene	µg/L	--	--	--	--	1300	--	17000	--	4200	1.0	EPA 8270D	1300
2-Methylphenol	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8270D	--
2,2'-Oxybis(1-Chloropropane)	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8270D	--
4-Methylphenol	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8270D	--
N-Nitroso-Di-N-Propylamine	µg/L	--	--	--	--	0.51	--	--	0.82	--	5.0	EPA 8270D	5.0
Hexachloroethane	µg/L	--	--	--	--	3.3	--	8.9	5.3	30	2.0	EPA 8270D	3.3
Nitrobenzene	µg/L	--	--	--	--	690	--	1900	--	450	1.0	EPA 8270D	450
Isophorone	µg/L	--	--	--	--	960	--	600	1600	120000	1.0	EPA 8270D	600
2-Nitrophenol	µg/L	--	--	--	--	--	--	--	--	--	5.0	EPA 8270D	--
2,4-Dimethylphenol	µg/L	--	--	--	--	850	--	--	--	550	1.0	EPA 8270D	550
Benzoic Acid	µg/L	--	--	--	--	--	--	--	--	--	10	EPA 8270D	--
bis(2-Chloroethoxy) Methane	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8270D	--
2,4-Dichlorophenol	µg/L	--	--	--	--	290	--	790	--	190	5.0	EPA 8270D	190
1,2,4-Trichlorobenzene	µg/L	--	--	--	--	70	--	--	--	230	1.0	EPA 8270D	70
Naphthalene	µg/L	--	--	--	--	--	--	--	--	4900	1.0	EPA 8270D	4900
4-Chloroaniline	µg/L	--	--	--	--	--	--	--	--	--	5.0	EPA 8270D	--
Hexachlorobutadiene	µg/L	--	--	--	--	18	--	50	30	190	1.0	EPA 8270D	18
4-Chloro-3-methylphenol	µg/L	--	--	--	--	--	--	--	--	--	5.0	EPA 8270D	--
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8270D	--
Hexachlorocyclopentadiene	µg/L	--	--	--	--	1100	--	17000	--	3600	5.0	EPA 8270D	1100
2,4,6-Trichlorophenol	µg/L	--	--	--	--	2.4	--	6.5	3.9	--	5.0	EPA 8270D	5.0
2,4,5-Trichlorophenol	µg/L	--	--	--	--	--	--	--	--	--	5.0	EPA 8270D	--
2-Chloronaphthalene	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8270D	--
2-Nitroaniline	µg/L	--	--	--	--	--	--	--	--	--	5.0	EPA 8270D	--
Dimethylphthalate	µg/L	--	--	--	--	1100000	--	2900000	--	72000	1.0	EPA 8270D	72000
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8270D	--
3-Nitroaniline	µg/L	--	--	--	--	--	--	--	--	--	5.0	EPA 8270D	--
Acenaphthene	µg/L	--	--	--	--	990	--	--	--	640	1.0	EPA 8270D	640
2,4-Dinitrophenol	µg/L	--	--	--	--	5300	--	14000	--	3500	10	EPA 8270D	3500
4-Nitrophenol	µg/L	--	--	--	--	--	--	--	--	--	5.0	EPA 8270D	--
Dibenzofuran	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8270D	--
2,6-Dinitrotoluene	µg/L	--	--	--	--	--	--	--	--	--	5.0	EPA 8270D	--
2,4-Dinitrotoluene	µg/L	--	--	--	--	3.4	--	9.1	--	1400	5.0	EPA 8270D	5.0
Diethylphthalate	µg/L	--	--	--	--	44000	--	120000	--	28000	1.0	EPA 8270D	28000
4-Chlorophenyl-phenylether	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8270D	--
Fluorene	µg/L	--	--	--	--	5300	--	14000	--	3500	1.0	EPA 8270D	3500
4-Nitroaniline	µg/L	--	--	--	--	--	--	--	--	--	5.0	EPA 8270D	--
4,6-Dinitro-2-Methylphenol	µg/L	--	--	--	--	--	--	--	--	--	10	EPA 8270D	--
N-Nitrosodiphenylamine	µg/L	--	--	--	--	6.0	--	16	9.7	--	1.0	EPA 8270D	6
4-Bromophenyl-phenylether	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8270D	--

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RI/FS WORK PLAN

DAKOTA CREEK SITE

		Groundwater Criteria		Surface Water Criteria							Analytical Laboratory Criteria[1]		
				Ch. 173-201A WAC[5]	Section 304 of the Clean Water Act[6]		40 CFR Part 131[7]		WAC 173-340-730[8]				
Analytes	Units	Washington State Groundwater Background Concentrations[3]	Petroleum Hydrocarbons Method A Cleanup Levels for Groundwater[4]	Surface Water ARAR Protection of Aquatic Life - Marine/Chronic	Surface Water ARAR Protection of Aquatic Life - Marine/Chronic	Surface Water ARAR Protection of Human Health for Consumption of Organisms	Surface Water ARAR Protection of Aquatic Life - Marine/Chronic	Surface Water ARAR Protection of Human Health for Consumption of Organisms	Surface Water ARAR MTCA Method B Carcinogen Standard Formula Value	Surface Water ARAR MTCA Method B Non-Carcinogen Standard Formula Value	Reporting Limit	Analytical Method	Preliminary Groundwater Cleanup Level[2]
Semivolatile Organic Compounds (continued)													
Hexachlorobenzene	µg/L	--	--	--	--	0.00029	--	0.00077	0.00047	0.24	1.0	EPA 8270D	1.0
Pentachlorophenol	µg/L	--	--	7.9	7.9	3.0	7.9	8.2	4.9	7100	5.0	EPA 8270D	5.0
Phenanthrene	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8270D	--
Carbazole	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8270D	--
Anthracene	µg/L	--	--	--	--	40000	--	110000	--	26000	1.0	EPA 8270D	26000
Di-n-Butylphthalate	µg/L	--	--	--	--	4500	--	12000	--	2900	1.0	EPA 8270D	2900
Fluoranthene	µg/L	--	--	--	--	140	--	370	--	90	1.0	EPA 8270D	90
Pyrene	µg/L	--	--	--	--	4000	--	11000	--	2600	1.0	EPA 8270D	2600
Butylbenzylphthalate	µg/L	--	--	--	--	1900	--	--	--	1300	1.0	EPA 8270D	1300
3,3'-Dichlorobenzidine	µg/L	--	--	--	--	0.028	--	0.077	0.046	--	5.0	EPA 8270D	5.0
Benzo(a)anthracene	µg/L	--	--	--	--	0.018	--	0.031	0.030	--	1.0	EPA 8270D	0.018
bis(2-Ethylhexyl)phthalate	µg/L	--	--	--	--	2.2	--	5.9	3.6	400	1.0	EPA 8270D	2.2
Chrysene	µg/L	--	--	--	--	0.018	--	0.031	0.030	--	1.0	EPA 8270D	0.018
Di-n-Octyl phthalate	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8270D	--
Benzo(b)fluoranthene	µg/L	--	--	--	--	0.018	--	0.031	0.030	--	1.0	EPA 8270D	0.018
Benzo(k)fluoranthene	µg/L	--	--	--	--	0.018	--	0.031	0.030	--	1.0	EPA 8270D	0.018
Benzo(a)pyrene	µg/L	--	--	--	--	0.018	--	0.031	0.030	--	1.0	EPA 8270D	0.018
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	0.018	--	0.031	0.030	--	1.0	EPA 8270D	0.018
Dibenz(a,h)anthracene	µg/L	--	--	--	--	0.018	--	0.031	0.030	--	1.0	EPA 8270D	0.018
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8270D	--
Polycyclic Aromatic Hydrocarbons													
Naphthalene	µg/L	--	--	--	--	--	--	--	--	4900	0.01	8270M GC/MS Low Level	4900
2-Methylnaphthalene	µg/L	--	--	--	--	--	--	--	--	--	0.01	8270M GC/MS Low Level	--
Acenaphthylene	µg/L	--	--	--	--	--	--	--	--	--	0.01	8270M GC/MS Low Level	--
Acenaphthene	µg/L	--	--	--	--	990	--	--	--	640	0.01	8270M GC/MS Low Level	640
Fluorene	µg/L	--	--	--	--	5300	--	14000	--	3500	0.01	8270M GC/MS Low Level	3500
Phenanthrene	µg/L	--	--	--	--	--	--	--	--	--	0.01	8270M GC/MS Low Level	--
Anthracene	µg/L	--	--	--	--	40000	--	110000	--	26000	0.01	8270M GC/MS Low Level	26000
Fluoranthene	µg/L	--	--	--	--	140	--	370	--	90	0.01	8270M GC/MS Low Level	90
Pyrene	µg/L	--	--	--	--	4000	--	11000	--	2600	0.01	8270M GC/MS Low Level	2600
Benzo(a)anthracene	µg/L	--	--	--	--	0.018	--	0.031	0.030	--	0.01	8270M GC/MS Low Level	0.018
Chrysene	µg/L	--	--	--	--	0.018	--	0.031	0.030	--	0.01	8270M GC/MS Low Level	0.018
Benzo(b)fluoranthene	µg/L	--	--	--	--	0.018	--	0.031	0.030	--	0.01	8270M GC/MS Low Level	0.018
Benzo(k)fluoranthene	µg/L	--	--	--	--	0.018	--	0.031	0.030	--	0.01	8270M GC/MS Low Level	0.018
Benzo(a)pyrene	µg/L	--	--	--	--	0.018	--	0.031	0.030	--	0.01	8270M GC/MS Low Level	0.018
Indeno(1,2,3-cd)pyrene	µg/L	--	--	--	--	0.018	--	0.031	0.030	--	0.01	8270M GC/MS Low Level	0.018
Dibenz(a,h)anthracene	µg/L	--	--	--	--	0.018	--	0.031	0.030	--	0.01	8270M GC/MS Low Level	0.018
Benzo(g,h,i)perylene	µg/L	--	--	--	--	--	--	--	--	--	0.01	8270M GC/MS Low Level	--
Dibenzofuran	µg/L	--	--	--	--	--	--	--	--	--	0.01	8270M GC/MS Low Level	--
Pesticides													
alpha-BHC	µg/L	--	--	--	--	0.0049	--	0.013	0.0079	--	0.05	EPA 8081	0.05
beta-BHC	µg/L	--	--	--	--	0.017	--	0.046	0.028	--	0.05	EPA 8081	0.05
delta-BHC	µg/L	--	--	--	--	--	--	--	--	--	0.05	EPA 8081	0.05
gamma-BHC (Lindane)	µg/L	--	--	--	--	1.8	--	0.063	0.038	6	0.05	EPA 8081	0.05
Heptachlor	µg/L	--	--	0.0036	0.0036	0.000079	0.0036	0.00021	0.00013	0.12	0.05	EPA 8081	0.05
Aldrin	µg/L	--	--	0.0019	--	0.000050	--	0.00014	0.000082	0.017	0.05	EPA 8081	0.05
Heptachlor Epoxide	µg/L	--	--	--	0.0036	0.000039	0.0036	0.00011	0.000064	0.003	0.05	EPA 8081	0.05
Endosulfan I	µg/L	--	--	0.0087	0.0087	89	0.0087	2.0	--	58	0.05	EPA 8081	0.05
Dieldrin	µg/L	--	--	0.0019	0.0019	0.000054	0.0019	0.00014	0.000087	0.028	0.10	EPA 8081	0.10
4,4'-DDE	µg/L	--	--	0.001	--	0.00022	--	0.00059	0.00036	--	0.10	EPA 8081	0.10
Endrin	µg/L	--	--	0.0023	0.0023	0.060	0.0023	0.81	--	0.2	0.10	EPA 8081	0.10
Endosulfan II	µg/L	--	--	0.0087	0.0087	89	0.0087	2.0	--	58	0.10	EPA 8081	0.10
4,4'-DDD	µg/L	--	--	0.001	--	0.00031	--	0.00084	0.0005	--	0.10	EPA 8081	0.10
Endosulfan Sulfate	µg/L	--	--	0.0087	--	89	0.0087	2.0	--	58	0.10	EPA 8081	0.10
4,4'-DDT	µg/L	--	--	0.001	0.001	0.00022	0.001	0.00059	0.00036	0.024	0.10	EPA 8081	0.10
Methoxychlor	µg/L	--	--	--	--	--	--	--	--	8.4	0.50	EPA 8081	0.50
Endrin Ketone	µg/L	--	--	--	--	--	--	--	--	--	0.10	EPA 8081	0.10
Endrin Aldehyde	µg/L	--	--	--	--	--	--	--	--	--	0.10	EPA 8081	0.10
gamma Chlordane	µg/L	--	--	0.004	0.004	0.001	0.004	0.00059	0.0013	0.092	0.05	EPA 8081	0.05
alpha Chlordane	µg/L	--	--	0.004	0.004	0.001	0.004	0.00059	0.0013	0.092	0.05	EPA 8081	0.05
Toxaphene	µg/L	--	--	0.0002	0.0002	0.00028	0.0002	0.00075	0.00045	--	5.0	EPA 8081	5.0

TABLE 6

PRELIMINARY GROUNDWATER CLEANUP LEVELS

RI/FS WORK PLAN

DAKOTA CREEK SITE

Analytes	Units	Groundwater Criteria: Washington State Groundwater Background Concentrations[3]	Groundwater Criteria: Petroleum Hydrocarbons Method A Cleanup Levels for Groundwater[4]	Surface Water Criteria: Ch. 173-201A WAC[5]: Surface Water ARAR Protection of Aquatic Life - Marine/Chronic	Surface Water Criteria: Section 304 of the Clean Water Act[6]: Surface Water ARAR Protection of Aquatic Life - Marine/Chronic	Surface Water Criteria: Section 304 of the Clean Water Act[6]: Surface Water ARAR Protection of Human Health for Consumption of Organisms	Surface Water Criteria: 40 CFR Part 131[7]: Surface Water ARAR Protection of Aquatic Life - Marine/Chronic	Surface Water Criteria: 40 CFR Part 131[7]: Surface Water ARAR Protection of Human Health for Consumption of Organisms	Surface Water Criteria: WAC 173-340-730[8]: Surface Water ARAR MTCA Method B Carcinogen Standard Formula Value	Surface Water Criteria: WAC 173-340-730[8]: Surface Water ARAR MTCA Method B Non-Carcinogen Standard Formula Value	Analytical Laboratory Criteria[1]: Reporting Limit	Analytical Laboratory Criteria[1]: Analytical Method	Analytical Laboratory Criteria[1]: Preliminary Groundwater Cleanup Level[2]
Herbicides													
2,4,5-TP (Silvex)	µg/L	--	--	--	--	--	--	--	--	--	0.25	EPA 8151A	--
2,4,5-T	µg/L	--	--	--	--	--	--	--	--	--	0.25	EPA 8151A	--
Dinoseb	µg/L	--	--	--	--	--	--	--	--	--	0.25	EPA 8151A	--
Dicamba	µg/L	--	--	--	--	--	--	--	--	--	0.50	EPA 8151A	--
Herbicides (continued)													
2,4-D	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8151A	--
2,4-DB	µg/L	--	--	--	--	--	--	--	--	--	5.0	EPA 8151A	--
Dalapon	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8151A	--
MCPA	µg/L	--	--	--	--	--	--	--	--	--	250	EPA 8151A	--
Dichloroprop	µg/L	--	--	--	--	--	--	--	--	--	1.0	EPA 8151A	--
Polychlorinated Biphenyls													
Aroclor 1016	µg/L	--	--	--	--	--	--	--	--	0.0058	0.01	EPA 8082 Low Level	0.01
Aroclor 1221	µg/L	--	--	--	--	--	--	--	--	--	0.01	EPA 8082 Low Level	0.01
Aroclor 1232	µg/L	--	--	--	--	--	--	--	--	--	0.01	EPA 8082 Low Level	0.01
Aroclor 1242	µg/L	--	--	--	--	--	--	--	--	--	0.01	EPA 8082 Low Level	0.01
Aroclor 1248	µg/L	--	--	--	--	--	--	--	--	--	0.01	EPA 8082 Low Level	0.01
Aroclor 1254	µg/L	--	--	--	--	--	--	--	--	0.0017	0.01	EPA 8082 Low Level	0.01
Aroclor 1260	µg/L	--	--	--	--	--	--	--	--	--	0.01	EPA 8082 Low Level	0.01
Total PCBs	µg/L	--	--	0.03	0.03	0.000064	0.03	0.00017	0.00011	--	0.01	EPA 8082 Low Level	0.01
Dioxins and Furans													
2,3,7,8-TCDD	µg/L	--	--	--	--	5.1E-09	--	1.4E-08	8.6E-09	--	0.000005	EPA 1613/8290	0.000005
-Penta, Hexa, Hepta	µg/L	--	--	--	--	--	--	--	--	--	0.000025	EPA 1613/8290	0.000025
-Octa	µg/L	--	--	--	--	--	--	--	--	--	0.00005	EPA 1613/8290	0.00005

Notes:

1 Reporting limits (TPH, metals, PAHs, and PCBs) and minimum levels (TCDD) for ARI and Frontier Analytical, respectively.

2 Applicable Groundwater Cleanup Level is the lowest groundwater or surface water criteria as indicated by shading. Adjustments to these preliminary cleanup levels were made based on natural background and reporting limit considerations per WAC 173-340-720(7)(c).

3 PTI, 1989. Background Concentrations of Selected Chemicals in Water, Soil, Sediments, and Air of Washington State.

4 MTCA Method A Groundwater Cleanup Levels [WAC 173-340-720(3) and Chapter 173-340 WAC Table 720-1]. Applicable as surface water cleanup level for noncarcinogenic effects of petroleum mixtures per WAC 173-340-730(3)(b)(iii)(C).

5 Chapter 173-201A WAC. Water Quality Standards for Surface Waters of the State of Washington [WAC 173-340-730(2)(b)(i)(A) and WAC 173-340-730(3)(b)(i)(A)].

6 National Recommended Water Quality Criteria; published under Section 304 of the Clean Water Act [WAC 173-340-730(2)(b)(i)(B) and WAC 173-340-730(3)(b)(i)(B)].

7 National Toxics Rule, 40 CFR Part 131.36 [WAC 173-340-730(2)(b)(i)(C) and WAC 173-340-730(3)(b)(i)(C)].

8 MTCA Method B Surface Water Cleanup Levels, protection of human health - fish ingestion ([WAC 173-340-730(3)(b)(iii)].

Shading indacates value was selected as the Preliminary Groundwater Cleanup Level.

-- Cleanup levels not developed for constituent.

ARAR Applicable or relevant appropriate requirement

All Cleanup Levels (except background concentrations for metals) were obtained from the Washington State Department of Ecology Cleanup Levels and Risk Calculations (CLARC) On-Line Database.

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TABLE 7
COMPARISON OF GROUNDWATER RESULTS TO APPLICABLE CLEANUP LEVELS
RI/FS WORK PLAN
DAKOTA CREEK SITE

Analytes	Units	Preliminary Groundwater Cleanup Level	Cleanup Level Reference[1]	MW-1 9/4/2001	MW-1 10/24/2001	MW-1 6/5/2002	MW-1 8/19/2002	MW-1 11/17/2006	MW-2 9/4/2001	MW-2 10/24/2001	Dup of MW-2 10/24/2001	MW-2 6/5/2002	Dup of MW-2 6/5/2002	MW-2 8/19/2002	Dup of MW-2 8/19/2002	MW-2 11/17/2006	Dup of MW-2 11/17/2006	MW-3 9/4/2001	Dup of MW-3 9/4/2001	MW-3 10/24/2001	MW-3 6/5/2002	MW-3 8/19/2002	MW-3 11/17/2006	MW-4 9/4/2001	MW-4 10/24/2001	MW-4 6/5/2002	MW-4 8/19/2002	MW-4 11/17/2006
Metals (Total)																												
Arsenic	mg/L	0.008	B	NA	NA	0.005	0.0006	0.0033	NA	NA	NA	0.003	0.003	0.004	0.002	0.004	0.0038	NA	NA	NA	0.001 U	0.001	0.0009	NA	NA	0.008	0.012	0.0116
Cadmium	mg/L	0.00888	D	NA	NA	0.002 U	0.002 U	0.0002 U	NA	NA	NA	0.002 U	0.002 U	0.002 U	0.002 U	0.0002 U	0.0002 U	NA	NA	NA	0.002 U	0.002 U	0.0002 U	NA	NA	0.002 U	0.002 U	0.0002 U
Chromium	mg/L	240	A	NA	NA	0.015	0.014	0.01	NA	NA	NA	0.005 U	0.005 U	0.005 U	0.005 U	0.004	0.004	NA	NA	NA	0.005 U	0.005 U	0.002	NA	NA	0.005 U	0.005 U	0.003
Copper	mg/L	0.02	B	NA	NA	0.01	0.012	0.0054	NA	NA	NA	0.002 U	0.002 U	0.007	0.004	0.0031	0.0033	NA	NA	NA	0.002 U	0.004	0.0013	NA	NA	0.003	0.002 U	0.0011
Lead	mg/L	0.01	B	NA	NA	0.001	0.001 U	0.001 U	NA	NA	NA	0.001	0.001 U	0.001 U	0.001 U	0.002	0.002	NA	NA	NA	0.001	0.001	0.003	NA	NA	0.005	0.001 U	0.001
Mercury	mg/L	0.000025	C	NA	NA	0.0001 U	0.0001 U	0.0001 U	NA	NA	NA	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	0.0001 U	NA	NA	NA	0.0001 U	0.0001 U	0.0001 U	NA	NA	0.0001 U	0.0001 U	0.0001 U
Nickel	mg/L	0.0082	C	NA	NA	0.0038	0.0042	0.0021	NA	NA	NA	0.0075	0.0083	0.0099	0.0082	0.0039	0.0039	NA	NA	NA	0.0034	0.0037	0.0015	NA	NA	0.0034	0.0033	0.002
Zinc	mg/L	0.16	B	NA	NA	0.01	0.0006 U	0.004 U	NA	NA	NA	0.006 U	0.006 U	0.006 U	0.006 U	0.004	0.005	NA	NA	NA	0.006 U	0.017	0.004 U	NA	NA	0.011	0.006 U	0.004 U
Metals (Dissolved)																												
Arsenic	mg/L	0.008	B	0.009	0.006	0.004	NA	NA	0.003	0.005	0.005	0.003	0.004	NA	NA	NA	NA	0.001	0.002	0.001 U	0.001 U	NA	NA	0.017	0.015	0.009	NA	NA
Cadmium	mg/L	0.00888	D	0.002 U	0.002 U	0.002 U	NA	NA	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	NA	NA	NA	NA	0.002 U	0.002 U	0.002 U	0.002 U	NA	NA	0.002 U	0.002 U	0.002 U	NA	NA
Chromium	mg/L	240	A	0.012	0.01	0.009	NA	NA	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	NA	NA	NA	NA	0.005 U	0.005 U	0.005 U	0.005 U	NA	NA	0.005 U	0.005 U	0.005 U	NA	NA
Copper	mg/L	0.02	B	0.007	0.002	0.004	NA	NA	0.002 U	0.002	0.002	0.002 U	0.002 U	NA	NA	NA	NA	0.002 U	0.002 U	0.002 U	0.002 U	NA	NA	0.002 U	0.002	0.002 U	NA	NA
Lead	mg/L	0.01	B	**0.02 U**	0.001 U	0.001 U	NA	NA	**0.02 U**	0.002 U	0.002 U	0.001 U	0.001 U	NA	NA	NA	NA	**0.02 U**	**0.02 U**	0.001 U	0.001 U	NA	NA	**0.02 U**	0.001 U	0.001 U	NA	NA
Mercury	mg/L	0.000025	C	**0.0001 U**	**0.0001 U**	**0.0001 U**	NA	NA	**0.0001 U**	**0.0001 U**	**0.0001 U**	**0.0001 U**	**0.0001 U**	NA	NA	NA	NA	**0.0001 U**	**0.0001 U**	**0.0001 U**	**0.0001 U**	NA	NA	**0.0001 U**	**0.0001 U**	**0.0001 U**	NA	NA
Nickel	mg/L	0.0082	C	0.01 U	0.0023	0.0022	NA	NA	0.01 U	0.007	0.007	0.0075	0.0075	NA	NA	NA	NA	0.01 U	0.01 U	0.0027	0.0033	NA	NA	0.01 U	0.0027	0.0011	NA	NA
Zinc	mg/L	0.16	B	0.008	0.006 U	0.006 U	NA	NA	0.007	0.006 U	0.006 U	0.006 U	0.006 U	NA	NA	NA	NA	0.006 U	0.006 U	0.006 U	0.006 U	NA	NA	0.01	0.006 U	0.006 U	NA	NA
Volatile Organic Compounds																												
Chloromethane	µg/L	130	A	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
Bromomethane	µg/L	970	A	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
Vinyl Chloride	µg/L	2.4	D	0.02 U	NA	1 U	NA	0.2 U	0.02 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	0.02 U	0.02 U	NA	1 U	NA	0.2 U	0.02 U	NA	1 U	NA	0.2 U
Chloroethane	µg/L	--	--	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
Methylene Chloride	µg/L	590	D	2 U	NA	2 U	NA	0.3	2 U	NA	NA	2 U	2 U	NA	NA	0.3 U	0.3 U	2 U	2 U	NA	2 U	NA	0.3 U	2 U	NA	2 U	NA	0.3 U
Acetone	µg/L	--	--	5 U	NA	5 U	NA	3 U	5 U	NA	NA	5 U	5 U	NA	NA	3.8	3 U	5 U	5 U	NA	5 U	NA	3 U	9.3	NA	5 U	NA	3 U
Carbon Disulfide	µg/L	--	--	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2
1,1-Dichloroethene	µg/L	1.9	A	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
1,1-Dichloroethane	µg/L	--	--	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
trans-1,2-Dichloroethene	µg/L	10000	A	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
cis-1,2-Dichloroethene	µg/L	--	--	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
Chloroform	µg/L	280	A	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
1,2-Dichloroethane	µg/L	37	D	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
2-Butanone	µg/L	--	--	5 U	NA	5 U	NA	1 U	5 U	NA	NA	5 U	5 U	NA	NA	1 U	1 U	5 U	5 U	NA	5 U	NA	4	5 U	NA	5 U	NA	1 U
1,1,1-Trichloroethane	µg/L	420000	A	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
Carbon Tetrachloride	µg/L	1.6	D	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
Vinyl Acetate	µg/L	--	--	5 U	NA	5 U	NA	0.2 U	5 U	NA	NA	5 U	5 U	NA	NA	0.2 U	0.2 U	5 U	5 U	NA	5 U	NA	0.2 U	5 U	NA	5 U	NA	0.2 U
Bromodichloromethane	µg/L	17	D	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
1,2-Dichloropropane	µg/L	15	D	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
cis-1,3-Dichloropropene	µg/L	19	A	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
Trichloroethene	µg/L	1.5	A	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
Dibromochloromethane	µg/L	13	D	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
1,1,2-Trichloroethane	µg/L	16	D	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
Benzene	µg/L	23	A	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
trans-1,3-Dichloropropene	µg/L	19	A	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
Bromoform	µg/L	140	D	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
4-Methyl-2-Pentanone	µg/L	--	--	5 U	NA	5 U	NA	1 U	5 U	NA	NA	5 U	5 U	NA	NA	1 U	1 U	5 U	5 U	NA	5 U	NA	1 U	5 U	NA	5 U	NA	1 U
2-Hexanone	µg/L	--	--	5 U	NA	5 U	NA	3 U	5 U	NA	NA	5 U	5 U	NA	NA	3 U	3 U	5 U	5 U	NA	5 U	NA	3 U	5 U	NA	5 U	NA	3 U
Tetrachloroethene	µg/L	0.39	A	**1 U**	NA	**1 U**	NA	0.2 U	**1 U**	NA	NA	**1 U**	**1 U**	NA	NA	0.2 U	0.2 U	**1 U**	**1 U**	NA	**1 U**	NA	0.2 U	**1 U**	NA	**1 U**	NA	0.2 U
1,1,2,2-Tetrachloroethane	µg/L	4	D	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
Toluene	µg/L	15000	D	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
Chlorobenzene	µg/L	1600	D	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
Ethylbenzene	µg/L	2100	D	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
Styrene	µg/L	--	--	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
Trichlorofluoromethane	µg/L	--	--	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
1,1,2-Trichlorotrifluoroethane	µg/L	--	--	2 U	NA	2 U	NA	0.2 U	2 U	NA	NA	2 U	2 U	NA	NA	0.2 U	0.2 U	2 U	2 U	NA	2 U	NA	0.2 U	2 U	NA	2 U	NA	0.2 U
m,p-Xylene	µg/L	--	--	1 U	NA	1 U	NA	0.4 U	1 U	NA	NA	1 U	1 U	NA	NA	0.4 U	0.4 U	1 U	1 U	NA	1 U	NA	0.4 U	1 U	NA	1 U	NA	0.4 U
o-Xylene	µg/L	--	--	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
1,2-Dichlorobenzene	µg/L	1300	D	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
1,3-Dichlorobenzene	µg/L	960	D	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
1,4-Dichlorobenzene	µg/L	4.9	A	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
Acrolein	µg/L	--	--	50 U	NA	50 U	NA	5 U	50 U	NA	NA	50 U	50 U	NA	NA	5 U	5 U	50 U	50 U	NA	50 U	NA	5 U	50 U	NA	50 U	NA	5 U
Methyl Iodide	µg/L	--	--	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
Bromoethane	µg/L	--	--	2 U	NA	2 U	NA	0.2 U	2 U	NA	NA	2 U	2 U	NA	NA	0.2 U	0.2 U	2 U	2 U	NA	2 U	NA	0.2 U	2 U	NA	2 U	NA	0.2 U
Acrylonitrile	µg/L	1.0	G	1 U	NA	1 U	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	1 U	1 U	1 U	1 U	NA	1 U	NA	1 U	1 U	NA	1 U	NA	1 U
1,1-Dichloropropene	µg/L	--	--	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
Dibromomethane	µg/L	--	--	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
1,1,1,2-Tetrachloroethane	µg/L	--	--	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
1,2-Dibromo-3-Chloropropane	µg/L	--	--	5 U	NA	5 U	NA	0.5 U	5 U	NA	NA	5 U	5 U	NA	NA	0.5 U	0.5 U	5 U	5 U	NA	5 U	NA	0.5 U	5 U	NA	5 U	NA	0.5 U
1,2,3-Trichloropropane	µg/L	--	--	3 U	NA	3 U	NA	0.5 U	3 U	NA	NA	3 U	3 U	NA	NA	0.5 U	0.5 U	3 U	3 U	NA	3 U	NA	0.5 U	3 U	NA	3 U	NA	0.5 U
trans-1,4-Dichloro-2-Butene	µg/L	--	--	5 U	NA	5 U	NA	1 U	5 U	NA	NA	5 U	5 U	NA	NA	1 U	1 U	5 U	5 U	NA	5 U	NA	1 U	5 U	NA	5 U	NA	1 U
1,3,5-Trimethylbenzene	µg/L	--	--	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
1,2,4-Trimethylbenzene	µg/L	--	--	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
Hexachlorobutadiene	µg/L	18	D	5 U	NA	5 U	NA	0.5 U	5 U	NA	NA	5 U	5 U	NA	NA	0.5 U	0.5 U	5 U	5 U	NA	5 U	NA	0.5 U	5 U	NA	5 U	NA	0.5 U
Ethylene Dibromide	µg/L	--	--	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
Bromochloromethane	µg/L	--	--	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
2,2-Dichloropropane	µg/L	--	--	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
1,3-Dichloropropane	µg/L	19	A	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
Isopropylbenzene	µg/L	--	--	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
n-Propyl Benzene	µg/L	--	--	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
Bromobenzene	µg/L	--	--	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
2-Chlorotoluene	µg/L	--	--	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
4-Chlorotoluene	µg/L	--	--	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
tert-Butylbenzene	µg/L	--	--	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
sec-Butylbenzene	µg/L	--	--	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
Volatile Organic Compounds (continued)																												
4-Isopropyltoluene	µg/L	--	--	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
n-Butylbenzene	µg/L	--	--	1 U	NA	1 U	NA	0.2 U	1 U	NA	NA	1 U	1 U	NA	NA	0.2 U	0.2 U	1 U	1 U	NA	1 U	NA	0.2 U	1 U	NA	1 U	NA	0.2 U
1,2,4-Trichlorobenzene	µg/L	70	D	5 U	NA	5 U	NA	0.5 U	5 U	NA	NA	5 U	5 U	NA	NA	0.5 U	0.5 U	5 U	5 U	NA	5 U	NA	0.5 U	5 U	NA	5 U	NA	0.5 U
Naphthalene	µg/L	4900	A	5 U	NA	5 U	NA	0.5 U	5 U	NA	NA	5 U	5 U	NA	NA	0.5 U	0.5 U	5 U	5 U	NA	5 U	NA	0.5 U	5 U	NA	5 U	NA	0.5 U

TABLE 7

COMPARISON OF GROUNDWATER RESULTS TO APPLICABLE CLEANUP LEVELS

RI/FS WORK PLAN

DAKOTA CREEK SITE

Analytes	Units	Preliminary Groundwater Cleanup Level	Cleanup Level Reference[1]	MW-1 9/4/2001	MW-1 10/24/2001	MW-1 6/5/2002	MW-1 8/19/2002	MW-1 11/17/2006	MW-2 9/4/2001	MW-2 10/24/2001	Dup of MW-2 10/24/2001	MW-2 6/5/2002	Dup of MW-2 6/5/2002	MW-2 8/19/2002	Dup of MW-2 8/19/2002	MW-2 11/17/2006	Dup of MW-2 11/17/2006	MW-3 9/4/2001	Dup of MW-3 9/4/2001	MW-3 10/24/2001	MW-3 6/5/2002	MW-3 8/19/2002	MW-3 11/17/2006	MW-4 9/4/2001	MW-4 10/24/2001	MW-4 6/5/2002	MW-4 8/19/2002	MW-4 11/17/2006
1,2,3-Trichlorobenzene	µg/L	--	--	5 U	NA	5 U	NA	0.5 U	5 U	NA	NA	5 U	5 U	NA	NA	0.5 U	0.5 U	5 U	5 U	NA	5 U	NA	0.5 U	5 U	NA	5 U	NA	0.5 U

