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Draft Technical Memorandum

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From: Dean Malte; Ty Schreiner

Subject: Duwamish Fill Site (CSID 77)
Site Status and Historical Review Summary
K/J 1696059*00

This Technical Memorandum presents a summary of historical uses, previous environmental investigations and existing data, current status, and additional potential data needs for the Duwamish Fill Site (Site).

This summary is based on the following information sources:

- Reports, correspondence, analytical data, and other information included in the Site file materials maintained by the Washington State Department of Ecology (Ecology).

- Historical aerial photographs obtained from the Washington State Department of Natural Resources (DNR) (1951, 1959, 1961, 1965, 1970, 1974, 1978, 1982, 1985, 1988, 1992, 1996) and Quantum Spatial of Anchorage, Alaska (1946, 1967), and viewed online at the King County iMAP website (http://gismaps.kingcounty.gov/iMap/) (1936, 1992, 2000, 2002, 2005, 2007, 2009, 2012, 2013, 2015) and Google Earth (1990, 2002-2007, 2009-2016). Representative historical aerial photographs are included in Attachment 1.

Overview

The Site is located in the city of Tukwila, Washington (Figure 1), and is approximately 8 acres in size. The Site is bounded to the west by Tukwila International Boulevard (TIB; aka Highway 99), to the east by an onramp to northbound Highway 599, and to the north by an onramp to southbound Highway 599. TIB and the northbound Highway 599 onramp intersect near the southern end of the Site.

The Site is currently undeveloped and mostly covered with vegetation including trees and brush. The Site includes an “upper area” (defined as the southern portion; approximately 3 acres) and a “lower area” (defined as the northern portion; approximately 5 acres) with an elevation difference between the upper area and lower area of approximately 40 feet (refer to Figure 2). A topographic ridge is used to determine the boundary between the two areas. (Note: The designations of *upper area* and *lower area* are used throughout this Technical Memorandum.) The upper area is accessed from TIB and is covered with thick vegetation except for several small clearings located at and north of the southern access point. The lower area is separated

from the upper area, and from the roadways to the east and west, by steep embankments; it is entirely covered with vegetation with the best access from the onramp to the north. In general, the lower area is a shallow depression with a wetland area located in its western portion.

The Site was used by the Washington State Department of Transportation (WSDOT) as a landfill for street cleaning waste beginning in the early 1970s and continuing through the early 1990s. The WSDOT wastes primarily included street sweepings and sludge from regular street maintenance, but also may have included spill cleanup materials. The WSDOT wastes were typically placed in stockpiles and subsequently spread out over the ground surface. In addition, several 55-gallon drums possibly containing residual paint, asphalt patch material, or ethylene glycol were reportedly placed at the Site on the bank between the upper and lower areas [United States Environmental Protection Agency (USEPA), 1990; location shown on Figure 2]. A work plan for assessment of the drums was included in Ecology's records (Hart-Crowser 1990), but it does not appear that the work was performed.

Prior to placement of the WSDOT waste, the Site was used as farmland which was covered in 1965 when Highway 599 was constructed (see Site History below).

The WSDOT wastes are the primary suspected source of environmental contaminants at the Site. The primary contaminants of potential concern (COPCs) include metals and carcinogenic polycyclic aromatic hydrocarbons (cPAHs), with other potential COPCs including total petroleum hydrocarbons (TPH), volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs) and pesticides, and semi-volatile organic compounds (SVOCs) (see Historical Sampling and Analysis below).

Site History – Aerial Photograph Summary

This section provides a summary of Site development history based on historical aerial photographs; copies of select historical aerials are included in Attachment 1.

Prior to 1965, the lower area of the Site was used as farmland. Aerial photographs from 1936, 1946, 1951, 1959, and 1961 show flat, cultivated fields covering most of the lower portion of the Site. The fields include the area of the existing wetland, which does not appear to have been present at the time. Linear features which may be irrigation ditches are visible around the perimeter of the fields on the 1946 photograph. The embankment separating the upper and lower areas of the Site is visible on the pre-1965 aerial photographs and is covered with trees and other vegetation.

The upper area of the Site appears undeveloped on the 1936 and 1946 photographs. A roadway with several small structures, possibly residences, is visible in the upper area on the 1951, 1959, and 1961 photographs. Several of the residences appear to have been located on

the southern portion of the upper area of the Site. In addition, what appears to be an automotive service facility is visible on the 1951 (under construction), 1959, and 1961 photographs at the southern end of the Site. Most of the area covered by this facility is located south of the Site (current location of the Highway 599 onramp and gravel median) but appears to have included the southernmost portion of the upper area of the Site.

The 1965 aerial photograph shows extensive modifications to the Site and adjoining areas related to construction of Highway 599 and associated ramps. The residences and automotive service facility visible on earlier photographs have been removed. Fill materials appear to have been placed over most of the Site, except the central portion of the lower area. Fill was placed beneath the Highway 599 ramps north and east of the Site, and beneath a construction access road visible along the western margin of the Site, east of TIB. Standing water may be present in the central portion of the lower area. Fill material also appears to have been placed in the upper area of the Site. Most of the vegetation visible on earlier photographs has been removed or covered with fill. The onramp located east of the Site was constructed on an elevated berm, creating a steep embankment between the roadway and the lower area of the Site.

The completed Highway 599 roadway and ramps are visible and in use on the 1967 aerial photograph. Standing water appears to be present in the lower area at the approximate location of the existing wetland, which appears to have been established after placement of the construction-related fill. Two ditches are visible in the upper area, and both bisect the construction access road. The ditches appear to convey surface water runoff. The northern ditch is aligned with a similarly-sized ditch located across TIB to the west, presumably connected by a culvert. The ditches appear to connect the upper and lower areas, and appear to discharge to the wetland area (although the exact routes are unclear). Other small channels and possible erosional features are visible on the slope between the upper and lower areas, and the roadway embankment along the eastern Site margin. Both ditches are also visible on the 1970 aerial photograph, but are obscured by vegetation and fill placed by WSDOT photos from subsequent years.

Placement of fill by WSDOT in the upper area is evident on the 1974 aerial photograph, and in the lower area on the 1978 photograph. A cleared and graded area is visible at the southern end of the upper Site on the 1967 and 1970 photographs, but it is unclear if this is related to placement of WSDOT waste materials or to Highway 599 construction. Based on aerial photographs, dumping of waste material at the Site by WSDOT appears to have started between 1970 and 1974 in the upper area, and between 1974 and 1978 in the lower area. (Note: Information in Ecology's file indicates that WSDOT waste dumping started after 1965, but exact dates are not specified.) Information in Ecology's Site file indicating that dumping of WSDOT waste material at the Site ended in the early 1990s is consistent with the 1992, 1996, and more recent aerials.

The location and extent of visibly apparent street waste material dumping (i.e., active fill areas) is depicted on aerial photographs in Attachment 1, and the final overall extent of WSDOT street waste fill (based on aerial photographs) is shown on Figures 2 and 3. Attachment 1 also includes aerial photographs that show the Site area prior to Highway 599 construction, and the extent of Highway 599 construction fill placement. (Note: Fill and or waste materials may be present beyond the margins depicted on the aerial photographs and Figures 2 and 3, particularly on the slope between the upper and lower areas.)

Aerial photographs from the 2000s and 2010s show continued growth of vegetation throughout the Site, including most areas over which WSDOT waste materials were placed. In the upper area, a persistent bare patch is visible over the southwestern portion of the former waste fill area. Accumulated garbage is visible around the perimeter of the bare patch on the 2000 photograph, but was removed by 2002 and is not visible on subsequent photographs. In the lower area, vegetation cover generally increases through the 2000s and 2010s, but persistent bare and/or thinly vegetated areas are visible over the former WSDOT waste fill placement area east of the wetland. Vegetation over the former waste fill area appears to be primarily low brush or grasses, with limited growth of trees. Trees are present primarily to the west and south of the wetland, including the slope between the upper and lower portions of the Site.

The extent of the wetland area is generally not distinguishable on the historical aerial photographs. For reference, the margins of the wetland area shown by Hart-Crowser (1989, 1991, 1992) are shown on the aerial photographs in Attachment 1 and on Figures 2 and 3.

Historical Sampling and Analysis

Sampling and laboratory analysis of waste materials dumped at the Site (street sweepings and vactor truck sludge) and environmental media at the Site (soil/sediment, surface water, and groundwater) were performed between 1987 and 1992. No sampling has been reported for the Site since 1992.

Samples collected and analyses performed are summarized in Table 1 and findings are discussed below. Copies of the available reports and data summary tables from these reports are included in Attachment 2, where available, and copies of laboratory analytical data reports are included in Attachments 3 and 4 as referenced in the following sections.

WSDOT Waste Material Characterization

In the late 1980s, multiple samples of WSDOT waste materials were collected for characterization [Ecology and Environment (EE) 1990]. In May 1987, King County Metro Transit (METRO) collected one sample of vactor truck sludge immediately after it was placed at the Site. In January through March 1988, WSDOT collected a total of 34 samples including

12 identified as “landfill” samples from materials located at the Site, 10 described as “street sweepings”, four described as “vactor” materials, and eight described as “along SR5” or “SR5”. It is unclear how much of the material represented by the “street sweepings”, “vactor”, and “SR5” samples was placed at the Site, but it is presented by WSDOT as being representative of their street wastes. No maps, notes, or chain-of-custody (COC) documents are available for these samples.

The May 1987 METRO sample was analyzed for total metals, and the 1988 WSDOT samples were analyzed for leachable metals (using EP TOX methodology). All samples were also analyzed for oil/grease (Method 503A).

Leachable metals detected in the 12 WSDOT samples collected at the Site (“landfill” samples) included barium [up to 2.67 milligrams per liter (mg/L)], cadmium (up to 0.2 mg/L), copper (up to 0.55 mg/L), nickel (up to 0.85 mg/L), lead (up to 20.73 mg/L), selenium (up to 0.14 mg/L), and zinc (up to 15.05 mg/L). The lead concentration in three “landfill” samples was above the dangerous waste criterion of 5 mg/L (5.38 to 20.73 mg/L). The specific locations of these samples are not indicated in Ecology’s file materials.

Leachable cadmium, copper, nickel, lead, and zinc were also detected in the WSDOT “street sweepings,” “vactor,” and “SR5” samples, with lead concentrations above the dangerous waste criterion of 5 mg/L in three samples (13.05 to 22.01 mg/L). The available information suggests that at least some of the material represented by these samples was likely placed at the Site, but the specific disposition of the sampled materials is not indicated.

Oil and grease concentrations in the 12 “landfill” samples ranged from 8.2 to 337.8 milligrams per kilogram (mg/kg), and from 1.4 to 417.6 mg/kg in the “street sweepings,” “vactor,” and “SR5” samples.

Total metals detected in the 1987 METRO sample included iron (1194.5 mg/kg), nickel (3.2 mg/kg), lead (141.1 m/kg), and zinc (89.2 mg/kg); oil/grease was detected at 1,400 mg/kg.

A copy of data sheets from Federal Testing Laboratories for the 1987 METRO and 1988 WSDOT and samples is included in Attachment 2.

Surface Soil / Sediment

Surface soil and sediment samples were collected on multiple occasions between 1989 and 1991 by Ecology, the city of Tukwila, and the Seattle-King County Department of Public Health (SKCDPH). Sample locations are approximate (Ecology samples) or unverified (Tukwila and SKCDPH samples), and descriptions of sampling methods are limited (particularly for the Tukwila and SKCDPH samples).

July 1989 Ecology Samples

Five surface soil samples were collected by Ecology on 24 July 1989. Based on Ecology's field notes and Field Sampling Report (Ecology 1989; copy included in Attachment 5), four samples (S1, S2, S5, and S6) appear to have been collected from recently placed WSDOT waste materials in the upper area, and one (S3) from a bare patch in the lower area. Sampling was also attempted near the southwestern end of the wetland area, but was unsuccessful. The approximate sample locations, based on Ecology's notes and a draft field map, are shown on Figure 2.

All five samples were analyzed for total metals and samples S1, S2, S3, and S5 were also analyzed for VOCs, SVOCs including PAHs and phenols, and pesticides/PCBs. [Note: The COC lists hydrocarbon, oil/grease, and herbicides analyses which do not appear to have been performed. The COC lists sample S3 as an "upland" sample and sample S5 as a "wetland" sample, which appear to be incorrect. The field map shows a sample "S4" near the wetland, but no sample "S4" was submitted for analysis.]

VOCs and pesticides were not detected at concentrations above the laboratory reporting limits. PCB Aroclor 1254 was detected in all four samples analyzed at concentrations of 38 to 86 micrograms per kilogram (µg/kg), below the Model Toxics Control Act (MTCA) Method B soil cleanup level (CUL) of 500 µg/kg.

Total carcinogenic cPAHs were detected in all four samples analyzed at concentrations of 127 to 254 µg/kg [based on summation of detected cPAH compounds using toxicity equivalency factor (TEF) methodology; non-detected cPAH compounds were not included in the summation], above the MTCA Method A soil CUL of 100 µg/kg. Other SVOCs, including non-carcinogenic PAHs, phthalates, and pentachlorophenol (PCP) were detected at concentrations well below MTCA Method A/B CULs. [Note: A review of the SVOC data by Manchester Environmental Laboratory (Manchester 1990a) concluded that the data were of limited use based on uncertainty with quantitation, but were useful qualitatively to show that the detected compounds were present.]

Total metals detected in the July 1989 samples include arsenic, cadmium, chromium, copper, mercury, nickel, lead, selenium, and zinc. The total lead concentrations in upland samples S1, S2, and S6 (292 to 728 mg/kg) were above the MTCA Method A soil CUL of 250 mg/kg.

A copy of a data summary (from EE 1990] showing detected analytes is included in Attachment 2, and a complete laboratory report is provided in Attachment 4.

Ecology Waste Pile Samples April and July 1990

Ecology collected soil samples from a plastic-covered stockpile located in the upper area on 13 April 1990 and 3 July 1990; both samples were designated "DOT-Oil." The stockpile was described in an Ecology field report dated 3 July 1990 (Ecology 1990b) as approximately 3 feet high and 6 feet long with a blackish color and petroleum odor (copy included in Attachment 5). WSDOT indicated that the material was from a roadway spill cleanup that was stored at the Site temporarily (EE 1990).

The sample collected on 13 April 1990 was analyzed for total and leachable [using toxicity characteristic leaching procedure (TCLP) methodology] priority pollutant metals, and the sample collected 3 July 1990 was analyzed for VOCs, SVOCs, pesticides/PCBs, and TPH. (Note: Both of the COCs for the "DOT-Oil" samples list the same VOC, SVOC, pesticides/PCB, and metals analyses, but the actual analyses appear to have been split between the two samples.)

Total arsenic was detected at a concentration of 35.4 mg/kg, above the MTCA Method A soil CUL of 20 mg/kg. Other metals detected at concentrations below MTCA soil CULs included chromium, copper, lead, nickel, and zinc. TCLP metals including barium, cadmium, and lead were detected at concentrations below dangerous waste criteria.

Pesticides and PCBs were not detected in the "DOT-Oil" sample. Detected VOCs included toluene (1,400 µg/kg, "J" flagged), ethylbenzene (3,500 µg/kg), and total xylenes (24,000 µg/kg); detected SVOCs included naphthalene (73,000 µg/kg), 2-methylnaphthalene (100,000 µg/kg), dimethylphthalate (1,900 µg/kg, "J" flagged), and bis(2-ethylhexyl)phthalate (2,200 µg/kg, "J" flagged). TPH (identified as gasoline) was detected at a concentration of 1,700 mg/kg, above the MTCA Method A soil CUL of 100 mg/kg. The total xylenes and naphthalene concentrations were also above MTCA Method A soil CULs.

The stockpiled material was reportedly removed from the Site (EE 1990), but the stockpile was not fully covered and appears to have been placed directly on the ground surface, indicating a potential for migration of COPCs into Site environmental media prior to removal of the stockpiled material from the Site.

February 1991 City of Tukwila Samples

On 8 February 1991, the city of Tukwila sampled material that had been dumped at the Site within the preceding 2 weeks. A 15 March 1991 letter (Tukwila 1991) describes the collection of three surface soil samples from low spots between dump piles where rain water had gathered. The samples were presumably collected from the upper area, but no map or COC were identified in Ecology's file materials. An analytical report from Laucks Testing Laboratories (attached to the 15 March 1991 letter; copy included in Attachment 4) lists three samples

(designated #1, #2, and #3) with all three analyzed for TPH and sample #1 also analyzed for VOCs, pesticides/PCBs, SVOCs, and total metals (23 metals analyzed).

TPH (using Method 418.1) was detected in all three samples at concentrations of 460 to 1,300 mg/kg, below the MTCA Method A soil CUL of 2,000 mg/kg. VOCs were not detected in sample #1 except for acetone (17 µg/kg) and methylene chloride (4 µg/kg) at concentrations below MTCA soil CULs. PCBs and pesticides were not detected in sample #1 except for beta-BHC (beta-hexachlorocyclohexane) at a concentration of 25 µg/kg, below the MTCA Method B soil CUL of 556 µg/kg.

SVOCs detected at concentrations above MTCA Method A/B soil CULs included total cPAHs, which were detected in sample #1 at a concentration of 118 µg/kg (based on summation of detected cPAH compounds using TEF methodology), above the MTCA Method A soil CUL of 100 µg/kg.

Metals were detected in sample #1 at concentrations above MTCA Method A soil CULs including cadmium (3.2 mg/kg; above the MTCA Method A CUL of 2 mg/kg) and mercury (20 mg/kg; above the MTCA Method A CUL of 2 mg/kg).

April 1991 Seattle/King County Health Department Samples

The SKCDPH collected three surface soil samples at the Site on 16 April 1991. A letter dated 23 April 1991 (SKCDPH 1991) indicates that the three samples were composite samples that were collected “around the site”, but no maps or COC documents were identified in Ecology’s file materials. Analytical reports from Alden Analytical Laboratories, Inc. for PAH analyses and from Sound Analytical Services, Inc. for TPH and total metals analyses were included in Ecology’s files (copies included in Attachment 4).

TPH (using Method 8015-Modified, listed as Total Extractable Hydrocarbons on laboratory report) was detected in all three samples at concentrations of 1,100 to 1,800 mg/kg, below the MTCA Method A soil CUL of 2,000 mg/kg.

Total cPAHs were detected in all three samples at concentrations of 311 to 674 µg/kg (based on summation of detected cPAH compounds using TEF methodology), above the MTCA Method A soil CUL of 100 µg/kg.

Total lead was detected in two samples at concentrations above the MTCA Method A soil CUL of 250 mg/kg (282 and 624 mg/kg) and in the third sample at 87.9 mg/kg. Other metals detected at concentrations below MTCA Method A/B soil CULs included barium, cadmium, chromium, mercury, and silver.

Surface Water

Surface water samples were collected on three occasions between January and May 1990 by Ecology and WSDOT. Sample locations are approximate (Ecology samples) or unverified (WSDOT samples), and descriptions of sampling methods are limited for the WSDOT samples.

January 1990 Ecology Samples

Four surface water samples were collected by Ecology on 30 January 1990. Based on an Ecology Sampling Report and Protocol memorandum dated 13 February 1990 (Ecology 1990a; copy included in Attachment 4) and hand-drawn field sampling map, the surface water samples were collected from a catch basin in the lower area (SW-1), from standing water in the wetland area (SW-2 and SW-3), and from east of the Site at a location (SW-4) where dye tracing indicated the flow from SW-1 surfaced near the east-adjoining METRO South Base property (see Figure 2). The Sampling Report and Protocol memorandum indicates that surface water from the SW-4 location flows to METRO culverts which discharge to a stream and ultimately to the Lower Duwamish Waterway (LDW).

The surface water samples were submitted to METRO Lab for analysis of total metals, VOCs, SVOCs, and pesticides/PCBs. Results are summarized in a memorandum from METRO Lab dated 1 March 1990 (METRO 1990; copy included in Attachment 4).

Pesticides, PCBs, VOCs, and SVOCs were not detected in any of the January 1990 surface water samples. Metals results were not included in Ecology's file materials, and a data summary included in an October 1990 Work Plan document (EE 1990) indicates that METRO did not perform the metals analyses because the samples were not preserved.

February 1990 WSDOT Samples

Two surface water samples were collected by WSDOT on 6 February 1990. The samples were designated Site 1 South East Pond (SE-Pond) and Site 2 North West Pond (NW-Pond), but no maps or COC documents were identified in Ecology's file materials. Presumably these samples were collected from standing water in the wetland area, but this could not be verified.

Results are presented in a Certificate of Analysis from Laucks Testing Laboratories (the laboratory report is not dated but shows 6 February 1990 as the date the samples were received) and include results for total metals, total PCBs, total organic halogens (TOX), PCP, and PAHs. Results are listed in a data summary (from EE 1990) included in Attachment 2, and a copy of the Laucks Testing Laboratories Certificate of Analysis is provided in Attachment 4.

Detected analytes included copper [up to 11 micrograms per liter (µg/l)], nickel (up to 10 µg/l), zinc (up to 12 µg/l), PCP (up to 4 µg/l), TOX (up to 30 µg/l), and 2-methylnaphthalene (up to

2 µg/l). The PCP concentration is above the potentially applicable MTCA Method B groundwater CUL of 0.219 µg/l, and some potential surface water Applicable or Relevant and Appropriate Requirements (ARARs) for protection of human health. The copper and nickel concentrations are above some potentially applicable surface water ARARs for protection of aquatic life.

May 1990 Ecology Samples

Ecology collected four surface water samples from the wetland area in the lower area on 8 May 1990. Sample locations and collection methods are described in the Ecology Sampling Report and Protocol memorandum dated 2 October 1990 (Ecology 1990c; copy included in Attachment 5). Samples SW-1 and SW-2 were collected from the southern portion of the wetland area, sample SW-3 was collected from the central portion of the wetland area, and sample GW-2 was collected from water which seeped into a 3- to 4-foot hole dug (by Ecology) next to location SW-1. (Note: The SW-1, SW-2, and SW-3 samples collected in May 1990 are from different locations than those with the same names collected in January 1990.)

The Sampling Report and Protocol memorandum indicates the surface water samples were submitted to Ecology's Manchester Environmental Laboratory for analysis; however, it appears that the analyses were performed by Laucks Testing Laboratories (VOCs, SVOCs, pesticides/PCBs) and AMTEST (Oil/Grease) with review by Manchester Environmental Laboratory. The Sampling Report and Protocol memorandum also indicates the May 1990 samples were to be analyzed for total metals, but no metals data were identified for these samples in Ecology's file materials. Sample SW-2 was analyzed only for VOCs.

The May 1990 surface water sample results are presented in a Data Review report by Manchester µLaboratory dated 29 June 1990 (Manchester 1990b). The data review included VOC, SVOC, and pesticide/PCB analyses and all data were found to be acceptable for use.

No VOCs, SVOCs, pesticides, or PCBs were detected in the May 1990 surface water samples. Oil/Grease was detected in all four samples at concentrations of 8.1 to 29.6 mg/L. Based on field notes and the Sampling Report and Protocol memorandum, the Oil/Grease does not appear to be related to petroleum hydrocarbons (no petroleum odor/sheen noted) and samples were described as murky, turbid, and containing organic matter and/or decayed vegetation.

Sample results are listed in a data summary (from EE 1990) included in Attachment 2, and a copy of the Manchester Data Review is provided in Attachment 4.

Subsurface Soil

Subsurface soil samples were collected from soil borings advanced at the Site by Hart-Crowser in 1988 and 1991 as part of an investigation performed by WSDOT. Sampling locations, methods, and analytical results are summarized in reports by Hart-Crowser (1989 and 1991).

1988 Hart-Crowser WSDOT Samples

In November to December 1998, 10 soil borings were advanced at the Site by Hart-Crowser, including three in the upper area and seven in the lower area (Figure 2). (Note: Boring C-3 and C-3A were advanced at the same location). In addition, two background soil samples were collected to the west of the Site in January 1989. Borings in the upper area were advanced using a hollow-stem auger drill rig to 15 to 20 feet below ground surface (bgs), and those in the lower area were advanced by hand auger to 5.5 to 12 feet bgs. Borings were typically advanced to approximately 5 feet below the depth of WSDOT street waste fill materials (Hart-Crowser 1989), but borings C-3, C-3A, and D-6 appear to have been terminated within the fill material.

A total of 51 soil samples (including two background samples) were submitted for analysis of leachable metals (cadmium, chromium, lead, copper, nickel, and zinc) using EP TOX methodology. In addition, two samples from boring C-3A were submitted for analysis of VOCs based on solvent-like odors, possibly associated with carpet material, encountered at boring C-3 (C-3A was advanced next to C-3 for the purpose of VOC sample collection).

Leachable lead was detected in samples collected from three borings (B-10, C-3, and D-6) at concentrations of 0.1 to 1.2 mg/L, and leachable zinc was detected in samples collected from six borings (B-3, B-5, B-10, B-12, C-3, C-5, and D-6) at concentrations of 0.1 to 2.2 mg/L. The lead and zinc concentrations are below dangerous waste criteria. No other leachable metals were detected, and total metals analyses were not performed.

VOCs detected in the samples from boring C-3A included acetone (86 µg/kg), methylene chloride (2 µg/kg), toluene (5 µg/kg), 2-butanone (methyl ethyl ketone) (9 µg/kg), and total xylenes (3 µg/kg). The detected concentrations are below MTCA Method A/B soil CULs.

Copies of data summary tables from Hart-Crowser (1989) are included in Attachment 2, maps and boring logs in Attachment 6, and analytical reports in Attachment 3.

1991 Hart-Crowser WSDOT Samples

In June 1991, nine soil borings were advanced at the Site by Hart-Crowser with four completed as groundwater monitoring wells (Hart-Crowser 1991). Three wells (MW-2, MW-3, and MW-4) were located in the lower area, and one (MW-1) was located across TIB to the west of the upper

area (see Figure 2). Soil borings B-13 through B-17 were located in the western portion of the lower area, near the base of the slope separating the upper and lower areas. Four of the borings (B-13, B-14, B-15, MW-3) were located in the suspected former drum area (see Figure 2), but no other field evaluation of the possible drum location appears to have been performed. Borings were advanced to depths of 16.5 to 35 feet bgs.

Soil samples collected from each boring were submitted for analysis of VOCs (nine samples), SVOCs (nine samples), TPH (12 samples), total priority pollutant metals (18 samples), and PAHs (18 samples).

Metals including arsenic, cadmium, chromium, copper, lead, nickel, and zinc were detected in all of the soil samples at concentrations below the respective MTCA Method A/B soil CULs. No other metals were detected at concentrations above the laboratory reporting limits. TPH (analyzed using Method 418.1) was detected in 10 soil samples at concentrations up to 150 mg/kg, below the MTCA Method A soil CUL of 2,000 mg/kg.

Detected VOC analytes included methylene chloride (up to 1.1 mg/kg) and acetone (up to 2.1 mg/kg); however, both of these compounds were also present in method blanks (most are "B" flagged). The highest non-flagged result for methylene chloride (0.99 mg/kg; B-14-S-2, 5 to 6.5 feet bgs) was above the MTCA Method A soil CUL of 0.02 mg/kg, but well below the Method B soil CUL of 480 mg/kg. Detected SVOCs included di-n-butylphthalate (up to 1.4 mg/kg), but the compound was also present in method blanks (all of the results are "B" flagged).

CPAHs were detected in one soil sample (B-17-S-1; 2.5 to 4 feet bgs) at a concentration of 341 µg/kg (based on detected cPAHs summed using TEF methodology), above the MTCA Method A soil CUL of 100 µg/kg. CPAHs were not detected in other samples at concentrations above laboratory reporting limits, including a deeper sample at boring B-17 (12.5 to 14.0 feet bgs). Non-carcinogenic PAHs were detected in 12 soil samples at concentrations well below respective MTCA Method A/B soil CULs.

Copies data summary tables from Hart-Crowser (1991) are included in Attachment 2, maps and boring logs in Attachment 6, and analytical reports in Attachment 3.

Groundwater

Four groundwater monitoring wells were installed at the Site in 1991 (Hart Crowser 1991) and samples were collected by Hart-Crowser in July 1991 and February 1992. In addition, Ecology apparently collected groundwater samples from the Site wells in July 1991 (separate from the Hart-Crowser sampling event).

The four wells were constructed using 5-foot screen sections with the tops of the screens placed 5 to 10 feet below water table to “screen the relatively coarsest and most uniform water-bearing soils” (Hart-Crowser 1991). The wells were not screened across the water table, nor within the WSDOT waste fill sequence (screens appear to have been set in native materials approximately 5 to 10 feet below the base of the waste fill materials). Copies of boring logs and cross-sections from Hart-Crowser (1991) are included in Attachment 6.

July 1991 Hart-Crowser Groundwater Samples

Groundwater samples were collected from four Site monitoring wells by Hart-Crowser on 1 July 1991. The samples were collected using a stainless steel bailer and submitted for analysis of priority pollutant metals (total and dissolved), TPH, VOCs, SVOCs, and PAHs. A copy of a groundwater data summary table from Hart-Crowser (1991) is included in Attachment 2 for reference, and copies of laboratory reports are included in Attachment 3.

Total metals detected at concentrations above laboratory reporting limits included arsenic, cadmium, chromium, copper, lead, nickel, and zinc. The concentrations of arsenic (up to 37 µg/l), cadmium (up to 10 µg/l), chromium (up to 130 µg/l), and lead (up to 200 µg/l) were above the respective MTCA Method A/B groundwater CULs. The total arsenic concentration was also above the MTCA Method B surface water CUL of 0.0982 µg/l, and above potentially applicable surface water ARARs for protection of aquatic life and human health. The detected concentrations of total cadmium, chromium, copper, lead, nickel, and zinc are also above potentially applicable surface water ARARs for protection of aquatic life.

Dissolved metals detected at concentrations above laboratory reporting limits included arsenic (up to 9 µg/l), lead (up to 5 µg/l), and zinc (up to 110 µg/l). The dissolved arsenic concentration was above MTCA Method A/B groundwater and Method B surface water CULs, and also above potentially applicable surface water ARARs for protection of human health. The detected concentrations of dissolved lead and zinc are above potentially applicable surface water ARARs for protection of aquatic life.

The reporting limits for some non-detected total and dissolved metals are above potential cleanup standards including MTCA groundwater CULs (antimony and thallium), MTCA surface water CULs (thallium), surface water ARARs for protection of aquatic life (mercury and silver), and surface water ARARs for protection of human health (antimony, mercury, and thallium).

TPH (by Method 418.1) was not detected in any of the groundwater samples, but the reporting limit of 1,000 µg/l is above the potential MTCA Method A groundwater CUL of 500 µg/l (for diesel- and/or oil-range TPH). Detected VOC analytes included acetone (up to 21 µg/l), methylene chloride (up to 3 µg/l, “J” flagged), and toluene (up to 1 µg/l), but the concentrations were below potentially applicable MTCA groundwater and surface water CULs and surface water ARARs.

No SVOC analytes were detected at concentrations above laboratory reporting limits. Detected PAH analytes included only phenanthrene in the sample collected from MW-3 (0.092 µg/l), but no other PAHs (including cPAHs) were detected at concentrations above laboratory reporting limits. [Note: The reporting limit for cPAHs of 0.1 µg/l was above the MTCA Method B surface water CUL and potential surface water ARARs for protection of human health based on benzo(a)pyrene].

July 1991 Ecology Groundwater Samples

Ecology collected groundwater samples from Site wells MW-1 to MW-4 on 11 July 1991. Samples were collected using a bailer and were submitted for analysis of priority pollutant metals (total and dissolved), VOCs, PAHs, pesticides/PCBs, HCID, and ethylene glycol. The data are presented in a QA Summary on Water Samples from Manchester Environmental Laboratory dated 5 September 1991 (Manchester 1991a) and a Data Review by Manchester Environmental Laboratory dated 23 September 1991 (Manchester 1991b), copies of which are included in Attachment 4.

Total metals detected in the Ecology groundwater samples included arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc. The total arsenic concentration (up to 6.19 µg/l) was above the MTCA Method B groundwater CUL of 0.058 µg/l and Method B surface water CUL of 0.098 µg/l for all samples, and above the MTCA Method A groundwater CUL of 5 µg/l for MW-1 and MW-4. The reported total concentrations of arsenic and mercury were above some potentially applicable surface water ARARs for protection of human health, and the reported total concentrations of lead, mercury, cadmium, copper, nickel, and zinc were above some potentially applicable surface water ARARs for protection of aquatic organisms.

Dissolved metals detected at concentrations above laboratory reporting limits included arsenic (up to 3.4 µg/l), lead (up to 5.4 µg/l), mercury (up to 0.052 µg/l), and zinc (up to 28 µg/l). The dissolved arsenic concentration was above the MTCA Method B groundwater and Method B surface water CULs, and also above potentially applicable surface water ARARs for protection of human health. The detected concentrations of dissolved lead and mercury are above potentially applicable surface water ARARs for protection of aquatic life.

The reporting limits for some non-detected total and dissolved metals are above potential cleanup standards including MTCA groundwater CULs (antimony and thallium), MTCA surface water CULs (thallium), surface water ARARs for protection of aquatic life (cadmium, copper, nickel, and silver), and surface water ARARs for protection of human health (antimony and thallium).

VOCs were not detected at concentrations above the laboratory reporting limit except for acetone in sample MW-4 at a concentration of 21 µg/l, well below the MTCA Method B groundwater CUL of 7,200 µg/l.

PAHs were not detected at concentrations above the laboratory reporting limit except for the sample collected at well MW-4. The total cPAH concentration (summed using TEF methodology) for MW-4 was 0.037 µg/l, although the results were all "J" flagged based on low surrogate recoveries. The total cPAH concentration was below the MTCA Method A groundwater CUL for total cPAHs of 0.1 µg/l, but above the MTCA Method B groundwater CUL of 0.012 µg/l and Method B surface water CUL of 0.0296 µg/l [based on benzo(a)pyrene]. The concentration was also above potentially applicable surface water ARARs for protection of human health.

Pesticides and PCBs were not detected at concentrations above the laboratory reporting limit except for heptachlor in sample MW-2 at a concentration of 0.29 µg/l. The heptachlor concentration was above the MTCA Method B groundwater CUL of 0.0194 µg/l and the MTCA Method B surface water CUL of 0.00013 µg/l.

Hydrocarbons and ethylene glycol were not detected at concentrations above the laboratory reporting limits.

February 1992 Hart-Crowser Groundwater Samples

Groundwater samples were collected from four Site monitoring wells by Hart-Crowser on 13 January 1992 and submitted for analysis of priority pollutant metals (total and dissolved), TPH, VOCs, SVOCs, and PAHs (Hart-Crowser 1992). A copy of a groundwater data summary table from Hart-Crowser (1992) is included in Attachment 2 for reference, and copies of laboratory reports are included in Attachment 3.

Total metals detected at concentrations above laboratory reporting limits included arsenic, chromium, copper, lead, nickel, and zinc. The concentrations of arsenic (up to 14 µg/l), chromium (up to 120 µg/l), and lead (up to 35 µg/l) were above the respective MTCA Method A groundwater CULs. The total arsenic concentration was also above the MTCA Method B surface water CUL of 0.0982 µg/l, and above potentially applicable surface water ARARs for protection of human health. The detected concentrations of total chromium, copper, lead, nickel, and zinc are also above some potentially applicable surface water ARARs for protection of aquatic life.

Dissolved metals detected at concentrations above laboratory reporting limits included copper (up to 10 µg/l) and zinc (up to 50 µg/l). The detected concentrations of dissolved copper and zinc are above potentially applicable surface water ARARs for protection of aquatic life.

The reporting limits for some non-detected total and dissolved metals are above potential cleanup standards including MTCA groundwater CULs (antimony and thallium), MTCA surface water CULs (thallium), surface water ARARs for protection of aquatic life (cadmium, mercury,

and silver), and surface water ARARs for protection of human health (antimony, mercury, and thallium).

TPH (by Method 418.1) was not detected in any of the groundwater samples, but the reporting limit of 1,000 µg/l is above the potential MTCA Method A groundwater CUL of 500 µg/l (for diesel- and/or oil-range TPH). Detected VOC analytes included tetrachloroethylene (PCE) (5 µg/l; MW-3). The PCE concentration equals the MTCA Method A groundwater CUL and is above some potentially applicable surface water ARARs for protection of human health.

No SVOC analytes were detected at concentrations above laboratory reporting limits except for bis(2-ethylhexyl) phthalate at a concentration (up to 16 µg/l) above some potentially applicable surface water ARARs for protection of human health. No PAH analytes (including cPAHs) were detected at concentrations above laboratory reporting limits. [Note: The reporting limit for cPAHs of 0.1 µg/l was above the MTCA Method B surface water CUL and potential surface water ARARs for protection of human health based on benzo(a)pyrene.]

Hydrogeology

Soil materials identified at the Site include both native and fill materials. Fill materials placed at the Site have included construction fill associated with Highway 599 construction in the mid-1960s and WSDOT street waste materials. Hart-Crowser (1991) indicated that fill is up to 15 feet thick, but does not distinguish between Highway 599 construction fill and street waste fill. Fill is described as heterogeneous and poorly sorted mixtures silt, sand, and gravel with organics and debris.

Native soils underlying the fill include recent fluvial deposits deposited on top of denser glacial sediments (Hart-Crowser 1991). Native soils described in boring logs typically include sand, silty sand, and sandy silt materials, often described as clayey and/or gravelly, overlying dense silt. Peat and sandy peat deposits are described for the lower area. Copies of boring logs and cross-sections from Hart-Crower (1989 and 1991) are included in Attachment 6.

Groundwater was typically encountered at depths of 2 to 20 feet bgs with the shallowest occurrence in the lower area. The shallow groundwater gradient is generally to the northeast (Hart-Crowser 1991, 1992). Hydraulic conductivity, based on slug tests performed at wells MW-1, MW-2, and MW-3, ranges from approximately 6.5E-6 to 7.9E-5 cubic meter per second (cm/s) (Hart-Crowser 1991).

As previously discussed, a wetland area has been described in the lower area. A Work Plan prepared by Ecology and Environment (1990) indicates a surface water drainage system at the Site discharge surface water to a drainage ditch located east of the Highway 599 ramp (presumably through a culvert). The drainage ditch discharges to a stream, and ultimately to

the LDW. Drainage features for the Site are also shown on construction plan sheet for Highway 599 that were included in Ecology's file, but final construction details are not verified. Copies of Highway 599 plans and a map from Ecology and Environment (1990) illustrating the drainage system is included in Attachment 6, and Site drainage facilities are shown on Figure 2.

Summary and Data Gaps

Street maintenance waste materials dumped at the Site by WSDOT between approximately the early 1970s and early 1990s have affected Site soil (surface and subsurface), groundwater, and surface water.

The primary COPCs identified at the Site based on historical sampling and analyses include metals (primarily lead) and cPAHs:

- Extractable lead was detected in WSDOT waste materials at concentrations above dangerous waste criteria. Total lead was detected in surface soil samples at concentrations above MTCA Method A soil CULs, and in groundwater samples at concentrations above MTCA Method A groundwater CULs. Lead concentrations detected in groundwater (total and dissolved) were also above some potential ARARs for protection of aquatic organisms.

- Other metals detected in groundwater samples at concentrations above MTCA Method A/B groundwater CULs included total and dissolved arsenic, total cadmium, and total chromium. Arsenic concentrations were also above the MTCA Method B surface water CUL. Detected metals concentrations in groundwater samples were also above some potential ARARs for protection of human health (arsenic and mercury), and some potential ARARs for protection of aquatic organisms (cadmium, chromium, copper, mercury nickel, and zinc).

- Total cPAH concentrations (based on TEF summation) in soil were above the MTCA Method A soil CUL in multiple surface soil samples and one subsurface soil sample. (Note: Subsurface soil samples were analyzed for PAHs only for the 1991 Hart-Crower investigation.) The total cPAH concentration in one groundwater sample was slightly above the MTCA Method B groundwater and surface water CULs [based on benzo(a)pyrene]; however, the results were estimated ("J" flagged by the laboratory). CPAH analytes were not detected in other groundwater or surface water samples, but the reporting limits were typically above MTCA Method A/B groundwater CULs, MTCA Method B surface water CULs, and potential surface water ARARs. (Note: Total cPAH concentrations listed in reports from Ecology's files and included in various Attachments are based on summations without TEFs.)

Other analytes, including SVOCs, PCBs, VOCs, TPH, and pesticides, were detected in one or more samples collected at the Site:

- VOC analytes detected in groundwater samples collected at the Site included acetone, methylene chloride, toluene, and PCE. Concentrations were below MTCA groundwater CULs except the PCE concentration (detected at MW-3) which equaled the MTCA Method A groundwater CUL. VOC analytes detected in soil samples included acetone, methylene chloride, toluene, 2-butanone, and xylenes at concentrations below MTCA Method A/B soil CULs. Acetone and methylene chloride were present in method blanks for soil and groundwater samples.

- SVOC analytes detected in soil and groundwater samples collected at the Site included phthalates, non-carcinogenic PAHs, and PCP (surface soil only) at concentrations below the respective MTCA Method A/B CULs.

- TPH (based on Method 418.1) was detected in soil samples at concentrations below the MTCA Method A soil CUL for oil- or diesel-range TPH. TPH was not detected in groundwater samples, but the reporting limit was above the MTCA Method A groundwater CUL for oil- or diesel-range TPH. In addition, Oil/Grease was detected in WSDOT waste characterization samples and Ecology surface water samples, but these samples were not analyzed for TPH.

- PCB Aroclor 1254 was detected in multiple surface soil samples, but at concentrations below the MTCA Method B soil CUL. PCBs were not detected in surface water or groundwater samples. Analysis of PCBs was not performed for subsurface soil.

- Pesticides were not detected in samples (surface soil, surface water, groundwater) collected at the Site except for heptachlor in one groundwater sample collected by Ecology at well MW-2 at a concentration above the MTCA Method B groundwater and surface water CULs. The WSDOT waste materials do not appear to be a source of pesticides, but the Site was used as farmland prior to construction of Highway 599 in 1965.

As indicated in previous sections, some of the existing Site data is from samples for which the locations are unknown or unverified, sampling methods are not adequately documented, and/or the sampled material was removed from the Site. Therefore, the results for these samples should be considered “informational” and may not be representative of Site conditions or suitable for comparison with cleanup standards. These results were excluded from the preceding COC and detected analyte summary bullets (but are discussed in the Historical Sampling and Analysis section):

- Two soil samples were collected by Ecology in 1990 from a stockpile of spill cleanup material that was subsequently removed from the Site. The samples contained arsenic, gasoline-range TPH, xylenes, and naphthalene at concentrations above MTCA Method A soil CULs. No samples appear to have been collected from beneath the stockpile following removal.

- WSDOT collected two surface water samples in 1990; however, the locations and sampling methods are not documented. The samples appear to have been collected from the Site wetland area, but this cannot be verified (including the possibility that the samples are from another site). PCP was detected at a concentration slightly above the MTCA Method B groundwater CUL.

- The city of Tukwila collected three surface soil samples in 1991; however, the location and sampling methodology of the samples is uncertain, and they appear to have been collected from areas of standing water between waste piles. Total cadmium, total mercury, and total cPAHs were detected at concentrations above MTCA Method A soil CULs.

- Three surface soil samples were collected by SKCDPH in 1991. The samples are described as composite samples collected "around the site", but the actual locations and are unknown and collection methods are not documented. Total lead and total cPAHs were detected at concentrations above MTCA Method A soil CULs.

Data Gaps

Based on the available analytical results, site media (soil, surface water, and groundwater) appear to have been impacted by past filling/dumping activities. The existing data for the Site do not appear to be sufficient to fully characterize the nature and extent of potential impacts from WSDOT waste material dumped at the Site. Additional data need include, but are not necessarily limited to:

- The nature and extent of chemical impacts to Site soil, groundwater, and surface water have not been fully characterized or delineated. Additional sampling and laboratory analysis of environmental media at the Site is needed to verify previous results and current conditions, define the extent of COPCs in Site media, and collect sufficient data to develop cleanup alternatives for the Site.

- The current extent of wetland area and the location and condition of existing surface water drainage facilities/routes need to be verified. Various Site maps depict catch basins, manholes, and culverts, but the information is not consistent between different sources. Surface water runoff is likely a primary potential pathway for migration of contaminants to the LDW.

- Chromium has been detected in soil and water samples at the Site, including concentrations above the MTCA Method A groundwater CUL; however, analysis of hexavalent chromium has not been performed.

- Analysis of dioxins/furans has not been performed for Site media or WSDOT waste materials.

- The location and disposition of possible buried drums do not appear to have been verified; the suspected drum placement area is shown on Figure 2. A geophysical (i.e., electromagnetic) survey may be helpful in assessing if buried drums may exist at the Site.

- The waste materials dumped at the Site by WSDOT appear to have originated from street maintenance wastes collected from multiple locations and included storage (at least temporarily) of spill cleanup materials and therefore, should not be considered homogeneous. Additional sampling and analysis of fill material are needed to verify current conditions and identify potential areas with elevated COPC concentrations (i.e., hot spots), if any, and to verify the lateral and vertical extent of WSDOT street waste fill materials placed at the Site.

- Ecology's Site file indicates that general refuse and garbage have been observed historically at the Site (visible on some photographs in Attachment 5). WSDOT indicated that dumping of garbage by the general public has been an occasional issue at the Site as well. WSDOT indicated that they have removed accumulated garbage/refuse on multiple occasions, but some was likely mixed with the WSDOT street cleaning wastes. Recent aerial photographs do not show any obvious garbage/refuse accumulation; however, the former fill areas are covered with vegetation. A thorough inspection/survey of the Site would be needed to verify the extent of WSDOT fill materials and to identify other refuse mixed with WSDOT street cleaning waste or otherwise accumulated at the Site.

- A full evaluation of potential surface water ARARs needs to be performed, and Site groundwater and surface water samples need to be collected and analyzed using analytical methods with sufficiently low reporting limits.

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Washington State Department of Ecology. 1990b. Field Report, Duwamish Fill Site, for Waste Pile Sample Collected 3 July 1990. Dated 3 July 1990.

Washington State Department of Ecology. 1990c. Sampling Report and Protocol, Duwamish Fill Site, for Surface Water Samples Collected 8 May 1990. Dated 2 October 1990.

Enclosures:
Table 1 – Summary of Historical Sampling and Analysis
Figure 1 – Vicinity Map
Figure 2 – Site Overview and Historical Sampling Location Map
Figure 3 – WSDOT Fill Area Summary Map
Attachment 1 – Historical Aerial Photographs
Attachment 2 – Data Summary Tables from Site Reports
Attachment 3 – Laboratory Data and Reports from Hart-Crowser (on CD only)
Attachment 4 – Laboratory Data Reports for Ecology and Other Samples (on CD only)
Attachment 5 – Ecology Sampling and Inspection Reports (on CD only)
Attachment 6 – Historical Maps, Boring Logs, and Cross-Sections (on CD only)

Table

TABLE 1

SUMMARY OF HISTORICAL SAMPLING AND ANALYSIS[a]
Duwamish Fill Site Expanded Site
Seattle, Washington

Media	Date	Sampler	Samples Collected	Matrix	Analyses Performed	Notes
WSDOT Street Waste Materials - Samples Collected Primarily for Waste Characterization	May 1987	METRO	1 Vactor sludge sample	sludge	Total Metals (As, Cd, Cr, Cu, Fe, Hg, Ni, Pb, Se, Ag, Zn); Oil and Grease	Collected from materials dumped at Site within two weeks prior to sample collection.
	January/February 1988	WSDOT	12 samples "at landfill"	soil/solids	Leachable (EP TOX) Metals (As, Ba, Cd, Cr, Cu, Pb, Hg, Ni, Se, Ag, Zn); Oil and Grease	Collected from materials already placed at Site; no maps or other sampling documentation available in Ecology's file materials.
		WSDOT	2 samples "along SR5"	solids	Leachable (EP TOX) Metals (As, Ba, Cd, Cr, Cu, Pb, Hg, Ni, Se, Ag, Zn); Oil and Grease	Collected from WSDOT street maintenance wastes; disposition of samples materials not verified but some likely placed at Site.
	March 1988	WSDOT	10 samples "street sweepings"	solids	Leachable (EP TOX) Metals (As, Ba, Cd, Cr, Cu, Pb, Hg, Ni, Se, Ag, Zn); Oil and Grease	Collected from WSDOT street maintenance wastes; disposition of samples materials not verified but some likely placed at Site.
		WSDOT	1 sample "along SR5"	solids	Leachable (EP TOX) Metals (As, Ba, Cd, Cr, Cu, Pb, Hg, Ni, Se, Ag, Zn); Oil and Grease	Collected from WSDOT street maintenance wastes; disposition of samples materials not verified but some likely placed at Site.
		WSDOT	4 samples "vactor"	sludge	Leachable (EP TOX) Metals (As, Ba, Cd, Cr, Cu, Pb, Hg, Ni, Se, Ag, Zn); Oil and Grease	Collected from WSDOT street maintenance wastes; disposition of samples materials not verified but some likely placed at Site.
Surface Soil / Sediment Samples Collected at the Site	24 July 1989	Ecology	5 surface soil samples; 4 from upper area, 1 from lower area	soil/ sediment	Total Metals (As, Cd, Cr, Cu, Hg, Ni, Pb, Se, Zn); VOCs, SVOCs, PAHs, PCBs/Pesticides	Approximate locations shown on field map; COC available. Manchester Lab data review indicates SVOC data is of limited use based on uncertainty with quantitation.
	13 April 1990 and 3 July 1990	Ecology	2 samples from a street cleanup material stockpile temporarily stored at the upper Site area	surface soil	Total Metals (As, Be, Cd, Cr, Cu, Pb, Ni, Ag, Zn, Sb, Se, Th), Leachable (TCLP) Metals (As, Ba, Cd, Cr, Pb, Ag, Se), VOCs, SVOCs, PCBs/Pesticides, TPH	The stockpile was subsequently removed from the Site, but did not appear to be fully covered and was stored directly on the ground surface.
	8 February 1991	City of Tukwila	3 surface soil samples collected at the Site "between dump piles where rain water had gathered"	surface soil	Total Metals (Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Fe, Pb, Mg, Mn, Hg, Ni, K, Se, Ag, Na, Th, V, Zn), VOCs, SVOCs, PCBs/Pesticides	Locations uncertain; no map, COC, or other sample collection documentation is available in Ecology's file materials.
	23 April 1991	Seattle-King County Dept. of Public Health	3 composite surface soil samples collected at locations "around the Site"	surface soil	Total Metals (As, Ba, Cd, Cr, Pb, Hg, Se, Ag), PAHs, TPH	Locations uncertain; no map, COC, or other sample collection documentation is available in Ecology's file materials.
Surface Water Samples Collected at the Site	30 January 1990	Ecology	4 surface water samples collected from the lower Site area (3 samples) and east of the Site (1 sample)	surface water	VOCs, SVOCs, PCBs/Pesticides (total metals analyses were requested but not performed because samples were not preserved)	Approximate locations are shown on a field map and locations/methods are described in a field sampling report; COC available.
	6 February 1990	WSDOT	2 surface water samples were collected by WSDOT	surface water	Total Metals (Cd, Cr, Cu, Pb, Hg, Ni, Zn), pentachlorophenol (PCP), total organic halides (TOX), PCBs, PAHs	No maps, field notes, COCs or other documents were available in Ecology's files. The samples were presumably collected from the Site wetland, but this is not verified.
	8 May 1990	Ecology	4 surface water samples collected from the lower Site area wetland	surface water	VOCs, SVOCs, PCBs/Pesticides, Oil/Grease (total metals analyses were requested but do not appear to have performed)	Approximate locations are shown on a field map and sampling methods and locations are described in a field sampling report; COC available.
Subsurface Soil Samples Collected at the Site	Nov-Dec 1998	Hart-Crowser (for WSDOT)	51 soil samples collected from soil borings in the upper (3 borings) and lower (7 borings) Site areas	subsurface soil	Leachable (EP TOX) Metals (Cd, Cr, Cu, Pb, Ni, Zn), VOCs (2 samples)	Location map, COCs, boring logs, lab reports and sampling methods are provided in Hart-Crowser's summary report (Hart-Crowser 1989).
	June 1991	Hart-Crowser (for WSDOT)	18 soil samples collected from 9 soil borings in the lower Site area; wells installed in 4 of the borings	subsurface soil	Total Metals (Sb, As, Be, Cd, Cr, Cu, Pb, Hg, Ni, Se, Ag, Th, Zn), VOCs, SVOCs, PAHs, TPH	Location map, COCs, boring and well logs, lab reports and sampling methods are provided in Hart-Crowser's environmental assessment report (Hart-Crowser 1991).
Groundwater Samples Collected from Site Monitoring Wells	1 July 1991	Hart-Crowser (for WSDOT)	Groundwater samples collected from 4 monitoring wells installed June 1991	groundwater	Total and Dissolved Metals (Sb, As, Be, Cd, Cr, Cu, Pb, Hg, Ni, Se, Ag, Th, Zn), VOCs, SVOCs, PAHs, TPH	Sample collection methods, maps, COC, and data reports are presented in Hart-Crowser's environmental assessment report (Hart-Crowser 1991).
	11 July 1991	Ecology	Groundwater samples collected from 4 monitoring wells installed June 1991	groundwater	Total and Dissolved Metals (Sb, As, Be, Cd, Cr, Cu, Pb, Hg, Ni, Se, Ag, Th, Zn), VOCs, PAHs, PCBs/Pesticides, TPH, Ethylene Glycol	Limited information on sampling methods, no purge/sampling records, COC available, data reported in QA Summary and Data Review by Ecology's Manchester lab.
	13 January 1992	Hart-Crowser (for WSDOT)	Groundwater samples collected from 4 monitoring wells installed June 1991	groundwater	Total and Dissolved Metals (Sb, As, Be, Cd, Cr, Cu, Pb, Hg, Ni, Se, Ag, Th, Zn), VOCs, SVOCs, PAHs, TPH	Sample collection methods, maps, COC, and data reports are presented in Hart-Crowser's wet-season groundwater monitoring report (Hart-Crowser 1992).

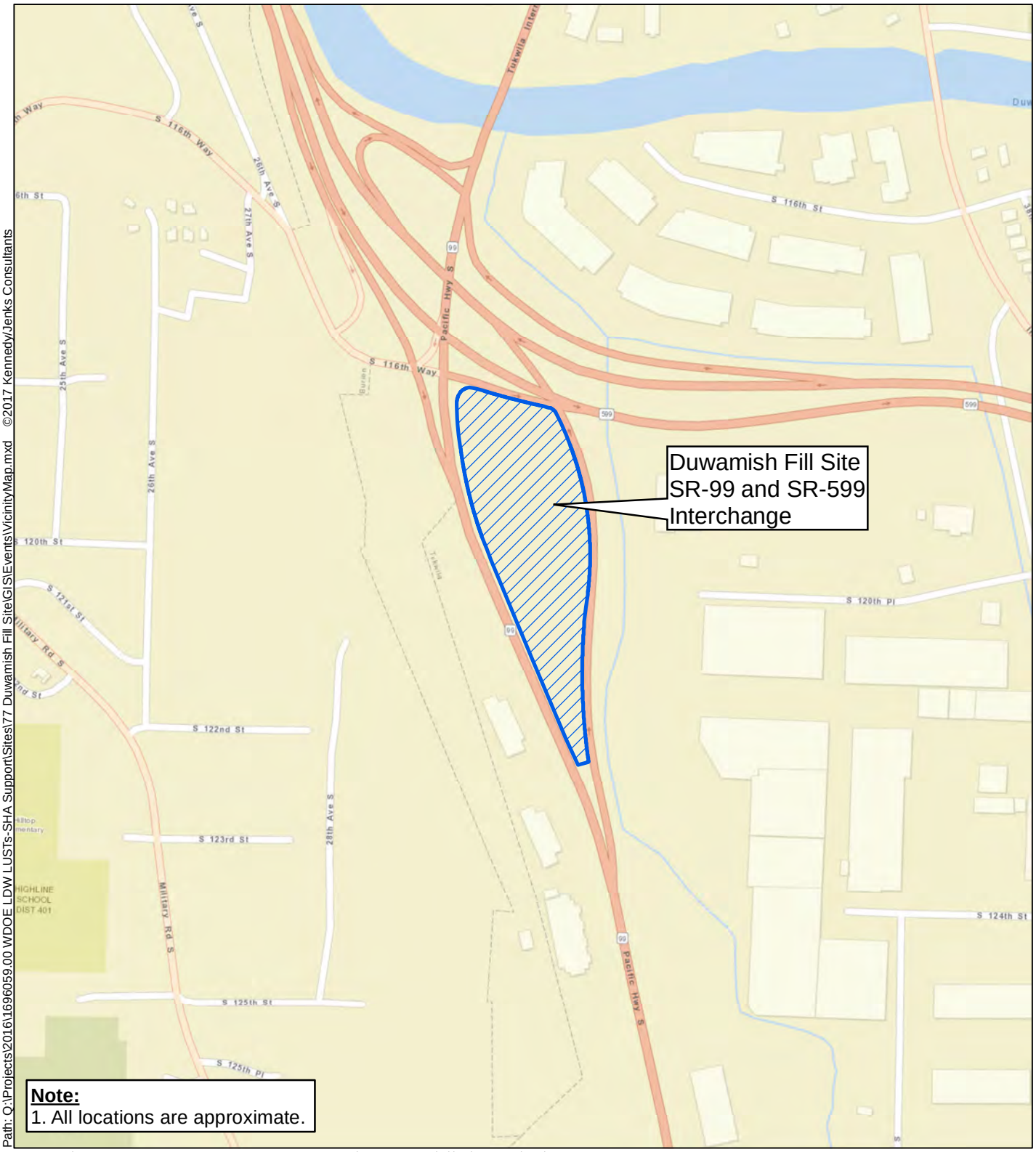
Notes:
(a) Historical sample collection and analysis based on information available in Ecology's Site file materials. See text for additional information for each sampling event.

WSDOT	Washington State Department of Transportation
METRO	King County Metro
Ecology	Washington State Department of Ecology
COC	Chain-of-Custody
VOCs	Volatile Organic Compounds
SVOCs	Semi-Volatile Organic Compounds
PCBs	Polychlorinated Biphenyls
PAHs	Polycyclic Aromatic Hydrocarbons
TPH	Total Petroleum Hydrocarbons

Metals:

Al - Aluminum	Mg - Magnesium
Sb - Antimony	Mn - Manganese
As - Arsenic	Hg - Mercury
Ba - Barium	Ni - Nickel
Be - Beryllium	K - Potassium
Cd - Cadmium	Se - Selenium
Cr - Chromium	Ag - Silver
Cu - Copper	Na - Sodium
Fe - Iron	Th - Thallium
Pb - Lead	V - Vanadium
	Zn - Zinc

Figures



Note:
1. All locations are approximate.

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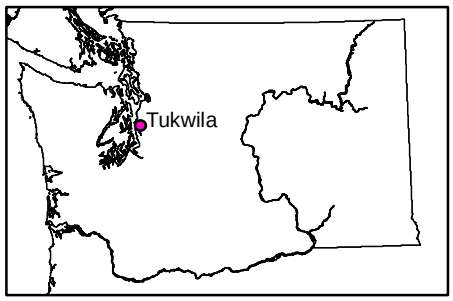
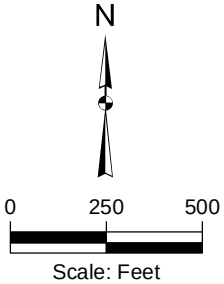
Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community





Kennedy/Jenks Consultants

Duwamish Fill Site (CSID 77)
Tukwila, King County, Washington
SR-99 and SR-599 Interchange

DRAFT

Vicinity Map

1696059*00
March 2017

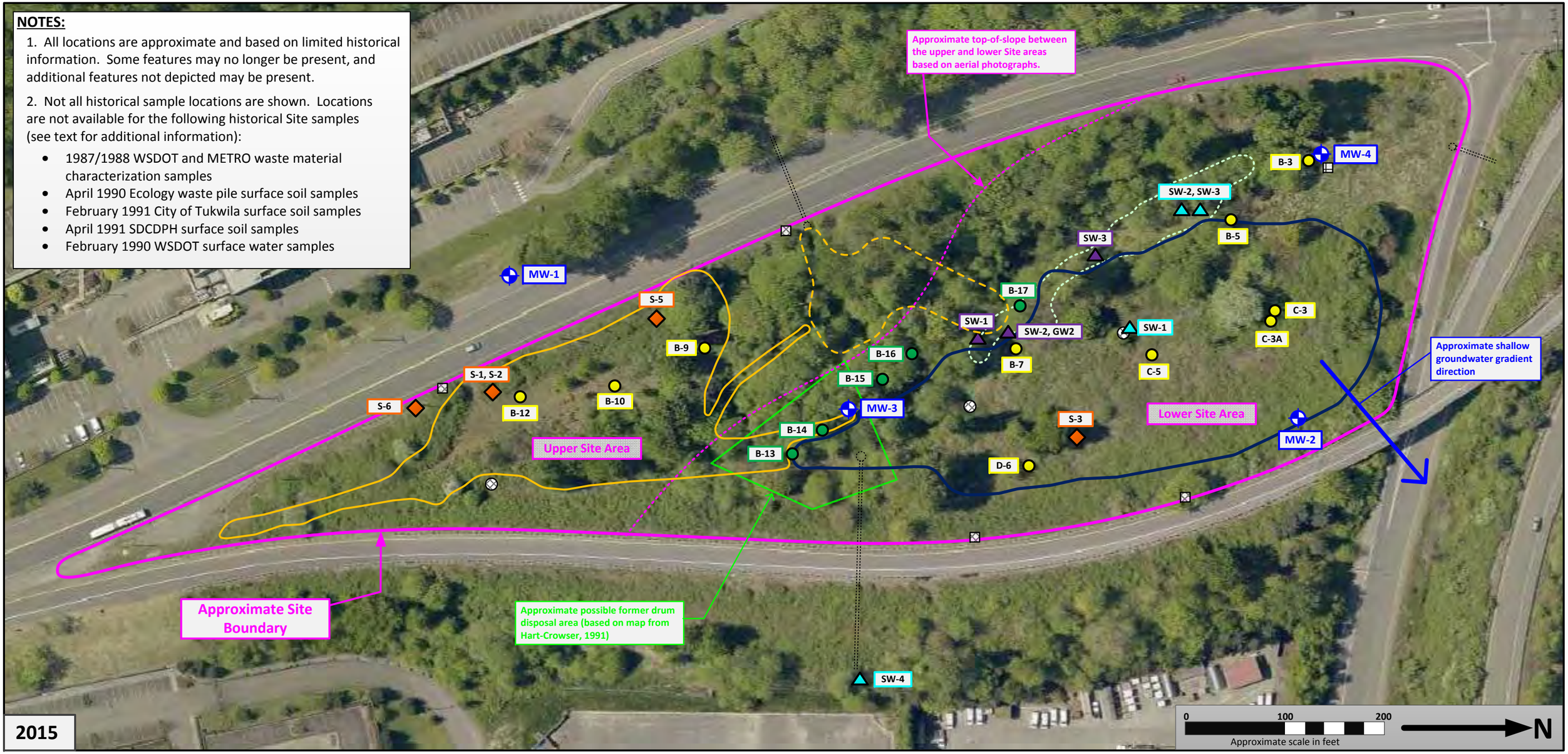
Figure 1

NOTES:

1. All locations are approximate and based on limited historical information. Some features may no longer be present, and additional features not depicted may be present.

2. Not all historical sample locations are shown. Locations are not available for the following historical Site samples (see text for additional information):

- 1987/1988 WSDOT and METRO waste material characterization samples
- April 1990 Ecology waste pile surface soil samples
- February 1991 City of Tukwila surface soil samples
- April 1991 SDCDPH surface soil samples
- February 1990 WSDOT surface water samples



LEGEND:

- S-3 — Ecology Surface Soil Samples – July 1989 (Approximate based on Ecology field map and notes)
- B-9 — WSDOT Soil Borings – Nov/Dec 1988 (Approximate based on map from Hart-Crowser, 1989)
- B-14 — WSDOT Soil Borings – June 1991 (Approximate based on map from Hart-Crowser, 1991)
- SW-1 — Ecology Surface Water Samples – January 1990 (Approximate based on Ecology field map and notes)
- SW-3 — Ecology Surface Water Samples – May 1990 (Approximate based on Ecology field notes and summary)
- MW-2 — WSDOT Monitoring Wells – June 1991 (Approximate based on map from Hart-Crowser, 1991)

- Approximate extent of WSDOT street waste fill placed in upper area based on aerial photographs, dashed where uncertain.
- Approximate extent of WSDOT street waste fill placed in lower area based on aerial photographs.
- Approximate locations of surface water drainage culverts based on historical maps and aerial photographs.
- Approximate locations of surface water catch basins and manholes from historical maps and aerial photographs.
- Approximate margin of wetland identified in the lower Site area (based on map from Hart-Crowser, 1989 and 1991) .

DRAFT

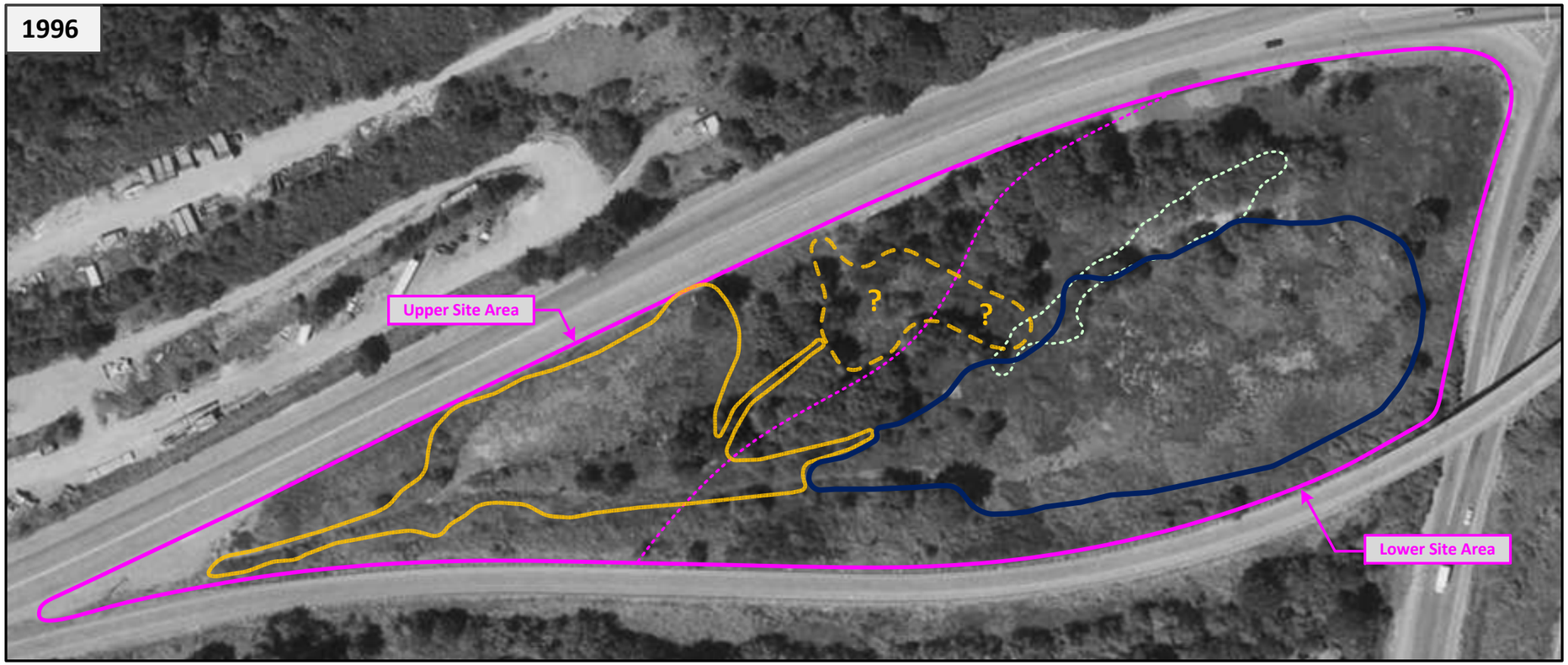
Kennedy/Jenks Consultants

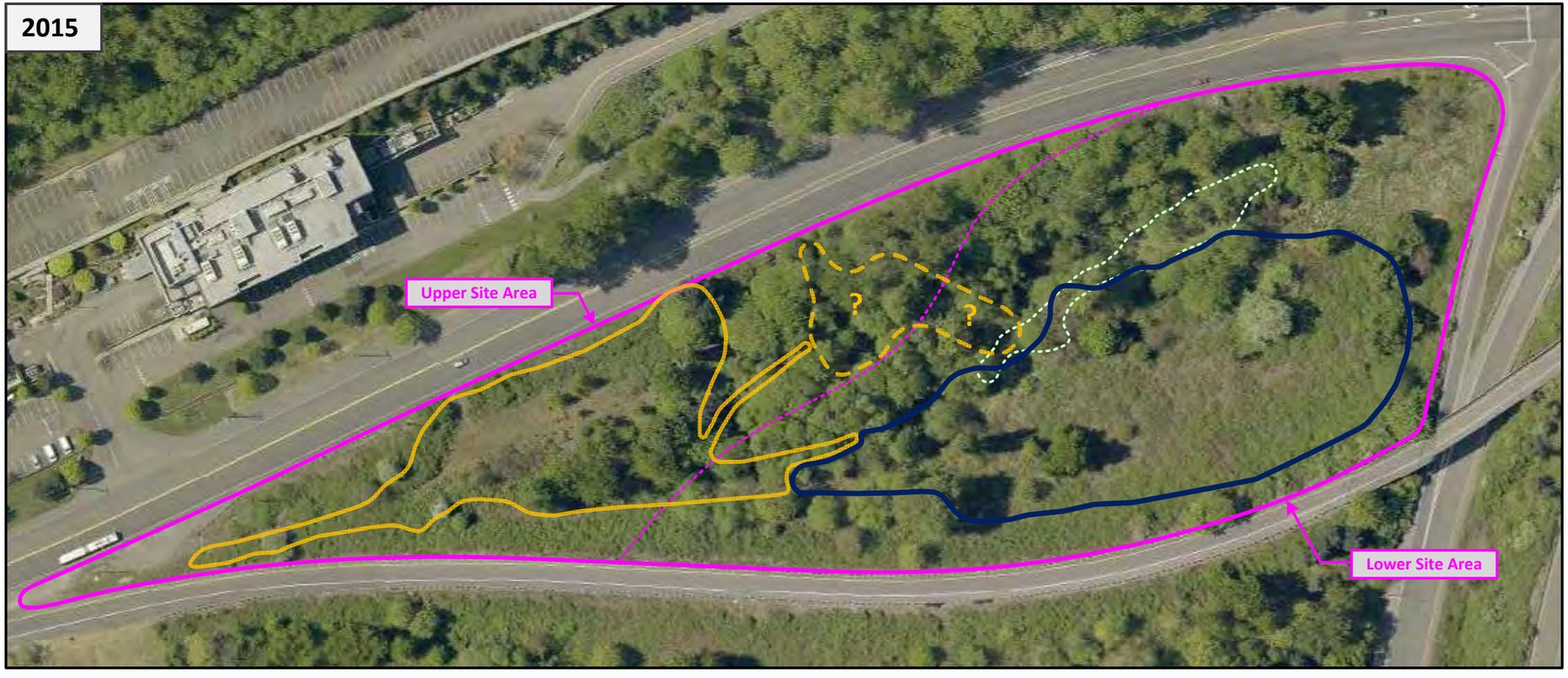
Duwamish Fill Site (CSID 77)
Tukwila International Blvd and Highway 599
Tukwila, WA

Site Overview and Historical Sampling Location Map

1696059*00
May 2017

Figure 2





LEGEND:

- Approximate Site boundary as depicted in reports from Hart-Crowser (1989, 1991, 1992)
- Approximate historical top-of-slope between the upper and lower Site areas based on 1946 and 1961 aerial photographs.
- Approximate extent of WSDOT street waste fill placed in upper area based on 1970 to 1992 aerial photographs (refer to Attachment 1).
- Approximate extent of possible WSDOT street waste fill area and/or drainage modification area visible on 1982 aerial photograph (refer to Attachment 1).
- Approximate extent of WSDOT street waste fill placed in lower area based on 1970 to 1992 aerial photographs (refer to Attachment 1).
- Approximate margin of wetland area identified in the lower Site area based on 1989 and 1991 maps from Hart-Crowser (does not necessarily represent current conditions).

NOTES:

1. All locations and areas are approximate
2. Fill areas are based on aerial photographs (see Attachment 1) and are approximate. Fill materials may be present in Site areas outside the margins shown.

0 100 200
Approximate scale in feet

N

DRAFT

Kennedy/Jenks Consultants

Duwamish Fill Site (CSID 77)
Tukwila International Blvd and Highway 599
Tukwila, WA

WSDOT Fill Area Summary Map

1696059*00
May 2017

Figure 3

Attachment 1

Historical Aerial Photographs

ATTACHMENT 1. Duwamish Fill Site (CSID 77) – Historical Aerial Photographs 1946-1967 (Page 1 of 3)

Approximate top-of-slope between upper and lower areas

Approximate Site boundary

Approximate estimated extent of active street waste fill, upper area (dashed where uncertain)

Approximate estimated extent of active street waste fill, lower area

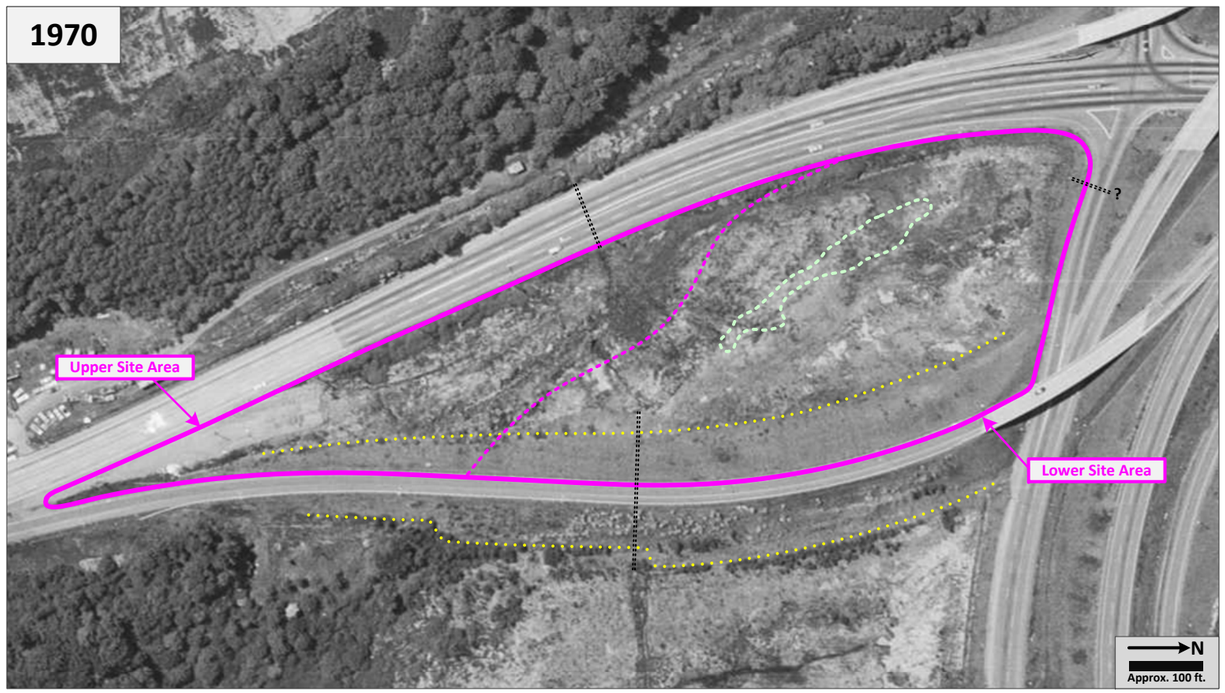
Approximate toe of road embankment slope as constructed in 1965

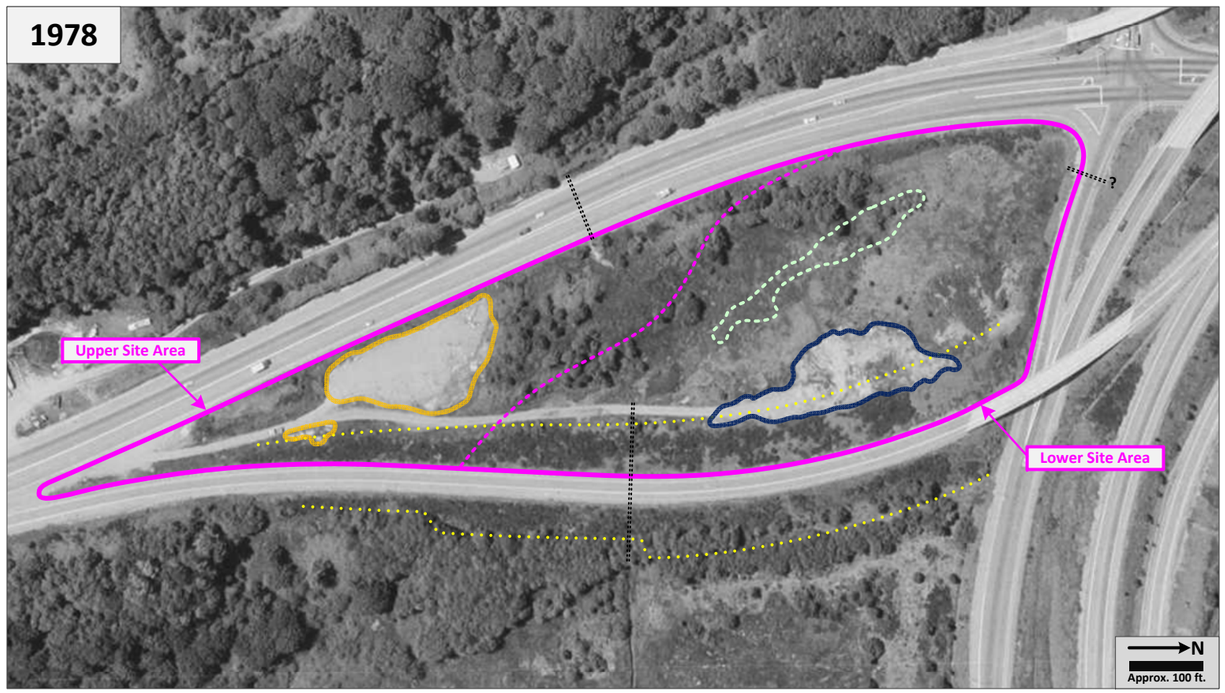
Approximate culvert location

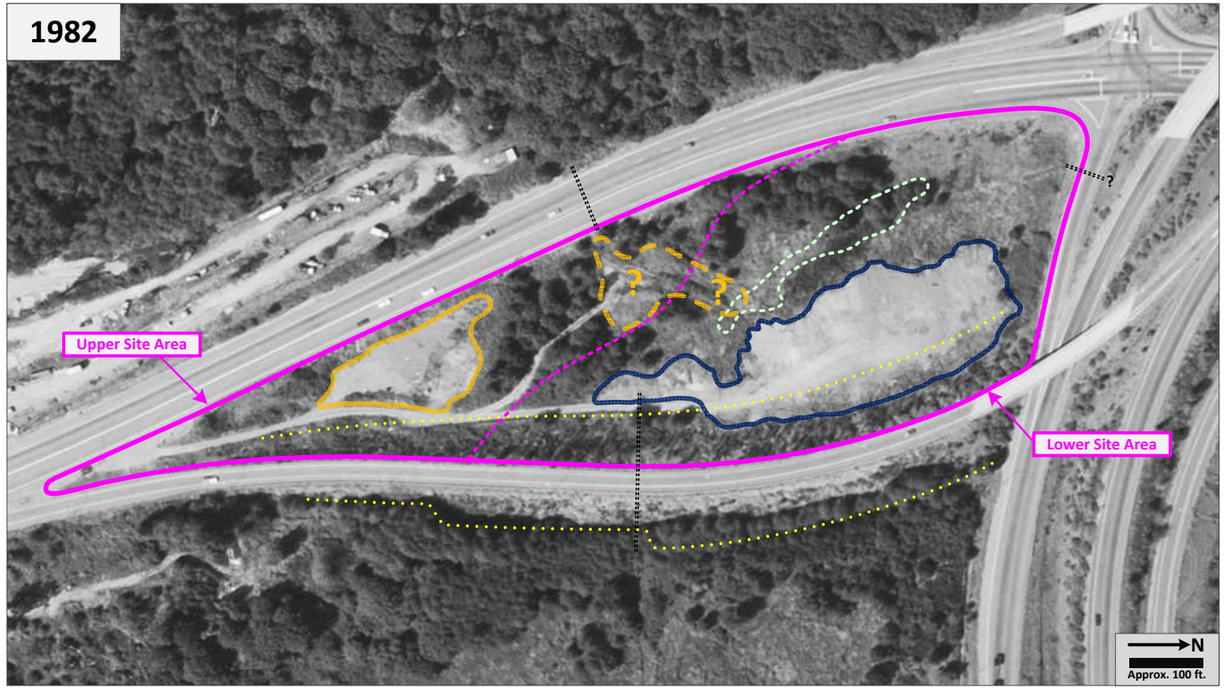
Approximate wetland area margin based on maps from Hart-Crower (1989, 1991, 1992)

NOTE: ALL LOCATIONS AND MARGINS ARE APPROXIMATE

ATTACHMENT 1. Duwamish Fill Site (CSID 77) – Historical Aerial Photographs 1970-1982 (Page 2 of 3)







Approximate top-of-slope between upper and lower areas

Approximate Site boundary

Approximate estimated extent of active street waste fill, upper area (dashed where uncertain)

Approximate estimated extent of active street waste fill, lower area

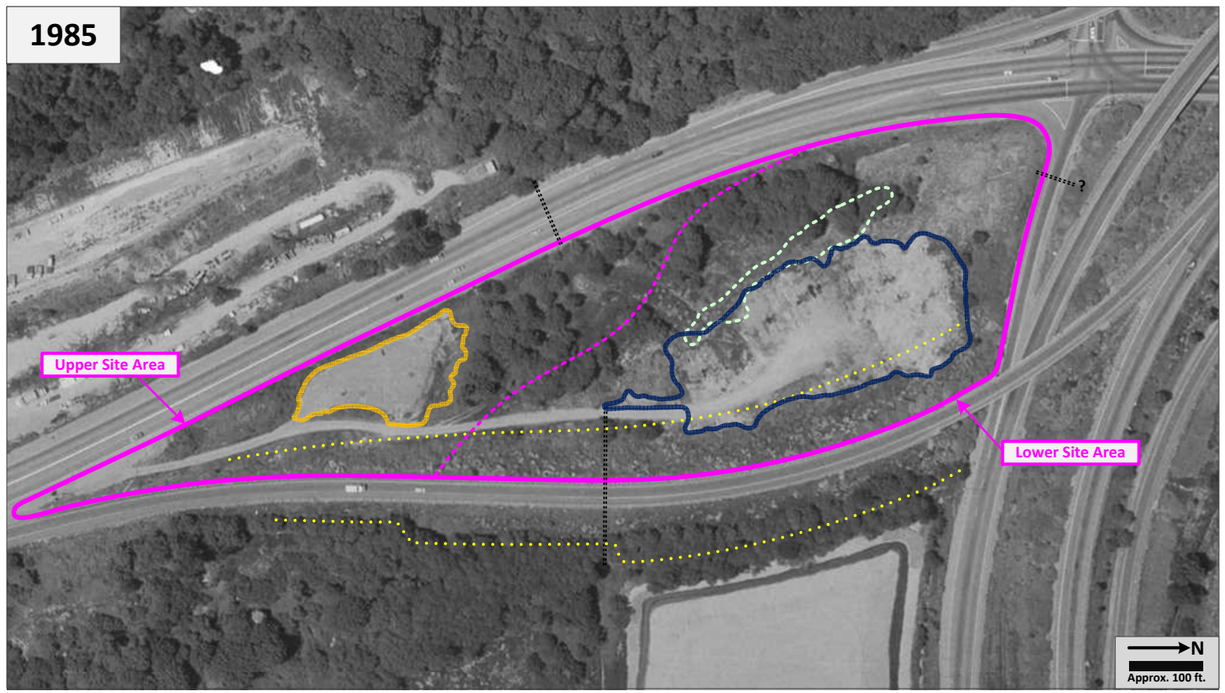
Approximate toe of road embankment slope as constructed in 1965

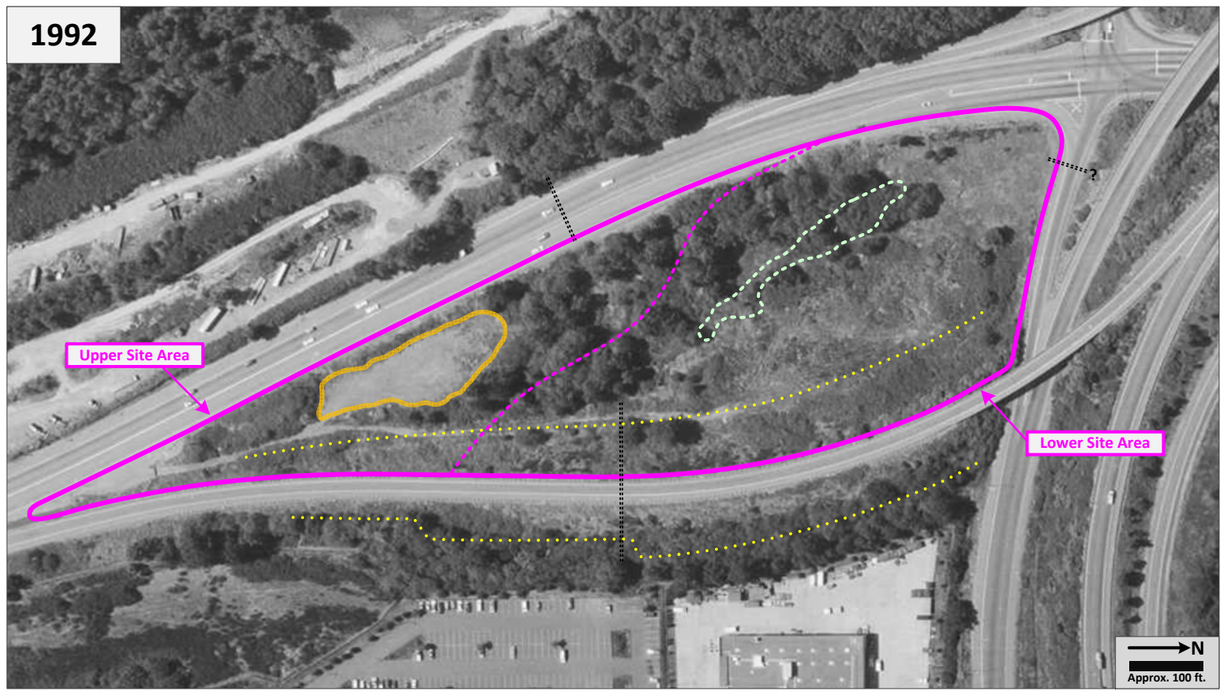
Approximate culvert location

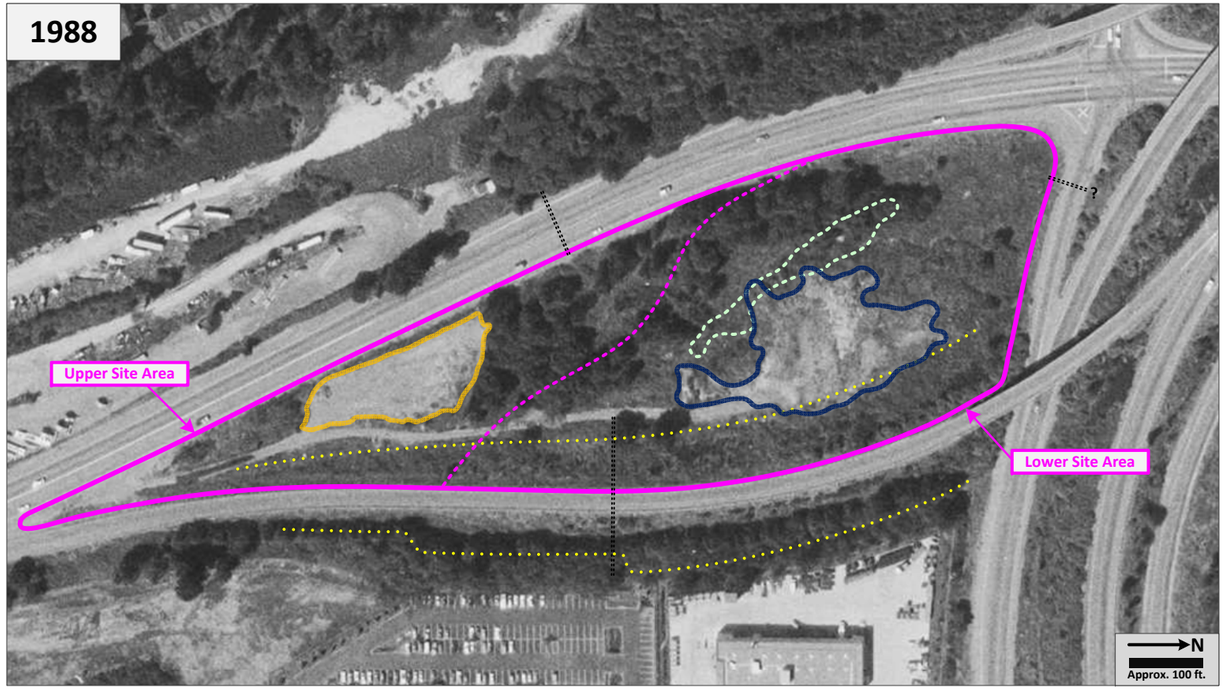
Approximate wetland area margin based on maps from Hart-Crower (1989, 1991, 1992)

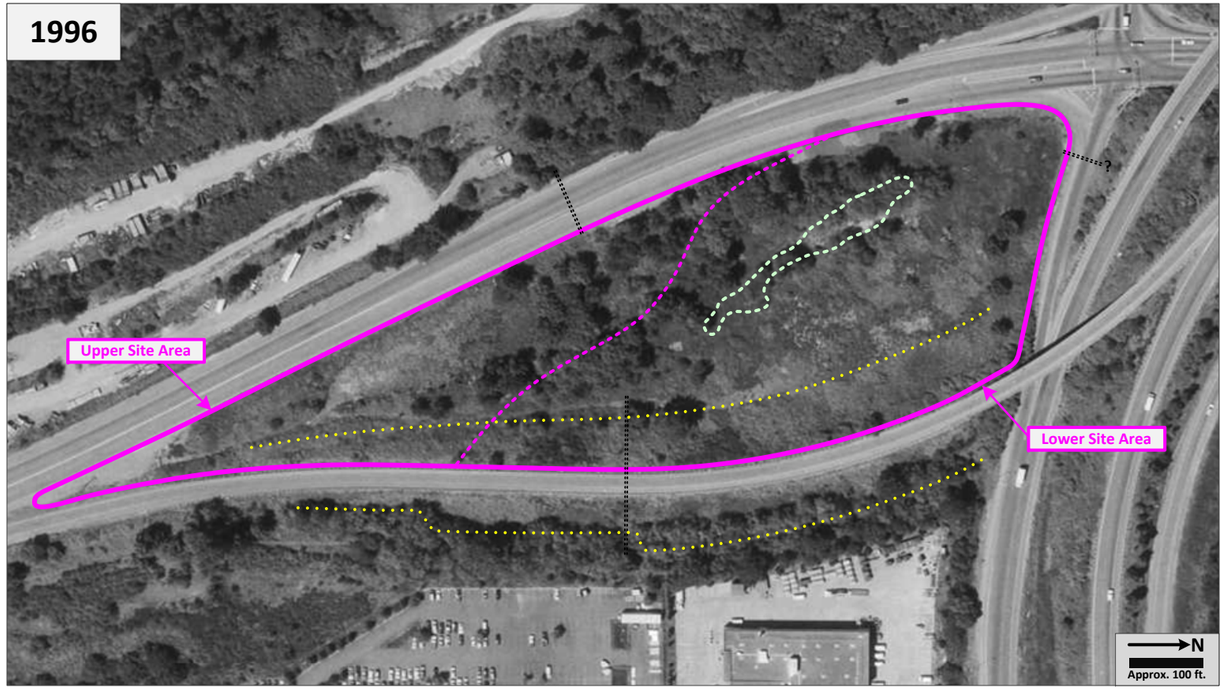
NOTE: ALL LOCATIONS AND MARGINS ARE APPROXIMATE

ATTACHMENT 1. Duwamish Fill Site (CSID 77) – Historical Aerial Photographs 1985-1996 (Page 3 of 3)









Approximate top-of-slope between upper and lower areas

Approximate Site boundary

Approximate estimated extent of active street waste fill, upper area (dashed where uncertain)

Approximate estimated extent of active street waste fill, lower area

Approximate toe of road embankment slope as constructed in 1965

Approximate culvert location

Approximate wetland area margin based on maps from Hart-Crower (1989, 1991, 1992)

NOTE: ALL LOCATIONS AND MARGINS ARE APPROXIMATE

Attachment 2

Data Summary Tables for Site Reports

FEDERAL TESTING LABORATORIES 29½ Dravus • Seattle, WA 98109 • 283-4202

received 5/3/88 from Jim Ganderson

February 3, 1988

State of Washington
Department of Transportation
6431 Corson Ave So, #C-81410
Seattle, Washington 98108
Attn: James G. Ganderson, P.E.

Test Report: #88-404

Process: Soil Anal/JO 23543
Specification: EPA Procedures
Date Tested: Jan 28 - Feb 2, 1988

Fourteen (14) samples of soil samples were received for heavy metal and oil/grease analyses. The heavy metal determinations were performed using EP Toxicity Extraction porcedures. The oil/grease analyses were performed with solvent extraction/gravimetric method 503A. No purchase order was received.

	Sample 4-1 (6)		Sample 9-1 (14)		Sample 7-1 (11)		Sample 3-1 (5)	
Arsenic	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm
Barium	0.38	ppm	0.85	ppm	2.67	ppm	0.70	ppm
Cadmium	<0.002	ppm	<0.002	ppm	0.20	ppm	0.036	ppm
Chromium	<0.005	ppm	<0.005	ppm	<0.005	ppm	<0.005	ppm
Copper	<0.002	ppm	<0.002	ppm	<0.002	ppm	<0.002	ppm
Lead	7.31	ppm	4.05	ppm	20.73	ppm	3.14	ppm
Mercury	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm
Nickel	0.48	ppm	0.055	ppm	0.10	ppm	0.14	ppm
Selenium	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm
Silver	<0.003	ppm	<0.003	ppm	<0.003	ppm	<0.003	ppm
Zinc	15.05	ppm	2.79	ppm	5.04	ppm	3.89	ppm
pH	7.11		7.58		6.09		7.92	
Oil/ grease	337.8	ppm	17.0	ppm	313.0	ppm	42.4	ppm

FEDERAL TESTING LABORATORIES 29½ Dravus • Seattle, WA 98109 • 283-4202

State of Washington
Department of Transportation
Soil Anal, cont.
Test Report #88-404
page 2.

	Sample 5-2 (8)		Sample 2-2 (4)		Sample 6-1 (9)		Sample 8-1 (13)		Sample 1-2 (2)	
Arsenic	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm
Barium	0.44	ppm	0.78	ppm	0.39	ppm	0.46	ppm	0.47	ppm
Cadmium	<0.002	ppm	<0.002	ppm	<0.002	ppm	<0.002	ppm	0.049	ppm
Chromium	<0.005	ppm	<0.005	ppm	<0.005	ppm	<0.005	ppm	<0.005	ppm
Copper	<0.002	ppm	<0.002	ppm	<0.002	ppm	<0.002	ppm	<0.002	ppm
Lead	<0.025	ppm	5.38	ppm	<0.025	ppm	2.66	ppm	0.96	ppm
Mercury	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm
Nickel	0.082	ppm	0.13	ppm	0.061	ppm	<0.01	ppm	0.26	ppm
Selenium	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm
Silver	<0.003	ppm	<0.003	ppm	<0.003	ppm	<0.003	ppm	<0.003	ppm
Zinc	1.45	ppm	8.57	ppm	0.12	ppm	0.61	ppm	3.62	ppm
pH	7.26		7.42		7.91		7.15		7.72	
/grease	6.4	ppm	28.4	ppm	8.2	ppm	1.4	ppm	27.6	ppm

	Sample 7-2 (12)		Sample 2-1 (3)		Sample 1-1 (1)		Sample 6-2 (10)		Sample 5-1 (7)	
Arsenic	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm
Barium	0.44	ppm	0.71	ppm	0.24	ppm	0.52	ppm	0.32	ppm
Cadmium	<0.002	ppm	<0.002	ppm	<0.002	ppm	<0.002	ppm	<0.002	ppm
Chromium	<0.005	ppm	<0.005	ppm	<0.005	ppm	<0.005	ppm	<0.005	ppm
Copper	<0.002	ppm	<0.002	ppm	<0.002	ppm	<0.002	ppm	<0.002	ppm
Lead	0.66	ppm	0.74	ppm	<0.025	ppm	0.85	ppm	<0.025	ppm
Mercury	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm
Nickel	0.039	ppm	0.084	ppm	<0.01	ppm	0.85	ppm	<0.01	ppm
Selenium	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm
Silver	<0.003	ppm	<0.003	ppm	<0.003	ppm	<0.003	ppm	<0.003	ppm
Zinc	0.44	ppm	2.58	ppm	0.62	ppm	0.76	ppm	1.31	ppm
pH	7.39		7.41		6.17		7.80		7.61	
Oil/ grease	19.8	ppm	135.8	ppm	17.0	ppm	47.4	ppm	24.4	ppm

The detection limits for the ICP Spectrometer are the following: Arsenic: 0.001 ppm, Barium: 0.001 ppm, Cadmium: 0.002 ppm, Chromium: 0.005 ppm, Copper: 0.002 ppm, Lead: 0.025 ppm, Mercury: 0.001 ppm, Nickel: 0.01 ppm, Selenium: 0.001 ppm, Silver: 0.003 ppm, Zinc: 0.004 ppm.

FEDERAL TESTING LABORATORIES

Patrick P. Raney

FEDERAL TESTING LABORATORIES 29½ Dravus • Seattle, WA 98109 • 283-4202

March 27, 1988

State of Washington
Department of Transportation
6431 Corson Ave So, #C-81410
Seattle, Washington 98108
Attn: James G. Ganderson, P.E.

Test Report: #88-899

Process: Soil Anal/JO 24019
Specification: EPA Procedures
Date Tested: Mar 15 - 24, 1988

Twenty (20) samples of soil samples were received for heavy metal and oil/grease analyses. The heavy metal determinations were performed using EP Toxicity Extraction porcedures. The oil/grease analyses were performed with solvent extraction/gravimetric method 503A.

	Sample 15SW	Sample 16SW	Sample 17SW	Sample 18SW	Sample 19SW
rsenic	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
arium	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
admium	<0.002 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm
hromium	<0.005 ppm	<0.005 ppm	<0.005 ppm	<0.005 ppm	<0.005 ppm
opper	0.16 ppm	0.46 ppm	0.31 ppm	0.16 ppm	0.13 ppm
ead	0.30 ppm	2.10 ppm	3.01 ppm	1.48 ppm	0.67 ppm
ercury	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
ickel	0.15 ppm	0.34 ppm	0.23 ppm	0.36 ppm	<0.01 ppm
elenium	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
ilver	<0.003 ppm	<0.003 ppm	<0.003 ppm	<0.003 ppm	<0.003 ppm
inc	1.06 ppm	14.06 ppm	6.27 ppm	4.59 ppm	3.48 ppm
H	7.66	7.20	6.79	6.19	7.95
il/ grease	83.6 ppm	145.6 ppm	36.0 ppm	295.2 ppm	26.8 ppm

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State of Washington
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Material Anal, cont.
Test Report #88-899
page 2.

	Sample 20SW	Sample 21SW	Sample 22SW	Sample 23SW	Sample 24SW
Arsenic	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Barium	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Cadmium	<0.002 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm
Chromium	<0.005 ppm	<0.005 ppm	<0.005 ppm	<0.005 ppm	<0.005 ppm
Copper	0.33 ppm	0.10 ppm	<0.002 ppm	0.12 ppm	0.08 ppm
Lead	3.09 ppm	1.03 ppm	0.87 ppm	1.00 ppm	1.34 ppm
Mercury	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Nickel	0.50 ppm	0.08 ppm	<0.01 ppm	0.12 ppm	0.15 ppm
Selenium	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Silver	<0.003 ppm	<0.003 ppm	<0.003 ppm	<0.003 ppm	<0.003 ppm
Zinc	7.55 ppm	3.88 ppm	1.48 ppm	4.16 ppm	4.00 ppm
pH	7.32	7.45	8.66	7.54	7.51
oil/ grease	90.0 ppm	59.4 ppm	35.2 ppm	120.6 ppm	417.6 ppm

	Sample 25V	Sample 26V	Sample 27V	Sample 28V	Sample 29
Arsenic	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Barium	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Cadmium	0.04 ppm	<0.002 ppm	0.04 ppm	<0.002 ppm	<0.002 ppm
Chromium	<0.005 ppm	<0.005 ppm	<0.005 ppm	<0.005 ppm	<0.005 ppm
Copper	0.13 ppm	0.17 ppm	0.55 ppm	0.12 ppm	<0.002 ppm
Lead	1.38 ppm	<0.025 ppm	<0.025 ppm	1.05 ppm	<0.025 ppm
Mercury	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Nickel	0.29 ppm	0.30 ppm	0.36 ppm	0.32 ppm	<0.01 ppm
Selenium	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Silver	<0.003 ppm	<0.003 ppm	<0.003 ppm	<0.003 ppm	<0.003 ppm
Zinc	6.50 ppm	1.29 ppm	1.87 ppm	7.12 ppm	<0.004 ppm
pH	7.23	7.97	6.95	6.93	7.10
oil/ grease	353.2 ppm	83.0 ppm	286.0 ppm	134.6 ppm	1.8 ppm

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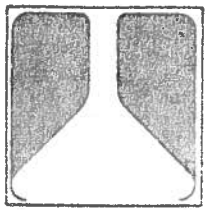

State of Washington
Department of Transportation
Material Anal, cont.
Test Report #88-899
page 2.

	Sample 30	Sample 31	Sample 32	Sample 33	Sample 34
Arsenic	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Barium	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Cadmium	<0.002 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm
Chromium	<0.005 ppm	<0.005 ppm	<0.005 ppm	<0.005 ppm	<0.005 ppm
Copper	<0.002 ppm	0.46 ppm	<0.002 ppm	0.20 ppm	0.12 ppm
Lead	13.05 ppm	15.08 ppm	<0.025 ppm	22.01 ppm	<0.025 ppm
Mercury	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Nickel	0.31 ppm	0.16 ppm	<0.01 ppm	0.06 ppm	0.10 ppm
Selenium	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Silver	<0.003 ppm	<0.003 ppm	<0.003 ppm	<0.003 ppm	<0.003 ppm
Zinc	4.71 ppm	11.52 ppm	1.63 ppm	4.19 ppm	2.26 ppm
pH	6.05	6.56	7.03	7.37	7.16
oil/ grease	21.4 ppm	52.6 ppm	7.2 ppm	31.8 ppm	33.4 ppm

The detection limits for the ICP Spectrometer are the following: Arsenic: 0.001 ppm, Barium: 0.001 ppm, Cadmium: 0.002 ppm, Chromium: 0.005 ppm, Copper: 0.002 ppm, Lead: 0.025 ppm, Mercury: 0.001 ppm, Nickel: 0.01 ppm, Selenium: 0.001 ppm Silver: 0.003 ppm, Zinc: 0.004 ppm.

FEDERAL TESTING LABORATORIES

Patrick P. Raney

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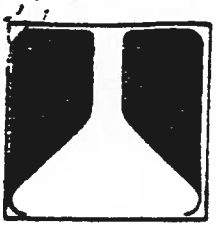

JAMES E. RICHARDS
MAY 2 : 1987
SUPERVISOR OF FACIL. MAINT.

May 20, 1987

Metro Transit
11911 East Marginal Way South, Bldg C.
Seattle, Washington 98036
Attn: E. Atkinson

Test Report: #87-1142

Process: Oil/pH /JO 20894
Specification: FTPS Anal Procedures
Date Tested: May 8 - 18, 1987

Sludge samples were tested for pH value electrometrically. The oil content is tested according to Standard Method 503A Partition Gravimetric Method.

Purchase order: B -23960

Sample Number	Date	Time	pH	Oil Content
Sludge	4/20/87		6.80	1400 ppm

Heavy metals:

Arsenic	<0.001	ppm
Cadmium	<0.002	ppm
Chromium	<0.005	ppm
Copper	<0.002	ppm
Iron	1194.5	ppm
Mercury	<0.001	ppm
Nickel	3.2	ppm
Lead	141.1	ppm
Selenium	<0.001	ppm
Silver	<0.001	ppm
Zinc	89.2	ppm

FEDERAL TESTING LABORATORIES

Patrick P. Raney

WDOT LANDFILL SITE: SOIL DATA (ORGANICS)

ECOLOGY SAMPLES

STATION ID	S1	S2	S3	S5	
LOCATION	Upland	Upland	Lowland	Upland	Waste Pile
DATE	7-24-89	7-24-89	7-24-89	7-24-89	7-03-90
ANALYSES	(a)	(a)	(a)	(a)	(b)
ORGANIC COMPOUND					
TPH (mg/kg)	NA	NA	NA	NA	1700 (gas)
PESTICIDES/PCBS (ug/kg)					
Aroclor 1254	45	38	86	39	
LPAH (ug/kg)					
Acenaphthene	9.6	10	14 U	14 U	
Anthracene	27	30	18 U	17	
Fluorene	11	13	18 U	18 U	
Phenanthrene	180	170	40	110	
HPAH (ug/kg)					
Benzo(a)anthracene	120	120	46	71	
Benzo(a)pyrene	150	230	89	100	
Benzo(b)fluoranthene	240	240	120	160	
Benzo(g,h,i)perylene	150	110	70	59	
Benzo(k)fluoranthene	210	310	130	160	
Chrysene	190	190	66	110	
Dibenzo(a,h)anthracene	220	52 U	54 U	53 U	
Fluoranthene	340	380	57	190	
Indeno(1,2,3-c,d)pyrene	230	120	73	110	
Pyrene	270	310	76	220	
PHTHALATES (ug/kg)					
Benzyl butyl phthalate	68	170	18 U	52	
Bis(2-ethylhexyl)phthalate	850	860	18 U	520	
PHENOLS (ug/kg)					
Pentachlorophenol	210	110	36 U	35 U	

HART CROWSER SAMPLES (ug/kg)

STATION	C-3A-4.6	C-3A-6.5
DATE	12-09-88	12-09-88
VOAs		
Acetone	56	86
2-Butanone	6 U	9
Toluene	2	5
Total xylenes	2 U	3

a) Samples analyzed for volatile and extractable organic compounds. Only parameters that exceed analytical detection limit reported.

b) Sample collected from waste pile deposited at site from spill response action. Sample analyzed for total petroleum hydrocarbons.

U = Undetected

DOT LANDFILL SITE: SOIL DATA (METALS)

COLOGY SAMPLES

Total metals (mg/kg)

	TYPE	DATE	As	Ba	Cd	Cr	Cu	Hg	Ni	Pb	Se	Ag	Zn
PLAND S1	SOIL LF	7-24-89	9.3	NA	0.82	71	50	0.04	32	292	0.0587 U	NA	270
PLAND S2	SOIL LF	7-24-89	10.6	NA	0.82	100	113	0.04	36	375	0.067	NA	216
OWLAND S3	SOIL LF	7-24-89	16	NA	0.86	42	388	0.04	54	73	0.2312	NA	208
PLAND S5	SOIL LF	7-24-89	12.5	NA	0.74	42	45	0.08	33	122	0.0577 U	NA	238
PLAND S6	SOIL LF	7-24-89	14.3	NA	0.62	48	45	0.04	27	728	0.0615 U	NA	127
TCA SOIL			20	NC	8	80	500	1	NC	500	NC	NC	500

ETRO SAMPLES

Total metals (mg/kg)

	TYPE	DATE	As	Ba	Cd	Cr	Cu	Hg	Ni	Pb	Se	Ag	Zn
7-1142	VACTOR	5-20-87	0.001 U		0.002 U	0.005 U	0.002 U	0.001 U	3.2	141.1	0.001 U	0.001 U	89.2

DOT SAMPLES

EP TOX (mg/L)

	TYPE	DATE	As	Ba	Cd	Cr	Cu	Hg	Ni	Pb	Se	Ag	Zn
-1	SOIL LF	1-28-88 *	0.001 U	0.38	0.002 U	0.005 U	0.002 U	0.001 U	0.480	7.31	0.001 U	0.003 U	15.05
-1	SOIL IS	1-28-88 *	0.001 U	0.85	0.002 U	0.005 U	0.002 U	0.001 U	0.055	4.05	0.001 U	0.003 U	2.79
-1	SOIL LF	1-28-88 *	0.001 U	2.67	0.200	0.005 U	0.002 U	0.001 U	0.100	20.73	0.001 U	0.003 U	5.04
-1	SOIL LF	1-28-88 *	0.001 U	0.70	0.036	0.005 U	0.002 U	0.001 U	0.001 U	3.14	0.140	0.001 U	3.89
-2	SOIL LF	1-28-88 *	0.001 U	0.44	0.002 U	0.005 U	0.002 U	0.001 U	0.082	0.025 U	0.001 U	0.003 U	1.45
-2	SOIL LF	1-28-88 *	0.001 U	0.78	0.002 U	0.005 U	0.002 U	0.001 U	0.130	5.38	0.001 U	0.003 U	8.57
-1	SOIL LF	1-28-88 *	0.001 U	0.39	0.002 U	0.005 U	0.002 U	0.001 U	0.061	0.025 U	0.001 U	0.003 U	0.12
-1	SOIL IS	1-28-88 *	0.001 U	0.46	0.002 U	0.005 U	0.002 U	0.001 U	0.010 U	2.66	0.001 U	0.003 U	0.61
-2	SOIL LF	1-28-88 *	0.001 U	0.47	0.049	0.005 U	0.002 U	0.001 U	0.260	0.96	0.001 U	0.003 U	3.62
-2	SOIL LF	1-28-88 *	0.001 U	0.44	0.002 U	0.005 U	0.002 U	0.001 U	0.039	0.66	0.001 U	0.003 U	0.44
-1	SOIL LF	1-28-88 *	0.001 U	0.71	0.002 U	0.005 U	0.002 U	0.001 U	0.084	0.74	0.001 U	0.003 U	2.58
-1	SOIL LF	1-28-88 *	0.001 U	0.24	0.002 U	0.005 U	0.002 U	0.001 U	0.010 U	0.025 U	0.001 U	0.003 U	0.62
-2	SOIL LF	1-28-88 *	0.001 U	0.52	0.002 U	0.005 U	0.002 U	0.001 U	0.850	0.85	0.001 U	0.003 U	0.76
-1	SOIL LF	1-28-88 *	0.001 U	0.32	0.002 U	0.005 U	0.002 U	0.001 U	0.010 U	0.025 U	0.001 U	0.003 U	1.31

* WDOT considers this data invalid: No QA/QC, improper sample containers
Note: WDOT bulldozed site and mixed soils after these samples collected

	TYPE	DATE	As	Ba	Cd	Cr	Cu	Hg	Ni	Pb	Se	Ag	Zn
15SW	STREET	3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.16	0.001 U	0.15	0.30	0.001 U	0.003 U	1.06
16SW	STREET	3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.46	0.001 U	0.34	2.10	0.001 U	0.003 U	14.06
17SW	STREET	3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.31	0.001 U	0.23	3.01	0.001 U	0.003 U	6.27
18SW	STREET	3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.16	0.001 U	0.36	1.48	0.001 U	0.003 U	4.59
19SW	STREET	3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.13	0.001 U	0.01 U	0.67	0.001 U	0.003 U	3.48
20SW	STREET	3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.33	0.001 U	0.50	3.09	0.001 U	0.003 U	7.55
21SW	STREET	3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.1	0.001 U	0.08	1.03	0.001 U	0.003 U	3.88
22SW	STREET	3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.002 U	0.001 U	0.01 U	0.87	0.001 U	0.003 U	1.48
23SW	STREET	3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.12	0.001 U	0.12	1.00	0.001 U	0.003 U	4.16
24SW	STREET	3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.08	0.001 U	0.15	1.34	0.001 U	0.003 U	4.00
25V	VACTOR	3-15-88	0.001 U	0.001 U	0.04	0.005 U	0.13	0.001 U	0.29	1.38	0.001 U	0.003 U	6.50
26V	VACTOR	3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.17	0.001 U	0.30	0.03 U	0.001 U	0.003 U	1.29
27V	VACTOR	3-15-88	0.001 U	0.001 U	0.04	0.005 U	0.55	0.001 U	0.36	0.03 U	0.001 U	0.003 U	1.87
28V	VACTOR	3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.12	0.001 U	0.32	1.05	0.001 U	0.003 U	7.12
29	SOIL IS	3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.002 U	0.001 U	0.01 U	0.03 U	0.001 U	0.003 U	7.10
30		3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.002 U	0.001 U	0.31	13.05	0.001 U	0.003 U	4.71
31		3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.46	0.001 U	0.16	15.08	0.001 U	0.003 U	11.52
32		3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.002 U	0.001 U	0.01 U	0.03 U	0.001 U	0.003 U	7.03
33		3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.2	0.001 U	0.06 U	22.01	0.001 U	0.003 U	7.37
34		3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.12	0.001 U	0.10	0.03 U	0.001 U	0.003 U	7.16
LAKEVIEW	STREET	3-6-89	0.1 U	0.1 U	0.1 U	0.1 U		0.05 U		0.20	0.1 U	0.1 U	
BELFAIR	STREET	1-25-89	0.1 U	0.4	0.1 U	0.1 U		0.05 U		0.10 U	0.1 U	0.1 U	
STAR LAKE	VACTOR	3-27-89	0.1 U	0.2	0.1 U	0.1 U		0.05 U		0.10 U	0.1	0.1 U	
L. GENEVA	VACTOR	3-27-89	0.1 U	0.2	0.1 U	0.1 U		0.05 U		0.10 U	0.1 U	0.1 U	

EP TOX	DW CRITERIA		5	100	1	5	0.2		5

'ART CROWSER DATA

EP TOX (mg/L)

	DEPTH	TYPE	DATE	Cd	Cu	Cr	Pb	Ni	Zn
B-3	2.5	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1
	5	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	8.5	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	10	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	12	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
B-5	0.3	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2
	0.8	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	3.2	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	5.0	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	7.0	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
B-7	0.3	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	2.8	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	4.5	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	6.5	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	8.9	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
B-9	2.5	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	5.0	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	7.5	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	10.0	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	12.5	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	15.0	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	17.5	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
B-10	2.5	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.6
	5.0	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.8	0.1 U	1.2
	7.5	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.3	0.1 U	0.5
	10.0	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2
	12.5	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.5	0.1 U	1
	15.0	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	17.5	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	20.0	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
B-12	2.5	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2
	5.0	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	10.0	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	12.5	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	15.0	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
C-3	1.5	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.4
	2	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	2.2
	4.5	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1	0.1 U	0.3
	7.6	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	1.2	0.1 U	0.9
C-5	1.9	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1
	6	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	7	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	8	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
D-6	1	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.3	0.1 U	0.3
	2.3	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	5.5	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
EP TOX	DW CRITERIA				1	5	5		5

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WDOT LANDFILL: WATER SAMPLES

ECOLOGY SECOLOGY SAMPLES

STATION	STATION	DATE	LOCATION	ANALYSES
SW-1	SW-1	1-30-90	Catch basin discharges offsite	Priority pollutants *
SW-2	SW-2	1-30-90	Wetland	Priority pollutants *
SW-3	SW-3	1-30-90	Wetland	Priority pollutants *
SW-4	SW-4	1-30-90	East of SR-599 offramp (u/s Metro SB)	Priority pollutants *

* Metals samples not preserved: Metro did not analyze.
No organic compounds detected: analytical DLs 0.1-10 ug/L.

STATION	STATION	DATE	LOCATION	ANALYSES	O&G (mg/L)	Hardness (mg/L as CaCO3)	Acetone (ug/L)	Carbon disulfide (ug/L)	Toluene (ug/L)	Bis(2-ethyl hexyl phthalate (ug/L)	Fluor-anthene (ug/L)	Pyrene (ug/L)
SW-1	SW-1	5-08-90	Foot of upland site	Priority pollutants	8.1	327	3 J	5 U	5 U	1 J	10 U	10 U
SW-2	SW-2	5-08-90	20 ft north of SW-1	VOAs	32.6	128	10 U	1 J	3 J	NA	NA	NA
SW-3	SW-3	5-08-90	North end of landfill	Priority pollutants	29.6	121	10 U	5 U	5 U	4 J	1 J	1 J
GW-2	GW-2	5-08-90	20 ft north of SW-1 (dug 3 ft hole)	Priority pollutants	3	282	10 U	5 U	5 U	10 U	10 U	10 U

Metals results missing from file.

WDOT SAMPWDOT SAMPLES

STATION	STATION	DATE	LOCATION	ANALYSES	Cd (ug/L)	Cr (ug/L)	Cu (ug/L)	Pb (ug/L)	Hg (ug/L)	Ni (ug/L)	Zn (ug/L)	Penta (ug/L)	TOX (ug/L)	PCB (ug/L)	2-methyl naphthalene (ug/L)
Site 1	Site 1	2-06-90	South East Pond	Metals, PAH, PCBs, TOX, Pentachlorophenol	2 U	5 U	11	10 U	1 U	10	12	4	30	0.5 U	2
Site 2	Site 2	2-06-90	North West Pond	Metals, PAH, PCBs, TOX, Pentachlorophenol	2 U	5 U	5	10 U	1 U	10 U	12	1 U	20	0.5 U	2 U

ecology and environment

Table 1

WSDOT Solid Waste Disposal Site
SR99 and South 124th Street, Seattle
Summary of Soil Constituent Concentrations

PARAMETER	Detection Frequency	Minimum Detected Value (in ppm)	Maximum Detected Value (in ppm)	Mean of Detected Values (in ppm)	Mean of All Values (in ppm)
Native Soils					
Copper	0/11	-----	-----	-----	0.1
Nickel	0/11	-----	-----	-----	0.1
Cadmium	0/11	-----	-----	-----	0.01
Lead	0/11	-----	-----	-----	0.1
Chromium	0/11	-----	-----	-----	0.1
Zinc	0/11	-----	-----	-----	0.1
Fill Soils					
Copper	0/38	-----	-----	-----	0.1
Nickel	0/38	-----	-----	-----	0.1
Cadmium	0/38	-----	-----	-----	0.01
Lead	6/38	0.1	1.2	0.533	0.168
Chromium	0/38	-----	-----	-----	0.1
Zinc	15/38	0.1	2.2	0.553	0.279
Total Soils					
Copper	0/49	-----	-----	-----	0.1
Nickel	0/49	-----	-----	-----	0.1
Cadmium	0/49	-----	-----	-----	0.01
Lead	6/49	0.1	1.2	0.533	0.153
Chromium	0/49	-----	-----	-----	0.1
Zinc	15/49	0.1	2.2	0.553	0.239

Table 2

WSDOT Solid Waste Disposal Site
SR99 and South 124th Street, Seattle
Summary of Soil Constituent Concentrations With Depth

PARAMETER	Detection Frequency	Minimum Detected Value (in ppm)	Maximum Detected Value (in ppm)	Mean of Detected Values (in ppm)	Mean of All Values (in ppm)
0 - 5 ft. depth interval					
Copper	0/18	-----	-----	-----	0.1
Nickel	0/18	-----	-----	-----	0.1
Cadmium	0/18	-----	-----	-----	0.01
Lead	2/18	0.1	0.3	0.2	0.111
Chromium	0/18	-----	-----	-----	0.1
Zinc	9/18	0.1	2.2	0.489	0.294
5 - 10 ft. depth interval					
Copper	0/17	-----	-----	-----	0.1
Nickel	0/17	-----	-----	-----	0.1
Cadmium	0/17	-----	-----	-----	0.01
Lead	3/17	0.3	1.2	0.767	0.218
Chromium	0/17	-----	-----	-----	0.1
Zinc	4/17	0.1	1.2	0.675	0.235
>10 ft. depth interval					
Copper	0/14	-----	-----	-----	0.1
Nickel	0/14	-----	-----	-----	0.1
Cadmium	0/14	-----	-----	-----	0.01
Lead	1/14	0.5	0.5	0.5	0.129
Chromium	0/14	-----	-----	-----	0.1
Zinc	2/14	0.2	1.0	0.6	0.171

Table 3 – Summary of Soil Quality Data

Boring Number	MW-1	MW-1	MW-2	MW-2	MW-3	MW-3	DUP	MW-4	MW-4
Sample Number	S-2	S-7	S-2	S-7	S-2	S-4	S-4	S-2	S-5
Depth in Feet	5.0-6.5	22.5-24.0	5.0-6.5	22.5-24.0	5.0-6.5	10.0-11.5		5.0-6.5	7.5-9.0
PID (H-Nu)	13	4.9	<1	<1	<1	<1		<1	<1
				Concentration in mg/kg (ppm)					
METALS									
Arsenic	3.3	3.1	2.1	2.1	3.5	4.6	8.4	3.0	2.3
Cadmium	1.3	1.0	0.8	1.0	0.7	1.0	1.5	0.7	0.5
Chromium	31.5	28.8	19.4	18.6	11.8	26.0	30.9	11.7	8.3
Copper	21.0	15.1	17.2	18.6	18.7	18.2	29.2	18.6	10.8
Lead	3.2	4.2	4.0	2.9	4.6	5.8	21.9	6.0	1.8
Nickel	38.6	38.7	27.6	23.4	11.2	25.4	43.4	9.9	8.5
Zinc	35.4	32.6	26.9	27.3	25.8	74.5	184.0	24.8	16.5
TOTAL PETROLEUM HYDROCARBONS									
	19	NA	5.5	5 U	8.4	5 U	17	24	10
VOLATILE ORGANICS									
Methylene Chloride	0.25 U	NA	0.19 JB	NA	NA	0.64 B	NA	NA	0.45 B
Acetone	1 U	NA	1 U	NA	NA	1 U	NA	NA	1 U
SEMIVOLATILE ORGANICS									
Di-n-Butylphthalate	0.82 B	NA	0.16 JB	NA	NA	0.22 JB	NA	NA	0.84 B
POLYNUCLEAR AROMATIC HYDROCARBONS*									
Non-Carcinogenic	0.26	0.26	0.51 U	0.51 U	0.92 U	0.51 U	0.27	0.90 U	0.26
Carcinogenic	0.14 U	0.14 U	0.14 U	0.14 U	0.25 U	0.14 U	0.14 U	0.24 U	0.14 U

U = Chemical parameter not detected at detection limit indicated.
B = Chemical parameter also detected in laboratory blank.
J = Concentration is estimated value.
NA = Not analyzed.
*Note: Summed PAH concentrations are based on one-half of detection limit values for non-detected compounds.

3351u3.wk1

Table 3 – (Continued)

Boring Number	B-13	B-13	B-14	B-14	B-15	B-15	B-16	B-16	B-17	B-17
Sample Number	S-3	S-5	S-2	S-5	S-2	S-6	S-3	S-5	S-1	S-5
Depth in Feet	7.5-9.0	12.5-14.0	5.0-6.5	12.5-14.0	5.0-6.5	15.0-16.5	7.5-9.0	12.5-14.0	2.5-4.0	12.5-14.0
PID (H-Nu)	17.3	3.7	<1	<1	<1	6.8	8.9	11.2	<1	<1
Concentration in mg/kg (ppm)										
METALS										
Arsenic	6.4	14.1	7.0	2.5	4.2	1.4	11.2	1.8	10.2	2.4
Cadmium	0.9	1.4	1.3	0.8	0.7	1.1	1.3	1.0	0.8	0.9
Chromium	15.1	28.7	30.6	28.4	12.9	29.5	30.3	32.1	18.9	10.7
Copper	26.2	29.2	26.3	15.8	21.5	19.4	20.2	15.1	28.0	23.0
Lead	7.1	55.1	20.3	2.2	5.2	4.5	28.7	3.1	18.9	3.4
Nickel	14.2	29.4	34.6	27.9	8.0	29.8	29.9	32.0	21.1	9.8
Zinc	28.4	53.9	230.0	29.1	19.7	36.3	42.6	31.4	37.7	23.7
TOTAL PETROLEUM HYDROCARBONS										
	25	NA	36	NA	32	NA	150	NA	70	NA
VOLATILE ORGANICS										
Methylene Chloride	0.52	NA	0.99	NA	1.1 B	NA	0.86 B	NA	0.92 B	NA
Acetone	1.1 J	NA	1.4 J	NA	1.9 B	NA	1.4 B	NA	2.1 B	NA
SEMIVOLATILE ORGANICS										
Di-n-Butylphthalate	1 B	NA	1.4 B	NA	1.1 B	NA	1.2 B	NA	1.1 B	NA
POLYNUCLEAR AROMATIC HYDROCARBONS*										
Non-Carcinogenic	0.38	0.46	0.44	0.41	0.78 U	0.51 U	0.46	0.26	2.28	0.26
Carcinogenic	0.20 U	0.20 U	0.21 U	0.22 U	0.21 U	0.14 U	0.22 U	0.14 U	1.56	0.14 U

U = Chemical parameter not detected at detection limit indicated.
B = Chemical parameter also detected in laboratory blank.
J = Concentration is estimated value.
NA = Not analyzed.
*Note: Summed PAH concentrations are based on one-half of detection limit values for non-detected compounds.

Table 4 – Summary of Groundwater Quality Data

Well Number	MW-1	MW-2	MW-3	MW-3 DUP	MW-4	TRIP BLANK
FIELD PARAMETERS						
Temperature in °C	16	17	14		16	
pH	7.8	6.4	6.5		6.4	
Elec. Conductivity in µmho	250	980	780		960	
		Concentration in µg/L (ppb)				
METALS (TOTAL)						
Arsenic	16	32	14	10	37	
Cadmium	8	5 U	8	6	10	
Chromium	120	20	130	90	120	
Copper	100	20 U	100	80	240	
Lead	22	110	25	21	200	
Nickel	160	10 U	120	90	100	
Zinc	240	150	330	310	400	
METALS (DISSOLVED)						
Arsenic	2	2 U	3	2	9	
Cadmium	5 U	5 U	5 U	5 U	5 U	
Chromium	10 U	10 U	10 U	10 U	10 U	
Copper	20 U	20 U	20 U	20 U	20 U	
Lead	5	3	5	5	5	
Nickel	10 U	10 U	10 U	10 U	10 U	
Zinc	50 U	110	90	90	50 U	
TOTAL PETROLEUM HYDROCARBONS						
	1000 U	1000 U	1000 U	1000 U	1000 U	
VOLATILE ORGANICS						
Acetone	10 U	10 U	8 J	10 U	21	8 J
Methylene Chloride	5 U	5 U	5 U	5 U	3 J	6
Toluene	1 U	1 U	1 U	1 U	1	1 U
SEMIVOLATILE ORGANICS						
Di-n-Butylphthalate	10 U	10 U	10 U	10 U	10 U	
POLYNUCLEAR AROMATIC HYDROCARBONS*						
Non-Carcinogenic	3.00 U	3.00 U	1.57	3.00 U	3.00 U	
Carcinogenic	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	

U = Chemical parameter not detected at detection limit indicated

B = Chemical parameter also detected in laboratory blank

J = Concentration is estimated value

* Note: Summed PAH concentrations are based on one-half of detection limit values for non-detected compounds

335t4.wk1

Table 1 - Summary of Groundwater Quality Data

Well Number	MW-1	MW-2	MW-3	MW-3D	MW-4	Trip Blank
Field Parameters						
Temperature in °C	13	12	11	NA	11	NA
pH	8.1	7.0	7.0	NA	6.7	NA
Elec. Conductivity in µmhos	500	1350	820	NA	1400	NA
Total Metals						
in µg/L (ppb)						
Arsenic	8.5	5	12	14	7.3	NA
Cadmium	2 U	2 U	2 U	2 U	2 U	NA
Chromium	60	74	120	120	54	NA
Copper	22	42	100	98	35	NA
Lead	5.8	8.4	33	34	35	NA
Nickel	43	43	100	120	14	NA
Zinc	180	130	320	300	180	NA
Dissolved Metals						
in µg/L (ppb)						
Arsenic	5 U	5 U	5 U	5 U	5 U	NA
Cadmium	2 U	2 U	2 U	2 U	2 U	NA
Chromium	10 U	10 U	10 U	10 U	10 U	NA
Copper	10	6.5	5 U	5 U	5 U	NA
Lead	3 U	3 U	3 U	3 U	3 U	NA
Nickel	10 U	10 U	10 U	10 U	10 U	NA
Zinc	39	50	22	22	32	NA
Total Petroleum Hydrocarbons						
in µg/L (ppb)						
TPH 418.1	1000 U	1000 U	1000 U	1000 U	1000 U	NA
Volatile Organics						
in µg/L (ppb)						
Acetone	10 U	10 U	10 U	10 U	10 U	67
Methylene Chloride	5 U	5 U	5 U	5 U	5 U	5 U
Tetrachloroethene	1 U	1 U	1 U	5	1 U	1 U
Semivolatile Organics						
in µg/L (ppb)						
Bis(2-ethylhexyl) Phthalate	10 U	10 U	10 U	10 U	16	NA
Polynuclear Aromatic Hydrocarbons (PAHs) (a)						
in µg/L (ppb)						
Non-carcinogenic	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U	NA
Carcinogenic	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	NA

Notes:

U Not detected at indicated detection limit.

NA Not analyzed.

(a) Summed PAH concentrations are based on one-half of detection limit values for non-detected compounds.

On CD

Attachment 3 – Laboratory Data and Reports from Hart-Crowser

Attachment 4 – Laboratory Data Reports for Ecology and Other Samples

Attachment 5 – Ecology Sampling and Inspection Reports

Attachment 6 – Historical Maps, Boring Logs, and Cross-Sections

HARTCROWSER

Earth and Environmental Technologies

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APR 28 1989
DEPARTMENT OF ECOLOGY
NORTHWEST REGION

Phase I Sampling and Analysis
WSDOT Solid Waste Disposal Site
SR-99 and South 124th Street
Seattle, Washington

Prepared for
Washington State
Department of Transportation

J-2228

1910 Fairview Avenue East Seattle, Washington 98102-3699 206.324.9530

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SEATTLE, WASHINGTON

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PHASE I SAMPLING AND ANALYSIS
WSDOT SOLID WASTE DISPOSAL SITE
SR-99 AND SOUTH 124TH STREET
SEATTLE, WASHINGTON

INTRODUCTION

The Washington State Department of Transportation (WSDOT) received an order from the Washington State Department of Ecology (Ecology) (Order No. DE 88-N161, dated August 4, 1988) to characterize and remediate a metals-contaminated solid waste disposal site located at State Route 99 and South 124th Street in Seattle, Washington. Figure 1 presents the site location. Sampling conducted at the site in mid-1987 and early 1988 showed extractable lead concentrations exceeded Dangerous Waste criteria (EP Toxicity).

The order required WSDOT to 1) develop a sampling plan characterizing the nature and extent of metals contamination; 2) perform sampling in accordance with the approved sampling plan; and 3) develop a plan for the removal of all contaminated soil. A secondary issue, aside from characterization and remediation, is that a portion of the site may be a wetlands. Ecology has agreed to address this issue separately, subsequent to sampling, analysis, and remediation.

The approved sampling plan is presented in Appendix A. This report presents the results of the latest sampling and analysis conducted at the site and discusses the need for any additional sampling and remediation. Any future site activities will be based on discussions between WSDOT and Ecology directing the need for and approach to additional sampling and/or remediation.

This work was performed in accordance with our proposal dated November 8, 1988, Task Assignment No. 13, Statewide Hazardous Waste Agreement Y-3832.

This work was performed and this report prepared in accordance with generally accepted professional practices in the same or similar localities, related to the nature of the work accomplished, at the time the services are performed. It is intended for the exclusive use

of WSDOT for specific application to the job site. This report is not meant to represent a legal opinion. No other warranty, express or implied, is made.

Our work included:

- Providing personnel and equipment necessary to carry out on-site sampling of soil;
- Engaging analytical laboratory services to perform sample analyses;
- Interpreting sample analysis results; and
- Presenting results to WSDOT in a project report, including any recommendations for Phase II work.

SUMMARY OF FINDINGS

- Forty-nine soil samples were collected from nine borings located in three distinct areas at the WSDOT Solid Waste Disposal Site (see Figure 2): upper area (three borings); lower area - wet locations (three borings); lower area - dry locations (three borings). Samples were collected throughout the soil column from the surface to 5 feet below the waste material-native soil contact. Chemical parameters for sample analysis were selected based on previous sample results and included EP Toxicity for cadmium, chromium, lead, copper, nickel, and zinc.
- Waste material from WSDOT disposal activities was made up of fine to medium sands and silts, with some gravels and organic matter occasionally found. The native soils appeared to be more compact sand and silts or peats. Based on soil color, soils below 5 feet appeared to be in a reduced environment - they were gray and mottled.
- Solvent-like odors were noticed at one sample location, boring C-3; these odors were associated with carpeting removed from the boring. Because of these odors, two additional soil samples were collected for volatile organic analysis. It was necessary to auger a second boring (C-3A) adjacent to boring C-3 to collect these samples since

organic analyses were not anticipated as being necessary during the initial sampling.