TABLE 7
COMPARISON OF GROUNDWATER RESULTS TO APPLICABLE CLEANUP LEVELS
RI/FS WORK PLAN
DAKOTA CREEK SITE

Analytes	Units	Preliminary Groundwater Cleanup Level	Cleanup Level Reference[1]	MW-1 9/4/2001	MW-1 10/24/2001	MW-1 6/5/2002	MW-1 8/19/2002	MW-1 11/17/2006	MW-2 9/4/2001	MW-2 10/24/2001	Dup of MW-2 10/24/2001	MW-2 6/5/2002	Dup of MW-2 6/5/2002	MW-2 8/19/2002	Dup of MW-2 8/19/2002	MW-2 11/17/2006	Dup of MW-2 11/17/2006	MW-3 9/4/2001	Dup of MW-3 9/4/2001	MW-3 10/24/2001	MW-3 6/5/2002	MW-3 8/19/2002	MW-3 11/17/2006	MW-4 9/4/2001	MW-4 10/24/2001	MW-4 6/5/2002	MW-4 8/19/2002	MW-4 11/17/2006
Petroleum Hydrocarbons																												
TPH-G	mg/L	1.0	F	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
TPH-D	mg/L	0.5	F	0.25 UJ	0.25 U	0.25 U	0.25 U	0.25 U	4.1	5	4.8	3	2.8	0.25 U	0.25 U	0.25 U	0.25 U	0.64	0.75	0.64	0.68	0.25 U	0.25 U	1.3	1.1	0.63	0.25 U	0.25 U
TPH-O	mg/L	0.5	F	0.5 UJ	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.63	0.81	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Si/Acid Cleaned TPH-D	mg/L	0.5	F	NA	NA	0.25 U	NA	NA	NA	NA	NA	0.25 U	0.25 U	NA	NA	NA	NA	NA	NA	NA	0.25 U	NA	NA	NA	NA	0.25 U	NA	NA
Si/Acid Cleaned TPH-O	mg/L	0.5	F	NA	NA	0.5 U	NA	NA	NA	NA	NA	0.5 U	0.5 U	NA	NA	NA	NA	NA	NA	NA	0.5 U	NA	NA	NA	NA	0.5 U	NA	NA
Semivolatile Organic Compounds																												
Phenol	µg/L	1100000	A	NA	NA	2 U	NA	1 U	NA	NA	NA	2 U	2 U	NA	NA	1 U	1 U	NA	NA	NA	2 U	NA	1 U	NA	NA	2 U	NA	1 U
Bis-(2-Chloroethyl) Ether	µg/L	0.53	D	NA	NA	2 U	NA	**1 U**	NA	NA	NA	**2 U**	**2 U**	NA	NA	**1 U**	**1 U**	NA	NA	NA	**2 U**	NA	**1 U**	NA	NA	**2 U**	NA	**1 U**
2-Chlorophenol	µg/L	97	A	NA	NA	1 U	NA	1 U	NA	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	1 U
1,3-Dichlorobenzene	µg/L	960	D	NA	NA	1 U	NA	1 U	NA	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	1 U
1,4-Dichlorobenzene	µg/L	4.9	A	NA	NA	1 U	NA	1 U	NA	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	1 U
Benzyl Alcohol	µg/L	--	--	NA	NA	5 U	NA	5 U	NA	NA	NA	5 U	5 U	NA	NA	5 U	5 U	NA	NA	NA	5 U	NA	5 U	NA	NA	5 U	NA	5 U
1,2-Dichlorobenzene	µg/L	1300	D	NA	NA	1 U	NA	1 U	NA	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	1 U
2-Methylphenol	µg/L	--	--	NA	NA	1 U	NA	1 U	NA	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	1 U
2,2'-Oxybis(1-Chloropropane)	µg/L	--	--	NA	NA	1 U	NA	1 U	NA	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	1 U
4-Methylphenol	µg/L	--	--	NA	NA	1 U	NA	1 U	NA	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	1 U
N-Nitroso-Di-N-Propylamine	µg/L	5.0	G	NA	NA	2 U	NA	5 U	NA	NA	NA	2 U	2 U	NA	NA	5 U	5 U	NA	NA	NA	2 U	NA	5 U	NA	NA	2 U	NA	5 U
Hexachloroethane	µg/L	3.3	D	NA	NA	2 U	NA	1 U	NA	NA	NA	2 U	2 U	NA	NA	1 U	1 U	NA	NA	NA	2 U	NA	1 U	NA	NA	2 U	NA	1 U
Nitrobenzene	µg/L	450	A	NA	NA	1 U	NA	1 U	NA	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	1 U
Isophorone	µg/L	600	C	NA	NA	1 U	NA	1 U	NA	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	1 U
2-Nitrophenol	µg/L	--	--	NA	NA	5 U	NA	5 U	NA	NA	NA	5 U	5 U	NA	NA	5 U	5 U	NA	NA	NA	5 U	NA	5 U	NA	NA	5 U	NA	5 U
2,4-Dimethylphenol	µg/L	550	A	NA	NA	3 U	NA	1 U	NA	NA	NA	3 U	3 U	NA	NA	1 U	1 U	NA	NA	NA	3 U	NA	1 U	NA	NA	3 U	NA	1 U
Benzoic Acid	µg/L	--	--	NA	NA	50 U	NA	10 U	NA	NA	NA	50 U	50 U	NA	NA	10 U	10 U	NA	NA	NA	50 U	NA	10 U	NA	NA	50 U	NA	10 U
bis(2-Chloroethoxy) Methane	µg/L	--	--	NA	NA	1 U	NA	1 U	NA	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	1 U
2,4-Dichlorophenol	µg/L	190	A	NA	NA	3 U	NA	5 U	NA	NA	NA	3 U	3 U	NA	NA	5 U	5 U	NA	NA	NA	3 U	NA	5 U	NA	NA	3 U	NA	5 U
1,2,4-Trichlorobenzene	µg/L	70	D	NA	NA	1 U	NA	1 U	NA	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	1 U
Naphthalene	µg/L	4900	A	NA	NA	1 U	NA	1 U	NA	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	1 U
4-Chloroaniline	µg/L	--	--	NA	NA	3 U	NA	5 U	NA	NA	NA	3 U	3 U	NA	NA	5 U	5 U	NA	NA	NA	3 U	NA	5 U	NA	NA	3 U	NA	5 U
Hexachlorobutadiene	µg/L	18	D	NA	NA	2 U	NA	1 U	NA	NA	NA	2 U	2 U	NA	NA	1 U	1 U	NA	NA	NA	2 U	NA	1 U	NA	NA	2 U	NA	1 U
4-Chloro-3-methylphenol	µg/L	--	--	NA	NA	2 U	NA	5 U	NA	NA	NA	2 U	2 U	NA	NA	5 U	5 U	NA	NA	NA	2 U	NA	5 U	NA	NA	2 U	NA	5 U
2-Methylnaphthalene	µg/L	--	--	NA	NA	1 U	NA	1 U	NA	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	1 U
Hexachlorocyclopentadiene	µg/L	1100	D	NA	NA	5 U	NA	5 U	NA	NA	NA	5 U	5 U	NA	NA	5 U	5 U	NA	NA	NA	5 U	NA	5 U	NA	NA	5 U	NA	5 U
2,4,6-Trichlorophenol	µg/L	5.0	G	NA	NA	5 U	NA	5 U	NA	NA	NA	5 U	5 U	NA	NA	5 U	5 U	NA	NA	NA	5 U	NA	5 U	NA	NA	5 U	NA	5 U
2,4,5-Trichlorophenol	µg/L	--	--	NA	NA	5 U	NA	5 U	NA	NA	NA	5 U	5 U	NA	NA	5 U	5 U	NA	NA	NA	5 U	NA	5 U	NA	NA	5 U	NA	5 U
2-Chloronaphthalene	µg/L	--	--	NA	NA	1 U	NA	1 U	NA	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	1 U
2-Nitroaniline	µg/L	--	--	NA	NA	5 U	NA	5 U	NA	NA	NA	5 U	5 U	NA	NA	5 U	5 U	NA	NA	NA	5 U	NA	5 U	NA	NA	5 U	NA	5 U
Dimethylphthalate	µg/L	72000	A	NA	NA	1 U	NA	1 U	NA	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	1 U
Acenaphthylene	µg/L	--	--	NA	NA	1 U	NA	1 U	NA	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	1 U
3-Nitroaniline	µg/L	--	--	NA	NA	6 U	NA	5 U	NA	NA	NA	6 U	6 U	NA	NA	5 U	5 U	NA	NA	NA	6 U	NA	5 U	NA	NA	6 U	NA	5 U
Acenaphthene	µg/L	640	A	NA	NA	1 U	NA	1 U	NA	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	1 U
2,4-Dinitrophenol	µg/L	3500	A	NA	NA	25 U	NA	10 U	NA	NA	NA	25 U	25 U	NA	NA	10 U	10 U	NA	NA	NA	25 U	NA	10 U	NA	NA	25 U	NA	10 U
4-Nitrophenol	µg/L	--	--	NA	NA	5 U	NA	5 U	NA	NA	NA	5 U	5 U	NA	NA	5 U	5 U	NA	NA	NA	5 U	NA	5 U	NA	NA	5 U	NA	5 U
Dibenzofuran	µg/L	--	--	NA	NA	1 U	NA	1 U	NA	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	1 U
2,6-Dinitrotoluene	µg/L	--	--	NA	NA	5 U	NA	5 U	NA	NA	NA	5 U	5 U	NA	NA	5 U	5 U	NA	NA	NA	5 U	NA	5 U	NA	NA	5 U	NA	5 U
2,4-Dinitrotoluene	µg/L	5.0	G	NA	NA	5 U	NA	5 U	NA	NA	NA	5 U	5 U	NA	NA	5 U	5 U	NA	NA	NA	5 U	NA	5 U	NA	NA	5 U	NA	5 U
Diethylphthalate	µg/L	28000	A	NA	NA	1 U	NA	1 U	NA	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	1 U
4-Chlorophenyl-phenylether	µg/L	--	--	NA	NA	1 U	NA	1 U	NA	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	1 U
Fluorene	µg/L	3500	A	NA	NA	1 U	NA	1 U	NA	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	1 U
4-Nitroaniline	µg/L	--	--	NA	NA	5 U	NA	5 U	NA	NA	NA	5 U	5 U	NA	NA	5 U	5 U	NA	NA	NA	5 U	NA	5 U	NA	NA	5 U	NA	5 U
4,6-Dinitro-2-Methylphenol	µg/L	--	--	NA	NA	15 U	NA	10 U	NA	NA	NA	15 U	15 U	NA	NA	10 U	10 U	NA	NA	NA	15 U	NA	10 U	NA	NA	15 U	NA	10 U
N-Nitrosodiphenylamine	µg/L	6	D	NA	NA	1 U	NA	1 U	NA	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	1 U
4-Bromophenyl-phenylether	µg/L	--	--	NA	NA	1 U	NA	1 U	NA	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	1 U
Hexachlorobenzene	µg/L	1.0	G	NA	NA	1 U	NA	1 U	NA	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	1 U
Pentachlorophenol	µg/L	5.0	G	NA	NA	5 U	NA	5 U	NA	NA	NA	5 U	5 U	NA	NA	5 U	5 U	NA	NA	NA	5 U	NA	5 U	NA	NA	5 U	NA	5 U
Phenanthrene	µg/L	--	--	NA	NA	1 U	NA	1 U	NA	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	1 U
Carbazole	µg/L	--	--	NA	NA	1 U	NA	1 U	NA	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	1 U
Anthracene	µg/L	26000	A	NA	NA	1 U	NA	1 U	NA	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	1 U
Di-n-Butylphthalate	µg/L	2900	A	NA	NA	1 U	NA	1 U	NA	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	1 U
Fluoranthene	µg/L	90	A	NA	NA	1 U	NA	1 U	NA	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	1 U
Pyrene	µg/L	2600	A	NA	NA	1 U	NA	1 U	NA	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	1 U
Butylbenzylphthalate	µg/L	1300	A	NA	NA	1 U	NA	1 U	NA	NA	NA	1 U	1 U	NA	NA	1 U	1 U	NA	NA	NA	1 U	NA	1 U	NA	NA	1 U	NA	1 U
3,3'-Dichlorobenzidine	µg/L	5.0	C	NA	NA	5 U	NA	5 U	NA	NA	NA	5 U	5 U	NA	NA	5 U	5 U	NA	NA	NA	5 U	NA	5 U	NA	NA	5 U	NA	5 U
Benzo(a)anthracene	µg/L	0.018	D	NA	NA	**1 U**	NA	**1 U**	NA	NA	NA	**1 U**	**1 U**	NA	NA	**1 U**	**1 U**	NA	NA	NA	**1 U**	NA	**1 U**	NA	NA	**1 U**	NA	**1 U**
bis(2-Ethylhexyl)phthalate	µg/L	2.2	D	NA	NA	4 U	NA	1 U	NA	NA	NA	4 U	4 U	NA	NA	1 U	1 U	NA	NA	NA	4 U	NA	1 U	NA	NA	4 U	NA	1 U
Chrysene	µg/L	0.018	D	NA	NA	**1 U**	NA	**1 U**	NA	NA	NA	**1 U**	**1 U**	NA	NA	**1 U**	**1 U**	NA	NA	NA	**1 U**	NA	**1 U**	NA	NA	**1 U**	NA	**1 U**
Di-n-Octyl phthalate	µg/L	--	--	NA	NA	2 U	NA	1 U	NA	NA	NA	2 U	2 U	NA	NA	1 U	1 U	NA	NA	NA	2 U	NA	1 U	NA	NA	2 U	NA	1 U
Benzo(b)fluoranthene	µg/L	0.018	D	NA	NA	**1 U**	NA	**1 U**	NA	NA	NA	**1 U**	**1 U**	NA	NA	**1 U**	**1 U**	NA	NA	NA	**1 U**	NA	**1 U**	NA	NA	**1 U**	NA	**1 U**
Benzo(k)fluoranthene	µg/L	0.018	D	NA	NA	**1 U**	NA	**1 U**	NA	NA	NA	**1 U**	**1 U**	NA	NA	**1 U**	**1 U**	NA	NA	NA	**1 U**	NA	**1 U**	NA	NA	**1 U**	NA	**1 U**
Benzo(a)pyrene	µg/L	0.018	D	NA	NA	**1 U**	NA	**1 U**	NA	NA	NA	**1 U**	**1 U**	NA	NA	**1 U**	**1 U**	NA	NA	NA	**1 U**	NA	**1 U**	NA	NA	**1 U**	NA	**1 U**
Indeno(1,2,3-cd)pyrene	µg/L	0.018	D	NA	NA	**1 U**	NA	**1 U**	NA	NA	NA	**1 U**	**1 U**	NA	NA	**1 U**	**1 U**	NA	NA	NA	**1 U**	NA	**1 U**	NA	NA	**1 U**	NA	**1 U**
Dibenz(a,h)anthracene	µg/L	0.018	D	NA	NA	**1 U**	NA	**1 U**	NA	NA	NA	**1 U**	**1 U**	NA	NA	**1 U**	**1 U**	NA	NA	NA	**1 U**	NA	**1 U**	NA	NA	**1 U**	NA	**1 U**
Benzo(g,h,i)perylene	µg/L	--	--	NA	NA	**1 U**	NA	**1 U**	NA	NA	NA	**1 U**	**1 U**	NA	NA	**1 U**	**1 U**	NA	NA	NA	**1 U**	NA	**1 U**	NA	NA	**1 U**	NA	**1 U**
Polycyclic Aromatic Hydrocarbons																												
Naphthalene	µg/L	4900	A	NA	NA	NA	0.1 U	0.01 U	NA	NA	NA	NA	NA	0.1 U	0.1 U	0.021 B	0.027 B	NA	NA	NA	NA	0.1 U	0.01 U	NA	NA	NA	0.1 U	0.011 B
2-Methylnaphthalene	µg/L	--	--	NA	NA	NA	0.1 U	0.01 U	NA	NA	NA	NA	NA	0.1 U	0.1 U	0.0062 J	0.0069 J	NA	NA	NA	NA	0.1 U	0.01 U	NA	NA	NA	0.1 U	0.01 U
Acenaphthylene	µg/L	--	--	NA	NA	NA	0.1 U	0.01 U	NA	NA	NA	NA	NA	0.1 U	0.1 U	0.0052 J	0.0058 J	NA	NA	NA	NA	0.1 U	0.01 U	NA	NA	NA	0.1 U	0.012
Acenaphthene	µg/L	640	A	NA	NA	NA	0.1 U	0.01 U	NA	NA	NA	NA	NA	0.08 J	0.1	0.01 U	0.0059 J	NA	NA	NA	NA	0.23	0.22	NA	NA	NA	0.1 U	0.039
Polycyclic Aromatic Hydrocarbons (continued)																												
Fluorene	µg/L	3500	A	NA	NA	NA	0.1 U	0.01 U	NA	NA	NA	NA	NA	0.1 U	0.1 U	0.01 U	0.01 U	NA	NA	NA	NA	0.1	0.054	NA	NA	NA	0.1 U	0.043
Phenanthrene	µg/L	--	--	NA	NA	NA	0.1 U	0.01 U	NA	NA	NA	NA	NA	0.1 U	0.1 U	0.0074 J	0.0054 J	NA	NA	NA	NA	0.1 U	0.01 U	NA	NA	NA	0.1 U	0.024
Anthracene	µg/L	26000	A	NA	NA	NA	0.1 U	0.01 U	NA	NA	NA	NA	NA	0.1 U	0.1 U	0.0051 J	0.01 U	NA	NA	NA	NA	0.1 U	0.0056 J	NA	NA	NA	0.1 U	0.0088 J
Fluoranthene	µg/L	90	A	NA	NA	NA	0.1 U	0.01 U	NA	NA	NA	NA	NA	0.1 U	0.1 U	0.03	0.019	NA	NA	NA	NA	0.17	0.13	NA	NA	NA	0.1 U	0.012
Pyrene	µg/L	2600	A	NA	NA	NA	0.1 U	0.01 U	NA	NA	NA	NA	NA	0.1 U	0.1 U	0.028	0.015	NA	NA	NA	NA	0.2	0.13	NA	NA	NA	0.1 U	0.0092 J
Benzo(a)anthracene	µg/L	0.018	D	NA	NA	NA	**0.1 U**	0.01 U	NA	NA	NA	NA	NA	**0.1 U**	**0.1 U**	0.01 U	0.01 U	NA	NA	NA	NA	**0.1 U**	0.0052 J	NA	NA	NA	**0.1 U**	0.01 U
Chrysene	µg/L	0.018	D	NA	NA	NA	**0.1 U**	0.01 U	NA	NA	NA	NA	NA	**0.1 U**	**0.1 U**	0.0069 J	0.01 U	NA	NA	NA	NA	**0.1 U**	0.0065 J	NA	NA	NA	**0.1 U**	0.01 U
Benzo(b)fluoranthene	µg/L	0.018	D	NA	NA	NA	**0.1 U**	0.01 U	NA	NA	NA	NA	NA	**0.1 U**	**0.1 U**	0.01 U	0.01 U	NA	NA	NA	NA	**0.1 U**	0.01 U	NA	NA	NA	**0.1 U**	0.01 U
Benzo(k)fluoranthene	µg/L	0.018	D	NA	NA	NA	**0.1 U**	0.01 U	NA	NA	NA	NA	NA	**0.1 U**	**0.1 U**	0.01 U	0.01 U	NA	NA	NA	NA	**0.1 U**	0.01 U	NA	NA	NA	**0.1 U**	0.01 U
Benzo(a)pyrene	µg/L	0.018	D	NA	NA	NA	**0.1 U**	0.01 U	NA	NA	NA	NA	NA	**0.1 U**	**0.1 U**	0.01 U	0.01 U	NA	NA	NA	NA	**0.1 U**	0.01 U	NA	NA	NA	**0.1 U**	0.01 U

TABLE 7
COMPARISON OF GROUNDWATER RESULTS TO APPLICABLE CLEANUP LEVELS
RI/FS WORK PLAN
DAKOTA CREEK SITE

Analytes	Units	Preliminary Groundwater Cleanup Level	Cleanup Level Reference[1]	MW-1 9/4/2001	MW-1 10/24/2001	MW-1 6/5/2002	MW-1 8/19/2002	MW-1 11/17/2006	MW-2 9/4/2001	MW-2 10/24/2001	Dup of MW-2 10/24/2001	MW-2 6/5/2002	Dup of MW-2 6/5/2002	MW-2 8/19/2002	Dup of MW-2 8/19/2002	MW-2 11/17/2006	Dup of MW-2 11/17/2006	MW-3 9/4/2001	Dup of MW-3 9/4/2001	MW-3 10/24/2001	MW-3 6/5/2002	MW-3 8/19/2002	MW-3 11/17/2006	MW-4 9/4/2001	MW-4 10/24/2001	MW-4 6/5/2002	MW-4 8/19/2002	MW-4 11/17/2006
Indeno(1,2,3-cd)pyrene	µg/L	0.018	D	NA	NA	NA	**0.1 U**	0.01 U	NA	NA	NA	NA	NA	**0.1 U**	**0.1 U**	0.01 U	0.01 U	NA	NA	NA	NA	**0.1 U**	0.01 U	NA	NA	NA	**0.1 U**	0.01 U
Dibenz(a,h)anthracene	µg/L	0.018	D	NA	NA	NA	**0.1 U**	0.01 U	NA	NA	NA	NA	NA	**0.1 U**	**0.1 U**	0.01 U	0.01 U	NA	NA	NA	NA	**0.1 U**	0.01 U	NA	NA	NA	**0.1 U**	0.01 U
Benzo(g,h,i)perylene	µg/L	--	--	NA	NA	NA	0.1 U	0.01 U	NA	NA	NA	NA	NA	0.1 U	0.1 U	0.01 U	0.01 U	NA	NA	NA	NA	0.1 U	0.01 U	NA	NA	NA	0.1 U	0.01 U
Dibenzofuran	µg/L	--	--	NA	NA	NA	0.1 U	0.01 U	NA	NA	NA	NA	NA	0.1 U	0.1 U	0.01 U	0.01 U	NA	NA	NA	NA	0.1 U	0.01 U	NA	NA	NA	0.1 U	0.01 U

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RI/FS WORK PLAN
DAKOTA CREEK SITE

Analytes	Units	Preliminary Groundwater Cleanup Level	Cleanup Level Reference[1]	MW-1 9/4/2001	MW-1 10/24/2001	MW-1 6/5/2002	MW-1 8/19/2002	MW-1 11/17/2006	MW-2 9/4/2001	MW-2 10/24/2001	Dup of MW-2 10/24/2001	MW-2 6/5/2002	Dup of MW-2 6/5/2002	MW-2 8/19/2002	Dup of MW-2 8/19/2002	MW-2 11/17/2006	Dup of MW-2 11/17/2006	MW-3 9/4/2001	Dup of MW-3 9/4/2001	MW-3 10/24/2001	MW-3 6/5/2002	MW-3 8/19/2002	MW-3 11/17/2006	MW-4 9/4/2001	MW-4 10/24/2001	MW-4 6/5/2002	MW-4 8/19/2002	MW-4 11/17/2006
Pesticides																												
alpha-BHC	µg/L	0.05	G	NA	NA	0.051 U	NA	0.05 U	NA	NA	NA	0.051 U	0.051 U	NA	NA	0.05 U	0.05 U	NA	NA	NA	0.05 U	NA	0.05 U	NA	NA	0.052 U	NA	0.05 U
beta-BHC	µg/L	0.05	G	NA	NA	0.051 U	NA	0.05 U	NA	NA	NA	0.051 U	0.051 U	NA	NA	0.05 U	0.05 U	NA	NA	NA	0.05 U	NA	0.05 U	NA	NA	0.052 U	NA	0.05 U
delta-BHC	µg/L	0.05	G	NA	NA	0.051 U	NA	0.05 U	NA	NA	NA	0.051 U	0.051 U	NA	NA	0.05 U	0.05 U	NA	NA	NA	0.05 U	NA	0.05 U	NA	NA	0.052 U	NA	0.05 U
gamma-BHC (Lindane)	µg/L	0.05	G	NA	NA	0.051 U	NA	0.05 U	NA	NA	NA	0.051 U	0.051 U	NA	NA	0.05 U	0.05 U	NA	NA	NA	0.05 U	NA	0.05 U	NA	NA	0.052 U	NA	0.05 U
Heptachlor	µg/L	0.05	G	NA	NA	0.051 U	NA	0.05 U	NA	NA	NA	0.051 U	0.051 U	NA	NA	0.05 U	0.05 U	NA	NA	NA	0.05 U	NA	0.05 U	NA	NA	0.052 U	NA	0.05 U
Aldrin	µg/L	0.05	G	NA	NA	0.051 U	NA	0.05 U	NA	NA	NA	0.051 U	0.051 U	NA	NA	0.05 U	0.05 U	NA	NA	NA	0.05 U	NA	0.05 U	NA	NA	0.052 U	NA	0.05 U
Heptachlor Epoxide	µg/L	0.05	G	NA	NA	0.051 U	NA	0.05 U	NA	NA	NA	0.051 U	0.051 U	NA	NA	0.05 U	0.05 U	NA	NA	NA	0.05 U	NA	0.05 U	NA	NA	0.052 U	NA	0.05 U
Endosulfan I	µg/L	0.05	G	NA	NA	0.051 U	NA	0.05 U	NA	NA	NA	0.051 U	0.051 U	NA	NA	0.05 U	0.05 U	NA	NA	NA	0.05 U	NA	0.05 U	NA	NA	0.052 U	NA	0.05 U
Dieldrin	µg/L	0.1	G	NA	NA	0.1 U	NA	0.1 U	NA	NA	NA	0.1 U	0.1 U	NA	NA	0.1 U	0.1 U	NA	NA	NA	0.1 U	NA	0.1 U	NA	NA	0.1 U	NA	0.1 U
4,4'-DDE	µg/L	0.1	G	NA	NA	0.1 U	NA	0.1 U	NA	NA	NA	0.1 U	0.1 U	NA	NA	0.1 U	0.1 U	NA	NA	NA	0.1 U	NA	0.1 U	NA	NA	0.1 U	NA	0.1 U
Endrin	µg/L	0.1	G	NA	NA	0.1 U	NA	0.1 U	NA	NA	NA	0.1 U	0.1 U	NA	NA	0.1 U	0.1 U	NA	NA	NA	0.1 U	NA	0.1 U	NA	NA	0.1 U	NA	0.1 U
Endosulfan II	µg/L	0.1	G	NA	NA	0.1 U	NA	0.1 U	NA	NA	NA	0.1 U	0.1 U	NA	NA	0.1 U	0.1 U	NA	NA	NA	0.1 U	NA	0.1 U	NA	NA	0.1 U	NA	0.1 U
4,4'-DDD	µg/L	0.1	G	NA	NA	0.1 U	NA	0.1 U	NA	NA	NA	0.1 U	0.1 U	NA	NA	0.1 U	0.1 U	NA	NA	NA	0.1 U	NA	0.1 U	NA	NA	0.1 U	NA	0.1 U
Endosulfan Sulfate	µg/L	0.1	G	NA	NA	0.1 U	NA	0.1 U	NA	NA	NA	0.1 U	0.1 U	NA	NA	0.1 U	0.1 U	NA	NA	NA	0.1 U	NA	0.1 U	NA	NA	0.1 U	NA	0.1 U
4,4'-DDT	µg/L	0.1	G	NA	NA	0.1 U	NA	0.1 U	NA	NA	NA	0.1 U	0.1 U	NA	NA	0.1 U	0.1 U	NA	NA	NA	0.1 U	NA	0.1 U	NA	NA	0.1 U	NA	0.1 U
Methoxychlor	µg/L	0.5	G	NA	NA	0.51 U	NA	0.5 U	NA	NA	NA	0.51 U	0.51 U	NA	NA	0.5 U	0.5 U	NA	NA	NA	0.5 U	NA	0.5 U	NA	NA	0.52 U	NA	0.5 U
Endrin Ketone	µg/L	0.1	G	NA	NA	0.1 U	NA	0.1 U	NA	NA	NA	0.1 U	0.1 U	NA	NA	0.1 U	0.1 U	NA	NA	NA	0.1 U	NA	0.1 U	NA	NA	0.1 U	NA	0.1 U
Endrin Aldehyde	µg/L	0.1	G	NA	NA	0.1 U	NA	0.1 U	NA	NA	NA	0.1 U	0.1 U	NA	NA	0.1 U	0.1 U	NA	NA	NA	0.1 U	NA	0.1 U	NA	NA	0.1 U	NA	0.1 U
gamma Chlordane	µg/L	0.05	G	NA	NA	0.051 U	NA	0.05 U	NA	NA	NA	0.051 U	0.051 U	NA	NA	0.05 U	0.05 U	NA	NA	NA	0.05 U	NA	0.05 U	NA	NA	0.052 U	NA	0.05 U
alpha Chlordane	µg/L	0.05	G	NA	NA	0.051 U	NA	0.05 U	NA	NA	NA	0.051 U	0.051 U	NA	NA	0.05 U	0.05 U	NA	NA	NA	0.05 U	NA	0.05 U	NA	NA	0.052 U	NA	0.05 U
Toxaphene	µg/L	5	G	NA	NA	**5.1 U**	NA	5 U	NA	NA	NA	**5.1 U**	**5.1 U**	NA	NA	5 U	5 U	NA	NA	NA	5 U	NA	5 U	NA	NA	**5.2 U**	NA	5 U
Herbicides																												
2,4,5-TP (Silvex)	µg/L	--	--	NA	NA	0.28 U	NA	0.25 U	NA	NA	NA	0.28 U	0.29 U	NA	NA	0.25 U	0.25 U	NA	NA	NA	0.28 U	NA	0.25 U	NA	NA	0.29 U	NA	0.25 U
2,4,5-T	µg/L	--	--	NA	NA	0.6 U	NA	0.25 U	NA	NA	NA	0.61 U	0.61 U	NA	NA	0.25 U	0.25 U	NA	NA	NA	0.6 U	NA	0.25 U	NA	NA	0.61 U	NA	0.25 U
Dinoseb	µg/L	--	--	NA	NA	0.5 U	NA	0.25 U	NA	NA	NA	0.51 U	0.51 U	NA	NA	0.25 U	0.25 U	NA	NA	NA	0.5 U	NA	0.25 U	NA	NA	0.51 U	NA	0.25 U
Dicamba	µg/L	--	--	NA	NA	0.7 U	NA	0.5 U	NA	NA	NA	0.71 U	0.71 U	NA	NA	0.5 U	0.5 U	NA	NA	NA	0.7 U	NA	0.5 U	NA	NA	0.71 U	NA	0.5 U
2,4-D	µg/L	--	--	NA	NA	1.5 U	NA	1 U	NA	NA	NA	1.5 U	1.5 U	NA	NA	1 U	1 U	NA	NA	NA	1.5 U	NA	1 U	NA	NA	1.5 U	NA	1 U
2,4-DB	µg/L	--	--	NA	NA	10 U	NA	5 U	NA	NA	NA	10 U	10 U	NA	NA	5 U	5 U	NA	NA	NA	10 U	NA	5 U	NA	NA	10 U	NA	5 U
Dalapon	µg/L	--	--	NA	NA	2 U	NA	1 U	NA	NA	NA	2 U	2 U	NA	NA	1 U	1 U	NA	NA	NA	2 U	NA	1 U	NA	NA	2 U	NA	1 U
MCPA	µg/L	--	--	NA	NA	250 U	NA	250 U	NA	NA	NA	250 U	260 U	NA	NA	250 U	250 U	NA	NA	NA	250 U	NA	250 U	NA	NA	260 U	NA	250 U
Dichloroprop	µg/L	--	--	NA	NA	3.1 U	NA	1 U	NA	NA	NA	3.1 U	3.2 U	NA	NA	1 U	1 U	NA	NA	NA	3.1 U	NA	1 U	NA	NA	3.2 U	NA	1 U

Notes:

-- Criteria not developed for specific analyte.

1 Cleanup level references:

A) MTCA Method B Criteria—Protective of Surface Water, standard formula value (CLARC On-Line Database)

B) Washington State Groundwater Background Concentration (PTI 1989)

C) Surface Water ARAR—Marine National Toxics Rule (40 CFR 131; CLARC On-Line Database)

D) Surface Water ARAR—Marine Clean Water Act (304; CLARC On-Line Database)

E) Surface Water ARAR-Marine Water Quality Standards for Surface Waters of the State of Washington (Chapter 173-201A; CLARC On-Line Database)

F) MTCA Method A Cleanup Levels for Groundwater

G) ARI Method Reporting Limit

NA Constituent not analyzed for.

Shading indicates cleanup level exceedance

Bold indicates reporting limit exceeds cleanup level.

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TABLE 8
HISTORICAL DATA SUMMARY AND DATA GAP IDENTIFICATION
RI/FS WORK PLAN
DAKOTA CREEK SITE

	Preliminary Soil Cleanup Level			MTCA Method A				MTCA Method C		MTCA Simplified TEE (Industrial/Commercial)		
Analytes	**Exceeds Preliminary Soil Cleanup Level**	**Basis**	**Sample Represents Removed Soil**	**Exceeds Method A Criteria**	**Sample Represents Removed Soil**	**Basis**	**Exceeds Preliminary Groundwater Cleanup Level (2006 Sampling Event)**	**Exceeds Direct Contact Criteria**	**Sample Represents Removed Soil**	**Exceeds TEE Criteria**	**Sample Represents Removed Soil**	**Data Gap Evaluation**
Total Petroleum Hydrocarbons												
Gasoline	16	(a)	12	16	12	Protection of groundwater (drinking water)	No	Not available	--	0	--	Figure 4 of Landau's 2002 "Completion Report" indicates that 2 samples with gasoline concentrations greater than soil cleanup level are outside of the excavation area (A-1 Pump 1991, North Wall #2 [166 mg/kg] and S-7-TPH-2 4-7 ft BGS [560 mg/kg]). Based on the location of these samples it is likely that the soil represented by these samples was removed duing the 2002 Independent Cleanup Action. 2 samples remain with gasoline greater than soil cleanup level (S-3-EFA-0 [200 mg/kg] and S-3-EFA-1 [250 mg/kg]).
Diesel	15	(a)	15	15	13	Accumulation of free product on groundwater	No	Not available	--	4	4	Figure 4 of Landau's 2002 "Completion Report" indicates that 2 samples may remain with diesel greater than soil cleanup level are outside of the excavation area (S-7-TPH-2 1-4 ft BGS [4,400 mg/kg] and S-7-TPH-2 4-7 ft BGS [7,600 mg/kg]). Based on the location of these samples it is likely that the soil represented by these samples was removed during the 2002 Independent Cleanup Action.
Heavy Oil	7	(a)	5	7	5	Accumulation of free product on groundwater	No	Not available	--	0	--	2 samples remain with heavy oil greater than soil cleanup level (DC-UPLD SS-4 [2,220 mg/kg] and DC-UPLD SS-6 [2,100 mg/kg]).
Metals												
Arsenic	18	(b)	6	11	5	Protection of groundwater (drinking water); adusted for natural background	Yes	3	3	11	7	Arsenic exceeds soil background and soil groundwater (i.e., surface water) protection cleanup levels and groundwater cleanup level in MW-4. Arsenic exceeded the simplified industrial TEE soil concentration at four samples that remain as shown on Figure 5b.
Copper	37	(b)	7	0	0	--	No	0	--	12	6	Because copper did not exceed the groundwater cleanup level, the MTCA Method C direct contact cleanup level is applicable cleanup level. Copper did not exceed the direct contact criteria. Copper exceeded the simplified industrial TEE soil concentration at six samples that remain as shown on Figure 5b.
Lead	0	--	--	0	--	--	No	Not available	--	5	4	Lead exceeds the simplified industrial TEE soil concentration in one sample in the Earth Fill Area as shown on Figure 5b.
Mercury	29	(b)	6	3	2	Protection of groundwater (drinking water)	No	0	--	2	2	Because mercury did not exceed the groundwater cleanup level the MTCA Method C direct contact cleanup level is applicable cleanup level. Mercury did not exceed the direct contact criteria.
Nickel	16	(b)	3	0	0	--	No	0	--	0	--	Because nickel did not exceed the groundwater cleanup level the MTCA Method C direct contact cleanup level is applicable cleanup level. Nickel did not exceed the direct contact criteria.
Silver	11	(c)	3	0	0	--	No	0	--	0	--	Because silver did not exceed the groundwater cleanup level the MTCA Method C direct contact cleanup level is applicable cleanup level. Silver did not exceed the direct contact criteria.
Zinc	31	(b)	7	0	0	--	No	0	--	16	7	Because zinc did not exceed the groundwater cleanup level the MTCA Method C direct contact cleanup level is applicable cleanup level. Zinc did not exceed the direct contact criteria. Zinc exceeded the simplified industrial TEE soil concentration at nine samples that remain as shown on Figure 5b.
Volatile Organic Compounds												
Methylene chloride	2	(a)	0	2	0	Protection of groundwater (drinking water)	No	0	--			Because methylene chloride did not exceed the groundwater cleanup level the MTCA Method C direct contact cleanup level is applicable cleanup level. Copper did not exceed the direct contact criteria.
Semivolatile Organic Compounds												
Bis(2-ethylhexyl)phthalate	1	(c)	1	0	0	--	No	0	--			Soil represented by sample with elevated bis(2-ethylhexyl)phthalate was removed during Independent Cleanup Action
2-Methylnaphthalene	1	(a)	1	1	1	Protection of groundwater (drinking water)	No	0	--			Soil represented by sample with elevated 2-methylnaphthalene was removed during Independent Cleanup Action
Polycyclic Aromatic Hydrocarbons												
Benzo(a)anthracene	5	(c)	1	0	0	--	No	0	--			Because benzo(a)anthracene did not exceed the groundwater cleanup level the MTCA Method C direct contact cleanup level is applicable cleanup level. Benzo(a)anthracene did not exceed the direct contact criteria.
Chrysene	6	(c)	1	0	0	--	No	0	--			Because chrysene did not exceed the groundwater cleanup level the MTCA Method C direct contact cleanup level is applicable cleanup level. Chrysene did not exceed the direct contact criteria.
Benzo(b)fluoranthene	2	(c)	0	0	0	--	No	0	--			Because benzo(b)fluoranthene did not exceed the groundwater cleanup level the MTCA Method C direct contact cleanup level is applicable cleanup level. Benzo(b)fluoranthene did not exceed the direct contact criteria.
Benzo(k)fluoranthene	2	(c)	0	0	0	--	No	0	--			Because benzo(k)fluoranthene did not exceed the groundwater cleanup level the MTCA Method C direct contact cleanup level is applicable cleanup level. Benzo(k)fluoranthene did not exceed the direct contact criteria.
Benzo(a)pyrene	3	(c)	0	0	0	--	No	0	--			Because benzo(a)pyrene did not exceed the groundwater cleanup level the MTCA Method C direct contact cleanup level is applicable cleanup level. Benzo(a)pyrene did not exceed the direct contact criteria.
Pesticides												
Endrin	1	(d)	1	0	0	--	No	0	--			Soil represented by sample with elevated endrin was removed during Independent Cleanup Action
Polychlorinated Biphenyls												
Aroclor 1262	1	(d)	1	0	0	--	Not analyzed	0	--			Aroclor 1262 exceeded groundwater protection cleanup level in sample S-7-2 1-4 fr BGS (groundwater was not analyzed for PCBs). Figure 4 of Landau's 2002 "Completion Report" indicates that sample S-7-TPH-2 1-4 ft BGS was outside of the excavation area. Based on the location of this sample it is likely that the soil represented by this sample was removed during the 2002 Independent Cleanup Action.
Total PCBs	4	(d)	4	0	0	--	Not analyzed	0	--			Total PCBs exceeded groundwater protection cleanup level in sample S-7-2 1-4 fr BGS (groundwater was not analyzed for PCBs). Figure 4 of Landau's 2002 "Completion Report" indicates that sample S-7-TPH-2 1-4 ft BGS was outside of the excavation area. Based on the location of this sample it is likely that the soil represented by this sample was removed during the 2002 Independent Cleanup Action.
Dioxins and Furans												
Dioxins and Furans	--	--	--	--	--	--	--	--	--			Dioxins and furans have not been analyzed for in soil or groundwater at the site.

Notes:
(a) MTCA Method A Soil Cleanup Levels for Industrial Properties
(b) Natural Background Soil Metals Concentrations in Washington State, Puget Sound Region. October 1994.
(c) MTCA Method C Industrial Soil Cleanup Levels; Groundwater Protection ([WAC 173-340-745(5)(b)(iii)(A)]
(d) Reporting Limits for Analytical Resources, Inc.
Shading indicates potential data gap
-- = Not applicable

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TABLE 8A
UPLAND SAMPLING AND ANALYSIS PLAN
RI/FS WORK PLAN
DAKOTA CREEK SITE

Sampling Area (reference to Text section of Work Plan)	Type of Exploration	Sample IDs	Number of Explorations [1]	Approximate Sample Depths (feet bgs)[3]	Number of Samples	Approximate Type and Number of Chemical Analyses[2,3]												Comments
						Metals	TPH-G/BETX	TPH-Dx	EPH	VPH	PAHs	MTBE/EDB/EDC	VOCs[4]	SVOCs	Organochlorine Pesticides	Herbicides	Dioxins and Furans	
SOIL SAMPLING AND ANALYSIS																		
Arsenic at MW-4 (Section 3.4.1)	Direct Push Soil Boring	SB-1 and SB-2	2	One in vadose zone; one in water table	4	4 (As)	0	0	0	0	0	0	0	0	0	0	0	At least two samples will be collected from each boring (one in vadose zone and one within water table). Purpose of samples is to characterize arsenic soil concentrations near MW-4.
Dioxin at the 1975 Earth Fill Area (Section 3.4.2)	Direct Push Soil Boring	SB-4, SB-5 and SB-7	3	One in fill area; one below fill area	6	0	0	3	3	3	3	3	0	0	0	0	6	Soil samples primarily collected to characterize dioxin and furan soil concentrations in Earth Fill Area (SB-4, SB-5 and SB-7). Borings SB-3 and SB-6 will be completed primarily to evaluate the lateral extent of the earth fill area based on soil conditions encountered during drilling. Soil samples from SB-3 and SB-6 will be archived pending the analytical results from the samples collected in the earth fill area (SB-4, SB-5 and SB-7). Surface soil samples (0 to 1-foot bgs) will be collected to calculate site-specific TPH soil cleanup level in the Earth Fill Area (TPH-G/BETX,TPH-Dx, EPH, VPH, MTBE/EDB/EDC, PAHs). Additional samples will be submitted for analysis of these TPH-related compounds if field screening indicates the presence of petroleum contamination.
Total Petroleum Hydrocarbons (Section 3.4.3)	Direct Push Soil Boring	MW-5	1	Based on field screening	2	0	2	2	2	2	2	2	0	0	0	0	0	Soil samples will be collected to characterize petroleum-related contamination, if any, in the excavated portion of the Petroleum Area.
Zinc at DC-UPLD-SS-3 (Section 3.4.4)	Direct Push Soil Boring	SB-8 through SB-11	4	0-2 and 4-6	8	8 (Zn)	0	0	0	0	0	0	0	0	0	0	0	Soil samples will be collected to characterize zinc soil concentrations west of the Earth Fill Area based on initial simplified industrial TEE evaluation.
Zinc at S-9-CPH-0 (Section 3.4.4)	Hand Auger	SS-1 through SS-4	4	0-2	4	4 (As)	0	0	0	0	0	0	0	0	0	0	0	Soil samples will be collected to characterize zinc soil concentrations southeast of the Petroleum Area based on initial simplified industrial TEE evaluation.
Arsenic, Copper, and Zinc at DC-UPLD-13A (Section 3.4.4)	Direct Push Soil Boring	SB-12 through SB-15	4	0-2 and 4-6	8	8 (As, Cu, Zn)	0	0	0	0	0	0	0	0	0	0	0	Soil samples will be collected to characterize zinc soil concentrations arsenic, copper, and zinc in the Marine Railway Area based on initial simplified industrial TEE evaluation.
SOIL TOTAL					32	24	2	5	5	5	5	5	0	0	0	0	6	
GROUNDWATER SAMPLING AND ANALYSIS																		
Groundwater (Section 3.5)	5 monitoring wells	MW-1 through MW-5	5	Shallow groundwater	5	5 (As, Cd, Cr, Cu, Pb, Hg,Ni, Zn)	5	5	0	0	5	0	5	5	5	5	5	One sample from groundwater monitoring well located near AST will be analyzed for extractable petroleum hydrocarbons.
SAMPLING AND ANALYSIS TOTAL					37	29	7	10	5	5	10	5	5	5	5	5	11	

Notes:

[1] Proposed exploration locations are shown in Figures 5b and 5c.

[2] The number of analyses shown does not include chemical analyses that will be completed for quality assurance/quality control (QA/QC) purposes.

[3] Analytical methods are outlined in Section 6.0 Actual number of samples and sample depth will depend on conditions encountered in each exploration. Groundwater will be tested for total metals.

[4] VOCs will include EDB, EDC, and MTBE.

As = arsenic, Cd = cadmium, Cr = chromium, Cu = copper, Pb=lead, Hg = mercury, Ni = nickel, Zn = zinc

bgs = Below ground surface

PAH = Polycyclic aromatic hydrocarbons; BETX = benzene, ethylbenzene, toluene, and xylenes; VOCs = volatile organic compounds; SVOC = semivolatile organic compounds; MTBE = methyl tertbutyl ether; EDB = 1,2-dibromoethane; EDC = 1,2-dichloroethane; EPH = extractable petroleum hydrocarbons; VPH = volatile petroleum hydrocarbons

-- = analytical testing not planned

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TABLE 9
COC EXCEEDANCES IN DCI BASIN SEDIMENT SAMPLES - HISTORIC STUDIES
RI/FS WORK PLAN
DAKOTA CREEK SITE

Sample Identification	DC-SED-03 (1997)	DC-SED-08 (1997)	D2 Comp (A) (2000)	IT-004 (2002)	OH004 (2002)	Sediment Quality Standards (SQS)WAC 173-204-320 (a)	Sediment Cleanup Screening Level (CSL) WAC 173-204-520
Metals (mg/kg)						**mg/kg Dry Weight**	
Arsenic	37.6	22.1	28.8	**82.6**	3.4	57	93
Copper	**1240**	374	174J	**1140**	18.9	390	390
Mercury	--	--	--	**0.43**	<0.07	0.41	0.59
Zinc	**528**	171	257	**665**	41.1	410	960
PAHs (mg/kg OC)[b]						**mg/kg Organic Carbon (c)**	
LPAH[c]	**522**	263	151	**384**	43	370	780
Acenaphthene	--	12	6.1	**33**	4.5JQ	16	57
Fluorene	**55.9**	11.6	6.7	**28**	3.0JQ	23	79
Phenanthrene	**363**	**122**	78	**263**	32	100	480
Anthracene	104	30	44	53JQ	3.1JQ	220	1200
HPAH[d]	**1860**	953	**1404**	**1987**	209	960	5300
Fluoranthene	**460**	**225**	**289**	**500**	**229** (90)*	160	1200
Pyrene	414	261	356	375	61	1,000	1400
Benzo(a)anthracene	**187**	96	**167**	**188**	9.8JQ	110	270
Chrysene	**221**	**121**	**172**	**225**	25	110	460
TotalBenzofluoranthenes[e]	**245**	158	183	**338**	18JQ	230	450
Benzo(a)pyrene	**138**	77	**133**	**150**	4.5JQ	99	210
Indeno(l,2,3-c.d)pyrene	**97.3**	**44.1**	**67**	**101**	<19	34	88
Dibenz(a,h)anthracene	--	**14**	9.4	6.5JQ	<19 X	12	33
Benzo(g,h,i)perylene	**97.3**	**51**	28	**104**	<19	31	78
Butylbenzylphthalate	--	--	<1.1	--	--	4.9	64
bis(2-Ethylhexy1)phthalate	--	--	14	**75**	<19	47	78
Dibenzofuran	--	--	3.1	**18**	2.5JQ	15	58
PCBs mg/kg OC[c]	**32**	**31.9**	1.3	<54 X	<1.9	12	65

Notes:

(a) This table summarizes only those sediment samples with at least one chemical of concern at concentrations greater than the Sediment Management Standards Sediment Quality Standards (SQS) and/or Cleanup Screening Level (CSL). The data in this table comes from studies completed at the site between 1997 and 2006.

(b) The listed chemical parameter criteria represent concentrations in parts per million, "normalized," or expressed, on a total organic carbon basis. To normalize to total organic carbon, the dry weight concentration for each parameter is divided by the decimal fraction representing the percent total organic carbon content of the sediment.

(c) The LPAH criterion represents the sum of the following "low molecular weight polynuclear aromatic hydrocarbon" compounds: Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, and Anthracene. The LPAH criterion is not the sum of the criteria values for the individual LPAH compounds as listed.

(d) The HPAH criterion represents the sum of the following "high molecular weight polynuclear aromatic hydrocarbon" compounds: Fluoranthene, Pyrene, Benzo(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. The HPAH criterion is not the sum of the criteria values for the individual HPAH compounds as listed.

(e) The benzofluoranthenes criterion represents the sum of the concentrations of the "B," "J," and "K" isomers.

J= This is an estimated concentration

Q = Associated sample result is greater than the method detection limit but less than the sample reporting limit

X = Method detection limit exceeds the SQS or CSL criteria

* =the duplicate sample result in parenthesis is less than the associated SMS SQS

mg/kg = milligram per kilogram OC = organic carbon -- = not analyzed ppm = parts per million

Bold indicates concentrations greater than the SMS SQS

Grey shading indicates concentrations greater than the SMS SQS and CSL

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TABLE 10
DIOXIN ANALYTICAL DATA RESULTS - 2004 AND 2007
RI/FS WORK PLAN
DAKOTA CREEK SITE

DCI 2004 Analytical Results - Anchor Enivronmental

Sample ID	WHO TEF - Human health/mammals (2005)	AN-DCI-1	AN-DCI-2	ANP1-1	ANP1-2	AN-REF-1-01-SD	AN-REF-2-01-SD
Depth		1-3ft	1-3ft	2-3ft	1-3ft	0-15cm	0-15cm
Conventionals							
Total solids	--	60	60.4	87.2	78.2	58	70.6
Total Organic Carbon	--	2.24	4.25	0.27	0.64	1.17	0.74
Dioxins (ng/kg)							
1,2,3,4,6,7,8-HpCDD	0.01	55.574	25.002	2.5U	2.5U	2.742	6.001
1,2,3,4,6,7,8-HpCDF	0.01	5.652	5.104	2.5U	2.5U	2.5U	2.5U
1,2,3,4,7,8,9-HpCDF	0.01	2.5U	2.5U	2.5U	2.5U	2.5U	2.5U
1,2,3,4,7,8-HxCDD	0.1	2.5U	2.5U	2.5U	2.5U	2.5U	2.5U
1,2,3,4,7,8-HxCDF	0.1	2.5U	2.5U	2.5U	2.5U	2.5U	2.5U
1,2,3,6,7,8-HxCDD	0.1	1.76	2.5U	2.5U	2.5U	2.5U	2.5U
1,2,3,6,7,8-HxCDF	0.1	2.5U	2.5U	2.5U	2.5U	2.5U	2.5U
1,2,3,7,8,9-HxCDD	0.1	2.5U	2.5U	2.5U	2.5U	2.5U	2.5U
1,2,3,7,8,9-HxCDF	0.1	2.5U	2.5U	2.5U	2.5U	2.5U	2.5U
1,2,3,7,8-PeCDD	1	2.5U	2.5U	2.5U	2.5U	2.5U	2.5U
1,2,3,7,8-PeCDF	0.03	2.5U	2.5U	2.5U	2.5U	2.5U	2.5U
2,3,4,6,7,8-HxCDF	0.1	2.5U	2.5U	2.5U	2.5U	2.5U	2.5U
2,3,4,7,8-PeCDF	0.3	2.5U	2.5U	2.5U	2.5U	2.5U	2.5U
2,3,7,8-TCDD	1	1U	1U	1U	1U	1U	1U
2,3,7,8-TCDF	0.1	1U	1U	1U	1U	1U	1U
OCDD	0.0003	589.61	206.812	10.782	9.1	16.972	47.747
OCDF	0.0003	10.785	18.241	5U	5U	5U	5U
Total HpCDD	--	187.883	74.169	1.144	2.5U	2.742	13.324
Total HpCDF	--	17.656	15.014	2.5U	2.5U	2.5U	2.5U
Total HxCDD	--	14.483	4.915	2.5U	2.5U	1.218	2.5U
Total HxCDF	--	8.325	6.699	2.5U	2.5U	2.5U	2.5U
Total PeCDD	--	2.5U	3.567	2.5U	2.5U	2.5U	2.5U
Total PeCDF	--	0.737	4.561	2.5U	2.5U	2.5U	2.5U
Total TCDD	--	1U	5	1U	1U	1U	1U
Total TCDF	--	1U	1.084	1U	1U	1U	1U
Dioxin TEQ		3.94	3.47	3.13	3.13	3.15	3.19

TABLE 10
DIOXIN ANALYTICAL DATA RESULTS - 2004 AND 2007
RI/FS WORK PLAN
DAKOTA CREEK SITE

DCI 2007 Sediment Sampling Results

Sample ID / Depth	WHO TEF - Human health/mammals (2005)	DCI06-1A 0-10 cm	DCI06-2A 0-10 cm	DCI06-2-D 0-10 cm	DCI06-3A 0-10 cm	DCI06-4A 0-10 cm	DCI06-4B 10-20 cm	DCI06-5A 0-10 cm	DCI06-5B 10-20 cm	DCI06-6A 0-10 cm	DCI06-7A 0-10 cm	DCI06-7B 10-20 cm	DCI06-8A 0-10 cm	DCI06-9A 0-10 cm	AN-REF-1-01-SD 0-15 cm	AN-REF-2-01-SD 0-15 cm
Conventionals	*Method*	*160.3)*														
Total solids	--	69.5	78.3	78.2	75.5	67	59.6	34.8	42.9	81.9	55.1	57.2	71.1	95.8	58	70.6
Total Organic Carbon	--	1.32	0.641	1.15	0.448	0.883	3.43	4.96	2.88	0.56	1.48	1.06	1.27	0.239	1.17	0.74
Dioxins (ng/kg)	*Method*	*8290)*														
1,2,3,4,6,7,8-HpCDD	0.01	20	2J	5	18	6100A	220	180	9	1100 A	330	220	310 A	17	2.742 J	6.001
1,2,3,4,6,7,8-HpCDF	0.01	3.1J	1.1U	0.91U	3.6J	1000A	54	29	1.4 J	180	40	23	39	6.8	2.5 U	2.5 U
1,2,3,4,7,8,9-HpCDF	0.01	0.82U	1.1U	0.91U	0.97U	36	2	1.3	0.37 U	7.2	2.5	2 J	2.7	1.1 J	2.5 U	2.5 U
1,2,3,4,7,8-HxCDD	0.1	0.82U	1.1U	0.91U	0.97U	28	1.8	1.8 J	0.37 U	8.9	2.1	1.1 J	2.7	1 U	2.5 U	2.5 U
1,2,3,4,7,8-HxCDF	0.1	0.82U	1.1U	0.91U	0.97U	28	1.6	1.4 J	0.37 U	0.44 E	2.5	0.97 E	3.1	1 E	2.5 U	2.5 U
1,2,3,6,7,8-HxCDD	0.1	1.4J	1.1U	0.91U	1.2J	330A	11	10	0.68 J	61 A	14	8.4	13	1 U	2.5 U	2.5 U
1,2,3,6,7,8-HxCDF	0.1	0.82U	1.1U	0.91U	0.97U	0.26E	1.6	1.4 J	0.37 U	3.2	1.5 J	1 J	1.5	1 U	2.5 U	2.5 U
1,2,3,7,8,9-HxCDD	0.1	0.82U	1.1U	0.91U	0.97U	49	3.9	2.5 J	0.46 J	21	4.8	2.2	6.2	1 U	2.5 U	2.5 U
1,2,3,7,8,9-HxCDF	0.1	0.82U	1.1U	0.91U	0.97U	16	0.69J	1 U	0.37 U	2.8	0.94 J	0.97 U	0.88 JA	1 U	2.5 U	2.5 U
1,2,3,7,8-PeCDD	1	0.82U	1.1U	0.91U	0.97U	7.5	1.1J	1 J	0.37 U	5.1	1.1 J	0.97 U	1.4	1 U	2.5 U	2.5 U
1,2,3,7,8-PeCDF	0.03	0.82U	1.1U	0.91U	0.97U	2.5	0.27I	1.2 J	0.37 U	0.96 JA	0.56 J	0.97 U	2.3	1 U	2.5 U	2.5 U
2,3,4,6,7,8-HxCDF	0.1	0.82U	1.1U	0.91U	0.97U	49	2.3	2 J	0.37 U	10	2.4	2.5 J	2.4	1 U	2.5 U	2.5 U
2,3,4,7,8-PeCDF	0.3	0.82U	1.1U	0.91U	0.97U	11	1.4	1.3 J	0.49 J	2.3	1.4 J	0.97 U	1.5	1 U	2.5 U	2.5 U
2,3,7,8-TCDD	1	0.27AU	0.21U	0.18U	0.19U	0.41A	0.12IA	0.25 AU	0.19 AU	0.43 JA	0.11 IA	0.19 U	0.16 JA	0.2 U	1 U	1 U
2,3,7,8-TCDF	0.1	0.64J	0.21U	0.18U	0.19U	0.7	0.83A	1.4	0.74 A	0.43 JA	1.3	0.55 J	0.65 A	0.31 J	1 U	1 U
OCDD	0.0003	180	14	35	130	53000N2	1900	1800	78	10000	3100	2200	2500	160	16.972 J	47.747 B
OCDF	0.0003	6.5J	2.1U	2.2J	5.6	1000	81	29	2.2 J	150	70	54	110	19	5 U	5 U
Total HpCDD	--	74	4.1J	20	48	10000	580	400	33	2000	840	580	900	31	2.742	13.324
Total HpCDF	--	9.3	1.1U	1.3J	8.4	4700	160	100	3.8	640	140	79	170	20	2.5 U	2.5 U
Total HxCDD	--	14	1.1U	1J	18	850	76	48	8.1	220	90	49	150	4.6 J	1.218	2.5 U
Total HxCDF	--	5	1.1U	0.91U	3.7	1800	34	60	2	360	70	32	69	6	2.5 U	2.5 U
Total PeCDD	--	0.96J	1.1U	0.91U	8.3	46	24	9.7	3.8	20	10	0.97 U	10	1 U	2.5 U	2.5 U
Total PeCDF	--	3.1J	1.1U	0.91U	0.97U	120	20	16	3.3	33	17	5.4	12	5.9	2.5 U	2.5 U
Total TCDD	--	4.7	0.21U	0.18U	14	100	64	12	12	12	20	2.1	4.6	0.2 U	1 U	1 U
Total TCDF	--	6.3	0.21U	0.18U	0.25	14	17	24	14	4.5	11	2.7	4.7	5.2	1 U	1 U
Dioxin TEQ		1.55	0.989	1.079	1.39	148.6	7.4	6.35	0.84	32.94	9.28	5.58	9.42	1.60	3.15	3.19

Notes:

WHO TEFs for the protection of human health and mammals were used (WHO 2005) to calculate total TEQs.

DCI06-2-D Indicates field duplicate sample.

A = Detection limit based on signal-to-noise measurement.

B = Detected in method blank (assumed as this qualifier is from analysis conducted by a previous study).

E = PCDE Interference.

J = Concentration detected is below the calibration range.

NA = Not applicable

N2 = Value obtained from additional analysis.

TEF = Toxicity Equivalency Factors.

TEQ = Total Toxicity Equivalence   WHO = World Health Organization   CDD = chlorinated dibenzodioxins.

U = Not detected   CDF = chlorinated dibenzofurans.

Shading indicates total TEQ values greater than the reference sample total TEQ values.

SEAT:\5\5147006\00\Finals\DCI Draft RIFS Tables (Sediment Data) (Tables 9, 10).xls

TABLE 11
HISTORICAL SEDIMENT DATA SUMMARY AND DATA GAP IDENTIFICATION
RI/FS WORK PLAN
DAKOTA CREEK SITE

Analytes	Sediment Management Standards (SMS): Sediment Quality Standards (SQS) WAC 173-204-320	Sediment Management Standards (SMS): Sediment Cleanup Screening Level (CSL) WAC 173-204-520	Samples Exceeding SQS	Samples Exceeding CSL	Sample Represents Sediment to Remain in Place	Sample Represents Surface Grab	Sample Represents 10-20 cm	Sample Represents below 20 cm	Basis	Data Gap Evaluation
Metals	MG/KG DRY WEIGHT (parts per million)									
Arsenic	57	93	1	0	1	1	0	0	No adverse effects on biological resources and no significant health risk to humans	Arsenic exceeds the SMS SQS in one sample (IT-004) collected from 0-10 cm to the south of the planned bulkhead where no dredging is planned. This area to the south of the planned bulkhead represents a data gap in terms of vertical extent of impacted sediment.
Copper	390	390	2	2	1	2	0	0	No adverse effects on biological resources and no significant health risk to humans	Copper exceeds the SMS SQS/CSL in one surface sample (DC-Sed-03) collected within the planned dredge area and in sample IT-004. Contamination identified in the planned dredge area (DC-Sed-03) will be addressed by the proposed interim action, no further analysis is required. The area associated with IT-004 represents a data gap in terms of vertical extent of impacted material since it is to remain in place after development.
Mercury	0.41	0.59	1	0	1	1	0	0	No adverse effects on biological resources and no significant health risk to humans	Mercury exceeds the SMS SQS in IT-004. This represents a data gap as described above.
Zinc	410	960	2	0	1	2	0	0	No adverse effects on biological resources and no significant health risk to humans	Zinc exceeds the SMS SQS criteria in DC-Sed-03, representing material to be dredged, and IT-004. Contamination identified in the planned dredge area (DC-Sed-03) will be addressed by the proposed interim action, no further analysis is required. The area associated with IT-004 represents a data gap as described above.
PAHs	MG/KG ORGANIC CARBON (parts per million carbon)									
LPAH	370	780	2	0	1	2	0	0	No adverse effects on biological resources and no significant health risk to humans	LPAHs exceed the SMS SQS criteria in DC-Sed-03, representing material to be dredged, and IT-004. Contamination identified in the planned dredge area (DC-Sed-03) will be addressed by the proposed interim action, no further analysis is required. The area associated with IT-004 represents a data gap as described above.
Acenaphthene	16	57	1	0	1	1	0	0	No adverse effects on biological resources and no significant health risk to humans	Acenaphthene exceeds the SMS SQS criteria in IT-004. The area associated with IT-004 represents a data gap as described above.
Fluorene	23	79	2	0	1	2	0	0	No adverse effects on biological resources and no significant health risk to humans	Fluorene exceeds the SMS SQS criteria in DC-Sed-03, representing material to be dredged, and IT-004. Contamination identified in the planned dredge area (DC-Sed-03) will be addressed by the proposed interim action, no further analysis is required. The area associated with IT-004 represents a data gap as described above.
Phenanthrene	100	480	3	0	2	3	0	0	No adverse effects on biological resources and no significant health risk to humans	Phenanthrene exceeds the SMS SQS criteria in DC-Sed-03 (representing material to be dredged), DC-Sed-08 (located to the south of the planned bulkhead) and IT-004. Contamination identified in the planned dredge area (DC-Sed-03) will be addressed by the proposed interim action, no further analysis is required. The area associated with IT-004 and DC-Sed-08 represents a data gap relative to the vertical extent of phenanthrene impacted material in this area.
HPAH	960	5300	3	0	2	3	0	0	No adverse effects on biological resources and no significant health risk to humans	HPAHs exceed the SMS SQS criteria in two surface sediment samples (DC-Sed-03 and IT-004) and one composite sample (D2 Comp (A)) collected from 0 to 5 ft below the mudline. D2 Comp (A) and DC-Sed-03 were collected in the area that will be dredged . Contamination identified in the planned dredge area will be addressed by the proposed interim action, no further analysis is required. The area associated with IT-004 represents a data gap relative to the vertical extent of impacted material in this area as described above.
Fluoranthene	160	1200	4*	0	3	4	0	0	No adverse effects on biological resources and no significant health risk to humans	Fluoranthene exceeds the SMS SQS criteria in three surface sediment sampes (DC-Sed-03, DC-Sed-08 and IT-004) and one composite sample (D2 Comp (A)) collected from 0 to 5 ft below the mudline. D2 Comp (A) and DC-Sed-03 were collected in the area that will be dredged . Contamination identified in the planned dredge area will be addressed by the proposed interim action, no further analysis is required. The area associated with IT-004 and DC-Sed-08 represents a data gap relative to the vertical extent of impacted material in this area as described above. *Fluoranthene concentrations also exceeded the SQS in sample OH004 but the concentration of fluoranthene in the duplicate of this sample was less than the SQS, indicating that the initial results may have been due to laboratory error or chemical interference.
Benzo(a)anthracene	110	270	3	0	2	3	0	0	No adverse effects on biological resources and no significant health risk to humans	Benzo(a)anthracene exceeds the SMS SQS criteria in two surface sediment sampes (DC-Sed-03,and IT-004) and one composite sample (D2 Comp (A)) collected from 0 to 5 ft below the mudline. D2 Comp (A) and DC-Sed-03 were collected in the area that will be dredged . Contamination identified in the planned dredge area will be addressed by the proposed interim action, no further analysis is required. The area associated with IT-004 represents a data gap relative to the vertical extent of impacted material in this area as described above.

Analytes	Sediment Management Standards (SMS) Sediment Quality Standards (SQS) WAC 173-204-320	Sediment Cleanup Screening Level (CSL) WAC 173-204	Samples Exceeding SQS	Samples Exceeding CSL	Sample Represents Sediment to Remain in Place	Sample Represents Surface Grab	Sample Represents 10-20 cm	Sample Represents below 20 cm	Basis	Data Gap Evaluation
PAHs	MG/KG ORGANIC CARBON (parts per million carbon)									
Chrysene	110	460	4	0	3	4	0	0	No adverse effects on biological resources and no significant health risk to humans	Chrysene exceeds the SMS SQS criteria in three surface sediment sampes (DC-Sed-03, DC-Sed-08 and IT-004) and one composite sample (D2 Comp (A)) collected from 0 to 5 ft below the mudline. D2 Comp (A) and DC-Sed-03 were collected in the area that will be dredged . Contamination identified in the planned dredge area will be addressed by the proposed interim action, no further analysis is required. The area associated with IT-004 and DC-Sed-08 represents a data gap relative to the vertical extent of impacted material in this area as described above.
Total Benzofluoranthenes	230	450	2	0	1	2	0	0	No adverse effects on biological resources and no significant health risk to humans	Total benzofluoranthenes exceed the SMS SQS criteria in DC-Sed-03, representing material to be dredged, and IT-004. DC-Sed-03 were collected in the area that will be dredged . Contamination identified in the planned dredge area will be addressed by the proposed interim action, no further analysis is required. The area associated with IT-004 represents a data gap as described above.
Benzo(a)pyrene	99	210	3	0	2	3	0	0	No adverse effects on biological resources and no significant health risk to humans	Benzo(a)pyrene exceeds the SMS SQS criteria in two surface sediment sampes (DC-Sed-03,and IT-004) and one composite sample (D2 Comp (A)) collected from 0 to 5 ft below the mudline. D2 Comp (A) and DC-Sed-03 were collected in the area that will be dredged . Contamination identified in the planned dredge area will be addressed by the proposed interim action, no further analysis is required. The area associated with IT-004 represents a data gap relative to the vertical extent of impacted material in this area as described above.
Indeno(l,2,3-c.d)pyrene	34	88	4	2	3	4	0	0	No adverse effects on biological resources and no significant health risk to humans	Indeno(1,2,3-c,d)pyrene exceeds the SMS SQS and/or CSL criteria in three surface sediment samples (DC-Sed-03, DC-Sed-08 and IT-004) and one composite sample (D2 Comp (A)) collected from 0 to 5 ft below the mudline. D2 Comp (A) and DC-Sed-03 were collected in the area that will be dredged . Contamination identified in the planned dredge area will be addressed by the proposed interim action, no further analysis is required. The area associated with IT-004 and DC-Sed-08 represents a data gap relative to the vertical extent of impacted material in this area as described above.
Dibenz(a,h)anthracene	12	33	1**	0	1	1	0	0	No adverse effects on biological resources and no significant health risk to humans	Dibenz (a,h)anthracene exceeds the SMS SQS criteria in DC-Sed-08. The area associated with DC-Sed-08 represents a data gap as described above. **An elevated non-detection of dibenz(a,h) anthracene was reported for sample OH004.
Benzo(g,h,i)perylene	31	78	3	2	2	3	0	0	No adverse effects on biological resources and no significant health risk to humans	Benzo(g,h,i)perylene exceeds the SMS SQS and/or CSL criteria in three surface sediment samples (DC-Sed-03, DC-Sed-08 and IT-004) . DC-Sed-03 were collected in the area that will be dredged . Contamination identified in the planned dredge area will be addressed by the proposed interim action, no further analysis is required. The area associated with IT-004 and DC-Sed-08 represents a data gap relative to the vertical extent of impacted material in this area as described above.
bis(2-Ethylhexy1)phthalate	47	78	1	0	1	1	0	0	No adverse effects on biological resources and no significant health risk to humans	Bis(2-ethylhexyl)phthalate exceeds the SMS SQS criteria in IT-004. The area associated with IT-004 represents a data gap as described above.
Dibenzofuran	15	58	1	0	1	1	0	0	No adverse effects on biological resources and no significant health risk to humans	Dibenzofuran exceeds the SMS SQS criteria in IT-004. The area associated with IT-004 represents a data gap as described above.
PCBs	12	65	2**	0	1**	2	0	0	No adverse effects on biological resources and no significant health risk to humans	Total PCBs exceeds the SMS SQS criteria in two surface sediment samples (DC-Sed-03,and DC-Sed-08) . DC-Sed-03 were collected in the area that will be dredged . Contamination identified in the planned dredge area will be addressed by the proposed interim action, no further analysis is required. The area associated with DC-Sed-08 represents a data gap relative to the vertical extent of impacted material in this area as described above. **An elevated non-detection of total PCBs was reported for sample IT-004.
Analytes	***Samish Bay Reference Sample Dioxins Total TEQ***	***Fidalgo Bay Reference Sample Dioxins Total TEQ (Average)***	**Greater than Samish Bay TEQ**	**Greater than Fidalgo Bay TEQ**	**Sample Represents Sediment to Remain in Place**	**Sample Represents Surface Grab**	**Sample Represents 10-20 cm**	**Sample Represents below 20 cm**	Basis	Data Gap Evaluation
Dioxins/furans	2.43	3.17	11	9	4	5	2	2***	Comparison to background at reference location	The vertical and horizontal extent of dioxin contamination is unquantifiable since a cleanup number has not been established for dioxin. ***The samples representing depths below 20cm were composite core samples collected from depths ranging from 1 ft to 3 ft.
Unknown	--	--	Unknown	Unknown	*4*	*4*	*4*	*4*	No adverse effects on biological resources and no significant health risk to humans	The SMU-1, SMU-2 and SMU-3 areas are data gaps as they will not be dredged and samples have not been collected in the south portions of each of these SMU's. Therefore, potential nature and extent of contamination is unknown in the areas where no sediment data exists.

Notes:

Green shading indicates potential data gap

The listed SMS chemical parameter criteria represent concentrations in parts per million, "normalized," or expressed, on a total organic carbon basis. To normalize to total organic carbon, the dry weight concentration for each parameter is divided by the decimal fraction representing the percent total organic carbon content of the sediment.

LPAH criterion represents the sum of the following "low molecular weight polynuclear aromatic hydrocarbon" compounds: Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, and Anthracene. The LPAH criterion is not the sum of the criteria values for the individual LPAH compounds as listed.

HPAH criterion represents the sum of the following "high molecular weight polynuclear aromatic hydrocarbon" compounds: Fluoranthene, Pyrene, Benzo(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. The HPAH criterion is not the sum of the criteria values for the individual HPAH compounds as listed.

The total benzofluoranthenes criterion represents the sum of the concentrations of the "B," "J," and "K" isomers.

WHO TEFs for the protection of human health and mammals were used (WHO 2005) to calculate total TEQs.

TEF = Toxicity Equivalency Factors.

TEQ = Total Toxicity Equivalence

WHO = World Health Organization

TABLE 11A
BASIN SEDIMENT SAMPLING AND ANALYSIS PLAN
RI/FS WORK PLAN
DAKOTA CREEK SITE

Sampling Area (Proposed sample location on Figure 8)	Type of Exploration	Sample IDs	Number of Explorations[1]	Approximate Sample Depths	Number of Samples	Approximate Type and Number of Chemical Analyses[2]: Metals, EPA Method 6000/7000	Ionizable and nonionizable organic compounds (including SVOCs/PAHs), EPA Method 8270 SIM;	PCBs, EPA Method 8082	Pesticides, EPA Method 8081A	VOCs, EPA Method 8260B	Butyl Tins by Krone Method	Conventional Parameters[3]	Comments
SEDIMENT SAMPLING AND ANALYSIS													
East side of the basin	Core	G-1, G-2	2	Surface samples (upper 10cm -20 cm) with subsurface samples archived	2	2	2	2	2	2	2	2	The purpose of these cores will to be to fill data gaps located near the east side of the basin.These samples will be used to characterize material that will be left in place after dredging.
Area near the old marine railway	Core	G-3, G-4	2	Surface samples (upper 10cm -20 cm) with subsurface samples archived	2	2	2	2	2	2	2	2	The purpose of these cores will be to characterize subsurface samples in the area near the marine railway where metals, PAHs, PCBs were measured in previous surface samples at concentrations greater than SQS criteria. These samples will be used to characterize material that will be left in place after dredging.
Area west of the "East Dock"	Core	G-5, G-6	2	Surface samples (upper 10cm -20 cm) with subsurface samples archived	2	2	2	2	2	2	2	2	The purpose of these cores will be to characterize subsurface samples in the area near the "East Dock" where PAHs, PCBs were measured in previous surface samples at concentrations greater than SQS criteria. These samples will be used to characterize material that will be left in place after dredging.
Area outside of the planned dredge area north of the "L Dock"	Core	G-8	1	Surface samples (upper 10cm -20 cm) with subsurface samples archived	1	1	1	1	1	1	1	1	The purpose of these cores will to be to fill a data gap located north of the L Dock that is located outside of the planned dredge area. These samples will be used to characterize material that will be left in place after dredging.
SEDIMENT SAMPLING AND ANALYSIS TOTAL					7	7	7	7	7	7	7	7	

Notes:

[1] Proposed exploration locations are shown in Figure 8

[2] The number of analyses shown does not include chemical analyses that will be completed for quality assurance/quality control (QA/QC) purposes.

[3] Conventional parameters include total organic carbon, total solids, total volatile solids, ammonia, total sulfides, grain size.

PAH = Polycyclic aromatic hydrocarbons; SVOC = semivolatile organic compounds;

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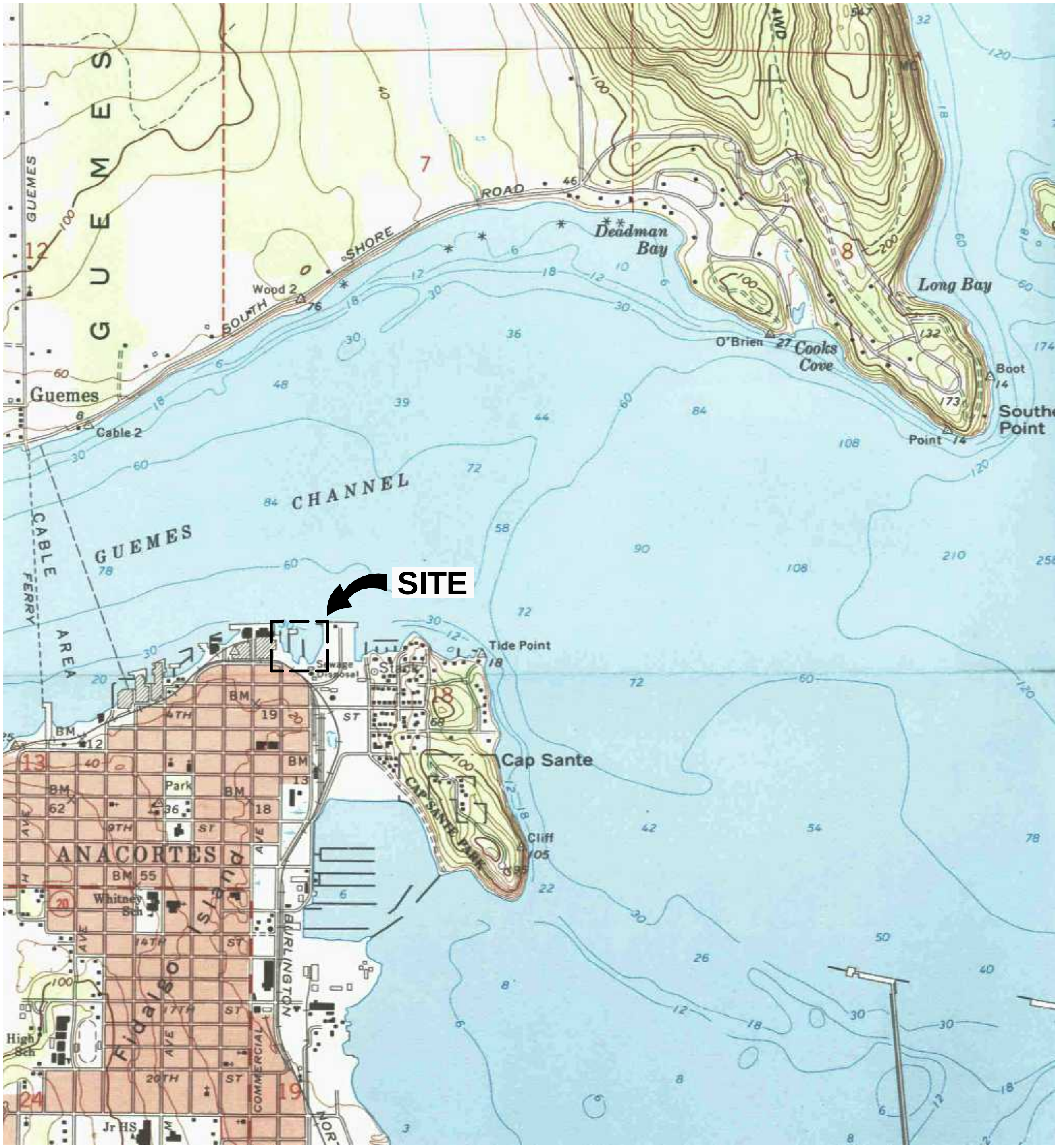

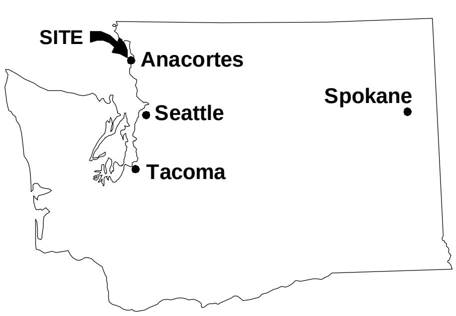

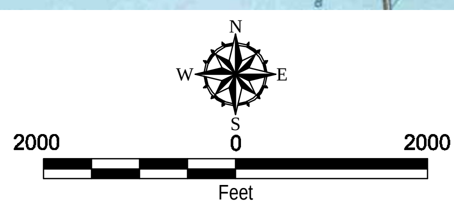

Reference: USGS 7.5' topographic quadrangle map "(Anacortes North, Wash.," photoinspected 1978).

Vicinity Map

Port of Anacortes - Dakota Creek Industries
Anacortes, Washington

GEOENGINEERS

Figure 1

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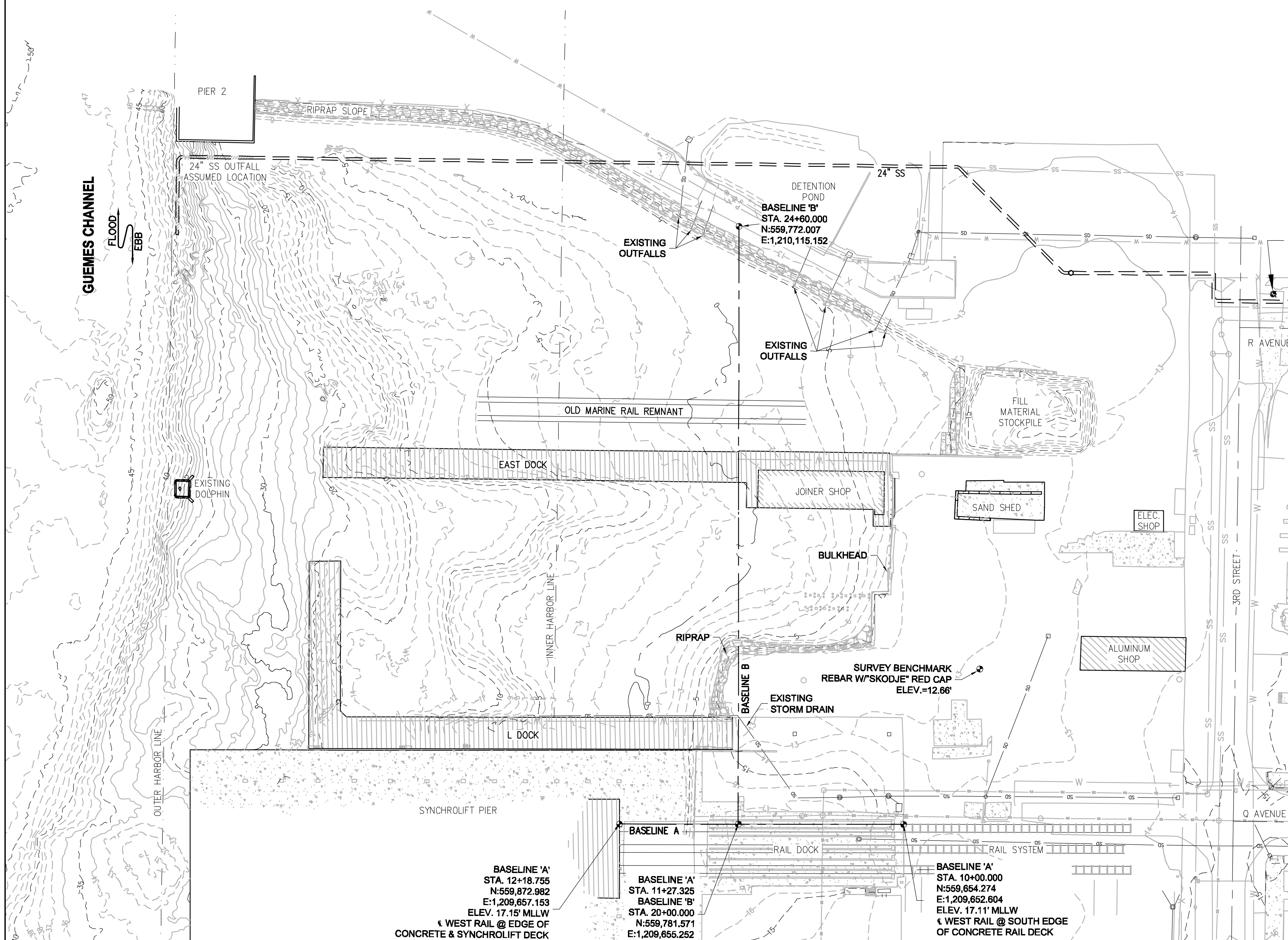
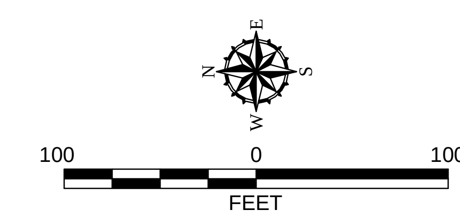


Legend

- Existing fence
- TJB Telephone junction box (pedestal)
- CB Catch Basin
- Sewer manhole
- Storm manhole
- Found rebar with yellow cap marked as noted
- Rebar/survey marker
- Gravel
- Concrete
- Rip Rap
- Elevation contour



SURVEY NOTES

1) THIS DRAWING BASED ON SURVEY BY LEONARD, BOUDINOT, SKODJE INC. NOV. 2006

2) HORIZONTAL DATUM = BETWEEN THE MONUMENT AT THE INTERSECTION OF "R" AVENUE AND 4TH STREET AND THE MONUMENT AT THE INTERSECTION OF "T" AVENUE AND 4TH STREET. BEARS S 88°06'27" E, AS CALCULATED FROM COORDINATES SHOWN ON RECORD OF SURVEY, "A SURVEY OF ANACORTES HARBOR LINES IN T.35 N., R.1 E., AND T.34 N., & 35 N., R.2 E., W.M.", AS RECORDED UNDER AUDITOR'S FILE NUMBER 200110030106, RECORDS OF SKAGIT COUNTY, WASHINGTON.

3) VERTICAL DATUM = STANDARD DISK, STAMPED "5 1922", SET VERTICALLY IN THE EAST END OF NORTH FACE OF CONCRETE FOUNDATION OF GREAT NORTHERN RAILWAY STATION ON EAST SIDE OF R" AVENUE AT SEVENTH STREET. IT IS 3 1/2 FEET WEST OF THE NORTHEAST CORNER OF BUILDING, 3/4 FOOT ABOVE BRICK SIDEWALK, AND 26 FEET WEST OF THE WEST RAIL OF RAILROAD TRACK. ELEVATION = 16.98 FEET ABOVE MEAN LOWER LOW WATER (MLLW).

6) THIS DRAWING REPRESENTS THE EXISTING CONDITIONS AS FOUND ON THE DATE OF SURVEY; NOV. 2006. F.B.#651, PGS. 68-70.

7) THE UTILITIES SHOWN HEREON REPRESENT WHAT WAS FOUND BY FIELD INVESTIGATION ON THE DATE OF THE SURVEY. THE 1-800 UTILITY LOCATE SERVICE WAS USED. OTHER UNDERGROUND UTILITIES DO EXIST IN THIS AREA. THIS MAP IS REPRESENTING SOME UTILITIES THAT WERE NOT APPARENT ON THE GROUND.