- Lead and zinc were the only metals detected using the EP Toxicity test. Lead was above detection levels in 15 percent of the samples; zinc in 33 percent of the samples. These two metals were detected at very low levels and only in the waste materials - the highest reported concentration of extractable lead was 1.2 mg/L (ppm) and of extractable zinc was 2.2 mg/L (ppm). No extractable lead or zinc (or any other metals) were detected in native soils or in the two background soil samples collected.

- Of the fifteen samples in which either extractable lead or zinc were detected, nine were detected in two borings, B-10 and C-3.

- There did not appear to be any correlation between leachable metals concentrations and the three sampled areas within the solid waste disposal site, i.e., upper, lower-wet, or lower-dry.

- Although zinc was detected in the upper 5 feet in 9 of the 18 samples from this depth interval, there appeared to be little, if any, correlation of zinc or lead concentrations with depth.

- The volatile organic results showed very low levels of acetone (86 ppb), toluene (5 ppb), 2-butanone (9 ppb), and total xylenes (3 ppb) to be present in boring C-3A.

RECOMMENDATIONS

- Additional sampling of on-site soils does not appear to be warranted at the site. Phase I sampling results indicate current conditions are not causing contaminants to be released at dangerous waste levels.

- Remediation of current conditions also does not seem warranted. Presently, there are no dangerous wastes at the site based on our sampling and analysis.

- WSDOT should implement a program to characterize vactor sludge and street sweeping wastes prior to disposal.

Potentially, these wastes have extractable levels of lead or other metals in excess of dangerous waste characteristics. WSDOT should recognize they may be at risk for contaminating the environment.

Once the incoming materials have been characterized, we recommend designing, if necessary, a disposal system to address any issues brought about by the characterizations.

SITE DESCRIPTION AND NATURE OF THE WASTES

The site, shaped like an elongated teardrop, is located between roadway embankments supporting SR-99 (Pacific Highway South), SR-599, and an access ramp to SR-599. It is approximately 8 acres and can be divided into two areas: upper and lower. The upper area is approximately 3 acres and rises about 25 feet above the lower area of 5 acres. The lower area contains a wetland within its western half. The remainder of the lower area is dry. A gravel road travels the eastern side of the site and provides access to the two areas. Much of the site is covered by grasses, shrubs, and trees. Current topographic information does not exist for the site. See Figure 1.

The site received street sweeping waste, vactor truck sludge, and other materials generated during roadway cleanups since circa 1965. According to WSDOT maintenance employees, these wastes were randomly spread across the site. No particular plan was adhered to for filling the site. Reportedly, waste in the upper area is 25 to 30 feet deep and in the lower area approximately 4 to 6 feet deep. Apparently, there are no locations within the site that are free of these roadway maintenance wastes.

The wastes were assumed to be heterogeneous throughout the site. Prior WSDOT sampling (data are contained in Appendix A) indicates that metals concentrations vary widely across the surface of the site, e.g., EP Toxicity levels for lead range from <0.025 ppm to 20.73 ppm.

FIELD SAMPLING ACTIVITIES

The goal of the Phase I sampling was to evaluate the surficial and vertical distribution of metals at the site. We sought to profile the distribution and concentration of leachable metals at the site; to determine if dangerous wastes were present on-site; and to investigate the relationships between the three areas present at the site and metals distribution and concentration.

A total of 49 soil samples were collected at the WSDOT solid waste disposal site by Hart Crowser during December 1988. We completed three borings in each of the three areas at the site: upper area - borings B-9, B-10, B-12; lower area, wet locations - borings B-3, B-5, B-7; and lower area, dry locations - borings C-3, C-5, D-6. These borings were somewhat relocated during field activities from what was outlined in the sampling plan due to conditions encountered in the field. In addition, we collected two samples for organic analyses from a boring (C-3A) installed adjacent to C-3. Boring C-3 had solvent-like odors associated with carpet fragment removed from the boring at a depth of approximately 4.5 feet. Two background soil samples, BG-1 and BG-2, were collected off-site in January 1989. The locations of these borings and samples are shown on Figures 1 and 2. All borings and samples were field located, staked, and numbered.

Sample collection procedures are outlined in Section 4.0 of the Sampling Plan, presented in Appendix A. Geologic sample descriptions are presented in Appendix B. Analytical laboratory data reports, a review of the data quality, and chain of custody forms for the samples are included in Appendix C.

Chemical Analysis

A total of 51 soil samples, including two background samples, were submitted to Laucks Testing Laboratories, Inc., of Seattle, Washington for EP Toxicity metals analysis. The metals analyzed were cadmium, chromium, lead, copper, nickel, and zinc. In addition, two soil samples collected from boring C-3A were submitted for volatile organics analysis using EPA method 8240.

Results of Chemical Analysis

Lead and zinc were the only metals detected using the EP Toxicity test. Extractable lead was detected in only 6 of the 49 samples analyzed. Lead concentrations ranged from not detected to 1.2 mg/L (ppm). Extractable lead, or any other metals, were not detected in any of the samples collected in native soils. Extractable zinc was detected in 15 of the 49 samples analyzed. Zinc concentrations ranged from not detected to 2.2 mg/L (ppm). Extractable zinc, or any other metals, were not detected in any of the samples collected in native soils. A summary of detection frequencies and values is presented in Table 1 at the end of the text of this report.

Metal concentrations with depth are presented on Figure 3. The vertical distribution trends of lead and zinc concentrations in soil were examined, relative to ground surface. A statistical model was used to evaluate trends in the data, a trend being a consistent change in the concentration from one location to another. The model was fit to the actual data and is used to quantify the rate at which concentrations change over the site.

The model is only a guideline and has error associated with its prediction. To evaluate the error associated with model use the term r-squared is used. R-squared is a measure of the model fit to the actual data. The range of values for r-squared is 0 to 1. A value near 1 (>0.90) indicates that model fit is good. A value <0.7 indicates that model fit is poor and that the data do not present a trend to be evaluated.

Lead concentrations do not appear to be correlated with sample depth. The calculated correlation coefficient(r^2) for lead concentrations versus depth was well below 0.5 and no clear trend was observed in the data presented in Table 2. Based on the data presented in Table 2, zinc concentrations appear to decrease slightly with depth. However, the calculated correlation coefficient for zinc concentrations versus depth was also quite low, well below 0.5.

In addition, no correlation was noted between the type of area within the disposal site;

upper, lower-wet, or lower-dry and concentration and distribution of metals.

Several volatile organic compounds were detected in the two soil samples collected from boring C-3A. Acetone (56 ppb) and toluene (2 ppb) were detected in the sample collected at a depth of 4.6 feet. Acetone (86 ppb) and toluene (5 ppb) were also detected in the soil sample collected at a depth of 6.5 feet. 2-butanone (9 ppb) and total xylenes (3 ppb) were also detected in this sample.

Discussion of Sample Analysis Results

Our sample analysis results did not detect heavy metals at concentration near hazardous waste designation levels. The EP Toxicity test results did note a rather random spread of metals at the sampled locations, inferring limited leachability. However, our results do not explain previous sampling results or general assumptions about sludges and sweepings from roadways.

Our results can be summarized as follows:

- Copper, nickel, cadmium, and chromium were not detected in any of the samples collected at this site. No EP Toxicity metals were detected in the two soil background samples.

- Extractable lead was detected in less than 15 percent of the soil samples. The highest concentration detected (1.2 mg/L) is well below Ecology's dangerous waste criteria of 5 mg/L for EP Toxicity lead (WAC 173-303-090(8)).

- Extractable zinc was detected in less than 33 percent of the soil samples collected at the site. The highest concentration detected (2.2 mg/L) is below Ecology's Technical Information Memorandum (TIM) No. 86-1 (contained in Appendix D) guideline of 5.0 mg/L for the sum total of extractable copper, nickel, and zinc. This is because copper and nickel were not detected in any soil samples above 0.1 mg/L (0.1 mg/L + 0.1 mg/L + 2.2 mg/L = 2.4 mg/L which is less than 5.0 mg/L). This TIM guideline suggests that there may be associated environmental risk if this level is exceeded and that additional testing -- the aquatic toxicity criteria --

is warranted. Such is not the case at this site.

Although dangerous waste levels of extractable lead were detected at the site surface during past WSDOT sampling (March 1988, see Appendix A), they are not now present based on our recently conducted sampling. Although we can not explain this difference, there are several reasons to discount these earlier results.

The random, grab sampling conducted by WSDOT at the surface of the site may have hit a hot spot. In addition, WSDOT representatives have stated that their sampling protocol was poor -- no mapping of sample locations, improper containers, lack of decontamination between samples, etc. In addition to the samples not being representative, cross contamination of samples could have resulted giving higher levels of leachable metals than what actually existed.

There are other scenarios that could explain why our metals results were so low:

- There have been previous studies of sludges and sweepings from roadways that noted lead and other metals contamination. However, due to the wet climate present in this area, much of these metals may have already leached from these solids before collection and disposal.

- Another scenario is that it may be that metals levels are related to the age of the deposits. Fresh or new waste materials may contain higher levels of metals that are quickly washed out. Older deposits do not contain leachable levels of metals. Additional testing is required to assess the validity of this scenario and to determine if 1) any treatment or other remedial action is necessary prior to placing new waste materials at the WSDOT solid waste disposal site, or 2) an alternative disposal site is necessary, e.g., a lined landfill with leachate collection.

- A third scenario is that metals in the fill material are bound or absorbed to organic matter, negatively charged clay particles, or iron and manganese oxides. A substantial amount of organic material was observed in the fill and native soils. The presence of this organic material can greatly reduce the

mobility of metals at the WSDOT solid waste disposal site.

Finally, our sampling analysis results did identify two solvent like compounds at low concentrations. Acetone and 2-butanone (methyl ethyl ketone (MEK)) concentrations detected in boring C-3A soil samples may be due to laboratory contamination. Acetone and MEK are often used as solvents in analytical laboratories and are common laboratory contaminants. However, these compounds were not detected in the associated laboratory method blank. The low concentrations (less than 6 ppb) of toluene and total xylenes may indicate the presence of residual solvents or other petroleum products. The concentrations are very low and are not of concern.

Apparently, the organic contaminants associated with boring C-3 are an isolated case or else we would have run across similar contaminants elsewhere on-site.

We hope this report will meet your immediate needs. Please call us if you have any questions or if we can be of further assistance.

HART CROWSER, INC.

KRISTIN J. DARNELL
Project Engineer

RICHARD D. PIERCE
Associate

KJD/RDP:sde
FR2228/JOBS

Table 1

WSDOT Solid Waste Disposal Site
SR99 and South 124th Street, Seattle
Summary of Soil Constituent Concentrations

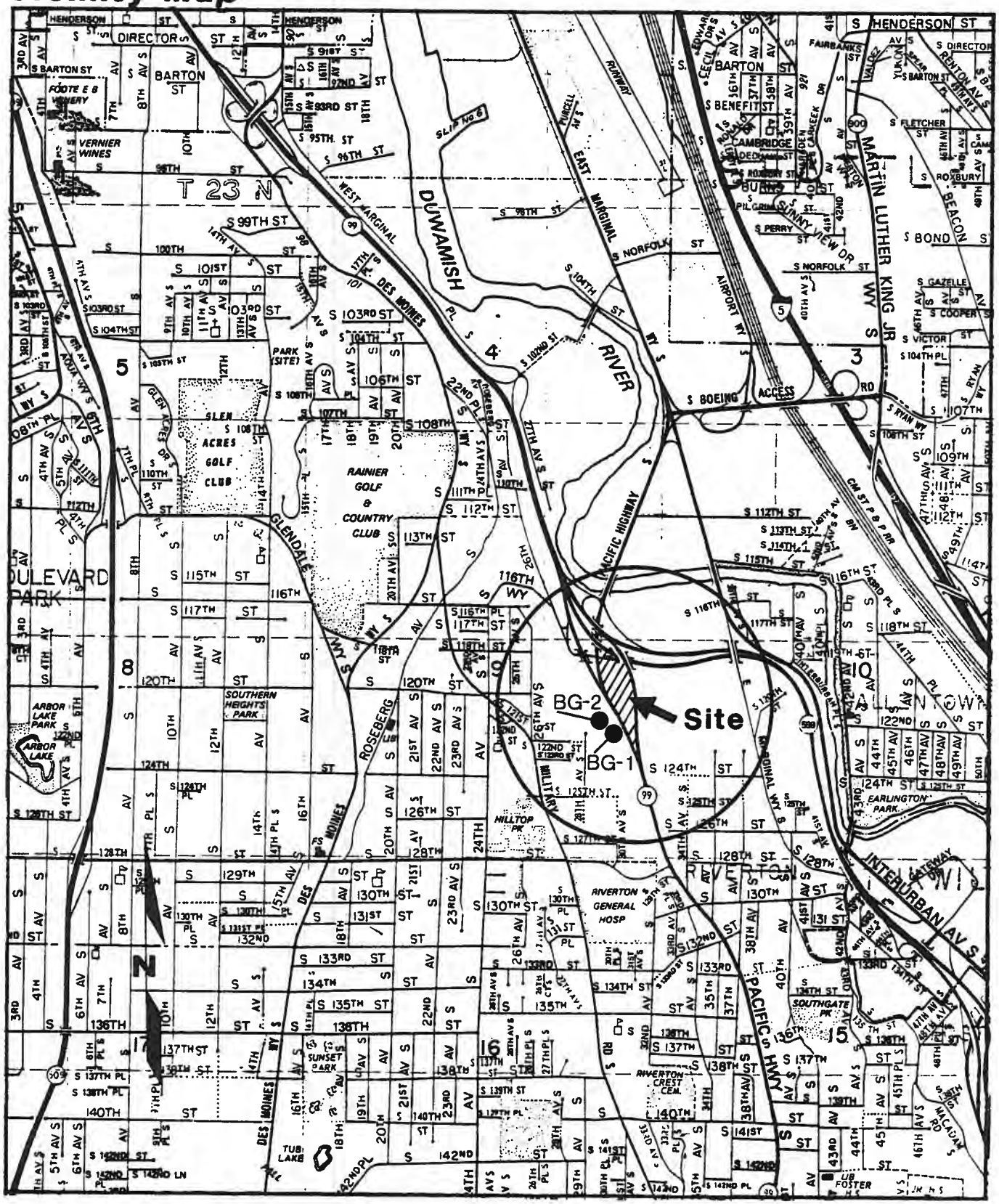
PARAMETER	Detection Frequency	Minimum Detected Value (in ppm)	Maximum Detected Value (in ppm)	Mean of Detected Values (in ppm)	Mean of All Values (in ppm)
Native Soils					
Copper	0/11	-----	-----	-----	0.1
Nickel	0/11	-----	-----	-----	0.1
Cadmium	0/11	-----	-----	-----	0.01
Lead	0/11	-----	-----	-----	0.1
Chromium	0/11	-----	-----	-----	0.1
Zinc	0/11	-----	-----	-----	0.1
Fill Soils					
Copper	0/38	-----	-----	-----	0.1
Nickel	0/38	-----	-----	-----	0.1
Cadmium	0/38	-----	-----	-----	0.01
Lead	6/38	0.1	1.2	0.533	0.168
Chromium	0/38	-----	-----	-----	0.1
Zinc	15/38	0.1	2.2	0.553	0.279
Total Soils					
Copper	0/49	-----	-----	-----	0.1
Nickel	0/49	-----	-----	-----	0.1
Cadmium	0/49	-----	-----	-----	0.01
Lead	6/49	0.1	1.2	0.533	0.153
Chromium	0/49	-----	-----	-----	0.1
Zinc	15/49	0.1	2.2	0.553	0.239

Table 2

WSDOT Solid Waste Disposal Site
SR99 and South 124th Street, Seattle
Summary of Soil Constituent Concentrations With Depth

PARAMETER	Detection Frequency	Minimum Detected Value (in ppm)	Maximum Detected Value (in ppm)	Mean of Detected Values (in ppm)	Mean of All Values (in ppm)
0 - 5 ft. depth interval					
Copper	0/18	-----	-----	-----	0.1
Nickel	0/18	-----	-----	-----	0.1
Cadmium	0/18	-----	-----	-----	0.01
Lead	2/18	0.1	0.3	0.2	0.111
Chromium	0/18	-----	-----	-----	0.1
Zinc	9/18	0.1	2.2	0.489	0.294
5 - 10 ft. depth interval					
Copper	0/17	-----	-----	-----	0.1
Nickel	0/17	-----	-----	-----	0.1
Cadmium	0/17	-----	-----	-----	0.01
Lead	3/17	0.3	1.2	0.767	0.218
Chromium	0/17	-----	-----	-----	0.1
Zinc	4/17	0.1	1.2	0.675	0.235
>10 ft. depth interval					
Copper	0/14	-----	-----	-----	0.1
Nickel	0/14	-----	-----	-----	0.1
Cadmium	0/14	-----	-----	-----	0.01
Lead	1/14	0.5	0.5	0.5	0.129
Chromium	0/14	-----	-----	-----	0.1
Zinc	2/14	0.2	1.0	0.6	0.171

Vicinity Map



Base map prepared from Thomas Guide map 33 of King County, Washington, 1988 updated edition.

●BG-1 Background Sample Location and Number

0 2000 4000

Scale in Feet

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Figure 1

Site and Exploration Plan

boundary appears approx. correct
Addtnl soil samples would further define wetland edge

Hwy. 99 (Pacific Hwy.)

Manhole

Power Pole

Power Pole with 2 Transformers

Overflow Catch Basin

Light Post

B-12

B-10

B-9

Trees and Brush

Water

B-3

Catch Basin

B-5

B-7

3' of fill - upland weedy species - irregular surface, previously filled

C-3

C-5

C-3A

D-6

Sweepings Dumped in Road to Lower Level

Access Ramp

Hwy. 599

B-5 Phase I Boring Location and Number

Approximate Location of Upper Area

Base Map Prepared from Drawings Entitled "SR 99 West Marginal Way to Burns Street, King County, Washington, Sheets 27 and 28", by Washington State Highway Commission, Dated April 13, 1964. Field Revised December, 1988

N

0 100 200

Scale in Feet

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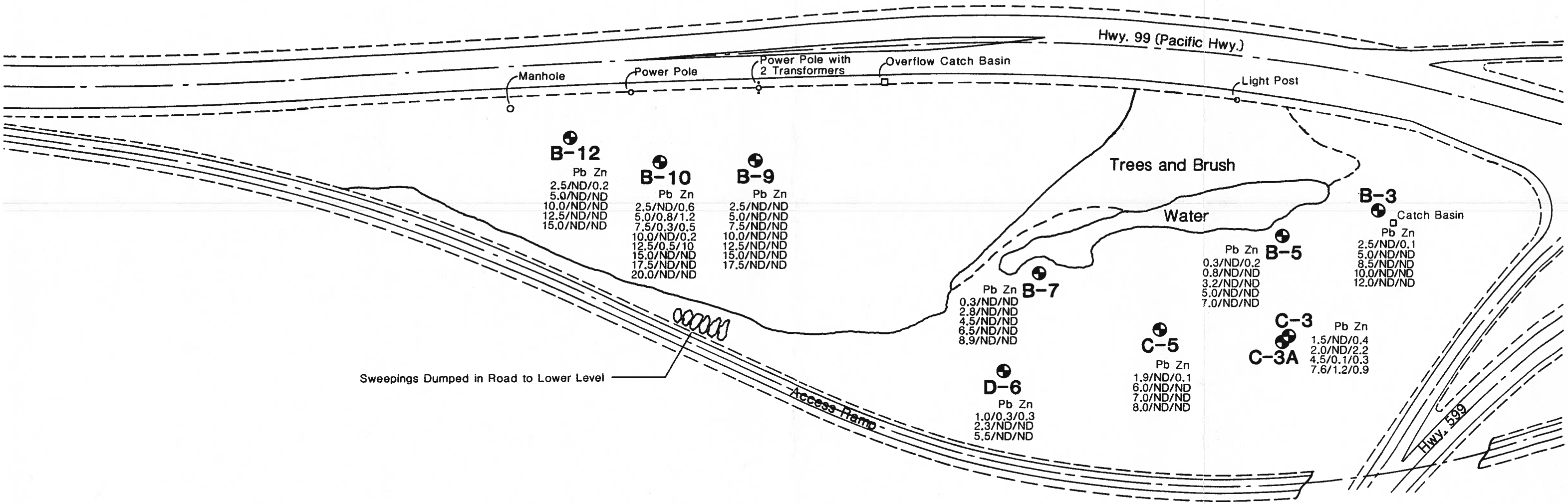
Figure 2

Extractable Lead and Zinc Concentrations Versus Depth



B-5 Phase I Boring Location and Number

Approximate Location of Upper Area

2.5/ND/0.6 Sample Depth in Feet/Extractable Lead Concentration in ppm / Extractable Zinc Concentration in ppm

ND Not Detected

Base Map Prepared from Drawings Entitled "SR 99 West Marginal Way to Burns Street, King County, Washington, Sheets 27 and 28", by Washington State Highway Commission, Dated April 13, 1964. Field Revised December, 1988

N

0 100 200
Scale in Feet

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Figure 3

Hart Crowser
J-2228

APPENDIX A
SAMPLING PLAN
WSDOT SOLID WASTE DISPOSAL SITE
SR-99 AND SOUTH 124TH STREET
SEATTLE, WASHINGTON

J-2228

SAMPLING PLAN
WSDOT SOLID WASTE DISPOSAL SITE
SR-99 AND SOUTH 124th STREET
SEATTLE, WASHINGTON

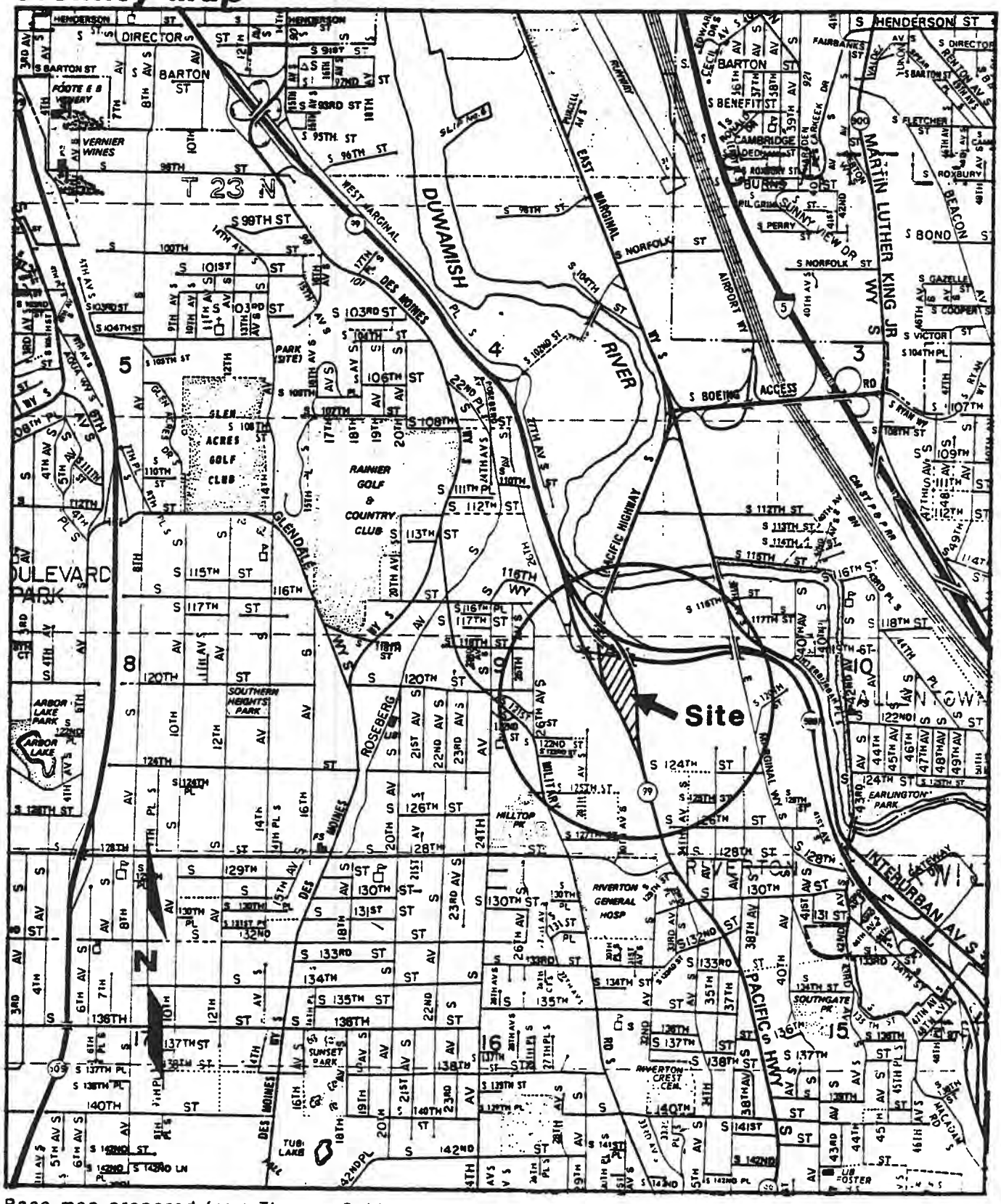
1.0 NEED FOR SAMPLING PLAN

The Washington State Department of Transportation (WSDOT) received an order from the Washington State Department of Ecology (Ecology) (Order No. DE 88-N161, dated August 4, 1988) to characterize and remediate a metals-contaminated solid waste disposal site located at State Route 99 and South 124th Street in Seattle, Washington. Figure 1 presents the site location. Sampling conducted at the site in mid-1987 and early 1988 showed extractable lead concentrations exceeded Dangerous Waste criteria (EP Toxicity). The order and information to document the metals contamination and subsequent need for characterization and remediation is contained in Appendix A.

A secondary issue, aside from characterization and remediation, is that a portion of the site may be a wetlands. Ecology has agreed to address this issue separately, subsequent to sampling, analysis, and remediation.

This document presents the sampling plan that details the rationale, locations, procedures, and analyses necessary to characterize the site. Remediation will be addressed separately once information about the nature and extent of metals contamination is available. The sampling plan is introduced through a discussion of the site and the wastes disposed of there.

Vicinity Map



Base map prepared from Thomas Guide map 33
of King County, Washington, 1988 updated edition.

0 2000 4000

Scale in Feet

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Figure 1

2.0 SITE DESCRIPTION AND NATURE OF THE WASTES

The site, shaped like an elongated teardrop, is located between roadway embankments supporting SR-99 (Pacific Highway South), SR-599, and an access ramp to SR-599. It is approximately 8 acres and can be divided into two areas: upper and lower. The upper area is approximately 3 acres and rises about 25 feet above the lower area of 5 acres. A gravel road travels the eastern side of the site and provides access to the two areas. Much of the site is covered by grasses, shrubs, and trees. Current topographic information does not exist for the site.

The site received street sweeping waste, vactor truck sludge, and other roadway waste since circa 1965. According to WSDOT maintenance employees, these wastes were randomly spread across the site. No particular plan was adhered to for filling the site. Waste in the upper area is 25 to 30 feet deep and in the lower area approximately 4 to 6 feet deep. Apparently, there are no locations within the site that are free of these roadway maintenance wastes.

The wastes are assumed to be heterogeneous throughout the site. Prior sampling (data is contained in Appendix A) indicates that metals concentrations vary widely across the surface of the site, e.g., EP Toxicity levels for lead range from <0.025 ppm to 20.73 ppm.

No sampling for metals concentrations with depth has been performed. These concentrations are likely to also vary widely.

WSDOT employees were able to locate an area containing buried drums of paint waste. Reportedly, these drums were empty-to-partially full and are located at the northern edge of the upper area, toward the bottom of the fill. This paint waste might be a source of lead, chromium, or other metals.

3.0 SAMPLING AND ANALYSIS PLAN AND RATIONALE

The goal of sampling and analysis is to characterize the distribution of metals concentrations at the site. Prior to characterization, an attempt to locate the buried drums will be made so that they are not punctured and their contents released during sampling. To accomplish characterization, the site will be divided into a grid with 100-foot intervals; up to five locations within each grid square will be selected for sampling. The approximate sampling locations are shown on Figure 2. These locations may be adjusted depending on field conditions. The locations will be staked, numbered, and surveyed prior to sampling. Sampling and analysis will then proceed in a phased approach.

3.1 Phase I Sampling and Analysis

First, information regarding metals concentrations with depth will be gathered to evaluate trends at the site. Several disparate areas have been identified within the site: upper area; lower area - wet locations; and lower area - dry locations. Three borings will be advanced in each of these three areas. The Phase I borings are located as shown on Figure 2.

Split spoon samples will be collected at the surface and at every 2.5 feet until the waste-native soil contact is reached. Grab samples of native soil will be collected at the contact and at 2.5 feet and 5 feet below the contact.

Soil samples will be submitted to an analytical laboratory for testing. Testing will include EP Toxicity analyses for cadmium, chromium, copper, lead, nickel, and zinc. These analyses reflect the only metals found at the site in any significant quantities (based on previous analyses contained in Appendix A). In addition a portion of the collected soil sample will be archived.

The Phase I sampling results will be evaluated for trends with depth at each of the three locations. A meeting will be held between WSDOT and

Ecology to discuss the sampling results and agree on the need for Phase II sampling and its approach. It may be possible that a remediation plan can be developed based on the results of Phase I sampling. If it is determined that additional information about the site is necessary, Phase II sampling may then proceed in one of two ways depending on whether depth trends were identified.

3.2 Phase II Sampling and Analysis - No Depth Trends

If no trends with depth are apparent at the site, then it may be necessary to sample the locations shown on Figure 2. Within grid squares in the upper area, up to 5 borings would be advanced. Samples would be collected at the surface, every 2.5 feet through the waste, at the native soil-waste contact, and at 2.5 and 5 feet below the contact. Within each sampled grid square across each depth interval, the samples would be composited for analysis. (A portion of each sample would be retained as a grab sample.) Composited samples collected at the surface, every 5 feet through the waste, at the native soil-waste contact, and at 5 feet below the contact would be submitted for analysis. The remainder of composited samples would be archived together with the grab samples taken from each boring. The analyses would be the same as in Phase I - EP Toxicity testing for cadmium, chromium, copper, lead, nickel, and zinc.

In the lower area, sampling would be similar, except that the waste is only 4 to 6 feet deep. Within grid squares, up to 5 borings would be advanced. Due to the irregular nature of the site, every grid square would not have 5 borings; Figure 2 shows the actual number of borings in each square. Samples would be collected at the surface, at the native soil-waste contact, and at 5 feet below the contact. Within each sampled grid square across each depth interval, the samples would be composited for analysis with a portion retained as a grab sample. Composited samples collected at the surface and at the contact would be submitted for analysis. The remainder of the composited samples would be archived together with the grab samples taken from each boring. The analyses would be the same as in Phase I.

3.3 Phase II Sampling and Analysis - Depth Trends

If trends with depth are apparent at the site, then the sampling outlined in the previous section would be focused and reduced. As an example, if the Phase I sampling results show that metals are not present above dangerous waste levels in the wastes below the top 2.5 feet, then samples below 2.5 would not be collected in the second phase of sampling.

A second scenario might be that dangerous waste levels of metals exist only at the surface of the waste and at the native soil-waste contact. In this case, Phase II sampling would occur only at these two depths (surface and contact) and no intermediate depth samples would be collected for analysis.

At this time it is impossible to predict the distribution of metals concentrations at the site. As previously stated, once Phase I results become available, discussions between WSDOT and Ecology should ensue to direct the need for and approach to Phase II sampling.

3.4 Phase III Analyses

Because composited samples would be submitted for analysis, analytical results would be multiplied by the number of borings contributing to each sample (generally 5). This new number would be used to assess analytical results against dangerous waste levels and Ecology guidance. This multiplication is necessary because a worst-case assumption can be made: only one sample out of the 5 composited together has excessive levels of metals; the other 4 samples contributed nothing.

If any composited sample result shows excessive metals levels (after multiplication), it may be necessary to analyze the 5 individual grab samples (archived by the laboratory) making up that composite sample for the metal of concern. This round of analysis will permit further definition of the location of the waste(s) bearing the high metal levels.

3.5 Summary

Sampling and analysis will proceed in a phased, controlled approach. This will permit an increasing body of knowledge upon which decisions can be made without requiring immediate substantial investments. The goal of characterizing the site will be accomplished so that remediation can focus on targeted areas that contain levels of metals beyond dangerous waste criteria and/or Ecology guidelines.

4.0 SAMPLING PROCEDURES

Soil samples will be obtained either by drilling or hand excavations. All sampling will be conducted under the continuous observance of a geologist or geochemist. Field logs will be prepared for each boring. The Health and Safety Plan presented in Attachment B will guide field activities at the site.

4.1 Drilling

Soil samples will be obtained using a split-spoon sampler and the Standard Penetration Test (SPT) procedure. The Standard Penetration Test, as described in ASTM D 1586, will involve driving a 2-inch I.D. split-spoon sampler a distance of 18 inches with a 140-pound hammer, free-falling 30 inches. The number of blows required to drive the sample the last 12 inches is the Standard Penetration Resistance. The resistance, or blow count, will provide a measure of the relative density of granular soils and consistency of cohesive soils. The blow counts will be plotted on the boring logs at the respective sample depth. Soil descriptions on the boring logs will be prepared in general accordance with ASTM D 2488.

The individual samples will be removed from the split-spoon sampler with a stainless-steel spoon and placed in specially cleaned glass jars. Each jar will be labeled with the boring number, depth interval, sample number, date, and time the sample was recovered. Samples will be placed on ice in

an insulated cooler and delivered to the testing laboratory. Information regarding the general sample appearance, odor, etc., will be recorded.

Drilling and sampling equipment will be cleaned after each use. Each section of the auger will be washed and the split-spoon sampler and stainless steel spoon will be scrubbed with an Alconox detergent solution, rinsed with tap water, and rinsed with deionized water.

4.2 Hand Excavations

Soil samples will be obtained using a hand auger, post-hole digger, shovel, or other like equipment. At each location a clean stainless-steel spoon will be used to recover the sample. It will be necessary to auger, dig, shovel, etc. to the appropriate depth, scrape loose material out of the hole, and collect undisturbed soils from the bottom of the hole. All samples will be placed in cleaned glass jars. Each jar will be labeled with the boring number, depth interval, sample number, date, and time the sample was recovered. Samples will be placed on ice in an insulated cooler and delivered to the testing laboratory. Information regarding the general sample appearance, odor, etc., will be recorded. Sampling equipment will be cleaned after each use with an Alconox detergent solution, rinsed with tap water, and rinsed with deionized water.

5.0 QUALITY ASSURANCE/QUALITY CONTROL

The accuracy of data generated depends on sampling procedures that are well conceived and implemented. Field samples will be collected according to the sampling plan and procedures presented in Sections 3.0 and 4.0. In addition, one blind duplicate for every 20 samples will be submitted to the analytical laboratory. Finally, chain of custody procedures will be maintained until samples are turned over to the laboratory.

To control the quality of laboratory analysis of samples, established preservation and storage measures will be taken. All soil samples will be

stored in glass containers at 4°C. No preservatives will be necessary. The maximum holding time for the samples is 180 days, but samples will be analyzed as soon as possible after collection.

Quality analytical data will be substantiated by laboratory QA/QC samples including surrogate spikes, internal standards, laboratory blanks, and laboratory matrix spike and matrix spike duplicates.

KJD:sde
SP2228/JOBS

J-2228

ATTACHMENT A

ORDER NO. DE 88-N161

CORRESPONDENCE REGARDING METALS CONTAMINATION

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
4350-150th Ave. N.E. • Redmond, Washington 98052-5301 • (206) 867-7000

AUG 04 1988

RECEIVED
DISTRICT ADMINISTRATOR
AUG 10 1988

CERTIFIED MAIL

Washington State Department
of Transportation
No. C-81410
Seattle, Washington 98108

Attention: Mr. R.E. Bockstruck
District I Administrator

Dear Mr. Bockstruck:

Enclosed is Order No. DE 88-N161. All correspondence relating to this document should be directed to the enforcement coordinator. If you have any questions concerning the content of the document, please call Ms. Lee Dorigan, telephone (206) 867-~~7000~~ 7018.

A form entitled "Acknowledgment of Service" is also enclosed. Please sign this form and return it to this office.

This order is issued under the provisions of Chapter 70.105 and RCW 90.48.

Any person feeling aggrieved by this order may obtain review thereof by application, within thirty (30) days of receipt of this order, to the Washington Pollution Control Hearings Board, Mail Stop PY-21, Olympia, WA 98504-8921. Concurrently, a copy of the application must be sent to the Department of Ecology, Attention: Attorney General, Mail Stop PV-11, Olympia, WA 98504-8711. These procedures are consistent with the provisions of Chapter 43.21B RCW and the rules and regulations adopted thereunder.

Sincerely,

Mary A. Kautz

Mary A. Kautz
Enforcement Coordinator

MAK:gm

Enclosures

DEPARTMENT OF ECOLOGY

IN THE MATTER OF COMPLIANCE)
BY WASHINGTON STATE DEPARTMENT)
OF TRANSPORTATION)

ACKNOWLEDGMENT OF SERVICE
No. DE 88-N161

To: Department of Ecology
Northwest Regional Office
4350 - 150th Ave. N.E.
Redmond, Washington 98052-5301

Attention: Enforcement Coordinator, Environmental Quality

Receipt is acknowledged of Order No. DE 88-N161.

DATED this _____ day of_____, _____.

_____
(Signature)

_____
(Title)

DEPARTMENT OF ECOLOGY

IN THE MATTER OF THE COMPLIANCE BY)
WA STATE DEPARTMENT OF TRANSPORTATION) ORDER
with Chapter 70.105 and 90.48. RCW) No. DE 88-N161
and the Rules and Regulations of the)
Department of Ecology)

TO: Washington State Dept. of Transportation
No. C-81410
Seattle, Washington 98108

Attention: Mr. R.E. Bockstruck
District I Administrator

Chapter 173-303 WAC, entitled "Dangerous Waste Regulations," designates those solid wastes which are dangerous or extremely hazardous to the public health and environment; and provides for surveillance and monitoring of dangerous wastes until they are detoxified, reclaimed, neutralized or disposed of safely.

RCW 90.48.080 provides that it shall be unlawful for any person to throw, drain, run, or otherwise discharge into any of the waters of this state, or to cause, permit or suffer to be thrown, run, drained, allowed to seep or otherwise discharge into such waters any organic or inorganic matter that shall cause or tend to cause pollution of such waters according to the determination of the Director.

RCW 70.105.095 reads in part: "Whenever on the basis of any information the department determines that a person has violated or is about to violate any provision of this chapter, the department may issue an order requiring compliance immediately or within a specified period of time."

RCW 90.48.120 reads in part: "Whenever, in the opinion of the department, any person shall violate or is about to violate the provisions of this chapter, or fails to control the polluting content of waste discharged or to be discharged into any waters of the state, the department shall notify such person of its determination by registered mail..." Notice is hereby given in accordance with RCW 90.48.120, as follows:

In response to a complaint received by the Department of Ecology, a joint inspection was conducted on June 12, 1987 by the Department and the Department of Transportation (WDOT) of the dumping of contaminated material at a wetland site off Highway 99 at 124th South in Seattle by WDOT. On May 2, 1988, a review of the results of samples taken found lead in excess of dangerous waste levels at three of the seven sites sampled in the wetland. The results of the inspection and review finds WDOT in violation of the following:

a) The act of filling a wetland is prohibited under WAC 173-304-130.

b) The discharge of contaminated material to the wetlands tributary to the Duwamish River, a violation of RCW 90.48.080.

c) Designation of solid waste as required under WAC 173-303-070.

d) Treatment, storage, or disposal of dangerous waste. A person shall only offer a designated dangerous waste to a TSD facility, WAC 173-303-141.

e) Spills and discharges into the environment . . . any dangerous waste or hazardous substance is intentionally or accidently spilled or discharged into the environment (unless otherwise permitted) such that public health or the environment are threatened, regardless of the quantity of dangerous waste or hazardous substance, WAC 173-303-145.

In view of the foregoing and in accordance with the provisions of RCW 70.105.095 and 90.48.120:

IT IS ORDERED THAT Washington State Department of Transportation shall, upon receipt of this Order, take appropriate action in accordance with the following instructions:

1) Within 15 days, WDOT shall obtain an environmental consulting firm to:

   a) Develop a detailed sampling plan characterizing the nature and extent of the metals contamination on a grid. The grid will show width and depth of the metals contamination. The plan shall be reviewed and approved by the Department of Ecology-Northwest Regional Office (Ecology-NWRO) prior to implementation of the plan.

b) Within 45 days of the receipt of this order, sampling shall begin on site according to the approved sampling plan.

c) Develop a plan for the removal of all contaminated soil and the remediation of the wetland. The plan shall be written within 30 days of receipt of data from the sampling plan and implemented within 15 days after the review and approval by Ecology-NWRO.

2) Monthly monitoring reports accompanied with photographs shall be submitted to Ecology-NWRO for a period of one year after remediation of the site.

Any person who fails to take corrective action as specified in a compliance order shall be liable for a civil penalty of not more than ten thousand dollars for each day of continued noncompliance. In addition, the department may suspend or revoke any permits and/or certificates issued under the provisions of this chapter to a person who fails to comply with an order directed against him.

Any person feeling aggrieved by this order may obtain review thereof by application, within thirty (30) days of receipt of this order, to the Washington Pollution Control Hearings Board, Mail Stop PY-21, Olympia, Washington 98504-8921. Concurrently, a copy of the application must be sent to the Department of Ecology, Attention: Assistant Attorney General, Mail Stop PV-11, Olympia, Washington 98504-8711. These procedures are consistent with the provisions of Chapter 43.21B RCW and the rules and regulations adopted thereunder.

DATED at Redmond Washington August 2, 1988

Nancy Ellison

Nancy Ellison, Regional Manager
Northwest Regional Office
Department of Ecology
State of Washington

Washington State
Department of Transportation
District 1
15325 S.E. 30th Place
Bellevue Washington 98007-6568
(206) 562-4000

Duane Berentsen
Secretary of Transportation

June 17, 1988

Department of Ecology
4350 150th Ave. NE
Redmond, WA 98052-5301

Attn: Lee Dorigan

SR 99, Area 5 S. 124th St.

Dear Ms. Dorigan:

We have investigated the above landfill site and offer these solutions to your letter of July 20, 1987.

1. The area of debris covered by dirt is the area of active landfill. Landfill areas will be covered with soil and seeded to prevent erosion upon completion of landfill operations in specific areas.

2. The dumping of household garbage is always a problem along our right-of-way. This area is posted to prohibit garbage dumping but there are always violators. We clean up garbage and try to maintain our right-of-way.

3. The next area of concern if filling of the wetlands. We have leveled the mounds of material as part of our normal operation. Mr. Bickle and Mr. Gunderson of our Maintenance branch met with you and agreed upon a course of action where we will remove part of the fill material to rehabilitate areas of wetland habitation. This rehabilitation will be accomplished with guidance from your staff. Also, access to the lower portion of the site has been restricted until the wetland area is identified. After the wetland area has been determined, we will continue to use the remaining portion outside the wetland.

4. The final area of concern is lead-contaminated fill material. We have taken numerous samples of material at the fill site and find the average lead content of the fill to be 3.3 parts per million (ppm). There are small undefined areas of high lead content, but these areas will be mixed with material from other parts of the pit during the reclamation process.

In addition, we took 15 samples of vactor and street sweeping waste. The lead content in these sample varies from less than 0.025 ppm to 3.09 ppm. All of the readings are well within the maximum limit of 5 ppm. Thus, we feel very strongly that we do not have a lead problem on our state highway system within the greater Seattle area. We would further expect these lead levels to decrease with time as fewer vehicles use leaded fuel.

In summary, we will continue to use this fill site outside the wetland area for street sweeping, vactor sludge and other roadway waste. We will remove the fill material placed in wetlands and seed the reclaimed area. Also, areas of fill that will no longer be used will be seeded. The issue of lead contamination appears to have resolved itself.

Contact Jim Gunderson at 764-4117 if you have further questions or comments.

Sincerely,

John R. Stephenson

R. E. BOCKSTRUCK, P.E.
District Administrator

REB:cmi
Attach.

cc: Jim Kaska (w/attach.), MS 119
Jim Gunderson (w/attach.), MS 27
Dick Bickle (w/attach.), MS 45

Maintenance File

FEDERAL TESTING LABORATORIES 29½ Dravus • Seattle, WA 98109 • 283-4202

February 3, 1988

State of Washington
Department of Transportation
6431 Corson Ave So, #C-81410
Seattle, Washington 98108
Attn: James G. Ganderson, P.E.

Test Report: #88-404

Process: Soil Anal/JO 23543
Specification: EPA Procedures
Date Tested: Jan 28 - Feb 2, 1988

12 samples at Landfill 2 along SR 5

Fourteen (14) samples of soil samples were received for heavy metal and oil/grease analyses. The heavy metal determinations were performed using EP Toxicity Extraction porcedures. The oil/grease analyses were performed with solvent extraction/gravimetric method 503A. No purchase order was received.

SR-5

	Sample 4-1		Sample 9-1 Soil sample		Sample 7-1		Sample 3-1	
s nic	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm
-rum	0.38	ppm	0.85	ppm	2.67	ppm	0.70	ppm
mium	<0.002	ppm	<0.002	ppm	0.20	ppm	0.036	ppm
nium	<0.005	ppm	<0.005	ppm	<0.005	ppm	<0.005	ppm
er	<0.002	ppm	<0.002	ppm	<0.002	ppm	<0.002	ppm
id	7.31	ppm	4.05	ppm	20.73	ppm	3.14	ppm
ury	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm
l	0.48	ppm	0.055	ppm	0.10	ppm	0.14	ppm
enium	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm
ver	<0.003	ppm	<0.003	ppm	<0.003	ppm	<0.003	ppm
	15.05	ppm	2.79	ppm	5.04	ppm	3.89	ppm
	7.11		7.58		6.09		7.92	
se	337.8	ppm	17.0	ppm	313.0	ppm	42.4	ppm

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State of Washington
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	Sample 5-2	Sample 2-2	Sample 6-1	Sample 8-1 SR-5 Soil Sample	Sample 1-2
Arsenic	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Barium	0.44 ppm	0.78 ppm	0.39 ppm	0.46 ppm	0.47 ppm
Cadmium	<0.002 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm	0.049 ppm
Chromium	<0.005 ppm	<0.005 ppm	<0.005 ppm	<0.005 ppm	<0.005 ppm
Copper	<0.002 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm
Lead	<0.025 ppm	5.38 ppm	<0.025 ppm	2.66 ppm	0.96 ppm
Mercury	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Nickel	0.082 ppm	0.13 ppm	0.061 ppm	<0.01 ppm	0.26 ppm
Selenium	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Silver	<0.003 ppm	<0.003 ppm	<0.003 ppm	<0.003 ppm	<0.003 ppm
Zinc	1.45 ppm	8.57 ppm	0.12 ppm	0.61 ppm	3.62 ppm
pH	7.26	7.42	7.91	7.15	7.72
Oil/grease	6.4 ppm	28.4 ppm	8.2 ppm	1.4 ppm	27.6 ppm

	Sample 7-2	Sample 2-1	Sample 1-1	Sample 6-2	Sample 5-1
Arsenic	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Barium	0.44 ppm	0.71 ppm	0.24 ppm	0.52 ppm	0.32 ppm
Cadmium	<0.002 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm
Chromium	<0.005 ppm	<0.005 ppm	<0.005 ppm	<0.005 ppm	<0.005 ppm
Copper	<0.002 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm
Lead	0.66 ppm	0.74 ppm	<0.025 ppm	0.85 ppm	<0.025 ppm
Mercury	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Nickel	0.039 ppm	0.084 ppm	<0.01 ppm	0.85 ppm	<0.01 ppm
Selenium	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Silver	<0.003 ppm	<0.003 ppm	<0.003 ppm	<0.003 ppm	<0.003 ppm
Zinc	0.44 ppm	2.58 ppm	0.62 ppm	0.76 ppm	1.31 ppm
pH	7.39	7.41	6.17	7.80	7.61
Oil/grease	19.8 ppm	135.8 ppm	17.0 ppm	47.4 ppm	24.4 ppm

The detection limits for the ICP Spectrometer are the following: Arsenic: 0.001 ppm, Barium: 0.001 ppm, Cadmium: 0.002 ppm, Chromium: 0.005 ppm, Copper: 0.002 ppm, Lead: 0.025 ppm, Mercury: 0.001 ppm, Nickel: 0.01 ppm, Selenium: 0.001 ppm, Silver: 0.003 ppm, Zinc: 0.004 ppm.

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March 27, 1988

State of Washington
Department of Transportation
6431 Corson Ave So, #C-81410
Seattle, Washington 98108
Attn: James G. Ganderson, P.E.

Test Report: #88-899

Process: Soil Anal/JO 24019
Specification: EPA Procedures
Date Tested: Mar 15 - 24, 1988

Twenty (20) samples of soil samples were received for heavy metal and oil/grease analyses. The heavy metal determinations were performed using EP Toxicity Extraction porcedures. The oil/grease analyses were performed with solvent extraction/gravimetric method 503A.

Street Sweepings

	Sample 15SW	Sample 16SW	Sample 17SW	Sample 18SW	Sample 19SW
rsenic	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
barium	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Cadmium	<0.002 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm
hromium	<0.005 ppm	<0.005 ppm	<0.005 ppm	<0.005 ppm	<0.005 ppm
opper	0.16 ppm	0.46 ppm	0.31 ppm	0.16 ppm	0.13 ppm
Lead	① 0.30 ppm	② 2.10 ppm	③ 3.01 ppm	④ 1.48 ppm	⑤ 0.67 ppm
ercury	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
ickel	0.15 ppm	0.34 ppm	0.23 ppm	0.36 ppm	<0.01 ppm
Selenium	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Silver	<0.003 ppm	<0.003 ppm	<0.003 ppm	<0.003 ppm	<0.003 ppm
inc	1.06 ppm	14.06 ppm	6.27 ppm	4.59 ppm	3.48 ppm
pH	7.66	7.20	6.79	6.19	7.95
oil/ grease	83.6 ppm	145.6 ppm	36.0 ppm	295.2 ppm	26.8 ppm

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State of Washington
Department of Transportation
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page 2.

street Sweepings

	Sample 20SW	Sample 21SW	Sample 22SW	Sample 23SW	Sample 24SW
Arsenic	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Barium	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Cadmium	<0.002 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm
Chromium	<0.005 ppm	<0.005 ppm	<0.005 ppm	<0.005 ppm	<0.005 ppm
Copper	0.33 ppm	0.10 ppm	<0.002 ppm	0.12 ppm	0.08 ppm
Lead	3.09 ppm	1.03 ppm	0.87 ppm	1.00 ppm	1.34 ppm
Mercury	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Nickel	0.50 ppm	0.08 ppm	<0.01 ppm	0.12 ppm	0.15 ppm
Selenium	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Silver	<0.003 ppm	<0.003 ppm	<0.003 ppm	<0.003 ppm	<0.003 ppm
Zinc	7.55 ppm	3.88 ppm	1.48 ppm	4.16 ppm	4.00 ppm
pH	7.32	7.45	8.66	7.54	7.51
Oil/ grease	90.0 ppm	59.4 ppm	35.2 ppm	120.6 ppm	417.6 ppm

	Vacter Sample 25V	Vacter Sample 26V	Vacter Sample 27V	Vacter Sample 28V	Soil Sample Sample 29 SR 5
Arsenic	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Barium	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Cadmium	0.04 ppm	<0.002 ppm	0.04 ppm	<0.002 ppm	<0.002 ppm
Chromium	<0.005 ppm	<0.005 ppm	<0.005 ppm	<0.005 ppm	<0.005 ppm
Copper	0.13 ppm	0.17 ppm	0.55 ppm	0.12 ppm	<0.002 ppm
Lead	1.38 ppm	<0.025 ppm	<0.025 ppm	1.05 ppm	<0.025 ppm
Mercury	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Nickel	0.29 ppm	0.30 ppm	0.36 ppm	0.32 ppm	<0.01 ppm
Selenium	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Silver	<0.003 ppm	<0.003 ppm	<0.003 ppm	<0.003 ppm	<0.003 ppm
Zinc	6.50 ppm	1.29 ppm	1.87 ppm	7.12 ppm	<0.004 ppm
pH	7.23	7.97	6.95	6.93	7.10
Grease	353.2 ppm	83.0 ppm	286.0 ppm	134.6 ppm	1.8 ppm

Washington State Department of Transportation
District 1
15325 S.E. 30th Place
Bellevue, Washington 98007

Duane Berentsen
Secretary of Transportation

January 27, 1988

Lee Dorigan
Field Inspector
Washington State Department of Ecology
4350 - 150th Ave. N.E.
Redmond, WA 98052-5301

Area 5: SR99

SUBJECT: WSDOT Landfill Off Highway 99
at South 124th Street, King County,
Washington

Dear Ms. Dorigan:

I am responding to your letter of July 20, 1987 to R. E. Bockstruck. My crew is currently assessing the problem and testing material at the above site. We expect to finish testing in six weeks and will respond to the issues raised in your letter at that time.

Mr. Jim Gunderson of my staff is in charge of the landfill testing. If you have any questions, don't besitate to contact him at 764-4117.

Yours truly,

JAMES H. KASKA, P.E., C.V.S.
District Maintenance Engineer

JGG:jer

cc: J. G. Gunderson, MS 27
Maintenance File
Maintenance Day File

ADRIA BEATTY RINKER
Director

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
4350 - 150th Ave N.E. • Redmond, Washington 98052-5301 • (206) 885-1900

July 20, 1987

CERTIFIED MAIL

R.E. Bockstruck
District 1 Administrator
Washington State Department
of Transportation
#C-81410
Seattle, Washington 98108

Joint Inspection with Ecology and Transportation at
WDOT Landfill off Highway 99 at South 124 Street,
King County Washington on June 12, 1987

Dear Mr. Bockstruck:

Mr. William Osterhout and Mr. Ralph Nichols, engineers for the Department of Transportation (WDOT); and Richard Koch, District Engineer, and Lee Dorigan Environmentalist for the Department of Ecology (WDOE), met at the WDOT gate on Highway 99 at the request of WDOE on June 12, 1987. They conducted an inspection and photographed the site in response to a complaint from METRO and a previous inspection by WDOE. Please read this letter carefully and then implement measures to bring your facility into compliance with state water quality regulations and laws.

The inspection began at the truck gate at the south end of the site and continued north to the highway, then turned east along the highway to an area east of the highway, then retraced the same path returning to the truck gate. The first area of concern was the land filling on our left to the east of the road. This area contained debris partially covered by dirt. This area is a plateau created by layers of this land filling process, which appeared to be road littered covered by road dust. There was no evidence of a plan to prevent this material from entering waters of the state in violation of RCW 90.48.

The next area of concern was also on the east side of the road. Approximately 100 feet north of the land filling area were two discreet dumps of what appeared to be household garbage. These areas were not covered and are in violation of RCW 70.95.

The next area of concern was the bottom area of the site which was a wetland. This area was filled with innumerable mounds of material, covering the lower portion of the site. Some of the mound appeared to be from vactor truck dumps. In May of 1987, staff from METRO South Base took a sample from one of the vactor truck discharges just after watching the truck leave the site. METRO had the sample analyzed using the Extraction Procedure Toxicity test per WAC 173-303-090. The results (encl.) show that the material is dangerous waste because of lead in excess of 5 (five) parts per million (ppm). The act of filling a wetland is prohibited under WAC 173-304-130.

Because of the documented concerns identified above we have decided to recommend that WDOT hire an environmental firm to evaluate the contamination and propose remedial action at the WDOT dump site off of Highway 99 at 124th South. I understand that WDOT has a contract with Crowley Environmental and that they could be employed most expeditiously. Hiring Crowley would be the most desirable option and would prevent any enforcement from being taken by the Department of Ecology for the violation documented in this letter.

Don't hesitate to contact me at 867-7030 if you have further questions regarding this letter.

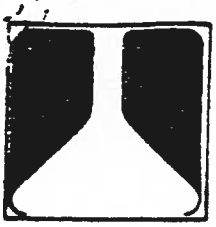
Sincerely,

Lee Dorigan
Field Inspector
Elliott Bay Action Team

LD/
Enclosure

cc: Rich Koch, WDOE
Ralph Nichols, WDOT
William Osterhout, WDOT

FEDERAL TESTING LABORATORIES 29½ Dravus • Seattle, WA 98109 • 283-4202



JAMES E. RICHARDS
MAY 2 : 1987
SUPERVISOR OF FACIL. MAINT.

May 20, 1987

Metro Transit
11911 East Marginal Way South, Bldg C.
Seattle, Washington 98036
Attn: E. Atkinson

Test Report: #87-1142

Process: Oil/pH /JO 20894
Specification: FTPS Anal Procedures
Date Tested: May 8 - 18, 1987

Sludge samples were tested for pH value electrometrically. The oil content is tested according to Standard Method 503A Partition Gravimetric Method.

Purchase order: B -23960

Sample Number	Date	Time	pH	Oil Content
Sludge	4/20/87		6.80	1400 ppm

Heavy metals:

Arsenic	<0.001	ppm
Cadmium	<0.002	ppm
Chromium	<0.005	ppm
Copper	<0.002	ppm
Iron	1194.5	ppm
Mercury	<0.001	ppm
Nickel	3.2	ppm
Lead	141.1	ppm
Selenium	<0.001	ppm
Silver	<0.001	ppm
Zinc	89.2	ppm

FEDERAL TESTING LABORATORIES

Patrick P. Raney

J-2228

ATTACHMENT B
HEALTH AND SAFETY PLAN
WSDOT SOLID WASTE DISPOSAL SITE
SR-99 AND SOUTH 124th STREET, SEATTLE, WASHINGTON

1. EMERGENCY INFORMATION

Ambulance 911

Police Dept. 911

Fire Dept. 911

Hospital Emergency Room 594-1050
(Riverton Hospital, 12844 Military Rd. S.

Occupational Injury Clinic 242-3651
(Virginia Mason - WIOMC, 13030 Military Rd. S.)

FOR ALL EMERGENCIES NOTIFY:
Hart Crowser Project Health and Safety Manager
David Chawes 324-9530

Hart Crowser Project Manager
Kristin Darnell/Jim Rybock 324-9530

2. PURPOSE

This Health and Safety Plan provides guidance to Hart Crowser, Inc. personnel conducting work at the Washington Department of Transportation

(WSDOT) Landfill Site, located at Highway 99 and S. 124th St., King County, Washington.

The Project Manager will issue a copy of this plan to employees and subcontractors hired by Hart Crowser for on-site work. Subcontractors will follow these provisions as minimum recommendations; more stringent health and safety measures may be taken at their discretion. Subcontractors are responsible for the health and safety of their own employees.

3. CONTAMINANT EVALUATION

This project involves collecting soil samples at the WSDOT Landfill Site to characterize the nature and extent of metals contamination in soils. The source of the metals contamination is street sweeping waste and vactor truck sludge materials.

Based on preliminary analytical results obtained by WSDOT, it appears that lead is the principal contaminant of concern from the standpoint of worker health. It is not clear from the sample results if organic or inorganic lead, or both, are present. Because the site contains waste from road cleaning, it may be presumed that both types of lead are present. The hazards associated with inhalation or accidental ingestion of inorganic lead and organic lead compounds are described below.

Inorganic Lead (Pb): Metallic lead and its inorganic compounds (excluding lead arsenate) can cause lead poisoning. This disease is hard to diagnose, but may include symptoms of decreased physical fitness, fatigue, sleep disturbances, headaches, aching bones and muscle, digestive symptoms (constipation), abdominal pains, and decreased appetite. These symptoms are reversible and complete recovery is possible.

Severe exposure could lead to anemia, pallor, a "lead-line" on the gums, and decreased hand-grip strength. Nerve damage may occur, with symptoms

such as "wrist-drop." These symptoms may be irreversible. Further damage can occur to the nervous symptoms and the kidneys.

Washington State has established a Permissible Exposure Limit (PEL) of 0.05 mg/m3 for inorganic lead and its compounds.

Organic Lead: The principal lead compounds associated with automobile operations are tetraethyl lead (TEL) and tetramethyl lead (TML). These compounds are colorless liquids, generally mixed with dyes for identification purposes. They are insoluble in water, but soluble in organic solvents. Both are used as anti-knock additives in leaded gasoline. TEL will decompose under bright sunlight to form crystals of tri-, di- and mono-ethyl lead compounds, which have a garlic-like odor.

Liquid TEL and TML may penetrate the skin without local injury. TEL itself is irritating to the eyes. Absorption of TEL may cause intoxication of the central nervous system, leading to symptoms of headache, anxiety, insomnia, nervous excitation, and minor digestive symptoms, with a metallic taste in the mouth. The most notable symptom of TEL poisoning is encephalopathy (brain damage) with symptoms of mild anxiety, toxic delirium with hallucinations, delusions, convulsions and acute psychosis. Full recovery is possible, although it may take a long time.

There are no cases of human poisoning from TML, however, animal tests have indicated that similar symptoms may be expected. TEL decomposition products (tri-, di- and mono-ethyl lead) in dust form may be inhaled, possibly leading to irritation of the upper respiratory tract and convulsive sneezing. These dusts may also cause itching, burning and redness of eyes and mucous membranes.

The current Washington PEL for tetraethyl lead is 0.1 mg/m3 tetramethyl lead the PEL is 0.15 mg/m3. These substances have a "skin" notation, meaning they pose a particular problem of absorption into the body if direct skin contact occurs.

Evaluation of Exposure Routes

Inhalation: This route has a high probability of occurring to site workers. Substantial amounts of airborne dust may be created during sampling operations. There is also the possibility of inhalation of chemicals as soils are excavated and brought to the surface.

Skin Contact: This route is also likely from contact with site soils and from the dust generated by wind or the work activities. Protective clothing and washing will remove most of this contamination before it could impact skin.

Ingestion: This route is the least likely, as no eating or other hand-to-mouth contact will be permitted on the site. Also, decontamination procedures established in this plan will ensure that minimal amounts of contaminants are ingested inadvertently.

Evaluation of Hazard Potential

Given the low lead concentrations detected by WSDOT in prior sampling, the possibility of generating airborne dust which contains concentrations of lead exceeding the PEL are considered low.

4.0 PROTECTION LEVELS

Level D: For general site activities where contact with soil is probable, wear tyvek coveralls, safety glasses, hardhat (if drill rig is present), disposable neoprene gloves, and chemically-resistant safety boots.

Level C: In addition to the protective clothing specified above, be prepared to wear respiratory protection if severe clouds of visible dust are generated, or if odors are disagreeable. Wear air-purifying respirators, half-face, equipped with combination GMC-H filters. This will prevent exposure to heavy metals and many volatile organic contaminants.

Contact the Project Health and Safety Manager for further instructions regarding air monitoring.

Minimization of Contamination

Minimize personnel and equipment used in the contaminated area. Send only the required amounts of soil or water to laboratories for analysis. Do not kneel on contaminated ground, stir up unnecessary dust, or perform any practice that increases the probability of hand-to-mouth transfer of contaminated materials (eating, drinking, chewing gum, smoking or chewing tobacco). Use plastic drop cloths and equipment covers where appropriate.

5.0 DECONTAMINATION

Personnel with known or suspected contamination will decontaminate fully before eating lunch or leaving the site.

Decontamination consists of the following steps:

a. Wash (with tri sodium phosphate solution) boots and gloves. Rinse with clean water.

b. Remove tyvek suit and place into plastic bag.

c. Wash and rinse gloves a second time, to remove contaminants possibly adhering to gloves after removing tyvek.

d. Remove safety boots and put on street shoes.

e. Remove gloves. Discard if damaged into plastic bag.

f. Wash hands and face.

g. Shower as soon after work shift as possible.

J-2228

PRELIMINARY COST ESTIMATE - PHASE I SAMPLING
WSDOT SOLID WASTE DISPOSAL SITE
SR-99 AND SOUTH 124th STREET
SEATTLE, WASHINGTON

	Activity	Costs
1)	Locate buried drums	
	Williamson and Associate	
	on-site field representative, 8 hrs @ $55/hr	$ 440
2)	Stake sampling locations	
	2 field technicians, 8 hrs @ $55/hr	880
3)	Collect samples	
	upper area* 1 field engineer, 8 hrs @ $55/hr	440
	lower area, 2 field engineers, 8 hrs @ $55/hr	880
	sampling equipment health and safety equipment	200
4)	Laboratory analyses	
	assuming three 35-foot borings in upper area, six 10-foot borings in lower area, and sampling at 25-foot intervals	
	- 75 samples @ $150/sample	11,250
	- 2 background samples @ $150/sample	300
5)	Data analysis and report preparation	
	1 geochemist, 16 hrs @ $65/hr	1,040
	graphics and clerical support, 8 hrs @ $35/hr	280
	TOTAL	$15,710

*This preliminary estimate assumes that WSDOT will perform any drilling at the site.

Hart Crowser
J-2228

APPENDIX B
GEOLOGIC LOGS

Key to Exploration Logs

Sample Descriptions

Classification of soils in this report is based on visual field and laboratory observations which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field nor laboratory testing unless presented herein. Visual-manual classification methods of ASTM D 2488 were used as an identification guide.

Soil descriptions consist of the following:
Density/consistency, moisture, color, minor constituents, MAJOR CONSTITUENT, additional remarks.

Density/Consistency

Soil density/consistency in borings is related primarily to the Standard Penetration Resistance. Soil density/consistency in test pits is estimated based on visual observation and is presented parenthetically on the test pit logs.