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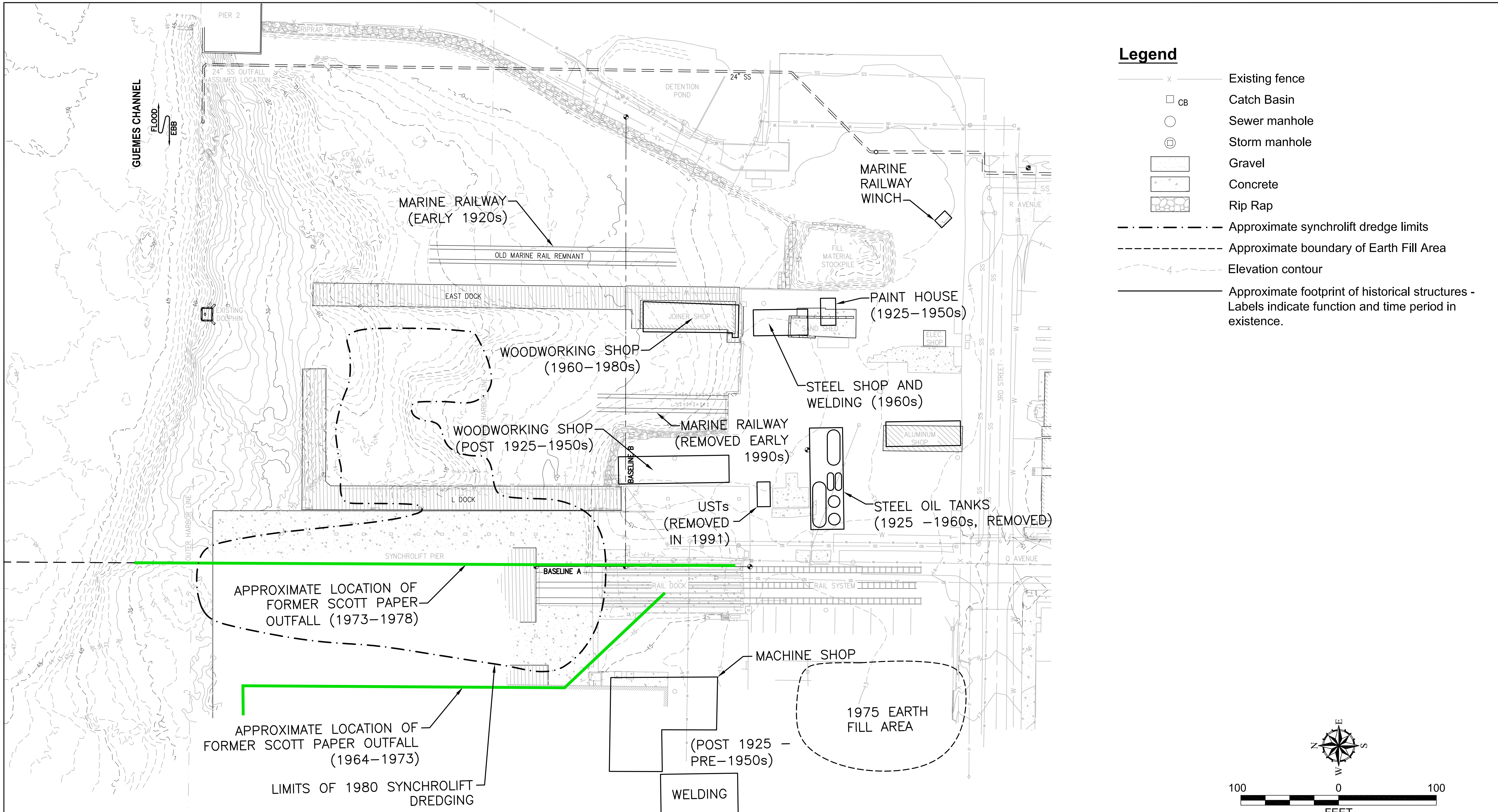
Site Plan - Existing Conditions and Project Control

Port of Anacortes - Dakota Creek Industries
Anacortes, Washington

GEOENGINEERS

Figure 2

P:\5\5147006\00\CADD\ARCHIVE\5147006F2.DWG\TAB:F2 MODIFIED BY TMICHAUD ON FEB 25, 2008 - 12:56



SURVEY NOTES

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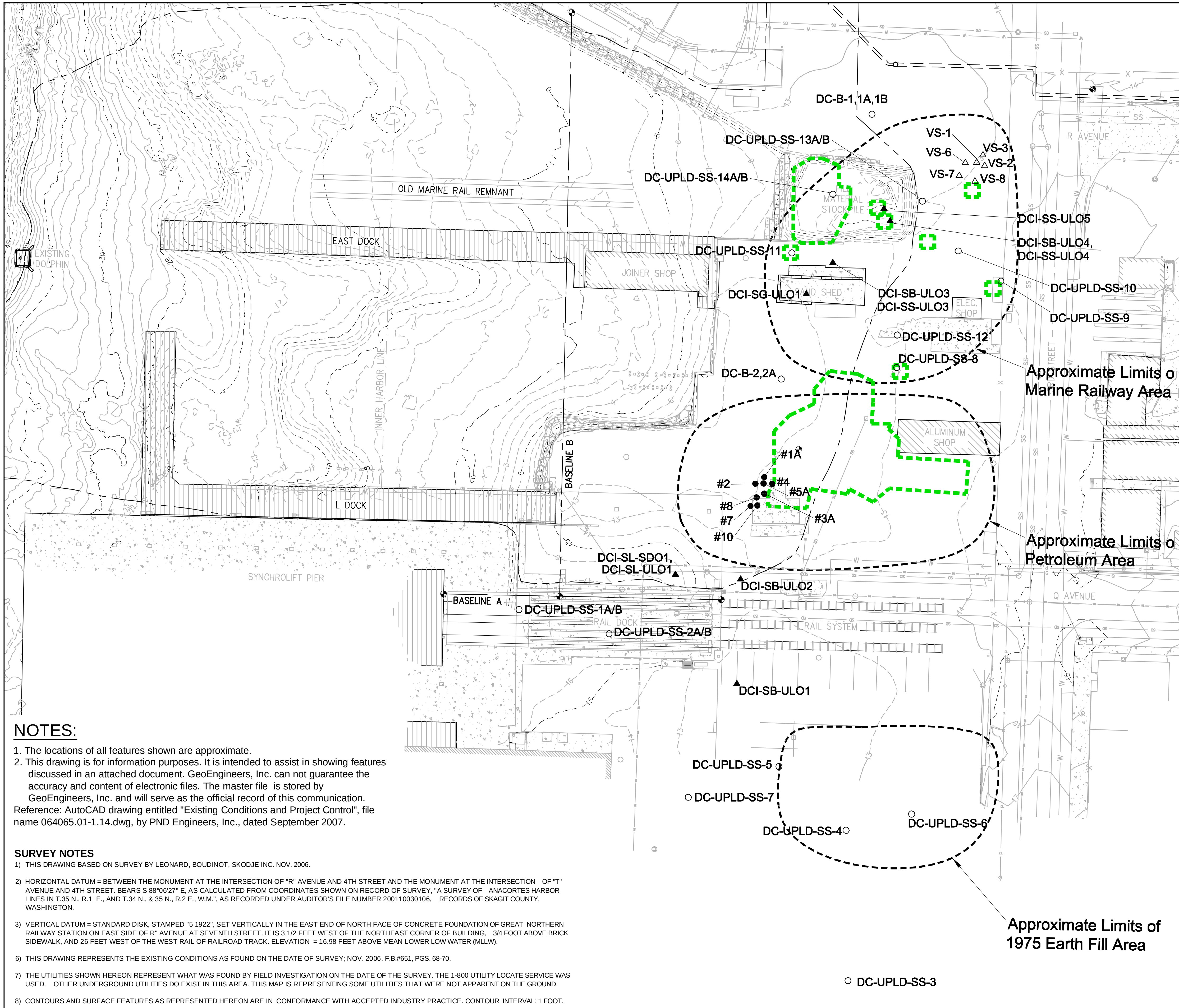
Site Plan - Historic Property Use

Port of Anacortes - Dakota Creek Industries
Anacortes, Washington

GEOENGINEERS

Figure 3

\\SEA\PROJECTS\5\5147006\00\CADD\5147006F3.DWG\TAB:F3 MODIFIED BY SSIMMONS ON MAR 05, 2008 - 12:56



Legend

Existing and Historical Site Features

- Existing fence
- TJB Telephone junction box (pedestal)
- CB Catch Basin
- Sewer manhole
- Storm manhole
- Found rebar with yellow cap marked as noted
- Rebar/survey marker
- Gravel
- Concrete
- Rip Rap
- Elevation contour
- Limits of the 2002 Remedial Excavation (Landau Associates, 2002 c)

Historical Soil Sample Location and Type

- ● TPHs Soil Excavation (A-1 Pump Service 1991)
- ○ Environmental Site Assessment (Otten Engineering 1997)
- △ Hydraulic Winch Soil Excavation (Landau Associates 2001)
- ▲ EPA Site Inspection (Weston 2001)

N E S W

80 0 80
FEET

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Pre - 2002 Remedial Excavation Soil and Groundwater Sample Locations

Port of Anacortes - Dakota Creek Industries
Anacortes, Washington

GEOENGINEERS

Figure 4

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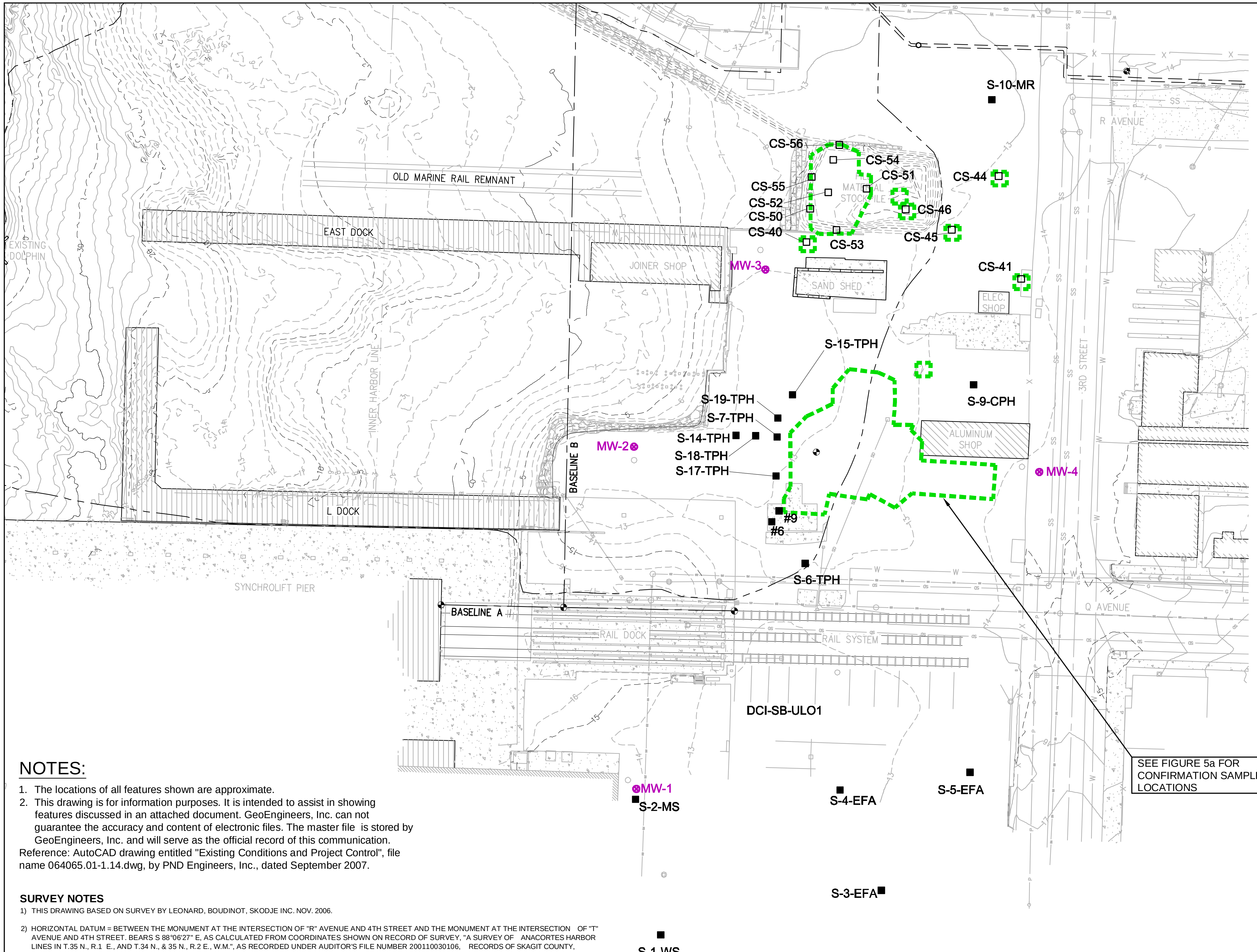

Legend

Existing and Historical Site Features

- Existing fence
- TJB Telephone junction box (pedestal)
- CB Catch Basin
- Sewer manhole
- Storm manhole
- Found rebar with yellow cap marked as noted
- Rebar/survey marker
- Gravel
- Concrete
- Rip Rap
- Elevation contour
- Limits of the 2002 Remedial Excavation (Landau Associates, 2002 c)

Historical Soil/Groundwater Sample Location and Type

- Confirmation Soil Sample (Landau Associates 2002 a)
- Remedial Soil Sample Investigation (Landau Associates 2002 a)
- Remedial Groundwater Sample Investigation (Landau Associates 2002 a)

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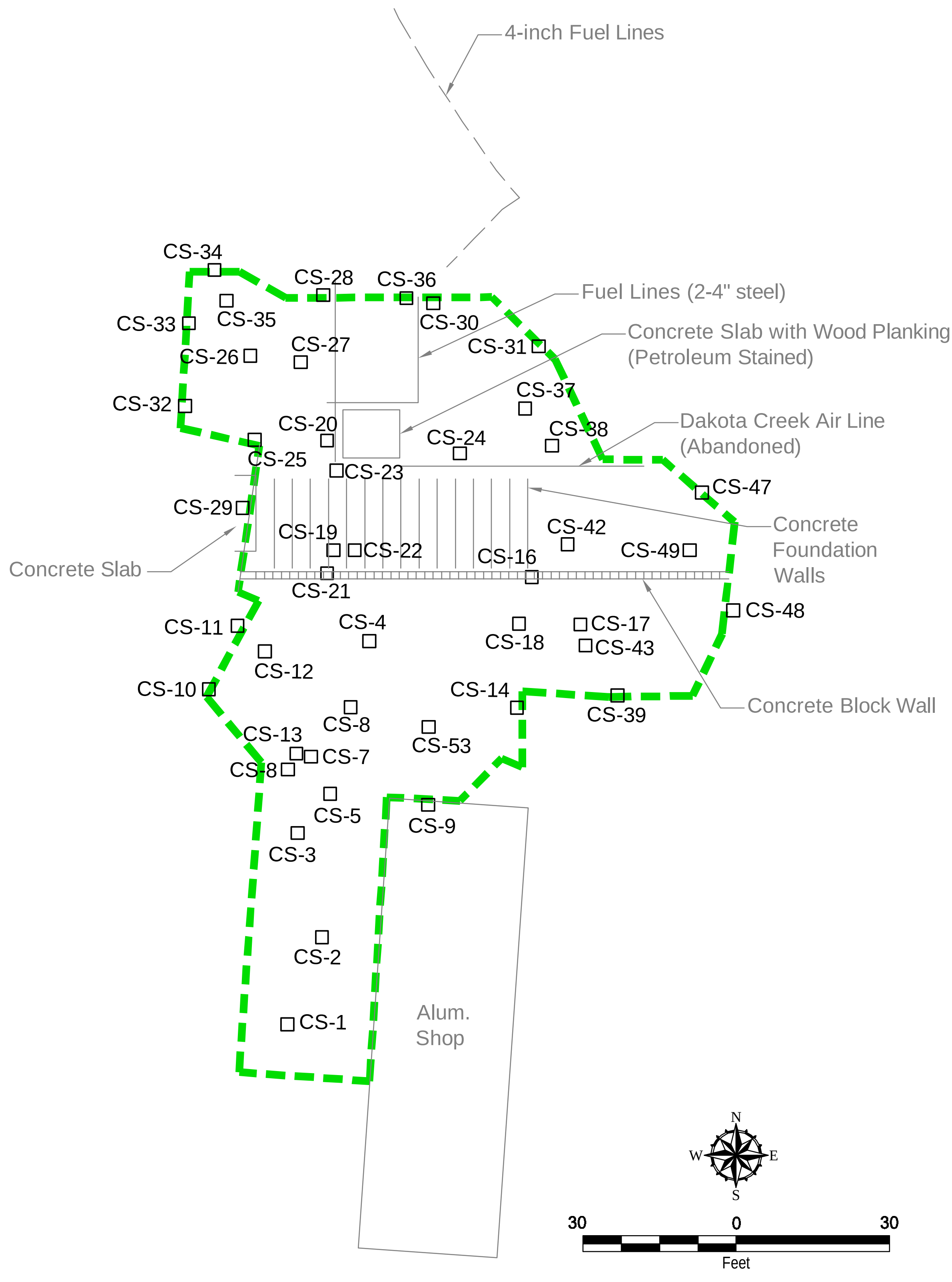
Post - 2002 Remedial Excavation Soil and Groundwater Sample Locations

Port of Anacortes - Dakota Creek Industries
Anacortes, Washington

GEOENGINEERS

Figure 5



LEGEND

CS-1 □ Confirmation Sample
(Landau Associates, 2002 c)

Reference: Figure obtained from Landau Associates, 2002 c
(Figure 5 Petroleum Area Excavation Deatil)

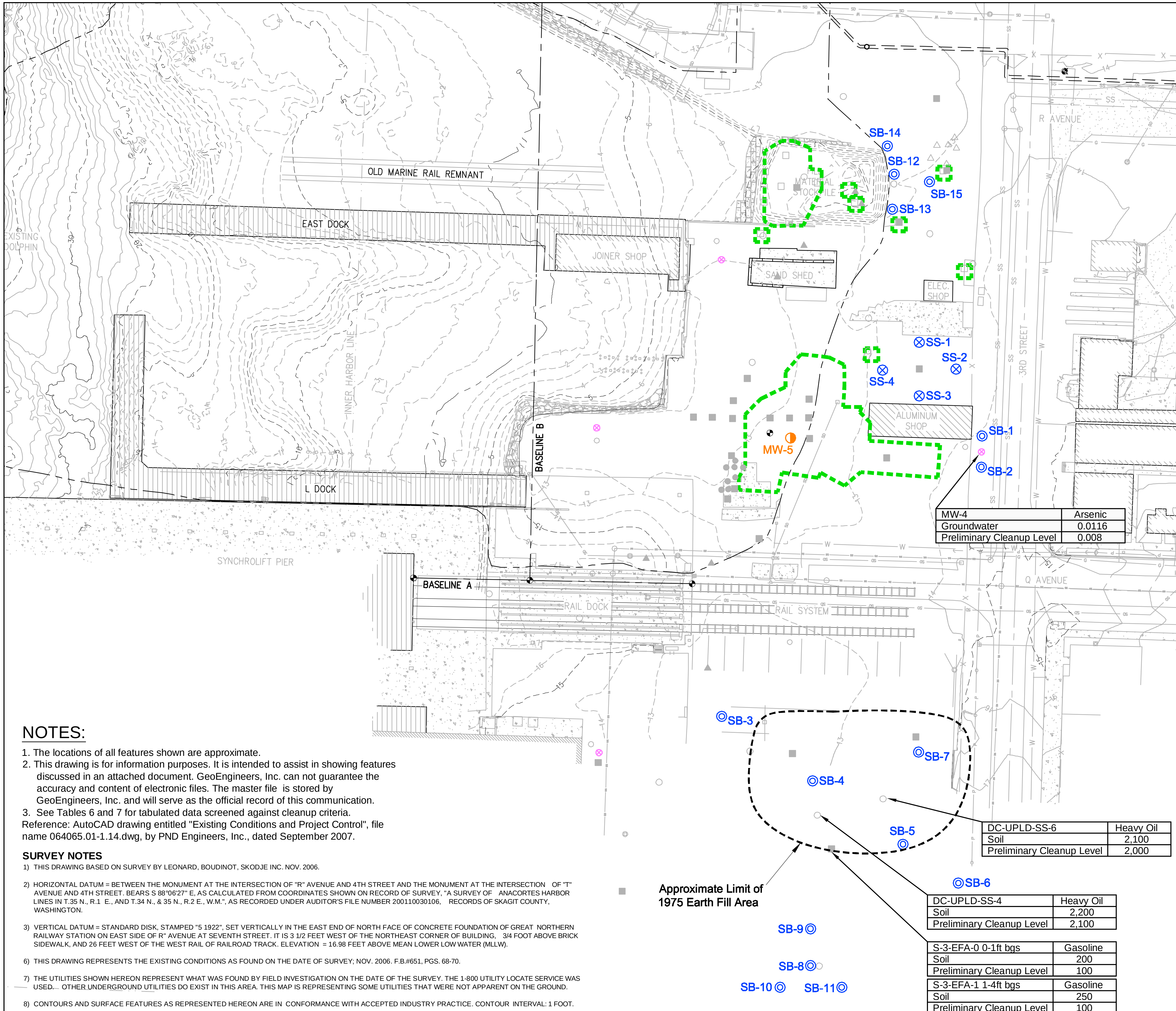
Petroleum Area 2002 Remedial Excavation Detail and Confirmation Sample Locations

Port of Anacortes - Dakota Creek Industries
Anacortes, Washington

GEOENGINEERS

Figure 5a

P:\5\5147006\00\CADD\5147006000F5A.DWG\TAB:F4A MODIFIED BY TMICHAUD ON FEB 29, 2008 - 8:20



MW-4	Arsenic
Groundwater	0.0116
Preliminary Cleanup Level	0.008

DC-UPLD-SS-6	Heavy Oil
Soil	2,100
Preliminary Cleanup Level	2,000

DC-UPLD-SS-4	Heavy Oil
Soil	2,200
Preliminary Cleanup Level	2,100

S-3-EFA-0 0-1ft bgs	Gasoline
Soil	200
Preliminary Cleanup Level	100

S-3-EFA-1 1-4ft bgs	Gasoline
Soil	250
Preliminary Cleanup Level	100

Legend

Existing and Historical Site Features

- Existing fence
- TJB Telephone junction box (pedestal)
- CB Catch Basin
- Sewer manhole
- Storm manhole
- Found rebar with yellow cap marked as noted
- Rebar/survey marker
- Gravel
- Concrete
- Rip Rap
- Elevation contour
- Limits of the 2002 Remedial Excavation (Landau Associates, 2002 c)

Historical Soil/Groundwater Sample Location and Type

(Groundwater results in µg/L. Soil results in mg/kg.)

- Confirmation soil sample (Landau Associates 2002 a)
- TPH soil excavation (A-1 Pump Service 1991)
- Environmental Site Assessment (Otten Engineering 1997)
- Hydraulic winch soil excavation (Landau Associates 2001)
- EPA site inspection (Weston 2001)
- Remedial investigation soil sample (Landau Associates 2002 a)
- Remedial investigation groundwater sample (Landau Associates 2002 a)

Proposed Soil/Groundwater Sample Location and Type

- Proposed soil borings
- Proposed monitoring well (soil samples will also be collected)
- Proposed surface soil samples

N E S W

100 0 100

FEET

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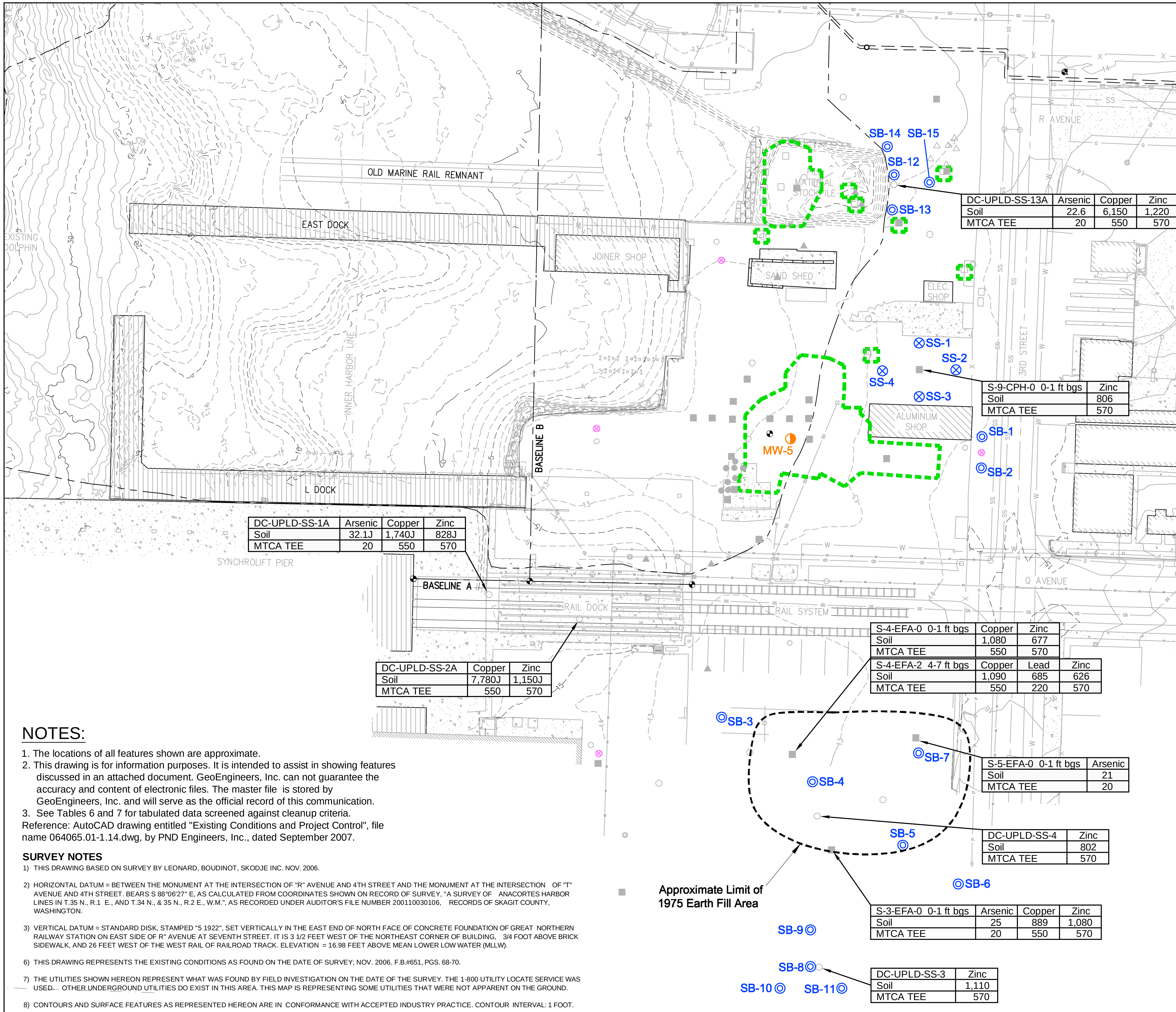
Summary of Preliminary Cleanup Level Exceedances and Proposed Sample Locations

Port of Anacortes - Dakota Creek Industries
Anacortes, Washington

GEOENGINEERS

Figure 5b

P:\5\5147006\00\CADD\514700600F5B.DWG\TAB:F5B MODIFIED BY TMICHAUD ON FEB 25, 2008 - 13:11



DC-UPLD-SS-13A	Arsenic	Copper	Zinc
Soil	22.6	6,150	1,220
MTCA TEE	20	550	570

S-9-CPH-0 0-1 ft bgs	Zinc
Soil	806
MTCA TEE	570

DC-UPLD-SS-1A	Arsenic	Copper	Zinc
Soil	32.1J	1,740J	828J
MTCA TEE	20	550	570

S-4-EFA-0 0-1 ft bgs	Copper	Zinc
Soil	1,080	677
MTCA TEE	550	570

S-4-EFA-2 4-7 ft bgs	Copper	Lead	Zinc
Soil	1,090	685	626
MTCA TEE	550	220	570

DC-UPLD-SS-2A	Copper	Zinc
Soil	7,780J	1,150J
MTCA TEE	550	570

S-5-EFA-0 0-1 ft bgs	Arsenic
Soil	21
MTCA TEE	20

DC-UPLD-SS-4	Zinc
Soil	802
MTCA TEE	570

S-3-EFA-0 0-1 ft bgs	Arsenic	Copper	Zinc
Soil	25	889	1,080
MTCA TEE	20	550	570

DC-UPLD-SS-3	Zinc
Soil	1,110
MTCA TEE	570

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Legend

Existing and Historical Site Features

- Existing fence
- TJB Telephone junction box (pedestal)
- CB Catch Basin
- Sewer manhole
- Storm manhole
- Found rebar with yellow cap marked as noted
- Rebar/survey marker
- Gravel
- Concrete
- Rip Rap
- Elevation contour

MTCA TEE = Model Toxics Control Act Terrestrial Ecological Evaluation (Table 749-2; Simplified Industrial)

- Limits of the 2002 Remedial Excavation (Landau Associates, 2002 c)

Historical Soil/Groundwater Sample Location and Type

- Confirmation soil sample (Landau Associates 2002 a)
- TPH soil excavation (A-1 Pump Service 1991)
- Environmental Site Assessment (Otten Engineering 1997)
- Hydraulic winch soil excavation (Landau Associates 2001)
- EPA site inspection (Weston 2001)
- Remedial investigation soil sample (Landau Associates 2002 a)
- Remedial investigation groundwater sample (Landau Associates 2002 a)

Proposed Soil/Groundwater Sample Location and Type

- Proposed soil borings
- Proposed monitoring well (soil samples will also be collected)
- Proposed surface soil samples

100 0 100

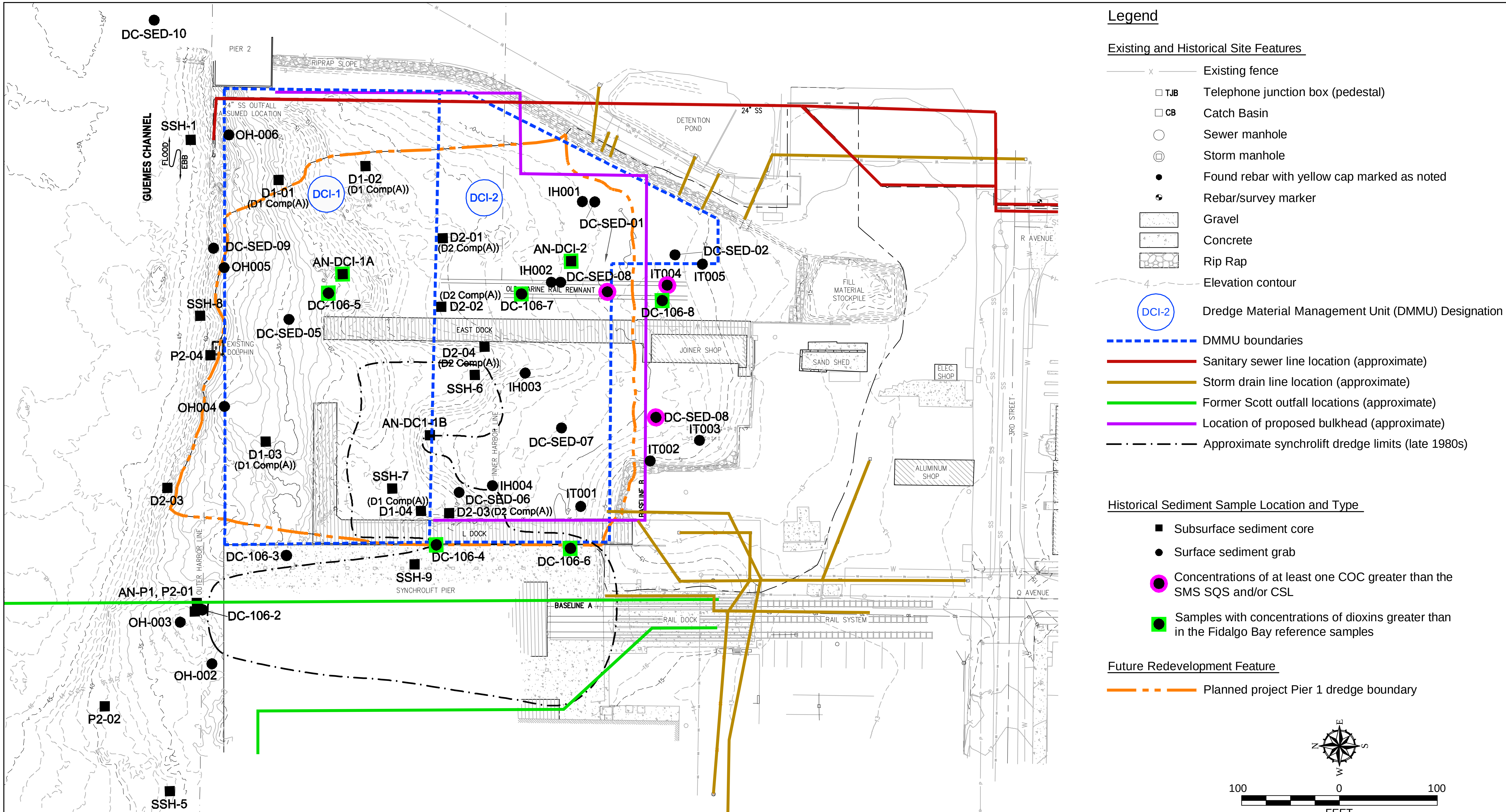
FEET

Summary of MTCA TEE Exceedances and Proposed Sample Locations

Port of Anacortes - Dakota Creek Industries
Anacortes, Washington

GEOENGINEERS

Figure 5c



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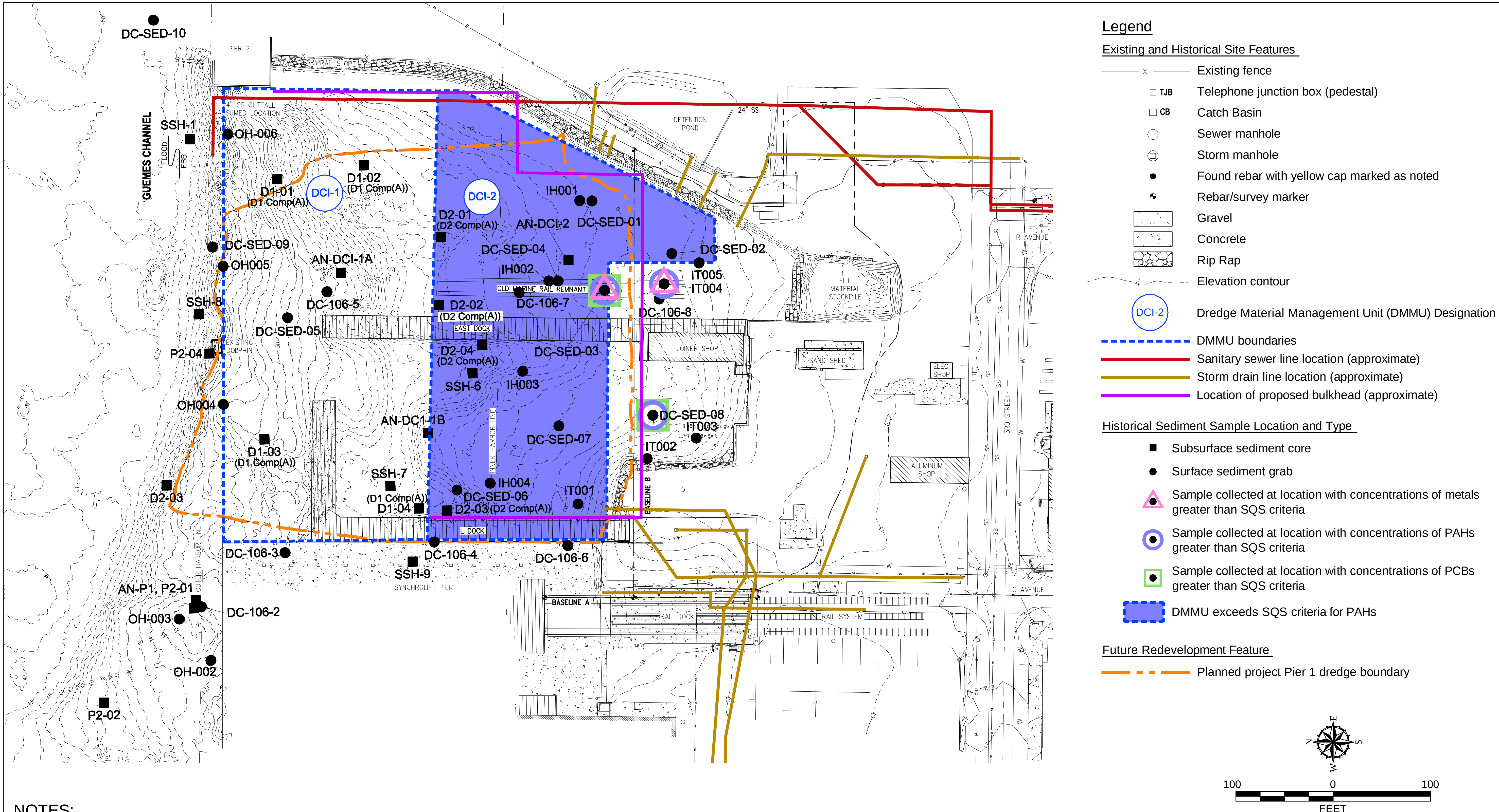
Planned Dredging Boundary and Historic Sediment Sample Locations

Port of Anacortes - Dakota Creek Industries
Anacortes, Washington

GEOENGINEERS

Figure 6



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3. See Table 9 for tabulated data screened against cleanup criteria.

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6) THIS DRAWING REPRESENTS THE EXISTING CONDITIONS AS FOUND ON THE DATE OF SURVEY; NOV. 2006. F.B.#651, PGS. 68-70.

7) THE UTILITIES SHOWN HEREON REPRESENT WHAT WAS FOUND BY FIELD INVESTIGATION ON THE DATE OF THE SURVEY. THE 1-800 UTILITY LOCATE SERVICE WAS USED. OTHER UNDERGROUND UTILITIES DO EXIST IN THIS AREA. THIS MAP IS REPRESENTING SOME UTILITIES THAT WERE NOT APPARENT ON THE GROUND.

8) CONTOURS AND SURFACE FEATURES AS REPRESENTED HEREON ARE IN CONFORMANCE WITH ACCEPTED INDUSTRY PRACTICE. CONTOUR INTERVAL: 1 FOOT.

Summary of Existing COCs Exceedances in Sediment

Port of Anacortes - Dakota Creek Industries
Anacortes, Washington

GEOENGINEERS

Figure 7

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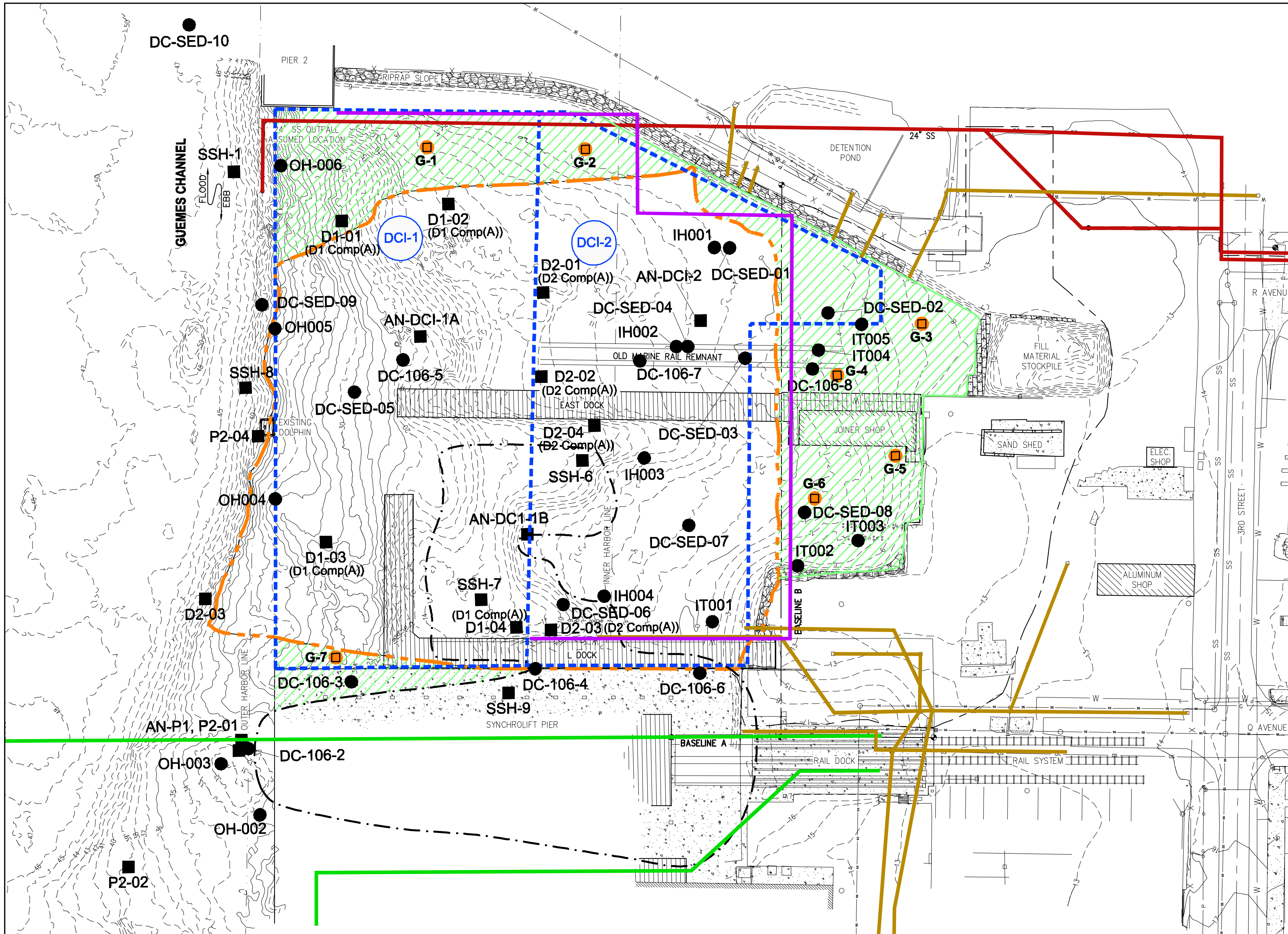


Legend

Existing and Historical Site Features

- Existing fence
- TJB Telephone junction box (pedestal)
- CB Catch Basin
- Sewer manhole
- Storm manhole
- Found rebar with yellow cap marked as noted
- Rebar/survey marker
- Gravel
- Concrete
- Rip Rap
- Elevation contour
- DCI-2 Dredge Material Management Unit (DMMU) Designation
- DMMU boundaries
- Sanitary sewer line location (approximate)
- Storm drain line location (approximate)
- Former Scott outfall locations (approximate)
- Location of proposed bulkhead (approximate)
- Approximate synchrolift dredge limits (late 1980s)

Historical Sediment Sample Location and Type

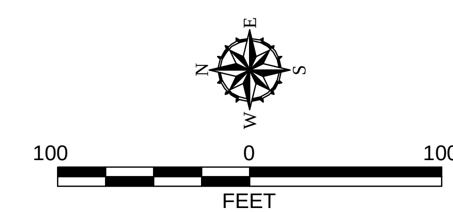
- Subsurface sediment core
- Surface sediment grab

Future Redevelopment Feature

- Planned project Pier 1 dredge boundary

Proposed RI/FS Sample Locations and Type

- G-7 Proposed sediment core sample and surface sample location
- Hatched areas represent sediment areas outside of the dredge cut for the planned redevelopment



NOTES:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: AutoCAD drawing entitled "Existing Conditions and Project Control", file name 064065.01-1.14.dwg, by PND Engineers, Inc., dated September 2007; and PDF of Figure 1.1 "Sediment Sampling Locations" from the Sediment Sampling Data Report by Floyd Snider, dated 1/3/2007.

SURVEY NOTES

1) THIS DRAWING BASED ON SURVEY BY LEONARD, BOUDINOT, SKODJE INC. NOV. 2006

2) HORIZONTAL DATUM = BETWEEN THE MONUMENT AT THE INTERSECTION OF "R" AVENUE AND 4TH STREET AND THE MONUMENT AT THE INTERSECTION OF "T" AVENUE AND 4TH STREET. BEARS S 88°06'27" E, AS CALCULATED FROM COORDINATES SHOWN ON RECORD OF SURVEY, "A SURVEY OF ANACORTES HARBOR LINES IN T.35 N., R.1 E., AND T.34 N., & 35 N., R.2 E., W.M.", AS RECORDED UNDER AUDITOR'S FILE NUMBER 200110030106, RECORDS OF SKAGIT COUNTY, WASHINGTON.

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8) CONTOURS AND SURFACE FEATURES AS REPRESENTED HEREON ARE IN CONFORMANCE WITH ACCEPTED INDUSTRY PRACTICE. CONTOUR INTERVAL: 1 FOOT.

Sediment Data Gaps and Proposed Sediment Sampling Locations

Port of Anacortes - Dakota Creek Industries
Anacortes, Washington

GEOENGINEERS

Figure 8

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GEOENGINEERS

APPENDIX A
PUBLIC PARTICIPATION PLAN

Site Cleanup:

DAKOTA CREEK INDUSTRIES SITE

115 Q Avenue
Anacortes, Washington

PUBLIC PARTICIPATION PLAN

Prepared by:
Washington State Department of Ecology

WASHINGTON STATE DEPARTMENT OF ECOLOGY

[January 2008]

THIS PLAN IS FOR YOU!

THIS PUBLIC PARTICIPATION PLAN IS PREPARED FOR THE DAKOTA CREEK INDUSTRIES SITE CLEANUP AS PART OF THE REQUIREMENTS OF THE MODEL TOXICS CONTROL ACT (MTCA). THE PLAN PROVIDES INFORMATION ABOUT MTCA CLEANUP ACTIONS AND REQUIREMENTS FOR PUBLIC INVOLVEMENT, AND IDENTIFIES HOW ECOLOGY AND PORT OF ANACORTES WILL SUPPORT PUBLIC INVOLVEMENT THROUGHOUT THE CLEANUP. THE PLAN IS INTENDED TO ENCOURAGE COORDINATED AND EFFECTIVE PUBLIC INVOLVEMENT TAILORED TO THE COMMUNITY'S NEEDS AT DAKOTA CREEK INDUSTRIES.

For additional copies of this document, please contact:

Washington State Department of Ecology
Sandra Caldwell, Ecology Project Coordinator
Toxics Cleanup Program
PO Box 47600
Olympia, WA 98504-7600
(360) 407-7209
Email: saca461@ecy.wa.gov

If you need this publication in an alternate format, please call the Toxics Cleanup Program at (360) 407-7170. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call (877) 833-6341 (TTY).

Table of Contents

1.0: INTRODUCTION AND OVERVIEW OF THE PUBLIC PARTICIPATION PLAN

This Public Participation Plan explains how you can become involved in improving the health of your community. It describes public participation opportunities that will be conducted during the cleanup as part of a cooperative agreement between the Washington State Department of Ecology (Ecology) and the Port of Anacortes (Port). The current agreement, called an Agreed Order, is a legal document in which the Port and Ecology agree to decide on cleanup actions for the Dakota Creek Industries site. Dakota Creek Industries] is located at 115 Q Avenue in Anacortes, Washington. These cleanup actions and the public participation process that helps guide them, are established in Washington's Model Toxics Control Act (MTCA).[2]

Under MTCA, Ecology is responsible for providing timely information and meaningful chances for the public to learn about and comment on important cleanup decisions before they are made. The goals of the public participation process are:

- To promote understanding of the cleanup process so that the public has the necessary information to participate.
- To encourage involvement through a variety of public participation opportunities.

This Public Participation Plan provides a framework for open dialogue about the cleanup among community members, Ecology, cleanup site owners, and other interested parties. It outlines basic MTCA requirements for community involvement activities that will help ensure that this exchange of information takes place during the investigation and cleanup, which include:

- Notifying the public about available reports and studies about the site.
- Notifying the public about review and comment opportunities during specific phases of the cleanup investigation.
- Providing appropriate public participation opportunities such as fact sheets to learn about cleanup documents and if community interest exists, holding meetings to solicit input and identify community concerns.
- Considering public comments received during public comment periods.

In addition to these basic requirements, the plan may include additional site-specific activities to meet the needs of your community. Based upon the type of the proposed cleanup action, the level of public concern, and the risks posed by the site, Ecology may decide that more public involvement opportunities are appropriate.

These opportunities form the basis for the public participation process. The intent of this plan is to:

- Provide complete and current information to all interested parties.
- Let you know when there are opportunities to provide input.
- Listen to concerns.

[2] The Model Toxics Control Act (MTCA) is the contaminated site cleanup law for the State of Washington. The full text of the law can be found in Revised Code of Washington (RCW), Chapter 70.105D. The legal requirements and criteria for public notice and participation during MTCA cleanup investigations can be found in Washington Administrative Code (WAC), Section 173-340-600.

- Address those concerns.

PART OF THE PUGET SOUND INITIATIVE

Dakota Creek Industries is one of a number of sites in the Fidalgo Bay area and is part of a larger cleanup effort called the Puget Sound Initiative (PSI). Governor Chris Gregoire and the Washington State Legislature authorized the PSI as a regional approach to protect and restore Puget Sound. The PSI includes cleaning up 50-60 contaminated sites within one-half mile of the Sound. These sites are grouped in several bays around the Sound for “baywide” cleanup efforts. As other sites in the Fidalgo Bay baywide area move forward into investigation and cleanup, information about them will be provided to the community as well as to interested people and groups.

ROLES AND RESPONSIBILITIES

Ecology will lead public involvement activities, with support from the Port. Ecology maintains overall responsibility and approval authority for the activities outlined in this plan. The Port is responsible for cleanup at this site. Ecology ultimately will oversee, all cleanup activities. Ecology will ultimately ensure that contamination on this site is cleaned up to concentrations that are established in state regulations and that protect human health and the environment.

ORGANIZATION OF THIS PUBLIC PARTICIPATION PLAN

The sections that follow in this plan provide:

- Section 2: Background information about the Dakota Creek Industries site.
- Section 3: An overview of the local community that this plan is intended to engage.
- Section 4: Public involvement opportunities in this cleanup.

This Public Participation Plan addresses current conditions at the site, but it is intended to be a dynamic working document that will be reviewed at each phase of the cleanup, and updated as needed. Ecology and the Port urge the public to become involved in the cleanup process.

2.0: SITE BACKGROUND

SITE DESCRIPTION AND LOCATION

The Dakota Creek Industries site is located at 115 Q Avenue in Anacortes, Skagit County, Washington. It is located near the northwest corner of Fidalgo Bay and to the south of Guemes Channel (see Figure 1). The site is bounded by Port of Anacortes Pier 1 to the west and Pier 2 to the east, 3rd street on the south, and the Guemes Channel to the north.

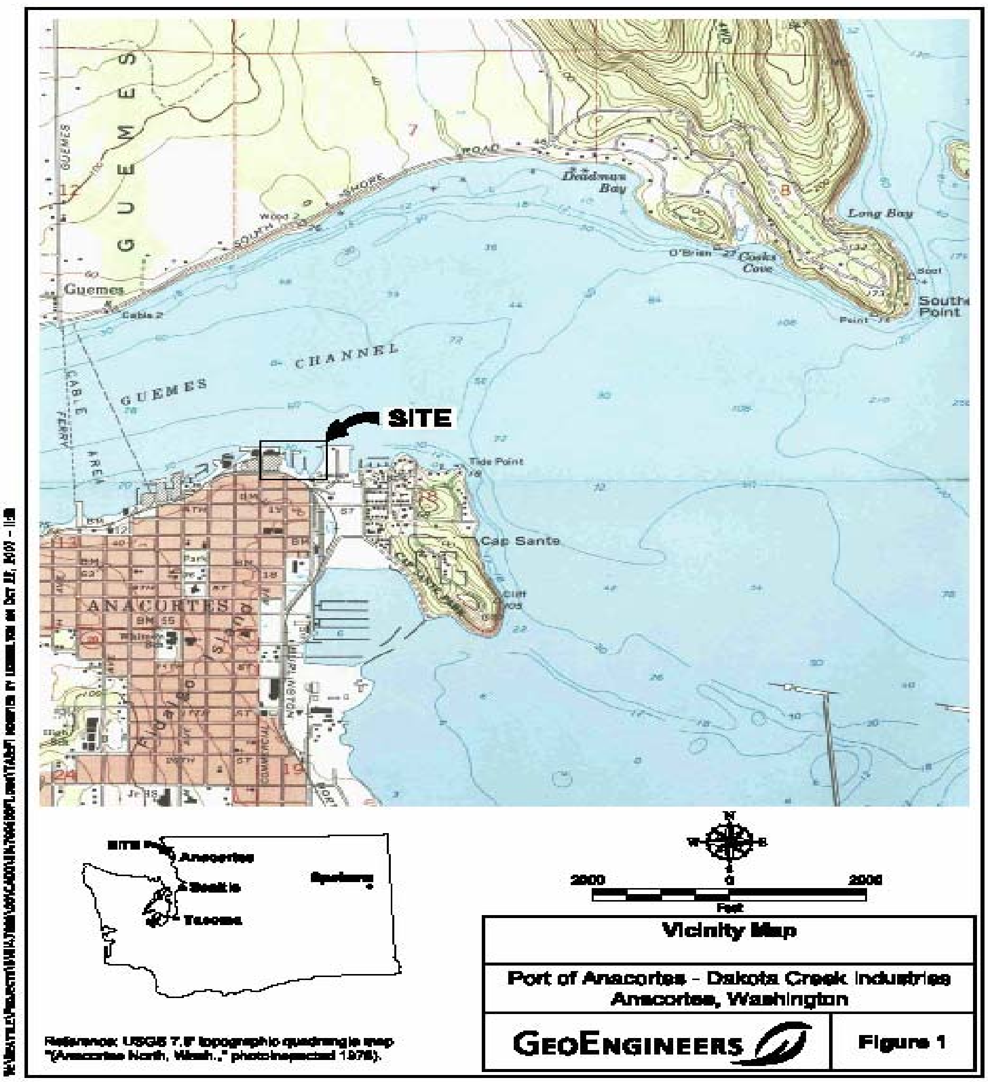


Figure 1: The Dakota Creek Industries site is shown in the above map with a star, located at 115 Q Avenue, Anacortes, Washington.

GENERAL SITE HISTORY AND CONTAMINANTS

The Dakota Creek Industries site has been used for shipbuilding and/or maintenance activities since at least 1879. The site is now occupied by an active shipyard. Chemicals formerly used on the site include petroleum hydrocarbons, dioxin, metals, and PCBs. A historic remedial excavation at the site removed much of the impacted soil at the site.

Ecology and the Port of Anacortes have conducted soil, groundwater and sediment investigations on the site and found the following contaminants at concentrations above MTCA cleanup levels:

- Heavy oil-range petroleum hydrocarbons: Preliminary soil cleanup level is based on accumulation of free product on groundwater. Free product has not been observed in site groundwater; however, a direct contact soil cleanup level for heavy oil-range petroleum hydrocarbons is not available.
- Arsenic: Arsenic has been detected in soil at concentrations greater than the soil background level, the MTCA Method C soil cleanup level based on groundwater protection, and the preliminary groundwater cleanup level, but was detected at a concentration less than the MTCA Method C direct contact soil cleanup level.
- Arsenic: Arsenic has been detected in groundwater at concentrations greater than the Washington State background level.
- Metals: Metals have been detected in nearshore surface sediment at concentrations greater than the Sediment Management Standards criteria
- Semi-volatile Organic Compounds (SVOCs): SVOCs have been detected in nearshore surface and subsurface sediment at concentrations greater than the Sediment Management Standards criteria

Further investigation will be done to fully characterize the contamination at the Dakota Creek Industries site.

THE CLEANUP PROCESS

Washington State's cleanup process and key chances for you to provide input are outlined in Figure 2. The general cleanup process includes the following steps:

- Remedial investigation (RI) - investigates the site for types, locations, and amounts of contaminants.
- Feasibility study (FS) - identifies cleanup options for those contaminants.
- Cleanup action plan (CAP) – selects the preferred cleanup option and explains how cleanup will be conducted.

At any time during the cleanup process, an interim action may be conducted. An interim action partially addresses cleanup at the site and is usually followed by site-wide cleanup.

Each of these steps will be documented in reports and plans that will be available for public review. Public comment periods of at least 30 calendar days are usually conducted for the following documents:

- Draft RI report.

- Draft FS report.
- Draft CAP.

These cleanup steps and documents are described in greater detail in the following subsections.

INTERIM ACTIONS

Interim actions may be conducted during the cleanup if required by Ecology. An interim action partially addresses the cleanup of a site, and may be required if:

- It is technically necessary to reduce a significant threat to human health or the environment.
- It corrects a problem that may become substantially worse or cost substantially more to fix if delayed.
- It is needed to complete another cleanup activity, such as design of a cleanup plan.

Interim actions are currently anticipated on the Dakota Creek Industries site.

REMEDIAL INVESTIGATION/FEASIBILITY STUDY REPORT

The Port has agreed to conduct an RI on the site. The RI determines which contaminants are on the site, where they are located, and whether there is a significant threat to human health or the environment. The draft RI report provides baseline data about environmental conditions that will be used to develop cleanup options. The feasibility study (FS) and report then identify and evaluate cleanup options, in preparation for the next step in the process.

The RI and FS processes typically include several phases:

- Scoping.
- Site characterization.
- Development and screening of cleanup alternatives.
- Treatability investigations (if necessary to support decisions).
- Detailed analysis.

The RI and FS reports are expected to be combined into a draft Dakota Creek Industries RI/FS report. The draft report will be made available for public review and comment. Comments will be considered as the draft cleanup action plan (CAP) is prepared.

CLEANUP ACTION PLAN

The Port and Ecology have agreed to develop a CAP for the site. After public comment on the draft RI/FS report, a preferred cleanup alternative will be selected. The draft CAP explains the cleanup standards that will be applied at the site, selects the preferred cleanup alternative(s), and outlines the work to be performed during the actual site remediation. The CAP may also evaluate the completeness and effectiveness of any interim actions that were performed on the site. The draft CAP will be available for public review and comment. Once public comments are reviewed and any changes are made, Ecology provides final approval and site cleanup can begin.

3.0: COMMUNITY PROFILE

COMMUNITY PROFILE

Anacortes is Skagit County's second largest city and its busiest seaport. The current population of Anacortes is approximately 16,000 people, situated within 14.8 square miles. The City of Bellingham is the nearest medium city, located approximately 18 miles north of Anacortes. The majority of jobs are within the fields of refining, manufacturing, casino resort, education, and healthcare.

KEY COMMUNITY CONCERNS

An important part of the Public Participation Plan is to identify key community concerns for each cleanup site. The Dakota Creek Industries site is industrial, but is located near a residential area. The proximity of the community to the site is likely to raise concerns about how daily life and the future of the community will be affected during and after cleanup of the site.

Many factors may contribute to concerns, such as the amount of contamination, how the contamination will be cleaned up, or future use of the site. Community concerns often change over time as new information is learned and questions are answered. Identifying site-specific community concerns at each stage of the cleanup process will be helpful to ensure that they are adequately addressed. On-going key community concerns will be identified for the Dakota Creek Industries site through public comments and other opportunities as outlined in Section 4.

4.0: PUBLIC PARTICIPATION OPPORTUNITIES

Ecology and the Port invite you to share your comments and participate in the cleanup in your community. As we work to meet our goals, we will evaluate whether this public participation process is successful. This section describes the public participation opportunities for this site.

MEASURING SUCCESS

We want this public participation process to succeed. Success can be measured, at least in part, in the following ways:

- Number of written comments submitted that reflect understanding of the cleanup process and the site.
- Direct, in-person feedback about the site cleanup or public participation processes, if public meetings are held.
- Periodic updates to this plan to reflect community concerns and responses.

If we are successful, this process will increase:

- Community awareness about plans for cleanup and opportunities for public involvement.
- Public participation throughout the cleanup.
- Community understanding regarding how their input will be considered in the decision-making process.

Activities and Information Sources

Ecology Contacts

Ecology is the lead contact for questions about the cleanup in your community. The Ecology staff identified in this section are familiar with the cleanup process and activities at the site. For more information about public involvement or about technical aspects of the cleanup, please contact:

For technical questions:

Panjini Balaraju
Ecology Project Coordinator
WA State Dept. of Ecology
Toxics Cleanup Program

P.O. Box 47600
Olympia, WA 98504-7600
Phone: (360) 407-6161
E-mail: pbal461@ecy.wa.gov

For public involvement questions or comments:

Sandra Caldwell
Ecology Project Coordinator
WA State Dept. of Ecology
Toxics Cleanup Program

P.O. Box 47600
Olympia, WA 98504-7600
Phone: (360) 407-7209
E-mail: saca461@ecy.wa.gov

Ecology's Webpage

Ecology has created a webpage to provide convenient access to information. Documents such as the Agreed Order, draft reports, and cleanup plans, are posted as they are issued during the investigation and cleanup process. Visitors to the webpage can find out about public comment periods and meetings; download, print, and read information; and submit comments via e- mail. The webpage also provides links to detailed information about the MTCA cleanup process. The Dakota Creek Industries site webpage is available at the following address: http://www.ecy.wa.gov/pubs/0709161.pdf

Information Centers/Document Repositories

The most comprehensive source of information about the Dakota Creek Industries site is the information center, or document repository. Two repositories provide access to the complete list of site-related documents. All Dakota Creek Industries investigation and cleanup activity reports will be kept in print at those two locations and will be available for your review. They can be requested on compact disk (CD) as well. Document repositories are updated before public comment periods to include the relevant documents for review. Documents remain at the repositories throughout the investigation and cleanup. For the Dakota Creek Industries site, the document repositories and their hours are:

Anacortes Public Library
1209 9th Street
Anacortes, WA 98221
360-293-1926
Major documents will be available
Hours: Mon–Thurs 11am to 8pm
Friday 11am to 5pm
Sat–Sun 12pm to 5pm

- **WA Department of Ecology Headquarters**
  300 Desmond Dr.
  Lacey, WA 98503
  By appointment. Please contact Carol Dorn at (360) 407-7224 or cesg461@ecy.wa.gov.

Public Comment Periods

Public comment periods provide opportunities for you to review and comment on major documents such as the Agreed Order, draft Public Participation Plan, draft RI/FS report, and the draft CAP. The typical public comment period is 30 calendar days.

Notice of Public Comment Periods

Notices for each public comment period will be provided by local newspaper and by mail. These notices indicate the timeframe and subject of the comment period, and explain how you can submit your comments. For the Dakota Creek Industries site, newspaper notices will be posted in the Anacortes American newspaper.

Notices are also sent by regular mail to the local community and interested parties. The community typically includes all residential and business addresses within one-quarter mile of the site, as well as potentially interested parties such as public health entities, environmental groups, and business associations.

Fact Sheets

One common format for public comment notification is the fact sheet. Like the newspaper notice, fact sheets explain the timeframe and purpose of the comment period, but also provide background and a summary of the document under review. One fact sheet has been prepared for the Dakota Creek Industries site. It explains the Agreed Order and this Public Participation Plan (See Appendix A). Future fact sheets will be prepared at key milestones in the cleanup process.

MTCA Site Register

Ecology produces an electronic newsletter called the MTCA Site Register. This semi-monthly publication provides updates of the cleanup activities occurring throughout the state, including public meeting dates, public comment periods, and cleanup-related reports. Individuals who would like to receive the MTCA Site Register can sign up three ways:

- Call (360) 407-6069
- Send an email request to ltho461@ecy.wa.gov
- Register on-line at http://www.ecy.wa.gov/programs/tcp/pub_inv/pub_inv2.html

Mailing Lists

Ecology maintains both an e-mail and regular mail distribution list throughout the cleanup process. The list is created from carrier route delineations for addresses within one-quarter mile of the site, potentially interested parties, public meeting sign-in sheets, and requests made in person or by regular mail or e-mail. You may request to be on the mailing list by contacting Ecology's public involvement staff person listed earlier in this section.

Optional Public Meetings

A public meeting will be held during a comment period if requested by ten or more people, or if Ecology decides it would be useful. Public meetings provide additional opportunities to learn about the investigation or cleanup, and to enhance informed comment. If you are interested in a public meeting about the Dakota Creek Industries site, please contact the Ecology staff listed earlier in this section.

Submitting Comments

You may submit comments by regular mail or e-mail during public comment periods to the Ecology Project Manager and technical staff person listed earlier in this section.

Response to Comments

Ecology will review all comments submitted during public comment periods, and will modify documents as necessary. You will receive notice by regular mail or e-mail that Ecology has received your comments, along with a general explanation about how the comments were addressed.

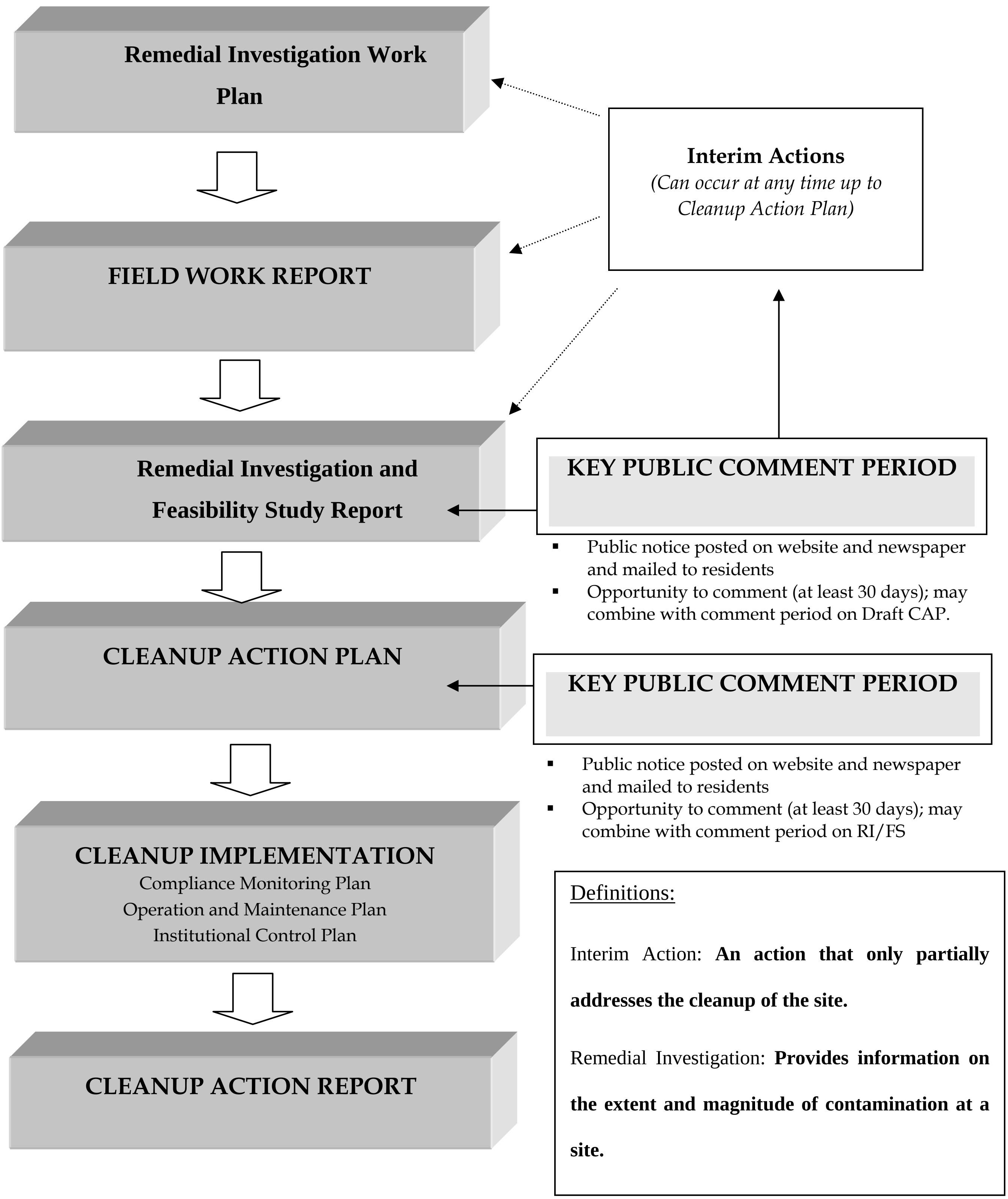
Other

Ecology and the Port are committed to the public participation process and will consider additional means for delivering information and receiving comments, including combining public comment periods for other actions (such as those associated with the State Environmental Policy Act).

PUBLIC PARTICIPATION GRANTS

You may be eligible to apply for a Public Participation Grant from Ecology to provide additional public participation activities. Those additional activities will not reduce the scope of the activities defined by this plan. Activities conducted under this plan would coordinate with the additional activities defined under the grant.

FIGURE 2: WASHINGTON STATE CLEANUP PROCESS



GLOSSARY

Cleanup: The implementation of a cleanup action or interim action.

Cleanup Action: Any remedial action except interim actions, taken at a site to eliminate, render less toxic, stabilize, contain, immobilize, isolate, treat, destroy, or remove a hazardous substance that complies with MTCA cleanup requirements, including but not limited to: compliance with cleanup standards; utilizing permanent solutions to the maximum extent practicable; and including adequate monitoring to ensure the effectiveness of the cleanup action.

Cleanup Action Plan: A document that selects the cleanup action and specifies cleanup standards and other requirements for a particular site. The cleanup action plan, which follows the remedial investigation/feasibility study report, is subject to a public comment period. After completion of a comment period on the cleanup action plan, Ecology finalizes the cleanup action plan.

Cleanup Level: The concentration (or amount) of a hazardous substance in soil, water, air, or sediment that protects human health and the environment under specified exposure conditions. Cleanup levels are part of a uniform standard established in state regulations, such as MTCA.

Cleanup Process: The process for identifying, investigating, and cleaning up hazardous waste sites.

Contaminant: Any hazardous substance that does not occur naturally or occurs at greater than natural background levels.

Feasibility Study: Provides identification and analysis of site cleanup alternatives and is usually completed within a year. The entire Remedial Investigation/Feasibility Study process takes about two years and is followed by the cleanup action plan. Remedial action evaluating sufficient site information to enable the selection of a cleanup action plan.

Hazardous Site List: A list of ranked sites that require further remedial action. These sites are published in the Site Register.

Interim Action: Any remedial action that partially addresses the cleanup of a site. It is an action that is technically necessary to reduce a threat to human health or the environment by eliminating or substantially reducing one or more pathways for exposure to a hazardous substance at a facility; an action that corrects a problem that may become substantially worse or cost substantially more to address if the action is delayed; an action needed to provide for completion of a site hazard assessment, state remedial investigation/feasibility study, or design of a cleanup action.

Model Toxics Control Act: Refers to Chapter 70.105D RCW. Voters approved it in November 1988. The implementing regulation is found in Chapter 173-340 WAC.

Public Notice: At a minimum, adequate notice mailed to all persons who have made a timely request of Ecology and to persons residing in the potentially affected vicinity of the proposed action; mailed to appropriate news media; published in the local (city or county) newspaper of largest circulation; and the opportunity for interested persons to comment.

Public Participation Plan: A plan prepared under the authority of WAC 173-340-600 to encourage coordinated and effective public involvement tailored to the public's needs at a particular site.

Release: Any intentional or unintentional entry of any hazardous substance into the environment, including, but not limited to, the abandonment or disposal of containers of hazardous substances.

Remedial Action: Any action or expenditure consistent with MTCA to identify, eliminate, or minimize any threat posed by hazardous substances to human health or the environment, including any investigative and monitoring activities of any release or threatened release of a hazardous substance, and any health assessments or health effects studies conducted in order to determine the risk or potential risk to human health.

Remedial Investigation: Any remedial action that provides information on the extent and magnitude of contamination at a site. This usually takes 12 to 18 months and is followed by the feasibility study. The purpose of the Remedial Investigation/Feasibility Study is to collect and develop sufficient site information to enable the selection of a cleanup action.

GeoEngineers

Appendix B

Sampling Analysis Plan/Quality Assurance Project Plan, Dakota Creek Industries Shipyard Interim Action - Upland Soil and Groundwater

APPENDIX B
SAMPLING ANALYSIS PLAN/QUALITY ASSURANCE PROJECT PLAN, DAKOTA CREEK INDUSTRIES SHIPYARD INTERIM ACTION - UPLAND SOIL AND GROUNDWATER

1.0 INTRODUCTION

Soil and groundwater samples will be obtained from the upland portion of the Dakota Creek Industries Shipyard site (Site) during the Remedial Investigation (RI) to fill data gaps identified after reviewing historic data from the Site. The sampling locations and analytes included in this portion of the investigation were discussed with Ecology during a telephone conference on November 20, 2007.

Soil samples will be collected for chemical analyses from 14 borings, one of which will be completed as a monitoring well (MW-5), and surface soil samples will be collected from four locations during this investigation. An additional round of groundwater samples will be collected from the existing monitoring wells at the site (MW-1 through MW-4) and the newly installed monitoring well (MW-5).

Two additional borings (SB-3 and SB-6) will be completed near the assumed boundary of the Earth Fill Area on the southwest portion of the site to evaluate the lateral extent of the earth fill area based on soil conditions encountered during drilling. Soil samples will be collected and archived from these borings pending chemical analytical results.

Soil samples obtained for chemical analysis during this study will be submitted to an Ecology-certified laboratory for analysis of one or more of the following:

- Arsenic by SW-846 6010
- SVOCs/PAHs by SW-846 8270C/8270-SIM
- Gasoline and BETX by NWTPH-Gx
- MTBE by EPA Method 8260B,
- EDB/EDC by EPA Method 8260B/8011,
- Diesel- and oil-range petroleum hydrocarbons by NWTPH-Dx with silica gel cleanup
- Dioxins and Furans using EPA Method 8290 Dioxins/furans by EPA Method 1613B (high resolution gas chromatographs/high resolution mass spectrometry [HRGC/HRMS]).

Analytical results for dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) will be presented in the RI report two different ways: as individual congeners and as toxic equivalencies (TEQ). EPA's recommended TEQ approach will be used to evaluate potential effects associated with complex mixtures of chlorinated dioxins and furans. This approach is based on the use of toxicity equivalency factors (TEFs), which, when applied, convert congener-specific concentrations into 2,3,7,8-TCDD equivalent concentrations (Ecology, 2007). This approach requires multiplying dioxin and furan congener results by their respective TEFs to obtain a total 2,3,7,8-TCDD equivalent concentration in each sample. TEQ values will be calculated for individual samples using only those congeners that are detected, as recommended by Ecology (2007). This approach recommends that the total concentration for chemical groups that are expressed as the sum of individual compounds should be derived by adding the concentrations of only those individual compounds that are detected. The TEFs developed by the World Health Organization (WHO) in the June 1997 Stockholm meeting (updated in 2005), and as summarized in Van den Berg, et al. (1998), will be used to calculate TEQ concentrations.

Groundwater samples obtained during this study will be submitted to an Ecology-certified laboratory for analysis the following:

- Priority Pollutant Metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc) using EPA Methods 6020 and 7470;
- VOCs using EPA Method 8260;
- SVOCs/PAHs using EPA Method 8270C/8270-SIM;
- Diesel- and heavy oil-range hydrocarbons using Ecology Method NWTPH-Dx (with silica gel/acid cleanup).
- Gasoline-range hydrocarbons using Ecology Method NWTPH-G;
- MTBE by EPA Method 8260B,
- EDB/EDC by EPA Method 8260B/8011,
- Orgaonchlorine pesticides (including carbaryl) using EPA Method 8081; and
- Herbicides using EPA Method 8151.

The specific analyses to be completed at each location (for groundwater and soil samples) is described in Table 8a of the Work Plan for the Remedial Investigation/Feasibility Study (RI/FS) and Interim Action at the Dakota Creek Industries (DCI) (GeoEngineers, 2008). The analytical results obtained during this RI will be used to identify the potential need for further remediation at the upland portion of the Site.

2.0 GENERAL SAMPLING PROCEDURES AND EQUIPMENT

This section specifies the field procedures, field quality assurance/quality control (QA/QC) protocol, and the chemical testing program to be implemented during the RI.

2.1 UNDERGROUND UTILITY LOCATE

Prior to drilling, an underground utility locate will be conducted in the area of the proposed boring locations to identify any subsurface utilities and/or potential underground physical hazards.

2.2 SURVEYING

During the RI, existing permanent or temporary benchmarks will be used to determine the elevation of explorations.

2.2.1 Vertical Controls

Each monitoring well casing rim and ground surface elevation will be surveyed by a professional land surveyor registered in Washington State. The surveyors will obtain only vertical control at the exploration locations. Ground surface elevations at each exploration location will be measured to the nearest 0.01-foot, and elevations will be reported relative to the City of Anacortes datum. Monitoring well casing rim elevations will be surveyed to the nearest 0.01-foot for all new and existing wells included in the sampling and monitoring program.

OR

Each monitoring well casing rim and ground surface elevation will be surveyed by GeoEngineers field personnel relative to the permanent benchmark. Elevations will be surveyed using a laser level, which has an accuracy of 0.01 feet. Elevations will be reported relative to the City of Anacortes datum.

2.2.2 Horizontal Controls

GeoEngineers field personnel will record the boring/monitoring well, test pit and surface water and sediment sampling locations, and other pertinent information, using hand-held Trimble GeoXT GPS units during sampling activities. GPS data collected in the field will be processed in the office using measurements from the nearest reference station to each collection point.

2.3 Direct Push Boring and Grab-sample Soil Sampling

Soil samples will be collected from borings advanced using direct-push drilling equipment. Continuous soil cores will be obtained from the direct-push borings using a 1.5-inch- or 3.25-inch-diameter split spoon sampler driven with a pneumatic hammer. The larger (3.25-inch-diameter) split spoon sampler will be used to complete the boring in which a monitoring well is to be constructed. Soil cuttings (unused soil core) from the borings will be placed in labeled 55-gallon drums. Drilling activities will be monitored continuously by a technical representative from GeoEngineers who will observe and classify the soil encountered and prepare detailed field notes.

Surface soil samples will be collected at the site using either a trowel or a hand auger. The sampling equipment will be decontaminated prior to the collection of each sample.

Soil samples obtained from the borings and the grab samples will be visually classified in general accordance with American Society of Testing and Materials (ASTM) D-2488. The samples also will be evaluated for the potential presence of hydrocarbon contamination using field screening techniques. Observations of soil and groundwater conditions and soil field screening results for each exploration will be included in a boring/soil sampling log.

Soil samples will be obtained from the direct-push borings and the grab sample locations and submitted for chemical analysis. Samples will be selected for analysis based on field screening results and/or sample depth relative to groundwater depth. Samples selected for analysis will be placed in containers provided by the analytical laboratory. Each sample container will be securely capped, labeled, and placed in a cooler with ice immediately upon collection.

2.4 Field Screening

Soil samples will be field screened for evidence of possible contamination. Field screening results will be recorded on the field logs, and the results will be used as a general guideline to delineate areas of possible contamination. Screening results will be used to aid in the selection of soil samples to be submitted for chemical analysis. The following screening methods will be used: (1) visual screening; (2) water sheen screening; (3) headspace vapor screening; and (4) magnet and acid. Field screening results are site- and location-specific. The results may vary with temperature, moisture content, soil type and chemical constituent.

Visual Screening. The soil will be observed for unusual color and stains and/or odor indicative of possible contamination.

Water Sheen Screening. This is a qualitative field screening method that can help identify the presence or absence of petroleum hydrocarbons. A portion of the soil sample will be placed in a pan containing distilled water. The water surface will be observed for signs of sheen. The following sheen classifications will be used:

Classification	Identifier	Description
No Sheen	(NS)	No visible sheen on the water surface
Slight Sheen	(SS)	Light, colorless, dull sheen; spread is irregular, not rapid; sheen dissipates rapidly
Moderate Sheen	(MS)	Light to heavy sheen; may have some color/iridescence; spread is irregular to flowing, may be rapid; few remaining areas of no sheen on the water surface
Heavy Sheen	(HS)	Heavy sheen with color/iridescence; spread is rapid; entire water surface may be covered with sheen

Headspace Vapor Screening. This is a semi-quantitative field screening method that can help identify the presence or absence of volatile chemicals. Volatile chemicals at this site are only anticipated in conjunction with residual oil. A portion of the soil sample is placed into a resealable plastic bag for headspace vapor screening. Ambient air will be captured in the bag; the bag will be sealed and then shaken gently to expose the soil to the air trapped in the bag. The bag will remain closed for approximately 5 minutes at ambient temperature before the headspace vapors are measured. Vapors present within the sample bag's headspace will be measured by inserting the probe of a photoionization detector (PID) through a small opening in the bag. A PID measures the concentration of organic vapors ionizable by a 10.6 electron volt (eV) lamp in parts per million (ppm) and quantifies organic vapor concentrations in the range between 0.1 ppm and 2,000 ppm (isobutylene equivalent) with an accuracy of 1 ppm between 0 ppm and 100 ppm. The maximum value on the instrument and the ambient air temperature will be recorded on the field log for each sample. The PID will be calibrated to 100 ppm isobutylene.

2.5 MONITORING WELL CONSTRUCTION AND DEVELOPMENT

Monitoring wells will be constructed by a Washington State licensed driller in compliance with State standards. Installation of the monitoring wells will be observed by a GeoEngineers field technician, who will maintain a detailed log of the materials and depths of the well. Monitoring wells will be installed to a depth approximately 10 feet below the groundwater table. The total depth of the monitoring wells is anticipated to be approximately 15 to 20 feet bgs.

Wells constructed in direct-push borings will be 2-inch-diameter PVC with 10- or 20-slot well screen. The top of the well screens will be located approximately 5 feet above measured groundwater level, or within 2 feet of the ground surface, whichever is deeper. The well screen intervals may be modified based on field screening results or variations in soil type. Medium sand will be placed in the borehole annulus surrounding the slotted portion of the well. A bentonite seal will be placed from the top of the sand to the bottom of the concrete surface completion. The surface completion for the groundwater monitoring wells will be a 2-foot by 2-foot concrete box that extends above the ground approximately 6 inches. A lockable "Thermos"-type cap will be installed in the top of the PVC well casing.

Each monitoring well will be developed to remove water introduced into the well during drilling (if any), stabilize the filter pack and formation materials surrounding the well screen, and restore the hydraulic connection between the well screen and the surrounding soil. The well screen will be gently surged with a decontaminated stainless steel bailer several times after installation. The removal rate and volume of groundwater removed will be recorded during well development procedures. Well development water will be obtained and stored temporarily on-site in 30-gallon or 55-gallon drums. The depth to water in the monitoring well will be measured prior to development.

2.6 GROUNDWATER SAMPLING

Groundwater levels will be measured in each monitoring well during each monitoring event. Groundwater levels will be measured to the nearest 0.01 foot using an electric water level indicator. The water levels will be measured relative to the casing rim elevations.

Groundwater samples will be obtained using low-flow/low-turbidity sampling techniques to minimize the suspension of sediment in groundwater samples. Groundwater samples will be obtained from monitoring wells using a peristaltic pump and disposable polyethylene tubing. Specifically, groundwater will be pumped at approximately 0.5 liter per minute using a peristaltic pump through tubing placed within the screened interval. A Horiba U-22 water quality measuring system (with flow-through-cell) will be used to monitor the following water quality parameters during purging: electrical conductivity, dissolved oxygen, pH, salinity, total dissolved solids, turbidity, oxidation-reduction potential and temperature. Ambient groundwater conditions will have been reached once these parameters vary by less than 10 percent on three consecutive measurements. The stabilized field measurements will be documented in the field log book (for subsequent use in the RI), and then groundwater samples will be obtained. Purge water will be stored in labeled 55-gallon drums for subsequent characterization. Section 6.8 addresses the disposition of investigation-derived waste such as purge water.