SAND or GRAVEL Density	Standard Penetration Resistance in Blows/Foot	SILT or CLAY Consistency	Standard Penetration Resistance in Blows/Foot	Approximate Shear Strength in TSF
Very loose	0 - 4	Very soft	0 - 2	<0.125
Loose	4 - 10	Soft	2 - 4	0.125 - 0.25
Medium dense	10 - 30	Medium stiff	4 - 8	0.25 - 0.5
Dense	30 - 50	Stiff	8 - 15	0.5 - 1.0
Very dense	>50	Very stiff	15 - 30	1.0 - 2.0
		Hard	>30	>2.0

Moisture

Dry	Little perceptible moisture
Damp	Some perceptible moisture, probably below optimum
Moist	Probably near optimum moisture content
Wet	Much perceptible moisture, probably above optimum

Minor Constituents

	Estimated Percentage
Not identified in description	0 - 5
Slightly (clayey, silty, etc.)	5 - 12
Clayey, silty, sandy, gravelly	12 - 30
Very (clayey, silty, etc.)	30 - 50

Legends

Sampling

BORING SAMPLES

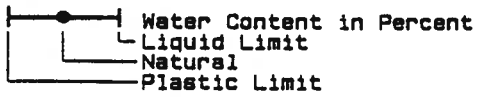
- Split Spoon
- Shelby Tube
- Cuttings
- Core Run
- * No Sample Recovery
- P Tube Pushed, Not Driven

TEST PIT SAMPLES

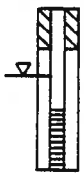
- Grab (Jar)
- Bag
- Shelby Tube

Test Symbols

GS	Grain Size Classification
CN	Consolidation
TUU	Triaxial Unconsolidated Undrained
TCU	Triaxial Consolidated Undrained
TCD	Triaxial Consolidated Drained
QU	Unconfined Compression
DS	Direct Shear
K	Permeability
PP	Pocket Penetrometer Approximate Compressive Strength in TSF
TV	Torvane Approximate Shear Strength in TSF
CBR	California Bearing Ratio
MD	Moisture Density Relationship
AL	Atterberg Limits



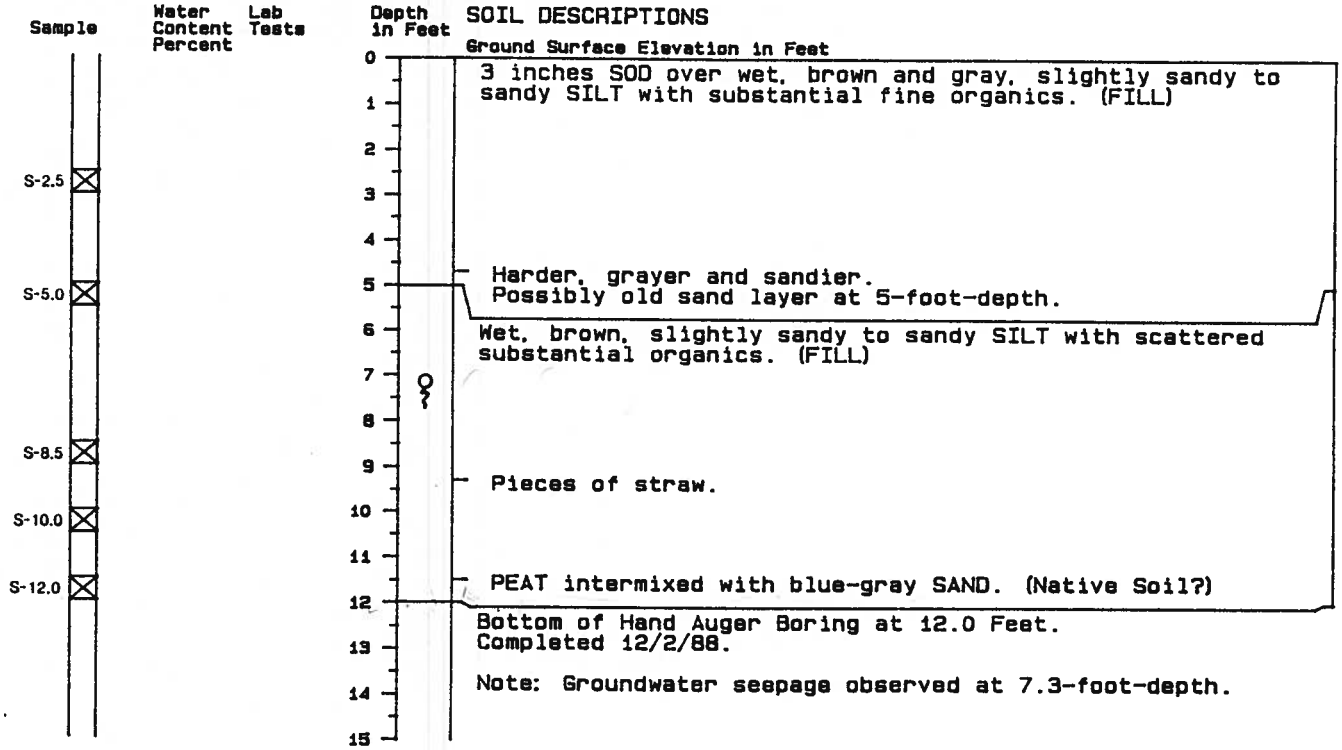
Ground Water Observations



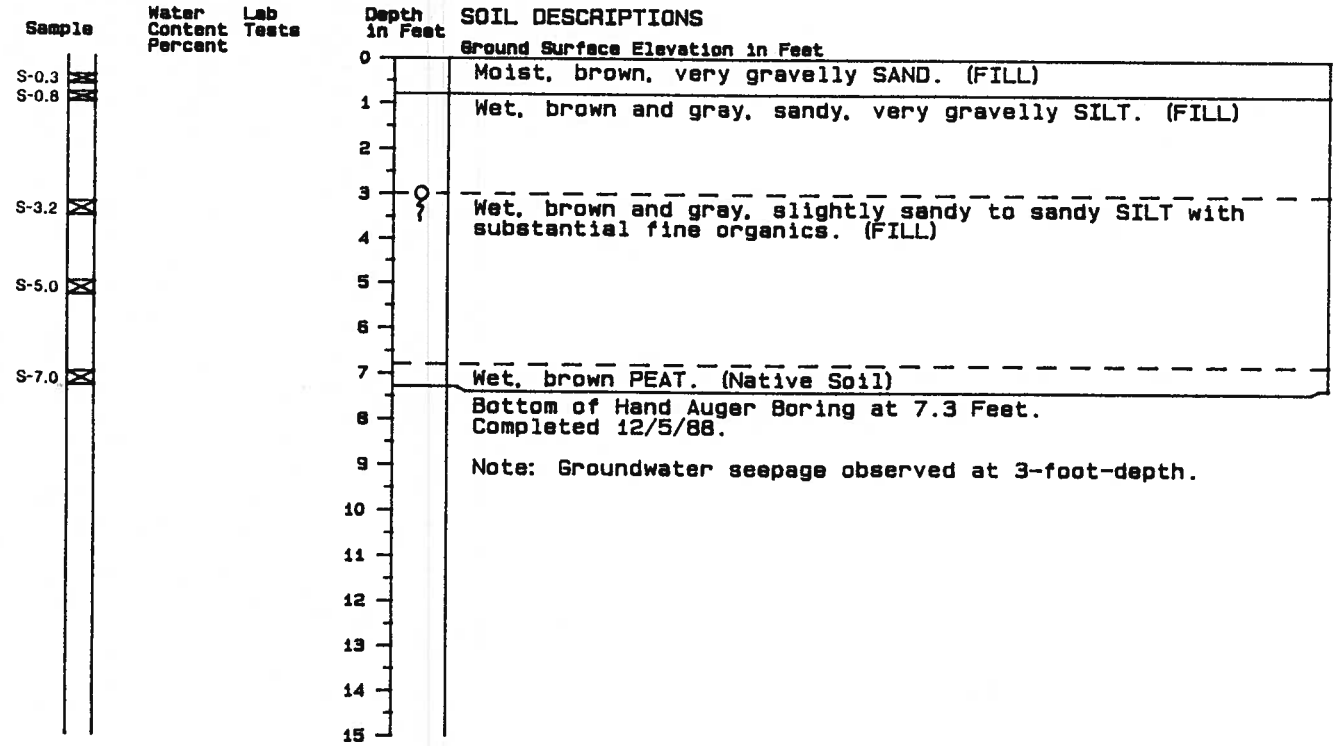
- Surface Seal
- Ground Water Level on Date (ATD) At Time of Drilling
- Observation Well Tip or Slotted Section
- Ground Water Seepage (Test Pits)

J-2228 January 1989
HART-CROWSER & associates, inc.
Figure B-1

Hand Auger Boring Log B-3

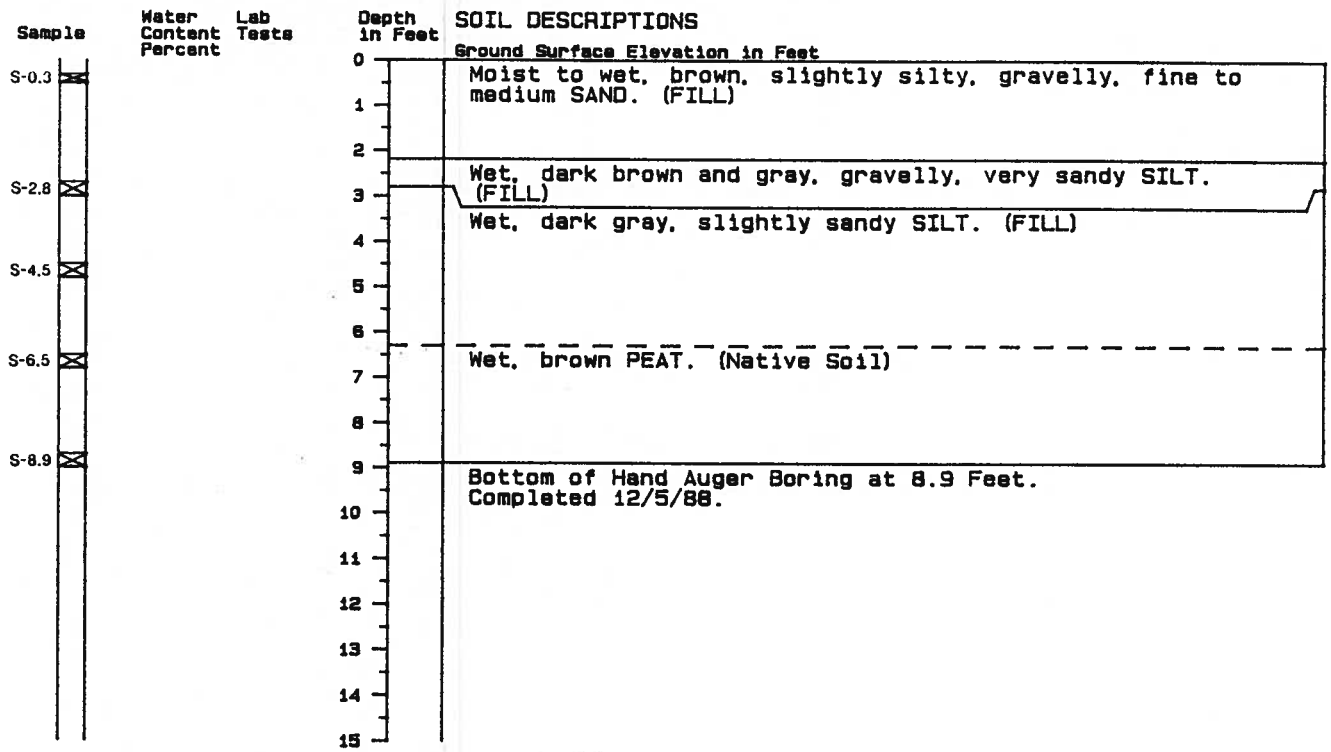


Hand Auger Boring Log B-5



1. Refer to Figure B-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water conditions, if indicated, are at time of excavation. Conditions may vary with time.

Hand Auger Boring Log B-7



1. Refer to Figure B-1 for explanation of descriptions and symbols.
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3. Ground water conditions, if indicated, are at time of excavation. Conditions may vary with time.

J-2228 December 1988
HART-CROWSER & associates, inc.
Figure B-3

Boring Log B-9

SOIL DESCRIPTIONS

Ground Surface Elevation in Feet

Stiff, damp to moist, brown and gray slightly sandy SILT with scattered fine organics. (FILL)

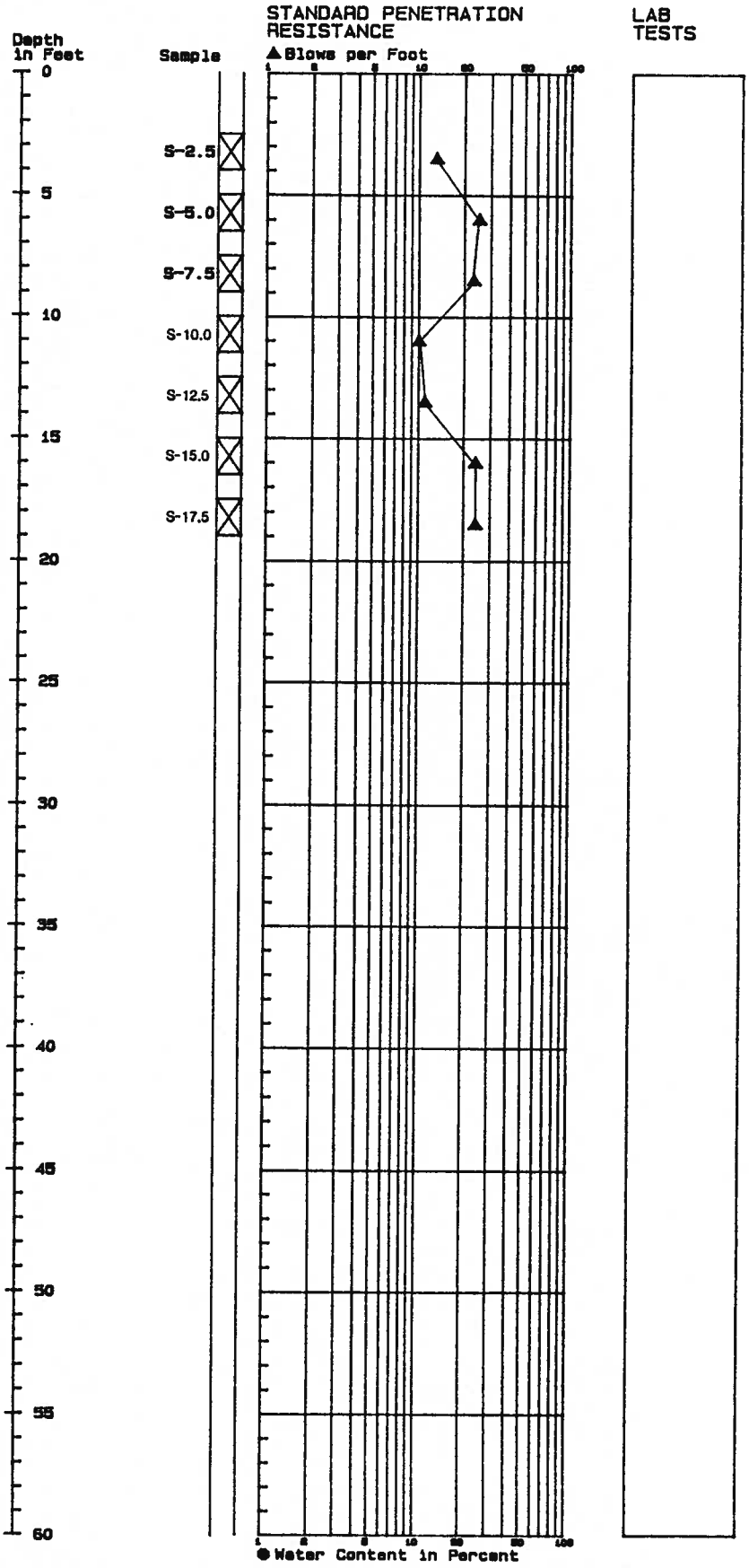
- Grades to very stiff.
- Orange sand stringers.

Loose to medium dense, wet, brown, slightly sandy SILT with some black mottling and pieces of wood. (Possibly FILL)

Medium dense, moist, gray, slightly gravelly to gravelly, silty, fine to medium SAND. (Native Soil?)

- Large gravels/cobbles.

Bottom of Boring at 19.0 Feet.
Completed 11/30/88.



1. Refer to Figure B-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

J-2228 November 1988

HART-CROWSER & associates, inc.

Figure B-4

Boring Log B-10

SOIL DESCRIPTIONS

Ground Surface Elevation in Feet

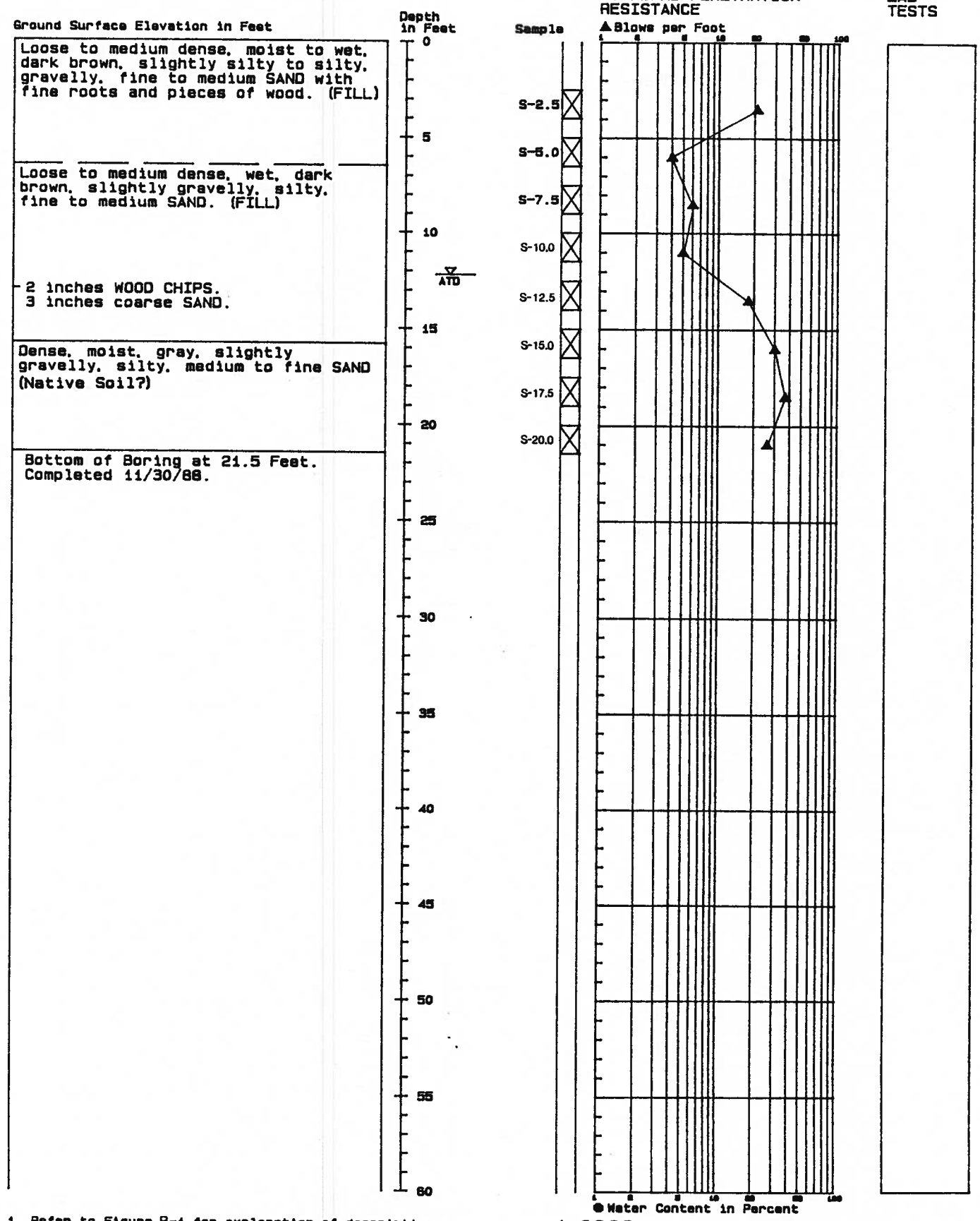
Loose to medium dense, moist to wet, dark brown, slightly silty to silty, gravelly, fine to medium SAND with fine roots and pieces of wood. (FILL)

Loose to medium dense, wet, dark brown, slightly gravelly, silty, fine to medium SAND. (FILL)

2 inches WOOD CHIPS.
3 inches coarse SAND.

Dense, moist, gray, slightly gravelly, silty, medium to fine SAND (Native Soil?)

Bottom of Boring at 21.5 Feet.
Completed 11/30/88.



1. Refer to Figure B-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

J-2228 November 1988

HART-CROWSER & associates, inc.

Figure B-5

Boring Log B-12

SOIL DESCRIPTIONS

Ground Surface Elevation in Feet

Loose to medium dense, moist to wet, dark brown, gravelly, silty, medium to fine SAND with fine roots.

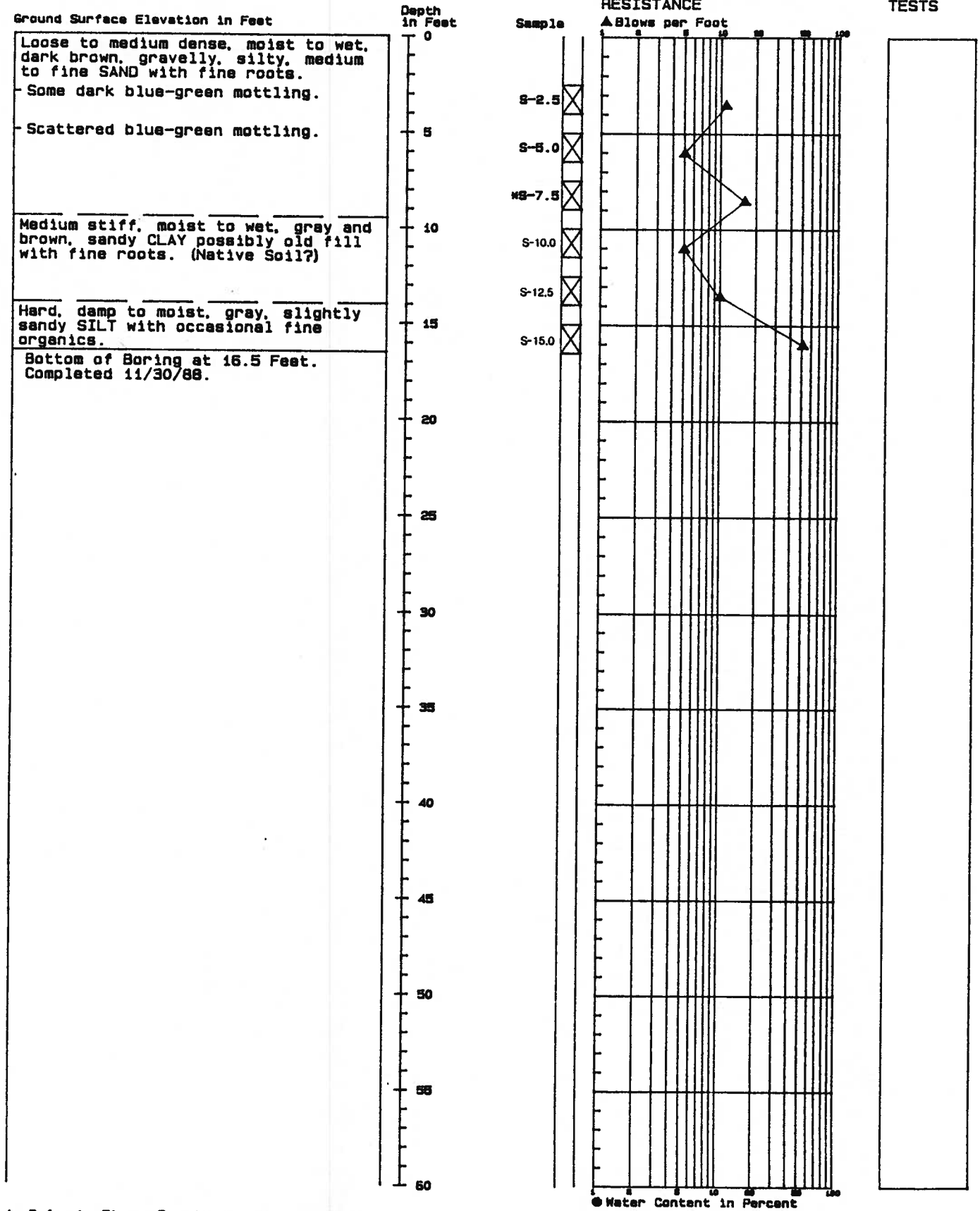
- Some dark blue-green mottling.

- Scattered blue-green mottling.

Medium stiff, moist to wet, gray and brown, sandy CLAY possibly old fill with fine roots. (Native Soil?)

Hard, damp to moist, gray, slightly sandy SILT with occasional fine organics.

Bottom of Boring at 16.5 Feet. Completed 11/30/88.



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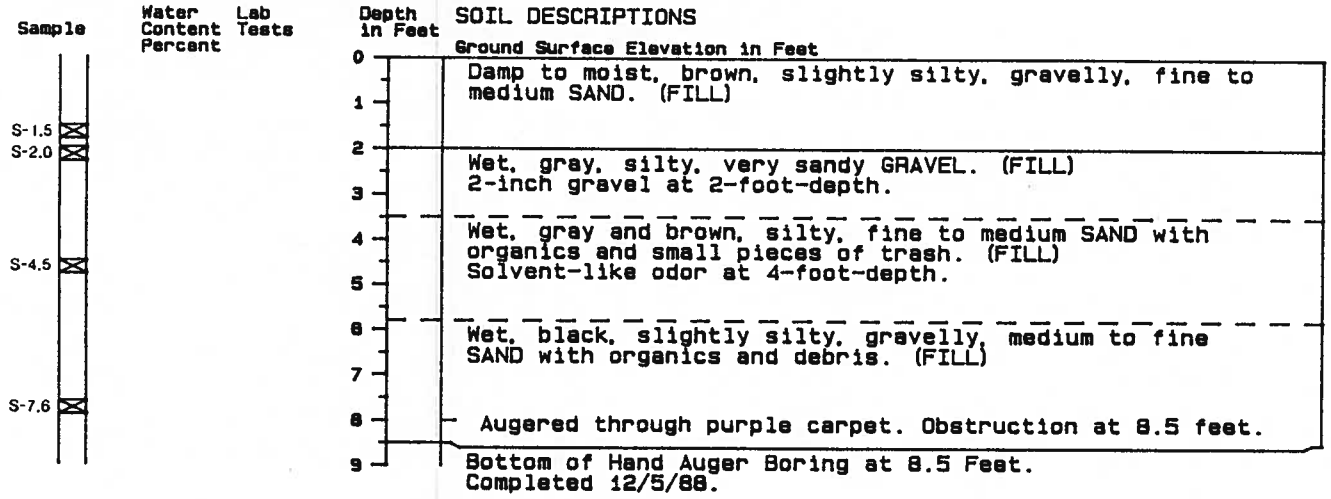
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

J-2228 November 1 1988

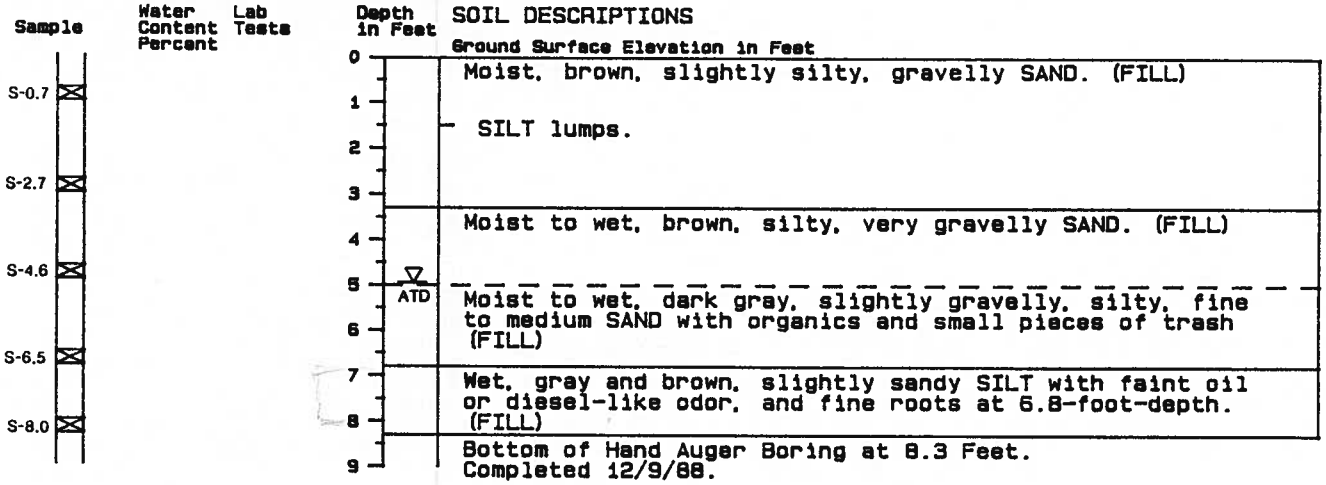
HART-CROWSER & associates, inc.

Figure B-6

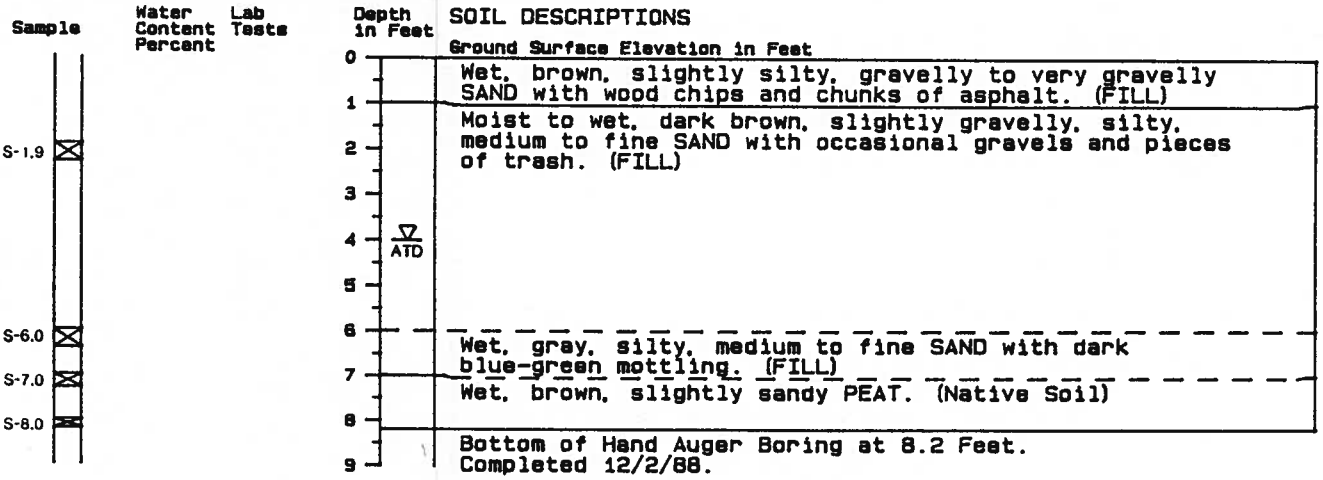
Hand Auger Boring Log C-3



Hand Auger Boring Log C-3A



Hand Auger Boring Log C-5

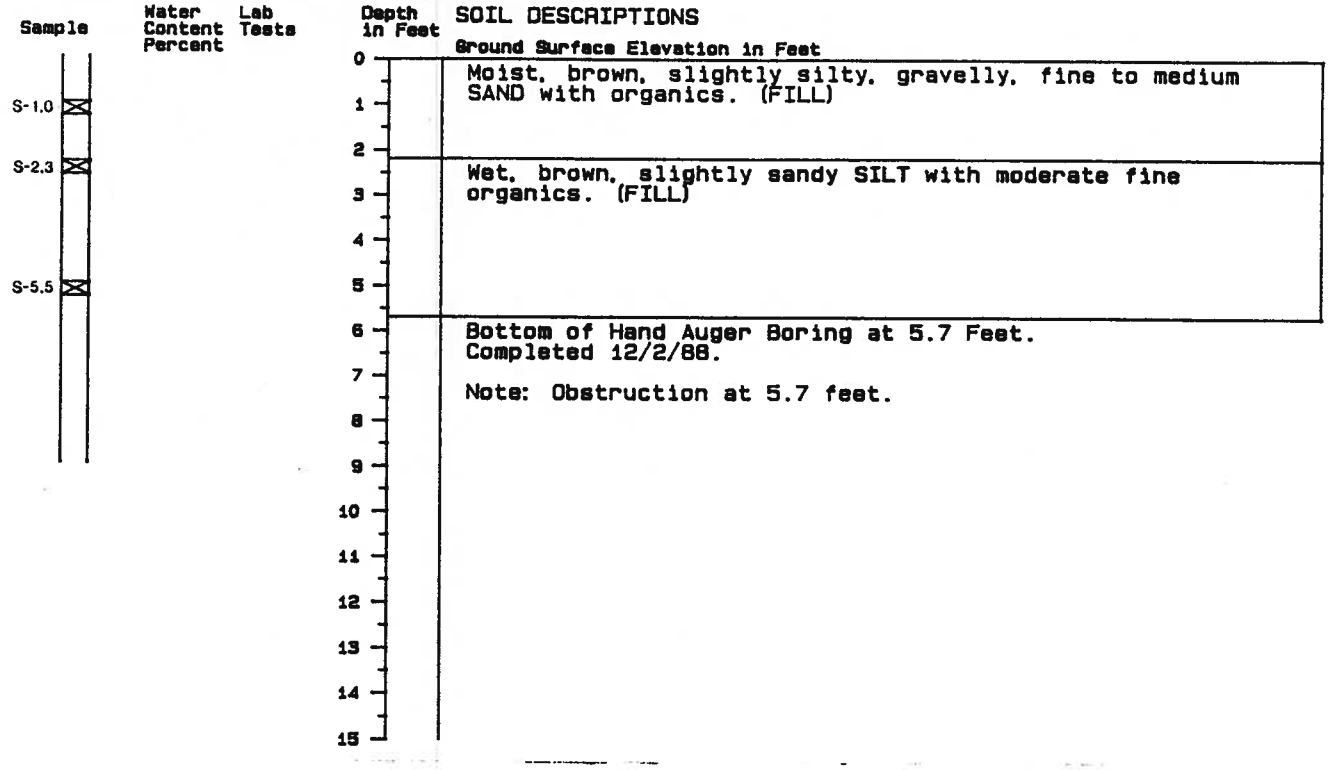


Note: Unable to continue due to sands collapsing above and below water table.

1. Refer to Figure B-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water conditions, if indicated, are at time of excavation. Conditions may vary with time.

J-2228 December 1988
HART-CROWSER & associates, inc.
Figure B-7

Hand Auger Boring Log D-6



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2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water conditions, if indicated, are at time of excavation. Conditions may vary with time.

J-2228 December 1988
HART-CROWSER & associates, inc.
Figure B-8

Hart Crowser
J-2228

APPENDIX C
ASSESSMENT OF LABORATORY DATA QUALITY
LABORATORY DATA
CHAIN OF CUSTODY FORMS

APPENDIX C
ASSESSMENT OF LABORATORY DATA QUALITY
LABORATORY DATA
CHAIN OF CUSTODY FORMS

DATA QUALITY

The analytical results generated from this study were reviewed by an environmental chemist to determine the quality of the data. The quality of the data was acceptable for use in the assessment of the WSDOT site. A more detailed evaluation of data quality is given below. Laboratory quality control data are presented with the laboratory data report.

Holding Times

There are no EPA established holding times for EP Toxicity metals or volatile organics analyses in soils. Generally, a six-month holding time for metals analysis and a two-week holding time for volatile organics analysis are commonly used. All samples were extracted within 15 days for EP Toxicity metals analysis. Volatile organics analysis was performed within one week of sample collection.

Field Duplicates

Three soil samples were split and submitted as field duplicates for EP Toxicity metals analysis. EP Toxicity metals were not detected in duplicate samples collected from borings B-7 and B-9. Zinc was detected at a concentration of 0.1 mg/L in one of the duplicate samples collected from boring C-5. The detection limit for zinc was 0.1 mg/L. No EP Toxicity metals were detected in the corresponding split sample. Since only one of the duplicate samples contained a detectable concentration of metals, relative percent differences for the duplicate samples could not be determined. However, it does not appear that there is a large variability of EP Toxicity metal concentrations in the duplicate soil samples.

Laboratory Method Blanks

According to EPA Contract Lab Program (CLP) requirements, at least one blank should be analyzed for every 20 samples received. Three laboratory method blanks were prepared and

analyzed for EP Toxicity metals. No metals were detected in the blanks.

One laboratory method blank was analyzed for volatile organic compounds. Ethylbenzene (1 ppb) was the only organic compound detected in the blank. Ethylbenzene was not detected in any of the samples.

Surrogate Recoveries

Surrogates are added to every sample prior to extraction and analysis to monitor for matrix effects, purging efficiency, and sample processing errors. All volatile organics surrogate recoveries were within CLP control limits.

Matrix Spike/Matrix Spike Duplicate

Three matrix spike/matrix spike duplicates (MS/MSD) were analyzed for EP Toxicity metals. There are no EPA established quality control limits for EP Toxicity metals MS/MSD analysis. We compared these values to CLP water quality control limits. One of the three MS/MSD analysis exceeded the water quality control limits for percent recovery and relative percent difference. Since the recoveries were above the upper quality control limit and the reported results were generally below the detection limit, we do not believe that a serious bias in the data has occurred.

Hart Crowser
J-2228

CERTIFICATES OF ANALYSIS
LAUCKS TESTING LABORATORIES, INC.
ON-SITE SOILS
EP TOXICITY -
CADMIUM, CHROMIUM, LEAD, COPPER, NICKEL, ZINC

Laucks 80 years
Testing Laboratories, Inc.
940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063
Chemistry. Microbiology. and Technical Services

TO: Hart Crowser, Inc.
Seattle, WA
ATTN: Kristin Darnell

RE: Project Number J-2228
Project Name SR 99

Laucks Testing Laboratories, Inc.

Narrative Packet

Laboratory Number 13450

Dated December 30, 1988

Laucks 81 years
Testing Laboratories, Inc.
940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063

Certificate

Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-21
Project Sample ID No. ---------- BE-9/2.5
Date Collected: ---------- 11/30/88
Time Collected: ---------- 8:45
Date Received at Lab: ---------- 12/01/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/14	12/19	12/21	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/14	12/19	12/21	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/14	12/19	12/21	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/14	12/19	12/21	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/14	12/19	12/21	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/14	12/19	12/21	SW 1310	LX EP3	SW 6010

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Certificate

Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-22
Project Sample ID No. ---------- B-3/2.5
Date Collected: ---------- 12/6/88
Time Collected: ---------- 09:00
Date Received at Lab: ---------- 12/6/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/13	12/19	12/21	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/13	12/19	12/21	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/13	12/19	12/21	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/13	12/19	12/21	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/13	12/19	12/21	SW 1310	LX EP3	SW 6010
Zinc	0.1		mg/L	0.1	0.1	0.1	500.	12/13	12/19	12/21	SW 1310	LX EP3	SW 6010

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Certificate

Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-23
Project Sample ID No. ---------- B-3/5.0
Date Collected: ---------- 12/6/88
Time Collected: ---------- 09:00
Date Received at Lab: ---------- 12/6/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/13	12/19	12/21	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/13	12/19	12/21	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/13	12/19	12/21	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/13	12/19	12/21	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/13	12/19	12/21	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/13	12/19	12/21	SW 1310	LX EP3	SW 6010

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Chemistry, Microbiology, and Technical Services

Certificate

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-24
Project Sample ID No. ---------- B-3/8.5
Date Collected: ---------- 12/6/88
Time Collected: ---------- 09:00
Date Received at Lab: ---------- 12/6/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/13	12/19	12/21	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/13	12/19	12/21	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/13	12/19	12/21	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/13	12/19	12/21	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/13	12/19	12/21	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/13	12/19	12/21	SW 1310	LX EP3	SW 6010

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Certificate

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TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-25
Project Sample ID No. ---------- B-3/10.0
Date Collected: ---------- 12/6/88
Time Collected: ---------- 09:00
Date Received at Lab: ---------- 12/6/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/15	12/19	12/21	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/15	12/19	12/21	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/15	12/19	12/21	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/15	12/19	12/21	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/15	12/19	12/21	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/15	12/19	12/21	SW 1310	LX EP3	SW 6010

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Certificate

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-26
Project Sample ID No. ---------- B-3/12.0
Date Collected: ---------- 12/6/88
Time Collected: ---------- 09:00
Date Received at Lab: ---------- 12/6/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/15	12/19	12/21	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/15	12/19	12/21	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/15	12/19	12/21	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/15	12/19	12/21	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/15	12/19	12/21	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/15	12/19	12/21	SW 1310	LX EP3	SW 6010

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Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-27
Project Sample ID No. ---------- C-5/1.9
Date Collected: ---------- 12/6/88
Time Collected: ---------- 13:40
Date Received at Lab: ---------- 12/6/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/15	12/19	12/21	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/15	12/19	12/21	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/15	12/19	12/21	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/15	12/19	12/21	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/15	12/19	12/21	SW 1310	LX EP3	SW 6010
Zinc	0.1		mg/L	0.1	0.1	0.1	500.	12/15	12/19	12/21	SW 1310	LX EP3	SW 6010

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Certificate

Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-28
Project Sample ID No. ---------- C-5/6.0
Date Collected: ---------- 12/6/88
Time Collected: ---------- 13:40
Date Received at Lab: ---------- 12/6/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/15	12/19	12/21	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/15	12/19	12/21	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/15	12/19	12/21	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/15	12/19	12/21	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/15	12/19	12/21	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/15	12/19	12/21	SW 1310	LX EP3	SW 6010

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Certificate

Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-29
Project Sample ID No. ---------- C-5/7.0
Date Collected: ---------- 12/6/88
Time Collected: ---------- 13:40
Date Received at Lab: ---------- 12/6/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/15	12/19	12/21	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/15	12/19	12/21	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/15	12/19	12/21	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/15	12/19	12/21	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/15	12/19	12/21	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/15	12/19	12/21	SW 1310	LX EP3	SW 6010

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Certificate

Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-30
Project Sample ID No. ---------- C-5/8.0
Date Collected: ---------- 12/6/88
Time Collected: ---------- 13:40
Date Received at Lab: ---------- 12/6/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010

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Certificate

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-31
Project Sample ID No. ---------- CE-5/6.0
Date Collected: ---------- 12/6/88
Time Collected: ---------- 13:40
Date Received at Lab: ---------- 12/6/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Zinc	0.1		mg/L	0.1	0.1	0.1	500.	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010

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Chemistry Microbiology and Technical Services

Certificate

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-32
Project Sample ID No. ---------- D-6/1.0
Date Collected: ---------- 12/6/88
Time Collected: ---------- 15:30
Date Received at Lab: ---------- 12/6/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Lead	0.3		mg/L	0.1	0.1	0.1	5.0	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Zinc	0.3		mg/L	0.1	0.1	0.1	500.	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010

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Certificate

Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-33
Project Sample ID No. ---------- D-6/2.3
Date Collected: ---------- 12/6/88
Time Collected: ---------- 15:30
Date Received at Lab: ---------- 12/6/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010

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Chemistry, Microbiology, and Technical Services

Certificate

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-34
Project Sample ID No. ---------- D-6/5.5
Date Collected: ---------- 12/6/88
Time Collected: ---------- 15:30
Date Received at Lab: ---------- 12/6/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010

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Chemistry, Microbiology, and Technical Services

Certificate

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-35
Project Sample ID No. ---------- C-3/1.5
Date Collected: ---------- 12/6/88
Time Collected: ---------- 09:00
Date Received at Lab: ---------- 12/6/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Zinc	0.4		mg/L	0.1	0.1	0.1	500.	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010

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Certificate

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-36
Project Sample ID No. ---------- C-3/2.0
Date Collected: ---------- 12/6/88
Time Collected: ---------- 09:00
Date Received at Lab: ---------- 12/6/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Zinc	2.2		mg/L	0.1	0.1	0.1	500.	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010

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TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-37
Project Sample ID No. ---------- C-3/4.5
Date Collected: ---------- 12/6/88
Time Collected: ---------- 09:00
Date Received at Lab: ---------- 12/6/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Lead	0.1		mg/L	0.1	0.1	0.1	5.0	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Zinc	0.3		mg/L	0.1	0.1	0.1	500.	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010

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TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-38
Project Sample ID No. ---------- C-3/7.6
Date Collected: ---------- 12/6/88
Time Collected: ---------- 09:00
Date Received at Lab: ---------- 12/6/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Lead	1.2		mg/L	0.1	0.1	0.1	5.0	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Zinc	0.9		mg/L	0.1	0.1	0.1	500.	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010

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TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-39
Project Sample ID No. ---------- B-5/0.3
Date Collected: ---------- 12/6/88
Time Collected: ---------- 11:00
Date Received at Lab: ---------- 12/6/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010
Zinc	0.2		mg/L	0.1	0.1	0.1	500.	12/19	12/23	12/23	SW 1310	LX EP3	SW 6010

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Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-40
Project Sample ID No. ---------- B-5/0.8
Date Collected: ---------- 12/6/88
Time Collected: ---------- 11:00
Date Received at Lab: ---------- 12/6/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010

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TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-41
Project Sample ID No. ---------- B-5/3.2
Date Collected: ---------- 12/6/88
Time Collected: ---------- 11:00
Date Received at Lab: ---------- 12/6/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010

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Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-42
Project Sample ID No. ---------- B-5/5.0
Date Collected: ---------- 12/6/88
Time Collected: ---------- 11:00
Date Received at Lab: ---------- 12/6/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010

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Certificate

Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-43
Project Sample ID No. ---------- B-5/7.0
Date Collected: ---------- 12/6/88
Time Collected: ---------- 11:00
Date Received at Lab: ---------- 12/6/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010

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Certificate

Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-44
Project Sample ID No. ---------- B-7/0.3
Date Collected: ---------- 12/6/88
Time Collected: ---------- 14:00
Date Received at Lab: ---------- 12/6/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010

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Certificate

Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-45
Project Sample ID No. ---------- B-7/2.8
Date Collected: ---------- 12/6/88
Time Collected: ---------- 14:00
Date Received at Lab: ---------- 12/6/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/20	12/23	12/23	SW 1310	LX EP3	SW 6010

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Certificate

Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-46
Project Sample ID No. ---------- B-7/4.5
Date Collected: ---------- 12/6/88
Time Collected: ---------- 14;00
Date Received at Lab: ---------- 12/6/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/21	12/23	12/23	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/21	12/23	12/23	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/21	12/23	12/23	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/21	12/23	12/23	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/21	12/23	12/23	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/21	12/23	12/23	SW 1310	LX EP3	SW 6010

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Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-47
Project Sample ID No. ---------- B-7/6.5
Date Collected: ---------- 12/6/88
Time Collected: ---------- 14:00
Date Received at Lab: ---------- 12/6/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/21	12/23	12/23	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/21	12/23	12/23	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/21	12/23	12/23	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/21	12/23	12/23	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/21	12/23	12/23	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/21	12/23	12/23	SW 1310	LX EP3	SW 6010

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Certificate

Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-48
Project Sample ID No. ---------- B-7/8.9
Date Collected: ---------- 12/6/88
Time Collected: ---------- 14:00
Date Received at Lab: ---------- 12/6/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/21	12/23	12/23	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/21	12/23	12/23	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/21	12/23	12/23	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/21	12/23	12/23	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/21	12/23	12/23	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/21	12/23	12/23	SW 1310	LX EP3	SW 6010

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Certificate

Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-49
Project Sample ID No. ---------- BE-7/0.3
Date Collected: ---------- 12/6/88
Time Collected: ---------- 14:00
Date Received at Lab: ---------- 12/6/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/21	12/23	12/23	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/21	12/23	12/23	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/21	12/23	12/23	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/21	12/23	12/23	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/21	12/23	12/23	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/21	12/23	12/23	SW 1310	LX EP3	SW 6010

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Certificate

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TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-B1219ICP.E01
Project Sample ID No. ---------- N/A
Date Collected: ---------- N/A
Time Collected: ---------- N/A
Date Received at Lab: ---------- N/A
Sample Matrix: ---------- EP Tox Blank

Blank Name	Sample No.	Analyte	Result	Units	SDL	MDL
B1219ICP.E01	1-19	Copper	<0.1	mg/L	0.1	0.1
B1219ICP.E01	1-19	Nickel	<0.1	mg/L	0.1	0.1
B1219ICP.E01	1-19	Cadmium	<0.01	mg/L	0.01	0.01
B1219ICP.E01	1-19	Lead	<0.1	mg/L	0.1	0.1
B1219ICP.E01	1-19	Chromium	<0.1	mg/L	0.1	0.1
B1219ICP.E01	1-19	Zinc	<0.1	mg/L	0.1	0.1

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Certificate

Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-B1219ICP.E02
Project Sample ID No. ---------- N/A
Date Collected: ---------- N/A
Time Collected: ---------- N/A
Date Received at Lab: ---------- N/A
Sample Matrix: ---------- EP Tox Blank

Blank Name	Sample No.	Analyte	Result	Units	SDL	MDL
B1219ICP.E02	20-29	Copper	<0.1	mg/L	0.1	0.1
B1219ICP.E02	20-29	Nickel	<0.1	mg/L	0.1	0.1
B1219ICP.E02	20-29	Cadmium	<0.01	mg/L	0.01	0.01
B1219ICP.E02	20-29	Lead	<0.1	mg/L	0.1	0.1
B1219ICP.E02	20-29	Chromium	<0.1	mg/L	0.1	0.1
B1219ICP.E02	20-29	Zinc	<0.1	mg/L	0.1	0.1

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Certificate

Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-B1223ICP.E01
Project Sample ID No. ---------- N/A
Date Collected: ---------- N/A
Time Collected: ---------- N/A
Date Received at Lab: ---------- N/A
Sample Matrix: ---------- EP Tox Blank

Blank Name	Sample No.	Analyte	Result	Units	SDL	MDL
B1223ICP.E01	30-49	Copper	<0.1	mg/L	0.1	0.1
B1223ICP.E01	30-49	Nickel	<0.1	mg/L	0.1	0.1
B1223ICP.E01	30-49	Cadmium	<0.01	mg/L	0.01	0.01
B1223ICP.E01	30-49	Lead	<0.1	mg/L	0.1	0.1
B1223ICP.E01	30-49	Chromium	<0.1	mg/L	0.1	0.1
B1223ICP.E01	30-49	Zinc	<0.1	mg/L	0.1	0.1

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Introduction

We are herewith transmitting our narrative packet and final analytical results for the referenced soil chemistry project.

The narrative is presented in the following segments:

Sample Receipt

Methods of Analysis

Reporting Conventions

Analytical History

Following narrative, all analytical results and associated quality control sample results are presented in individual packages by fraction, in order:

Inorganics EP Toxicity Analysis

Sample Receipt

Forty-nine (49) samples of soil were received at the laboratory between December 1 and December 6, 1988. All samples were received intact and in good condition, with no exceptions.

Laboratory number 13450 was assigned to this project and each individual sample was given a discrete sub-sample number (i.e., 13450-1, 13450-2, etc.). The identification of each sample is detailed in Table I, attached.

There were no discrepancies between sample identification and the chain-of-custody documents accompanying the samples.

The samples were held in cold storage at 4 degrees C until removed for preparation and/or analysis.

Table I
Sample Identification

Lab Number	Sample Number	HC Identification	Date Sampled	Date Received
13450	1	B-9/2.5	11-30-88	12-01-88
13450	2	B-9/5.0	11-30-88	12-01-88
13450	3	B-9/7.5	11-30-88	12-01-88
13450	4	B-9/10.0	11-30-88	12-01-88
13450	5	B-9/12.5	11-30-88	12-01-88
13450	6	B-9/15.0	11-30-88	12-01-88
13450	7	B-9/17.5	11-30-88	12-01-88
13450	8	B-10/2.5	11-30-88	12-01-88
13450	9	B-10/5.0	11-30-88	12-01-88
13450	10	B-10/7.5	11-30-88	12-01-88
13450	11	B-10/10.0	11-30-88	12-01-88
13450	12	B-10/12.5	11-30-88	12-01-88
13450	13	B-10/15.0	11-30-88	12-01-88
13450	14	B-10/17.5	11-30-88	12-01-88
13450	15	B-10/20.0	11-30-88	12-01-88
13450	16	B-12/2.5	11-30-88	12-01-88
13450	17	B-12/5.0	11-30-88	12-01-88
13450	18	B-12/10.0	11-30-88	12-01-88
13450	19	B-12/12.5	11-30-88	12-01-88
13450	20	B-12/15.0	11-30-88	12-01-88
13450	21	BE-9/2.5	11-30-88	12-01-88
13450	22	B-3/2.5	12-02-88	12-06-88
13450	23	B-3/5.0	12-02-88	12-06-88
13450	24	B-3/8.5	12-02-88	12-06-88
13450	25	B-3/10.0	12-02-88	12-06-88
13450	26	B-3/12.0	12-02-88	12-06-88
13450	27	C-5/1.9	12-02-88	12-06-88
13450	28	C-5/6.0	12-02-88	12-06-88
13450	29	C-5/7.0	12-02-88	12-06-88
13450	30	C-5/8.0	12-02-88	12-06-88
13450	31	CE-5/6.0	12-02-88	12-06-88
13450	32	D-6/1.0	12-02-88	12-06-88
13450	33	D-6/2.3	12-02-88	12-06-88
13450	34	D-6/5.5	12-02-88	12-06-88
13450	35	C-3/1.5	12-05-88	12-06-88
13450	36	C-3/2.0	12-05-88	12-06-88
13450	37	C-3/4.5	12-05-88	12-06-88
13450	38	C-3/7.6	12-05-88	12-06-88
13450	39	B-5/0.3	12-05-88	12-06-88
13450	40	B-5/0.8	12-05-88	12-06-88
13450	41	B-5/3.2	12-05-88	12-06-88
13450	42	B-5/5.0	12-05-88	12-06-88
13450	43	B-5/7.0	12-05-88	12-06-88
13450	44	B-7/0.3	12-05-88	12-06-88
13450	45	B-7/2.8	12-05-88	12-06-88
13450	46	B-7/4.5	12-05-88	12-06-88
13450	47	B-7/6.5	12-05-88	12-06-88
13450	48	B-7/8.9	12-05-88	12-06-88
13450	49	BE-7/0.3	12-05-88	12-06-88

Methods of Analysis

Samples were analyzed as specified on the chain-of-custody forms and in accordance with the Scope of Work dated June 24, 1988 and signed December 1, 1988. Specific methods of analysis employed are shown on each sample result page. Two letter codes are used to indicate the volumes from which test methods are drawn. These codes are defined as shown below:

SW = Test Methods for Evaluating Solid Waste (SW 846), U.S.E.P.A., November, 1986.

LX = A Laucks Testing Laboratories in-house method or modification of a published method, as noted.

Modifications

The following modifications were made in the test methods referenced.

EP3: A modification of method SW 3010. The volume is reduced once during digestion, rather than twice, and by a lesser amount. Both are HNO3 and HCl digestions.

Reporting Conventions

The following abbreviations appear in these reports:

MDL = Method Detection Limit

SDL = Sample Detection Limit (This figure can vary from sample to sample, dependent on sample size, matrix interferences, etc.)

CRDL = Contract Recommended Detection Limit.

Sample results may be flagged with a one-letter code designed to provide additional information about the analysis or the value reported. The flags employed are defined as shown below. Where no flag is present, the analyte was detected and the value reported is the measured concentration.

U = The analyte was not detected. The value reported is the greater of the SDL or the CRDL, if any.

B = The analyte of interest was detected in the method blank associated with the sample, as well as in the sample itself. (If the sample result is U flagged, no B flag is applied.)

J = The analyte was detected at a concentration greater than the SDL, but less than the CRDL. The value reported should be considered an estimate. The reported value may have been rounded to the SDL.

By convention, if an analyte is not detected and if the SDL is less than the CRDL, the CRDL value is reported with a U flag. The implication is that no analyte was detected at the SDL level either. If the SDL is larger than the CRDL, it becomes the value which is U flagged. As stated above, if an analyte is detected below the CRDL but above the SDL, the reported value is J flagged.

Analytical History

There are no U.S.E.P.A. established holding times for performance of an EP Toxicity extraction. Six months is a commonly employed rule-of-thumb. All samples were extracted within 15 days of receipt at the laboratory.

Once extracted, there is no established holding time for determination of metals in the extract. As the extract is aqueous, and nitric-acid preserved, Laucks employs a six-month holding time, as for a preserved water sample. All extracts were digested within 7 days of extraction; and all digests were analyzed within 2 days of preparation.

Laucks 81 YEARS
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Certificate

Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-1
Project Sample ID No. ---------- B-9/2.5
Date Collected: ---------- 11/30/88
Time Collected: ---------- 8:45
Date Received at Lab: ---------- 12/01/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010

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Certificate

Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-2
Project Sample ID No. ---------- B-9/5.0
Date Collected: ---------- 11/30/88
Time Collected: ---------- 8:45
Date Received at Lab: ---------- 12/01/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010

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Certificate

Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-3
Project Sample ID No. ---------- B-9/7.5
Date Collected: ---------- 11/30/88
Time Collected: ---------- 8:45
Date Received at Lab: ---------- 12/01/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010

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Certificate

Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-4
Project Sample ID No. ---------- B-9/10.0
Date Collected: ---------- 11/30/88
Time Collected: ---------- 8:45
Date Received at Lab: ---------- 12/01/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010

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Certificate

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TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-5
Project Sample ID No. ---------- B-9/12.5
Date Collected: ---------- 11/30/88
Time Collected: ---------- 8:45
Date Received at Lab: ---------- 12/01/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010

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Certificate

Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-6
Project Sample ID No. ---------- B-9/15.0
Date Collected: ---------- 11/30/88
Time Collected: ---------- 8:45
Date Received at Lab: ---------- 12/01/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010

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Certificate

Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-7
Project Sample ID No. ---------- B-9/17.5
Date Collected: ---------- 11/30/88
Time Collected: ---------- 8:45
Date Received at Lab: ---------- 12/01/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010

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TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-8
Project Sample ID No. ---------- B-10/2.5
Date Collected: ---------- 11/30/88
Time Collected: ---------- 10:30
Date Received at Lab: ---------- 12/01/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Zinc	0.6		mg/L	0.1	0.1	0.1	500.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010

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TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-9
Project Sample ID No. ---------- B-10/5.0
Date Collected: ---------- 11/30/88
Time Collected: ---------- 10:30
Date Received at Lab: ---------- 12/01/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Lead	0.8		mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Zinc	1.2		mg/L	0.1	0.1	0.1	500.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010

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TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-10
Project Sample ID No. ---------- B-10/7.5
Date Collected: ---------- 11/30/88
Time Collected: ---------- 10:30
Date Received at Lab: ---------- 12/01/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Lead	0.3		mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Zinc	0.5		mg/L	0.1	0.1	0.1	500.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010

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Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-11
Project Sample ID No. ---------- B-10/10.0
Date Collected: ---------- 11/30/88
Time Collected: ---------- 10:30
Date Received at Lab: ---------- 12/01/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Zinc	0.2		mg/L	0.1	0.1	0.1	500.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010

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Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-12
Project Sample ID No. ---------- B-10/12.5
Date Collected: ---------- 11/30/88
Time Collected: ---------- 10:30
Date Received at Lab: ---------- 12/01/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Lead	0.5		mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Zinc	1.0		mg/L	0.1	0.1	0.1	500.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010

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Certificate

Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-13
Project Sample ID No. ---------- B-10/15.0
Date Collected: ---------- 11/30/88
Time Collected: ---------- 10:30
Date Received at Lab: ---------- 12/01/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010

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Certificate

Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-14
Project Sample ID No. ---------- B-10/17.5
Date Collected: ---------- 11/30/88
Time Collected: ---------- 10:30
Date Received at Lab: ---------- 12/01/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010

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Certificate

Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-15
Project Sample ID No. ---------- B-10/20.0
Date Collected: ---------- 11/30/88
Time Collected: ---------- 10:30
Date Received at Lab: ---------- 12/01/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010

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Certificate

Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-16
Project Sample ID No. ---------- B-12/2.5
Date Collected: ---------- 11/30/88
Time Collected: ---------- 12:00
Date Received at Lab: ---------- 12/01/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Zinc	0.2		mg/L	0.1	0.1	0.1	500.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010

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Certificate

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-17
Project Sample ID No. ---------- B-12/5.0
Date Collected: ---------- 11/30/88
Time Collected: ---------- 12:00
Date Received at Lab: ---------- 12/01/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010

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Certificate

Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-18
Project Sample ID No. ---------- B-12/10.0
Date Collected: ---------- 11/30/88
Time Collected: ---------- 12:00
Date Received at Lab: ---------- 12/01/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/12	12/19	12/21	SW 1310	LX EP3	SW 6010

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Laucks 81 years
Testing Laboratories, Inc.
940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063
Chemistry, Microbiology, and Technical Services

Certificate

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-19
Project Sample ID No. ---------- B-12/12.5
Date Collected: ---------- 11/30/88
Time Collected: ---------- 12:00
Date Received at Lab: ---------- 12/01/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/14	12/19	12/21	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/14	12/19	12/21	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/14	12/19	12/21	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/14	12/19	12/21	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/14	12/19	12/21	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/14	12/19	12/21	SW 1310	LX EP3	SW 6010

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Certificate

Chemistry, Microbiology, and Technical Services

TO: Hart Crowser & Associates, Inc.

Laboratory Sample ID No. ---------- 13450-20
Project Sample ID No. ---------- B-12/15.0
Date Collected: ---------- 11/30/88
Time Collected: ---------- 12:00
Date Received at Lab: ---------- 12/01/88
Sample Matrix: ---------- SOIL

The sample was analyzed in accordance with the methods, and on the dates specified, with results as shown below:

Analyte	Test Result	Flag	Unit	SDL	MDL	CRDL	MCL	Date Ext	Date Prep	Date Anal	Method Ext	Method Prep	Method Anal
Copper	0.1	U	mg/L	0.1	0.1	0.1	100.	12/14	12/19	12/21	SW 1310	LX EP3	SW 6010
Nickel	0.1	U	mg/L	0.1	0.1	0.1	NA	12/14	12/19	12/21	SW 1310	LX EP3	SW 6010
Cadmium	0.01	U	mg/L	0.01	0.01	0.01	1.0	12/14	12/19	12/21	SW 1310	LX EP3	SW 6010
Lead	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/14	12/19	12/21	SW 1310	LX EP3	SW 6010
Chromium	0.1	U	mg/L	0.1	0.1	0.1	5.0	12/14	12/19	12/21	SW 1310	LX EP3	SW 6010
Zinc	0.1	U	mg/L	0.1	0.1	0.1	500.	12/14	12/19	12/21	SW 1310	LX EP3	SW 6010

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Chemistry, Microbiology, and Technical Services

APPENDIX

Matrix Spike/Matrix Spike Duplicate Report

		parts per million (mg/L)				mg/L			QC LIMITS	
Sample	Analyte	Spike Level	Sample Result	MS Result	% Rec	MSD Result	% Rec	RPD	RPD	REC
1	Copper	1.0	<0.1	1.3	132.	1.0	105.	23.	NE	NE
1	Nickel	2.0	<0.1	2.8	138.	2.2	109.	23.	NE	NE
1	Cadmium	1.0	<0.01	1.4	137.	1.1	107.	25.	NE	NE
1	Lead	2.0	<0.1	2.8	142.	2.2	110.	25.	NE	NE
1	Chromium	1.0	<0.1	1.4	143.	1.1	110.	26.	NE	NE
1	Zinc	1.0	<0.1	1.4	145.	1.1	115.	23.	NE	NE
20	Copper	1.0	<0.1	1.0	104.	1.0	105.	1.	NE	NE
20	Nickel	2.0	<0.1	2.1	107.	2.2	111.	4.	NE	NE
20	Cadmium	1.0	<0.01	1.1	106.	1.1	108.	2.	NE	NE
20	Lead	2.0	<0.1	2.2	108.	2.3	114.	6.	NE	NE
20	Chromium	1.0	<0.1	1.1	109.	1.1	113.	4.	NE	NE
20	Zinc	1.0	<0.1	1.1	113.	1.1	114.	1.	NE	NE
30	Copper	1.0	<0.1	1.1	109.	1.1	108.	1.	NE	NE
30	Nickel	2.0	<0.1	2.2	110.	2.1	107.	3.	NE	NE
30	Cadmium	1.0	<0.01	1.1	109.	1.1	107.	2.	NE	NE
30	Lead	2.0	<0.1	2.2	112.	2.2	108.	4.	NE	NE
30	Chromium	1.0	<0.1	1.1	107.	1.1	105.	2.	NE	NE
30	Zinc	1.0	<0.1	1.2	116.	1.1	112.	4.	NE	NE

MS = Matrix Spike
MSD = Matrix Spike Duplicate

Rec = Recovery
RPD = Relative Percent Difference

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Hart Crowser
J-2228

CERTIFICATES OF ANALYSIS
LAUCKS TESTING LABORATORIES, INC.
BORING C-3A
ORGANIC CHEMICAL ANALYSES

RECEIVED
JAN 16 1989
HART CROWSER, INC.

Laucks Testing Laboratories, Inc.
940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063

Certificate

Chemistry, Microbiology, and Technical Services

CLIENT: Hart Crowser, Inc.
1910 Fairview Ave. E.
Seattle, WA 98102
ATTN: Kristin Darnell

LABORATORY NO. 13577

DATE: Jan. 11, 1989

Job No. 2228

REPORT ON: SOIL

SAMPLE IDENTIFICATION: Submitted 12/13/88 and identified as shown below:

1) C-3.A 4.6 12/09/88 09:40
2) C-3.A 6.5

TESTS PERFORMED AND RESULTS:

	1	2
Total Solids, %	87.2	85.3

Samples were analyzed in accordance with Test Methods for Evaluating Solid Waste (SW-846), U.S.E.P.A., 1986, Method 8240 (volatile organics).

Volatile Organics (by GC/MS)

	parts per billion (ug/kg), dry basis		
	1	2	Method Blank
Chloromethane	<2.	<2.	<1.
Bromomethane	<2.	<2.	<1.
Vinyl Chloride	<2.	<2.	<1.
Chloroethane	<6.	<6.	<3.
Methylene Chloride	2.	<2.	<1.
*Acetone	56.	86.	<5.

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Laucks 81 years
Testing Laboratories, Inc.
940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063
Chemistry, Microbiology, and Technical Services

Certificate

Hart Crowser, Inc.

LABORATORY NO. 13577

parts per billion (ug/kg), dry basis

	1	2	Method Blank
*Carbon Disulfide	<2.	<2.	<1.
1,1-Dichloroethene	<2.	<2.	<1.
1,1-Dichloroethane	<2.	<2.	<1.
trans-1,2-Dichloroethene	<2.	<2.	<1.
cis-1,2-Dichloroethene	<2.	<2.	<1.
Total-1,2-Dichloroethene	<2.	<2.	<1.
Chloroform	<2.	<2.	<1.
*2-Butanone	<6.	9.	<3.
1,2-Dichloroethane	<2.	<2.	<1.
1,1,1-Trichloroethane	<2.	<2.	<1.
Carbon Tetrachloride	<2.	<2.	<1.
*Vinyl Acetate	<2.	<2.	<1.
Bromodichloromethane	<2.	<2.	<1.
1,2-Dichloropropane	<2.	<2.	<1.
Trichloroethene	<2.	<2.	<1.
Benzene	<2.	<2.	<1.
Dibromochloromethane	<6.	<6.	<3.
1,1,2-Trichloroethane	<2.	<2.	<1.
Bromoform	<2.	<2.	<1.
*4-Methyl-2-pentanone	<6.	<6.	<3.
*2-Hexanone	<6.	<6.	<3.
1,1,2,2-Tetrachloroethane	<6.	<6.	<3.
Tetrachloroethene	<2.	<2.	<1.
Toluene	2.	5.	<1.
Chlorobenzene	<6.	<6.	<3.
trans-1,3-Dichloropropene	<6.	<6.	<3.
Ethylbenzene	<2.	<2.	1.
cis-1,3-Dichloropropene	<6.	<6.	<3.
*Styrene	<2.	<2.	<1.
*Total Xylenes	<2.	3.	<1.

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Laucks 81 years
Testing Laboratories, Inc.
940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063
Chemistry, Microbiology, and Technical Services

Certificate

Hart Crowser, Inc.

LABORATORY NO. 13577

Key

< = "less than"
* = additional compounds from the EPA's Hazardous Substances List

Respectfully submitted,

Laucks Testing Laboratories, Inc.

J. M. Owens

JMO:emt

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Laucks 81 years
Testing Laboratories, Inc.
940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063

Certificate

Chemistry, Microbiology, and Technical Services

APPENDIX A

Surrogate Recovery Quality Control Report

Attached is a surrogate (chemically similar) compound utilized in the analysis of organic compounds. The surrogate is added to every sample prior to extraction and analysis to monitor for matrix effects, purging efficiency, and sample processing errors. The control limits represent the 95% confidence interval established in our laboratory through repetitive analysis of these sample types.

This report is submitted for the exclusive use of the person, partnership, or corporation to whom it is addressed. Subsequent use of the name of this company or any member of its staff in connection with the advertising or sale of any product or process will be granted only on contract. This company accepts no responsibility except for the due performance of inspection and/or analysis in good faith and according to the rules of the trade and of science.

JOB No. 13577 DATE: 12/27/88

Sample No. B1219MVOSJ1 Matrix: Soil Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
d4-1.2-Dichloroethane	99		74 - 125
d8-Toluene	101		77 - 121
p-Bromofluorobenzene	91		75 - 115

Sample No. 01 Matrix: Soil Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
d4-1.2-Dichloroethane	102		74 - 125
d8-Toluene	93		77 - 121
p-Bromofluorobenzene	81		75 - 115

Sample No. 02 Matrix: Soil Analysis: MS-VOA

Surrogate Compound	Percent Recovery	Comment	Control Limits
d4-1.2-Dichloroethane	96		74 - 125
d8-Toluene	92		77 - 121
p-Bromofluorobenzene	78		75 - 115

Laucks 81 YEARS
Testing Laboratories, Inc.
940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063

Chemistry, Microbiology, and Technical Services

Certificate

APPENDIX B

Copy of Chain-of-Custody is Attached

This report is submitted for the exclusive use of the person, partnership, or corporation to whom it is addressed. Subsequent use of the name of this company or any member of its staff in connection with the advertising or sale of any product or process will be granted only on contract. This company accepts no responsibility except for the due performance of inspection and/or analysis in good faith and according to the rules of the trade and of science.

Sample Custody Record

DATE 12/13/88 PAGE 1 OF 1

HARTCROWSER

Hart Crowser, Inc.
1910 Fairview Avenue East
Seattle, Washington 98102-3699

JOB NUMBER 2228 LAB NUMBER

PROJECT MANAGER K. Darnell

PROJECT NAME SR 99

SAMPLED BY: T. Walker

LAB NO.	SAMPLE	TIME	STATION	MATRIX	TESTING: VOA 8240	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
1	C-3A/4.6			SOIL	X	1	
2	C-3A/6.5			"	X	1	

RELINQUISHED BY	DATE	RECEIVED BY	DATE
Signature: Tim Walker	12/13	Signature:	
Printed Name: Tim Walker	TIME	Printed Name:	TIME
Company: Hart Crowser	16:00	Company:	

RELINQUISHED BY	DATE	RECEIVED BY	DATE
Signature:		Signature: Vera Gram	12/13
Printed Name:	TIME	Printed Name: Vera Gram	TIME
Company:		Company: Landau	16:00

TOTAL NUMBER OF CONTAINERS: 2

METHOD OF SHIPMENT: Hand Deliver

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS

Keep Cool

DISTRIBUTION:

1. PROVIDE WHITE AND YELLOW COPIES TO LABORATORY
2. RETURN PINK COPY TO PROJECT MANAGER
3. LABORATORY TO FILL IN SAMPLE NUMBER AND SIGN FOR RECEIPT
4. LABORATORY TO RETURN WHITE COPY TO HART CROWSER

Hart Crowser
J-2228

CERTIFICATES OF ANALYSIS
LAUCKS TESTING LABORATORIES, INC.
BACKGROUND SOIL SAMPLES
EP TOXICITY -
CADMIUM, CHROMIUM, LEAD, COPPER, NICKEL, ZINC

Laucks 81 years
Testing Laboratories, Inc.
940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063

Certificate

Chemistry, Microbiology, and Technical Services

RECEIVED
JAN 20 1989
HART CROWSER, INC.

CLIENT: Hart Crowser Inc.
1910 Fairview Ave. E.
Seattle, WA 98102-3699
ATTN: K. Darnell

LABORATORY NO. 13938

DATE: Jan. 18, 1989

JOB #2228

REPORT ON: SOIL

SAMPLE IDENTIFICATION: Submitted 1/9/89 and identified as shown:

1) BG-1 1/9 12:05
2) BG-2 1/9 12:10

Samples were analyzed for E.P. Toxicity in accordance with Test Methods for Evaluating Solid Waste (SW 846), U.S.E.P.A, November, 1986. Extraction was performed using Method 1310, and metals were performed by ICAP, Method 6010.

	parts per million (mg/L)		
	1	2	MCL
Cadmium	<0.01	<0.01	1.0
Chromium	<0.1	<0.1	5.0
Lead	<0.1	<0.1	5.0
Copper	<0.1	<0.1	100.
Nickel	<0.1	<0.1	-
Zinc	<0.1	<0.1	500.

Key

MCL = Maximum Contamination Level allowed per regulation.
< = Less than

Respectfully submitted,

Laucks Testing Laboratories, Inc.

J. M. Owens

JMO:veg

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Sample Custody Record

DATE 1/9/89 PAGE 1 OF 1

HARTCROWSER

Hart Crowser, Inc.
1910 Fairview Avenue East
Seattle, Washington 98102-3699

JOB NUMBER J-2228 LAB NUMBER

PROJECT MANAGER K. Darnell

PROJECT NAME State Route 99

SAMPLED BY: T. Walker

LAB NO.	SAMPLE	TIME	STATION	MATRIX	TESTING: EPTOX Metals	NO. OF CONTAINERS	OBSERVATIONS/COMMENTS/ COMPOSITING INSTRUCTIONS
		12:05	BG-1	SOIL	X	1	(1) Tests per work order
		12:10	BG-2	"	X	1	(2) Please rush - results by 1/16
							per telephone conversation Lauck's & K. Darnell

RELINQUISHED BY	DATE	RECEIVED BY	DATE
Signature: Tim Walker	1/9	Signature:	
Printed Name: Tim Walker	TIME	Printed Name:	TIME
Company: Hart Crowser Inc.	12:35	Company:	

RELINQUISHED BY	DATE	RECEIVED BY	DATE
Signature:		Signature: Lisa Johnson	1/9/89
Printed Name:	TIME	Printed Name: Lisa Johnson	TIME
Company:		Company: Laucks Labs	12:40

TOTAL NUMBER OF CONTAINERS: 2

METHOD OF SHIPMENT: Hand Delivered

SPECIAL SHIPMENT/HANDLING OR STORAGE REQUIREMENTS

DISTRIBUTION:

1. PROVIDE WHITE AND YELLOW COPIES TO LABORATORY
2. RETURN PINK COPY TO PROJECT MANAGER
3. LABORATORY TO FILL IN SAMPLE NUMBER AND SIGN FOR RECEIPT
4. LABORATORY TO RETURN WHITE COPY TO HART CROWSER

Hart Crowser
J-2228

APPENDIX D
DEPARTMENT OF ECOLOGY
TIM NO. 86-1

ANDREA BEATTY RINIKER
Director

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Mail Stop PV-11 • Olympia, Washington 98504-8711 • (206) 459-6000

MEMORANDUM

September 15, 1986

TO: Persons Interested in Hazardous Waste Control

THROUGH: Nancy Ellison, Acting Manager
Solid & Hazardous Waste Program

FROM: Ross Potter, Supervisor
Program Development Unit

SUBJECT: TIM NO. 86-1; Use of EP Toxicity Test Procedures to Determine Additional Testing Requirements for Certain Waste Streams Containing Copper, Nickel and Zinc

PROBLEM STATEMENT

Ecology experience has shown that foundry slags, foundry baghouse dusts and spent sandblasting grits are often regulated under Chapter 173-303 WAC due primarily to metal content. Often foundry wastes and sandblasting grits fail the EP toxicity characteristic and/or the aquatic toxicity criteria. Nickel (Ni), copper (Cu) and zinc (Zn) are common metal constituents found in foundry wastes and sandblasting grits; however, the EP toxicity test does not include these three metals. In addition, certain forms of Cu, Ni and Zn are known to be extremely toxic to fish.

Due to metal concentration variability encountered in foundry wastes and sandblasting grits, it is often necessary to require batch testing for EP toxicity and aquatic toxicity each time disposal is required. County health officials and many of the Ports have requested that Ecology develop a method for screening these wastes in order to cut down on testing time and cost. The following resolution should be used only for foundry slags, foundry baghouse dusts and waste sandblasting grits until such time as Chapter 173-303 WAC is amended to clarify this issue.

RESOLUTION

The following resolution could be used by a company in lieu of automatic aquatic toxicity testing. Concentrations of soluble Cu, Ni, and Zn could be determined using the EP toxicity procedures in addition to the eight metals already on the EP toxicity list (see WAC 173-303-090(8)). If the sum total of extractable Cu, Ni, and Zn is greater than or equal to 5 ppm, the sample should be tested against the aquatic toxicity criteria (WAC

173-303-101) (i.e., if extractable Ni + Cu + Zn $\geq$ 5 ppm, then conduct aquatic bioassay).

It should be stressed that this resolution is intended only as guidance. It should not be used if it is determined that aquatically toxic constituents other than Cu, Ni and Zn may be present in the waste (e.g., organotin paints, solvents, etc.). In addition, testing the waste against other criteria (e.g., halogenated hydrocarbons, carcinogens, etc.) should be required any time there is evidence that the waste may be designated for something other than aquatic toxicity.

This guidance should not be used on a monolithic sample unless the sample is crushed to a size that will pass a 9.5 mm sieve prior to running the EP toxicity test. Current EP toxicity test procedures require monolithic samples that pass the structural integrity test to be analyzed in the form of a 3.3 cm by 7.1 cm cylinder. This cylinder may result in less than 5 ppm extractable Cu + Ni + Zn; however, it may fail the fish toxicity test due to the larger surface area generated when the sample is crushed to obtain a 1.5 gm aliquot for aquatic toxicity testing.

The state dangerous waste regulation, Chapter 173-303 WAC, does not allow this EP toxicity approach in lieu of aquatic toxicity testing. However, we can tell persons with these certain waste types that if this guidance is followed and if there is no other reason to believe the waste would be designated as hazardous, that aquatic toxicity testing is not required. The decision on when to use this guidance should be made by the field staff in consultation with program staff on a case-by-case basis.

RATIONALE

Jim Knudson and Will Abercrombie developed what is believed to be a reasonable yet conservative method for triggering the aquatic toxicity test using the EP toxicity leach test as described above. The rationale developed is as follows:

Let Y = wet % of soluble Cu + Ni + Zn in the wet material

convert this to ppm;

$$\frac{Y}{100} \times 10^6 = \text{ppm (wet) of soluble Cu + Ni + Zn}$$

$$Y \times 10^4 = \text{ppm (wet) soluble Cu + Ni + Zn}$$

for the EP toxicity test;

20:1 dilution in 0.5 N acetic acid solution, resulting in a Cu + Ni + Zn concentration of;

$$\frac{Y \times 10^4}{20.0} = 500(Y) \text{ ppm}$$

for the fish toxicity test;

1000:1 dilution in water (assume pH = 7). The resulting Cu + Ni + Zn concentration would be;

$$\frac{Y \times 10^4}{1000} = (Y) \times 10 \text{ ppm}$$

Note: Y will vary with pH, but this assumption is conservative. That is, one would expect a 0.5 N acetic acid solution to extract more metals than a solution with a neutral pH.

Next;

$$\frac{\text{EP tox. conc.}}{\text{fish tox. conc.}} = \frac{Y \times 500}{Y \times 10} = \frac{50}{1}$$

Some soluble Cu, Ni, and Zn compounds are category X toxic according to the EPA Spill Table. A conservative assumption would be to state that fish will die if the sum of extractable Cu + Ni + Zn $\geq$ 0.1 ppm.

Thus;

EP toxic concentration = 50 x (fish toxicity concentration)

or

EP toxic concentration = 50 x (0.1 ppm) = 5 ppm

So, if the sum of Cu + Ni + Zn in the EP toxicity test equals or exceeds 5 ppm, then the fish toxicity test is triggered.

TC/sr

HARTCROWSER

Earth and Environmental Technologies

Environmental Assessment of Soil and Groundwater Quality Duwamish Fill Site Tukwila, Washington

Prepared for Washington State Department of Transportation

August 26, 1991
J-3351

CONTENTS

TABLES

CONTENTS (Continued)

CONTENTS (Continued)

ENVIRONMENTAL ASSESSMENT OF SOIL AND GROUNDWATER QUALITY DUWAMISH FILL SITE TUKWILA, WASHINGTON

INTRODUCTION

The Washington State Department of Transportation (WSDOT) contracted Hart Crowser, Inc., of Seattle, Washington, to assess environmental conditions at the Duwamish Fill Site located in Tukwila, Washington, near the intersection of SR-99 (Pacific Highway South) and SR-599 (Figure 1).

This report presents the results of recent field sampling activities, an analysis of site hydrogeology, and an evaluation of soil and groundwater quality at the project site. This work was performed as described in the Monitoring Well Installation and Groundwater Sampling Work Plan for the Duwamish Fill Site, dated January 16, 1991.

Site Description and Nature of the Wastes

The teardrop-shaped parcel is located between roadway embankments supporting SR-99, SR-599, and an access ramp to SR-599 (Figure 1). The project site occupies a total of 8 acres and may be divided into distinct upper and lower areas based on topographic relief (Figure 2). The upper area occupies 3 acres and is separated by a 40-foot escarpment from the lower area which occupies the remaining 5 acres. The northwestern portion of the project site forms a closed basin that traps standing water and encourages wetland growth.

The Duwamish Fill Site has periodically received street sweeping waste, vactor truck sludge, and other materials generated during roadway cleanups since circa 1965. According to WSDOT maintenance employees, these wastes were randomly spread across the site. No particular plan was followed during the filling of the site. Along the steep slope that divides the property, several open, possibly crushed 55-gallon drums were reportedly placed at the site between 1976 and 1980. The drums may have been empty or may have contained residual striping paint, asphalt patching material (CRS-Z), or ethylene glycol. More recently, the upper area of the site has been used solely for the

disposal of street sweeping wastes which are periodically graded. The lower portion of the site has been unused in recent years.

Background and Objectives

WSDOT received a compliance order from Ecology (Order No. DE-88 N 161, dated August 4, 1988) to characterize and remediate the Duwamish Fill Site. Ecology's order was based on soil samples collected in 1987 for total metals and 1988 for EPTOX metals, some of which contained extractable lead concentrations in excess of Dangerous Waste criteria, following extraction procedure toxicity (EP Tox) methods.

WSDOT contracted Hart Crowser to implement a site characterization plan which addressed the potential metals contamination of site soils cited by Ecology. The results of Hart Crowser's Phase I sampling and analysis were presented in a previous report to WSDOT dated April 19, 1989. During the Phase I study, nine borings were advanced and 49 soil samples were submitted for analysis of extractable metals by EP Tox testing (Figure 2). Only lead and zinc were detected using the EP Tox test. Lead was detected in 15 percent of the soil samples, at a maximum concentration of 1.2 ppm, well below the Dangerous Waste criteria of 5 ppm.

Although a soil metals contamination problem was not identified in our previous work, this Phase II site assessment of the Duwamish Fill Site is aimed at several objectives. These include:

- further characterization of metals in native soils and fill materials in the lower area;
- expansion of analytical parameters to include characterization of volatile and semivolatile compounds in the lower area soils;
- evaluation of groundwater quality potentially impacted by site soils or WSDOT disposal practices; and
- documentation of soil and groundwater quality at the base of a fill slope where several drums were reportedly disposed of.

Scope of Work

The scope of work for our assessment of the Duwamish Fill Site as agreed in accordance with Ecology's review of our work plans includes the following tasks:

- Drill and sample nine soil borings to evaluate native and fill soil conditions within and downslope from the suspected fill areas and reported drum burial site;
- Complete four of the borings as monitoring wells and collect groundwater samples from the newly installed wells to establish the chemical quality of shallow groundwaters beneath the property;
- Characterize the physical groundwater system below the site, including the depth, gradient, and hydraulic conductivity of the shallow water-bearing zones;
- Evaluate the potential for leaching and migration of trace metals and organic contaminants from road wastes disposed of in the fill soils; and
- Report the findings of this assessment and recommend appropriate actions or follow-up studies, as necessary.

Note that this work does not include further characterization of soils in the upper active fill area of the site. These soils were previously characterized for metals by Hart Crowser (1989).

SUMMARY OF FINDINGS

The Duwamish Fill Site is underlain by a glacial erosional surface and a sequence of recent alluvium along the margin of the Duwamish River valley. Groundwater perched on compact glacial soils percolates along the erosional surface, through alluvial sands and gravels, and eventually discharges toward the northeast and the Duwamish River. Much of the alluvium has a significant content of fines, resulting in rather low hydraulic conductivities and contaminant transport rates on the order of 10 feet per year.

Nine soil borings were advanced and four monitoring wells installed during this study to assess potential environmental impacts on soil and groundwater quality which may be associated with WSDOT disposal activities. Based on the results of our sampling and analysis, site soils contain low levels of petroleum hydrocarbons and trace metals, particularly near the base of a topographic slope where street sweepings and other fill materials have been historically placed, but concentrations are well below MTCA cleanup guidelines. Neither petroleum hydrocarbons nor metals have been dissolved and mobilized by groundwaters to a level of concern. A single soil sample marginally exceeded the MTCA cleanup level for carcinogenic PAH compounds for a residential property, but would fall in compliance under industrial standards. Trace or nondetectable concentrations of all other volatile and semivolatile organic compounds were found in both soil and groundwater.

Analytical results indicate that past and present WSDOT disposal practices -- including potential residential of striping paint, asphaltic materials, and other road wastes -- have not impacted site soils or shallow groundwaters. No remedial actions are warranted for the site based on the data contained in this report.

SITE HYDROGEOLOGIC CONDITIONS

To assess site conditions, Hart Crowser advanced nine soil borings during June 1991 using information from the previous Phase I Study (Hart Crowser, 1989). Four of the recent soil borings were completed as 2-inch-diameter PVC monitoring wells. After development, Hart Crowser collected groundwater samples from the newly installed monitoring wells on July 1, 1991. *In situ* hydraulic conductivity tests were performed in three of the monitoring wells. Appendix A describes our field procedures and presents boring logs and well construction details.

Regional Hydrogeologic Setting

The Puget Sound area was periodically overridden by the advance and retreat of continental glaciers during Pleistocene time, leaving deposits of till, outwash, and interglacial sediments which outcrop along the hills to the southwest of the project site. As the glaciers retreated at the

close of the last ice age, the Duwamish River valley became inundated by rising seas, forming a marine embayment. The valley gradually infilled with alluvial sediments and aggraded above sea level (Luzier, 1969).

Groundwater is found in unconfined and confined aquifers in glacial sediments rising up along the southwest flank of the Duwamish River valley. Compact glacial tills and fine-grained interglacial deposits form confining layers that direct groundwaters along bedding surfaces. Groundwaters in the glacial formations likely discharge into the alluvial sediments of the Duwamish River valley that underlie the project site.

Soil Stratigraphy

Subsurface cross sections of soil stratigraphy beneath the project site are presented on Figure 3 (along-flow or longitudinal section) and Figure 4 (cross-flow or transverse section). The subsurface soils consist of non-native fill deposits from WSDOT disposal activities, overlying native soils. Fill thickness ranges from 12 to 15 feet in the upper project area and from 0 to 15 feet in the lower project area. The fill consists of heterogeneous and poorly sorted mixtures of silt, sand, and gravel with admixed pieces of wood and plant material, pieces of asphalt, and other debris.

Native soils consist of recent fluvial deposits derived from the Duwamish River, overlying a sequence of compact, Pleistocene glacial sediments. An irregular erosional surface scoured by glacial processes separates the recent alluvium from the older, glacially overridden soils. The contact is readily identified during drilling activities by a marked increase in soil density (higher blow counts). The surface topography of the project site generally mimics the subsurface expression of this erosional surface. Glacier-derived silts and sands shoal and crop out in the uplands southwest of the project site (MW-1), but the erosional surface is depressed beneath the modern topographic basin (Figures 3 and 4); note that the Pleistocene glacial sediments were not encountered in MW-4.

Recent soils record the infilling of the Duwamish River Valley by marine and terrestrial processes. The oldest soils encountered in the post-Pleistocene sequence of valley deposits (gravelly sand and sandy gravel, at the base of MW-4) are probably fluvial sediments laid down

by the Duwamish River after the glaciers retreated. A marine incursion is indicated by subsequent deposits, interpreted as lagoon (silt with shell fragments) and beach environments (clean, water-bearing sand). The native sequence is capped by terrestrial soils, including swamp deposits beneath the modern wetlands on the lower site (sandy peat), and alluvium (gravelly, silty sand) prograding onto the property from the hills to the southwest. A small gulch crosses the modern topographic slope in the vicinity of MW-3, creating lenses of channel-filling sand and gravel. Modern fill deposits consist of silt with abundant plant material, and poorly sorted, silty and gravelly sand (Figures 3 and 4).

Groundwater Occurrence

Monitoring wells installed during the present investigation encountered groundwater at depths of 2 to 20 feet below ground surface. The greatest depths to water occurred at the upgradient and downgradient monitoring wells MW-1 and MW-2, respectively. The shallowest depth to groundwater was observed in MW-3, where subsurface waters collect at the base of the slope which divides the upper and lower project areas.

Groundwater Flow Pathways

Relative groundwater elevations are summarized in Table 1, and the water table elevation contours are presented on Figure 5. Groundwater flows in a generally north to northeasterly direction across the site. The groundwater surface mimics the topography of the land surface, such that the steepest groundwater gradient underlies the steep slope separating the upper and lower fill areas. The groundwater gradient averages 0.1 ft/ft across the site.

Groundwater is generally unconfined, existing under water table conditions across most of the project area. Peat beds and fine-grained fill materials locally form confining conditions. The compact, low permeability glacial soils that underlie the Pleistocene erosional surface appear to retard groundwater leakage to deeper formations, i.e., groundwater is perched in shallow soil zones.

The conceptual model of groundwater flow is presented on Figure 3. Alluvium (gravelly, silty sand) and possibly beach deposits (clean sand), perched on the glacial unconformity constitute the primary shallow

water-bearing zones. Groundwater enters these water-bearing units either by the infiltration of rainwater through overlying fill materials and native soils, or by groundwater discharging laterally from saturated sand layers in the glacial strata located upgradient and southwest of the site. The shallow groundwaters beneath the project site likely flow toward and discharge to the Duwamish River.

Aquifer Hydraulics

In situ hydraulic conductivity tests (slug tests) were performed in monitoring wells MW-1, MW-2, and MW-3 on July 2, 1991; test results are summarized in Table 2. An average hydraulic conductivity of 2×10^{-5} cm/sec was calculated from the slug test data obtained in MW-2 and MW-3 and is used as an approximate representation of the hydraulic conditions beneath the site. Under the existing water table gradient of 0.1 ft/ft, groundwater discharges at a rate of 6×10^{-3} ft/day. Assuming a soil porosity of 30 percent (a representative value for sandy materials), the groundwater gradient and hydraulic conductivity of the project soils yield an approximate groundwater velocity of 2×10^{-2} ft/day, or about 5 to 10 feet per year.

Hydraulic conductivity may also be approximated from the grain size distribution of soil samples, by the method of Hazen (Freeze and Cherry, 1979) (Table 2; grain-size distributions are included in Appendix A, Figures A-11 through A-13). Hydraulic conductivity based on this method compares well with the value derived from slug testing for well MW-3, in poorly sorted alluvium. The grain-size distribution for the clean sands of wells MW-2 and MW-4, however, suggests that permeability values should be several orders of magnitude higher than were determined by field testing. We suspect that the borehole walls were smeared with silts and clays from surrounding soils as the auger advanced, and the slug tests may be biased toward low conductivity values.

NATURE AND EXTENT OF CONTAMINATION

We sampled nine soil borings and four groundwater monitoring wells during the present investigation. Nine soil samples were analyzed for volatile organics (EPA Method 8240), nine soil samples for semivolatile organics (EPA Method 8270), ten soil samples for total petroleum

hydrocarbons (Method 418.1), eighteen soil samples and one duplicate for priority pollutant metals, and eighteen soil samples and one duplicate for polynuclear aromatic hydrocarbons (EPA Method 8310) (Table 3). Our sample selection targeted fill materials, which would contain the majority of potential pollutants. One groundwater sample from each well and one blind duplicate sample were analyzed for volatile organics, semivolatile organics, total petroleum hydrocarbons, priority metals (total and dissolved), and polynuclear aromatic hydrocarbons, by the methods listed above (Table 4).

Soil and groundwater samples were submitted to Analytical Technologies, Inc. of Renton, Washington, for chemical analysis. A laboratory data quality review and analytical testing certificates are provided in Appendix B.

An evaluation of appropriate cleanup levels for the Duwamish fill site was performed according to the guidelines set forth under the Model Toxic Control Act (MTCA) for the State of Washington (Ecology, 1991). MTCA-based soil cleanup levels are presented in Table 5, and groundwater cleanup levels are presented in Table 6. Criteria that are protective of human health and the environment, as stipulated by the federal Safe Drinking Water Act and Clean Water Act, are included in the evaluation because groundwaters migrating through property soils discharge to the Duwamish River, and aquifers beneath the property could conceivably provide a drinking-water source. The specific application of MTCA criteria to the Duwamish fill site is discussed further in Appendix C.

Soil Quality

Petroleum Hydrocarbons. Petroleum hydrocarbons were detected in minor concentrations across the site. The highest concentrations are derived in samples of fill materials from several borings near the base of the topographic slope where street sweepings were probably disposed of. Petroleum compounds are ubiquitous in urban environments and their presence is known to occur in street sweepings. In all cases, however, concentrations are well below the MTCA Method A cleanup level of 200 mg/kg for total petroleum hydrocarbons.

Priority Pollutant Metals. Our results indicate that trace amounts of priority pollutant metals -- including arsenic, cadmium, chromium,

copper, nickel, lead, and zinc -- occur at the site. Silver, beryllium, mercury, antimony, and thallium were not detected, and selenium was found in only one soil sample. Higher concentrations tend to be localized in shallow fill soils along the base of the slope (particularly B-13, S-5 and MW-3, S-4), but further delineation of the metals distribution is precluded by the low concentrations found in all samples. Like petroleum hydrocarbons, such metals are commonplace in the urban environment and are naturally occurring in Puget Sound glacial and alluvial sediments. All metal concentrations submitted in this investigation fall below MTCA cleanup levels (Table 5).

Volatile Organic Compounds. Acetone and methylene chloride were detected in small amounts in a few soil samples, at concentrations comparable to detections in laboratory blanks. Detections of these common solvents are likely an artifact of laboratory procedures. Other tentatively identified compounds are probably associated with petroleum traces in the soil.

Field hits of the photoionization detector (PID) reached values of 5 to 17 units in upgradient well MW-1, and borings B-13, B-15, and B-16 (Table 3). None of the PID hits, however, could be quantitated as significant detections of volatile organics.

Polynuclear Aromatic Hydrocarbons. Several soil samples contained trace amounts of non-carcinogenic PAH compounds well below risk-based cleanup concentrations. Only one sample (B-17, S-1) contained detectable concentrations of carcinogenic PAHs that exceeded MTCA cleanup levels for carcinogenic PAHs by less than 1 mg/kg (Tables 3 and 5). In fact, this constitutes the only MTCA exceedence of our study. In order to assume a conservative approach, however, we followed a MTCA evaluation for a residential property; these low levels of carcinogenic PAHs easily comply with industrial cleanup standards which are generally an order of magnitude higher than residential standards. An additional consideration is that boring B-17 was advanced in the center of a low depression where standing water collects, wetlands flourish, and peat accumulates; PAH detections in such soils may be associated with naturally degrading organic matter rather than man-made pollutants.

Semivolatile Organic Compounds. The only semivolatile compounds that were positively identified were also detected in laboratory blanks.

Several unknown or tentatively identified hydrocarbons may be associated with trace petroleum fractions in the fill materials; all are present at concentrations less than a few mg/kg.

Groundwater Quality

Field Parameters. Groundwater temperatures ranged from 14° to 17°C across the site (Table 4). The pH of groundwaters discharging from glacial sediments in the hills to the southwest (MW-1) is slightly alkaline, whereas groundwaters in the low lying areas of the site are slightly acidic, probably the result of decaying organic matter. The shallow groundwaters beneath the site also contain elevated dissolved salts, as indicated by higher electrical conductivities, presumably because flow is sluggish and evaporation is enhanced in the wetlands basin.

Priority Pollutant Metals. Total metals in groundwater contain the identical suite of trace metals found in site soils. Groundwater samples were quite turbid, and metal concentrations were substantially reduced or eliminated following filtration, indicating a predominant metals contribution from suspended particles (Table 4).

Only arsenic, lead, and zinc were detected in filtered water samples. Dissolved metal concentrations were evaluated relative to MTCA levels, because dissolved forms are more readily assimilated by humans and ecosystems and are more indicative of the form being transported through the groundwater system. All dissolved metals concentrations met MTCA cleanup levels and drinking water standards (Table 6). Maximum lead concentrations detected in site groundwaters were equal to MTCA cleanup levels. Arsenic concentrations detected in site groundwaters (9 μg/L) met the MTCA Method B cleanup level of 16 μg/L based on the protection of human health, which was most applicable to the site. Although the maximum detected concentration of arsenic exceeds the MTCA Method A cleanup level of 5 μg/L, it is typical of background concentrations for shallow groundwaters of the area which range in average from 9.2 to 11.05 μg/L based on 104 observations in South King County (South King County GWAC, 1989).

Volatile Organic Compounds. Other than common laboratory contaminants, the only positive identification of a volatile organic compound was toluene at 1 ug/L in MW-3, a thousand-fold less than the MTCA cleanup level.

Other Potential Contaminants. Petroleum hydrocarbons (TPH) were not detected in any wells above 1 ug/L. Non-carcinogenic PAHs were not detected above 1 ug/L, and no carcinogenic PAHs above 0.1 to 0.2 ug/L. No semivolatile organics were identified at detection limits between 10 and 100 ug/L.

DISCUSSION OF SOIL AND GROUNDWATER RESULTS

Site soils contain low levels of petroleum hydrocarbons and trace metals, particularly near the base of the topographic slope where street sweepings and other fill materials have historically been placed. Such compounds are ubiquitous in the urban environment and are well below MTCA cleanup levels in the Duwamish Fill Site soils. Neither petroleum hydrocarbons nor metals have been dissolved and mobilized by groundwaters beneath the site, to a level of concern.

No significant concentrations of semivolatile and volatile organic compounds were positively identified in either soil or groundwater matrices. Our chemical results suggest that the reported disposal of several drums which may have contained paints or solvents has not occurred to the extent which such practices have impacted the site soils or groundwater.

A single soil sample (B-17, S-1) slightly exceeded the MTCA cleanup level for carcinogenic PAH compounds (by less than 1 mg/kg) for a residential property, but the concentrations are within acceptable ranges for industrial land use. Because the sample was collected from a swampy depression, the PAH compounds may be derived from naturally degrading organic matter rather than asphaltic paving material. In addition, groundwater has not been impacted by the leaching of carcinogenic PAHs; soil concentrations are therefore sufficiently protective of the groundwater resource.

CONCLUSIONS AND RECOMMENDATIONS

We conclude that past and present practices at the Duwamish Fill Site have not compromised the soil or groundwater quality beneath the property. No corrective actions are warranted for this site based on the data in this report.

We recommend that a final round of groundwater sampling be conducted during wet-season conditions to assess any seasonal variability in groundwater flow patterns and the potential transport of contaminants. We suggest that a reduced suite of chemical analyses be performed on the groundwater samples to verify the lack of contamination indicated by the present investigation. If no contamination is indicated at that time, we suggest that the wells be abandoned, according to current regulations.

LIMITATIONS

The MTCA interpretation was derived from the MTCA regulations adopted on February 28, 1991, and toxicological data available at the time this report was written. MTCA regulations and toxicological data are subject to change. Should such changes occur, a re-evaluation of the MTCA interpretation may be necessary.

This work was performed and this report prepared in accordance with generally accepted professional practices in the same or similar localities, related to the nature of the work accomplished, at the time the services were performed. It is intended for the exclusive use of WSDOT for specific applications to the job site. No other warranty, express or implied, is made.

We trust this report meets your current needs.

Sincerely,

HART CROWSER, INC.

TODD M. THORNBURG
Project Hydrogeologist

M. MARIAN WINEMAN
Associate

DUWAMISH.lr

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Table 1 - Completion Data and Water Level Elevations of Monitoring Wells

Well ID	Top of Casing Elevation (TOC)	Depth to Top of Screen (from TOC)	Depth to Bottom of Screen (from TOC)	Static Water Level Elevation (at time of drilling)	Static Water Level Elevation (at time of sampling)
MW-1	106.53	2.3	28	90.23	89.44
MW-2	65.23	26.8	31.8	41.93	43.47
MW-3	63.96	14.3	19.3	55.56	59.50
MW-4	55.76	16.8	21.8	46.46	45.60

Notes:

All measurements are in feet.
Elevations are relative, based on an assumed reference elevation of 100.00 feet at one of the survey benchmarks on the upper property; elevations are not based on geodetic benchmarks.

Table 2 - Hydraulic Conductivity Values (cm/sec)

	Hydraulic Conductivity Estimated in cm/sec		
Well Number	Slug Test (Rising Head)	Slug Test (Falling Head)	Grain Size (Hazen Method)
MW-1	6.52×10^{-6}	7.9×10^{-5}	--
MW-2	1.22×10^{-5}	2.65×10^{-5}	1×10^{-2}
MW-3	2.80×10^{-5}	3.28×10^{-5}	1×10^{-5}
MW-4	--	--	2×10^{-2}

Note: See Appendix A for discussion of hydraulic conductivity testing (slug tests) and grain size distribution test reports.

Table 3 – Summary of Soil Quality Data

Boring Number	MW-1	MW-1	MW-2	MW-2	MW-3	MW-3	DUP	MW-4	MW-4
Sample Number	S-2	S-7	S-2	S-7	S-2	S-4	S-4	S-2	S-5
Depth in Feet	5.0-6.5	22.5-24.0	5.0-6.5	22.5-24.0	5.0-6.5	10.0-11.5		5.0-6.5	7.5-9.0
PID (H-Nu)	13	4.9	<1	<1	<1	<1		<1	<1
				Concentration in mg/kg (ppm)					
METALS									
Arsenic	3.3	3.1	2.1	2.1	3.5	4.6	8.4	3.0	2.3
Cadmium	1.3	1.0	0.8	1.0	0.7	1.0	1.5	0.7	0.5
Chromium	31.5	28.8	19.4	18.6	11.8	26.0	30.9	11.7	8.3
Copper	21.0	15.1	17.2	18.6	18.7	18.2	29.2	18.6	10.8
Lead	3.2	4.2	4.0	2.9	4.6	5.8	21.9	6.0	1.8
Nickel	38.6	38.7	27.6	23.4	11.2	25.4	43.4	9.9	8.5
Zinc	35.4	32.6	26.9	27.3	25.8	74.5	184.0	24.8	16.5
TOTAL PETROLEUM HYDROCARBONS									
	19	NA	5.5	5 U	8.4	5 U	17	24	10
VOLATILE ORGANICS									
Methylene Chloride	0.25 U	NA	0.19 JB	NA	NA	0.64 B	NA	NA	0.45 B
Acetone	1 U	NA	1 U	NA	NA	1 U	NA	NA	1 U
SEMIVOLATILE ORGANICS									
Di-n-Butylphthalate	0.82 B	NA	0.16 JB	NA	NA	0.22 JB	NA	NA	0.84 B
POLYNUCLEAR AROMATIC HYDROCARBONS*									
Non-Carcinogenic	0.26	0.26	0.51 U	0.51 U	0.92 U	0.51 U	0.27	0.90 U	0.26
Carcinogenic	0.14 U	0.14 U	0.14 U	0.14 U	0.25 U	0.14 U	0.14 U	0.24 U	0.14 U

U = Chemical parameter not detected at detection limit indicated.
B = Chemical parameter also detected in laboratory blank.
J = Concentration is estimated value.
NA = Not analyzed.
*Note: Summed PAH concentrations are based on one-half of detection limit values for non-detected compounds.

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Table 3 – (Continued)

Boring Number	B-13	B-13	B-14	B-14	B-15	B-15	B-16	B-16	B-17	B-17
Sample Number	S-3	S-5	S-2	S-5	S-2	S-6	S-3	S-5	S-1	S-5
Depth in Feet	7.5-9.0	12.5-14.0	5.0-6.5	12.5-14.0	5.0-6.5	15.0-16.5	7.5-9.0	12.5-14.0	2.5-4.0	12.5-14.0
PID (H-Nu)	17.3	3.7	<1	<1	<1	6.8	8.9	11.2	<1	<1
Concentration in mg/kg (ppm)										
METALS										
Arsenic	6.4	14.1	7.0	2.5	4.2	1.4	11.2	1.8	10.2	2.4
Cadmium	0.9	1.4	1.3	0.8	0.7	1.1	1.3	1.0	0.8	0.9
Chromium	15.1	28.7	30.6	28.4	12.9	29.5	30.3	32.1	18.9	10.7
Copper	26.2	29.2	26.3	15.8	21.5	19.4	20.2	15.1	28.0	23.0
Lead	7.1	55.1	20.3	2.2	5.2	4.5	28.7	3.1	18.9	3.4
Nickel	14.2	29.4	34.6	27.9	8.0	29.8	29.9	32.0	21.1	9.8
Zinc	28.4	53.9	230.0	29.1	19.7	36.3	42.6	31.4	37.7	23.7
TOTAL PETROLEUM HYDROCARBONS										
	25	NA	36	NA	32	NA	150	NA	70	NA
VOLATILE ORGANICS										
Methylene Chloride	0.52	NA	0.99	NA	1.1 B	NA	0.86 B	NA	0.92 B	NA
Acetone	1.1 J	NA	1.4 J	NA	1.9 B	NA	1.4 B	NA	2.1 B	NA
SEMIVOLATILE ORGANICS										
Di-n-Butylphthalate	1 B	NA	1.4 B	NA	1.1 B	NA	1.2 B	NA	1.1 B	NA
POLYNUCLEAR AROMATIC HYDROCARBONS*										
Non-Carcinogenic	0.38	0.46	0.44	0.41	0.78 U	0.51 U	0.46	0.26	2.28	0.26
Carcinogenic	0.20 U	0.20 U	0.21 U	0.22 U	0.21 U	0.14 U	0.22 U	0.14 U	1.56	0.14 U

U = Chemical parameter not detected at detection limit indicated.
B = Chemical parameter also detected in laboratory blank.
J = Concentration is estimated value.
NA = Not analyzed.
*Note: Summed PAH concentrations are based on one-half of detection limit values for non-detected compounds.

Table 4 – Summary of Groundwater Quality Data

Well Number	MW-1	MW-2	MW-3	MW-3 DUP	MW-4	TRIP BLANK
FIELD PARAMETERS						
Temperature in °C	16	17	14		16	
pH	7.8	6.4	6.5		6.4	
Elec. Conductivity in µmho	250	980	780		960	
		Concentration in µg/L (ppb)				
METALS (TOTAL)						
Arsenic	16	32	14	10	37	
Cadmium	8	5 U	8	6	10	
Chromium	120	20	130	90	120	
Copper	100	20 U	100	80	240	
Lead	22	110	25	21	200	
Nickel	160	10 U	120	90	100	
Zinc	240	150	330	310	400	
METALS (DISSOLVED)						
Arsenic	2	2 U	3	2	9	
Cadmium	5 U	5 U	5 U	5 U	5 U	
Chromium	10 U	10 U	10 U	10 U	10 U	
Copper	20 U	20 U	20 U	20 U	20 U	
Lead	5	3	5	5	5	
Nickel	10 U	10 U	10 U	10 U	10 U	
Zinc	50 U	110	90	90	50 U	
TOTAL PETROLEUM HYDROCARBONS						
	1000 U	1000 U	1000 U	1000 U	1000 U	
VOLATILE ORGANICS						
Acetone	10 U	10 U	8 J	10 U	21	8 J
Methylene Chloride	5 U	5 U	5 U	5 U	3 J	6
Toluene	1 U	1 U	1 U	1 U	1	1 U
SEMIVOLATILE ORGANICS						
Di-n-Butylphthalate	10 U	10 U	10 U	10 U	10 U	
POLYNUCLEAR AROMATIC HYDROCARBONS*						
Non-Carcinogenic	3.00 U	3.00 U	1.57	3.00 U	3.00 U	
Carcinogenic	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	

U = Chemical parameter not detected at detection limit indicated

B = Chemical parameter also detected in laboratory blank

J = Concentration is estimated value

* Note: Summed PAH concentrations are based on one-half of detection limit values for non-detected compounds

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Table 5 – MTCA Cleanup Levels for Soil

Compound	Summary Data: Frequency Detected	Summary Data: Maximum Value	MTCA Method B Risk-Based Cleanup Level (a)	MTCA Cleanup Level Exceeded
		Concentration in mg/kg		
Metals				
Arsenic	18/18	14.1	80	no
Cadmium	18/18	1.5	40	no
Chromium	18/18	32.1	400 (b)	no
Copper	18/18	29.2	2960	no
Lead	18/18	55.1	250 (c)	no
Nickel	18/18	43.4	1600	no
Zinc	18/18	230	16000	no
Volatile Organic Compounds				
Methylene Chloride	2/9	0.99	133	no
Acetone	2/9	1.4	8000	no
Total Petroleum Hydrocarbons				
418.1	11/12	150	200 (d)	no
Polynuclear Aromatic Hydrocarbons				
Phenanthrene	10/18	0.13	-	-
Anthracene	2/18	0.055	24000	no
Fluoranthrene	5/18	0.58	3200	no
Pyrene	3/18	0.5	2400	no
Benzo(a)anthracene	1/18	0.2	-	-
Chrysene	1/18	0.27	-	yes
Benzo(b)fluoranthene	1/18	0.47	-	-
Benzo(k)fluoranthene	1/18	0.2	-	-
Benzo(a)pyrene	1/18	0.24	0.09	yes
Benzo(g,h,i)perylene	1/18	0.15	-	-
Ideno(1,2,3-cd)pyrene	1/18	0.11	-	-
Total Carcinogenic PAHs	-	1.56	1.0 (c)	yes
Total Non-carcinogenic PAHs	-	2.28	-	-

Notes:

a Cleanup levels calculated using the risk equation provided in WAC 173-340-720(3)(a)(iii).

b Based on the most toxic form of chromium, hexavalent chromium.

c Based on MTCA Method A value because toxicologic criteria necessary for a Method B calculation have not been finalized by the EPA.

d Based on MTCA Method A value because no toxicologic criteria can be established for petroleum hydrocarbons; however, toxicologic

- criteria are available for component chemicals (PAHs and VOAs).
No MTCA Method B value bacause toxicologic cr developed by the EPA.

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Table 6 – MTCA Cleanup Levels for Groundwater

Compound	Summary Data		Quality Criteria for Water (a)			Maximum	MTCA Method B	Applicable MTCA	MTCA
	Frequency Detected	Maximum Value	Chronic Fish (b)	Ingestion of Aquatic Organisms (c)	Water and Fish Ingestion (f)	Contaminant Levels (g)	Risk-Based Cleanup Level (h)	Cleanup Level	Cleanup Level Exceeded
	Concentration in ug/L (ppb)								
Dissolved Metals									
Arsenic	3/4	9	190	0.14	0.02	50	16	16	no
Lead	4/4	5	1.32	—	50 (e)	50	5(j)	5	no
Zinc	2/4	110	58.91	5,000 (d)	5,000 (d)	5,000 (d)	3,200	3,200	no
Total Metals (k)									
Arsenic	4/4	37						NA	
Beryllium	1/4	6						NA	
Cadmium	3/4	10						NA	
Chromium	4/4	130						NA	
Copper	3/4	240						NA	
Lead	4/4	200						NA	
Nickel	3/4	160						NA	
Zinc	4/4	400						NA	
Volatile Organic Analysis									
Toluene	1/4	1	—	201,294	6,765	1,000	1,600	1,000	no
Polynuclear Aromatic Hydrocarbons									
Phenanthrene (i)	1/4	0.092	—	—	—	—	32	32	no

Notes:

a Established under the Clean Water Act. Criteria obtained from the EPA Region IV

b Protection of freshwater organism from chronic exposures.

c Protection of humans from contaminated fish ingestion.

d Based on organoleptic data for protection of humans from water and fish ingestion.

e Based on MCL value.

f For protection of humans from contaminated water and fish ingestion.

g Established under the Safe Drinking Water Act. Values reported are the lowest of either the currently effective MCLs, MCLs effective July 30, 1992, proposed MCLs, current effective secondary MCLs, and secondary MCLs effective July 30, 1992.

h Cleanup levels calculated using the risk equation provided in WAC 173-340-720(3)(a)(ii).

i Cleanup level is based on toxicological criteria for napthalene because no toxicologic criteria are published for phenanthrene. Napthalene is considered to be the most toxic of the non-carcinogenic PAHs, thereby making the substitution of phenanthrene criteria for napthalene criteria a conservative assumption.

j Based on MTCA Method A value because toxicologic criteria for a MTCA Method B calculation have not been finalized by the EPA.

k Cleanup criteria are provided for dissolved metals only because concentrations of dissolved metals are more readily assimilated by humans and aquatic organisms.

NA Not applicable.

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Vicinity Map

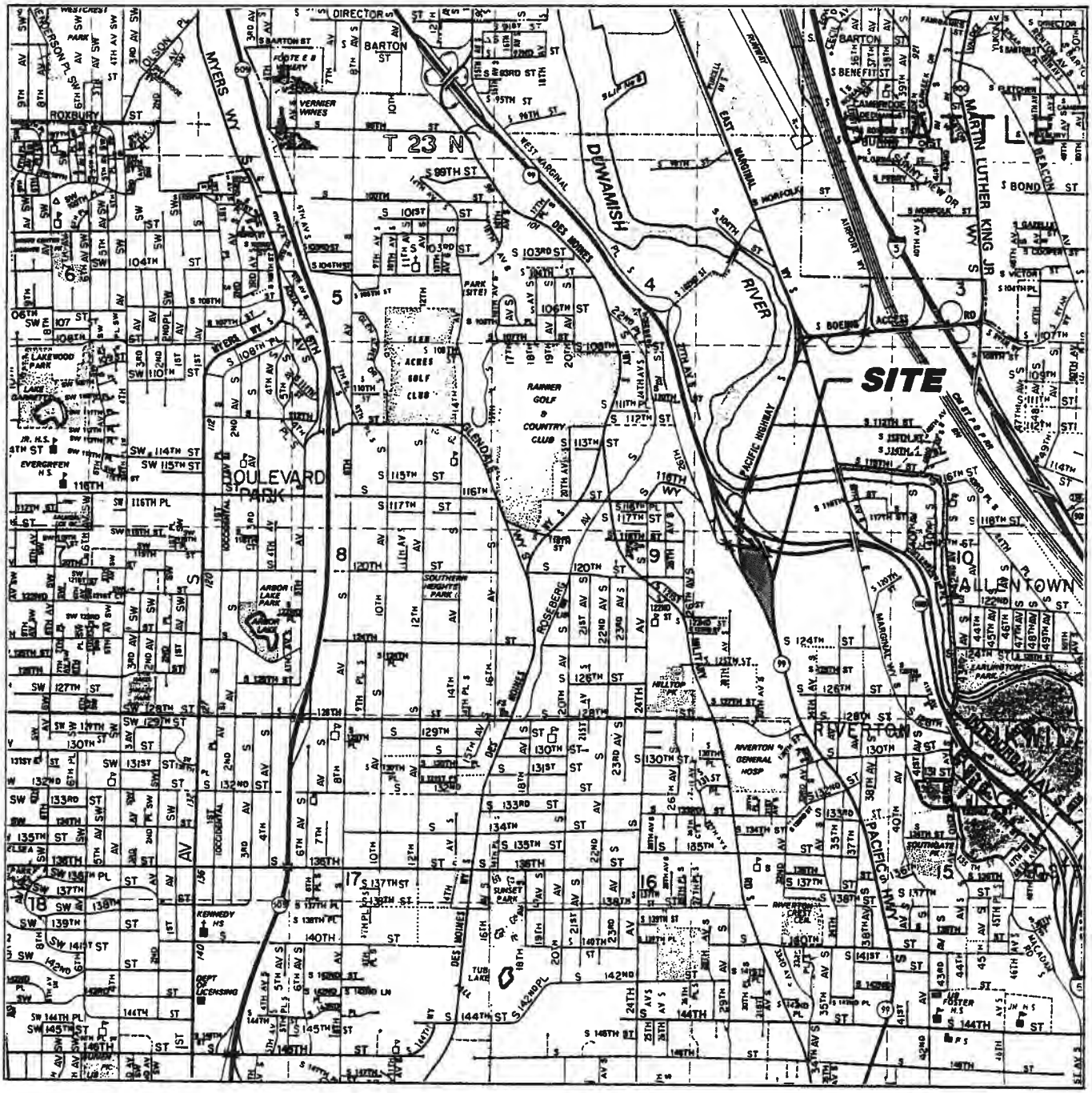

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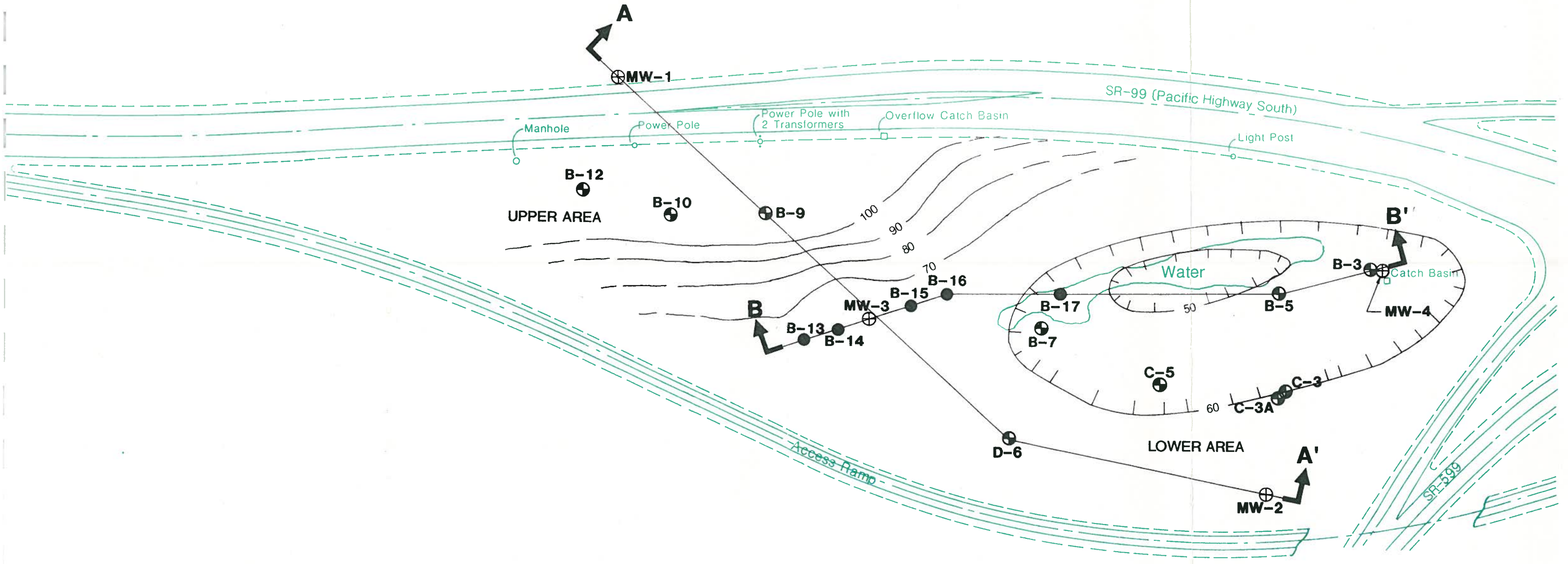
Figure 1

Site and Exploration Plan



- ● **B-13** Boring Location and Number
- ⊕ **MW-1** Monitoring Well Location and Number
- ◒ **B-5** Existing Phase I Boring Location and Number (Hart Crowser, 1989)
- — 90 — Relative Ground Surface Elevation Contour in Feet
- A A' Geologic Cross Section Location and Designation

Base map prepared from drawings entitled "SR 99 West Marginal Way to Burns Street, King County, Washington, Sheets 27 and 28", by Washington State Highway Commission, dated April 13, 1964. Field revised December, 1988.

N

0 100 200

Scale in Feet

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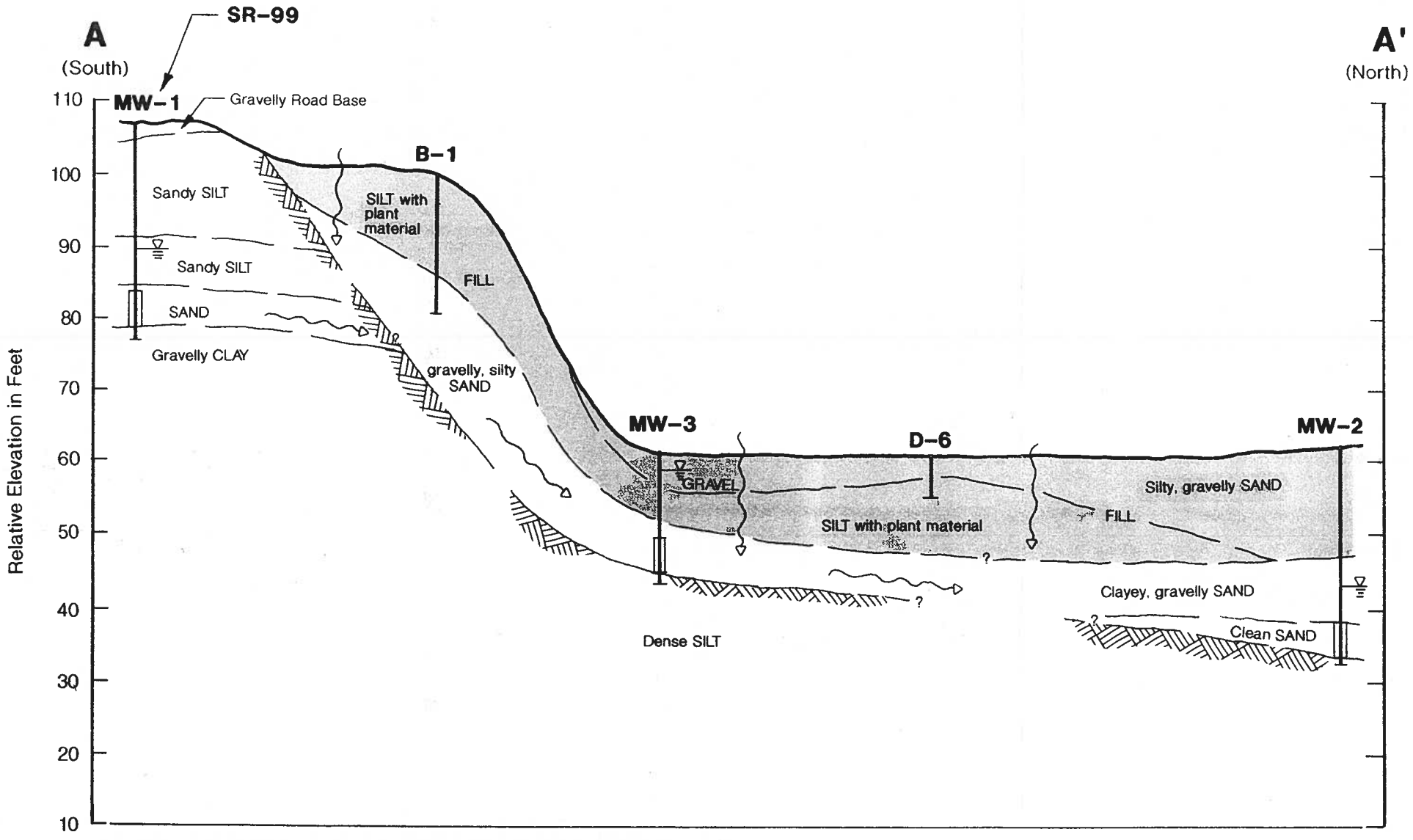
Figure 2

Generalized Geologic Cross Section A – A'



Note: Contacts between soil units are based upon interpolation between borings and represent our interpretation of subsurface conditions based on currently available data.

B–13 Soil Boring Number
Boring Location

MW–3 Well Number
Well Location

Water Level (July 1, 1991)

Screened Interval

Inferred Contact between Glacial and Modern Soils

Conceptual Groundwater Flow Paths

Fill Material

Horizontal Scale in Feet
0 100 200
0 20 40
Vertical Scale in Feet
Vertical Exaggeration x 5

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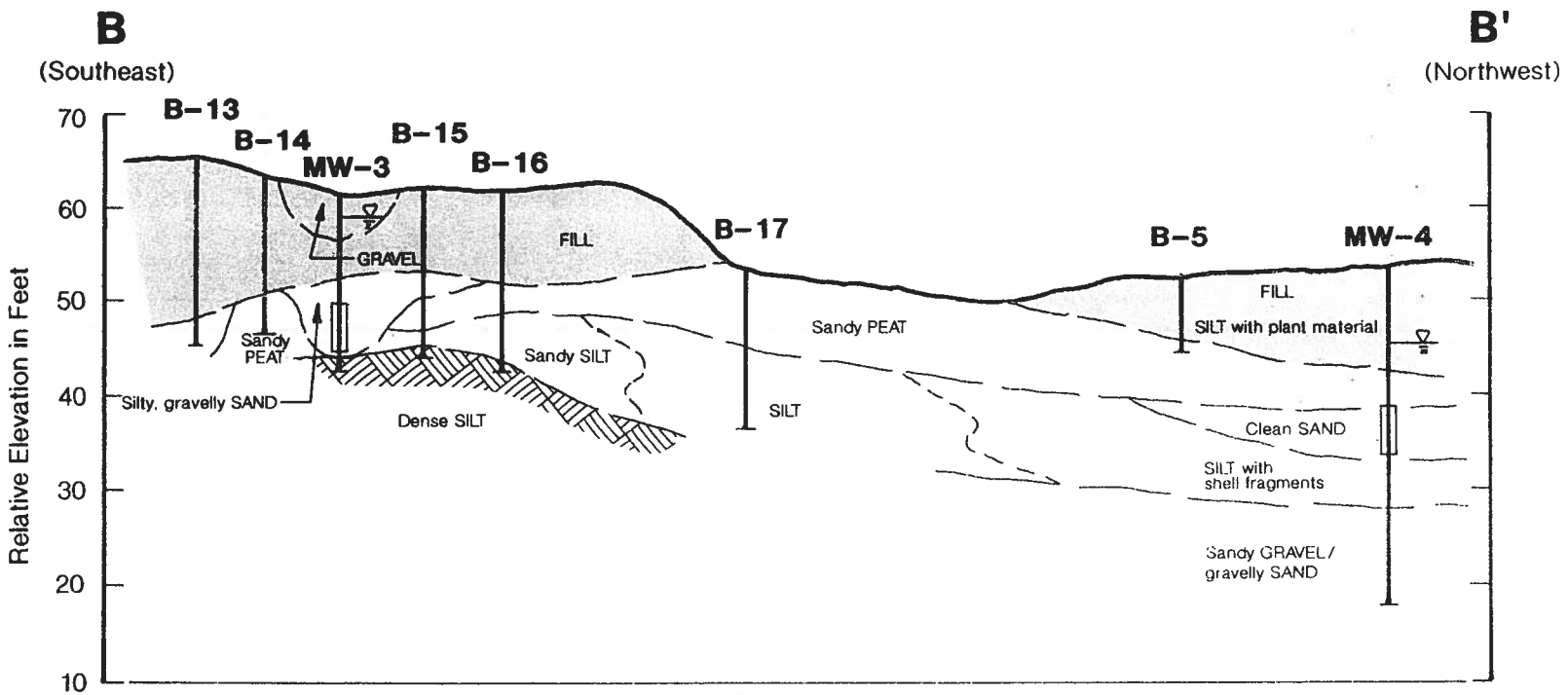
Figure 3

Generalized Geologic Cross Section B – B'



Note: Contacts between soil units are based upon interpolation between borings and represent our interpretation of subsurface conditions based on currently available data.

B-13 Soil Boring Number

Boring Location

Fill Material

MW-3 Well Number

Well Location

Water Level (July 1, 1991)

Screened Interval

Inferred Contact between Glacial and Modern Soils

Horizontal Scale in Feet

0 100 200

0 20 40

Vertical Scale in Feet

Vertical Exaggeration x 5

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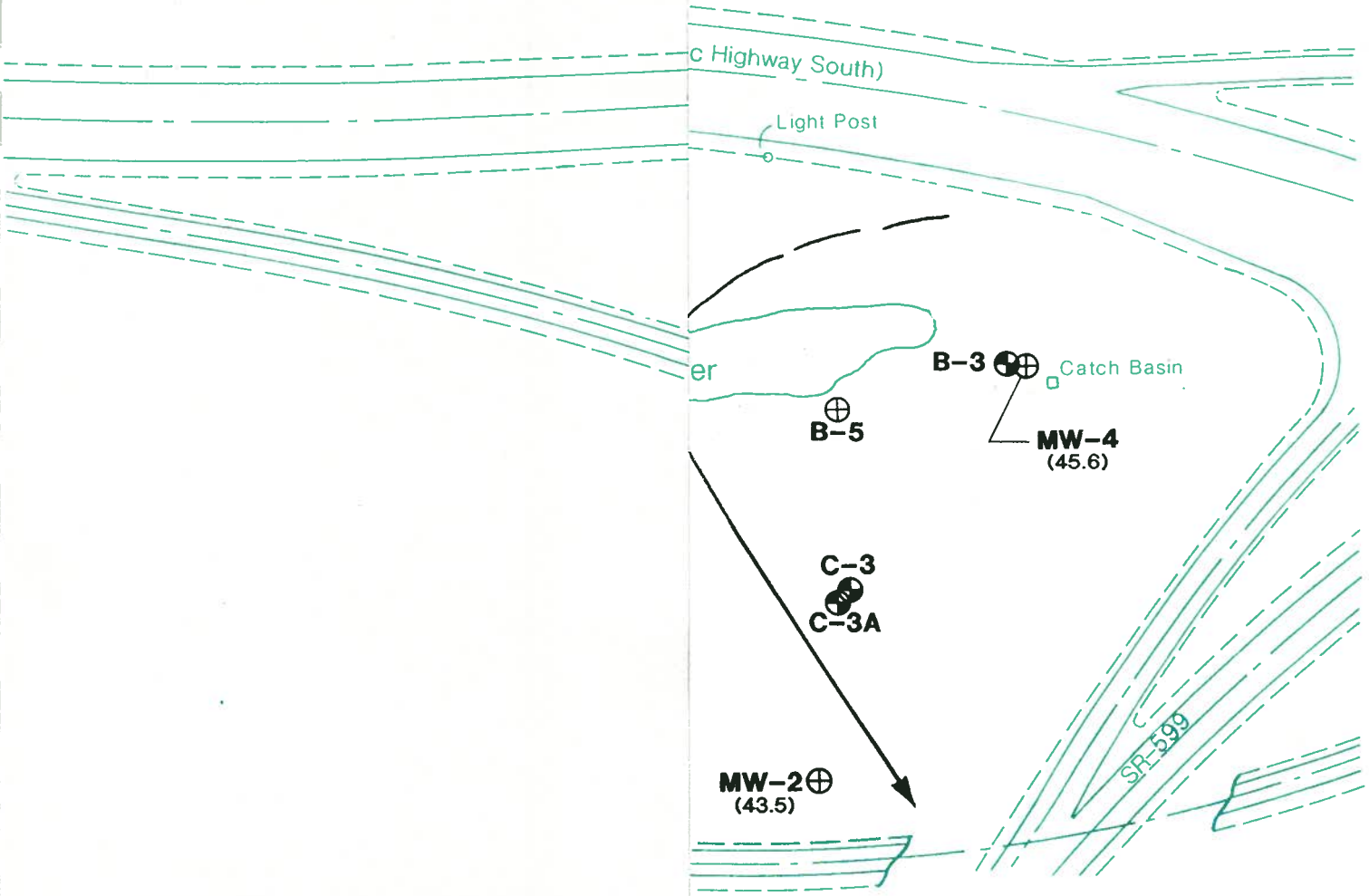
Figure 4

Relative Groundwater



● **B-13** Boring Location and Number

⊕ **MW-1** Monitoring Well Location and

(43.5) Relative Water Level Elevatio

◒ **B-5** Existing Phase I Boring Loca

—50— Relative Groundwater Elevati

→ Generalized Groundwater Fl

N

0 100 200

Scale in Feet

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Figure 5

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APPENDIX A
FIELD METHODS, BORING AND WELL LOGS, AND GRAIN SIZE ANALYSES

APPENDIX A
FIELD METHODS, BORING AND WELL LOGS, AND GRAIN SIZE ANALYSES

Introduction

This appendix provides a description of the specific sampling and analysis procedures for data collection during site characterization work at the Duwamish Fill Site, located in Tukwila, Washington. Hart Crowser's explorations at the site included drilling nine soil borings and completing four of the borings with groundwater monitoring wells. Analyses and testing included chemical analysis of soil and groundwater samples, water level monitoring, and hydraulic conductivity testing.

Drilling Procedures

This section presents the field procedures used to drill the soil borings and install the groundwater monitoring wells at the site. The equipment and procedures used for hollow-stem auger drilling and sampling are discussed below.

Hollow-Stem Auger Drilling Methods

Bruce McDonald, under subcontract to Hart Crowser, completed the drilling and subsurface soil sampling activities. A total of nine soil borings were drilled from June 24 through 27, 1991. Four of the soil borings were completed as groundwater monitoring wells. The soil borings were drilled using a 4-inch ID hollow-stem auger (HSA) rig to total depths ranging from 16.5 to 35 feet.

Equipment Decontamination

Before any work began, the drill rig, auger sections, and the downhole equipment were steam cleaned. Between each boring the downhole drilling and soil sampling equipment was steam cleaned using potable water.

All downhole soil sampling equipment was decontaminated using the following procedures before each sample was collected:

- The sampling equipment was washed in clean water, using a brush to dislodge soil, dirt, or other encrusted materials;
- The sampling equipment was then washed in an Alconox detergent solution; and
- The sampling equipment was rinsed in deionized water.