2.7 72-HOUR TIDAL STUDY

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 harbor. The data logger 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 72-hour 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 harbor 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 feet with a resolution of 0.01 feet.
4. Depth to water will also be measured from the top of the well casing to the nearest 0.01 feet with a manual electronic water level indicator. Depth-to-water level will be manually measure 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 harbor.

2.8 HYDRAULIC CONDUCTIVITY DETERMINATION

The groundwater hydraulic conductivity at the Site will be estimated using slug tests. Slug tests will be performed in all monitoring wells to identify the range of hydraulic conductivities present. Slug test can be performed prior to or following the 72-hour tidal study. The tests will be performed at a low tidal stage to minimize the interference of tidal fluctuations on the aquifer and the determination of the hydraulic conductivities.

Slug tests will be performed using a PVC slug rod, a down-hole pressure transducer as described above, and a water level indicator in general accordance with ASTM D 4044-96 (1999). The general procedure for conducting the slug tests in monitoring wells is summarized below:

1. At each monitoring well, the static depth of groundwater will be measure prior to placing the pressure transducer near the bottom of the well.
2. After stabilization of the groundwater level (from the displacement of the transducer) the slug rod will be lowered into the well until it is submerged in the water column.
3. The recovery of the perturbed water level will be monitored until it has returned to within 95 percent of the initial head indicated by the transducer prior to the introduction of the slug rod.
4. Once the water level has re-equilibrated, the slug rod will be quickly removed from the water column and the groundwater level will be monitored for recovery.
5. After the water level has recovered to within tolerance (95 percent) depth to groundwater will be manually measured again and the transducer will be removed and the well secured.

The slug test response data will be analyzed using the Bouwer and Rice Method (Bouwer and Rice 1976, Bouwer 1989).

2.9 Decontamination

Drilling and sampling equipment will be decontaminated using the procedures described in the QAPP.

2.10 Sample Handling

Sample handling procedures, including labeling, container and preservation requirements, and holding times are described in the QAPP.

2.11 Disposition Of Investigation-Derived Materials

2.11.1 Soil

Soil cuttings from borings completed during this study will be placed in labeled and sealed 55-gallon drums. The drums will be stored temporarily at a secure location pending receipt of analytical results and until appropriate disposal is identified.

2.11.2 Groundwater and Decontamination Water

Purge water removed from the monitoring wells and decontamination water generated during all sampling activities will be stored on-site in labeled 55-gallon drums. The drums will be stored temporarily at a secure location pending receipt of analytical results and until appropriate disposal is identified.

2.11.3 Disposition of Incidental Waste

Incidental waste generated during sampling activities includes items such as gloves, Tyvek suits, spent respirator cartridges, disposable bailers, plastic sheeting, paper towels and similar expended and discarded field supplies. These materials are considered de minimis and will be disposed of at local trash receptacle or county disposal facility.

3.0 QUALITY ASSURANCE PROJECT PLAN

This Quality Assurance Project Plan (QAPP) was developed for DCI upland RI exploration activities at the Site. The QAPP serves as the primary guide for the integration of quality assurance (QA) and quality control (QC) functions into project activities. The QAPP presents the objectives, procedures, organization, functional activities, and specific quality assurance and quality control activities designed to achieve data quality goals established for the project. This QAPP is based on guidelines specified in Washington Administrative Code (WAC) 173, Chapter 173-340 and Ecology guidance (February 2001).

Throughout the project, environmental measurements will be conducted to produce data that are scientifically valid, of known and acceptable quality, and meet established objectives. QA/QC procedures will be implemented so that precision, accuracy, representativeness, completeness, and comparability (PARCC) of data generated meet the specified data quality objectives.

3.1 PROJECT ORGANIZATION AND RESPONSIBILITY

Descriptions of the responsibilities, lines of authority and communication for the key positions to quality assurance and quality control are provided below. This organization facilitates the efficient production of project work, allows for an independent quality review, and permits resolution of any QA issues before submittal.

3.1.1 Project Leadership and Management

The Project Manager's duties consist of providing concise technical work statements for project tasks, selecting project team members, determining subcontractor participation, establishing budgets and schedules, adhering to budgets and schedules, providing technical oversight, and providing overall production and review of project deliverables. This person is also responsible to Port of Anacortes for fulfilling contractual and administrative control of the project. John Herzog is the Project Manager for activities at the Site.

3.1.2 Field Coordinator

The Field Coordinator is responsible for the daily management of activities in the field. Specific responsibilities include the following:

- Provides technical direction to the field staff.
- Develops schedules and allocates resources for field tasks.
- Coordinates data collection activities to be consistent with information requirements.
- Supervises the compilation of field data and laboratory analytical results.
- Assures that data are correctly and completely reported.
- Implements and oversees field sampling in accordance with project plans.
- Supervises field personnel.
- Coordinates work with on-site subcontractors.
- Schedules sample shipment with the analytical laboratory.
- Monitors that appropriate sampling, testing, and measurement procedures are followed.

- Coordinates the transfer of field data, sample tracking forms, and log books to the Project Manager for data reduction and validation.
- Participates in QA corrective actions as required.

The Field Coordinator for RI exploration activities at the Site is Victoria England.

3.1.3 Quality Assurance Leader

The GeoEngineers project Quality Assurance Leader is under the direction of John Herzog, who is responsible for the project's overall QA. The Project QA Leader is responsible for coordinating QA/QC activities as they relate to the acquisition of field data. The QA Leader has the following responsibilities:

- Serves as the official contact for laboratory data QA concerns.
- Responds to laboratory data, QA needs, resolves issues, and answers requests for guidance and assistance.
- Reviews the implementation of the QAPP and the adequacy of the data generated from a quality perspective.
- Maintains the authority to implement corrective actions as necessary.
- Reviews and approves the laboratory QA Plan.
- Evaluates the laboratory's final QA report for any condition that adversely impacts data generation.
- Ensures that appropriate sampling, testing, and analysis procedures are followed and that correct quality control checks are implemented.
- Monitors subcontractor compliance with data quality requirements.

The Project QA Leader is Victoria England of GeoEngineers.

3.1.4 Laboratory Management

The subcontracted laboratories conducting sample analyses for this project are required to obtain approval from the QA Leader before the initiation of sample analysis to assure that the laboratory QA plan complies with the project QA objectives. The Laboratory's QA Coordinator administers the Laboratory QA Plan and is responsible for quality control (QC). Specific responsibilities of this position include:

- Ensure implementation of the QA Plan.
- Serve as the laboratory point of contact.
- Activate corrective action for out-of-control events.
- Issue the final QA/QC report.
- Administer QA sample analysis.
- Comply with the specifications established in the project plans as related to laboratory services.
- Participate in QA audits and compliance inspections.

The chemical analytical laboratory Quality Assurance Coordinator is Sue Dunnihoo at Analytical Resources, Inc. in Tukwila, Washington.

3.1.5 Health and Safety

A site-specific health and safety plan (HASP) will be used for RI field activities and is presented in Appendix D. The Field Coordinator will be responsible for implementing the HASP during sampling activities. The Project Manager will discuss health and safety issues with the Field Coordinator on a routine basis during the completion of field activities.

The Field Coordinator will conduct a tailgate safety meeting each morning before beginning daily field activities. The Field Coordinator will terminate any work activities that do not comply with the HASP. Companies providing services for this project on a subcontracted basis will be responsible for developing and implementing their own HASP.

3.2 DATA QUALITY OBJECTIVES

The quality assurance objective for technical data is to collect environmental monitoring data of known, acceptable, and documentable quality. The QA objectives established for the project are:

- Implement the procedures outlined herein for field sampling, sample custody, equipment operation and calibration, laboratory analysis, and data reporting that will facilitate consistency and thoroughness of data generated.
- Achieve the acceptable level of confidence and quality required so that data generated are scientifically valid and of known and documented quality. This will be performed by establishing criteria for precision, accuracy, representativeness, completeness, and comparability, and by testing data against these criteria.

Specific data quality objectives (DQOs) to evaluate data quality and usability are provided in the sections below.

3.2.1 Analytes and Matrices of Concern

Samples of soil and groundwater will be collected during upland exploration activities. Table B-1 summarizes the sample matrices, analyses to be performed at the Site.

3.2.2 Detection Limits

Analytical methods have quantitative limitations at a given statistical level of confidence that are often expressed as the method detection limit (MDL). Individual instruments often can detect but not accurately quantify compounds at concentrations lower than the MDL, referred to as the instrument detection limit (IDL). Although results reported near the MDL or IDL provide insight to site conditions, quality assurance dictates that analytical methods achieve a consistently reliable level of detection known as the practical quantitation limit (PQL). The contract laboratory will provide numerical results for all analytes and report them as detected above the PQL or undetected at the PQL.

Achieving a stated detection limit for a given analyte is helpful in providing statistically useful data. Intended data uses, such as comparison to numerical criteria or risk assessments, typically dictate specific project target reporting limits (TRLs) necessary to fulfill stated objectives. Table 1 in the RI/FS/IA Work Plan report provides a list of specific TRLs based primarily on numerical criteria derived from *Cleanup Levels and Risk Calculations (CLARC) under the Model Toxics Control Act Cleanup Regulation, Version 3.1* found at http://www.ecy.wa.gov/programs/tcp/tools/CLARC_v_3.1/clarc_v_3_1.htm. Other criteria include State of Washington (WAC 173-201) and federal Ambient Water Quality Criteria (AWQC). The analytical methods and processes selected will provide PQLs less than the TDLs under ideal conditions.

However, the reporting limits presented in Table 1 are considered targets because several factors may influence final detection limits. First, moisture and other physical conditions of soil affect detection limits. Second, analytical procedures may require sample dilutions or other practices to accurately quantify a particular analyte at concentrations above the range of the instrument. The effect is that other analytes could be reported as undetected but at a value much higher than a specified TDL. Data users must be aware that high non-detect values, although correctly reported, can bias statistical summaries and careful interpretation is required to correctly characterize site conditions.

3.2.3 Precision

Precision is the measure of mutual agreement among replicate or duplicate measurements of an analyte from the same sample and applies to field duplicate or split samples, replicate analyses, and duplicate spiked environmental samples (matrix spike duplicates). The closer the measured values are to each other, the more precise the measurement process. Precision error may affect data usefulness. Good precision is indicative of relative consistency and comparability between different samples. Precision will be expressed as the relative percent difference (RPD) for spike sample comparisons of various matrices and field duplicate comparisons for water samples. This value is calculated by:

$$RPD(\%) = \frac{|D_1 - D_2|}{(D_1 + D_2)/2} X\ 100,$$

Where

D_1 = Concentration of analyte in sample.

D_2 = Concentration of analyte in duplicate sample.

The calculation applies to split samples, replicate analyses, duplicate spiked environmental samples (matrix spike duplicates), and laboratory control duplicates. The RPD will be calculated for samples and compared to the applicable criteria. Precision can also be expressed as the percent difference (%D) between replicate analyses. Persons performing the evaluation must review one or more pertinent documents (USEPA February 1994; USEPA 1986; or USEPA 1983) that address criteria exceedances and courses of action. Relative percent difference goals for this effort is 30 percent in water and 40 percent in soil for all analyses.

3.2.4 Accuracy

Accuracy is a measure of bias in the analytic process. The closer the measurement value is to the true value, the greater the accuracy. This measure is defined as the difference between the reported value versus the actual value and is often measured with the addition of a known compound to a sample. The amount of known compound reported in the sample, or percent recovery, assists in determining the performance of the analytical system in correctly quantifying the compounds of interest. Since most environmental data collected represent one point spatially and temporally rather than an average of values, accuracy plays a greater role than precision in assessing the results. In general, if the percent recovery is low, non-detect results may indicate that compounds of interest are not present when in fact these compounds are present. Detected compounds may be biased low or reported at a value less than actual environmental conditions. The reverse is true when recoveries are high. Non-detect values are considered accurate while detected results may be higher than the true value.

Accuracy will be expressed as the percent recovery of a surrogate compound (also know as "system monitoring compound"), a matrix spike result, or from a standard reference material where:

$$Recovery\,(\%) = \frac{Sample\ Result}{Spike\ Amount}\ X\ 100$$

Persons performing the evaluation must review one or more pertinent documents (USEPA February 1994; USEPA 1986; or USEPA 1983) that address criteria exceedances and courses of action. Accuracy criteria for surrogate spikes, matrix spikes, and laboratory control spikes are found in Table B-1 of this work plan.

3.2.5 Representativeness, Completeness and Comparability

Representativeness expresses the degree to which data accurately and precisely represent the actual site conditions. The determination of the representativeness of the data will be performed by completing the following:

- Comparing actual sampling procedures to those delineated within the SAP and this QAPP.
- Comparing analytical results of field duplicates to determine the variations in the analytical results.
- Invalidating nonrepresentative data or identifying data to be classified as questionable or qualitative. Only representative data will be used in subsequent data reduction, validation, and reporting activities.

Completeness establishes whether a sufficient amount of valid measurements were obtained to meet project objectives. The number of samples and results expected establishes the comparative basis for completeness. Completeness goals are 90 percent useable data for samples/analyses planned. If the completeness goal is not achieved an evaluation will be made to determine if the data are adequate to meet study objectives.

Comparability expresses the confidence with which one set of data can be compared to another. Although numeric goals do not exist for comparability, a statement on comparability will be prepared to determine overall usefulness of data sets, following the determination of both precision and accuracy.

3.2.6 Holding Times

Holding times are defined as the time between sample collection and extraction, sample collection and analysis, or sample extraction and analysis. Some analytical methods specify a holding time for analysis only. For many methods, holding times may be extended by sample preservation techniques in the field. If a sample exceeds a holding time, then the results may be biased low. For example, if the extraction holding time for volatile analysis of soil sample is exceeded, then the possibility exists that some of the organic constituents have volatilized from the sample or degraded. Results for that analysis will be qualified as estimated to indicate that the reported results may be lower than actual site conditions. Holding times are presented in Table B-2.

3.2.7 Blanks

According to the *National Functional Guidelines for Organic Data Review* (USEPA 1994), "The purpose of laboratory (or field) blank analysis is to determine the existence and magnitude of contamination resulting from laboratory (or field) activities. The criteria for evaluation of blanks apply to any blank associated with the samples (e.g., method blanks, instrument blanks, trip blanks, and equipment blanks)."

Trip blanks are placed with samples during shipment; method blanks are created during sample preparation and follow samples throughout the analysis process.

Analytical results for blanks will be interpreted in general accordance with *National Functional Guidelines for Organic Data Review* and professional judgment.

3.3 SAMPLE COLLECTION, HANDLING AND CUSTODY

3.3.1 Sampling Equipment Decontamination

The drilling equipment will be decontaminated before beginning each exploration using a hot-water pressure washer. Reusable sampling/monitoring equipment (trowels, split-spoons, hand augers, etc.) that comes in contact with soil or groundwater will be decontaminated before each use. Decontamination procedures for this equipment will consist of the following: (1) wash with nonphosphate detergent solution (Liqui-Nox and distilled water), (2) rinse with distilled water, and (3) place the decontaminated equipment on clean plastic sheeting or in a plastic bag. Field personnel will limit cross-contamination by changing gloves between sampling events. Wash water used to decontaminate the sampling equipment will be stored on-site in labeled 55-gallon drums for subsequent characterization and disposal.

In addition to the decontamination procedures described above, sampling equipment that has visible petroleum product staining will be decontaminated by steam cleaning and/or as follows:

- Wash with brush and Liqui-Nox soap.
- Rinse with potable water.
- Wash with ethyl-alcohol.
- Rinse with distilled water.

3.3.2 Sample Containers and Labeling

The Field Coordinator will establish field protocol to manage field sample collection, handling, and documentation. Soil samples obtained during this study will be placed in appropriate laboratory-prepared containers. Sample containers and preservatives are listed in Table B-2.

Sample containers will be labeled with the following information at the time of collection:

- project name and number,
- sample name, which will include a reference to depth if appropriate, and
- date and time of collection.

The sample collection activities will be noted in the field log books. The Field Coordinator will monitor consistency between the SAP, sample containers/labels, field log books, and the chain-of-custody.

3.3.3 Sample Storage

Samples will be placed in a cooler with "blue ice" immediately after they are collected. The objective of the cold storage will be to attain a sample temperature of 4 degrees Celsius. Holding times will be observed during sample storage. Holding times for the project analyses are summarized in Table B-2.

3.3.4 Sample Shipment

The samples will be transported and delivered to the analytical laboratory in the coolers. Field personnel will transport and hand-deliver samples that are being submitted to a local laboratory for analysis. Samples that are being submitted to an out-of-town laboratory for analysis will be transported by a commercial express mailing service on an overnight basis. The Field Coordinator will monitor that the shipping container (cooler) has been properly secured using clear plastic tape and custody seals.

3.3.5 Chain-of-Custody Records

Field personnel are responsible for the security of samples from the time the samples are taken until the samples have been received by the shipper or laboratory. A chain-of-custody (COC) form will be completed at the end of each field day for samples being shipped to the laboratory. Information to be included on the COC form includes:

- Project name and number.
- Sample identification number.
- Date and time of sampling.
- Sample matrix (soil, water, etc.) and number of containers from each sampling point, including preservatives used.
- Depth of subsurface soil sample.
- Analyses to be performed.
- Names of sampling personnel and transfer of custody acknowledgment spaces.
- Shipping information including shipping container number.

The original COC record will be signed by a member of the field team and bear a unique tracking number. Field personnel shall retain carbon copies and place the original and remaining copies in a plastic bag, taped to the inside lid of the cooler before sealing the container for shipment. This record will accompany the samples during transit by carrier to the laboratory.

3.3.6 Laboratory Custody Procedures

The laboratory will follow their standard operating procedures (SOPs) to document sample handling from time of receipt (sample log-in) to reporting. Documentation will include at a minimum, the analysts name or initial, time, and date.

3.3.7 Field Documentation

Field documentation provides important information about potential problems or special circumstances surrounding sample collection. Field personnel will maintain daily field logs while on-site. The field logs will be prepared on field report forms or in a bound logbook. Entries in the field logs and associated sample documentation forms will be made in waterproof ink, and corrections will consist of line-out deletions that are initialed and dated. Individual logbooks will become part of the project files at the conclusion of this field exploration.

At a minimum, the following information will be recorded during the collection of each sample:

- Sample location and description
- Site or sampling area sketch showing sample location and measured distances

- Sampler's name(s)
- Date and time of sample collection
- Designation of sample as composite or discrete
- Type of sample (soil or water)
- Type of sampling equipment used
- Field instrument readings
- Field observations and details that are pertinent to the integrity/condition of the samples (e.g., weather conditions, performance of the sampling equipment, sample depth control, sample disturbance, etc.)
- Preliminary sample descriptions (e.g., lithologies, noticeable odors, colors, field screening results)
- Sample preservation
- Shipping arrangements (overnight air bill number)
- Name of recipient laboratory

In addition to the sampling information, the following specific information also will be recorded in the field log for each day of sampling:

- Team members and their responsibilities
- Time of arrival/entry on Site and time of Site departure
- Other personnel present at the Site
- Summary of pertinent meetings or discussions with regulatory agency or contractor personnel
- Deviations from sampling plans, Site safety plans, and QAPP procedures
- Changes in personnel and responsibilities with reasons for the changes
- Levels of safety protection
- Calibration readings for any equipment used and equipment model and serial number

The handling, use, and maintenance of field log books are the field coordinator's responsibilities.

3.4 CALIBRATION PROCEDURES

3.4.1 Field Instrumentation

Equipment and instrumentation calibration facilitates accurate and reliable field measurements. Field and laboratory equipment used on the project will be calibrated and adjusted in general accordance with the manufacturer's recommendations. Methods and intervals of calibration and maintenance will be based on the type of equipment, stability characteristics, required accuracy, intended use, and environmental conditions. The basic calibration frequencies are described below.

The photo or flame-ionization detector (PID/FID) used for vapor measurements will be calibrated daily for site safety monitoring purposes in general accordance with the manufacturer's specifications. The calibration results will be recorded in the field logbook.

The Horiba U-22 water quality measuring system and Hach DR/2010 spectrophotometer used for measuring monitored natural attenuation parameters will be calibrated prior to each monitoring event in general accordance with the manufacturer's specifications. The calibration results will be recorded in the field report.

3.4.2 Laboratory Instrumentation

For analytical chemistry, calibration procedures will be performed in general accordance with the methods cited and laboratory standard operating procedures. Calibration documentation will be retained at the laboratory and readily available for a period of six months.

3.5 Data Reporting and Laboratory Deliverables

Laboratories will report data in formatted hardcopy and digital form. Analytical laboratory measurements will be recorded in standard formats that display, at a minimum, the field sample identification, the laboratory identification, reporting units, qualifiers, analytical method, analyte tested, analytical result, extraction and analysis dates, and detection limit (PQL only). Each sample delivery group will be accompanied by sample receipt forms and a case narrative identifying data quality issues. Laboratory electronic data deliverables (EDD) will be established by GeoEngineers, Inc., with the contract laboratory. Final results will be sent to the Project Manager.

Chromatograms will be provided for every sample analyzed using Ecology Method NWTPH-Dx. The laboratory will assure that the full height of all peaks appear on the chromatograms and that the same horizontal time scale is used to allow for comparisons to other chromatograms.

3.6 Internal Quality Control

3.6.1 Field Quality Control

Field QC samples serve as a control and check mechanism to monitor the consistency of sampling methods and the influence of off-site factors on environmental samples. Off-site factors include airborne volatile organic compounds and potable water used in drilling activities.

Equipment Rinsates

Equipment rinsates indicate if sampling equipment decontamination procedures are performed adequately between adjacent sampling locations. Cross contamination may occur if equipment is not thoroughly cleaned between samples. One equipment rinsate of a commonly used sampling apparatus (split spoon sampler, stainless steel spoons, etc.) will be collected during the field exploration activities. The rinsate will be collected after cleaning and decontaminating the sampling apparatus under normal operating conditions. A rinsate sample will be collected by pouring HPLC-grade water over the apparatus and into the sample containers. The rinsate will be collected between two sampling locations on the same day.

Field Duplicates

In addition to replicate analyses performed in the laboratory, field duplicates also serve as measures for precision. Under ideal field conditions, field duplicates (referred to as splits), are created when a volume of the sample matrix is thoroughly mixed, placed in separate containers, and identified as different samples. This tests both the precision and consistency of laboratory analytical procedures and methods, and the consistency of the sampling techniques used by field personnel.

One field duplicate will be collected during each groundwater monitoring event. Field duplicates will not be collected for other sample matrices.

Trip Blanks
Trip blanks accompany volatile organic analysis sample containers during shipment and sampling periods. Trip blanks will not be used for this project as volatiles are not being analyzed.

3.6.2 Laboratory Quality Control

Laboratory quality control procedures will be evaluated through a formal data validation process. The analytical laboratory will follow standard method procedures that include specified QC monitoring requirements. These requirements will vary by method but generally include:

- method blanks
- internal standards
- calibrations
- matrix spike/matrix spike duplicates (MS/MSD)
- laboratory control spikes/spike duplicates (LCS/LCSD)
- laboratory replicates or duplicates
- surrogate spikes

Laboratory Blanks
Laboratory procedures employ the use of several types of blanks but the most commonly used blank for QA/QC assessments are method blanks. Method blanks are laboratory quality control (QC) samples that consist of either a soil like material having undergone a contaminant destruction process or HPLC water. Method blanks are extracted and analyzed with each batch of environmental samples undergoing analysis. Method blanks are particularly useful during volatile analysis since volatile compounds can be transported in the laboratory through the vapor phase. If a substance is found in the method blank then one (or more) of the following occurred:

- Measurement apparatus or containers were not properly cleaned and contained contaminants.
- Reagents used in the process were contaminated with a substance(s) of interest.
- Contaminated analytical equipment was not properly cleaned.
- Volatile substances in the air with high solubility or affinities toward the sample matrix contaminated the samples during preparation or analysis.

It is difficult to determine which of the above scenarios took place if blank contamination occurs. However, it is assumed that the conditions that affected the blanks also likely affected the project samples. Given method blank results, validation rules assist in determining which substances in samples are considered “real,” and which ones are attributable to the analytical process. Furthermore, the guidelines state, “. . . there may be instances where little or no contamination was present in the associated blank, but qualification of the sample is deemed necessary. Contamination introduced through dilution water is one example.”

Calibrations
Several types of calibrations are used, depending on the method, to determine whether the methodology is ‘in control’ by verifying the linearity of the calibration curve and to assure that the sample results reflect accurate and precise measurements. The main calibrations used are initial calibrations, daily calibrations, and continuing calibration verification.

Matrix Spike/Matrix Spike Duplicates (MS/MSD)

Matrix spike/spike duplicate samples are used to assess influences or interferences caused by the physical or chemical properties of the sample itself. For example, extreme pH affects the results of SVOCs. Or, the presence of a particular compound may interfere with accurate quantitation of another analyte. MS/MSD data is reviewed in combination with other QC monitoring data to determine matrix effects. In some cases, matrix affects cannot be determined due to dilution and/or high levels of related substances in the sample. A matrix spike is evaluated by spiking a known amount of one or more of the target analytes ideally at a concentration of 5 to 10 times higher than the sample result. A percent recovery is calculated by subtracting the sample result from the spike result, dividing by the spiked amount, and multiplying by 100.

The samples for the MS and MSD analyses should be collected from a boring or sampling location that is believed to exhibit low-level contamination. A sample from an area of low-level contamination is needed because the objective of MS/MSD analyses is to determine the presence of matrix interferences, which can best be achieved with low levels of contaminants. Additional sample volume will be collected for these analyses. This MS/MSD sample will be a composite to achieve a level of representativeness and reproducibility in the data.

Laboratory Control Spikes/Spike Duplicates (LCS/LCSD)

Also known as blanks spikes, laboratory control spikes are similar to matrix spikes in that a known amount of one or more of the target analytes are spiked into a prepared media and a percent recovery of the spiked substances are calculated. The primary difference between a matrix spike and LCS is that the LCS spike media is considered "clean" or contaminant free. For example, HPLC water is typically used for LCS water analyses. The purpose of an LCS is to help assess the overall accuracy and precision of the analytical process including sample preparation, instrument performance, and analyst performance. LCS data must be reviewed in context with other controls to determine if out-of-control events occur.

Laboratory Replicates/Duplicates

Laboratories often utilize MS/MSDs, LCS/LCSDs, and/or replicates to assess precision. Replicates are a second analysis of a field collected environmental sample. Replicates can be split at varying stages of the sample preparation and analysis process, but most commonly occur as a second analysis on the extracted media.

Surrogate Spikes

The purposes of using a surrogate are to verify the accuracy of the instrument being used and extraction procedures. Surrogates are substances similar to, but not one of, the target analytes. A known concentration of surrogate is added to the sample and passed through the instrument, noting the surrogate recovery. Each surrogate used has an acceptable range of percent recovery. If a surrogate recovery is low, sample results may be biased low and depending on the recovery value, a possibility of false negatives may exist. Conversely, when recoveries are above the specified range of acceptance a possibility of false positives exist, although non-detected results are considered accurate.

3.7 DATA REDUCTION AND ASSESSMENT PROCEDURES

3.7.1 Data Reduction

Data reduction involves the conversion or transcription of field and analytical data to a useable format. The laboratory personnel will reduce the analytical data for review by the Quality Assurance Leader and Project Manager.

3.7.2 Field Measurement Evaluation

Field data will be reviewed at the end of each day by following the quality control checks outlined below and procedures in the SAP. Field data documentation will be checked against the applicable criteria as follows:

- Sample collection information.
- Field instrumentation and calibration.
- Sample collection protocol.
- Sample containers, preservation and volume.
- Field QC samples collected at the frequency specified.
- Sample documentation and chain of custody (COC) protocols.
- Sample shipment.

Cooler receipt forms and sample condition forms provided by the laboratory will be reviewed for out-of-control incidents. The final report will contain what effects, if any, an incident has on data quality. Sample collection information will be reviewed for correctness before inclusion in a final report.

3.7.3 Field Quality Control Evaluation

A field quality control evaluation will be conducted by reviewing field log books and daily reports, discussing field activities with staff, and reviewing field QC samples (trip blanks, equipment rinsates, and field duplicates). Trip blanks and equipment rinsates will be evaluated using the same criteria as method blanks.

Precision for field duplicate soil samples will not be evaluated because even a well mixed sample is not entirely homogenous due to sampling procedures, soil conditions, and contaminant transport mechanisms.

3.7.4 Laboratory Data Quality Control Evaluation

The laboratory data assessment will consist of a formal review of the following quality control parameters:

- Holding times
- Method blanks
- Matrix spike/spike duplicates
- Laboratory control spikes/spike duplicates
- Surrogate spikes
- Replicates

In addition to these quality control mechanisms, other documentation such as cooler receipt forms and case narratives will be reviewed to fully evaluate laboratory QA/QC.

TABLE B-1
MEASURMENT QUALITY OBJECTIVES
UPLAND RI/FS WORK PLAN,DAKOTA CREEK INDUSTRIES
ANACORTES, WASHINGTON

		Check Standard (LCS) %R Limits[2,3]		Matrix Spike (MS) %R Limits[3,4]		Surrogate Standards (SS) %R Limits 1,[2,3]	Duplicate Samples MSD or Lab Duplicate RPD Limits[4]		Field Duplicate Samples RPD Limits[4]	
Laboratory Analysis	Reference Method	Soil	Water	Soil	Water		Soil	Water	Soil	Water
Metals/Mercury	SW-846 6010/6020	80%-120%	80%-120%	75%-125%	75%-125%	NA	35%	20%	50%	35%
VOC	SW-846 8260B	30%-150%	30%-150%	50%-150%	50%-150%	50%-140%	35%	20%	50%	35%
SVOC	SW-846 8270C	30%-150%	40%-150%	50%-150%	50%-150%	20%-135%	35%	20%	50%	35%
PAHs	SW-846 8270SIM	30%-150%	40%-150%	50%-150%	50%-150%	20%-135%	35%	20%	50%	35%
PCDD/PCDF	SW-846 8290 or SW-846 1613B	50%-150%	50%-150%	50%-150%	50%-150%	50%-150%	35%	20%	50%	35%
Gasoline-range petroleum hydrocarbons	NWTPH-Gx	50%-150%	50%-150%	50%-150%	50%-150%	50%-150%	35%	20%	50%	35%
Diesel- and Heavy oil-range Hydrocarbons	NWTPH-Dx	50%-150%	50%-150%	50%-150%	50%-150%	50%-150%	35%	20%	50%	35%
Organochlorine Pesticides	SW-846 8081	30%-150%	40%-150%	50%-150%	50%-150%	20%-135%	35%	20%	50%	35%
Herbicides	SW-846 8151	50%-150%	50%-150%	50%-150%	50%-150%	50%-150%	35%	20%	50%	35%
Metals/Mercury	SW-846 6010/6020 SW-846 7470/7471	80%-120%	80%-120%	75%-125%	75%-125%	NA	35%	20%	50%	35%

Notes:

[1] Individual surrogate recoveries are compound specific

[2] Recovery Ranges are estimates. Actual ranges will be provided by the laboratory when contracted.

[3] Percent Recovery Limits are expressed as ranges based on laboratory control limits. Limits will vary for individual analytes

[4] RPD contol limits are only applicable if the concentration are greater than 5 times the method reporting limit (MRL). For results less than 5 times the MRL, the difference between the sample and duplicate must be less than 2X the MRL for soils and 1X the MRL for waters.

VOC = Volatile Organic Compounds
SVOC = Semivolatile Organic Compound
PCDD = Polychlorinated Dibenzo-p-dioxins
PCDF = Polychlorinated Dibenzofurans
LCS = Laboratory Control Sample
MS/MSD = Matrix Spike/Matrix Spike Duplicate
RPD = Relative Percent Difference
NA = Not Applicable

SEAT:\00\Working\050403700QAPP Table 1

TABLE B-2
SAMPLE CONTAINERS, PRESERVATION & HOLDING TIME
UPLAND RI/FS WORK PLAN, DAKOTA CREEK
ANACORTES, WASHINGTON

		Soil				Groundwater			
Analysis	Method	Minimum Sample Size	Sample Containers	Sample Preservation	Holding Times	Minimum Sample Size	Sample Containers	Sample Preservation	Holding Times
VOC	SW-846 8260B	--	--	--	--	120 mL	3 - 40 mL VOA Vials	HCl - pH<2	14 days preserved 7 days unpreserved
SVOC and PAHs	SW-846 8270C SW-846 8270SIM	100 g	4 or 8 oz glass widemouth with Teflon-lined lid	Cool 4°C	14 days to extraction, 40 days from extraction to analysis	1 L	1 liter amber glass with Teflon-lined lid	Cool 4°C	7 days to extraction 40 days from extraction to analysis
PCDD/PCDF	SW-846 8290 or	100 g	4 or 8 oz glass widemouth with Teflon-lined lid	Cool 4°C	30 days to extraction, 40 days from extraction to analysis	--	--	--	--
Herbicides	SW-846 8151	--	--	--	--	1 L	1 liter amber glass with Teflon-lined lid	Cool 4°C	7 days to extraction 40 days from extraction to analysis
Organochlorine Pesticides	SW-846 8081	--	--	--	--	1 L	1 liter amber glass with Teflon-lined lid	Cool 4°C	7 days to extraction 40 days from extraction to analysis
Diesel- and Heavy Oil-Range Hydrocarbons	NWTPH-Dx	100 g	8 or 16 oz amber glass wide-mouth with Teflon-lined lid	Cool 4°C	14 days to extraction, 40 days from extractiom to analysis	1 L	1 liter amber glass with Teflon-lined lid	Cool 4 C, HCl to pH < 2	14 days to extraction 40 days from extraction to analysis
Gas Range Hydrocarbons Gas Range Hydrocarbons/BETX	NWTPH-G NWTPH-Gx	100 g	4 or 8 oz glass widemouth with Teflon-lined lid	Cool 4°C	14 days	120 mL	3 - 40 mL VOA Vials	HCl - pH<2	14 days preserved 7 days unpreserved
Metals Mercury	SW-846 6010/6020 SW-846 7470/7471	100 g	4 or 8 oz glass widemouth with Teflon-lined lid	Cool 4°C	180 days/ 28 days for Mercury	500 mL	1 L poly bottle	HNO_3 - pH<2 (Dissolved metals preserved after filtration)	180 days (28 days for Mercury)

Note: Holding Times are based on elapsed time from date of collection

VOC = Volatile Organic Compounds
SVOC = Semivolatile Organic Compound
PCDD = Polychlorinated Dibenzo-p-dioxins
PCDF = Polychlorinated Dibenzofurans
HCl = Hydrochloric Acid
HNO_3 = Nitric Acid
oz = ounce
mL = milliliter
L = liter
g = gram

TABLE B-3
QUALITY CONTROL SAMPLES TYPE AND FREQUENCY
UPLAND RI/FS WORK PLAN, DAKOTA CREEK
ANACORTES, WASHINGTON

Parameter	Field QC			Laboratory QC			
	Field Duplicates	Equipment Rinsates	Trip Blanks	Method Blanks	LCS	MS / MSD	Lab Duplicates
VOCs	1/20 samples for each water matrix	1/matrix	1/cooler	1/batch	1/batch	1 set/batch	NA
SVOCs	1/20 samples for each water matrix	1/matrix	NA	1/batch	1/batch	1 set/batch	NA
PCDDs/PCDFs	1/20 samples for each water matrix	1/matrix	NA	1/batch	1/batch	1 set/batch	NA
Diesel Range Hydrocarbons	1/20 samples for each water matrix	1/matrix	NA	1/batch	1/batch	NA	1/batch
Gas Range Hydrocarbons	1/20 samples for each water matrix	1/matrix	NA	1/batch	1/batch	NA	1/batch
Metals/Mercury	1/20 samples for each water matrix	1/matrix	NA	1/batch	1/batch	1 MS/batch	1/batch

Note: An analytical lot or batch is defined as a group of samples taken through a preparation procedure and sharing a method blank, LCS, and MS/ MSD (or MS and lab duplicate). No more than 20 field samples can be contained in one batch.

LCS = Laboratory control sample
MS = Matrix spike sample
MSD = Matrix spike duplicate sample
VOC = Volatile organic compounds
SVOC = Semivolatile Organic Compound
PCDD = Polychlorinated dibenzo-p-dioxins
PCDF = Polychlorinated dibenzofurans

SEAT:\00\Working\Draft RI-FS Work Plan\514700600QAAP Table 3 (App B)

APPENDIX C

SAMPLING ANALYSIS PLAN/QUALITY ASSURANCE PROJECT PLAN, DAKOTA CREEK INDUSTRIES SHIPYARD FACILITY INTERIM ACTION SEDIMENT CHARACTERIZATION STUDY

APPENDIX C
SAMPLING AND ANALYSIS PLAN/
QUALITY ASSURANCE PROJECT PLAN
DAKOTA CREEK INDUSTRIES SHIPYARD FACILITY INTERIM ACTION
SEDIMENT CHARACTERIZATION STUDY

1.0 SAMPLING AND ANALYSIS APPROACH

The approach used to develop the Dakota Creek Industries (DCI) shipyard facility (Site) interim action sediment characterization study is based on the results of previous investigations at the Site and consultation with Ecology. The approach is based on the following Site conditions:

- The sediment located in the waterward half of the basin and the sediment located below the contact with native till in the nearshore half of the basin is suitable for open water disposal (as defined by the Dredge Material Management Program [DMMP]) and in-water beneficial use (as defined by the Sediment Management Standards [SMS]).
- The sediment located above the contact with native till in the nearshore half of the basin has the potential for adverse impacts to biological resources at the Site due to contaminants of concern (COCs) at concentrations greater than the SMS Sediment Quality Standards (SQS).
- Metals and/or semi-volatile organic compounds (SVOCs)/polycyclic aromatic hydrocarbons (PAHs) were identified as COC's (with concentrations greater than the SMS SQS) in surface sediments in the nearshore portion of the basin during the 1997, 2000 and 2002 studies (Otten Engineering 1997, Hart Crowser 2000 and Weston 2002). Individual PAH compounds and total high molecular weight PAHs (HPAHs) were detected at concentrations greater than the associated SMS SQS criteria in sediment samples collected from the nearshore portion of the basin (Hart Crowser 2000).
- Areas of sediment along the boundaries of the basin (identified as sediment management units SMU-1 through SMU-3) will remain in place after the redevelopment dredging is completed as shown on Figure 8 of the RI/FS/IA Work Plan report.
- Ecology has requested additional characterization for those areas where sediment will remain after the planned redevelopment dredging is completed.
- The area of sediment to the north of the mouth of the basin that will remain in place after dredging is completed has been adequately characterized during previously completed sediment studies and is suitable for open water disposal (as defined by the DMMP) and/or beneficial in-water use (as defined by the SMS). No additional characterization of sediment in this area is planned.

The sampling and analysis program (SAP) is based on the above known and interpreted Site conditions and focuses on further evaluation of the sediment within those areas of the basin that will be exposed to the water column after dredging is complete. The sample locations were selected to further evaluate areas that were identified as impacted during previously completed studies or to characterize areas that were not characterized (data gaps) during previous studies.

The program was developed based on consultation with Ecology and generally consists of the following:

- Seven surface samples and seven 5 feet cores will be collected from the sediment in the areas that will remain behind the planned retaining wall and on the east and west sides of the basin (SMU-1 through SMU-3). The sampling locations are shown on Figure 8 of the RI/FS/IA Work Plan report.

- Surface samples collected from sample locations G-1 through G-3, G-5 and G-7 (as shown on Figure 8) will be analyzed for the complete suite of SMS COCs, as shown in Table C-1 and C-2.
- Subsurface samples collected from 2 feet to 3 feet below the mudline from sample locations G-4 and G-6 (as shown on Figure 8) will be analyzed for the complete suite of SMS COCs, as shown in Table C-1 and C-2.
- The remaining surface and subsurface core samples will be archived in 1-feet intervals pending analytical results.
- The archived samples will be analyzed for the full suite of SMS COCs where surface and/or subsurface sample analytical results indicate concentrations of COCs greater than the associated SMS. These analyses will serve to characterize the vertical extent of potentially impacted sediment.
- Bioassay testing is not planned for this study.

As part of the interim action, sediment grab samples will be collected from the sediment located in each catch basin identified on the upland portion of the Site. Sediment samples will only be collected from catch basins where sufficient volume of sediment has accumulated. The catchbasin sediment grab samples will be analyzed for dioxins/furans in addition to the full suite of SMS COCs.

The SMS SQS/CSL criteria; recommended sample preparation methods/analytical methods; sediment sample volumes/containers for physical/chemical analyses; and storage temperatures and holding times are included as Table C-1 through Table C-4 of this SAP.