Soil Sampling

Soil samples were collected at 2½- to 5-foot-depth intervals using a pre-cleaned 3-inch-diameter, 18-inch-long, split-spoon sampler, driven by a 140-pound hammer, dropping a distance of 30 inches. The number of blows required to drive the sample were recorded to provide a measure of the relative density of granular soils and consistency of cohesive soils.

At each sample interval, the on-site hydrogeologist performed the following tasks:

- Placed the sampler on a clean surface where the split-barrel was opened and the soil sample split longitudinally;
- Filled laboratory-supplied, clean sampling containers with soil from the desired depth interval from the center of the split-spoon sampler;
- Labeled the sample containers with the exploration numbers, depth interval, date, and job number;
- Wiped the sample jars clean, capped them with a Teflon-lined lid, and placed them in a cooled ice chest; and
- Used the remaining portion of the soil to half fill a clean plastic jar, covered the jar mouth with foil, and capped the jar for subsequent headspace vapor measurements.

Sample Jar Headspace Vapor Measurement

Soil samples for headspace vapor measurements were collected as described above. To assess the presence of organic vapors in the soil samples, the following procedure was followed:

- The sample jar was allowed to equilibrate with ambient temperature conditions for at least 10 minutes;
- Either an HNU or Photovac Photoionization Detector (PID), was used to take the measurements;
- The sample jar lid was unscrewed, and the tip of the PID extension probe was inserted through the foil covering into the headspace area of the jar;
- The maximum organic vapor reading was recorded on the field log for the appropriate sample.

Soil Description

The hydrogeologist visually classified the soil samples recovered from the borings using the system shown on Figure A-1, Key to Exploration Logs, prepared a log of soils encountered in the exploration, and recorded pertinent observations regarding drilling conditions, groundwater occurrence, and visual evidence of contamination. Interpretive logs and monitoring well construction diagrams are presented in this appendix on Figures A-2 through A-10. Other pertinent data recorded on the logs include:

- Sample interval, type, and recovery;
- Blow count (penetration resistance) from drive samples;
- Sample jar headspace vapor measurements; and
- Drill action.

Drill Cuttings

Cuttings from borings were placed in barrels pending chemical analysis. Drums were identified by boring number and contents, and were left adjacent to the boring location for appropriate disposal. The drums of cuttings from MW-1 were removed from the right of way and left within the secured project area.

Hole Abandonment

Boreholes which were not completed as monitoring wells were abandoned by backfilling with bentonite chips.

Groundwater Monitoring Well Construction

The groundwater monitoring wells were installed using HSA drilling equipment. The wells were constructed with 2-inch-diameter, flush threaded, schedule 40 PVC riser pipes and screen. The wells were designed to screen the relatively coarsest and most uniform water-bearing soils, with the top of the screened interval being approximately 5 to 10 feet below the static water level.

The following procedure was used to installed the wells:

- Five feet of 0.010-inch-slot V-wrap PVC screen fitted with a threaded end cap was attached to blank casing and placed through the auger flights to the desired depth.

- As the auger flights were slowly withdrawn from the borehole, silica sand (20/40 sieve size) was placed in the annular space from the bottom of the boring to a height of 2 to 3 feet above the top of the screen. The depth of the sand pack was periodically checked by the on-site hydrogeologist to assure proper placement of the sand pack;

- Bentonite seals were placed above the sand pack. The seals were constructed by placing bentonite chips in the annular space on top of the filter sand to within 2 feet of the ground surface.

- A concrete surface seal was then placed above the bentonite seal to the ground surface.

- The monitoring wells were completed by setting an 8-inch steel, stick-up monument in the concrete, in place over the PVC riser pipe. A steel flush-mount surface monument was installed over MW-1.

After completion, the four monitoring well locations, top of PVC casing elevations, and soil boring locations were surveyed by Hart Crowser personnel. Well and boring locations were surveyed relative to an

assumed reference elevation of 100.0 for a benchmark in the upper area, and have not been tied into the state coordinate system.

Groundwater Monitoring Well Development

To improve hydraulic connection with the water-bearing zones screened, and to remove accumulated fine-grained materials resulting from installation procedures, the newly installed monitoring wells were developed before they were sampled.

- All equipment used for well development was washed with Alconox detergent, and rinsed with tap and deionized water prior to use at each well;
- A water level measurement, reported as the depth to water from the top of the casing, was made with an electric well sounder and a total well depth measurement was recorded with a weighted tape before and after development;
- A stainless steel, bottom-filling bailer was used to surge and remove the sediment in the screened section of the groundwater monitoring well;
- Bailing and surging were continued at monitoring wells MW-1, MW-2, and MW-4 until they were bailed dry. This occurred after 2 to 3 casing volumes of water were removed;
- Bailing and surging were continued at monitoring well MW-3 until at least 10 casing volumes of water were removed;
- A new length of dedicated polyethylene rope was used for the bailer at each well site;
- Well development water was placed in labeled 55-gallon drums and kept at the site for appropriate disposal;
- Well development data was documented on Hart Crowser's Field Well Development Data Form.

Water Level Measurements

The Hart Crowser hydrogeologist measured the water levels in the wells during installation, prior to and following well development, and prior to sampling. The water level measurements were made using a calibrated electric well probe. The measurements were recorded to ±0.01 foot, referenced to a marking on the top of the PVC well casing.

Groundwater Sampling

Groundwater samples were collected in accordance with methods outlined in EPA document number 600/2-85/104, "Practical Guide for Groundwater Sampling". The following sections discuss the equipment and handling of groundwater samples.

Equipment

The following equipment was used for groundwater sampling:

- pH, temperature, and EC meter;
- Electronic well sounder;
- Stainless steel bailers;
- New polypropylene rope;
- Silicone and neoprene tubing with 0.45 μm filters;
- Peristaltic pump;
- Appropriate sampling containers;
- Blue ice and coolers; and
- Sample Custody Record.

Groundwater Sampling Procedure

Groundwater samples were collected as follows:

- The depth to the water level from the top of the casing was measured and recorded;

- Prior to sampling, groundwater was purged from the well using a stainless steel bailer. Three casing volumes of water were removed from monitoring well MW-3, while monitoring wells MW-1, MW-2, and MW-4 were bailed dry after approximately 2 casing volumes.

These wells were allowed to recover to at least 80 percent of their original casing volume prior to sampling;

- Sampling containers were provided by the analytical laboratory and appropriately labeled with the project name, location, date, time, and sampler's initials;

- Non-acidified sample containers were thoroughly rinsed with groundwater prior to collection;

- Groundwater samples were collected in the following order:

  1) Volatile Organics;
  2) Semivolatile Organics;
  3) PAHs;
  4) TPHs; and
  5) Metals - total and dissolved.

- Volatile sample containers were slowly filled with water, capped, inverted, and tapped to check for remaining air bubbles;

- All sample containers were filled slowly to minimize turbulence;

- Groundwater samples for dissolved metals analyses were collected using a peristaltic pump and dedicated tubing with an inline 0.45 micron (Gelman Sciences Model FF-8200) filter to transfer the water from the bailer and remove suspended solids prior to filling the acid preserved sample bottles;

- Groundwater samples were immediately placed in a cooled ice chest. Samples collected for volatile analysis were placed in sealable bags to minimize cross contamination;

- A laboratory supplied trip blank was stored in the ice chest to detect possible cross contamination of volatile organics;

- After samples for chemical analysis had been collected, a sample was obtained for field measurement of temperature, pH, and electrical conductivity;

- Groundwater sampling activities were documented on Hart Crowser's Groundwater Sampling Data Form;

- Samples collected for chemical analysis were transported by courier to the analytical laboratory within 24 hours from the time they were collected. All samples were submitted under chain of custody protocol.

Sample Protocol

Appropriate sample containers provided by ATI were used. Each container was labeled with an indelible marker on pre-applied labels supplied by the analytical laboratory. Time, date, initials of sampler, site location, and well name were written on the labels. Sampling activities were recorded on the record form or log. A chain of custody record was completed.

Immediately after sampling, samples were placed with appropriate packing for transport to ATI.

The chain of custody record was completed when samples were delivered to ATI. At a minimum, the following was included:

- Client identification information;
- Name of person receiving the samples;
- Condition of transport and sample containers;
- Verification of sample containers and chain of custody record;
- Time and date samples delivered to analytical laboratory;
- Allocation of samples; and
- Required sample analysis.

A copy of the chain of custody record was retained and provided to the appropriate QA officer.

Hydraulic Conductivity (K) Testing

Falling head and rising head hydraulic conductivity tests (slug tests) were performed in three of the monitoring wells to estimate the *in situ* ability of the soil to pass groundwater through its pore spaces.

The tests were initiated by causing a rapid change in the water level in the well by introducing (falling head) or removing (rising head) a solid cylindrical rod of known volume. The recovery of the water level with time was monitored using a 10 psi pressure transducer coupled to a Terra data logger and lap-top computer. The data obtained from the rising and falling head tests were plotted and analyzed by the method of Bower and Rice (1976) for unconfined aquifers. The results are presented in Table 2.

Key to Exploration Logs

Sample Description

Classification of soils in this report is based on visual field and laboratory observations which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field nor laboratory testing unless presented herein. Visual–manual classification methods of ASTM D 2488 were used as an identification guide.

Soil descriptions consist of the following:
Density/consistency, moisture, color, minor constituents, MAJOR CONSTITUENT, additional remarks.

Density/Consistency

Soil density/consistency in borings is related primarily to the Standard Penetration Resistance.
Soil density/consistency in test pits is estimated based on visual observation and is presented parenthetically on the test pit logs.

SAND or GRAVEL Density	Standard Penetration Resistance (N) in Blows/Foot	SILT or CLAY Consistency	Standard Penetration Resistance (N) in Blows/Foot	Approximate Shear Strength in TSF
Very loose	0 – 4	Very soft	0 – 2	<0.125
Loose	4 – 10	Soft	2 – 4	0.125 – 0.25
Medium dense	10 – 30	Medium stiff	4 – 8	0.25 – 0.5
Dense	30 – 50	Stiff	8 – 15	0.5 – 1.0
Very dense	>50	Very stiff	15 – 30	1.0 – 2.0
		Hard	>30	>2.0

Moisture

Dry	Little perceptable moisture
Damp	Some perceptable moisture, probably below optimum
Moist	Probably near optimum moisture content
Wet	Much perceptable moisture, probably above optimum

Minor Constituents

	Estimated Percentage
Not identified in description	0 – 5
Slightly (clayey, silty, etc.)	5 – 12
Clayey, silty, sandy, gravelly	12 – 30
Very (clayey, silty, etc.)	30 – 50

Legends

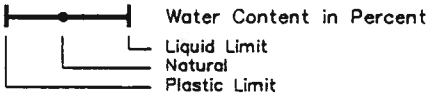
Sampling Test Symbols

BORING SAMPLES

☒	Split Spoon
⧅	Shelby Tube
▥	Cuttings
*	No Sample Recovery
⊛	Chemical Analysis
P	Tube Pushed, Not Driven

Test Symbols

GS	Grain Size Classification
CN	Consolidation
TUU	Triaxial Unconsolidated Undrained
TCU	Triaxial Consolidated Undrained
TCD	Triaxial Consolidated Drained
QU	QU
DS	Direct Shear
K	Permeability
PP	Pocket Penetrometer Approximate Compressive Strength in TSF
TV	Torvane Approximate Shear Strength in TSF
CBR	California Bearing Ratio
MD	Moisture Density Relationship
AL	Atterberg Limits



Groundwater Observations

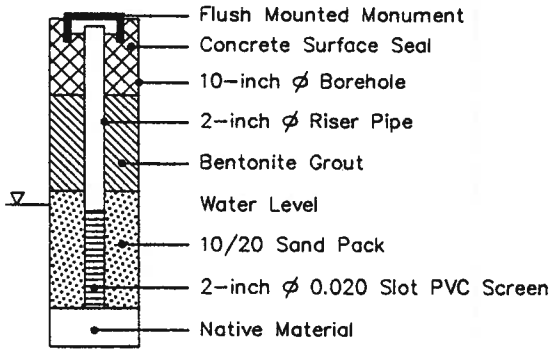


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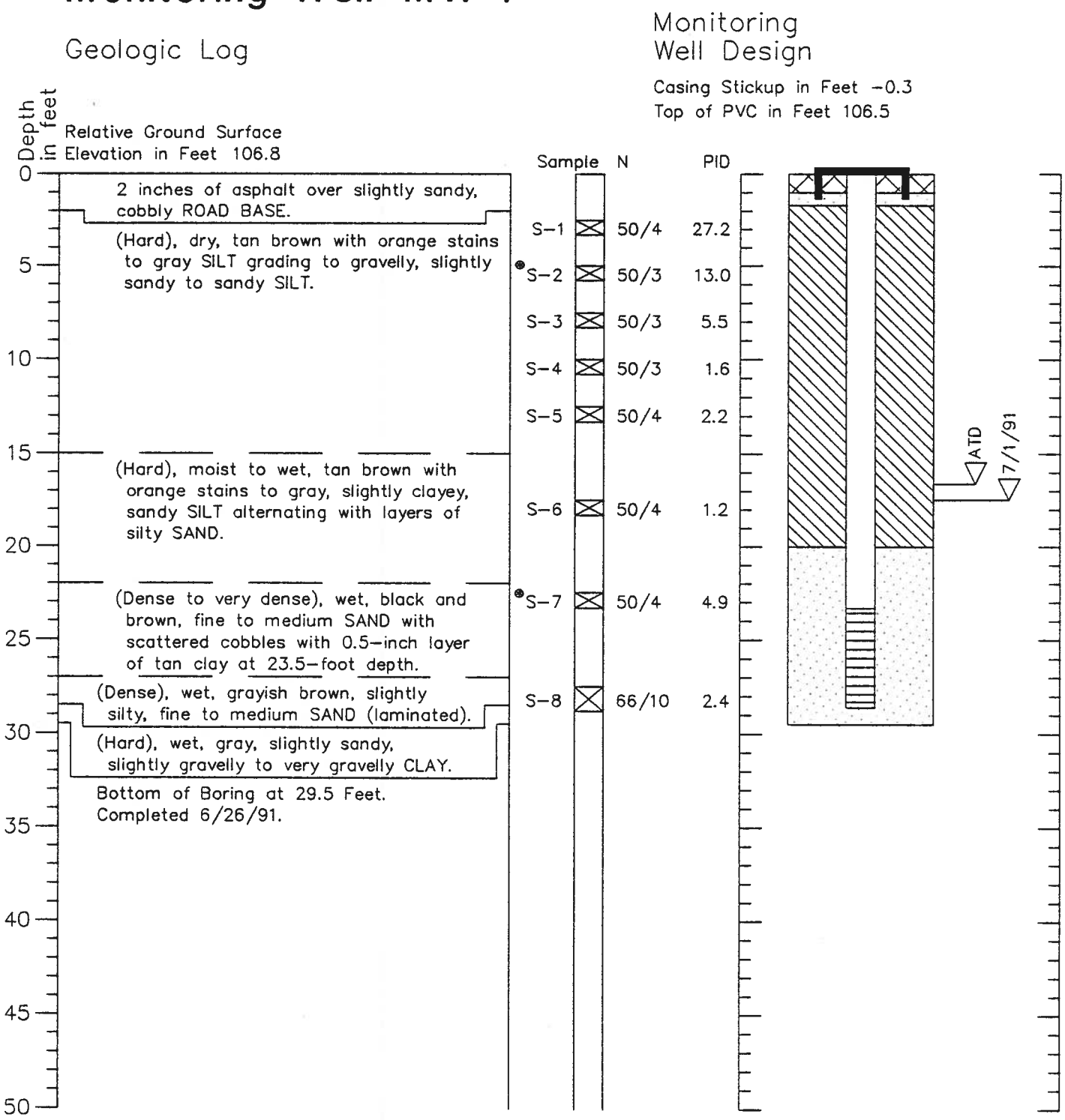
Figure A-1

Boring Log and Construction Data for Monitoring Well MW-1



1. Refer to Figure A−1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

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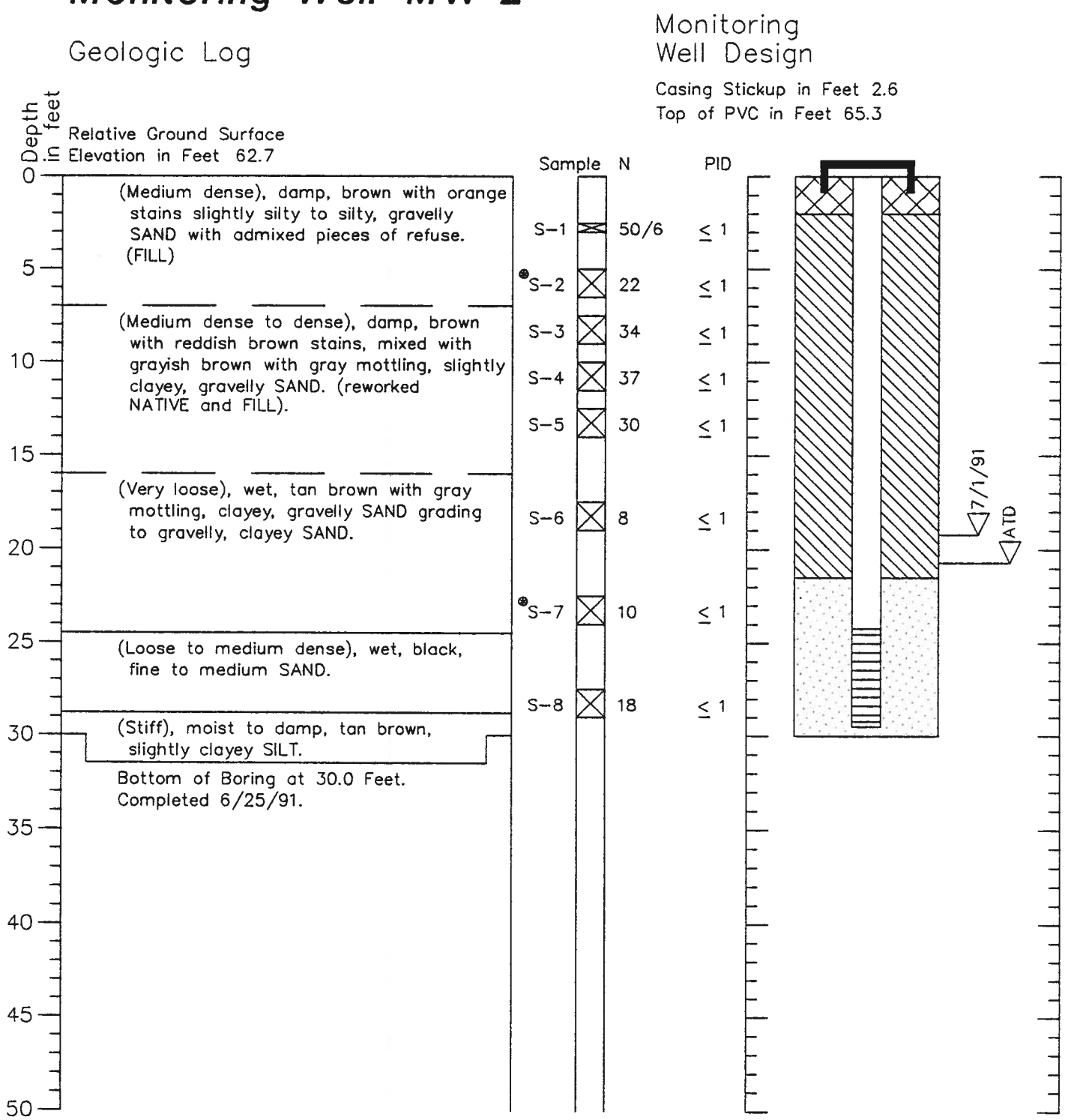
Figure A-2

Boring Log and Construction Data for Monitoring Well MW-2



1. Refer to Figure A–1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

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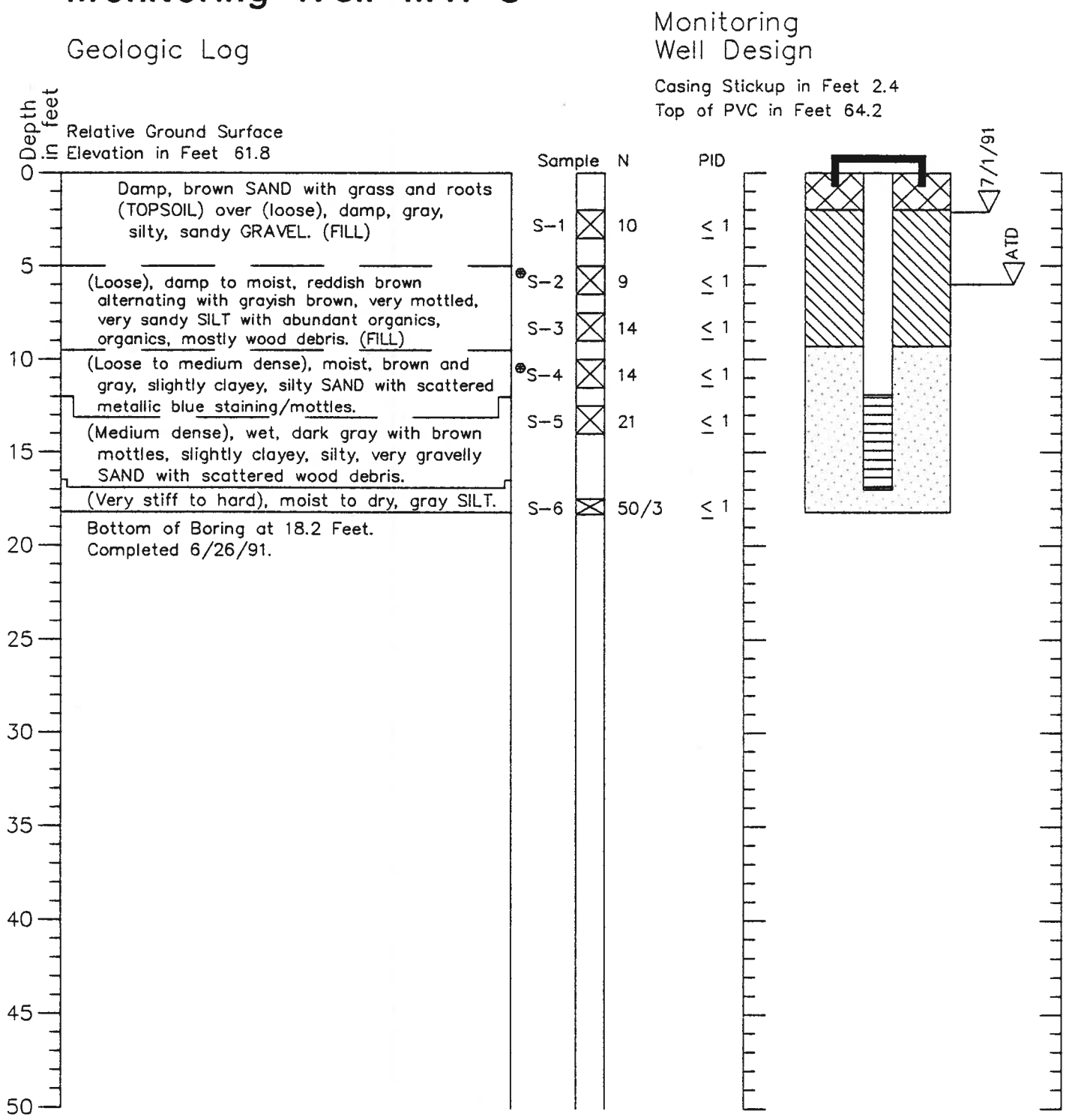
Figure A-3

Boring Log and Construction Data for Monitoring Well MW-3



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

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Figure A-4

Boring Log and Construction Data for Monitoring Well MW-4

Geologic Log

Relative Ground Surface Elevation in Feet 54.0

Depth in feet

0 — SOD over (soft), damp to moist, brown, slightly sandy SILT very organic-rich with large wood fragments and fines. (FILL)

5 — (Soft), damp to moist, brown, clayey SILT with grass mixed with (loose), damp to wet, gray, medium SAND with scattered gravel. (FILL)

10 — (Soft), damp, brown PEAT with gray, slightly silty SAND laminations increasing with depth.

15 — (Medium dense), wet, black, fine to medium SAND.

20 — (Very soft), wet, grayish black, slightly sandy, clayey SILT with abundant shell fragments.

25 — Wet, sandy GRAVEL to gravelly SAND.

30

35 — Bottom of Boring at 35.0 Feet. Completed 6/24/91.

40

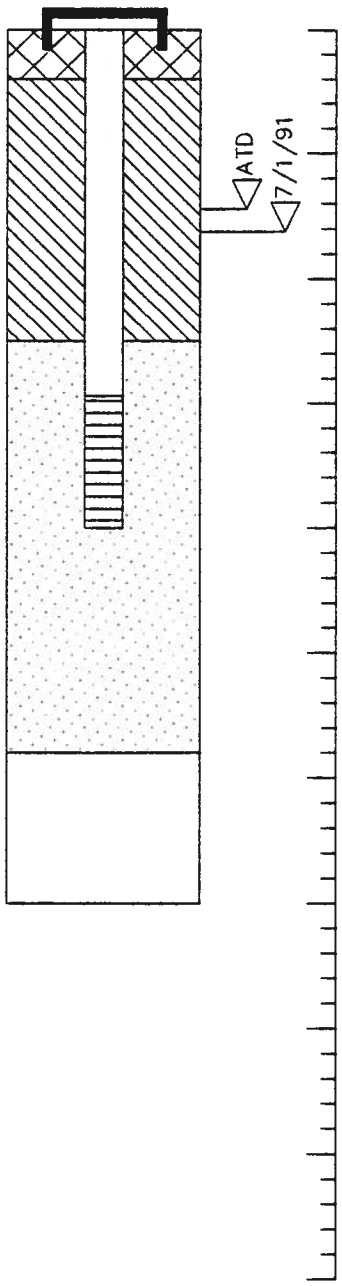
45

50

Sample	N	PID
S-1	20	≤ 1
⊛S-2	11	≤ 1
S-3	11	≤ 1
S-4	15	≤ 1
⊛S-5	25	≤ 1
S-6	25	≤ 1
S-7	4	≤ 1
S-8	100/6	≤ 1

Monitoring Well Design

Casing Stickup in Feet 2.1
Top of PVC in Feet 56.1



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

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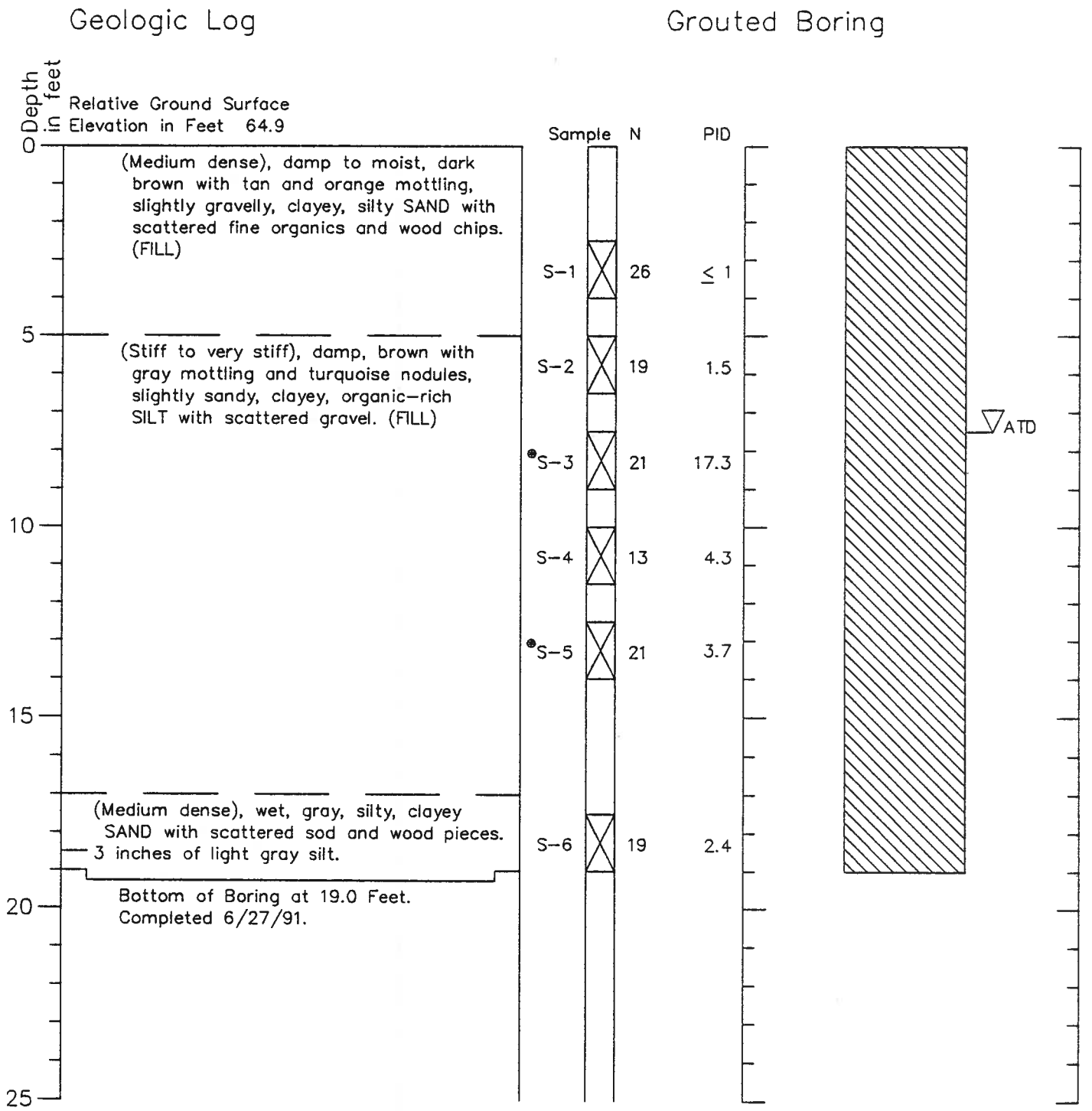
Figure A-5

Boring Log B-13



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

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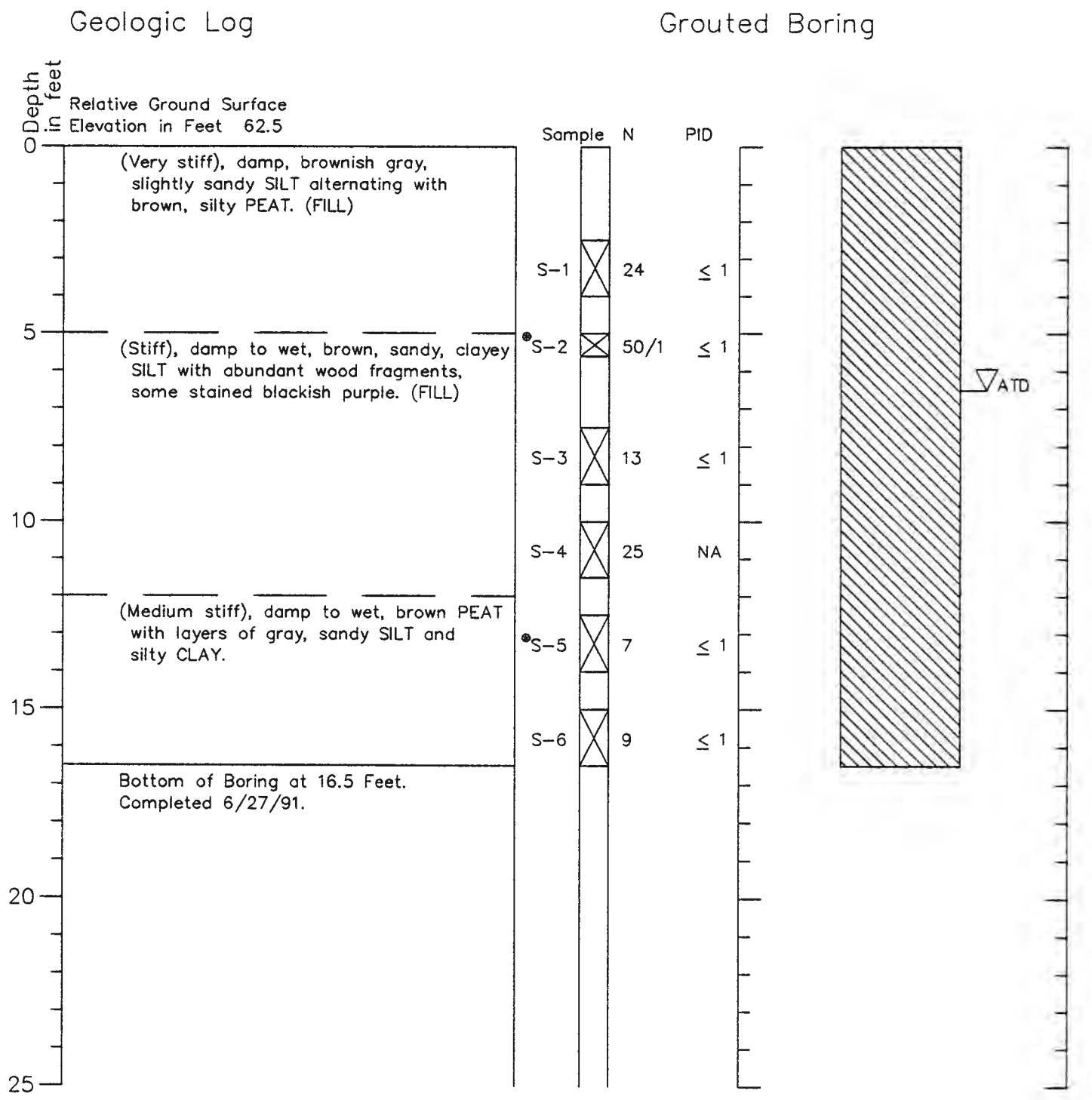
Figure A-6

Boring Log B-14



1. Refer to Figure A–1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

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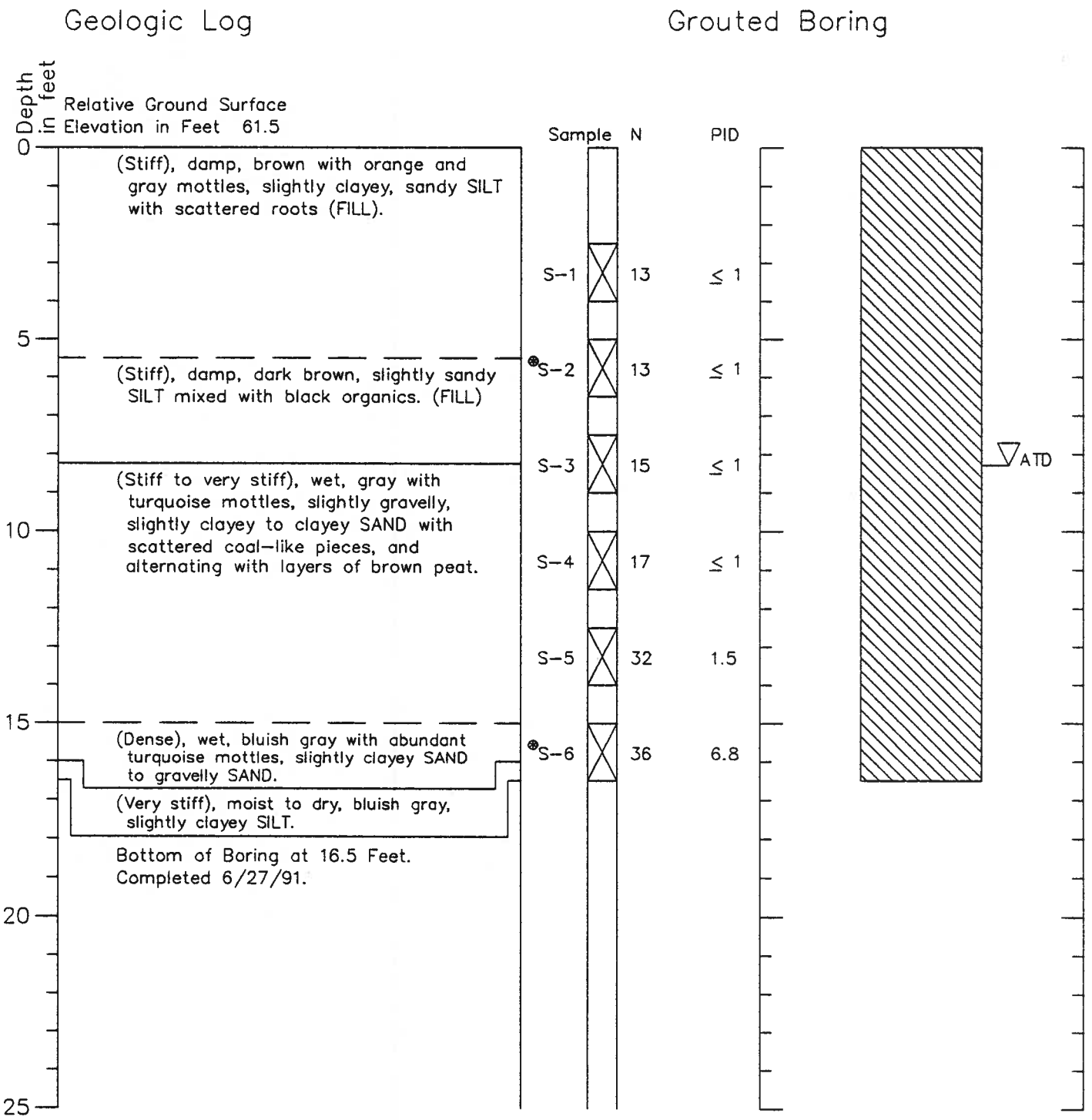
J-3351 6/91

Figure A-7

Boring Log B-15



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

HARTCROWSER

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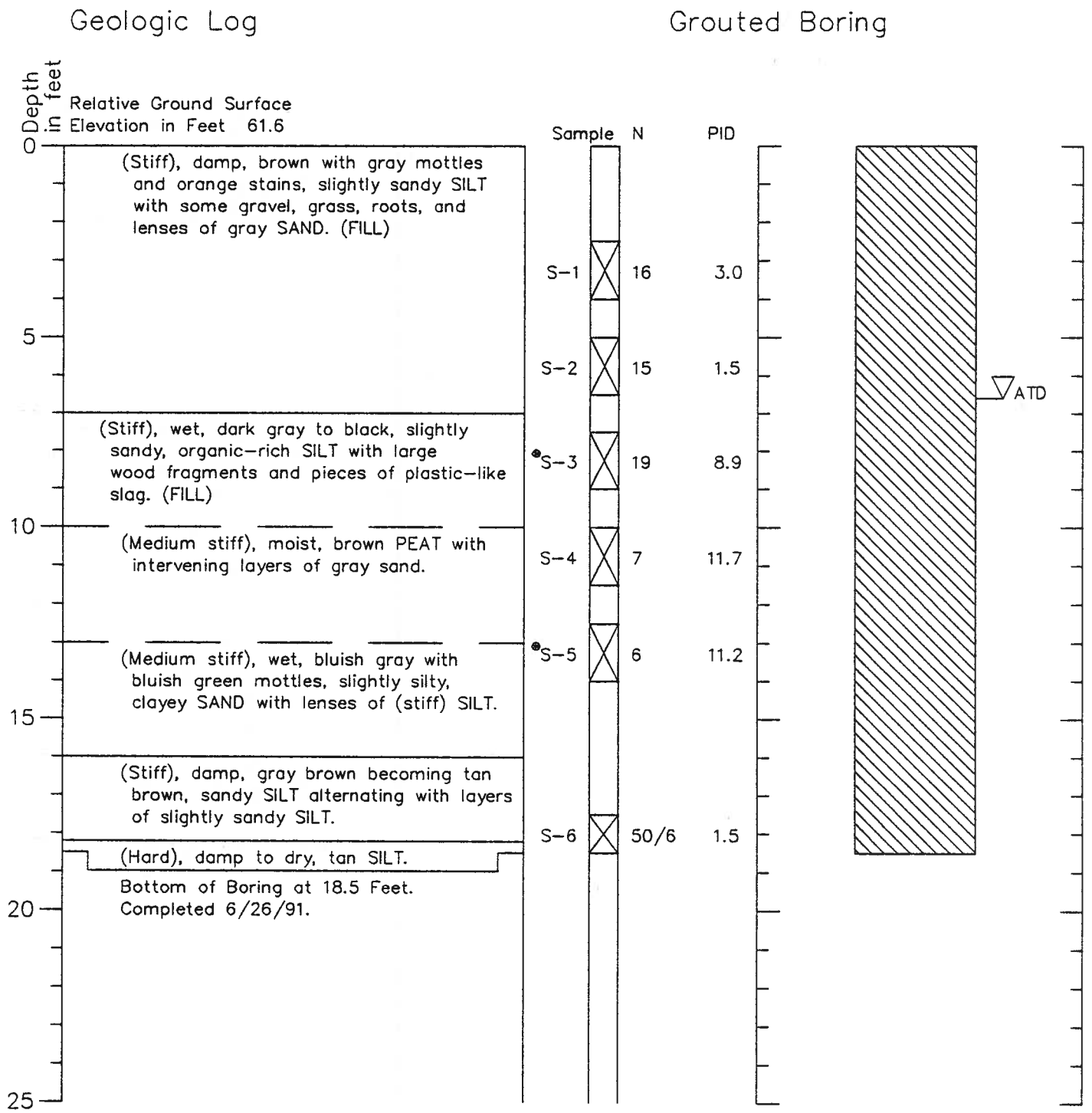
Figure A-8

Boring Log B-16



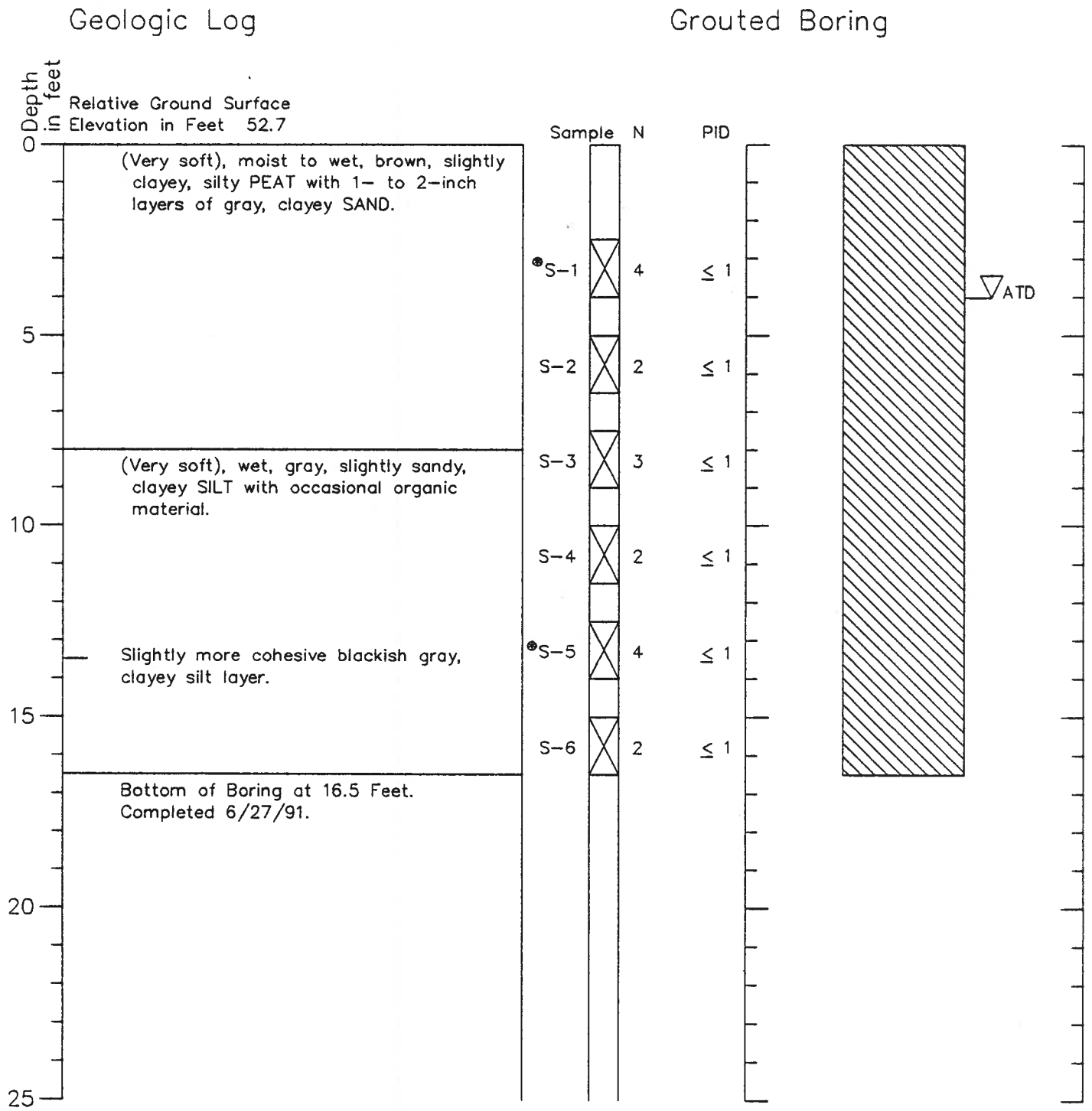
1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

HARTCROWSER

J-3351 6/91

Figure A-9

Boring Log B-17



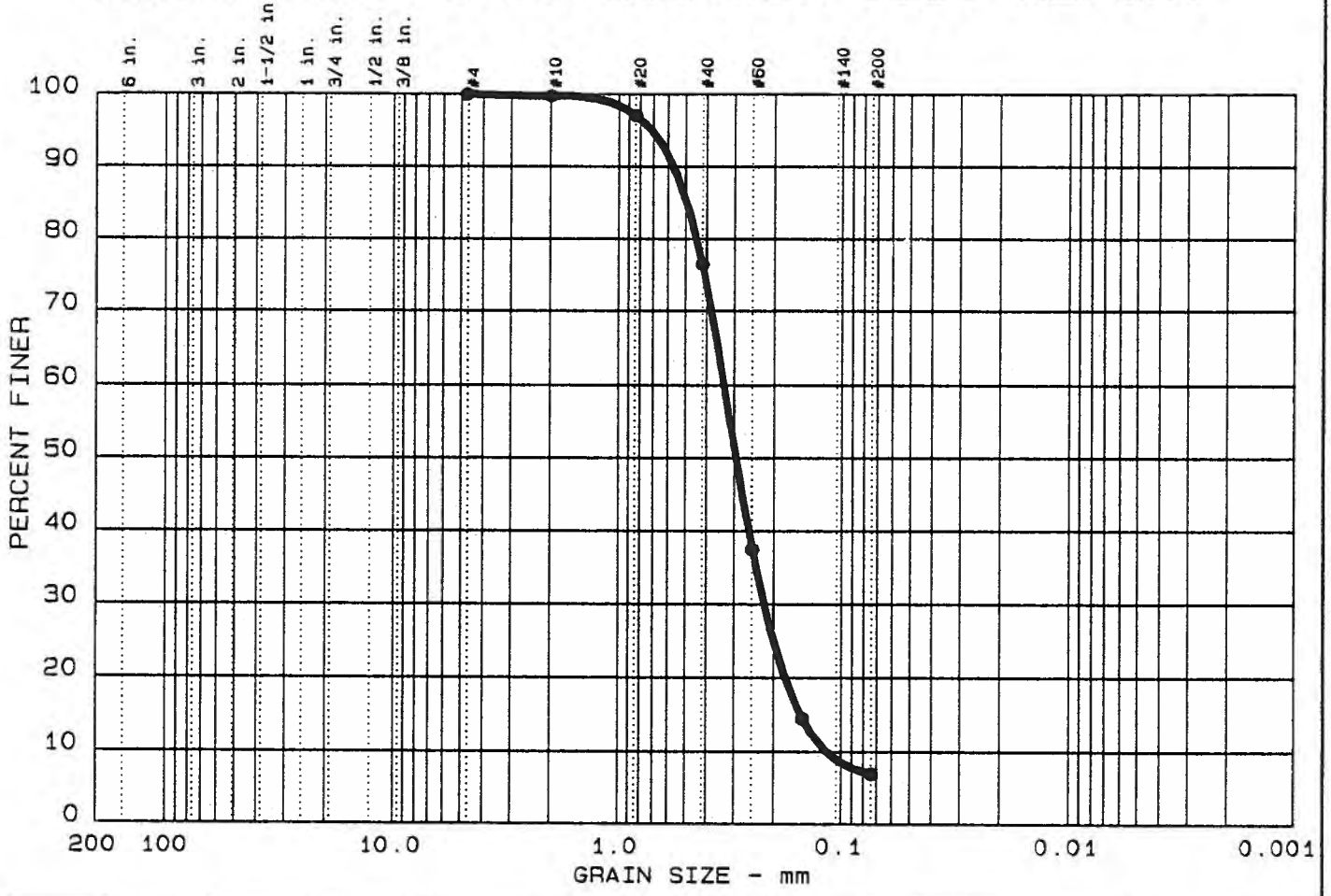
1. Refer to Figure A–1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

HARTCROWSER

J-3351 6/91

Figure A-10

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+75 mm	% GRAVEL	% SAND	% SILT	% CLAY
●	1	0.0	0.0	93.1	6.9	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.49	0.33	0.30	0.221	0.1512	0.1160	1.26	2.9

MATERIAL DESCRIPTION	USCS	NAT. MOIST.
● Slightly silty, fine to medium SAND	SP-SM	32%

Remarks:

Project: WSDOT

● Location: MW-2, S-8

HART CROWSER

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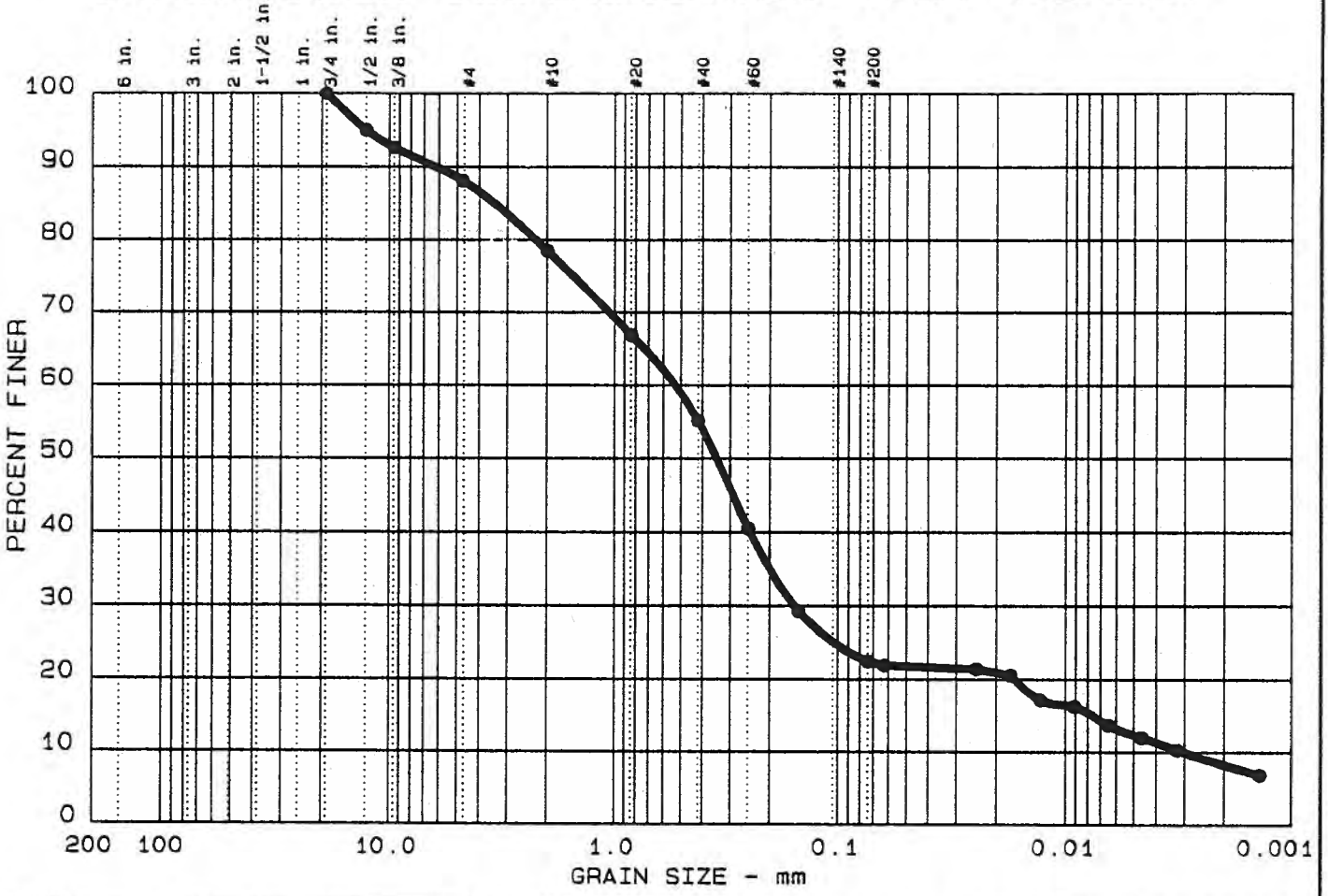
Figure A-11

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+75 mm	% GRAVEL	% SAND	% SILT	% CLAY
●	3	0.0	11.9	65.7	10.1	12.3

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			3.39	0.52	0.35	0.155	0.0076	0.0031	14.96	171.8

MATERIAL DESCRIPTION	USCS	NAT. MOIST.
● Slightly silty, slightly gravelly, clayey SAND	SM	24%

Remarks:

Project: WSDOT

● Location: MW-3, S-5

HART CROWSER

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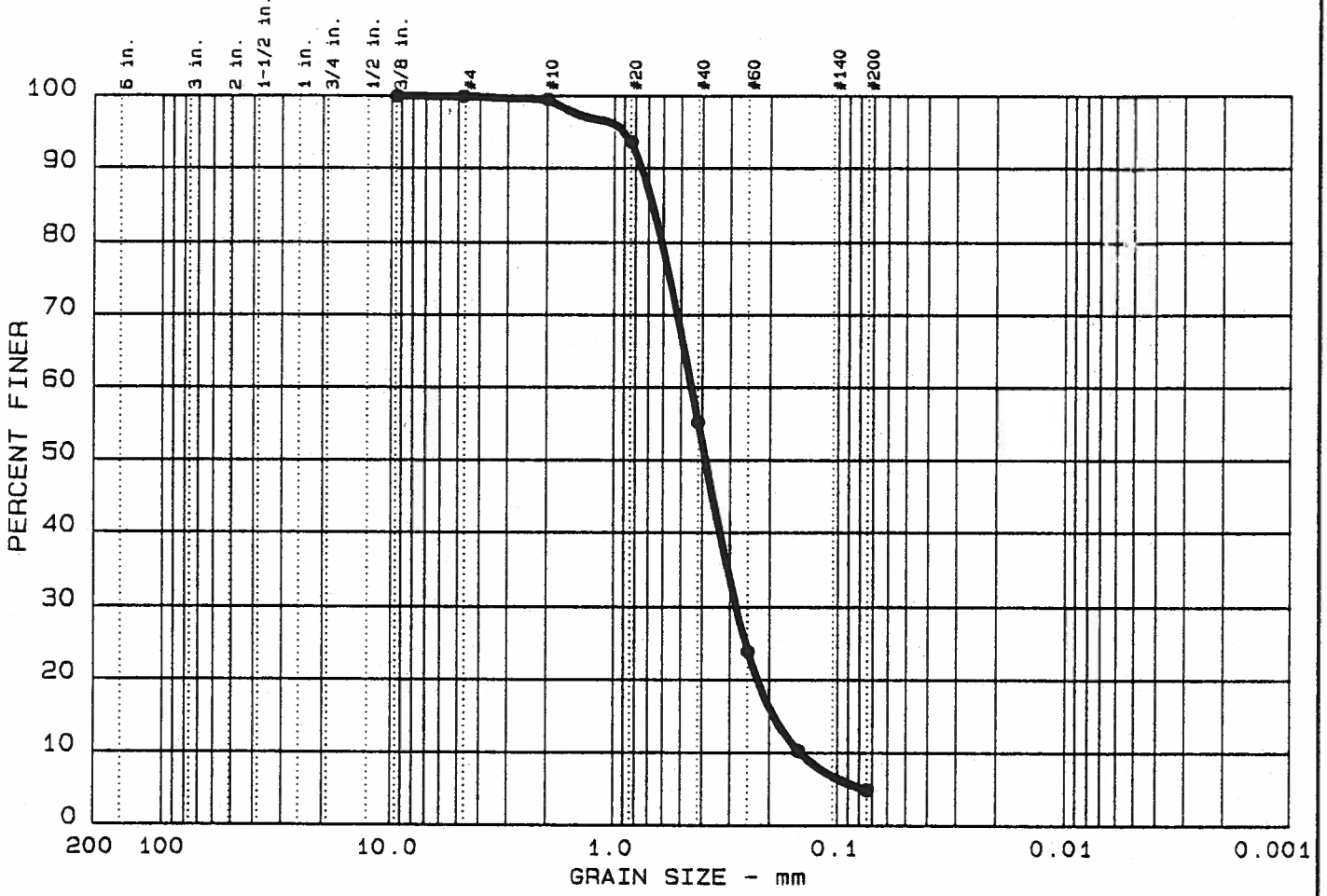
Figure A-12

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	%+75 mm	% GRAVEL	% SAND	% SILT	% CLAY
●	2	0.0	0.0	95.1	4.9	

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.67	0.45	0.39	0.282	0.1905	0.1462	1.21	3.1

MATERIAL DESCRIPTION	USCS	NAT. MOIST.
● Fine to medium SAND	SP	22%

Remarks:

Project: WSDOT

● Location: MW-4, S-6

HART CROWSER

J-3351 7/21/91

Figure A-13

APPENDIX B
DATA QUALITY REVIEW

APPENDIX B
DATA QUALITY REVIEW

This data review summarizes the procedures used to evaluate the quality of the chemical data and their appropriateness for use in characterizing chemical contamination at the Duwamish Fill Site. The sample results reviewed herein are for soil and groundwater samples collected by Hart Crowser on June 24, 25, and July 1, 1991.

Our review of the data is performed in general accordance with Laboratory Data Validation Functional Guidelines (EPA, 1988a and 1988b), Test Methods for Evaluating Solid Wastes, SW-846 (EPA, 1986), and Risk Assessment Guidance for Superfund, Chapter 5 Data Evaluation (EPA, 1989).

Where appropriate the sample results are qualified with a "B", "J" or "U". A "B" qualifier indicates that the compound was also detected in a blank sample. A "J" qualifier indicates that the reported concentration is provided as an estimate of the true concentration. A "U" qualifier indicates that the compound was not detected at the reported level of detection (see Tables 3 and 4).

Summary of Findings

The samples were properly collected, handled and analyzed such that the sample results are considered representative of the soil and groundwater samples collected. The analytical detection limits are sufficiently low and the sample results sufficiently accurate and precise to meet the site characterization use intended for the data.

In some cases, sample results reported by ATI were omitted for site evaluation purposes because of blank contamination and unavoidable low surrogate recovery. Tentatively identified compounds were also omitted from the data used for site evaluation purposes because of the low concentrations and low toxicities of the chemicals identified.

Sample results for PAHs in water and for some zinc results in soil are qualified as estimated because duplicate and matrix spike duplicate results exceeded control limits.

The relative percent difference between field duplicate samples indicates that actual site soil concentrations may differ from reported sample concentrations by as much as 116 percent for some metals in soil.

Blank Contamination

In accordance with EPA guidelines, sample results should not be reported unless the concentration of the compound in the sample exceeds ten times the concentration reported in the blank sample for common laboratory contaminants, and five times the concentration reported for uncommon laboratory contaminants. Our review of the data revealed the need to qualify reported sample results as undetected because of chemicals identified in blank samples. Blank contaminants identified methylene chloride and acetone in soil and water, di-n-butylphthalate in soil, and lead in water (Tables 3 and 4).

Surrogate Recovery

The percent recovery of chemicals intentionally introduced into a sample (surrogates) are used to evaluate whether the results of that sample are accurate. Surrogate recoveries were reported for all samples analyzed for volatile and semivolatile organics.

Lower than normal surrogate recoveries were observed for volatile organic soil sample results B-16 S-3, B-15 S-2, and B-17 S-1, and for some acid surrogates only, in semivolatile organic water sample results MW-2, MW-3, and Dup (duplicate sample of MW-3). In many cases the surrogate recoveries are only slightly below ATI control limits.

The low surrogate recoveries resulted from unavoidable matrix interference problems. Re-extraction and analysis was performed for all samples not in compliance without overcoming the matrix interferences. Actual concentrations of those chemicals which have physical properties similar to the surrogate chemicals with low recoveries may therefore be higher than the reported values.

Allowing for the omission of those sample results with low surrogate recoveries, sufficient data remains to evaluate the presence or absence of volatile and semivolatile organics at the site.

A matrix spike duplicate is performed to assess the precision of the analytical method for the sample analyzed, and is expressed as a relative percent difference. Two of the four chemicals included in a PAH matrix spike duplicate test for water reported relative percent difference values which exceed ATI control limits. While no action is required by EPA guidelines to qualify data results as estimated because of the exceedence, the large relative percent difference (RPD) values reported indicate poor reproducibility in the reported concentrations of PAHs in water.

Laboratory Duplicates

A laboratory duplicate sample for zinc in soil exceeded EPA control limits. In accordance with EPA guidelines, those soil samples analyzed in conjunction with this duplicate sample should be qualified as estimated values.

Tentatively Identified Compounds

Tentatively identified compounds are those compounds which are observed during analysis when using mass spectrophotometry methods (volatiles and semivolatiles) but which are not expressly included in the list of compounds for which the method is intended to apply. All reported concentrations of tentatively identified compounds are considered as estimates.

Both volatile and semivolatile analyses detected tentatively identified compounds in some samples. In accordance with Risk Assessment Guidance for Superfund, Chapter 5 Data Evaluation (EPA, 1989), the tentatively identified compounds will not be used for site characterization because of the low detection frequencies and concentrations of these compounds, and because there is no reason to suspect that contaminants in addition to those expressly included in the analytical methods occur at the site.

Field Duplicates

Field duplicate samples were collected for soil sample MW-3 S-4, and for groundwater sample MW-3. While the duplicate samples were analyzed for all test methods, chemicals were only detected in the samples analyzed for metals. The relative percent difference (RPD)

between reported sample results for metals in soil ranged from 17 to 116 percent. In groundwater the relative percent difference for total metals ranged from 6 to 36 percent, and for dissolved metals the relative percent difference ranged from 0 to 40 percent. These RPD data are presented in Table B-1.

No guidelines exist for evaluating field duplicates. The relative percent difference between field duplicates is used as a guide when evaluating the degree of accuracy by which the sample results describe actual chemical concentrations at the site. The relative percent difference observed in these samples are not unusual.

Table B-1 – Metals Relative Percent Difference Date

	Soil			Groundwater					
	Concentration in mg/kg			Total Metals in mg/L.			Dissolved Metals in mg/L.		
Chemical	MW-3, S-4	Field Dup.	RPD	MW-3	Field Dup.	RPD	MW-3	Field Dup.	RPD
Metals:									
Arsenic	4.6	8.4	58	0.014	0.01	33	0.003	0.002	40
Cadmium	1	1.5	40	0.008	0.006	29	ND	ND	-
Chromium	26	30.9	17	0.13	0.09	36	ND	ND	-
Copper	18.2	29.2	46	0.1	0.08	22	ND	ND	-
Nickel	25.4	43.4	52	0.12	0.09	29	ND	ND	-
Lead	5.8	21.9	116	0.025	0.021	17	0.005	0.005	0
Zinc	74.5	184	85	0.33	0.31	6	0.09	0.09	0

RPD = ((Sample Result-Duplicate Result)/(Average Result))*100
ND = Not Detected

3351tb1.wk1

Hart Crowser
J-3351

CERTIFICATES OF ANALYSIS
ANALYTICAL TECHNOLOGIES, INC.

Analytical Technologies, Inc. 560 Naches Avenue, S.W., Suite 101 Renton, WA 98055, (206) 228-8335

ATI I.D. # 9106-290

July 31, 1991

Hart Crowser, Inc.
1910 Fairview Avenue East
Seattle, WA 98102-3699

Attention : Marian Wineman

Project Number : 3351

Project Name : WSDOT-Duwamish

On June 26, 1991, Analytical Technologies, Inc. received seven soil samples for analysis. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and the quality control data are enclosed.

Emily C. Carfioli
Senior Project Manager

Frederick W. Grothkopp
Technical Manager

FWG/ew

Analytical Technologies, Inc.

ATI I.D. # 9106-290

SAMPLE CROSS REFERENCE SHEET

CLIENT : HART CROWSER, INC.
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH

ATI #	CLIENT DESCRIPTION	DATE SAMPLED	MATRIX
9106-290-1	MW-4 S-2	06/24/91	SOIL
9106-290-2	MW-4 S-5	06/24/91	SOIL
9106-290-3	MW-2 S-2	06/25/91	SOIL
9106-290-4	MW-2 S-7	06/25/91	SOIL
9106-290-5	MW-3 S-2	06/25/91	SOIL
9106-290-6	MW-3 S-4	06/25/91	SOIL
9106-290-7	MW-3 DUP	06/25/91	SOIL

----- TOTALS -----

MATRIX	# SAMPLES
SOIL	7

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

Analytical Technologies, Inc.

ATI I.D. # 9106-290

ANALYTICAL SCHEDULE

CLIENT : HART CROWSER, INC.
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH

ANALYSIS	TECHNIQUE	REFERENCE	LAB
VOLATILE ORGANIC COMPOUNDS	GCMS	EPA 8240	R
SEMI-VOLATILE COMPOUNDS	GCMS	EPA 8270	R/SD
POLYNUCLEAR AROMATIC HYDROCARBONS	HPLC/UV	EPA 8310	SD
ANTIMONY	ICAP	EPA 6010	SD
ARSENIC	AA/GF	EPA 7060	SD
BERYLLIUM	ICAP	EPA 6010	SD
CADMIUM	ICAP	EPA 6010	SD
CHROMIUM	ICAP	EPA 6010	SD
COPPER	ICAP	EPA 6010	SD
LEAD	ICAP	EPA 6010	SD
MERCURY	AA/COLD VAPOR	EPA 7471	SD
NICKEL	ICAP	EPA 6010	SD
SELENIUM	AA/GF	EPA 7740	SD
SILVER	ICAP	EPA 6010	SD
THALLIUM	AA/GF	EPA 7841	SD
ZINC	ICAP	EPA 6010	SD
PETROLEUM HYDROCARBONS	IR	EPA 418.1	R
MOISTURE	GRAVIMETRIC	CLP SOW ILM01.0	R
MOISTURE	GRAVIMETRIC	METHOD 7-2.2	SD

R = ATI - Renton
SD = ATI - San Diego
T = ATI - Tempe
PNR = ATI - Pensacola
FC = ATI - Fort Collins
SUB = Subcontract

Analytical Technologies, Inc.

ATI I.D. # 9106-290

VOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 3351	DATE RECEIVED	: N/A
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 06/2
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 06/2
SAMPLE MATRIX	: SOIL	UNITS	: mg/K
EPA METHOD	: 8240	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
ACETONE	<1.0
BENZENE	<0.050
BROMODICHLOROMETHANE	<0.050
BROMOFORM	<0.25
BROMOMETHANE	<0.50
2-BUTANONE (MEK)	<0.50
CARBON DISULFIDE	<0.050
CARBON TETRACHLORIDE	<0.050
CHLOROBENZENE	<0.050
CHLOROETHANE	<0.050
CHLOROFORM	<0.050
CHLOROMETHANE	<0.50
DIBROMOCHLOROMETHANE	<0.050
1,1-DICHLOROETHANE	<0.050
1,2-DICHLOROETHANE	<0.050
1,1-DICHLOROETHENE	<0.050
1,2-DICHLOROETHENE (TOTAL)	<0.050
1,2-DICHLOROPROPANE	<0.050
CIS-1,3-DICHLOROPROPENE	<0.050
TRANS-1,3-DICHLOROPROPENE	<0.050
ETHYLBENZENE	<0.050
2-HEXANONE (MBK)	<0.50
4-METHYL-2-PENTANONE (MIBK)	<0.50
METHYLENE CHLORIDE	0.58
STYRENE	<0.050
1,1,2,2-TETRACHLOROETHANE	<0.050
TETRACHLOROETHENE	<0.050
TOLUENE	<0.050
1,1,1-TRICHLOROETHANE	<0.050
1,1,2-TRICHLOROETHANE	<0.050
TRICHLOROETHENE	<0.050
VINYL ACETATE	<0.50
VINYL CHLORIDE	<0.050
TOTAL XYLENES	<0.050

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-D4	106
TOLUENE-D8	103
BROMOFLUOROBENZENE	106

Analytical Technologies, Inc.

ATI I.D. # 9106-290

VOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 3351	DATE RECEIVED	: N/A
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 06/27/91
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 06/27/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8240	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION
ETHANE, 1,1,2-TRICHLORO- 1,2,2-TRIFLUORO-		122	2.2
HEXANE		241	0.30

Analytical Technologies, Inc.

ATI I.D. # 9106-290-2

VOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/24/91
PROJECT #	: 3351	DATE RECEIVED	: 06/26/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 06/27/91
CLIENT I.D.	: MW-4 S-5	DATE ANALYZED	: 07/08/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8240	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
ACETONE	<1.0
BENZENE	<0.050
BROMODICHLOROMETHANE	<0.050
BROMOFORM	<0.25
BROMOMETHANE	<0.50
2-BUTANONE (MEK)	<0.50
CARBON DISULFIDE	<0.050
CARBON TETRACHLORIDE	<0.050
CHLOROBENZENE	<0.050
CHLOROETHANE	<0.050
CHLOROFORM	<0.050
CHLOROMETHANE	<0.50
DIBROMOCHLOROMETHANE	<0.050
1,1-DICHLOROETHANE	<0.050
1,2-DICHLOROETHANE	<0.050
1,1-DICHLOROETHENE	<0.050
1,2-DICHLOROETHENE (TOTAL)	<0.050
1,2-DICHLOROPROPANE	<0.050
CIS-1,3-DICHLOROPROPENE	<0.050
TRANS-1,3-DICHLOROPROPENE	<0.050
ETHYLBENZENE	<0.050
2-HEXANONE (MBK)	<0.50
4-METHYL-2-PENTANONE (MIBK)	<0.50
METHYLENE CHLORIDE	0.45 B
STYRENE	<0.050
1,1,2,2-TETRACHLOROETHANE	<0.050
TETRACHLOROETHENE	<0.050
TOLUENE	<0.050
1,1,1-TRICHLOROETHANE	<0.050
1,1,2-TRICHLOROETHANE	<0.050
TRICHLOROETHENE	<0.050
VINYL ACETATE	<0.50
VINYL CHLORIDE	<0.050
TOTAL XYLENES	<0.050
SURROGATE PERCENT RECOVERIES	
1,2-DICHLOROETHANE-D4	87
TOLUENE-D8	83
BROMOFLUOROBENZENE	83

B = Also found in blank.

Analytical Technologies, Inc.

ATI I.D. # 9106-290-2

VOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/24/91
PROJECT #	: 3351	DATE RECEIVED	: 06/26/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 06/27/91
CLIENT I.D.	: MW-4 S-5	DATE ANALYZED	: 07/08/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8240	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION

NO NON-HSL COMPOUNDS FOUND > 10% OF NEAREST INTERNAL STANDARD

Analytical Technologies, Inc.

ATI I.D. # 9106-290-3

VOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/25/91
PROJECT #	: 3351	DATE RECEIVED	: 06/26/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 06/27/91
CLIENT I.D.	: MW-2 S-2	DATE ANALYZED	: 07/05/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8240	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
ACETONE	<1.0
BENZENE	<0.050
BROMODICHLOROMETHANE	<0.050
BROMOFORM	<0.25
BROMOMETHANE	<0.50
2-BUTANONE (MEK)	<0.50
CARBON DISULFIDE	<0.050
CARBON TETRACHLORIDE	<0.050
CHLOROBENZENE	<0.050
CHLOROETHANE	<0.050
CHLOROFORM	<0.050
CHLOROMETHANE	<0.50
DIBROMOCHLOROMETHANE	<0.050
1,1-DICHLOROETHANE	<0.050
1,2-DICHLOROETHANE	<0.050
1,1-DICHLOROETHENE	<0.050
1,2-DICHLOROETHENE (TOTAL)	<0.050
1,2-DICHLOROPROPANE	<0.050
CIS-1,3-DICHLOROPROPENE	<0.050
TRANS-1,3-DICHLOROPROPENE	<0.050
ETHYLBENZENE	<0.050
2-HEXANONE (MBK)	<0.50
4-METHYL-2-PENTANONE (MIBK)	<0.50
METHYLENE CHLORIDE	0.19 JB
STYRENE	<0.050
1,1,2,2-TETRACHLOROETHANE	<0.050
TETRACHLOROETHENE	<0.050
TOLUENE	<0.050
1,1,1-TRICHLOROETHANE	<0.050
1,1,2-TRICHLOROETHANE	<0.050
TRICHLOROETHENE	<0.050
VINYL ACETATE	<0.50
VINYL CHLORIDE	<0.050
TOTAL XYLENES	<0.050
SURROGATE PERCENT RECOVERIES	
1,2-DICHLOROETHANE-D4	99
TOLUENE-D8	92
BROMOFLUOROBENZENE	90

J = Estimated value.
B = Also found in blank.

Analytical Technologies, Inc.

ATI I.D. # 9106-290-3

VOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/25/91
PROJECT #	: 3351	DATE RECEIVED	: 06/26/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 06/27/91
CLIENT I.D.	: MW-2 S-2	DATE ANALYZED	: 07/05/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8240	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION

NO NON-HSL COMPOUNDS FOUND > 10% OF NEAREST INTERNAL STANDARD

Analytical Technologies, Inc.

ATI I.D. # 9106-290-6

VOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/25,
PROJECT #	: 3351	DATE RECEIVED	: 06/26,
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 06/27,
CLIENT I.D.	: MW-3 S-4	DATE ANALYZED	: 07/05,
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8240	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
ACETONE	<1.0
BENZENE	<0.050
BROMODICHLOROMETHANE	<0.050
BROMOFORM	<0.25
BROMOMETHANE	<0.50
2-BUTANONE (MEK)	<0.50
CARBON DISULFIDE	<0.050
CARBON TETRACHLORIDE	<0.050
CHLOROBENZENE	<0.050
CHLOROETHANE	<0.050
CHLOROFORM	<0.050
CHLOROMETHANE	<0.50
DIBROMOCHLOROMETHANE	<0.050
1,1-DICHLOROETHANE	<0.050
1,2-DICHLOROETHANE	<0.050
1,1-DICHLOROETHENE	<0.050
1,2-DICHLOROETHENE (TOTAL)	<0.050
1,2-DICHLOROPROPANE	<0.050
CIS-1,3-DICHLOROPROPENE	<0.050
TRANS-1,3-DICHLOROPROPENE	<0.050
ETHYLBENZENE	<0.050
2-HEXANONE (MBK)	<0.50
4-METHYL-2-PENTANONE (MIBK)	<0.50
METHYLENE CHLORIDE	0.64 B
STYRENE	<0.050
1,1,2,2-TETRACHLOROETHANE	<0.050
TETRACHLOROETHENE	<0.050
TOLUENE	<0.050
1,1,1-TRICHLOROETHANE	<0.050
1,1,2-TRICHLOROETHANE	<0.050
TRICHLOROETHENE	<0.050
VINYL ACETATE	<0.50
VINYL CHLORIDE	<0.050
TOTAL XYLENES	<0.050

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-D4	91
TOLUENE-D8	84
BROMOFLUOROBENZENE	81

B = Also found in blank.

Analytical Technologies, Inc.

ATI I.D. # 9106-290-6

VOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/25/91
PROJECT #	: 3351	DATE RECEIVED	: 06/26/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 06/27/91
CLIENT I.D.	: MW-3 S-4	DATE ANALYZED	: 07/05/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8240	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION
ETHANE, 1,1,2-TRICHLORO- 1,2,2-TRIFLUORO-	B	121	0.82
HEXANE	B	241	0.34

B = Also found in blank.

Analytical Technologies, Inc.

ATI I.D. # 9106-290

VOLATILE ORGANIC ANALYSIS
QUALITY CONTROL DATA

CLIENT	: HART CROWSER, INC.	SAMPLE I.D. #	: 9106-321-1
PROJECT #	: 3351	DATE EXTRACTED	: 07/01/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE ANALYZED	: 07/05/91
EPA METHOD	: 8240	UNITS	: mg/Kg
SAMPLE MATRIX	: SOIL		

COMPOUND	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
1,1-DICHLOROETHENE	<0.050	2.50	1.78*	71	2.07	83	15
TRICHLOROETHENE	<0.050	2.50	2.15*	86	2.32	93	8
BENZENE	<0.050	2.50	2.18*	87	2.44	98	11
TOLUENE	<0.050	2.50	2.24*	90	2.45	98	9
CHLOROBENZENE	<0.050	2.50	2.18*	87	2.42	97	10

* Analyzed July 8, 1991.

$$\% \text{ Recovery} = \frac{(\text{Spiked Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Spike Result} - \text{Dup. Spike Result})|}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

ATI I.D. # 9106-290

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 3351	DATE RECEIVED	: N/A
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/04/91
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 07/08/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
N-NITROSODIMETHYLAMINE	<0.17
PHENOL	<0.17
ANILINE	<0.17
BIS(2-CHLOROETHYL)ETHER	<0.17
2-CHLOROPHENOL	<0.17
1,3-DICHLOROBENZENE	<0.17
1,4-DICHLOROBENZENE	<0.17
BENZYL ALCOHOL	<0.17
1,2-DICHLOROBENZENE	<0.17
2-METHYLPHENOL	<0.17
BIS(2-CHLOROISOPROPYL)ETHER	<0.17
4-METHYLPHENOL	<0.17
N-NITROSO-DI-N-PROPYLAMINE	<0.17
HEXACHLOROETHANE	<0.17
NITROBENZENE	<0.17
ISOPHORONE	<0.17
2-NITROPHENOL	<0.17
2,4-DIMETHYLPHENOL	<0.17
BENZOIC ACID	<0.85
BIS(2-CHLOROETHOXY)METHANE	<0.17
2,4-DICHLOROPHENOL	<0.17
1,2,4-TRICHLOROBENZENE	<0.17
NAPHTHALENE	<0.17
4-CHLOROANILINE	<0.17
HEXACHLOROBUTADIENE	<0.17
4-CHLORO-3-METHYLPHENOL	<0.17
2-METHYLNAPHTHALENE	<0.17
HEXACHLOROCYCLOPENTADIENE	<0.17
2,4,6-TRICHLOROPHENOL	<0.17
2,4,5-TRICHLOROPHENOL	<0.85
2-CHLORONAPHTHALENE	<0.17
2-NITROANILINE	<0.85
DIMETHYLPHTHALATE	<0.17
ACENAPHTHYLENE	<0.17
3-NITROANILINE	<0.85
ACENAPHTHENE	<0.17
2,4-DINITROPHENOL	<0.85
4-NITROPHENOL	<0.85

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Analytical Technologies, Inc.

ATI I.D. # 9106-290

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 3351	DATE RECEIVED	: N/A
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/04/91
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 07/08/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
DIBENZOFURAN	<0.17
2,4-DINITROTOLUENE	<0.17
2,6-DINITROTOLUENE	<0.17
DIETHYLPHTHALATE	<0.17
4-CHLOROPHENYL-PHENYLETHER	<0.17
FLUORENE	<0.17
4-NITROANILINE	<0.85
4,6-DINITRO-2-METHYLPHENOL	<0.85
N-NITROSODIPHENYLAMINE	<0.17
4-BROMOPHENYL-PHENYLETHER	<0.17
HEXACHLOROBENZENE	<0.17
PENTACHLOROPHENOL	<0.85
PHENANTHRENE	<0.17
ANTHRACENE	<0.17
DI-N-BUTYLPHTHALATE	0.54
FLUORANTHENE	<0.17
BENZIDINE	<1.7
PYRENE	<0.17
BUTYLBENZYLPHTHALATE	<0.17
3,3'-DICHLOROBENZIDINE	<0.34
BENZO(A)ANTHRACENE	<0.17
BIS(2-ETHYLHEXYL)PHTHALATE	<0.17
CHRYSENE	<0.17
DI-N-OCTYLPHTHALATE	<0.17
BENZO(B)FLUORANTHENE	<0.17
BENZO(K)FLUORANTHENE	<0.17
BENZO(A)PYRENE	<0.17
INDENO(1,2,3-CD)PYRENE	<0.17
DIBENZO(A,H)ANTHRACENE	<0.17
BENZO(G,H,I)PERYLENE	<0.17

SURROGATE PERCENT RECOVERIES

NITROBENZENE-D5	73
2-FLUOROBIPHENYL	74
TERPHENYL-D14	71
PHENOL-D5	79
2-FLUOROPHENOL	69
2,4,6-TRIBROMOPHENOL	79

Analytical Technologies, Inc.

ATI I.D. # 9106-290

SEMIVOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 3351	DATE RECEIVED	: N/A
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/04/91
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 07/08/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION
2-PROPANOL, 1-CHLORO-		51	0.87
SUBSTITUTED ALKENE		1401	0.73

Analytical Technologies, Inc.

ATI I.D. # 9106-290

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/
PROJECT #	: 3351	DATE RECEIVED	: 06/
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/
CLIENT I.D.	: MW-4 S-5	DATE ANALYZED	: 07/
SAMPLE MATRIX	: SOIL	UNITS	: mg/
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
N-NITROSODIMETHYLAMINE	<0.17
PHENOL	<0.17
ANILINE	<0.17
BIS(2-CHLOROETHYL)ETHER	<0.17
2-CHLOROPHENOL	<0.17
1,3-DICHLOROBENZENE	<0.17
1,4-DICHLOROBENZENE	<0.17
BENZYL ALCOHOL	<0.17
1,2-DICHLOROBENZENE	<0.17
2-METHYLPHENOL	<0.17
BIS(2-CHLOROISOPROPYL)ETHER	<0.17
4-METHYLPHENOL	<0.17
N-NITROSO-DI-N-PROPYLAMINE	<0.17
HEXACHLOROETHANE	<0.17
NITROBENZENE	<0.17
ISOPHORONE	<0.17
2-NITROPHENOL	<0.17
2,4-DIMETHYLPHENOL	<0.17
BENZOIC ACID	<0.85
BIS(2-CHLOROETHOXY)METHANE	<0.17
2,4-DICHLOROPHENOL	<0.17
1,2,4-TRICHLOROBENZENE	<0.17
NAPHTHALENE	<0.17
4-CHLOROANILINE	<0.17
HEXACHLOROBUTADIENE	<0.17
4-CHLORO-3-METHYLPHENOL	<0.17
2-METHYLNAPHTHALENE	<0.17
HEXACHLOROCYCLOPENTADIENE	<0.17
2,4,6-TRICHLOROPHENOL	<0.17
2,4,5-TRICHLOROPHENOL	<0.85
2-CHLORONAPHTHALENE	<0.17
2-NITROANILINE	<0.85
DIMETHYLPHTHALATE	<0.17
ACENAPHTHYLENE	<0.17
3-NITROANILINE	<0.85
ACENAPHTHENE	<0.17
2,4-DINITROPHENOL	<0.85
4-NITROPHENOL	<0.85

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Analytical Technologies, Inc.

ATI I.D. # 9106-290-2

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/24/91
PROJECT #	: 3351	DATE RECEIVED	: 06/26/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/04/91
CLIENT I.D.	: MW-4 S-5	DATE ANALYZED	: 07/08/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
DIBENZOFURAN	<0.17
2,4-DINITROTOLUENE	<0.17
2,6-DINITROTOLUENE	<0.17
DIETHYLPHTHALATE	<0.17
4-CHLOROPHENYL-PHENYLETHER	<0.17
FLUORENE	<0.17
4-NITROANILINE	<0.85
4,6-DINITRO-2-METHYLPHENOL	<0.85
N-NITROSODIPHENYLAMINE	<0.17
4-BROMOPHENYL-PHENYLETHER	<0.17
HEXACHLOROBENZENE	<0.17
PENTACHLOROPHENOL	<0.85
PHENANTHRENE	<0.17
ANTHRACENE	<0.17
DI-N-BUTYLPHTHALATE	0.84 B
FLUORANTHENE	<0.17
BENZIDINE	<1.7
PYRENE	<0.17
BUTYLBENZYLPHTHALATE	<0.17
3,3'-DICHLOROBENZIDINE	<0.34
BENZO(A)ANTHRACENE	<0.17
BIS(2-ETHYLHEXYL)PHTHALATE	<0.17
CHRYSENE	<0.17
DI-N-OCTYLPHTHALATE	<0.17
BENZO(B)FLUORANTHENE	<0.17
BENZO(K)FLUORANTHENE	<0.17
BENZO(A)PYRENE	<0.17
INDENO(1,2,3-CD)PYRENE	<0.17
DIBENZO(A,H)ANTHRACENE	<0.17
BENZO(G,H,I)PERYLENE	<0.17

SURROGATE PERCENT RECOVERIES

NITROBENZENE-D5	70
2-FLUOROBIPHENYL	72
TERPHENYL-D14	69
PHENOL-D5	80
2-FLUOROPHENOL	67
2,4,6-TRIBROMOPHENOL	81

B = Also found in blank.

Analytical Technologies, Inc.

ATI I.D. # 9106-290-2

SEMIVOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/24/91
PROJECT #	: 3351	DATE RECEIVED	: 06/26/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/04/91
CLIENT I.D.	: MW-4 S-5	DATE ANALYZED	: 07/08/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION
2-PROPANOL, 1-CHLORO-	B	59	3.8
SUBSTITUTED ALKENE	B	1401	1.6
SUBSTITUTED HYDROCARBON		2247	0.89
UNKNOWN		2321	0.89

B = Also found in blank.

Analytical Technologies, Inc.

ATI I.D. # 9106-290-3

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/25/91
PROJECT #	: 3351	DATE RECEIVED	: 06/26/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/04/91
CLIENT I.D.	: MW-2 S-2	DATE ANALYZED	: 07/08/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
N-NITROSODIMETHYLAMINE	<0.17
PHENOL	<0.17
ANILINE	<0.17
BIS(2-CHLOROETHYL)ETHER	<0.17
2-CHLOROPHENOL	<0.17
1,3-DICHLOROBENZENE	<0.17
1,4-DICHLOROBENZENE	<0.17
BENZYL ALCOHOL	<0.17
1,2-DICHLOROBENZENE	<0.17
2-METHYLPHENOL	<0.17
BIS(2-CHLOROISOPROPYL)ETHER	<0.17
4-METHYLPHENOL	<0.17
N-NITROSO-DI-N-PROPYLAMINE	<0.17
HEXACHLOROETHANE	<0.17
NITROBENZENE	<0.17
ISOPHORONE	<0.17
2-NITROPHENOL	<0.17
2,4-DIMETHYLPHENOL	<0.17
BENZOIC ACID	<0.85
BIS(2-CHLOROETHOXY)METHANE	<0.17
2,4-DICHLOROPHENOL	<0.17
1,2,4-TRICHLOROBENZENE	<0.17
NAPHTHALENE	<0.17
4-CHLOROANILINE	<0.17
HEXACHLOROBUTADIENE	<0.17
4-CHLORO-3-METHYLPHENOL	<0.17
2-METHYLNAPHTHALENE	<0.17
HEXACHLOROCYCLOPENTADIENE	<0.17
2,4,6-TRICHLOROPHENOL	<0.17
2,4,5-TRICHLOROPHENOL	<0.85
2-CHLORONAPHTHALENE	<0.17
2-NITROANILINE	<0.85
DIMETHYLPHTHALATE	<0.17
ACENAPHTHYLENE	<0.17
3-NITROANILINE	<0.85
ACENAPHTHENE	<0.17
2,4-DINITROPHENOL	<0.85
4-NITROPHENOL	<0.85

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Analytical Technologies, Inc.

ATI I.D. # 9106-290-3

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/25/91
PROJECT #	: 3351	DATE RECEIVED	: 06/26/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/04/91
CLIENT I.D.	: MW-2 S-2	DATE ANALYZED	: 07/08/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
DIBENZOFURAN	<0.17
2,4-DINITROTOLUENE	<0.17
2,6-DINITROTOLUENE	<0.17
DIETHYLPHTHALATE	<0.17
4-CHLOROPHENYL-PHENYLETHER	<0.17
FLUORENE	<0.17
4-NITROANILINE	<0.85
4,6-DINITRO-2-METHYLPHENOL	<0.85
N-NITROSODIPHENYLAMINE	<0.17
4-BROMOPHENYL-PHENYLETHER	<0.17
HEXACHLOROBENZENE	<0.17
PENTACHLOROPHENOL	<0.85
PHENANTHRENE	<0.17
ANTHRACENE	<0.17
DI-N-BUTYLPHTHALATE	0.16 JB
FLUORANTHENE	<0.17
BENZIDINE	<1.7
PYRENE	<0.17
BUTYLBENZYLPHTHALATE	<0.17
3,3'-DICHLOROBENZIDINE	<0.34
BENZO(A)ANTHRACENE	<0.17
BIS(2-ETHYLHEXYL)PHTHALATE	<0.17
CHRYSENE	<0.17
DI-N-OCTYLPHTHALATE	<0.17
BENZO(B)FLUORANTHENE	<0.17
BENZO(K)FLUORANTHENE	<0.17
BENZO(A)PYRENE	<0.17
INDENO(1,2,3-CD)PYRENE	<0.17
DIBENZO(A,H)ANTHRACENE	<0.17
BENZO(G,H,I)PERYLENE	<0.17
SURROGATE PERCENT RECOVERIES	
NITROBENZENE-D5	65
2-FLUOROBIPHENYL	69
TERPHENYL-D14	68
PHENOL-D5	72
2-FLUOROPHENOL	62
2,4,6-TRIBROMOPHENOL	73

J = Estimated value.
B = Also found in blank.

Analytical Technologies, Inc.

ATI I.D. # 9106-290-3

SEMIVOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/25/91
PROJECT #	: 3351	DATE RECEIVED	: 06/26/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/04/91
CLIENT I.D.	: MW-2 S-2	DATE ANALYZED	: 07/08/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION
2-PROPANOL, 1-CHLORO-	B	55	1.7

B = Also found in blank.

Analytical Technologies, Inc.

ATI I.D. # 9106-290-6

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/25/91
PROJECT #	: 3351	DATE RECEIVED	: 06/26/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/04/91
CLIENT I.D.	: MW-3 S-4	DATE ANALYZED	: 07/08/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
N-NITROSODIMETHYLAMINE	<0.17
PHENOL	<0.17
ANILINE	<0.17
BIS(2-CHLOROETHYL)ETHER	<0.17
2-CHLOROPHENOL	<0.17
1,3-DICHLOROBENZENE	<0.17
1,4-DICHLOROBENZENE	<0.17
BENZYL ALCOHOL	<0.17
1,2-DICHLOROBENZENE	<0.17
2-METHYLPHENOL	<0.17
BIS(2-CHLOROISOPROPYL)ETHER	<0.17
4-METHYLPHENOL	<0.17
N-NITROSO-DI-N-PROPYLAMINE	<0.17
HEXACHLOROETHANE	<0.17
NITROBENZENE	<0.17
ISOPHORONE	<0.17
2-NITROPHENOL	<0.17
2,4-DIMETHYLPHENOL	<0.17
BENZOIC ACID	<0.85
BIS(2-CHLOROETHOXY)METHANE	<0.17
2,4-DICHLOROPHENOL	<0.17
1,2,4-TRICHLOROBENZENE	<0.17
NAPHTHALENE	<0.17
4-CHLOROANILINE	<0.17
HEXACHLOROBUTADIENE	<0.17
4-CHLORO-3-METHYLPHENOL	<0.17
2-METHYLNAPHTHALENE	<0.17
HEXACHLOROCYCLOPENTADIENE	<0.17
2,4,6-TRICHLOROPHENOL	<0.17
2,4,5-TRICHLOROPHENOL	<0.85
2-CHLORONAPHTHALENE	<0.17
2-NITROANILINE	<0.85
DIMETHYLPHTHALATE	<0.17
ACENAPHTHYLENE	<0.17
3-NITROANILINE	<0.85
ACENAPHTHENE	<0.17
2,4-DINITROPHENOL	<0.85
4-NITROPHENOL	<0.85

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Analytical Technologies, Inc.

ATI I.D. # 9106-290-6

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/25/91
PROJECT #	: 3351	DATE RECEIVED	: 06/26/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/04/91
CLIENT I.D.	: MW-3 S-4	DATE ANALYZED	: 07/08/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
DIBENZOFURAN	<0.17
2,4-DINITROTOLUENE	<0.17
2,6-DINITROTOLUENE	<0.17
DIETHYLPHTHALATE	<0.17
4-CHLOROPHENYL-PHENYLETHER	<0.17
FLUORENE	<0.17
4-NITROANILINE	<0.85
4,6-DINITRO-2-METHYLPHENOL	<0.85
N-NITROSODIPHENYLAMINE	<0.17
4-BROMOPHENYL-PHENYLETHER	<0.17
HEXACHLOROBENZENE	<0.17
PENTACHLOROPHENOL	<0.85
PHENANTHRENE	<0.17
ANTHRACENE	<0.17
DI-N-BUTYLPHTHALATE	0.22 JB
FLUORANTHENE	<0.17
BENZIDINE	<1.7
PYRENE	<0.17
BUTYLBENZYLPHTHALATE	<0.17
3,3'-DICHLOROBENZIDINE	<0.34
BENZO(A)ANTHRACENE	<0.17
BIS(2-ETHYLHEXYL)PHTHALATE	<0.17
CHRYSENE	<0.17
DI-N-OCTYLPHTHALATE	<0.17
BENZO(B)FLUORANTHENE	<0.17
BENZO(K)FLUORANTHENE	<0.17
BENZO(A)PYRENE	<0.17
INDENO(1,2,3-CD)PYRENE	<0.17
DIBENZO(A,H)ANTHRACENE	<0.17
BENZO(G,H,I)PERYLENE	<0.17
SURROGATE PERCENT RECOVERIES	
NITROBENZENE-D5	69
2-FLUOROBIPHENYL	71
TERPHENYL-D14	68
PHENOL-D5	77
2-FLUOROPHENOL	64
2,4,6-TRIBROMOPHENOL	77

J = Estimated value.
B = Also found in blank.

Analytical Technologies, Inc.

ATI I.D. # 9106-290-6

SEMIVOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/25/91
PROJECT #	: 3351	DATE RECEIVED	: 06/26/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/04/91
CLIENT I.D.	: MW-3 S-4	DATE ANALYZED	: 07/08/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION
2-PROPANOL, 1-CHLORO-	B	57	3.1
UNKNOWN HYDROCARBON		1776	0.55
UNKNOWN		1795	0.82
UNKNOWN HYDROCARBON		1849	0.96
UNKNOWN ALKANE		2409	1.1

B = Also found in blank.

Analytical Technologies, Inc.

ATI I.D. # 9106-290

SEMIVOLATILE ORGANIC ANALYSIS
QUALITY CONTROL DATA

CLIENT : HART CROWSER, INC.
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH
EPA METHOD : 8270
SAMPLE MATRIX : SOIL

SAMPLE I.D. # : 9106-290-3
DATE EXTRACTED : 07/04/91
DATE ANALYZED : 07/08/91
UNITS : mg/Kg

COMPOUND	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
1,2,4-TRICHLOROBENZENE	<0.17	3.33	2.85	86	2.73	82	4
ACENAPHTHENE	<0.17	3.33	2.35	71	2.29	69	3
2,4-DINITROTOLUENE	<0.17	3.33	1.91	57	1.89	57	1
PYRENE	<0.17	3.33	1.97	59	1.84	55	7
N-NITROSO-DI-N-PROPYLAMINE	<0.17	3.33	2.53	76	2.49	75	2
1,4-DICHLOROBENZENE	<0.17	3.33	2.44	73	2.28	68	7
PENTACHLOROPHENOL	<0.85	13.3	8.23	62	8.06	60	2
PHENOL	<0.17	6.67	4.68	70	4.45	67	5
2-CHLOROPHENOL	<0.17	6.67	4.13	62	3.96	59	4
4-CHLORO-3-METHYLPHENOL	<0.17	6.67	4.55	68	4.42	66	3
4-NITROPHENOL	<0.85	13.3	10.0	75	9.43	71	6

$$\% \text{ Recovery} = \frac{(\text{Spiked Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Spike Result} - \text{Dup. Spike Result})|}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

ATI I.D. # 9106-290

POLYNUCLEAR AROMATIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 3351	DATE RECEIVED	: N/A
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/05/91
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 07/11/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8310	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
NAPHTHALENE	<0.083
ACENAPHTHYLENE	<0.17
ACENAPHTHENE	<0.17
FLUORENE	<0.017
PHENANTHRENE	<0.0083
ANTHRACENE	<0.0083
FLUORANTHENE	<0.017
PYRENE	<0.017
BENZO(A)ANTHRACENE	<0.017
CHRYSENE	<0.017
BENZO(B)FLUORANTHENE	<0.017
BENZO(K)FLUORANTHENE	<0.017
BENZO(A)PYRENE	<0.017
DIBENZO(A,H)ANTHRACENE	<0.034
BENZO(G,H,I)PERYLENE	<0.017
INDENO(1,2,3-CD)PYRENE	<0.017

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE	84

Analytical Technologies, Inc.

ATI I.D. # 9106-290-1

POLYNUCLEAR AROMATIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/24/91
PROJECT #	: 3351	DATE RECEIVED	: 06/26/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/05/91
CLIENT I.D.	: MW-4 S-2	DATE ANALYZED	: 07/11/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8310	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
NAPHTHALENE	<0.15
ACENAPHTHYLENE	<0.30
ACENAPHTHENE	<0.30
FLUORENE	<0.030
PHENANTHRENE	<0.015
ANTHRACENE	<0.015
FLUORANTHENE	<0.030
PYRENE	<0.030
BENZO(A)ANTHRACENE	<0.030
CHRYSENE	<0.030
BENZO(B)FLUORANTHENE	<0.030
BENZO(K)FLUORANTHENE	<0.030
BENZO(A)PYRENE	<0.030
DIBENZO(A,H)ANTHRACENE	<0.061
BENZO(G,H,I)PERYLENE	<0.030
INDENO(1,2,3-CD)PYRENE	<0.030

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE	79

Analytical Technologies, Inc.

ATI I.D. # 9106-290-2

POLYNUCLEAR AROMATIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/24/91
PROJECT #	: 3351	DATE RECEIVED	: 06/26/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/05/91
CLIENT I.D.	: MW-4 S-5	DATE ANALYZED	: 07/12/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8310	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
NAPHTHALENE	<0.083
ACENAPHTHYLENE	<0.17
ACENAPHTHENE	<0.17
FLUORENE	<0.017
PHENANTHRENE	0.010
ANTHRACENE	<0.0083
FLUORANTHENE	<0.017
PYRENE	<0.017
BENZO(A)ANTHRACENE	<0.017
CHRYSENE	<0.017
BENZO(B)FLUORANTHENE	<0.017
BENZO(K)FLUORANTHENE	<0.017
BENZO(A)PYRENE	<0.017
DIBENZO(A,H)ANTHRACENE	<0.034
BENZO(G,H,I)PERYLENE	<0.017
INDENO(1,2,3-CD)PYRENE	<0.017

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE	118

Analytical Technologies, Inc.

ATI I.D. # 9106-290-3

POLYNUCLEAR AROMATIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/25/91
PROJECT #	: 3351	DATE RECEIVED	: 06/26/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/05/91
CLIENT I.D.	: MW-2 S-2	DATE ANALYZED	: 07/11/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8310	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
NAPHTHALENE	<0.083
ACENAPHTHYLENE	<0.17
ACENAPHTHENE	<0.17
FLUORENE	<0.017
PHENANTHRENE	<0.0083
ANTHRACENE	<0.0083
FLUORANTHENE	<0.017
PYRENE	<0.017
BENZO(A)ANTHRACENE	<0.017
CHRYSENE	<0.017
BENZO(B)FLUORANTHENE	<0.017
BENZO(K)FLUORANTHENE	<0.017
BENZO(A)PYRENE	<0.017
DIBENZO(A,H)ANTHRACENE	<0.034
BENZO(G,H,I)PERYLENE	<0.017
INDENO(1,2,3-CD)PYRENE	<0.017

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE	103

Analytical Technologies, Inc.

ATI I.D. # 9106-290-4

POLYNUCLEAR AROMATIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/25/91
PROJECT #	: 3351	DATE RECEIVED	: 06/26/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/05/91
CLIENT I.D.	: MW-2 S-7	DATE ANALYZED	: 07/11/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8310	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
NAPHTHALENE	<0.083
ACENAPHTHYLENE	<0.17
ACENAPHTHENE	<0.17
FLUORENE	<0.017
PHENANTHRENE	<0.0083
ANTHRACENE	<0.0083
FLUORANTHENE	<0.017
PYRENE	<0.017
BENZO(A)ANTHRACENE	<0.017
CHRYSENE	<0.017
BENZO(B)FLUORANTHENE	<0.017
BENZO(K)FLUORANTHENE	<0.017
BENZO(A)PYRENE	<0.017
DIBENZO(A,H)ANTHRACENE	<0.034
BENZO(G,H,I)PERYLENE	<0.017
INDENO(1,2,3-CD)PYRENE	<0.017

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE	123

Analytical Technologies, Inc.

ATI I.D. # 9106-290-5

POLYNUCLEAR AROMATIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/25/91
PROJECT #	: 3351	DATE RECEIVED	: 06/26/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/05/91
CLIENT I.D.	: MW-3 S-2	DATE ANALYZED	: 07/11/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8310	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
NAPHTHALENE	<0.15
ACENAPHTHYLENE	<0.31
ACENAPHTHENE	<0.31
FLUORENE	<0.031
PHENANTHRENE	<0.015
ANTHRACENE	<0.015
FLUORANTHENE	<0.031
PYRENE	<0.031
BENZO(A)ANTHRACENE	<0.031
CHRYSENE	<0.031
BENZO(B)FLUORANTHENE	<0.031
BENZO(K)FLUORANTHENE	<0.031
BENZO(A)PYRENE	<0.031
DIBENZO(A,H)ANTHRACENE	<0.062
BENZO(G,H,I)PERYLENE	<0.031
INDENO(1,2,3-CD)PYRENE	<0.031

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE	106

Analytical Technologies, Inc.

ATI I.D. # 9106-290-6

POLYNUCLEAR AROMATIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/25/91
PROJECT #	: 3351	DATE RECEIVED	: 06/26/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/05/91
CLIENT I.D.	: MW-3 S-4	DATE ANALYZED	: 07/12/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8310	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
NAPHTHALENE	<0.083
ACENAPHTHYLENE	<0.17
ACENAPHTHENE	<0.17
FLUORENE	<0.017
PHENANTHRENE	<0.0083
ANTHRACENE	<0.0083
FLUORANTHENE	<0.017
PYRENE	<0.017
BENZO(A)ANTHRACENE	<0.017
CHRYSENE	<0.017
BENZO(B)FLUORANTHENE	<0.017
BENZO(K)FLUORANTHENE	<0.017
BENZO(A)PYRENE	<0.017
DIBENZO(A,H)ANTHRACENE	<0.034
BENZO(G,H,I)PERYLENE	<0.017
INDENO(1,2,3-CD)PYRENE	<0.017

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE	103

Analytical Technologies, Inc.

ATI I.D. # 9106-290-7

POLYNUCLEAR AROMATIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/25/91
PROJECT #	: 3351	DATE RECEIVED	: 06/26/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/05/91
CLIENT I.D.	: MW-3 DUP	DATE ANALYZED	: 07/11/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8310	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
NAPHTHALENE	<0.083
ACENAPHTHYLENE	<0.17
ACENAPHTHENE	<0.17
FLUORENE	<0.017
PHENANTHRENE	0.0090
ANTHRACENE	<0.0083
FLUORANTHENE	0.020
PYRENE	<0.017
BENZO(A)ANTHRACENE	<0.017
CHRYSENE	<0.017
BENZO(B)FLUORANTHENE	<0.017
BENZO(K)FLUORANTHENE	<0.017
BENZO(A)PYRENE	<0.017
DIBENZO(A,H)ANTHRACENE	<0.034
BENZO(G,H,I)PERYLENE	<0.017
INDENO(1,2,3-CD)PYRENE	<0.017

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE	110

Analytical Technologies, Inc.

ATI I.D. # 9106-290

POLYNUCLEAR AROMATIC ANALYSIS
QUALITY CONTROL DATA

CLIENT	: HART CROWSER, INC.	SAMPLE I.D. #	: 9106-290-3
PROJECT #	: 3351	DATE EXTRACTED	: 07/05/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE ANALYZED	: 07/11/91
EPA METHOD	: 8310	UNITS	: mg/Kg
SAMPLE MATRIX	: SOIL		

COMPOUND	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
ACENAPHTHYLENE	<0.17	10.8	13	120	15	139*	14
PHENANTHRENE	<0.0083	1.08	1.5	139	1.7	157	13
PYRENE	<0.017	2.00	1.6	80	1.8	90	12
BENZO(K)FLUORANTHENE	<0.017	0.964	1.2	124	1.3	135	8

* Out of limits.

$$\% \text{ Recovery} = \frac{(\text{Spiked Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Spike Result} - \text{Dup. Spike Result})|}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

ATI I.D. # 9106-290

POLYNUCLEAR AROMATIC ANALYSIS
QUALITY CONTROL DATA

CLIENT	: HART CROWSER, INC.	SAMPLE I.D. #	: BLANK SPIKE
PROJECT #	: 3351	DATE EXTRACTED	: 07/05/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE ANALYZED	: 07/11/91
EPA METHOD	: 8310	UNITS	: mg/Kg
SAMPLE MATRIX	: SOIL		

COMPOUND	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
ACENAPHTHYLENE	<0.17	9.68	11	114	N/A	N/A	N/A
PHENANTHRENE	<0.0083	0.961	1.3	135	N/A	N/A	N/A
PYRENE	<0.017	0.980	1.3	133	N/A	N/A	N/A
BENZO(K)FLUORANTHENE	<0.017	0.861	0.92	107	N/A	N/A	N/A

$$\% \text{ Recovery} = \frac{(\text{Spiked Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Spike Result} - \text{Dup. Spike Result})|}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

ATI I.D. # 9106-290

PRIORITY POLLUTANT
METALS ANALYSIS

CLIENT : HART CROWSER, INC. MATRIX : SOIL
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH

ELEMENT	DATE PREPARED	DATE ANALYZED
ANTIMONY	07/05/91	07/08/91
ANTIMONY (SAMPLE -6)	07/05/91	07/05/91
ARSENIC	07/05/91	07/08/91
BERYLLIUM	07/05/91	07/08/91
BERYLLIUM (SAMPLE -6)	07/05/91	07/05/91
CADMIUM	07/05/91	07/08/91
CADMIUM (SAMPLE -6)	07/05/91	07/05/91
CHROMIUM	07/05/91	07/08/91
CHROMIUM (SAMPLE -6)	07/05/91	07/05/91
COPPER	07/05/91	07/08/91
COPPER (SAMPLE -6)	07/05/91	07/05/91
LEAD	07/05/91	07/08/91
LEAD (SAMPLE -6)	07/05/91	07/05/91
MERCURY	07/05/91	07/05/91
NICKEL	07/05/91	07/08/91
NICKEL (SAMPLE -6)	07/05/91	07/05/91
SELENIUM	07/05/91	07/08/91
SILVER	07/05/91	07/08/91
SILVER (SAMPLE -6)	07/05/91	07/05/91
THALLIUM	07/05/91	07/08/91
ZINC	07/05/91	07/08/91
ZINC (SAMPLE -6)	07/05/91	07/05/91

Analytical Technologies, Inc.

ATI I.D. # 9106-290

PRIORITY POLLUTANT METALS ANALYSIS DATA SUMMARY

CLIENT : HART CROWSER, INC. MATRIX : SOIL
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH UNITS : mg/Kg

ELEMENT	MW-4 S-2 -1	MW-4 S-5 -2	MW-2 S-2 -3	MW-2 S-7 -4	MW-3 S-2 -5
ANTIMONY	<3.0	<3.0	<3.0	<3.0	<3.0
ARSENIC	3.0	2.3	2.1	2.1	3.5
BERYLLIUM	<0.5	<0.5	<0.5	<0.5	<0.5
CADMIUM	0.7	0.5	0.8	1.0	0.7
CHROMIUM	11.7	8.3	19.4	18.6	11.8
COPPER	18.6	10.8	17.2	18.6	18.7
LEAD	6.0	1.8	4.0	2.9	4.6
MERCURY	<0.25	<0.25	<0.25	<0.25	<0.25
NICKEL	9.9	8.5	27.6	23.4	11.2
SELENIUM	<1.0	<1.0	<1.0	<1.0	<1.0
SILVER	<1.0	<1.0	<1.0	<1.0	<1.0
THALLIUM	<1.0	<1.0	<1.0	<1.0	<1.0
ZINC	24.8	16.5	26.9	27.3	25.8

Analytical Technologies, Inc.

ATI I.D. # 9106-290

PRIORITY POLLUTANT
METALS ANALYSIS
DATA SUMMARY
CONTINUED

CLIENT : HART CROWSER, INC. MATRIX : SOIL
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH UNITS : mg/Kg

ELEMENT	MW-3 S-4 -6	MW-3 DUP -7	REAGENT BLANK
ANTIMONY	<3.0	<3.0	<3.0
ARSENIC	4.6	8.4	<1.0
BERYLLIUM	<0.5	<0.5	<0.5
CADMIUM	1.0	1.5	<0.5
CHROMIUM	26.0	30.9	<0.5
COPPER	18.2	29.2	1.5
LEAD	5.8	21.9	<1.5
MERCURY	<0.25	<0.25	<0.25
NICKEL	25.4	43.4	<0.5
SELENIUM	<1.0	<1.0	<1.0
SILVER	<1.0	<1.0	<1.0
THALLIUM	<1.0	<1.0	<1.0
ZINC	74.5	184	1.7

Analytical Technologies, Inc.

ATI I.D. # 9106-290

PRIORITY POLLUTANT
METALS ANALYSIS
QUALITY CONTROL DATA

CLIENT : HART CROWSER, INC. MATRIX : SOIL
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH UNITS : mg/Kg

ELEMENT	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED RESULT	SPIKE ADDED	% REC
ANTIMONY	9106-290-2	<3.0	<3.0	NC	21.6	48.4	45
ARSENIC	9106-290-2	2.3	2.4	4	37.8	48.7	73
BERYLLIUM	9106-290-2	<0.5	<0.5	NC	45.6	48.4	94
CADMIUM	9106-290-2	0.5	0.5	0	42.7	48.4	87
CHROMIUM	9106-290-2	8.3	8.1	2	51.7	48.4	90
COPPER	9106-290-2	10.8	10.5	3	55.1	48.4	92
LEAD	9106-290-2	1.8	1.8	0	44.9	48.4	89
MERCURY	9106-290-3	<0.25	<0.25	NC	2.1	2.0	105
NICKEL	9106-290-2	8.5	8.4	1	52.4	48.4	91
SELENIUM	9106-290-2	<1.0	<1.0	NC	24.5	29.2	84
SILVER	9106-290-2	<1.0	<1.0	NC	39.4	48.4	81
THALLIUM	9106-290-2	<1.0	<1.0	NC	36.2	48.7	74
ZINC	9106-290-2	16.5	23.4	35*	58.1	48.4	86

NC = Not calculable.
* Out of limits.

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

ATI I.D. # 9106-290

GENERAL CHEMISTRY ANALYSIS

CLIENT : HART CROWSER, INC.
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH

MATRIX : SOIL

PARAMETER	DATE PREPARED	DATE ANALYZED
PETROLEUM HYDROCARBONS	07/25/91	07/25/91
MOISTURE (SAMPLES -2,-3,-6)	-	06/28/91
MOISTURE (SAMPLES -1,-4,-5,-7)	-	07/02/91
MOISTURE *	-	07/03/91

* Analyzed at ATI - San Diego, CA, laboratory.

Analytical Technologies, Inc.

ATI I.D. # 9106-290

GENERAL CHEMISTRY ANALYSIS
DATA SUMMARY

CLIENT : HART CROWSER, INC. MATRIX : SOIL
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH UNITS : mg/Kg

ATI I.D. #	CLIENT I.D.	PETROLEUM HYDROCARBONS
9106-290-1	MW-4 S-2	24
9106-290-2	MW-4 S-5	10
9106-290-3	MW-2 S-2	5.5
9106-290-4	MW-2 S-7	<5
9106-290-5	MW-3 S-2	8.4
9106-290-6	MW-3 S-4	<5
9106-290-7	MW-3 DUP	17
REAGENT BLANK	-	<5

Analytical Technologies, Inc.

ATI I.D. # 9106-290

GENERAL CHEMISTRY ANALYSIS
QUALITY CONTROL DATA

CLIENT : HART CROWSER, INC. MATRIX : SOIL
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH UNITS : mg/Kg

PARAMETER	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED RESULT	SPIKE ADDED	% REC
PETROLEUM HYDROCARBONS	9107-234-9	186	167	11	384	255	78

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

ATI I.D. # 9106-290

GENERAL CHEMISTRY ANALYSIS
DATA SUMMARY

CLIENT : HART CROWSER, INC. MATRIX : SOIL
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH UNITS : %

ATI I.D. #	CLIENT I.D.	MOISTURE	MOISTURE *
9106-290-1	MW-4 S-2	44	44.1
9106-290-2	MW-4 S-5	29	26.7
9106-290-3	MW-2 S-2	10	10.7
9106-290-4	MW-2 S-7	15	13.1
9106-290-5	MW-3 S-2	50	45.8
9106-290-6	MW-3 S-4	27	27.9
9106-290-7	MW-3 DUP	33	26.0

* Analyzed at ATI - San Diego, CA, laboratory.

Analytical Technologies, Inc.

ATI I.D. # 9106-290

GENERAL CHEMISTRY ANALYSIS
QUALITY CONTROL DATA

CLIENT : HART CROWSER, INC. MATRIX : SOIL
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH UNITS : %

PARAMETER	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED RESULT	SPIKE ADDED	% REC
MOISTURE	9106-309-8	20	21	5	N/A	N/A	N/A
MOISTURE	9106-314-1	7.1	7.2	1	N/A	N/A	N/A
MOISTURE *	107041-02	15.0	15.3	2	N/A	N/A	N/A

* Analyzed at ATI - San Diego, CA, laboratory.

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

Analytical**Technologies,**Inc.

560 Naches Avenue SW, Suite 101 Renton,WA 98055 (206)228-8335

Chain of Custody

003

DATE 6/24/91 PAGE 1 OF 1

LABORATORY NUMBER: 9106

PROJECT MANAGER:

COMPANY:

ADDRESS:

PHONE: SAMPLED BY:

SAMPLE DISPOSAL INSTRUCTIONS

☐ ATI Disposal @ $5.00 each ☐ Return

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	8010 Halogenated Volatiles	8020 Aromatic Volatiles	8020 BETX ONLY	8240 GCMS Volatiles	8270 GCMS BNA	8310 HPLC PNA	8080 Pesticides & PCB's	8080 PCB's ONLY	8140 Phosphate Pesticides	8150 Herbicides	WDOE PAH/HH (WAC 173)	418.1 (TPH)	413.2 Grease & Oil	8015 (Modified)	TOC 9060	TOX 9020	% Moisture	EP TOX Metals (8) EP EXT	Priority Pollutant Metals (13)	TCLP ONLY: 8080 Pesticide (4)	TCLP ONLY: 8240 ZH-EXT	TCLP ONLY: 8270	TCLP ONLY: 8150 Herbicides (2)	TCLP ONLY: Metals (8)			NUMBER OF CONTAINERS
										X													X								1
								X	X	X						X							X								
								X	X	X						X							X								
										X													X								
										X													X								
								X	X	X						X							X								
										X													X								1

PROJECT INFORMATION	
PROJECT NUMBER:	
PROJECT NAME:	
PURCHASE ORDER NUMBER:	
ONGOING PROJECT? YES ☐ NO ☐	

SAMPLE RECEIPT	
TOTAL NUMBER OF CONTAINERS	13
COC SEALS/INTACT? Y/N/NA	Y
RECEIVED GOOD COND./COLD	Y
RECEIVED VIA:	

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

TAT: (NORMAL) ☐ 2WKS (RUSH) ☐ 24HR ☐ 48 HRS ☐ 72 HRS ☐ 1 WK

GREATER THAN 24 HR. NOTICE? YES ☐ NO ☐ (LAB USE ONLY)

SPECIAL INSTRUCTIONS:

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Time:	Signature: Time:	Signature: Time:
Printed Name: Date:	Printed Name: Date:	Printed Name: Date:
Company:	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: Time:	Signature: Time:	Signature: Time:
Printed Name: Date:	Printed Name: Date:	Printed Name: Date:
Company:	Company:	Analytical Technologies, Inc.

ATI Labs: San Diego (619)458-9141 • Phoenix (602)438-1530 • Seattle (206)228-8335 • Pensacola (904)474-1001 **DISTRIBUTION:** White, Canary - ATI • Pink - ORIGINATOR

SD

AnalyticalTechnologies, Inc.

560 Naches Avenue SW, Suite 101 Renton, WA 98055 (206)228-8335

Chain of Custody

DATE 6/28/91 PAGE 1 OF 1

LABORATORY NUMBER: 1106 [illegible]

PROJECT MANAGER: Lee Vartuli

COMPANY: ATI - Renton

ADDRESS:

PHONE: (206)728 8335 SAMPLED BY:

SAMPLE DISPOSAL INSTRUCTIONS

☒ ATI Disposal @ $5.00 each ☐ Return

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	8010 Halogenated Volatiles	8020 Aromatic Volatiles	BETX ONLY	8240 GCMS Volatiles	8270 GCMS BNA EXT. ONLY	8310 HPLC PNA	8080 Pesticides & PCB's	PCB's ONLY	8140 Phosphate Pesticides	8150 Herbicides	WDOE PAH/HH (WAC 173)	418.1 (TPH)	413.2 Grease & Oil	8015 (Modified)	TOC 9060	TOX 9020	% Moisture	EP TOX Metals (8) EP EXT	Priority Pollutant Metals (13)	TCLP ONLY: 8080 Pesticide (4)	TCLP ONLY: 8240 ZH-EXT	TCLP ONLY: 8270	TCLP ONLY: 8150 Herbicides (2)	TCLP ONLY: Metals (8)			NUMBER OF CONTAINERS
9106-790-1	6/24/91		Soil	01						X											X		X								1
2	1			02					X	X											X		X								1
3	6/25			03					X	X											X		X								1
4				04						X											X		X								1
5				05						X											X		X								1
6				06					X	X											X		X								1
7				07						X											X		X								1

PROJECT INFORMATION

PROJECT NUMBER: 9106-790

PROJECT NAME: 1101 / 3351

PURCHASE ORDER NUMBER:

ONGOING PROJECT? YES ☐ NO ☐

SAMPLE RECEIPT

TOTAL NUMBER OF CONTAINERS	
COC SEALS/INTACT? Y/N/NA	
RECEIVED GOOD COND./COLD	
RECEIVED VIA:	

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

TAT: (NORMAL) ☐ 2WKS (RUSH) ☐ 24HR ☐ 48 HRS ☐ 72 HRS ☐ 1 WK

GREATER THAN 24 HR. NOTICE? YES ☐ NO ☐ (LAB USE ONLY)

SPECIAL INSTRUCTIONS: RETURN 8270 extract ASAP

due 7/10/91 - 10%

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Time: 4 pm	Signature: Time:	Signature: Time:
Printed Name: V PENNING Date: 6/28/91	Printed Name: Date:	Printed Name: Date:
Company: ATI	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: Time:	Signature: Time:	Signature: Time:
Printed Name: Date:	Printed Name: Date:	Printed Name: Date:
Company:	Company:	Analytical Technologies, Inc.

ATI Labs: San Diego (619)458-9141 • Phoenix (602)438-1530 • Seattle (206)228-8335 • Pensacola (904)474-1001 DISTRIBUTION: White, Canary - ATI • Pink - ORIGINATOR

Analytical Technologies, Inc. 560 Naches Avenue, S.W., Suite 101, Renton, WA 98055, (206) 228-8335

ATI I.D. # 9106-321

August 1, 1991

Hart Crowser, Inc.
1910 Fairview Avenue East
Seattle, WA 98102-3699

Attention : Marian Wineman

Project Number : 3351

Project Name : WSDOT-Duwamish

On June 28, 1991, Analytical Technologies, Inc. received twelve soil samples for analysis. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and the quality control data are enclosed.

Emily C. Carfiola
Senior Project Manager

Frederick W. Grothkopp
Technical Manager

FWG/ew

Analytical Technologies, Inc.

ATI I.D. # 9106-321

SAMPLE CROSS REFERENCE SHEET

CLIENT : HART CROWSER, INC.
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH

ATI #	CLIENT DESCRIPTION	DATE SAMPLED	MATRIX
9106-321-1	MW-1 S-2	06/25/91	SOIL
9106-321-2	MW-1 S-7	06/25/91	SOIL
9106-321-3	B-16 S-3	06/26/91	SOIL
9106-321-4	B-16 S-5	06/26/91	SOIL
9106-321-5	B-15 S-2	06/27/91	SOIL
9106-321-6	B-15 S-6	06/27/91	SOIL
9106-321-7	B-14 S-2	06/27/91	SOIL
9106-321-8	B-14 S-5	06/27/91	SOIL
9106-321-9	B-13 S-3	06/27/91	SOIL
9106-321-10	B-13 S-5	06/27/91	SOIL
9106-321-11	B-17 S-1	06/27/91	SOIL
9106-321-12	B-17 S-5	06/27/91	SOIL

----- TOTALS -----

MATRIX	# SAMPLES
SOIL	12

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

Analytical Technologies, Inc.

ATI I.D. # 9106-321

ANALYTICAL SCHEDULE

CLIENT : HART CROWSER, INC.
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH

ANALYSIS	TECHNIQUE	REFERENCE	LAB
VOLATILE ORGANIC COMPOUNDS	GCMS	EPA 8240	R
SEMI-VOLATILE COMPOUNDS	GCMS	EPA 8270	R/SD
POLYNUCLEAR AROMATIC HYDROCARBONS	HPLC/UV	EPA 8310	SD
ANTIMONY	ICAP	EPA 6010	SD
ARSENIC	AA/GF	EPA 7060	SD
BERYLLIUM	ICAP	EPA 6010	SD
CADMIUM	ICAP	EPA 6010	SD
CHROMIUM	ICAP	EPA 6010	SD
COPPER	ICAP	EPA 6010	SD
LEAD	ICAP	EPA 6010	SD
MERCURY	AA/COLD VAPOR	EPA 7471	SD
NICKEL	ICAP	EPA 6010	SD
SELENIUM	AA/GF	EPA 7740	SD
SILVER	ICAP	EPA 6010	SD
THALLIUM	AA/GF	EPA 7841	SD
ZINC	ICAP	EPA 6010	SD
PETROLEUM HYDROCARBONS	IR	EPA 418.1	R
MOISTURE	GRAVIMETRIC	CLP SOW ILM01.0	R
MOISTURE	GRAVIMETRIC	METHOD 7-2.2	SD

R = ATI - Renton
SD = ATI - San Diego
T = ATI - Tempe
PNR = ATI - Pensacola
FC = ATI - Fort Collins
SUB = Subcontract

Analytical Technologies, Inc.

ATI I.D. # 9106-321

CASE NARRATIVE

CLIENT : HART CROWSER, INC.
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH

CASE NARRATIVE: VOLATILE AND SEMI-VOLATILE ANALYSES

Volatiles

The control limits for the surrogate recovery of bromofluorobenzene (BFB) are 74-121%. The BFB recoveries in samples B-16 S-3, B-15 S-2, and B-17 S-1 (9106-321-3, -5, and -11) were below acceptable criteria. In addition, sample B-17 S-1 (9106-321-11) also had low toluene-d8 recovery (81-117%). These samples were re-extracted and reanalyzed. Recoveries were still low and suggest matrix interference. The results of the reanalyses are reported.

Semi-Volatiles

Sample B-15 S-2 (9106-321-5) was initially analyzed undiluted, and the internal standards did not pass criteria. The sample chromatogram shows an unresolved peak from approximately 21 through 29 minutes. This peak was identified as molecular sulfur (from the library search) and is listed as a Tentatively Identified Compound.

Analytical Technologies, Inc.

ATI I.D. # 9106-321

VOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 3351	DATE RECEIVED	: N/A
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/01/91
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 07/05/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8240	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
ACETONE	<1.0
BENZENE	<0.050
BROMODICHLOROMETHANE	<0.050
BROMOFORM	<0.25
BROMOMETHANE	<0.50
2-BUTANONE (MEK)	<0.50
CARBON DISULFIDE	<0.050
CARBON TETRACHLORIDE	<0.050
CHLOROBENZENE	<0.050
CHLOROETHANE	<0.050
CHLOROFORM	<0.050
CHLOROMETHANE	<0.50
DIBROMOCHLOROMETHANE	<0.050
1,1-DICHLOROETHANE	<0.050
1,2-DICHLOROETHANE	<0.050
1,1-DICHLOROETHENE	<0.050
1,2-DICHLOROETHENE (TOTAL)	<0.050
1,2-DICHLOROPROPANE	<0.050
CIS-1,3-DICHLOROPROPENE	<0.050
TRANS-1,3-DICHLOROPROPENE	<0.050
ETHYLBENZENE	<0.050
2-HEXANONE (MBK)	<0.50
4-METHYL-2-PENTANONE (MIBK)	<0.50
METHYLENE CHLORIDE	<0.25
STYRENE	<0.050
1,1,2,2-TETRACHLOROETHANE	<0.050
TETRACHLOROETHENE	<0.050
TOLUENE	<0.050
1,1,1-TRICHLOROETHANE	<0.050
1,1,2-TRICHLOROETHANE	<0.050
TRICHLOROETHENE	<0.050
VINYL ACETATE	<0.50
VINYL CHLORIDE	<0.050
TOTAL XYLENES	<0.050

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-D4	118
TOLUENE-D8	109
BROMOFLUOROBENZENE	104

Analytical Technologies, Inc.

ATI I.D. # 9106-321

VOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 3351	DATE RECEIVED	: N/A
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/01/91
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 07/05/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8240	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION

NO NON-HSL COMPOUNDS FOUND > 10% OF NEAREST INTERNAL STANDARD

Analytical Technologies, Inc.

ATI I.D. # 9106-321

VOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 3351	DATE RECEIVED	: N/A
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/09/91
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 07/10/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8240	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
ACETONE	1.2
BENZENE	<0.050
BROMODICHLOROMETHANE	<0.050
BROMOFORM	<0.25
BROMOMETHANE	<0.50
2-BUTANONE (MEK)	<0.50
CARBON DISULFIDE	<0.050
CARBON TETRACHLORIDE	<0.050
CHLOROBENZENE	<0.050
CHLOROETHANE	<0.050
CHLOROFORM	<0.050
CHLOROMETHANE	<0.50
DIBROMOCHLOROMETHANE	<0.050
1,1-DICHLOROETHANE	<0.050
1,2-DICHLOROETHANE	<0.050
1,1-DICHLOROETHENE	<0.050
1,2-DICHLOROETHENE (TOTAL)	<0.050
1,2-DICHLOROPROPANE	<0.050
CIS-1,3-DICHLOROPROPENE	<0.050
TRANS-1,3-DICHLOROPROPENE	<0.050
ETHYLBENZENE	<0.050
2-HEXANONE (MBK)	<0.50
4-METHYL-2-PENTANONE (MIBK)	<0.50
METHYLENE CHLORIDE	0.55
STYRENE	<0.050
1,1,2,2-TETRACHLOROETHANE	<0.050
TETRACHLOROETHENE	<0.050
TOLUENE	<0.050
1,1,1-TRICHLOROETHANE	<0.050
1,1,2-TRICHLOROETHANE	<0.050
TRICHLOROETHENE	<0.050
VINYL ACETATE	<0.50
VINYL CHLORIDE	<0.050
TOTAL XYLENES	<0.050

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-D4	115
TOLUENE-D8	105
BROMOFLUOROBENZENE	91

Analytical Technologies, Inc.

ATI I.D. # 9106-321

VOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 3351	DATE RECEIVED	: N/A
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/09/91
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 07/10/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8240	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION

NO NON-HSL COMPOUNDS FOUND > 10% OF NEAREST INTERNAL STANDARD

Analytical Technologies, Inc.

ATI I.D. # 9106-321-1

VOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/25/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/01/91
CLIENT I.D.	: MW-1 S-2	DATE ANALYZED	: 07/05/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8240	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
ACETONE	<1.0
BENZENE	<0.050
BROMODICHLOROMETHANE	<0.050
BROMOFORM	<0.25
BROMOMETHANE	<0.50
2-BUTANONE (MEK)	<0.50
CARBON DISULFIDE	<0.050
CARBON TETRACHLORIDE	<0.050
CHLOROBENZENE	<0.050
CHLOROETHANE	<0.050
CHLOROFORM	<0.050
CHLOROMETHANE	<0.50
DIBROMOCHLOROMETHANE	<0.050
1,1-DICHLOROETHANE	<0.050
1,2-DICHLOROETHANE	<0.050
1,1-DICHLOROETHENE	<0.050
1,2-DICHLOROETHENE (TOTAL)	<0.050
1,2-DICHLOROPROPANE	<0.050
CIS-1,3-DICHLOROPROPENE	<0.050
TRANS-1,3-DICHLOROPROPENE	<0.050
ETHYLBENZENE	<0.050
2-HEXANONE (MBK)	<0.50
4-METHYL-2-PENTANONE (MIBK)	<0.50
METHYLENE CHLORIDE	<0.25
STYRENE	<0.050
1,1,2,2-TETRACHLOROETHANE	<0.050
TETRACHLOROETHENE	<0.050
TOLUENE	<0.050
1,1,1-TRICHLOROETHANE	<0.050
1,1,2-TRICHLOROETHANE	<0.050
TRICHLOROETHENE	<0.050
VINYL ACETATE	<0.50
VINYL CHLORIDE	<0.050
TOTAL XYLENES	<0.050

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-D4	92
TOLUENE-D8	86
BROMOFLUOROBENZENE	84

Analytical Technologies, Inc.

ATI I.D. # 9106-321-1

VOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/25/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/01/91
CLIENT I.D.	: MW-1 S-2	DATE ANALYZED	: 07/05/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8240	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION

NO NON-HSL COMPOUNDS FOUND > 10% OF NEAREST INTERNAL STANDARD

Analytical Technologies, Inc.

ATI I.D. # 9106-321-3

VOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/26/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/09/91
CLIENT I.D.	: B-16 S-3	DATE ANALYZED	: 07/09/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8240	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
ACETONE	1.4 B
BENZENE	<0.088
BROMODICHLOROMETHANE	<0.088
BROMOFORM	<0.44
BROMOMETHANE	<0.88
2-BUTANONE (MEK)	<0.88
CARBON DISULFIDE	<0.088
CARBON TETRACHLORIDE	<0.088
CHLOROBENZENE	<0.088
CHLOROETHANE	<0.088
CHLOROFORM	<0.088
CHLOROMETHANE	<0.88
DIBROMOCHLOROMETHANE	<0.088
1,1-DICHLOROETHANE	<0.088
1,2-DICHLOROETHANE	<0.088
1,1-DICHLOROETHENE	<0.088
1,2-DICHLOROETHENE (TOTAL)	<0.088
1,2-DICHLOROPROPANE	<0.088
CIS-1,3-DICHLOROPROPENE	<0.088
TRANS-1,3-DICHLOROPROPENE	<0.088
ETHYLBENZENE	<0.088
2-HEXANONE (MBK)	<0.88
4-METHYL-2-PENTANONE (MIBK)	<0.88
METHYLENE CHLORIDE	0.86 B
STYRENE	<0.088
1,1,2,2-TETRACHLOROETHANE	<0.088
TETRACHLOROETHENE	<0.088
TOLUENE	<0.088
1,1,1-TRICHLOROETHANE	<0.088
1,1,2-TRICHLOROETHANE	<0.088
TRICHLOROETHENE	<0.088
VINYL ACETATE	<0.88
VINYL CHLORIDE	<0.088
TOTAL XYLENES	<0.088
SURROGATE PERCENT RECOVERIES	
1,2-DICHLOROETHANE-D4	90
TOLUENE-D8	84
BROMOFLUOROBENZENE	73 *

B = Also found in blank.
* Out of limits; confirmed by reanalysis.

Analytical Technologies, Inc.

ATI I.D. # 9106-321-3

VOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/26/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/09/91
CLIENT I.D.	: B-16 S-3	DATE ANALYZED	: 07/09/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8240	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION

NO NON-HSL COMPOUNDS FOUND > 10% OF NEAREST INTERNAL STANDARD

Analytical Technologies, Inc.