2.0 SAMPLE COLLECTION AND HANDLING

2.1 SEDIMENT SAMPLE COLLECTION – DCI BASIN

Surface sediment samples will be collected using a Van Veen sampler from a vessel outfitted for that purpose. Samples will be collected from the upper 10 cm of material at each sample location, as shown on Figure 8 of the RI/FS/IA Work Plan. Approximately 2 liters of material will be collected at each sampling location.

Subsurface samples will be collected and archived from each 1-feet interval, up to 5-feet below the mudline at each sample location. The subsurface sediment samples collected from locations G-1, G-2 and G-7 will be collected using 5 feet core samplers vibrated into the sediment from a vessel outfitted for that purpose. The subsurface sediment samples collected from locations G-3 through G-6 will be collected using a hollow-stem auger limited access drill rig that will be transported to the sample locations at low tide by barge. Approximately 2 liters of sediment will be collected and archived from each sampling interval at each sampling location.

Sample material will be collected using a stainless steel spoon and placed in a stainless steel bowl for homogenization by mixing prior to placement into sample containers. Portions of the sediment sample will be collected immediately upon sample extrusion, prior to homogenization, for total sulfides analysis.

2.2 Sediment Sample Collection – DCI Catch Basins

Grab samples will be collected from the sediment in each catch basin at the site. The grab samples will be collected using a stainless steel spoon or, where necessary, will be collected using a sampler attached to an extension arm to reach into deeper catch basins.

Catch basin sediment samples will also be homogenized prior to placement into sample containers. A discrete sample will be collected prior to homogenization for total sulfides analysis.

2.3 Equipment Decontamination

All equipment that will potentially contact sediment will be decontaminated before each use. Decontamination procedures will consist of the following:

- wash with non-phosphate detergent solution (Liqui-Nox and distilled water),
- triple rinse with distilled water, and
- storage of the decontaminated equipment on clean plastic sheeting or in a plastic bag pending subsequent use.

Field personnel will limit cross contamination by changing gloves between sampling events.

2.4 Field Documentation

The sample documentation will be recorded on the sample log sheet. In addition, field logs will be prepared on field report forms or in a bound logbook. Entries in the field logs and associated sample documentation forms will be made in waterproof ink. Individual logbooks will become part of the project files at the conclusion of this field exploration.

At a minimum, the following information will be recorded during the collection of each sample:

- Sample location and description, including sketch, measured distances, or coordinates.
- Sampler's name(s).
- Date and time of sample collection.
- Depth.
- Gross characteristics of the sediment.
  - Texture,
  - Color,
  - Biological structures,
  - Presence of debris.
- Field screening for evidence of petroleum hydrocarbon contamination.
  - Presence of sheen,
  - Odor,
  - Headspace vapor.
- Gross characteristics of the vertical profile.

    - Changes in material characteristics.
- Comments related to sample quality.
- Name of recipient laboratory.

The following information also will be recorded in the field log for each day of sampling:

- Team members and their responsibilities.
- Time of arrival/entry on Site and time of Site departure.
- Other personnel present at the Site.
- Summary of pertinent meetings or discussions with regulatory agency or contractor personnel.
- Deviations from sampling plans, Site safety plans, and QAPP procedures.
- Calibration readings for any equipment used and equipment model and serial number.

The handling, use and maintenance of field log books are the field coordinator's responsibilities.

2.5 NAVIGATION AND POSITIONING

The station locations will be determined using a handheld Global Positioning System (GPS) unit or the onboard GPS system on the sampling vessel and will be converted to latitude and longitude for use in the Sediment Quality database. Site maps accurately showing the locations of Site features, including piles and piers, have been created for the project area as part of project planning.

2.6 SAMPLE CONTAINERS AND LABELING

Field protocol will be established to manage field sample collection, handling and documentation. Sediment samples obtained during this study will be placed in appropriate laboratory-prepared containers. Sample containers and preservatives are listed in Table C-3.

Sample containers will be labeled with the following information at the time of collection:

- project name and number;
- sample name, which will include a reference to depth if appropriate; and
- date and time of collection.

The sample collection activities will be noted in the field log books. The Field Coordinator will monitor consistency between the SAP, sample containers/labels, field log books and the chain-of-custody.

2.7 SAMPLE STORAGE

Samples will be placed in a cooler with "blue ice" immediately after they are collected. Holding times will be observed during sample storage. Holding times for the project analyses are summarized in Table C-4.

2.8 SAMPLE SHIPMENT

The samples will be transported and delivered to the analytical laboratories in coolers. Field personnel will transport and deliver samples that are being submitted to a local laboratory for analysis. Samples that are being submitted to an out-of-town laboratory for analysis will be transported by a commercial express mailing service on an overnight basis. The shipping containers (coolers) will be properly secured using clear plastic tape and custody seals prior to shipment.

2.9 CHAIN-OF-CUSTODY RECORDS

Field personnel are responsible for the security of samples from the time the samples are collected until the samples have been received by the shipper or laboratory. A chain-of-custody form will be completed at the end of each field day for samples being shipped to the laboratory. Information to be included on the chain-of-custody form includes:

- Project name and number.
- Sample identification number.
- Date and time of sampling.
- Sample matrix (soil, water, etc.) and number of containers from each sampling point, including preservatives used.
- Depth of the sample.
- Analyses to be performed.
- Names of sampling personnel and transfer of custody acknowledgment spaces.
- Shipping information, including shipping container number.

The original chain-of-custody record will be signed by a member of the field team and bear a unique tracking number. Field personnel shall retain copies and place the original and remaining copies in a plastic bag, taped to the inside lid of the cooler before sealing the container for shipment. This record will accompany the samples during transit by carrier to the laboratory.

The laboratory will measure the temperature of the samples upon receipt. The temperature will be recorded on the chain-of-custody record.

2.10 FIELD INSTRUMENTATION

Proper calibration of equipment and instrumentation facilitates accurate and reliable field measurements. Field and laboratory equipment used on the project will be calibrated and adjusted in general accordance with the manufacturer's recommendations. Methods and intervals of calibration and maintenance will be based on the type of equipment, stability characteristics, required accuracy, intended use, and environmental conditions.

2.11 FIELD MEASUREMENT EVALUATION

Field data will be reviewed at the end of each day by following the quality control checks outlined below and procedures in the SAP. Field data documentation will be checked against the applicable criteria as follows:

- Sample collection information.
- Field instrumentation and calibration.
- Sample collection protocol.
- Sample containers, preservation and volume.

- Field QC samples collected at the frequency specified.
- Sample documentation and chain-of-custody protocols.
- Sample shipment.

2.12 HEALTH AND SAFETY

A Site-specific Health and Safety Plan (HASP) is presented in Appendix D of the Remedial Investigation/Feasibility Study/Interim Action (RI/FS/IA) Work Plan for the Site. GeoEngineers field staff will conduct a tailgate safety meeting each morning before beginning daily field activities. The field staff will terminate any work activities that do not comply with the HASP. Companies providing services for this project on a subcontracted basis will be responsible for developing and implementing their own HASP.

3.0 CHEMICAL ANALYTICAL PROGRAM

Ecology has identified areas of the basin that will require additional characterization as described above. This SAP outlines the proposed chemical analyses of the sediment that will remain after the planned dredging.

The surface sediment samples to be collected at sample locations G-1 through G-3, G-5 and G-7 and the subsurface sediment samples to be collected at sample locations G-4 and G- 6 (as shown on Figure 8) will be analyzed for the full suite of SMS COCs, as requested by Ecology.

The catchbasin sediment samples also will be analyzed for the full suite of SMS COCs.

3.1 SMS CHEMICALS OF CONCERN

Each surface sample will be submitted for analysis of the full suite of SMS COCs and SMS conventionals as described below:

- Metals using EPA 6000/7000 series methodology;
- Ionizable and nonionizable organic compounds (including SVOCs/PAHs) using EPA Method 8270 SIM;
- PCBs using EPA 8082 methodology; and
- Samples will also be analyzed for conventional parameters including total organic carbon, total solids, total volatile solids, ammonia, total sulfides, grain size.

Samples collected from 1 foot intervals in the cores will be archived pending the analytical results from the surface sediment samples.

Analyses for sediment conventional parameters and SMS COCs will be conducted in accordance with SMS/PSEP protocols. A list of analytes, preparation methods, cleanup methods, detection limits and analytical methods used for chemical analysis of marine sediments are summarized in Table C-2.

Sediment samples collected from the catch basins on the upland portion of the Site also will be submitted for analysis of the SMS COCs and SMS conventionals.

3.2 Interpretation of Chemical Analytical Data

Chemical analytical data obtained during this study will be evaluated relative to SMS criteria as shown on Table C-1.

4.0 QUALITY ASSURANCE PROJECT PLAN OVERVIEW - INTERIM ACTION SEDIMENT CHARACTERIZATION STUDY

4.1 General

This Quality Assurance Project Plan (QAPP) was developed for sediment exploration activities at the former DCI site. This QAPP also applies to the catch basin sediment collection activities to be completed on the upland portion of the site. This QAPP and the SAP provide the framework for completing the data collection and analytical phases of the project. The QAPP serves as the primary guide for the integration of quality assurance (QA) and quality control (QC) functions into project activities. The QAPP presents the objectives, procedures, organization, functional activities and specific quality assurance and quality control activities designed to achieve data quality goals established for the project. This QAPP is based on guidelines specified in the SMS of the WAC 173, Chapter 204-100 to 204-620 and the *Sediment and Sampling Analysis Plan Appendix, Guidance on the Development of Sediment Sampling and Analysis Plans Meeting the Requirements of the Sediment Management Standards — Chapter 173-204 WAC* (SAPA).

Environmental measurements will be conducted throughout the project to produce data that are scientifically valid, of known and acceptable quality and meet established objectives. QA/QC procedures will be implemented so that precision, accuracy, representativeness, completeness and comparability (PARCC) of data generated meet the specified data quality objectives.

This QAPP will be used during the following three stages of the Interim Action sediment investigation:

- Project Planning – to present the plans for project execution from a quality assurance viewpoint.
- Project Implementation – to act as a guide for quality assurance reviews and as the specifications for assessing the quality of data generated.
- Project Completion – to serve as a basis for determining whether the project has attained established goals.

4.2 Chemical Analytical Data Quality Objectives

4.2.1 General

The quality assurance objective for technical data is to collect environmental monitoring data of known, acceptable and documentable quality. The QA objectives established for the project are:

- Implement the procedures outlined herein for sample custody, equipment operation and calibration, laboratory analysis, and data reporting that will facilitate consistency and thoroughness of data generated.
- Achieve the acceptable level of confidence and quality required so that data generated are scientifically valid and of known and documented quality. This will be performed by establishing criteria for precision, accuracy, representativeness, completeness and comparability and by testing data against these criteria.

Specific data quality objectives (DQOs) to evaluate data quality and usability are provided in the sections below.

4.2.2 Detection Limits

Analytical methods have quantitative limitations at a given statistical level of confidence that are often expressed as the method detection limit (MDL). Individual instruments often can detect but not accurately quantify compounds at concentrations lower than the MDL, referred to as the instrument detection limit (IDL). Although results reported near the MDL or the IDL provide insight to Site conditions, quality assurance dictates that analytical methods achieve a consistently reliable level of detection known as the practical quantitation limit (PQL). The contract laboratory will provide numerical results for all analytes and report them as detected above the PQL or undetected at the PQL.

Sediment detection limits for this project were derived from SAPA. Achieving a stated practical quantitation limit for a given analyte is helpful in providing statistically useful data; however, the target practical quantitation limits presented in Table C-2 are only targets. The practical quantitation limits presented in Table C-2 are considered targets because several factors may influence final practical quantitation limits. First, moisture and other physical conditions of soil affect practical quantitation limits. Second, analytical procedures may require sample dilutions or other practices to accurately quantify a particular analyte at concentrations above the range of the instrument. The effect is that other analytes could be reported as undetected but at a value much higher than a specified TDL. High non-detect values, although correctly reported, can bias statistical summaries and careful interpretation is required to correctly characterize Site conditions.

4.2.3 Precision

Precision is the measure of mutual agreement among replicate or duplicate measurements of an analyte from the same sample and applies to field duplicate or split samples, replicate analyses and duplicate spiked environmental samples (matrix spike duplicates). The closer the measured values are to each other, the more precise the measurement process. Precision error may affect data usefulness. Good precision is indicative of relative consistency and comparability between different samples. Precision will be expressed as the relative percent difference (RPD) for spike sample comparisons of various matrices and field duplicate comparisons for water samples. This value is calculated by:

$$RPD(\%) = \frac{|D_1 - D_2|}{(D_1 + D_2)/2} \; X \; 100,$$

Where

D_1 = Concentration of analyte in sample

D_2 = Concentration of analyte in duplicate sample

The calculation applies to split samples, replicate analyses, duplicate spiked environmental samples (matrix spike duplicates) and laboratory control duplicates. The RPD will be calculated for samples and compared to the applicable criteria. Precision can also be expressed as the percent difference (%D) between replicate analyses. Evaluation of precision will be based on one or more pertinent documents (USEPA February 1994; USEPA 1986; or USEPA 1983) that address criteria exceedances and courses of action.

4.2.4 Accuracy

Accuracy is a measure of bias in the analytical process. The closer the measurement value is to the true value, the greater the accuracy. This measure is defined as the difference between the reported value versus the actual value and is often measured with the addition of a known compound to a sample. The amount of known compound reported in the sample, or percent recovery, assists in determining the performance of the analytical system in correctly quantifying the compounds of interest. Since most environmental data collected represent one point spatially and temporally rather than an average of values, accuracy plays a greater role than precision in assessing the results. In general, if the percent recovery is low, non-detect results may indicate that compounds of interest are not present when in fact these compounds are present. Detected compounds may be biased low or reported at a value less than actual environmental conditions. The reverse is true when recoveries are high. Non-detect values are considered accurate while detected results may be higher than the true value.

Accuracy will be expressed as the percent recovery of a surrogate compound (also known as "system monitoring compound"), a matrix spike result, or from a standard reference material where:

$$Recovery\ (\%) = \frac{Sample\ Result}{Spike\ Amount}\ X\ 100$$

The evaluation of accuracy will be based on one or more pertinent documents (USEPA February 1994; USEPA 1986; or USEPA 1983) that address criteria exceedances and courses of action.

4.3 Representativeness, Completeness and Comparability

Representativeness expresses the degree to which data accurately and precisely represent the actual Site conditions. The determination of the representativeness of the data will be performed by completing the following:

- Comparing actual sampling procedures to those delineated within the project SAP and QAPP.
- Comparing analytical results of field duplicates to determine the variations in the analytical results.
- Invalidating nonrepresentative data or identifying data to be classified as questionable or qualitative. Only representative data will be used in subsequent data reduction, validation, and reporting activities.

Completeness establishes whether a sufficient amount of valid measurements were obtained to meet project objectives. The number of samples and results expected establishes the comparative basis for completeness. Completeness goals are 90 percent useable data for samples/analyses planned. If the completeness goal is not achieved an evaluation will be made to determine if the data are adequate to meet study objectives.

Comparability expresses the confidence with which one set of data can be compared to another. Although numeric goals do not exist for comparability, a statement on comparability will be prepared to determine overall usefulness of data sets, following the determination of both precision and accuracy.

4.3.1 Holding Times

Holding times are defined as the time between sample collection and extraction, sample collection and analysis or sample extraction and analysis. Some analytical methods specify a holding time for analysis only. For many methods, holding times may be extended by sample preservation techniques in the field. If a sample exceeds a holding time, then the results may be biased low. For example, if the extraction holding time for volatile analysis of soil sample is exceeded, then the possibility exists that some of the organic constituents have volatilized from the sample or degraded. Results for that analysis will be qualified as estimated to indicate that the reported results may be lower than actual Site conditions. Holding times are presented in Table C-4.

4.3.2 Blanks

According to the *National Functional Guidelines for Organic Data Review* (USEPA 1994), "The purpose of laboratory (or field) blank analysis is to determine the existence and magnitude of contamination resulting from laboratory (or field) activities. The criteria for evaluation of blanks apply to any blank associated with the samples (e.g., method blanks, instrument blanks, trip blanks, and equipment blanks)." Trip blanks are placed with samples during shipment; method blanks are created during sample preparation and follow samples throughout the analysis process.

Analytical results for blanks will be interpreted in general accordance with *National Functional Guidelines for Organic Data Review* and professional judgment.

4.3.3 Laboratory Custody Procedures

The laboratory will follow their standard operating procedures (SOPs) to document sample handling from time of receipt (sample log-in) to reporting. Documentation will include at a minimum, the analysts name or initial, time and date.

4.3.4 Laboratory Calibration Procedures

For analytical chemistry, calibration procedures will be performed in general accordance with the methods cited and laboratory standard operating procedures. Calibration documentation will be retained at the laboratory and readily available for a period of six months.

4.3.5 Internal Quality Control

4.3.5.1 Trip Blanks

Trip blanks accompany volatile organic analysis sample containers during shipment and sampling periods. Trip blanks will accompany all sample shipments that include samples for analysis of volatile organics.

4.3.6 Laboratory Quality Control

Laboratory quality control procedures will be evaluated through a formal data validation process. The analytical laboratory will follow standard method procedures that include specified QC monitoring requirements. These requirements will vary by method but generally include:

- method blanks
- internal standards
- calibrations

- matrix spike/matrix spike duplicates (MS/MSD)
- laboratory control spikes/spike duplicates (LCS/LCSD)
- laboratory replicates or duplicates
- surrogate spikes

4.3.6.1 Laboratory Blanks

Laboratory procedures employ the use of several types of blanks but the most commonly used blank for QA/QC assessments are method blanks. Method blanks are laboratory QC samples that consist of either a soil-like material having undergone a contaminant destruction process or High Purity Liquid Chromatography (HPLC) water. Method blanks are extracted and analyzed with each batch of environmental samples undergoing analysis. Method blanks are particularly useful during volatile analysis since volatile compounds can be transported in the laboratory through the vapor phase. If a substance is found in the method blank then one (or more) of the following occurred:

- Measurement apparatus or containers were not properly cleaned and contained contaminants.
- Reagents used in the process were contaminated with a substance(s) of interest.
- Contaminated analytical equipment was not properly cleaned.
- Volatile substances in the air with high solubility or affinities toward the sample matrix contaminated the samples during preparation or analysis.

It is difficult to determine which of the above scenarios took place if blank contamination occurs. However, it is assumed that the conditions that affected the blanks also likely affected the project samples. Given method blank results, validation rules assist in determining which substances in samples are considered “real” and which ones are attributable to the analytical process. Furthermore, the guidelines state, “. . . there may be instances where little or no contamination was present in the associated blank, but qualification of the sample is deemed necessary. Contamination introduced through dilution water is one example.”

4.3.6.2 Calibrations

Several types of calibrations are used, depending on the method, to determine whether the methodology is “in control” by verifying the linearity of the calibration curve and to assure that the sample results reflect accurate and precise measurements. The main calibrations used are initial calibrations, daily calibrations, and continuing calibration verification.

4.3.6.3 Matrix Spike/Matrix Spike Duplicates (MS/MSD)

Matrix spike/matrix spike duplicate samples are used to assess influences or interferences caused by the physical or chemical properties of the sample itself. For example, extreme pH affects the results of SVOCs. Or, the presence of a particular compound may interfere with accurate quantitation of another analyte. MS/MSD data is reviewed in combination with other QC monitoring data to determine matrix effects. In some cases, matrix affects cannot be determined due to dilution and/or high levels of related substances in the sample. A matrix spike is evaluated by spiking a known amount of one or more of the target analytes ideally at a concentration of 5 to 10 times higher than the sample result. A percent recovery is calculated by subtracting the sample result from the spike result, dividing by the spiked amount and multiplying by 100.

The samples for the MS and MSD analyses should be collected from a boring or sampling location that is believed to exhibit low-level contamination. A sample from an area of low-level contamination is needed because the objective of MS/MSD analyses is to determine the presence of matrix interferences, which can best be achieved with low levels of contaminants. Additional sample volume will be collected for these analyses. This MS/MSD sample will be a composite to achieve a level of representativeness and reproducibility in the data.

4.3.6.4 Laboratory Control Spikes/Spike Duplicates (LCS/LCSD)

Also known as blanks spikes, laboratory control spikes are similar to matrix spikes in that a known amount of one or more of the target analytes are spiked into a prepared media and a percent recovery of the spiked substances are calculated. The primary difference between a MS and LCS is that the LCS spike media is considered "clean" or contaminant free. For example, HPLC water is typically used for LCS water analyses. The purpose of a LCS is to help assess the overall accuracy and precision of the analytical process, including sample preparation, instrument performance and analyst performance. LCS data must be reviewed in context with other controls to determine if out-of-control events occur.

4.3.6.5 Laboratory Replicates/Duplicates

Laboratories often utilize MS/MSDs, LCS/LCSDs and/or replicates to assess precision. Replicates are a second analysis of a field collected environmental sample. Replicates can be split at varying stages of the sample preparation and analysis process, but most commonly occur as a second analysis on the extracted media.

4.3.6.6 Surrogate Spikes

The purposes of using a surrogate are to verify the accuracy of the instrument being used and extraction procedures. Surrogates are substances similar to, but not one of, the target analytes. A known concentration of surrogate is added to the sample and passed through the instrument, noting the surrogate recovery. Each surrogate used has an acceptable range of percent recovery. If a surrogate recovery is low, sample results may be biased low and depending on the recovery value, a possibility of false negatives may exist. Conversely, when recoveries are above the specified range of acceptance a possibility of false positives exist, although non-detected results are considered accurate.

4.3.7 Chemical Data Reduction and Assessment Procedures

4.3.7.1 Data Reduction

Data reduction involves the conversion or transcription of field and analytical data to a useable format. The laboratory personnel will reduce the analytical data for review by the Quality Assurance Leader and Project Manager.

4.3.7.2 Laboratory Data Quality Control Evaluation

The laboratory data assessment will consist of a formal review of the following quality control parameters, utilizing criteria identified in previous sections of this QAPP:

- Holding times.
- Method blanks.
- Matrix spike/spike duplicates.
- Laboratory control spikes/spike duplicates.
- Surrogate spikes.
- Replicates.

Cooler receipt forms and sample condition forms provided by the laboratory will be reviewed for out-of-control incidents. The final report will contain what effects, if any, an incident has on data quality.

5.0 REPORT PREPARATION

5.1 CHEMICAL ANALYSES

Chemical analytical data will be reported in formatted hard copy and digital form. Analytical laboratory measurements will be recorded in standard formats that display, at a minimum, the field sample identification, the laboratory identification, reporting units, qualifiers, analytical method, analyte tested, analytical result, extraction and analysis dates, and detection limit (PQL only). Each sample delivery group will be accompanied by sample receipt forms and a case narrative identifying data quality issues. Laboratory electronic data deliverables (EDD) will be established by GeoEngineers, Inc., with the contract laboratory. Final results will be sent to the Project Manager.

Sediment sampling data for all required fields listed in the current version of SEDQUAL (Sediment Quality Information System) shall be submitted to Ecology electronically in SEDQUAL data entry templates including, but not limited to REFERENCE, SURVEY, STATION, SAMPLE, CHEMISTRY, BIOASSAY and BIOASSAY CONTROL. Station locations should include latitude/longitude coordinates in NAD83 HARN south zone feet and chemical concentration data should be reported in dry weight units.

Electronic SEDQUAL template data must be verified to be compatible with the current version of SEDQUAL which uses ASCII protocol, comma delimited text files prior to delivery to Ecology. Verification shall be conducted by the consultant importing each of the data templates into their SEDQUAL database, correcting any errors, and then exporting the corrected final templates for delivery to Ecology.

Sediment sampling data shall also be submitted to Ecology in hardcopy reports containing data tables in both dry weight and total organic carbon normalized units in comparison to applicable state regulatory criteria. Electronic SEDQUAL template data shall be submitted to Ecology simultaneously with the hardcopy report.

6.0 SCHEDULE AND DELIVERABLES

Field activities are currently scheduled to occur in late 2007/early 2008. The deliverables for this Interim Action sediment investigation will be integrated with the upland investigation sampling in conformance with the Agreed Order.

7.0 PROJECT MANAGEMENT AND TEAM

7.1 PROJECT ORGANIZATION AND RESPONSIBILITY

Descriptions of the responsibilities of key project personnel, lines of authority and communication for the key positions to quality assurance and quality control are provided below. This organization facilitates the efficient production of project work, allows for an independent quality review and permits resolution of any QA issues before submittal.

7.2 PROPERTY OWNER REPRESENTATION

Port of Anacortes is the owner of the Site and is the primary party in the Agreed Order for the Site. The Port has primary authority for this project and associated negotiations with Ecology.

7.3 ECOLOGY SITE REPRESENTATION

Ecology represents the State and has authority for negotiation and implementation of the Agreed Order. Ecology's project manager is Sandra Caldwell and Peter Adolphsen is Ecology's sediment specialist/advisor to the project.

7.4 GEOENGINEERS PROJECT LEADERSHIP AND MANAGEMENT

GeoEngineers is the primary consultant with responsibility for implementation of the activities and production of deliverables for the Agreed Order under the direction of the Port. The Project leadership and management for the sediment investigation are the same as described in the Upland Soil and Groundwater Quality Assurance Project Plan (QAPP) in Appendix A. Please refer to Appendix A for details regarding the Project personnel.

TABLE C-1

SMS[1] CHEMICAL EVALUATION CRITERIA

RI/FS INTERIM ACTION - SEDIMENT, DAKOTA CREEK INDUSTRIES
ANACORTES, WASHINGTON

Chemical	SMS Criteria	
	SQS	CSL
Conventionals		
Total Solids (%)	--	--
Total Volatile Solids (%)	--	--
Total Organic Carbon (%)	--	--
Ammonia (mg/kg)	--	--
Total Sulfides (mg/kg)	--	--
Metals[2]		
Antimony	--	--
Arsenic	57	93
Cadmium	5.1	6.7
Chromium	260	270
Copper	390	390
Lead	450	530
Mercury	0.41	0.59
Nickel	--	--
Selenium	--	--
Silver	6.1	6.1
Zinc	410	960
Organics		
LPAH[3]		
Total LPAH[4]	370	780
Acenaphthylene	66	66
Acenaphthene	16	57
Anthracene	220	1,200
Fluorene	23	79
Naphthalene	99	170
Phenanthrene	100	480
2-Methylnaphthalene	38	64
HPAH[3]		
Total HPAH[5]	960	5,300
Benzo(a)anthracene	110	270
Benzo(a)pyrene	99	210
Total Benzofluoranthenes	230	450
Benzo(g,h,i)perylene	31	78
Chrysene	110	460
Dibenzo(a,h)anthracene	12	33
Fluoranthene	160	1,200
Indeno(1,2,3-c,d)pyrene	34	88
Pyrene	1,000	1,400
Miscellaneous Extractables[3]		
Dibenzofuran	15	58
Hexachlorobutadiene	3.9	6.2
N-Nitrosodiphenylamine	11	11
Benzoic Acid	650	650
Benzyl Alcohol	57	73
Hexachloroethane	--	--

Notes appear on page 2

TABLE C-1

SMS[1] CHEMICAL EVALUATION CRITERIA

RI/FS INTERIM ACTION - SEDIMENT, DAKOTA CREEK INDUSTRIES

ANACORTES, WASHINGTON

Chemical	SMS Criteria	
	SQS	CSL
Chlorinated Hydrocarbons[3]		
Hexachlorobenzene	0.38	2.3
1,2-Dichlorobenzene	2.3	2.3
1,3-Dichlorobenzene	--	--
1,4-Dichlorobenzene	3.1	9
1,2,4-Trichlorobenzene	0.81	1.8
Phthalates[3]		
Bis(2-ethylhexyl)phthalate	47	78
Butyl benzyl phthalate	4.9	64
Diethyl phthalate	61	110
Dimethyl phthalate	53	53
Di-n-butyl phthalate	220	1,700
Di-n-octyl phthalate	58	4,500
PCBs[3]		
Total PCBs	12	65
Phenols[3]		
Pentachlorophenol	360	690
Phenol	420	1,200
2 Methylphenol	63	63
4 Methylphenol	670	670
2,4-Dimethylphenol	29	29

Notes:

[1]SMS = Sediment Management Standards.

[2] Dry weight results are reported as milligrams per kilogram (mg/kg).

[3] Dry weight results are micrograms per kilogram (ug/kg).

[4] Total LPAH = The sum of acenaphthylene, acenaphthene, anthracene, fluorene, naphthalene, and phenanthrene.

[5] Total HPAH = The sum of benzo(a)anthracene, benzo(a)pyrene, total benzofluoanthenes, benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene, fluoranthene, indeno(1,2,3,-c,d)pyrene, and pyrene.

SQS= Sediment quality standards

CSL = Cleanup screening level

LPAH = low molecular weight polynuclear aromatic hydrocarbon compounds

HPAH = high molecular weight polynuclear aromatic hydrocarbon compounds

Light shading indicates that the results are TOC normalized.

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TABLE C-2

RECOMMENDED SAMPLE PREPARATION METHODS, CLEANUP METHODS, ANALYTICAL METHODS AND PRACTICAL QUANTITATION LIMITS

RI/FS INTERIM ACTION - SEDIMENT, DAKOTA CREEK INDUSTRIES

ANACORTES, WASHINGTON

Chemical	Recommended Sample Preparation Methods[a]	Recommended Sample Cleanup Methods[b]	Recommended Analytical Methods[c]	Recommended Practical Quantitation Limits[d,e]
Metals (mg/kg dry weight)				
Antimony	PSEP/3050B	--	6010B/6020/B7041	50
Arsenic	PSEP/3050B	--	6010B/6020/7061A	19
Cadmium	PSEP/3050B	--	6010B/6020/7131A	1.7
Chromium	PSEP/3050B	--	6010B/6020/7191	87
Copper	PSEP/3050B	--	6010B/6020	130
Lead	PSEP/3050B	--	6010B/6020	150
Mercury	--f	--	7471A/245.5	0.14
Nickel	PSEP/3050B	--	6010B/6020	47
Silver	PSEP/3050B	--	6010B/6020	2
Zinc	PSEP/3050B	--	6010B/6020	137
Nonionizable Organic Compounds (µg/kg dry weight or as listed)				
LPAH Compounds				
Naphthalene	3540C/3550B/3545	3640A/3660B	8270C/1625C	700
Acenaphthylene	3540C/3550B/3545	3640A/3660B	8270C/1625C	433
Acenaphthene	3540C/3550B/3545	3640A/3660B	8270C/1625C	167
Fluorene	3540C/3550B/3545	3640A/3660B	8270C/1625C	180
Phenanthrene	3540C/3550B/3545	3640A/3660B	8270/1625C	500
Anthracene	3540C/3550B/3545	3640A/3660B	8270C/1625C	320
2-Methylnaphthalene	3540C/3550B/3545	3640A/3660B	8270C/1625C	223
HPAH Compounds				
Fluoranthene	3540C/3550B/3545	3640A/3660B	8270C/1625C	567
Pyrene	3540C/3550B/3545	3640A/3660B	8270C/1625C	867
Benz[a]anthracene	3540C/3550B/3545	3640A/3660B	8270C[h]/1625C	433
Chrysene	3540C/3550B/3545	3640A/3660B	8270C[h]/1625C	467
Total benzofluoranthenes[g]	3540C/3550B/3545	3640A/3660B	8270[h]/1625C	1067
Benzo[a]pyrene	3540C/3550B/3545	3640A/3660B	8270C[h]/1625C	533
Indeno[1,2,3-cd]pyrene	3540C/3550B/3545	3640A/3660B	8270C[h]/1625C	200
Dibenz[a,h]anthracene	3540C/3550B/3545	3640A/3660B	8270C[h]/1625C	77
Benzo[ghi]perylene	3540C/3550B/3545	3640A/3660B	8270C/1625C	223
Chlorinated Benzenes				
1,2-Dichlorobenzene	3540C/3550B/3545	3640A/3660B	8270C[h]/1625C	35
1,3-Dichlorobenzene	3540C/3550B/3545	3640A/3660B	8270C[h]/1625C	57
1,4-Dichlorobenzene	3540C/3550B/3545	3640A/3660B	8270C[h]/1625C	37
1,2,4-Trichlorobenzene	3540C/3550B/3545	3640A/3660B	8270C/[h]/1625C	31
Hexachlorobenzene	3540C/3550B/3545	3640A/3660B	8270C[h]/1625C	22

TABLE C-2
RECOMMENDED SAMPLE PREPARATION METHODS, CLEANUP METHODS, ANALYTICAL METHODS AND PRACTICAL QUANTITATION LIMITS
RI/FS INTERIM ACTION - SEDIMENT, DAKOTA CREEK INDUSTRIES
ANACORTES, WASHINGTON

Chemical	Recommended Sample Preparation Methods[a]	Recommended Sample Cleanup Methods[b]	Recommended Analytical Methods[c]	Recommended Practical Quantitation Limits[d,e]
Phthalate Esters				
Dimethyl phthalate	3540C/3550B/3545	3640A/3660B	8270C/1625C	24
Diethyl phthalate	3540C/3550B/3545	3640/A3660B	8270C/1625C	67
Di-n-butyl phthalate	3540C/3550B/3545	3640A/3660B	8270C/1625C	467
Butyl benzyl phthalate	3540C/3550B/3545	3640A/3660B	8270C/1625C	21
Bis[2-ethylhexyl] phthalate	3540C/3550B/3545	3640A/3660B	8270C/1625C	433
Di-n-octyl phthalate	3540C/3550B/3545	3640A/3660B	8270C/1625C	2067
Miscellaneous Extractable Compounds (µg/kg dry weight or as listed)				
Dibenzofuran	3540C/3550B/3545	3640A/3660B	8270C/1625C	180
Hexachlorobutadiene	3540C/3550B/3545	3640A/3660B	8270C/1625C	11
Hexachloroethane	3540C/3550B/3545	3640A/3660B	8270C/1625C	47
N-nitrosodiphenylamine	3540C/3550B/3545	3640A/3660B	8270C/1625C	28
PCBs				
PCB Aroclors®	3540/3550	3620B/3640A/3660B	8082	6
Ionizable Organic Compounds				
Phenol	3540C/3550B/3545	3640A/3660B	8270C/1625C	140
2-Methylphenol	3540C/3550B/3545	3640A/3660B	8270C/1625C	63
4-Methylphenol	3540C/3550B/3545	3640A/3660B	8270C/1625C	223
2,4-Dimethylphenol	3540C/3550B/3545	3640A/3660B	8270C/1625C	29
Pentachlorophenol	3540C/3550B/3545	3640A/3660B	8270C/1625C	120
Benzyl alcohol	3540C/3550B/3545	3640A/3660B	8270C/1625C	57
Benzoic acid	3540C/3550B/3545	3640A/3660B	8270C/1625C	217
Conventional Sediment Variables				
Ammonia	**--j**	--	Plumb (1981)	100 mg/L
Grain size	**--j**	--	Plumb (1981)	1%
Total solids	**--j**	--	PSEP	0.1% (wet wt)
Total organic carbon (TOC)	**--j**	--	9060	0.10%
Total sulfides	**--j**	--	Plumb (1981)/ 9030B	10 (mg/kg)
Acid Volatile Sulfides		--	AVS (U.S. EPA 1991)	10 (mg/kg)
Site Specific Compounds (µg/kg dry weight or as listed)				
Ammonia	**--j**	--	See above	100
Other potentially toxic metals (e.g., antimony, beryllium, nickel)	PSEP	--	See above	Sb 50, Ni 47
Organotin complexes			Bulk sediment: Krone Interstitial water: Krone (1989)	1-5 3 - 5 ug/L

TABLE C-2
RECOMMENDED SAMPLE PREPARATION METHODS, CLEANUP METHODS, ANALYTICAL METHODS AND PRACTICAL QUANTITATION LIMITS
RI/FS INTERIM ACTION - SEDIMENT, DAKOTA CREEK INDUSTRIES
ANACORTES, WASHINGTON

Chemical	Recommended Sample Preparation Methods[a]	Recommended Sample Cleanup Methods[b]	Recommended Analytical Methods[c]	Recommended Practical Quantitation Limits[d,e]
Pesticides, herbicides	3540C/3550B	3620B/3640A/3660B	8081A/8085/8151A	1.7-6.7
Petroleum compounds (e.g., benzene, toluene, ethylbenzene, xylene)	--	--	8021**B**/8260B/1624C	50
Total petroleum hydrocarbons	--	--	8440	20 mg/kg (gasoline), 50 mg/kg (#2 diesel)
			Ecology method - pub. 97-602 (1997)	100 mg/kg (lmotor oil) based on 100% solids
Polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (PCDDs/PCDFs)	--	--	1613	1 - 10 ng/kg
Guaiacols	3540C	--	NCASI Method CP – 86.02 Chlorinated Phenols	50-100
Resin acids	3540C (using acetone)	--	NCASI Method RA/FA 85.02	50-100
Radioactive substances, Explosive compounds	8330	--	8095/8330	250-2200 (method 8330)

TABLE C-2
RECOMMENDED SAMPLE PREPARATION METHODS, CLEANUP METHODS, ANALYTICAL METHODS AND PRACTICAL QUANTITATION LIMITS
RI/FS INTERIM ACTION - SEDIMENT, DAKOTA CREEK INDUSTRIES
ANACORTES, WASHINGTON

Note:

AVS - acid volatile sulfide

EPA - U.S. Environmental Protection Agency

GPC - gel permeation chromatography

HPAH - high molecular weight polycyclic aromatic hydrocarbon

LPAH - low molecular weight polycyclic aromatic hydrocarbon

PCB - polychlorinated biphenyl

PSEP - Puget Sound Estuary Program

TOC - total organic carbon

a Recommended sample preparation methods are:

-PSEP (1997a)

-Method 3050B and 3500 series - sample preparation methods from SW-846 (U.S. EPA 1996) and subjected to changes by EPA updates.

b Recommended sample cleanup methods are:

-Sample extracts subjected to GPC cleanup follow the procedures specified by EPA SW-846 Method 3640A. Special care should be used during GPC to minimize loss of analytes.

-If sulfur is present in the samples (as is common in most marine sediments), cleanup procedures specified by EPA SW-846 Method 3660B should be used.

-All PCB extracts should be subjected to sulfuric acid/permanganate cleanup as specified by EPA SW-846 Method 3665A.

-Additional cleanup procedures may be necessary on a sample-by-sample basis. Alternative cleanup procedures are described in PSEP (1997b) and U.S. EPA (1986).

c Recommended analytical methods are:

Method 6000, 7000, 8000, and 9000 series - analytical methods from SW-846 (U.S. EPA 1986) and updates

The SW-846 and updates are available from the web site at: http://www.epa.gov/epaoswer/hazwaste/test/sw846.htm

Method 1613 - analytical method from U.S. EPA-821/B-94-005 (1994)

Method 1624C/1625C - isotope dilution method (U.S. EPA 1989)

NCASI – analytical methods from the National Council for Air and Stream Improvement, Inc.

Plumb (1981) - U.S. EPA/U.S. Army Corps of Engineers Technical Report EPA/CE-81-1

PSEP (1986a)

Acid volatile sulfide method for sediment (U.S. EPA 1991).

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

To achieve the recommended practical quantitation limits for organic compounds, it may be necessary to use a larger sample size (approximately 100 g), a smaller final extract volume for gas chromatography/mass spectrometry analyses (0.5 mL), and one of the recommended sample cleanup methods as necessary to reduce interference, using different analytical methods with better sensitivity. Detection limits are on a dry-weight basis unless otherwise indicated. For sediment samples with low TOC, it may be necessary to achieve even lower detection limits for certain analytes in order to compare the TOC-normalized concentrations with applicable numerical criteria (see Table 1).

e The recommended practical quantitation limits are based on a value equal to one third of the 1988 dry weight lowest apparent effects threshold value (LAET, Barrick et al 1988) except for the following chemicals: 1,2-dichlorobenzene, 1,2,4-trichlorobenzene, hexachlorobenzene, hexachlorobutadiene, n-nitrosodiphenylamine, 2-methylphenol, 2,4-dimethylphenol, and benzyl alcohol, for which the recommended maximum detection limit is equal to the full value of the 1988 dry weight LAET.

f The sample digestion method for mercury is described in the analytical method (Method 7471A, September 1994).

g Total benzofluoranthenes represent the sum of the b, j, and k isomers.

h Selected ion monitoring may improve the sensitivity of method 8270C and is recommended in cases when detection limits must be lowered to human health criteria levels or when TOC levels elevate detection limits above ecological criteria levels. See PSEP organics chapter, appendix B–Guidance for Selected Ion Monitoring (1997b).

i Sample preparation methods for volatile organic compound analyses are described in the analytical methods.

j Sample preparation methods for sediment conventional analyses are described in the analytical methods.

TABLE C-3

MINIMUM SEDIMENT SAMPLE SIZES AND ACCEPTABLE CONTAINERS FOR PHYSICAL/CHEMICAL ANALYSES AND SEDIMENT TOXICITY TESTS

RI/FS INTERIM ACTION - SEDIMENT, DAKOTA CREEK INDUSTRIES
ANACORTES, WASHINGTON

Sample Type	Minimum Sample Size[a]	Container Type[b]
Physical/Chemical Analyses		
Grain size	100–150 g	P,G
Total solids	50 g	P,G
Total volatile solids	50 g	P,Gc
Total organic carbon	25 g	P,G
Ammonia	25 g	P,G
Total sulfides	50 g	P,Gc
Acid volatile sulfides	50 g	Gc
Oil and grease	100 g	G
Metals (except mercury)	50 g	P,G
Mercury	1 g	P,G
Methyl Mercury	100 g	G, Tc
Organotins	100 g	G (for bulk sediment) Pc, T (for interstitial t)
Semivolatile organic compounds	50–100 g	G
Toxicity Tests		
Marine		
Amphipod (Rhepoxynius abronius, Ampelisca abdita, or Eohaustorius estuarius)	0.25 L per replicate (1.25 L per station)	G
Bivalve larvae (Crassostrea gigas, Mytilus sp.)	200 g (wet weight) per station	G
Echinoderm larvae (Strongylocentrotus purpuratus, Strongylocentrotus droebachiensis, or Dendraster excentricus)	200 g (wet weight) per station	G
Juvenile polychaete (Neanthes sp.)	0.25 L per replicate (1.25 L per station)	G
Microtox® 100% porewater	0.5 L per station	G

TABLE C-3

MINIMUM SEDIMENT SAMPLE SIZES AND ACCEPTABLE CONTAINERS FOR PHYSICAL/CHEMICAL ANALYSES AND SEDIMENT TOXICITY TESTS

RI/FS INTERIM ACTION - SEDIMENT, DAKOTA CREEK INDUSTRIES
ANACORTES, WASHINGTON

Sample Type	Minimum Sample Size[a]	Container Type[b]
Freshwater		
Amphipod (Hyalella azteca)	0.1 L per replicate (0.8 L per station)	G
Midge (Chironomus tentans)	0.1 L per replicate (0.8 L per station)	G
Frog embryo (Xenopus laevis)	45 g (dry weight) per station	G
Microtox® 100% porewater	0.5 L per station	G

Notes:

[a] Recommended minimum field sample sizes (wet weight basis) for one laboratory analysis. If additional laboratory analyses are required (e.g., laboratory replicates, allowance for having to repeat an analysis), the field sample size should be increased accordingly. For some chemical analyses, smaller sample sizes may be used if comparable sensitivity can be obtained by adjusting instrumentation, extract volume, or other factors of the analysis.

[b] P - linear polyethylene; G - borosilicate glass; Pc – Polycarbonate; T - polytetrafluorethylene (PTFE, Teflon®)-lined cap.

[c] No headspace or air pockets should remain. If such samples are frozen in glass containers, breakage of the container is likely to occur.

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TABLE C-4
STORAGE TEMPERATURES AND MAXIMUM HOLDING TIMES FOR PHYSICAL/CHEMICAL ANALYSES AND SEDIMENT TOXICITY TESTS
RI/FS INTERIM ACTION - SEDIMENT, DAKOTA CREEK INDUSTRIES
ANACORTES, WASHINGTON

Sample Type	Sample Preservation Technique	Maximum Holding Time
Grain Size	Cool, 4°C	6 months
Total solids	Cool, 4°C	14 days
	Freeze, -18°C	6 months
Total volatile solids	Cool, 4°C	14 days
	Freeze, -18°C	6 months
Total organic carbon	Cool, 4°C	14 days
	Freeze, -18°C	6 months
Ammonia	Cool, 4°C	7 days
Total sulfides	Cool, 4°C, zero headspace required	7 days
	(a 250 ml sample for 5 ml of 2 N zinc acetate)	
Acid Volatile Sulfides	Cool, 4°C, zero headspace required	14 days
Oil and grease	Cool, 4°C (HCl)	28 days
	Freeze, -18°C (HCl)	6 months
Metals (except mercury)	Cool, 4°C	6 months
	Freeze, -18°C	2 years
Mercury	Freeze, -18°C	28 days
Methyl Mercury	Freeze, -18°C	28 days
Organotins	Cool, 4°C	14 days
after extraction	Freeze, -18°C	1 year
	(for interstitial water analysis, extract water prior to freezing)	40 days
	Cool, 4°C	
Semivolatile organic compounds; and PCBs	Cool, 4°C	14 days
after extraction	Freeze, -18°C	1 year
	Cool, 4°C	40 days
Sediment toxicity tests	Cool, 4°C	2 weeks[a]
	Cool, 4°C, nitrogen atmosphere	8 weeks[a]

Note:
HCl - hydrochloric acid
PCB - polychlorinated biphenyl
PCDD - polychlorinated dibenzo-p-dioxin
PCDF - polychlorinated dibenzofuran

[a] The PSEP (1995) protocols recommend a maximum holding time of 2 weeks, but recognize that it may be necessary under certain circumstances to extend the holding time to accommodate a tiered testing strategy in which chemical analyses are conducted prior to toxicity testing. The DMMP, for example, allows sediments to be stored in the dark in a nitrogen atmosphere at 4°C for up to 8 weeks.

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GeoEngineers

Appendix D

Health and Safety Plan

GEOENGINEERS, INC.
SITE HEALTH AND SAFETY PLAN CHECKLIST
DAKOTA CREEK INDUSTRIES GROUNDWATER, UPLAND SOIL AND SEDIMENT INVESTIGATION,
PORT OF ANACORTES

This checklist is to be used in conjunction with the GeoEngineers Safety Program Manual. Together, the program and this checklist constitute the site safety plan for this site. This plan is to be used by GeoEngineers personnel on this site. If the work entails potential exposures to other substances or unusual situations, additional safety and health information will be included and the plan will be approved by the GeoEngineers Health and Safety Manager. All plans are to be used in conjunction with current standards and policies outlined in the GeoEngineers Health and Safety Program Manual.

1.0 GENERAL PROJECT INFORMATION

Project Name:	Dakota Creek Industries Groundwater, Upland Soil and Sediment Investigation -
Project Number:	5147-006-00
Type of Project:	Groundwater, soil and sediment investigation
Start/Completion:	March 12/March 13, 2008 (for sediment investigation)
Subcontractors:	Marine Sampling Services, San Juan Enterprise, Inc., Analytical Resources, Inc.

Liability Clause - This Site Safety Plan is intended for use by GeoEngineers Employees only. It does not extend to the other contractors or subcontractors working on this site. If requested by subcontractors, this site safety plan may be used as a minimum guideline for those entities to develop safety plans or procedures for their own staff to work under. In this case, Form C-3 shall be signed by the subcontractor.

2.0 SCOPE OF WORK

The general scope of work is as follows:

1. ***Complete 7 sediment cores to collect sediment samples for SMS COC analyses***
2. ***Complete 16 borings including one monitoring well on the upland portion of the site.***
3. ***collect soil samples from the direct push soil borings***
4. ***Collect surface samples from 4 locations using a hand auger or trowel.***
4. ***Collect groundwater samples from 5 monitoring wells (after the newly installed well is developed).***
6. ***Collect sediment samples from catch basins on the upland portion of the property.***

3.0 PERSONNEL/CONTACT INFORMATION PHONE NUMBERS

TITLE	NAME	TELEPHONE NUMBERS
Site Safety and Health Supervisor	John Herzog	(206) 406-6431
Project Manager	John Herzog	(206) 406-6431

Health and Safety Program Manager	Leah Alcyon, CIH	(206) 728-2674
Field Engineer/Geologist	Tricia DeOme	(253) 267-2114
Field Engineer/Geologist	Amber Roesler	(503) 679-3656
Field Engineer/Geologist	Robert Trahan	(206) 240-2300
Client	Port of Anacortes	
Current Tenant	Dakota Creek Industries	

Site Safety and Health Supervisor -- The individual present at a hazardous waste site responsible to the employer and who has the authority and knowledge necessary to establish the site-specific health and safety plan and verify compliance with applicable safety and health requirements.

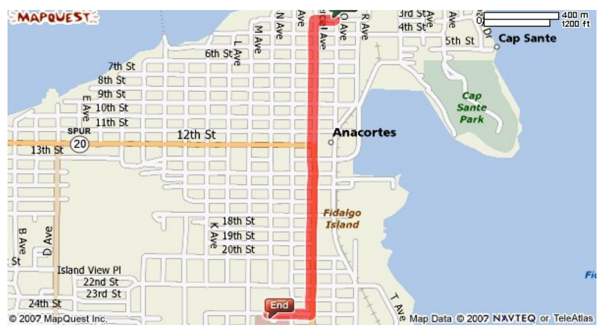
4.0 EMERGENCY INFORMATION

Hospital Name and Address:

Island Hospital
1211 24th Street
Anacortes, Washington
Phone: **(360) 299-1300**

Phone Numbers (Hospital ER):
Starting from:
Arriving at:
Distance:
Route to Hospital:

1. Head West on 3rd Street
2. Turn Left on Commercial Avenue.
3. Head South on Commercial Avenue for 21 blocks
4. Turn Right onto 24th Street



Ambulance:	9-1-1
Poison Control:	Seattle (206) 253-2121; Other (800) 732-6985
Police:	9-1-1
Fire:	9-1-1
Location of Nearest Telephone:	Cell phones are carried by field personnel.
Nearest Fire Extinguisher:	Located in the GEI vehicle on site.
Nearest First-Aid Kit:	Located in the GEI vehicle on site.

4.1 STANDARD EMERGENCY PROCEDURES

1. Get help -
   - send another worker to phone 911 (if necessary)
   - as soon as feasible, notify GeoEngineers' project manager
2. Reduce risk to injured person -
   - turn off equipment
   - move person from injury location (if possible)
   - keep person warm
   - perform CPR (if necessary)

3. Transport injured person to medical treatment facility (if necessary) -
   - by ambulance (if necessary) or GeoEngineers vehicle
   - stay with person at medical facility
   - keep GeoEngineers manager apprised of situation and notify human resources manager of situation

5.0 PERSONNEL TRAINING RECORDS

Name of Employee	Level of Training (24/ 40 hr)	Date of Last Training	HAZWOPER Supervisor Training	First Aid/ CPR	Respirator Fit Test

6.0 KNOWN (OR ANTICIPATED) HAZARDS

Note: A hazard assessment will be completed at every site prior to beginning field activities. Updates will be included in the daily log. This list is a summary of hazards listed on the form.

6.1 PHYSICAL HAZARDS

X	Drill rig
	Backhoe
	Trackhoe
	Crane
	Front End Loader
	Excavations/trenching (1:1 slopes for Type B soil)
	Shored/braced excavation if greater than 4 feet of depth
X	Overhead hazards/power lines (upland), sampling equipment (upland and over-water)
X	Tripping
X	Unusual traffic hazard – Site Traffic
X	Over-water hazards while sediment sampling (including falls, drowning)

6.2 PHYSICAL HAZARD MITIGATION MEASURES OR PROCEDURES

- Work areas will be marked with reflective cones, barricades and/or caution tape. Personnel will wear blaze orange vests for increased visibility by vehicle and equipment operators.
- Field personnel will be aware constantly of the location and motion of heavy equipment. A safe distance will be maintained between personnel and the equipment. Personnel will be visible to the operator at all times and will remain out of the swing and/or direction of the equipment apparatus. Personnel will approach operating heavy equipment only when they are certain the operator has indicated it is safe to do so.

- Heavy equipment and/or vehicles used on this site will not work within 20 feet of overhead utility lines without first ensuring that the lines are not energized. This distance may be reduced to 10 feet depending on the client and the use of a safety watch.
- Overhead Power Line Clearance Safety-Working equipment around overhead power lines requires distance and a spotter. Before a job begins, call the utility company and find out voltage in lines. Have the equipment de-energized if possible. Ensure that the equipment remains de-energized by using some type of lockout and tag procedure, and ensure that the electrician uses grounding lines when they are required.
- Keep a safe distance from energized parts which is a minimum of 10 feet for 50 kV and under. The minimum distance will be more for higher voltages (above 50kV). The only exception is for trained and qualified electrical workers using insulated tools designed for high voltage lines.
- Don't operate equipment around overhead power lines unless you are authorized and trained to do so. If an object (scaffolds, crane, etc.) must be moved in the area of overhead power lines, appoint a competent worker whose sole responsibility is to observe the clearance between the power lines and the object. Warn others if the minimum distance is not maintained.
- Never touch an overhead line if it has been brought down by machinery or has fallen. Never assume lines are dead. When a machine is in contact with an overhead line, DO NOT allow anyone to come near or touch the machine. Stay away from the machine and summon outside assistance. Never touch a person who is in contact with a live power line.
- If you are in a vehicle that is in contact with an overhead power line, DON'T LEAVE THE VEHICLE. As long as you stay inside and avoid touching metal on the vehicle, you may avoid an electrical hazard. If you need to get out to summon help or because of fire, jump out without touching any wires or the machine, keep your feet together, and hop to safety.
- When mechanical equipment is being operated near overhead power lines, employees standing on the ground may not contact the equipment unless it is located so that the required clearance cannot be violated even at the maximum reach of the equipment.
- When working near overhead power lines, the use of nonconductive wooden or fiberglass ladders is recommended. Aluminum ladders and metal scaffolds or frames are efficient conductors of electricity.
    - Avoid storing materials under or near overhead power lines.
- Personnel entry into unshored or unsloped excavations deeper than 4 feet is not allowed. Any trenching and shoring requirements will follow guidelines established in WAC 296-155, the Washington State Construction standards or OSHA 1926.651 Excavation Requirements. In the event that a worker is required to enter an excavation deeper than 4 feet, a trench box or other acceptable shoring will be employed or the side walls of the excavation will be sloped according to the soil type and guidelines as outlined in OSHA/WISHA regulations. If the shoring/sloping deviates from that outlined in the WAC, it will be designed and stamped by a PE. Prior to entry, personnel will conduct air monitoring as described later in this plan. All hazardous encumbrances and excavated material will be stockpiled at least 2 feet from the edge of a trench or open pit. If concentrations of volatile gases accumulate within an open trench or excavation, the means of entering shall adhere to confined space entry and air monitoring procedures outlined under the air monitoring recommendations in this plan and the GeoEngineers Safety Program Manual.

- Personnel will avoid tripping hazards, steep slopes, pit and other hazardous encumbrances. If it becomes necessary to work within 6 feet of the edge of a pit, slope, pier or other potentially hazardous area, appropriate fall protection measures will be implemented by the Site Safety and Health Supervisor in accordance with OSHA/WISHA regulations and the GEI Safety Program manual.
- Boat use will follow the GeoEngineers, Inc. Work Boat Use Policy. All employees will wear Coast Guard approved life jackets and there will be an emergency kit with flares available in the boat. A cell phone will also be in the boat. Cross Sound travel will be done only during daylight hours. The boat operator will be trained in safe boating practices.

Engineering controls:

____	Trench shoring (1:1 slope for Type B Soils)
____	Location work spaces upwind/wind direction monitoring
____	Other soil covers (as needed)
____	Other (specify)____

6.3 Chemical Hazards (potentially present at site)

Petroleum Hydrocarbons:

____	Naphthalenes or paraffins
X	Aromatic hydrocarbons (benzene, ethylbenzene, toluene, xylenes [BETX])
X	Gasoline
X	Diesel fuel
____	Waste oil
X	Other petroleum fuels (list) Heavy Oil

6.4 Hazards from Other Organic Compounds (present or potentially present at site)

____	Chlorinated hydrocarbons (Polychlorinated biphenyls) and PCE. Breakdown products of PCE have not been detected at the site.
X	PAHs (polycyclic aromatic hydrocarbons)
____	Pesticides/Herbicides
____	Other____

6.5 Metals (Potentially Present at Site)

____	Lead
____	Copper
____	Chromium
____	Zinc
____	Other metals (See known chemical characteristics in Site History)
X	Arsenic

Known chemical characteristics (maximum/average concentrations for routine monitoring):

	Soil Chemistry (mg/kg)	**Water Chemistry (µg/L)**
	________________	________________
	________________	________________

Summary of Petroleum Hazards

Compound/ Description	Exposure Limits/IDLH[b]	Exposure Routes	Toxic Characteristics[d]
Diesel Fuel—liquid with a characteristic odor	None established by OSHA, but ACGIH has adopted 100 mg/m^3 for a TWA (as total hydrocarbons)	Ingestion, inhalation, skin absorption, skin and eye contact	Irritated eyes, skin, and mucous membrane; fatigue; blurred vision; dizziness; slurred speech; confusion; convulsions; and headache, and dermatitis
Gasoline (Unleaded)—clear liquid with a characteristic odor	PEL 300 ppm TLV 300 ppm STEL 500 ppm	Ingestion, inhalation, skin absorption, skin and eye contact	Irritated eyes, skin, and mucous membrane; fatigue; blurred vision; dizziness; slurred speech; confusion; convulsions; and headache, and dermatitis
Mineral Oil – As a mist	The current OSHA PEL for mineral oil mist is 5 mg/m^3 of air as an 8-hr TWA	If the oil is not a mist, then route of exposure is skin and eye contact	Exposure to oil mists can cause eye, skin, and upper respiratory tract irritation
Mineral based crankcase oil – may contain metals, gas, antifreeze and PAHs	It depends on the contaminants	Ingestion, inhalation, skin absorption, skin and eye contact	It depends on the contaminants.

6.6 CHEMICAL HAZARD MITIGATION MEASURES OR PROCEDURES

Air monitoring will be conducted for flammable vapors and for establishing the level of respiratory protection.

- Half face combination organic vapor/HEPA or P100 cartridge respirators will be available on site to be used as necessary. P100 cartridges are to be used only if PID measurements are below the site action limit. P100 cartridges are used for protection against dust, metals and asbestos, while the combination organic vapor/HEPA cartridges are protective against both dust and vapor. Ensure that the PID or TLV will detect the chemicals of concern on site.
- Level D PPE will be worn at all times on site. Potentially exposed personnel will wash gloves, hands, face, and other pertinent items to prevent hand-to-mouth contact. This will be done prior to hand-to-mouth activities including eating, smoking, etc. Adequate personnel and equipment decontamination will be used to decrease potential ingestion and inhalation.Individual PELs or action limits are not expected to be exceeded given the planned activities. If there are waste oil contaminants in the soil and conditions are damp, airborne dust is not likely to be an issue. If

conditions are dry and dust is visible during site activities, personnel will use P100 cartridges on their respirators.

6.7 Biological Hazards

________	Poison Ivy or other vegetation	________
________	Insects or snakes	________
________	Used hypodermic needs or other infectious hazards	**Do not pick up or contact**
________	Others	________

6.8 Biological Hazard Mitigation Measures or Procedures

Site personnel shall avoid contact with or exposures to potential biological hazards encountered.

Additional Hazards ________________________________

6.9 Additional Hazards (Update in Daily Log)

Include evaluation of:

- *Physical Hazards* (excavations and shoring, equipment, traffic, tripping, heat stress, cold stress and others)
- *Chemical Hazards* (odors, spills, free product, airborne particulates and others present)
- *Biological Hazards* (snakes, spiders, other animals, discarded needles, poison ivy and others present)

7.0 LIST OF FIELD ACTIVITIES

Check the activities to be completed during the project

________	Site reconnaissance
X	Exploratory borings
________	Construction monitoring
________	Surveying
________	Test pit exploration
X	Monitor well installation
X	Monitor well development
X	Soil sample collection
X	Field screening of soil samples
X	Vapor measurements
X	Groundwater sampling
X	Groundwater depth and free product measurement
________	Product sample collection
________	Soil stockpile testing
________	Remedial excavation
________	Underground storage tank (UST) removal monitoring
________	Remediation system monitoring
________	Recovery of free product
X	Sediment sampling from catch basins
X	Sediment sampling from basin sediment from vessel outfitted for that purpose

8.0 SITE DESCRIPTION

8.1 SITE HISTORY:

Address/Location: 115 Q Avenue, Anacortes, WA

Site topography: Relatively flat

Predominant wind direction: Will be measured during site visits

Site drainage:

X Municipal drain

____ Surface water drainage – If so, direction of flow _________

X Engineered site drains

____ Other

Utility check complete: To be completed prior to drilling – see documentation Utility Checklist

Traffic or vehicle access control plans: NA

Site access control (exclusion zone) defined by: Yellow caution tape

____ Fence

____ Survey tape

____ Traffic cones

____ Other (traffic control barriers as required by the city)

Hot zone/exclusion zone (Define): ***Within 10 feet of borings***

This needs to be detailed for the site

Contamination reduction zone (Define): ***Decontamination will be set up and area will be delineated***

This needs to be detailed for the site

8.2 PERSONAL PROTECTIVE EQUIPMENT

8.2.1 Personal Protective Equipment (PPE)

Minimum level of protective equipment for these sites is Level D. After the initial and/or daily hazard assessment has been completed, select the appropriate protective gear (PPE) to preserve worker safety. Task-specific levels of PPE shall be reviewed with field personnel during the pre-work briefing conducted prior to the start of site operations.

Check applicable personal protection gear to be used:

__X__ Hardhat (if overhead hazards, or client requests)
__X__ Steel-toed boots (if crushing hazards are a potential or if client requests)
__X__ Safety glasses (if dust, particles, or other hazards are present or client requests)
__X__ Hearing protection (if it is difficult to carry on a conversation 3 feet away)
__X__ Rubber boots (if wet conditions)

Gloves (specify):

__X__ Nitrile
______ Latex
______ Liners
______ Leather
______ Other (specify) ______________________________

Protective clothing:

__X__ **Tyvek (if dry conditions are encountered, Tyvek is sufficient)**
______ Saranex (personnel shall use Saranex if liquids are handled or splash may be an issue)
__X__ Cotton
__X__ Rain gear (as needed)
__X__ Layered warm clothing (as needed)

Inhalation hazard protection:

__X__ Level D
______ Level C (respirators with organic vapor filters/ P100 filters)

8.2.1.1 Limitations of Protective Clothing

PPE clothing ensembles designated for use during site activities shall be selected to provide protection against known or anticipated hazards. However, no protective garment, glove, or boot is entirely chemical-resistant, nor does any PPE provide protection against all types of hazards. To obtain optimum performance from PPE, site personnel shall be trained in the proper use and inspection of PPE. This training shall include the following:

- Inspect PPE before and during use for imperfect seams, non-uniform coatings, tears, poorly functioning closures, or other defects. If the integrity of the PPE is compromised in any manner, proceed to the contamination reduction zone and replace the PPE.
- Inspect PPE during use for visible signs of chemical permeation such as swelling, discoloration, stiffness, brittleness, cracks, tears, or other signs of punctures. If the integrity of the PPE is compromised in any manner, proceed to the contamination reduction zone and replace the PPE.
- Disposable PPE should not be reused after breaks unless it has been properly decontaminated.

8.2.2 Respirator Selection, Use, and Maintenance

GeoEngineers has developed a written respiratory protection program in compliance with OSHA requirements contained in 29 CFR 1910.134. Site personnel shall be trained on the proper use, maintenance, and limitations of respirators. Site personnel that are required to wear respiratory protection shall be medically qualified to wear respiratory protection in accordance with 29 CFR 1910.134. Site personnel that will use a tight-fitting respirator must have passed a qualitative or quantitative fit test conducted in accordance with an OSHA-accepted fit test protocol. Fit testing must be repeated annually or whenever a new type of respirator is used.

8.2.3 Respirator Cartridges

If site personnel are required to wear air-purifying respirators, the appropriate cartridges shall be selected to protect personnel from known or anticipated site contaminants. The respirator/cartridge combination shall be certified and approved by NIOSH. A cartridge change-out schedule shall be developed based on known site contaminants, anticipated contaminant concentrations, and data supplied by the cartridge manufacturer related to the absorption capacity of the cartridge for specific contaminants. Site personnel shall be made aware of the cartridge change-out schedule prior to the initiation of site activities. Site personnel shall also be instructed to change respirator cartridges if they detect increased resistance during inhalation or detect vapor breakthrough by smell, taste, or feel although breakthrough is not an acceptable method of determining the change-out schedule. At a minimum, cartridges should be changed a minimum of once daily.

8.2.4 Respirator Inspection and Cleaning

The Site Safety and Health Supervisor shall periodically (i.e., weekly) inspect respirators at the project site. Site personnel shall inspect respirators prior to each use in accordance with the manufacturer's instructions. In addition, site personnel wearing a tight-fitting respirator shall perform a positive and negative pressure user seal check each time the respirator is donned to ensure proper fit and function. User seal checks shall be performed in accordance with the GeoEngineers respiratory protection program or the respirator manufacturer's instructions.

Respirators shall be hygienically cleaned as often as necessary to maintain the equipment in a sanitary condition. At a minimum, respirators shall be cleaned at the end of each work shift. Respirator cleaning procedures shall include an initial soap/water cleaning, a water rinse, a sanitizing soaking, and a final water rinse. One capful of bleach per one gallon of water can be used to create the sanitizing soak solution. When not in use, respirators shall be stored to protect against damage, hazardous chemicals, sunlight, dust, excessive temperatures, and excessive moisture. In addition, respirators shall be stored to prevent deformation of the face piece and exhalation valve.

8.2.5 Facial Hair and Corrective Lenses

Site personnel with facial hair that interferes with the sealing surface of a respirator shall not be permitted to wear respiratory protection or work in areas where respiratory protection is required. Normal eyeglasses cannot be worn under full-face respirators because the temple bars interfere with the sealing surface of the respirator. Site personnel requiring corrective lenses will be provided with spectacle inserts designed for use with full-face respirators. Contact lenses should not be worn with respiratory protection.

9.0 AIR MONITORING PLAN

Work upwind if at all possible.

Check instrumentation to be used:

______ TLV Monitor (flammability only, for methane and petroleum vapors)

______ PID (Photoionization Detector)

______ Other (i.e., detector tubes): ____

Check monitoring frequency/locations: and type (specify: work space, borehole, breathing zone):

______ **15 minutes - Continuous during soil disturbance activities or handling samples**

______ 15 minutes

______ 30 minutes

______ Hourly (in breathing zone during excavations, drilling, sampling)

Additional personal air monitoring for specific chemical exposure:

Action levels:

- The workspace will be monitored using a photoionization detector (PID). These instruments must be properly maintained, calibrated and charged (refer to the instrument manuals for details). Zero this meter in the same relative humidity as the area it will be used in and allow at least a 10-minute warm-up prior to zeroing. Do not zero in a contaminated area. The PID can be tuned to read chemicals specifically if there are not multiple contaminants on site. It can be tuned to detect one chemical with response factor entered into the equipment, but the PID picks up all volatile organic compounds (VOCs) present. Ionization potential (IP) of chemical has to be less than lamp (11.7/ 10.6eV) and PID does not detect methane. The ppm readout on the instrument is relative to the IP of isobutylene (calibration gas), so conversion must be made in order to estimate ppm of the chemical on-site.
- An initial vapor measurement survey of the site should be conducted to detect "hot spots" if contaminated soil is exposed at the surface. Vapor measurement surveys of the workspace should be conducted at least hourly or more often if persistent petroleum-related odors are detected. Additionally, if vapor concentrations exceed 5 ppm above background continuously for a 5-minute period as measured in the breathing zone, upgrade to Level C PPE or move to a noncontaminated area.
- If the workspace will be monitored using a TLV Sniffer, the TLV Sniffer is not consistently reliable in measuring vapor concentrations less than 400 ppm. Therefore, the TLV Sniffer should be used only as a warning indicator of high vapor concentrations. A PID is the preferred instrument and will be used if work with gasoline-contaminated soil is conducted.
- If the TLV Sniffer indicates greater than 1,000 ppm at the borehole or 600 ppm in the breathing zone, flammability may be a problem as well as indicating a health hazard. Stop work, move to a noncontaminated area and stabilize the situation. Continue work with caution, monitoring every 15 minutes.
- Standard industrial hygiene/safety procedure is to require that action be taken to reduce worker exposure to organic vapors when vapor concentrations exceed ½ the TLV. Because of the variety of chemicals, the PID will not indicate exposure to a specific PEL and is therefore not a preferred tool for determining worker exposure to chemicals. If odors are detected, then employees will upgrade to respirator with Organic Vapor cartridges and will contact the Health and Safety Program Manager for other sampling options.

Air Monitoring Action Levels

Contaminant	Activity	Monitoring Device	Frequency of Monitoring Breathing Zone	Action Level	Action
Organic Vapors	Environmental Remedial Actions	PID	Start of shift; prior to excavation entry; every 30 to 60 minutes and in event of odors	Background to 5 parts per million (ppm) in breathing zone	Use Level D or Modified Level D PPE

Contaminant	Activity	Monitoring Device	Frequency of Monitoring Breathing Zone	Action Level	Action
Organic Vapors	Environmental Remedial Actions	PID	Start of shift; prior to excavation entry; every 30 to 60 minutes and in event of odors	5 to 25 ppm in breathing zone	Upgrade to Level C PPE
Organic Vapors	Environmental Remedial Actions	PID	Start of shift; prior to excavation entry; every 30 to 60 minutes	>25 ppm in breathing zone	Stop work and evacuate the area. Contact Certified Industrial Hygienist (CIH) for guidance.
Combustible Atmosphere	Environmental Remedial Actions	PID/TLV	Start of shift; prior to excavation entry; every 30 to 60 minutes	<10% LEL or <1000 ppm	Depends on contaminant. The PEL is usually exceeded before the LEL.
Combustible Atmosphere	Environmental Remedial Actions	PID/TLV Or 4 gas meter	Start of shift; prior to excavation entry; every 30 to 60 minutes	>10% LEL or >1000 ppm	Stop work and evacuate the site. Contact CIH for guidance.
Oxygen Deficient/Enriched Atmosphere	Environmental Remedial Actions Confined Spaces	Oxygen meter Or 4 gas meter	Start of shift; prior to excavation entry; every 30 to 60 minutes	>19.5<23.5%	Continue work if inside range. If outside range, exit area and contact CIH.

10.0 DECONTAMINATION PROCEDURES

Decontamination consists of removing outer protective tyvek clothing and washing soiled boots and gloves using bucket and brush provided on-site in the contamination reduction zone. Inner gloves will then be removed, and respirator, hands and face will be washed in either a portable wash station or a bathroom facility in the support zone. Employees will perform decontamination procedures and wash prior to eating, drinking or leaving the site. ***Used PPE to be placed in on-site drum.***

Specify other site specific decontamination procedures:
Where is the water/ bathroom? Has the client provided the decon drum?

11.0 WASTE DISPOSAL OR STORAGE

PPE disposal (specify): To drums to be stored on-site pending characterization and disposal.

Drill cutting/excavated sediment disposal or storage:

______ On-site, pending analysis and further action
__x__ Secured (list method) Drums
______ Other (describe destination, responsible parties): ______

12.0 DOCUMENTATION EXPECTED TO BE COMPLETED

NOTE: The Field Log is to contain the following information:
Updates on hazard assessments, field decisions, conversations with subs, client or other parties.
Air monitoring/calibration results; personnel, locations monitored, activity at the time of monitoring

Actions taken
Action level for upgrading PPE and rationale
Meteorological conditions (temperature, wind direction, wind speed, humidity, rain, snow, etc.).

Required forms:

Field Log
Health and Safety Plan acknowledgment by GEI employees (Form C-2)
Contractors Health and Safety Plan Disclaimer (Form C-3)
Conditional forms available at GeoEngineers office: Accident Report (Form C-4)

13.0 APPROVALS

1.	Plan Prepared	______________________ Signature	____________ Date
2.	Plan Approval	______________________ PM Signature	____________ Date
3.	Health & Safety Officer	Leah Alcyon, CIH Health & Safety Program Manager	____________ Date

FORM C-1
HEALTH AND SAFETY MEETING
DAKOTA CREEK INDUSTRIES RI/FS/IA
5147-006-00

All personnel participating in this project must receive initial health and safety orientation. Thereafter, brief tailgate safety meetings will be held as deemed necessary by the Site Safety and Health Supervisor.

The orientation and the tailgate safety meetings shall include a discussion of emergency response, site communications and site hazards.

Date	Topics	Attendee	Company Name	Employee Initials

FORM C-2
SITE SAFETY PLAN – GEOENGINEERS' EMPLOYEE ACKNOWLEDGMENT
DAKOTA CREEK INDUSTRIES RI/FS/IA
5147-006-00

(All GeoEngineers' site workers complete this form, which should remain attached to the safety plan checklist and filed with other project documentation).

I, ____, do hereby verify that a copy of the current Safety Plan has been provided by GeoEngineers, Inc., for my review and personal use. I have read the document completely and acknowledge a full understanding of the safety procedures and protocol for my responsibilities on site. I agree to comply with all required, specified safety regulations and procedures. I understand that I will be informed immediately of any changes that would affect site personnel safety.

Signed ______________________________ Date ______________________

Range of Dates From: ______________________________
To: ______________________________

Signed ______________________________ Date ______________________

Range of Dates From: ______________________________
To: ______________________________

Signed ______________________________ Date ______________________

Range of Dates From: ______________________________
To: ______________________________

Signed ______________________________ Date ______________________

FORM C-3
SUBCONTRACTOR AND SITE VISITOR SITE SAFETY FORM
DAKOTA CREEK INDUSTRIES RI/FS/IA
5147-006-00

I, ____, verify that a copy of the current site Safety Plan has been provided by GeoEngineers, Inc. to inform me of the hazardous substances on site and to provide safety procedures and protocols that will be used by GeoEngineers' staff at the site. By signing below, I agree that the safety of my employees is the responsibility of the undersigned company.

Signed ______________________________ Date ______________________

Firm: ____

Signed ______________________________ Date ______________________

Firm: ____

Signed ______________________________ Date ______________________

Firm: ____

Signed ______________________________ Date ______________________

Firm: ____

Signed ______________________________ Date ______________________

Firm: ____

Signed ______________________________ Date ______________________

Firm: ____

GeoEngineers

Appendix E
Response To Ecology Comments Document

GEOENGINEERS

PLAZA 600 BUILDING, 600 STEWART STREET, SUITE 1700, SEATTLE, WA 98101, TELEPHONE: (206) 728-2674, FAX: (206) 728-2732 www.geoengineers.com

MEMORANDUM

TO: Sandra Caldwell, Panjini Balaraju, Ted Benson, Michelle Wilcox; Washington State Department of Ecology

FROM: Victoria R. England, John Herzog; GeoEngineers, Inc.

DATE: February 8, 2008

FILE: 5147-006-00

SUBJECT: Dakota Creek Industries Draft Work Plan – Response to Comments

The following is a summary of the response to comments submitted by the Washington State Department of Ecology (Ecology) regarding the "Draft Work Plan, Dakota Creek Industries Remedial Investigation/Feasibility Study and Interim Action Work Plan" dated January 2, 2008.

RESPONSE TO COMMENTS RECEIVED FROM TED BENSON:

1. The results of the analyses need to be reported to Ecology on corrected, error-checked Sedqual templates, so please place the following into the text in the sediments SAP:

   Sampling Data Submittal – Sediments

   "Sediment sampling ………. Electronic SEDQUAL template data shall be submitted to Ecology simultaneously with the hardcopy report."

Response: Text was added to page Appendix C-13, per comment.

2. Some of the notes on the page following Table C-2 are unreadable due to an apparent overlap of printing. Please rectify.

Response: This is corrected on Table C-2

3. In the main text there is a discrepancy between the table title and the table identification on the page footer (starts at Table 2). Please rectify.

Response: Table footer identifiers have been corrected

4. Dioxin. If the sediment that remains has a detection for dioxin, you should plan on removing it and disposing it at an upland location. Leaving it in place could serve as a source for recontamination due to mobilization from prop wash. However, dioxin policy is still forming, and this may change. Ecology is awaiting the area-wide characterization for Fidalgo Bay and Guemes Channel.

   Other than the above items, it looks like a very good approach. Undredged sediments will be characterized and if above CSL will be dredged and disposed upland. However, if only above SQS, the approach is not too clear. Since there is little to no sedimentation here, the sediments will not attenuate very much, and so will not have any natural recovery.

Response: Comment noted.

RESPONSE TO COMMENTS RECEIVED FROM PANJINI BALARAJU:

1. **General Comment**
   Overall the draft work plan is well written compiling all the previous investigations and cleanups. The information presented is easy to follow, especially the compilation of all the previous investigation results data tables, data gaps and comparison of concentrations to the preliminary cleanup levels. We commend GeoEngineer's effort in this regard.

Response to Comment: Noted

2. **General Comment**
   Contaminants of concern should also include MTBE, EDB and EDC (Table 830-1 parameters in MTCA). Soil and groundwater samples needs to be analyzed for these compounds also.

Response to Comment: Constituents added to the list of contaminants of concern for soil and groundwater and shown on page 12, 17 through 20, B-1, B-2. Groundwater samples and soil samples obtained from the proposed MW-5 soil boring will be submitted for analysis of these three volatile constituents.

3. **General Comment**
   Based on the TEE soil cleanup levels, there are exceedences of metals at few locations as shown on Figure 5c. Additional geoprobe borings need to be drilled to define the extent of contamination near DC-UPLD-SS-3, DC-UPLD-SS-2A, DC-UPLD-SS-1A, S-9-CPH-0 and DC-UPLD-SS-13A locations.

Response to Comment: Additional borings will be completed near DC-UPLD-SS-3, S-9-CPH-0, and DC-UPLD-13A. The area of the DCI site where samples DC-UPLD-SS-1A and DC-UPLD-SS-2A were collected is currently covered by a thick concrete pad; additional borings will not be completed near these two former samples locations. The following proposed sample locations will be added to Figure 5b.

- **DC-UPLD-SS-3: Soil borings SB-8 through SB-11 will be completed in this area. SB-8 will be completed at the former location of DC-UPLD-SS-3 because subsurface samples were not collected at this location. Soil borings SB-9 through 11 will surround SB-8 and will be completed approximately 25-feet from SB-8. Soil samples obtained from these additional borings will be submitted for analysis of zinc.**
- **S-9-CPH-0: Subsurface samples were collected at this location and metals detected at these locations did not exceed the MTCA TEE soil cleanup levels. Therefore, only surface soil samples will be collected at this area. SS-1 through SS-4 will surround the former S-9-CPH-0 sample locations and will be completed approximately 25-feet from S-9-CPH-0. Soil samples obtained from these additional borings will be submitted for analysis of zinc.**
- **DC-UPLD-13A. Soil borings SB-12 through SB-15 will be completed in this area. SB-8 will be completed at the former location of DC-UPLD-13A because subsurface samples were not collected at this location. Soil borings SB-13 through 15 will surround SB-12 and will be completed approximately 25-feet from SB-12. Soil samples obtained from these additional borings will be submitted for analysis of arsenic, copper, and zinc.**

4. **General Comment**
   Please add one more boring in the southern portion of the fill area (may be near S-5-EFA-0) to have a reasonable representation of the whole fill area for dioxins/furans.

Response to Comment: An additional boring was added near the former sampling location S-5-A

5. **General Comment**
   The work plan proposes to sample both inside and outside of the fill area for dioxins/furans, for concentration comparison. If outside soil sample results show any exceedenses, additional investigations may be needed all over the site to define the extent of dioxins/furans problems at the site.

Response to Comment: Samples will be collected for dioxins furans analysis from three borings located within the identified Earth Fill Area from fill material and from the native material located below the fill horizon. Two borings (SB-3 and SB-6) will be completed outside the estimated boundary of the Earth Fill Area to evaluate the lateral extent of the earth fill area based on soil conditions encountered during drilling. Soil samples will be collected and archived from these borings pending chemical analytical results.

6. **General Comment**
   The work plan proposes to use the direct contact cleanup levels for metals instead of soil to groundwater pathway values, since the groundwater monitoring results show no metals contamination (except arsenic in MW-4). We concur with this proposal, however, the TEE cleanup levels should also be considered in developing the preliminary cleanup levels for the site. A more stringent of the direct contact and/or TEE values should be selected as preliminary soil cleanup levels. In addition, more justification should be included in the work plan for not considering the soil to groundwater pathway cleanup levels based on the Empirical demonstration. Nonetheless, additional monitoring will be required to assure no groundwater contamination with metals.

Response to Comment: The text was changed to indicate that the TEE cleanup levels will be considered in developing the preliminary cleanup levels for the site.

7. **General Comment**
   The work plan proposes to install one-inch diameter well (one-inch diameter wells are not common). Since all the existing monitoring wells (MW-1 through MW-4) are of two-inch diameter, the proposed new well MW-5 should also be installed as a two-inch diameter well.

Response to Comment: The proposed well will be installed as a 2-inch diameter will. The text has been changed accordingly.

8. Page 25, Section 5.5, Screening of Cleanup Alternatives
   Paragraph 3: Since it is a MTCA site, delete reference to CERCLA RI/FS guidance. Instead, please cite WAC 173-340-350 (Remedial Investigations/Feasibility Study).

Response to Comment: Text changed as noted.

9. Appendix B, Table B-1, Measurement Quality Objectives
   The lower range percentage recovery value of 30% seems to be too low. After an analytical laboratory is selected, please send us a copy of the laboratory specific QA/QC plan for our review.

Response to Comment: Noted – we will send a copy of the laboratory specific QA/QC plan when a laboratory is selected.