ATI I.D. # 9106-321-5

VOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/27/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/09/91
CLIENT I.D.	: B-15 S-2	DATE ANALYZED	: 07/09/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8240	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
ACETONE	1.9 B
BENZENE	<0.074
BROMODICHLOROMETHANE	<0.074
BROMOFORM	<0.37
BROMOMETHANE	<0.74
2-BUTANONE (MEK)	<0.74
CARBON DISULFIDE	<0.074
CARBON TETRACHLORIDE	<0.074
CHLOROBENZENE	<0.074
CHLOROETHANE	<0.074
CHLOROFORM	<0.074
CHLOROMETHANE	<0.74
DIBROMOCHLOROMETHANE	<0.074
1,1-DICHLOROETHANE	<0.074
1,2-DICHLOROETHANE	<0.074
1,1-DICHLOROETHENE	<0.074
1,2-DICHLOROETHENE (TOTAL)	<0.074
1,2-DICHLOROPROPANE	<0.074
CIS-1,3-DICHLOROPROPENE	<0.074
TRANS-1,3-DICHLOROPROPENE	<0.074
ETHYLBENZENE	<0.074
2-HEXANONE (MBK)	<0.74
4-METHYL-2-PENTANONE (MIBK)	<0.74
METHYLENE CHLORIDE	1.1 B
STYRENE	<0.074
1,1,2,2-TETRACHLOROETHANE	<0.074
TETRACHLOROETHENE	<0.074
TOLUENE	<0.074
1,1,1-TRICHLOROETHANE	<0.074
1,1,2-TRICHLOROETHANE	<0.074
TRICHLOROETHENE	<0.074
VINYL ACETATE	<0.74
VINYL CHLORIDE	<0.074
TOTAL XYLENES	<0.074
SURROGATE PERCENT RECOVERIES	
1,2-DICHLOROETHANE-D4	89
TOLUENE-D8	81
BROMOFLUOROBENZENE	72 *

B = Also found in blank.
* Out of limits; confirmed by reanalysis.

Analytical Technologies, Inc.

ATI I.D. # 9106-321-5

VOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/27/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/09/91
CLIENT I.D.	: B-15 S-2	DATE ANALYZED	: 07/09/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8240	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION

NO NON-HSL COMPOUNDS FOUND > 10% OF NEAREST INTERNAL STANDARD

Analytical Technologies, Inc.

ATI I.D. # 9106-321-7

VOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/27/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/01/91
CLIENT I.D.	: B-14 S-2	DATE ANALYZED	: 07/06/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8240	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
ACETONE	1.4 J
BENZENE	<0.083
BROMODICHLOROMETHANE	<0.083
BROMOFORM	<0.42
BROMOMETHANE	<0.83
2-BUTANONE (MEK)	<0.83
CARBON DISULFIDE	<0.083
CARBON TETRACHLORIDE	<0.083
CHLOROBENZENE	<0.083
CHLOROETHANE	<0.083
CHLOROFORM	<0.083
CHLOROMETHANE	<0.83
DIBROMOCHLOROMETHANE	<0.083
1,1-DICHLOROETHANE	<0.083
1,2-DICHLOROETHANE	<0.083
1,1-DICHLOROETHENE	<0.083
1,2-DICHLOROETHENE (TOTAL)	<0.083
1,2-DICHLOROPROPANE	<0.083
CIS-1,3-DICHLOROPROPENE	<0.083
TRANS-1,3-DICHLOROPROPENE	<0.083
ETHYLBENZENE	<0.083
2-HEXANONE (MBK)	<0.83
4-METHYL-2-PENTANONE (MIBK)	<0.83
METHYLENE CHLORIDE	0.99
STYRENE	<0.083
1,1,2,2-TETRACHLOROETHANE	<0.083
TETRACHLOROETHENE	<0.083
TOLUENE	<0.083
1,1,1-TRICHLOROETHANE	<0.083
1,1,2-TRICHLOROETHANE	<0.083
TRICHLOROETHENE	<0.083
VINYL ACETATE	<0.83
VINYL CHLORIDE	<0.083
TOTAL XYLENES	<0.083
SURROGATE PERCENT RECOVERIES	
1,2-DICHLOROETHANE-D4	92
TOLUENE-D8	83
BROMOFLUOROBENZENE	80

J = Estimated value.

Analytical Technologies, Inc.

ATI I.D. # 9106-321-7

VOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/27/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/01/91
CLIENT I.D.	: B-14 S-2	DATE ANALYZED	: 07/06/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8240	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION
HEXANE		242	0.50

Analytical Technologies, Inc.

ATI I.D. # 9106-321-9

VOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/27/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/01/91
CLIENT I.D.	: B-13 S-3	DATE ANALYZED	: 07/09/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8240	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
ACETONE	1.1 J
BENZENE	<0.072
BROMODICHLOROMETHANE	<0.072
BROMOFORM	<0.36
BROMOMETHANE	<0.72
2-BUTANONE (MEK)	<0.72
CARBON DISULFIDE	<0.072
CARBON TETRACHLORIDE	<0.072
CHLOROBENZENE	<0.072
CHLOROETHANE	<0.072
CHLOROFORM	<0.072
CHLOROMETHANE	<0.72
DIBROMOCHLOROMETHANE	<0.072
1,1-DICHLOROETHANE	<0.072
1,2-DICHLOROETHANE	<0.072
1,1-DICHLOROETHENE	<0.072
1,2-DICHLOROETHENE (TOTAL)	<0.072
1,2-DICHLOROPROPANE	<0.072
CIS-1,3-DICHLOROPROPENE	<0.072
TRANS-1,3-DICHLOROPROPENE	<0.072
ETHYLBENZENE	<0.072
2-HEXANONE (MBK)	<0.72
4-METHYL-2-PENTANONE (MIBK)	<0.72
METHYLENE CHLORIDE	0.52
STYRENE	<0.072
1,1,2,2-TETRACHLOROETHANE	<0.072
TETRACHLOROETHENE	<0.072
TOLUENE	<0.072
1,1,1-TRICHLOROETHANE	<0.072
1,1,2-TRICHLOROETHANE	<0.072
TRICHLOROETHENE	<0.072
VINYL ACETATE	<0.72
VINYL CHLORIDE	<0.072
TOTAL XYLENES	<0.072
SURROGATE PERCENT RECOVERIES	
1,2-DICHLOROETHANE-D4	89
TOLUENE-D8	82
BROMOFLUOROBENZENE	78

J = Estimated value.

Analytical Technologies, Inc.

ATI I.D. # 9106-321-9

VOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/27/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/01/91
CLIENT I.D.	: B-13 S-3	DATE ANALYZED	: 07/09/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8240	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION
HEXANE		238	0.36

Analytical Technologies, Inc.

ATI I.D. # 9106-321-11

VOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/27/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/09/91
CLIENT I.D.	: B-17 S-1	DATE ANALYZED	: 07/09/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8240	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
ACETONE	2.1 B
BENZENE	<0.096
BROMODICHLOROMETHANE	<0.096
BROMOFORM	<0.48
BROMOMETHANE	<0.96
2-BUTANONE (MEK)	<0.96
CARBON DISULFIDE	<0.096
CARBON TETRACHLORIDE	<0.096
CHLOROBENZENE	<0.096
CHLOROETHANE	<0.096
CHLOROFORM	<0.096
CHLOROMETHANE	<0.96
DIBROMOCHLOROMETHANE	<0.096
1,1-DICHLOROETHANE	<0.096
1,2-DICHLOROETHANE	<0.096
1,1-DICHLOROETHENE	<0.096
1,2-DICHLOROETHENE (TOTAL)	<0.096
1,2-DICHLOROPROPANE	<0.096
CIS-1,3-DICHLOROPROPENE	<0.096
TRANS-1,3-DICHLOROPROPENE	<0.096
ETHYLBENZENE	<0.096
2-HEXANONE (MBK)	<0.96
4-METHYL-2-PENTANONE (MIBK)	<0.96
METHYLENE CHLORIDE	0.92 B
STYRENE	<0.096
1,1,2,2-TETRACHLOROETHANE	<0.096
TETRACHLOROETHENE	<0.096
TOLUENE	<0.096
1,1,1-TRICHLOROETHANE	<0.096
1,1,2-TRICHLOROETHANE	<0.096
TRICHLOROETHENE	<0.096
VINYL ACETATE	<0.96
VINYL CHLORIDE	<0.096
TOTAL XYLENES	<0.096
SURROGATE PERCENT RECOVERIES	
1,2-DICHLOROETHANE-D4	84
TOLUENE-D8	70 *
BROMOFLUOROBENZENE	55 *

B = Also found in blank.
* Out of limits; confirmed by reanalysis.

Analytical Technologies, Inc.

ATI I.D. # 9106-321

VOLATILE ORGANIC ANALYSIS
QUALITY CONTROL DATA

CLIENT	: HART CROWSER, INC.	SAMPLE I.D. #	: 9106-321-1
PROJECT #	: 3351	DATE EXTRACTED	: 07/01/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE ANALYZED	: 07/05/91
EPA METHOD	: 8240	UNITS	: mg/Kg
SAMPLE MATRIX	: SOIL		

COMPOUND	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
1,1-DICHLOROETHENE	<0.050	2.50	1.72	69	2.07	83	18
TRICHLOROETHENE	<0.050	2.50	1.96	78	2.32	93	17
BENZENE	<0.050	2.50	2.03	81	2.44	98	18
TOLUENE	<0.050	2.50	2.03	81	2.45	98	19
CHLOROBENZENE	<0.050	2.50	2.04	82	2.42	97	17

$$\% \text{ Recovery} = \frac{(\text{Spiked Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Spike Result} - \text{Dup. Spike Result})|}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

ATI I.D. # 9106-321

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 3351	DATE RECEIVED	: N/A
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/01/91
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 07/29/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
N-NITROSODIMETHYLAMINE	<0.17
PHENOL	<0.17
ANILINE	<0.17
BIS(2-CHLOROETHYL)ETHER	<0.17
2-CHLOROPHENOL	<0.17
1,3-DICHLOROBENZENE	<0.17
1,4-DICHLOROBENZENE	<0.17
BENZYL ALCOHOL	<0.17
1,2-DICHLOROBENZENE	<0.17
2-METHYLPHENOL	<0.17
BIS(2-CHLOROISOPROPYL)ETHER	<0.17
4-METHYLPHENOL	<0.17
N-NITROSO-DI-N-PROPYLAMINE	<0.17
HEXACHLOROETHANE	<0.17
NITROBENZENE	<0.17
ISOPHORONE	<0.17
2-NITROPHENOL	<0.17
2,4-DIMETHYLPHENOL	<0.17
BENZOIC ACID	<0.85
BIS(2-CHLOROETHOXY)METHANE	<0.17
2,4-DICHLOROPHENOL	<0.17
1,2,4-TRICHLOROBENZENE	<0.17
NAPHTHALENE	<0.17
4-CHLOROANILINE	<0.17
HEXACHLOROBUTADIENE	<0.17
4-CHLORO-3-METHYLPHENOL	<0.17
2-METHYLNAPHTHALENE	<0.17
HEXACHLOROCYCLOPENTADIENE	<0.17
2,4,6-TRICHLOROPHENOL	<0.17
2,4,5-TRICHLOROPHENOL	<0.85
2-CHLORONAPHTHALENE	<0.17
2-NITROANILINE	<0.85
DIMETHYLPHTHALATE	<0.17
ACENAPHTHYLENE	<0.17
3-NITROANILINE	<0.85
ACENAPHTHENE	<0.17
2,4-DINITROPHENOL	<0.85
4-NITROPHENOL	<0.85

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Analytical Technologies, Inc.

ATI I.D. # 9106-321

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 3351	DATE RECEIVED	: N/A
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/01/91
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 07/29/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
DIBENZOFURAN	<0.17
2,4-DINITROTOLUENE	<0.17
2,6-DINITROTOLUENE	<0.17
DIETHYLPHTHALATE	<0.17
4-CHLOROPHENYL-PHENYLETHER	<0.17
FLUORENE	<0.17
4-NITROANILINE	<0.85
4,6-DINITRO-2-METHYLPHENOL	<0.85
N-NITROSODIPHENYLAMINE	<0.17
4-BROMOPHENYL-PHENYLETHER	<0.17
HEXACHLOROBENZENE	<0.17
PENTACHLOROPHENOL	<0.85
PHENANTHRENE	<0.17
ANTHRACENE	<0.17
DI-N-BUTYLPHTHALATE	0.38
FLUORANTHENE	<0.17
BENZIDINE	<1.7
PYRENE	<0.17
BUTYLBENZYLPHTHALATE	<0.17
3,3'-DICHLOROBENZIDINE	<0.34
BENZO(A)ANTHRACENE	<0.17
BIS(2-ETHYLHEXYL)PHTHALATE	<0.17
CHRYSENE	<0.17
DI-N-OCTYLPHTHALATE	<0.17
BENZO(B)FLUORANTHENE	<0.17
BENZO(K)FLUORANTHENE	<0.17
BENZO(A)PYRENE	<0.17
INDENO(1,2,3-CD)PYRENE	<0.17
DIBENZO(A,H)ANTHRACENE	<0.17
BENZO(G,H,I)PERYLENE	<0.17

SURROGATE PERCENT RECOVERIES

NITROBENZENE-D5	30
2-FLUOROBIPHENYL	34
TERPHENYL-D14	39
PHENOL-D5	32
2-FLUOROPHENOL	27
2,4,6-TRIBROMOPHENOL	32

Analytical Technologies, Inc.

ATI I.D. # 9106-321

SEMIVOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 3351	DATE RECEIVED	: N/A
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/01/91
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 07/29/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION

NO NON-HSL COMPOUNDS FOUND > 10% OF NEAREST INTERNAL STANDARD

Analytical Technologies, Inc.

ATI I.D. # 9106-321-1

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/25/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/01/91
CLIENT I.D.	: MW-1 S-2	DATE ANALYZED	: 07/29/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
N-NITROSODIMETHYLAMINE	<0.17
PHENOL	<0.17
ANILINE	<0.17
BIS(2-CHLOROETHYL)ETHER	<0.17
2-CHLOROPHENOL	<0.17
1,3-DICHLOROBENZENE	<0.17
1,4-DICHLOROBENZENE	<0.17
BENZYL ALCOHOL	<0.17
1,2-DICHLOROBENZENE	<0.17
2-METHYLPHENOL	<0.17
BIS(2-CHLOROISOPROPYL)ETHER	<0.17
4-METHYLPHENOL	<0.17
N-NITROSO-DI-N-PROPYLAMINE	<0.17
HEXACHLOROETHANE	<0.17
NITROBENZENE	<0.17
ISOPHORONE	<0.17
2-NITROPHENOL	<0.17
2,4-DIMETHYLPHENOL	<0.17
BENZOIC ACID	<0.85
BIS(2-CHLOROETHOXY)METHANE	<0.17
2,4-DICHLOROPHENOL	<0.17
1,2,4-TRICHLOROBENZENE	<0.17
NAPHTHALENE	<0.17
4-CHLOROANILINE	<0.17
HEXACHLOROBUTADIENE	<0.17
4-CHLORO-3-METHYLPHENOL	<0.17
2-METHYLNAPHTHALENE	<0.17
HEXACHLOROCYCLOPENTADIENE	<0.17
2,4,6-TRICHLOROPHENOL	<0.17
2,4,5-TRICHLOROPHENOL	<0.85
2-CHLORONAPHTHALENE	<0.17
2-NITROANILINE	<0.85
DIMETHYLPHTHALATE	<0.17
ACENAPHTHYLENE	<0.17
3-NITROANILINE	<0.85
ACENAPHTHENE	<0.17
2,4-DINITROPHENOL	<0.85
4-NITROPHENOL	<0.85

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Analytical Technologies, Inc.

ATI I.D. # 9106-321-1

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/25/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/01/91
CLIENT I.D.	: MW-1 S-2	DATE ANALYZED	: 07/29/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
DIBENZOFURAN	<0.17
2,4-DINITROTOLUENE	<0.17
2,6-DINITROTOLUENE	<0.17
DIETHYLPHTHALATE	<0.17
4-CHLOROPHENYL-PHENYLETHER	<0.17
FLUORENE	<0.17
4-NITROANILINE	<0.85
4,6-DINITRO-2-METHYLPHENOL	<0.85
N-NITROSODIPHENYLAMINE	<0.17
4-BROMOPHENYL-PHENYLETHER	<0.17
HEXACHLOROBENZENE	<0.17
PENTACHLOROPHENOL	<0.85
PHENANTHRENE	<0.17
ANTHRACENE	<0.17
DI-N-BUTYLPHTHALATE	0.82 B
FLUORANTHENE	<0.17
BENZIDINE	<1.7
PYRENE	<0.17
BUTYLBENZYLPHTHALATE	<0.17
3,3'-DICHLOROBENZIDINE	<0.34
BENZO(A)ANTHRACENE	<0.17
BIS(2-ETHYLHEXYL)PHTHALATE	<0.17
CHRYSENE	<0.17
DI-N-OCTYLPHTHALATE	<0.17
BENZO(B)FLUORANTHENE	<0.17
BENZO(K)FLUORANTHENE	<0.17
BENZO(A)PYRENE	<0.17
INDENO(1,2,3-CD)PYRENE	<0.17
DIBENZO(A,H)ANTHRACENE	<0.17
BENZO(G,H,I)PERYLENE	<0.17

SURROGATE PERCENT RECOVERIES

NITROBENZENE-D5	55
2-FLUOROBIPHENYL	67
TERPHENYL-D14	83
PHENOL-D5	67
2-FLUOROPHENOL	55
2,4,6-TRIBROMOPHENOL	61

B = Also found in blank.

Analytical Technologies, Inc.

ATI I.D. # 9106-321-1

SEMIVOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/25/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/01/91
CLIENT I.D.	: MW-1 S-2	DATE ANALYZED	: 07/29/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION
UNKNOWN		1684	1.3
UNKNOWN		1753	1.4
UNKNOWN		1877	1.8
UNKNOWN		1937	1.6
UNKNOWN		2004	1.2

Analytical Technologies, Inc.

ATI I.D. # 9106-321-3

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/26/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/01/91
CLIENT I.D.	: B-16 S-3	DATE ANALYZED	: 07/29/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
N-NITROSODIMETHYLAMINE	<0.29
PHENOL	<0.29
ANILINE	<0.29
BIS(2-CHLOROETHYL)ETHER	<0.29
2-CHLOROPHENOL	<0.29
1,3-DICHLOROBENZENE	<0.29
1,4-DICHLOROBENZENE	<0.29
BENZYL ALCOHOL	<0.29
1,2-DICHLOROBENZENE	<0.29
2-METHYLPHENOL	<0.29
BIS(2-CHLOROISOPROPYL)ETHER	<0.29
4-METHYLPHENOL	<0.29
N-NITROSO-DI-N-PROPYLAMINE	<0.29
HEXACHLOROETHANE	<0.29
NITROBENZENE	<0.29
ISOPHORONE	<0.29
2-NITROPHENOL	<0.29
2,4-DIMETHYLPHENOL	<0.29
BENZOIC ACID	<1.5
BIS(2-CHLOROETHOXY)METHANE	<0.29
2,4-DICHLOROPHENOL	<0.29
1,2,4-TRICHLOROBENZENE	<0.29
NAPHTHALENE	<0.29
4-CHLOROANILINE	<0.29
HEXACHLOROBUTADIENE	<0.29
4-CHLORO-3-METHYLPHENOL	<0.29
2-METHYLNAPHTHALENE	<0.29
HEXACHLOROCYCLOPENTADIENE	<0.29
2,4,6-TRICHLOROPHENOL	<0.29
2,4,5-TRICHLOROPHENOL	<1.5
2-CHLORONAPHTHALENE	<0.29
2-NITROANILINE	<1.5
DIMETHYLPHTHALATE	<0.29
ACENAPHTHYLENE	<0.29
3-NITROANILINE	<1.5
ACENAPHTHENE	<0.29
2,4-DINITROPHENOL	<1.5
4-NITROPHENOL	<1.5

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Analytical Technologies, Inc.

ATI I.D. # 9106-321-3

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/26/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/01/91
CLIENT I.D.	: B-16 S-3	DATE ANALYZED	: 07/29/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
DIBENZOFURAN	<0.29
2,4-DINITROTOLUENE	<0.29
2,6-DINITROTOLUENE	<0.29
DIETHYLPHTHALATE	<0.29
4-CHLOROPHENYL-PHENYLETHER	<0.29
FLUORENE	<0.29
4-NITROANILINE	<1.5
4,6-DINITRO-2-METHYLPHENOL	<1.5
N-NITROSODIPHENYLAMINE	<0.29
4-BROMOPHENYL-PHENYLETHER	<0.29
HEXACHLOROBENZENE	<0.29
PENTACHLOROPHENOL	<1.5
PHENANTHRENE	<0.29
ANTHRACENE	<0.29
DI-N-BUTYLPHTHALATE	1.2 B
FLUORANTHENE	<0.29
BENZIDINE	<2.9
PYRENE	<0.29
BUTYLBENZYLPHTHALATE	<0.29
3,3'-DICHLOROBENZIDINE	<0.60
BENZO(A)ANTHRACENE	<0.29
BIS(2-ETHYLHEXYL)PHTHALATE	<0.29
CHRYSENE	<0.29
DI-N-OCTYLPHTHALATE	<0.29
BENZO(B)FLUORANTHENE	<0.29
BENZO(K)FLUORANTHENE	<0.29
BENZO(A)PYRENE	<0.29
INDENO(1,2,3-CD)PYRENE	<0.29
DIBENZO(A,H)ANTHRACENE	<0.29
BENZO(G,H,I)PERYLENE	<0.29

SURROGATE PERCENT RECOVERIES

NITROBENZENE-D5	55
2-FLUOROBIPHENYL	62
TERPHENYL-D14	64
PHENOL-D5	66
2-FLUOROPHENOL	54
2,4,6-TRIBROMOPHENOL	66

B = Also found in blank.

Analytical Technologies, Inc.

ATI I.D. # 9106-321-3

SEMIVOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/26/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/01/91
CLIENT I.D.	: B-16 S-3	DATE ANALYZED	: 07/29/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION
HYDROCARBON		1782	1.9
UNKNOWN		2007	2.3
UNKNOWN		2012	2.0
AMYRIN		2059	1.9
UNKNOWN		2442	2.7

Analytical Technologies, Inc.

ATI I.D. # 9106-321-5

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/27/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/01/91
CLIENT I.D.	: B-15 S-2	DATE ANALYZED	: 07/31/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 4 *

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
N-NITROSODIMETHYLAMINE	<0.98
PHENOL	<0.98
ANILINE	<0.98
BIS(2-CHLOROETHYL)ETHER	<0.98
2-CHLOROPHENOL	<0.98
1,3-DICHLOROBENZENE	<0.98
1,4-DICHLOROBENZENE	<0.98
BENZYL ALCOHOL	<0.98
1,2-DICHLOROBENZENE	<0.98
2-METHYLPHENOL	<0.98
BIS(2-CHLOROISOPROPYL)ETHER	<0.98
4-METHYLPHENOL	<0.98
N-NITROSO-DI-N-PROPYLAMINE	<0.98
HEXACHLOROETHANE	<0.98
NITROBENZENE	<0.98
ISOPHORONE	<0.98
2-NITROPHENOL	<0.98
2,4-DIMETHYLPHENOL	<0.98
BENZOIC ACID	<5.0
BIS(2-CHLOROETHOXY)METHANE	<0.98
2,4-DICHLOROPHENOL	<0.98
1,2,4-TRICHLOROBENZENE	<0.98
NAPHTHALENE	<0.98
4-CHLOROANILINE	<0.98
HEXACHLOROBUTADIENE	<0.98
4-CHLORO-3-METHYLPHENOL	<0.98
2-METHYLNAPHTHALENE	<0.98
HEXACHLOROCYCLOPENTADIENE	<0.98
2,4,6-TRICHLOROPHENOL	<0.98
2,4,5-TRICHLOROPHENOL	<5.0
2-CHLORONAPHTHALENE	<0.98
2-NITROANILINE	<5.0
DIMETHYLPHTHALATE	<0.98
ACENAPHTHYLENE	<0.98
3-NITROANILINE	<5.0
ACENAPHTHENE	<0.98
2,4-DINITROPHENOL	<5.0
4-NITROPHENOL	<5.0

* See Case Narrative.

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Analytical Technologies, Inc.

ATI I.D. # 9106-321-5

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/27/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/01/91
CLIENT I.D.	: B-15 S-2	DATE ANALYZED	: 07/31/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 4

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
DIBENZOFURAN	<0.98
2,4-DINITROTOLUENE	<0.98
2,6-DINITROTOLUENE	<0.98
DIETHYLPHTHALATE	<0.98
4-CHLOROPHENYL-PHENYLETHER	<0.98
FLUORENE	<0.98
4-NITROANILINE	<5.0
4,6-DINITRO-2-METHYLPHENOL	<5.0
N-NITROSODIPHENYLAMINE	<0.98
4-BROMOPHENYL-PHENYLETHER	<0.98
HEXACHLOROBENZENE	<0.98
PENTACHLOROPHENOL	<4.9
PHENANTHRENE	<0.98
ANTHRACENE	<0.98
DI-N-BUTYLPHTHALATE	1.1 B
FLUORANTHENE	<0.98
BENZIDINE	<9.8
PYRENE	<0.98
BUTYLBENZYLPHTHALATE	<0.98
3,3'-DICHLOROBENZIDINE	<2.0
BENZO(A)ANTHRACENE	<0.98
BIS(2-ETHYLHEXYL)PHTHALATE	<0.98
CHRYSENE	<0.98
DI-N-OCTYLPHTHALATE	<0.98
BENZO(B)FLUORANTHENE	<0.98
BENZO(K)FLUORANTHENE	<0.98
BENZO(A)PYRENE	<0.98
INDENO(1,2,3-CD)PYRENE	<0.98
DIBENZO(A,H)ANTHRACENE	<0.98
BENZO(G,H,I)PERYLENE	<0.98

SURROGATE PERCENT RECOVERIES

NITROBENZENE-D5	59
2-FLUOROBIPHENYL	70
TERPHENYL-D14	64
PHENOL-D5	71
2-FLUOROPHENOL	54
2,4,6-TRIBROMOPHENOL	60

B = Also found in blank.

Analytical Technologies, Inc.

ATI I.D. # 9106-321-5

SEMIVOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/27/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/01/91
CLIENT I.D.	: B-15 S-2	DATE ANALYZED	: 07/31/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 4

RESULTS BASED ON DRY WEIGHT

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION
UNKNOWN		986	2.0
SULFUR (MOL.)		1345	2.0 *
PENTATRIACONTANE		1738	0.98

* Quantitated by peak height.

Analytical Technologies, Inc.

ATI I.D. # 9106-321-7

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/27/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/01/91
CLIENT I.D.	: B-14 S-2	DATE ANALYZED	: 07/29/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
N-NITROSODIMETHYLAMINE	<0.28
PHENOL	<0.28
ANILINE	<0.28
BIS(2-CHLOROETHYL)ETHER	<0.28
2-CHLOROPHENOL	<0.28
1,3-DICHLOROBENZENE	<0.28
1,4-DICHLOROBENZENE	<0.28
BENZYL ALCOHOL	<0.28
1,2-DICHLOROBENZENE	<0.28
2-METHYLPHENOL	<0.28
BIS(2-CHLOROISOPROPYL)ETHER	<0.28
4-METHYLPHENOL	<0.28
N-NITROSO-DI-N-PROPYLAMINE	<0.28
HEXACHLOROETHANE	<0.28
NITROBENZENE	<0.28
ISOPHORONE	<0.28
2-NITROPHENOL	<0.28
2,4-DIMETHYLPHENOL	<0.28
BENZOIC ACID	<1.4
BIS(2-CHLOROETHOXY)METHANE	<0.28
2,4-DICHLOROPHENOL	<0.28
1,2,4-TRICHLOROBENZENE	<0.28
NAPHTHALENE	<0.28
4-CHLOROANILINE	<0.28
HEXACHLOROBUTADIENE	<0.28
4-CHLORO-3-METHYLPHENOL	<0.28
2-METHYLNAPHTHALENE	<0.28
HEXACHLOROCYCLOPENTADIENE	<0.28
2,4,6-TRICHLOROPHENOL	<0.28
2,4,5-TRICHLOROPHENOL	<1.4
2-CHLORONAPHTHALENE	<0.28
2-NITROANILINE	<1.4
DIMETHYLPHTHALATE	<0.28
ACENAPHTHYLENE	<0.28
3-NITROANILINE	<1.4
ACENAPHTHENE	<0.28
2,4-DINITROPHENOL	<1.4
4-NITROPHENOL	<1.4

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Analytical Technologies, Inc.

ATI I.D. # 9106-321-7

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/27/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/01/91
CLIENT I.D.	: B-14 S-2	DATE ANALYZED	: 07/29/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
DIBENZOFURAN	<0.28
2,4-DINITROTOLUENE	<0.28
2,6-DINITROTOLUENE	<0.28
DIETHYLPHTHALATE	<0.28
4-CHLOROPHENYL-PHENYLETHER	<0.28
FLUORENE	<0.28
4-NITROANILINE	<1.4
4,6-DINITRO-2-METHYLPHENOL	<1.4
N-NITROSODIPHENYLAMINE	<0.28
4-BROMOPHENYL-PHENYLETHER	<0.28
HEXACHLOROBENZENE	<0.28
PENTACHLOROPHENOL	<1.4
PHENANTHRENE	<0.28
ANTHRACENE	<0.28
DI-N-BUTYLPHTHALATE	1.4 B
FLUORANTHENE	<0.28
BENZIDINE	<2.8
PYRENE	<0.28
BUTYLBENZYLPHTHALATE	<0.28
3,3'-DICHLOROBENZIDINE	<0.57
BENZO(A)ANTHRACENE	<0.28
BIS(2-ETHYLHEXYL)PHTHALATE	<0.28
CHRYSENE	<0.28
DI-N-OCTYLPHTHALATE	<0.28
BENZO(B)FLUORANTHENE	<0.28
BENZO(K)FLUORANTHENE	<0.28
BENZO(A)PYRENE	<0.28
INDENO(1,2,3-CD)PYRENE	<0.28
DIBENZO(A,H)ANTHRACENE	<0.28
BENZO(G,H,I)PERYLENE	<0.28

SURROGATE PERCENT RECOVERIES

NITROBENZENE-D5	61
2-FLUOROBIPHENYL	68
TERPHENYL-D14	73
PHENOL-D5	68
2-FLUOROPHENOL	54
2,4,6-TRIBROMOPHENOL	74

B = Also found in blank.

Analytical Technologies, Inc.

ATI I.D. # 9106-321-7

SEMIVOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/27/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/01/91
CLIENT I.D.	: B-14 S-2	DATE ANALYZED	: 07/29/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION
ALKANE		1685	2.1
ALKANE		1783	1.7
D-FRIEDOOLEAN-14-EN-3-ONE		2005	1.7
UNKNOWN		2049	2.7
UNKNOWN		2124	5.4

Analytical Technologies, Inc.

ATI I.D. # 9106-321-9

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/27/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/01/91
CLIENT I.D.	: B-13 S-3	DATE ANALYZED	: 07/29/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
N-NITROSODIMETHYLAMINE	<0.24
PHENOL	<0.24
ANILINE	<0.24
BIS(2-CHLOROETHYL)ETHER	<0.24
2-CHLOROPHENOL	<0.24
1,3-DICHLOROBENZENE	<0.24
1,4-DICHLOROBENZENE	<0.24
BENZYL ALCOHOL	<0.24
1,2-DICHLOROBENZENE	<0.24
2-METHYLPHENOL	<0.24
BIS(2-CHLOROISOPROPYL)ETHER	<0.24
4-METHYLPHENOL	<0.24
N-NITROSO-DI-N-PROPYLAMINE	<0.24
HEXACHLOROETHANE	<0.24
NITROBENZENE	<0.24
ISOPHORONE	<0.24
2-NITROPHENOL	<0.24
2,4-DIMETHYLPHENOL	<0.24
BENZOIC ACID	<1.2
BIS(2-CHLOROETHOXY)METHANE	<0.24
2,4-DICHLOROPHENOL	<0.24
1,2,4-TRICHLOROBENZENE	<0.24
NAPHTHALENE	<0.24
4-CHLOROANILINE	<0.24
HEXACHLOROBUTADIENE	<0.24
4-CHLORO-3-METHYLPHENOL	<0.24
2-METHYLNAPHTHALENE	<0.24
HEXACHLOROCYCLOPENTADIENE	<0.24
2,4,6-TRICHLOROPHENOL	<0.24
2,4,5-TRICHLOROPHENOL	<1.2
2-CHLORONAPHTHALENE	<0.24
2-NITROANILINE	<1.2
DIMETHYLPHTHALATE	<0.24
ACENAPHTHYLENE	<0.24
3-NITROANILINE	<1.2
ACENAPHTHENE	<0.24
2,4-DINITROPHENOL	<1.2
4-NITROPHENOL	<1.2

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Analytical Technologies, Inc.

ATI I.D. # 9106-321-9

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/27/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/01/91
CLIENT I.D.	: B-13 S-3	DATE ANALYZED	: 07/29/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
DIBENZOFURAN	<0.24
2,4-DINITROTOLUENE	<0.24
2,6-DINITROTOLUENE	<0.24
DIETHYLPHTHALATE	<0.24
4-CHLOROPHENYL-PHENYLETHER	<0.24
FLUORENE	<0.24
4-NITROANILINE	<1.2
4,6-DINITRO-2-METHYLPHENOL	<1.2
N-NITROSODIPHENYLAMINE	<0.24
4-BROMOPHENYL-PHENYLETHER	<0.24
HEXACHLOROBENZENE	<0.24
PENTACHLOROPHENOL	<1.2
PHENANTHRENE	<0.24
ANTHRACENE	<0.24
DI-N-BUTYLPHTHALATE	1.0 B
FLUORANTHENE	<0.24
BENZIDINE	<2.4
PYRENE	<0.24
BUTYLBENZYLPHTHALATE	<0.24
3,3'-DICHLOROBENZIDINE	<0.49
BENZO(A)ANTHRACENE	<0.24
BIS(2-ETHYLHEXYL)PHTHALATE	<0.24
CHRYSENE	<0.24
DI-N-OCTYLPHTHALATE	<0.24
BENZO(B)FLUORANTHENE	<0.24
BENZO(K)FLUORANTHENE	<0.24
BENZO(A)PYRENE	<0.24
INDENO(1,2,3-CD)PYRENE	<0.24
DIBENZO(A,H)ANTHRACENE	<0.24
BENZO(G,H,I)PERYLENE	<0.24

SURROGATE PERCENT RECOVERIES

NITROBENZENE-D5	57
2-FLUOROBIPHENYL	59
TERPHENYL-D14	62
PHENOL-D5	64
2-FLUOROPHENOL	52
2,4,6-TRIBROMOPHENOL	63

B = Also found in blank.

Analytical Technologies, Inc.

ATI I.D. # 9106-321-9

SEMIVOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/27/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/01/91
CLIENT I.D.	: B-13 S-3	DATE ANALYZED	: 07/29/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION
SULFUR, MOL.		1316	1.9
ALKANE		1684	0.72
UNKNOWN		2005	0.97
UNKNOWN		2021	0.63
UNKNOWN		2159	0.63

Analytical Technologies, Inc.

ATI I.D. # 9106-321-11

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/27/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/01/91
CLIENT I.D.	: B-17 S-1	DATE ANALYZED	: 07/29/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
N-NITROSODIMETHYLAMINE	<0.32
PHENOL	<0.32
ANILINE	<0.32
BIS(2-CHLOROETHYL)ETHER	<0.32
2-CHLOROPHENOL	<0.32
1,3-DICHLOROBENZENE	<0.32
1,4-DICHLOROBENZENE	<0.32
BENZYL ALCOHOL	<0.32
1,2-DICHLOROBENZENE	<0.32
2-METHYLPHENOL	<0.32
BIS(2-CHLOROISOPROPYL)ETHER	<0.32
4-METHYLPHENOL	<0.32
N-NITROSO-DI-N-PROPYLAMINE	<0.32
HEXACHLOROETHANE	<0.32
NITROBENZENE	<0.32
ISOPHORONE	<0.32
2-NITROPHENOL	<0.32
2,4-DIMETHYLPHENOL	<0.32
BENZOIC ACID	<1.6
BIS(2-CHLOROETHOXY)METHANE	<0.32
2,4-DICHLOROPHENOL	<0.32
1,2,4-TRICHLOROBENZENE	<0.32
NAPHTHALENE	<0.32
4-CHLOROANILINE	<0.32
HEXACHLOROBUTADIENE	<0.32
4-CHLORO-3-METHYLPHENOL	<0.32
2-METHYLNAPHTHALENE	<0.32
HEXACHLOROCYCLOPENTADIENE	<0.32
2,4,6-TRICHLOROPHENOL	<0.32
2,4,5-TRICHLOROPHENOL	<1.6
2-CHLORONAPHTHALENE	<0.32
2-NITROANILINE	<1.6
DIMETHYLPHTHALATE	<0.32
ACENAPHTHYLENE	<0.32
3-NITROANILINE	<1.6
ACENAPHTHENE	<0.32
2,4-DINITROPHENOL	<1.6
4-NITROPHENOL	<1.6

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Analytical Technologies, Inc.

ATI I.D. # 9106-321-11

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/27/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/01/91
CLIENT I.D.	: B-17 S-1	DATE ANALYZED	: 07/29/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT	
DIBENZOFURAN	<0.32	
2,4-DINITROTOLUENE	<0.32	
2,6-DINITROTOLUENE	<0.32	
DIETHYLPHTHALATE	<0.32	
4-CHLOROPHENYL-PHENYLETHER	<0.32	
FLUORENE	<0.32	
4-NITROANILINE	<1.6	
4,6-DINITRO-2-METHYLPHENOL	<1.6	
N-NITROSODIPHENYLAMINE	<0.32	
4-BROMOPHENYL-PHENYLETHER	<0.32	
HEXACHLOROBENZENE	<0.32	
PENTACHLOROPHENOL	<1.6	
PHENANTHRENE	<0.32	
ANTHRACENE	<0.32	
DI-N-BUTYLPHTHALATE	1.1	B
FLUORANTHENE	<0.32	
BENZIDINE	<3.2	
PYRENE	<0.32	
BUTYLBENZYLPHTHALATE	<0.32	
3,3'-DICHLOROBENZIDINE	<0.65	
BENZO(A)ANTHRACENE	<0.32	
BIS(2-ETHYLHEXYL)PHTHALATE	<0.32	
CHRYSENE	<0.32	
DI-N-OCTYLPHTHALATE	<0.32	
BENZO(B)FLUORANTHENE	<0.32	
BENZO(K)FLUORANTHENE	<0.32	
BENZO(A)PYRENE	<0.32	
INDENO(1,2,3-CD)PYRENE	<0.32	
DIBENZO(A,H)ANTHRACENE	<0.32	
BENZO(G,H,I)PERYLENE	<0.32	

SURROGATE PERCENT RECOVERIES

NITROBENZENE-D5	48
2-FLUOROBIPHENYL	50
TERPHENYL-D14	55
PHENOL-D5	52
2-FLUOROPHENOL	43
2,4,6-TRIBROMOPHENOL	56

B = Also found in blank.

Analytical Technologies, Inc.

ATI I.D. # 9106-321-11

SEMIVOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/27/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/01/91
CLIENT I.D.	: B-17 S-1	DATE ANALYZED	: 07/29/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8270	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION
UNKNOWN		1550	2.1
HENEICOSANE, 11-(1-ETHYLPROPYL)-		1783	2.5
D-FRIEDOOLEAN-14-EN-3-ONE		2006	3.1
UNKNOWN		2051	5.5
UNKNOWN		2065	3.2

Analytical Technologies, Inc.

ATI I.D. # 9106-321

SEMIVOLATILE ORGANIC ANALYSIS
QUALITY CONTROL DATA

CLIENT : HART CROWSER, INC.
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH
EPA METHOD : 8270
SAMPLE MATRIX : SOIL

SAMPLE I.D. # : BLANK SPIKE
DATE EXTRACTED : 07/01/91
DATE ANALYZED : 07/29/91
UNITS : mg/Kg

COMPOUND	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
1,2,4-TRICHLOROBENZENE	<0.17	3.33	1.38	41	1.43	43	4
ACENAPHTHENE	<0.17	3.33	1.09	33	1.11	33	2
2,4-DINITROTOLUENE	<0.17	3.33	0.952	29	0.974	29	2
PYRENE	<0.17	3.33	1.19	36	1.22	37	2
N-NITROSO-DI-N-PROPYLAMINE	<0.17	3.33	1.39	42	1.53	46	10
1,4-DICHLOROBENZENE	<0.17	3.33	0.991	30	1.02	31	3
PENTACHLOROPHENOL	<0.85	13.3	4.25	32	4.26	32	0
PHENOL	<0.17	6.67	2.10	31	2.08	31	1
2-CHLOROPHENOL	<0.17	6.67	1.99	30	2.11	32	6
4-CHLORO-3-METHYLPHENOL	<0.17	6.67	2.92	44	3.03	45	4
4-NITROPHENOL	<0.85	13.3	4.48	34	5.06	38	12

$$\% \text{ Recovery} = \frac{(\text{Spiked Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Spike Result} - \text{Dup. Spike Result})|}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

ATI I.D. # 9106-321

POLYNUCLEAR AROMATIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 3351	DATE RECEIVED	: N/A
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/06/91
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 07/17/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8310	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
NAPHTHALENE	<0.083
ACENAPHTHYLENE	<0.17
ACENAPHTHENE	<0.17
FLUORENE	<0.017
PHENANTHRENE	<0.0083
ANTHRACENE	<0.0083
FLUORANTHENE	<0.017
PYRENE	<0.017
BENZO(A)ANTHRACENE	<0.017
CHRYSENE	<0.017
BENZO(B)FLUORANTHENE	<0.017
BENZO(K)FLUORANTHENE	<0.017
BENZO(A)PYRENE	<0.017
DIBENZO(A,H)ANTHRACENE	<0.034
BENZO(G,H,I)PERYLENE	<0.017
INDENO(1,2,3-CD)PYRENE	<0.017
SURROGATE PERCENT RECOVERIES	
2-CHLOROANTHRACENE	27

Analytical Technologies, Inc.

ATI I.D. # 9106-321-1

POLYNUCLEAR AROMATIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/25/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/06/91
CLIENT I.D.	: MW-1 S-2	DATE ANALYZED	: 07/17/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8310	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
NAPHTHALENE	<0.083
ACENAPHTHYLENE	<0.17
ACENAPHTHENE	<0.17
FLUORENE	<0.017
PHENANTHRENE	0.013
ANTHRACENE	<0.0083
FLUORANTHENE	<0.017
PYRENE	<0.017
BENZO(A)ANTHRACENE	<0.017
CHRYSENE	<0.017
BENZO(B)FLUORANTHENE	<0.017
BENZO(K)FLUORANTHENE	<0.017
BENZO(A)PYRENE	<0.017
DIBENZO(A,H)ANTHRACENE	<0.034
BENZO(G,H,I)PERYLENE	<0.017
INDENO(1,2,3-CD)PYRENE	<0.017

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE	117

Analytical Technologies, Inc.

ATI I.D. # 9106-321-2

POLYNUCLEAR AROMATIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/25/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/06/91
CLIENT I.D.	: MW-1 S-7	DATE ANALYZED	: 07/17/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8310	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
NAPHTHALENE	<0.083
ACENAPHTHYLENE	<0.17
ACENAPHTHENE	<0.17
FLUORENE	<0.017
PHENANTHRENE	0.0090
ANTHRACENE	<0.0083
FLUORANTHENE	<0.017
PYRENE	<0.017
BENZO(A)ANTHRACENE	<0.017
CHRYSENE	<0.017
BENZO(B)FLUORANTHENE	<0.017
BENZO(K)FLUORANTHENE	<0.017
BENZO(A)PYRENE	<0.017
DIBENZO(A,H)ANTHRACENE	<0.034
BENZO(G,H,I)PERYLENE	<0.017
INDENO(1,2,3-CD)PYRENE	<0.017

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE	115

Analytical Technologies, Inc.

ATI I.D. # 9106-321-3

POLYNUCLEAR AROMATIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/26/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/06/91
CLIENT I.D.	: B-16 S-3	DATE ANALYZED	: 07/17/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8310	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
NAPHTHALENE	<0.13
ACENAPHTHYLENE	<0.26
ACENAPHTHENE	<0.26
FLUORENE	<0.027
PHENANTHRENE	0.015
ANTHRACENE	<0.013
FLUORANTHENE	0.042
PYRENE	0.045
BENZO(A)ANTHRACENE	<0.027
CHRYSENE	<0.027
BENZO(B)FLUORANTHENE	<0.027
BENZO(K)FLUORANTHENE	<0.027
BENZO(A)PYRENE	<0.027
DIBENZO(A,H)ANTHRACENE	<0.053
BENZO(G,H,I)PERYLENE	<0.027
INDENO(1,2,3-CD)PYRENE	<0.027

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE	81

Analytical Technologies, Inc.

ATI I.D. # 9106-321-4

POLYNUCLEAR AROMATIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/26/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/06/91
CLIENT I.D.	: B-16 S-5	DATE ANALYZED	: 07/18/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8310	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
NAPHTHALENE	<0.083
ACENAPHTHYLENE	<0.17
ACENAPHTHENE	<0.17
FLUORENE	<0.017
PHENANTHRENE	0.0090
ANTHRACENE	<0.0083
FLUORANTHENE	<0.017
PYRENE	<0.017
BENZO(A)ANTHRACENE	<0.017
CHRYSENE	<0.017
BENZO(B)FLUORANTHENE	<0.017
BENZO(K)FLUORANTHENE	<0.017
BENZO(A)PYRENE	<0.017
DIBENZO(A,H)ANTHRACENE	<0.034
BENZO(G,H,I)PERYLENE	<0.017
INDENO(1,2,3-CD)PYRENE	<0.017

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE	118

Analytical Technologies, Inc.

ATI I.D. # 9106-321-5

POLYNUCLEAR AROMATIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/27/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/06/91
CLIENT I.D.	: B-15 S-2	DATE ANALYZED	: 07/17/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8310	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
NAPHTHALENE	<0.13
ACENAPHTHYLENE	<0.26
ACENAPHTHENE	<0.26
FLUORENE	<0.026
PHENANTHRENE	<0.013
ANTHRACENE	<0.013
FLUORANTHENE	<0.026
PYRENE	<0.026
BENZO(A)ANTHRACENE	<0.026
CHRYSENE	<0.026
BENZO(B)FLUORANTHENE	<0.026
BENZO(K)FLUORANTHENE	<0.026
BENZO(A)PYRENE	<0.026
DIBENZO(A,H)ANTHRACENE	<0.052
BENZO(G,H,I)PERYLENE	<0.026
INDENO(1,2,3-CD)PYRENE	<0.026

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE	109

Analytical Technologies, Inc.

ATI I.D. # 9106-321-6

POLYNUCLEAR AROMATIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/27/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/06/91
CLIENT I.D.	: B-15 S-6	DATE ANALYZED	: 07/18/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8310	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
NAPHTHALENE	<0.083
ACENAPHTHYLENE	<0.17
ACENAPHTHENE	<0.17
FLUORENE	<0.017
PHENANTHRENE	<0.0083
ANTHRACENE	<0.0083
FLUORANTHENE	<0.017
PYRENE	<0.017
BENZO(A)ANTHRACENE	<0.017
CHRYSENE	<0.017
BENZO(B)FLUORANTHENE	<0.017
BENZO(K)FLUORANTHENE	<0.017
BENZO(A)PYRENE	<0.017
DIBENZO(A,H)ANTHRACENE	<0.034
BENZO(G,H,I)PERYLENE	<0.017
INDENO(1,2,3-CD)PYRENE	<0.017

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE	112

Analytical Technologies, Inc.

ATI I.D. # 9106-321-7

POLYNUCLEAR AROMATIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/27/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/06/91
CLIENT I.D.	: B-14 S-2	DATE ANALYZED	: 07/17/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8310	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
NAPHTHALENE	<0.12
ACENAPHTHYLENE	<0.26
ACENAPHTHENE	<0.26
FLUORENE	<0.026
PHENANTHRENE	<0.012
ANTHRACENE	<0.012
FLUORANTHENE	0.067
PYRENE	<0.026
BENZO(A)ANTHRACENE	<0.026
CHRYSENE	<0.026
BENZO(B)FLUORANTHENE	<0.026
BENZO(K)FLUORANTHENE	<0.026
BENZO(A)PYRENE	<0.026
DIBENZO(A,H)ANTHRACENE	<0.051
BENZO(G,H,I)PERYLENE	<0.026
INDENO(1,2,3-CD)PYRENE	<0.026

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE	91

Analytical Technologies, Inc.

ATI I.D. # 9106-321-8

POLYNUCLEAR AROMATIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/27/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/06/91
CLIENT I.D.	: B-14 S-5	DATE ANALYZED	: 07/18/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8310	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
NAPHTHALENE	<0.13
ACENAPHTHYLENE	<0.27
ACENAPHTHENE	<0.27
FLUORENE	<0.027
PHENANTHRENE	0.015
ANTHRACENE	<0.013
FLUORANTHENE	<0.027
PYRENE	<0.027
BENZO(A)ANTHRACENE	<0.027
CHRYSENE	<0.027
BENZO(B)FLUORANTHENE	<0.027
BENZO(K)FLUORANTHENE	<0.027
BENZO(A)PYRENE	<0.027
DIBENZO(A,H)ANTHRACENE	<0.054
BENZO(G,H,I)PERYLENE	<0.027
INDENO(1,2,3-CD)PYRENE	<0.027

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE	173

Analytical Technologies, Inc.

ATI I.D. # 9106-321-9

POLYNUCLEAR AROMATIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/27/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/06/91
CLIENT I.D.	: B-13 S-3	DATE ANALYZED	: 07/17/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8310	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
NAPHTHALENE	<0.12
ACENAPHTHYLENE	<0.25
ACENAPHTHENE	<0.25
FLUORENE	<0.025
PHENANTHRENE	<0.012
ANTHRACENE	0.013
FLUORANTHENE	<0.025
PYRENE	<0.025
BENZO(A)ANTHRACENE	<0.025
CHRYSENE	<0.025
BENZO(B)FLUORANTHENE	<0.025
BENZO(K)FLUORANTHENE	<0.025
BENZO(A)PYRENE	<0.025
DIBENZO(A,H)ANTHRACENE	<0.050
BENZO(G,H,I)PERYLENE	<0.025
INDENO(1,2,3-CD)PYRENE	<0.025

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE	94

Analytical Technologies, Inc.

ATI I.D. # 9106-321-10

POLYNUCLEAR AROMATIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/27/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/06/91
CLIENT I.D.	: B-13 S-5	DATE ANALYZED	: 07/18/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8310	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
NAPHTHALENE	<0.12
ACENAPHTHYLENE	<0.25
ACENAPHTHENE	<0.25
FLUORENE	<0.025
PHENANTHRENE	0.022
ANTHRACENE	<0.012
FLUORANTHENE	0.074
PYRENE	0.026
BENZO(A)ANTHRACENE	<0.025
CHRYSENE	<0.025
BENZO(B)FLUORANTHENE	<0.025
BENZO(K)FLUORANTHENE	<0.025
BENZO(A)PYRENE	<0.025
DIBENZO(A,H)ANTHRACENE	<0.050
BENZO(G,H,I)PERYLENE	<0.025
INDENO(1,2,3-CD)PYRENE	<0.025

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE	89

Analytical Technologies, Inc.

ATI I.D. # 9106-321-11

POLYNUCLEAR AROMATIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/27/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/06/91
CLIENT I.D.	: B-17 S-1	DATE ANALYZED	: 07/17/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8310	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
NAPHTHALENE	<0.33
ACENAPHTHYLENE	<0.67
ACENAPHTHENE	<0.67
FLUORENE	<0.067
PHENANTHRENE	0.13
ANTHRACENE	0.055
FLUORANTHENE	0.58
PYRENE	0.50
BENZO(A)ANTHRACENE	0.20
CHRYSENE	0.27
BENZO(B)FLUORANTHENE	0.47
BENZO(K)FLUORANTHENE	0.20
BENZO(A)PYRENE	0.24
DIBENZO(A,H)ANTHRACENE	<0.13
BENZO(G,H,I)PERYLENE	0.15
INDENO(1,2,3-CD)PYRENE	0.11

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE	76

Analytical Technologies, Inc.

ATI I.D. # 9106-321-12

POLYNUCLEAR AROMATIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 06/27/91
PROJECT #	: 3351	DATE RECEIVED	: 06/28/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/06/91
CLIENT I.D.	: B-17 S-5	DATE ANALYZED	: 07/18/91
SAMPLE MATRIX	: SOIL	UNITS	: mg/Kg
EPA METHOD	: 8310	DILUTION FACTOR	: 1

RESULTS BASED ON DRY WEIGHT

COMPOUND	RESULT
NAPHTHALENE	<0.083
ACENAPHTHYLENE	<0.17
ACENAPHTHENE	<0.17
FLUORENE	<0.017
PHENANTHRENE	0.012
ANTHRACENE	<0.0083
FLUORANTHENE	<0.017
PYRENE	<0.017
BENZO(A)ANTHRACENE	<0.017
CHRYSENE	<0.017
BENZO(B)FLUORANTHENE	<0.017
BENZO(K)FLUORANTHENE	<0.017
BENZO(A)PYRENE	<0.017
DIBENZO(A,H)ANTHRACENE	<0.034
BENZO(G,H,I)PERYLENE	<0.017
INDENO(1,2,3-CD)PYRENE	<0.017

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE	91

Analytical Technologies, Inc.

ATI I.D. # 9106-321

POLYNUCLEAR AROMATIC ANALYSIS
QUALITY CONTROL DATA

CLIENT	: HART CROWSER, INC.	SAMPLE I.D. #	: 106556-06
PROJECT #	: 3351	DATE EXTRACTED	: 07/05/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE ANALYZED	: 07/11/91
EPA METHOD	: 8310	UNITS	: mg/Kg
SAMPLE MATRIX	: SOIL		

COMPOUND	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
ACENAPHTHYLENE	<0.17	10.8	13	120	15	139*	14
PHENANTHRENE	<0.0083	1.08	1.5	139	1.7	157	13
PYRENE	<0.017	2.00	1.6	80	1.8	90	12
BENZO(K)FLUORANTHENE	<0.017	0.964	1.2	124	1.3	135	8

* Out of limits.

$$\% \text{ Recovery} = \frac{(\text{Spiked Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Spike Result} - \text{Dup. Spike Result})|}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

ATI I.D. # 9106-321

POLYNUCLEAR AROMATIC ANALYSIS
QUALITY CONTROL DATA

CLIENT	: HART CROWSER, INC.	SAMPLE I.D. #	: 9106-321-1
PROJECT #	: 3351	DATE EXTRACTED	: 07/06/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE ANALYZED	: 07/17/91
EPA METHOD	: 8310	UNITS	: mg/Kg
SAMPLE MATRIX	: SOIL		

COMPOUND	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
ACENAPHTHYLENE	<0.17	19.5	16	82	15	77	6
PHENANTHRENE	0.013	1.84	2.0	108	1.9	103	5
PYRENE	<0.017	1.85	2.0	108	2.1	114	5
BENZO(K)FLUORANTHENE	<0.017	1.18	1.4	119	1.4	119	0

$$\% \text{ Recovery} = \frac{(\text{Spiked Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Spike Result} - \text{Dup. Spike Result})|}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

ATI I.D. # 9106-321

POLYNUCLEAR AROMATIC ANALYSIS
QUALITY CONTROL DATA

CLIENT : HART CROWSER, INC.
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH
EPA METHOD : 8310
SAMPLE MATRIX : SOIL

SAMPLE I.D. # : BLANK SPIKE
DATE EXTRACTED : 07/06/91
DATE ANALYZED : 07/17/91
UNITS : mg/Kg

COMPOUND	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
ACENAPHTHYLENE	<0.17	17.0	13	76	N/A	N/A	N/A
PHENANTHRENE	<0.0083	1.60	1.3	81	N/A	N/A	N/A
PYRENE	<0.017	1.62	1.4	86	N/A	N/A	N/A
BENZO(K)FLUORANTHENE	<0.017	1.03	0.96	93	N/A	N/A	N/A

$$\% \text{ Recovery} = \frac{(\text{Spiked Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Spike Result} - \text{Dup. Spike Result})|}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

ATI I.D. # 9106-321

PRIORITY POLLUTANT METALS ANALYSIS

CLIENT : HART CROWSER, INC. MATRIX : SOIL
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH

ELEMENT	DATE PREPARED	DATE ANALYZED
ANTIMONY	07/01/91	07/02/91
ARSENIC	07/01/91	07/13/91
BERYLLIUM	07/01/91	07/02/91
CADMIUM	07/01/91	07/02/91
CHROMIUM	07/01/91	07/02/91
COPPER	07/01/91	07/02/91
LEAD	07/01/91	07/02/91
MERCURY	07/01/91	07/02/91
NICKEL	07/01/91	07/02/91
SELENIUM	07/01/91	07/13/91
SILVER	07/01/91	07/02/91
THALLIUM	07/01/91	07/12/91
ZINC	07/01/91	07/02/91

Analytical Technologies, Inc.

ATI I.D. # 9106-321

PRIORITY POLLUTANT METALS ANALYSIS DATA SUMMARY

CLIENT : HART CROWSER, INC. MATRIX : SOIL
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH UNITS : mg/Kg

ELEMENT	MW-1 S-2 -1	MW-1 S-7 -2	B-16 S-3 -3	B-16 S-5 -4	B-15 S-2 -5
ANTIMONY	<3.0	<3.0	<3.0	<3.0	<3.0
ARSENIC	3.3	3.1	11.2	1.8	4.2
BERYLLIUM	<0.5	<0.5	<0.5	<0.5	<0.5
CADMIUM	1.3	1.0	1.3	1.0	0.7
CHROMIUM	31.5	28.8	30.3	32.1	12.9
COPPER	21.0	15.1	20.2	15.1	21.5
LEAD	3.2	4.2	28.7	3.1	5.2
MERCURY	<0.25	<0.25	<0.25	<0.25	<0.25
NICKEL	38.6	38.7	29.9	32.0	8.0
SELENIUM	<1.0	<1.0	<1.0	<1.0	<1.0
SILVER	<1.0	<1.0	<1.0	<1.0	<1.0
THALLIUM	<1.0	<1.0	<1.0	<1.0	<1.0
ZINC	35.4	32.6	42.6	31.4	19.7

Analytical Technologies, Inc.

ATI I.D. # 9106-321

PRIORITY POLLUTANT METALS ANALYSIS DATA SUMMARY CONTINUED

CLIENT : HART CROWSER, INC. MATRIX : SOIL
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH UNITS : mg/Kg

ELEMENT	B-15 S-6 -6	B-14 S-2 -7	B-14 S-5 -8	B-13 S-3 -9	B-13 S-5 -10
ANTIMONY	<3.0	<3.0	<3.0	<3.0	<3.0
ARSENIC	1.4	7.0	2.5	6.4	14.1
BERYLLIUM	<0.5	<0.5	<0.5	<0.5	<0.5
CADMIUM	1.1	1.3	0.8	0.9	1.4
CHROMIUM	29.5	30.6	28.4	15.1	28.7
COPPER	19.4	26.3	15.8	26.2	29.2
LEAD	4.5	20.3	2.2	7.1	55.1
MERCURY	<0.25	<0.25	<0.25	<0.25	<0.25
NICKEL	29.8	34.6	27.9	14.2	29.4
SELENIUM	<1.0	<1.0	<1.0	<1.0	<1.0
SILVER	<1.0	<1.0	<1.0	<1.0	<1.0
THALLIUM	<1.0	<1.0	<1.0	<1.0	<1.0
ZINC	36.3	230	29.1	28.4	53.9

Analytical Technologies, Inc.

ATI I.D. # 9106-321

PRIORITY POLLUTANT METALS ANALYSIS DATA SUMMARY CONTINUED

CLIENT : HART CROWSER, INC. MATRIX : SOIL
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH UNITS : mg/Kg

ELEMENT	B-17 S-1 -11	B-17 S-5 -12	REAGENT BLANK
ANTIMONY	<3.0	<3.0	<3.0
ARSENIC	10.2	2.4	<1.0
BERYLLIUM	<0.5	<0.5	<0.5
CADMIUM	0.8	0.9	<0.5
CHROMIUM	18.9	10.7	<0.5
COPPER	28.0	23.0	<1.0
LEAD	18.9	3.4	<1.5
MERCURY	<0.25	<0.25	<0.25
NICKEL	21.1	9.8	<1.0
SELENIUM	1.7	<1.0	<1.0
SILVER	<1.0	<1.0	<1.0
THALLIUM	<1.0	<1.0	<1.0
ZINC	37.7	23.7	<1.0

Analytical Technologies, Inc.

ATI I.D. # 9106-321

PRIORITY POLLUTANT
METALS ANALYSIS
QUALITY CONTROL DATA

CLIENT : HART CROWSER, INC. MATRIX : SOIL
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH UNITS : mg/Kg

ELEMENT	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED RESULT	SPIKE ADDED	% REC
ANTIMONY	9106-321-2	<3.0	<3.0	NC	25.7	63.3	41
ARSENIC	9106-321-2	3.1	3.7	18	62.9	61.0	98
BERYLLIUM	9106-321-2	<0.5	<0.5	NC	60.3	63.3	95
CADMIUM	9106-321-2	1.0	0.9	11	55.1	63.3	85
CHROMIUM	9106-321-2	28.8	25.5	12	80.8	63.3	82
COPPER	9106-321-2	15.1	14.9	1	72.6	63.3	91
LEAD	9106-321-2	4.2	2.7	43	60.1	63.3	88
MERCURY	9106-321-2	<0.25	<0.25	NC	2.4	2.4	100
NICKEL	9106-321-2	38.7	37.4	3	94.7	63.3	88
SELENIUM	9106-321-2	<1.0	<1.0	NC	33.8	28.9	117
SILVER	9106-321-2	<1.0	<1.0	NC	50.0	63.3	79
THALLIUM	9106-321-2	<1.0	<1.0	NC	53.0	48.1	110
ZINC	9106-321-2	32.6	29.5	10	84.2	63.3	82

NC = Not calculable.

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

ATI I.D. # 9106-321

GENERAL CHEMISTRY ANALYSIS

CLIENT : HART CROWSER, INC. MATRIX : SOIL
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH

PARAMETER	DATE PREPARED	DATE ANALYZED
PETROLEUM HYDROCARBONS	07/01/91	07/01/91
MOISTURE	-	07/02/91
MOISTURE *	-	07/01/91

* Analyzed at ATI - San Diego, CA, laboratory.

Analytical Technologies, Inc.

ATI I.D. # 9106-321

GENERAL CHEMISTRY ANALYSIS
DATA SUMMARY

CLIENT : HART CROWSER, INC. MATRIX : SOIL
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH UNITS : mg/Kg

ATI I.D. #	CLIENT I.D.	PETROLEUM HYDROCARBONS
9106-321-1	MW-1 S-2	19
9106-321-3	B-16 S-3	150
9106-321-5	B-15 S-2	32
9106-321-7	B-14 S-2	36
9106-321-9	B-13 S-3	25
9106-321-11	B-17 S-1	70
REAGENT BLANK	-	<5

Analytical Technologies, Inc.

ATI I.D. # 9106-321

GENERAL CHEMISTRY ANALYSIS
QUALITY CONTROL DATA

CLIENT : HART CROWSER, INC. MATRIX : SOIL
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH UNITS : mg/Kg

PARAMETER	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED RESULT	SPIKE ADDED	% REC
PETROLEUM HYDROCARBONS	9106-328-1	39,000	51,000	26	**	**	**
PETROLEUM HYDROCARBONS	BLANK SPIKE	<5	N/A	N/A	279	233	120

** Due to the necessary dilution of the sample, result was not attainable.

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

ATI I.D. # 9106-321

GENERAL CHEMISTRY ANALYSIS
DATA SUMMARY

CLIENT : HART CROWSER, INC. MATRIX : SOIL
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH UNITS : %

ATI I.D. #	CLIENT I.D.	MOISTURE	MOISTURE *
9106-321-1	MW-1 S-2	12	12.6
9106-321-2	MW-1 S-7	19	21.2
9106-321-3	B-16 S-3	43	36.1
9106-321-4	B-16 S-5	20	16.5
9106-321-5	B-15 S-2	32	34.6
9106-321-6	B-15 S-6	16	16.5
9106-321-7	B-14 S-2	40	33.5
9106-321-8	B-14 S-5	45	37.5
9106-321-9	B-13 S-3	31	32.2
9106-321-10	B-13 S-5	31	31.7
9106-321-11	B-17 S-1	48	74.8
9106-321-12	B-17 S-5	29	26.0

* Analyzed at ATI - San Diego, CA, laboratory.

Analytical Technologies, Inc.

ATI I.D. # 9106-321

GENERAL CHEMISTRY ANALYSIS
QUALITY CONTROL DATA

CLIENT : HART CROWSER, INC. MATRIX : SOIL
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH UNITS : %

PARAMETER	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED RESULT	SPIKE ADDED	% REC
MOISTURE	9106-321-10	31	30	3	N/A	N/A	N/A
MOISTURE	9106-315-1	11	11	0	N/A	N/A	N/A
MOISTURE *	9106-321-1	12.6	12.4	2	N/A	N/A	N/A
MOISTURE *	106553-06	9.5	9.6	1	N/A	N/A	N/A

* Analyzed at ATI - San Diego, CA, laboratory.

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

Analytical**Technologies,**Inc.

560 Naches Avenue SW, Suite 101 Renton,WA 98055 (206)228-8335

RE

DATE _____ PAGE 1 OF 1

Chain of Custody

LABORATORY NUMBER: [illegible]

PROJECT MANAGER: [illegible]

COMPANY: [illegible]

ADDRESS: [illegible]

PHONE: [illegible] SAMPLED BY: [illegible]

SAMPLE DISPOSAL INSTRUCTIONS

☐ ATI Disposal @ $5.00 each ☐ Return

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	8010 Halogenated Volatiles	8020 Aromatic Volatiles	8020 BETX ONLY	8240 GCMS Volatiles	8270 GCMS BNA	8310 HPLC PNA	8080 Pesticides & PCB's	8080 PCB's ONLY	8140 Phosphate Pesticides	8150 Herbicides	WDOE PAH/HH (WAC 173)	418.1 (TPH)	413.2 Grease & Oil	8015 (Modified)	TOC 9060	TOX 9020	% Moisture	EP TOX Metals (8) EP EXT	Priority Pollutant Metals (13)	8080 Pesticide (4)	8240 ZH-EXT	8270	8150 Herbicides (2)	Metals (8)			NUMBER OF CONTAINERS
																								TCLP ONLY						
[illegible]	[illegible]		Soil	1				X	X	X						X							X							1
[illegible]	[illegible]			2						X													X							1
[illegible]	[illegible]			3				X	X	X						X							X							1
[illegible]	[illegible]			4						X													X							1
[illegible]	[illegible]			5				X	X	X						X							X							1
[illegible]	[illegible]			6						X						X							X							1
[illegible]	[illegible]			7				X	X	X						X							X							1
[illegible]	[illegible]			8						X						X							X							1
[illegible]	[illegible]			9				X	X	X						X							X							1
[illegible]	[illegible]			10						X													X							1
[illegible]	[illegible]			11				X	X	X						X							X							1
[illegible]	[illegible]		V	12						X						X							X							1

PROJECT INFORMATION

PROJECT NUMBER: [illegible]

PROJECT NAME: [illegible]

PURCHASE ORDER NUMBER:

ONGOING PROJECT? YES ☐ NO ☐

SAMPLE RECEIPT

TOTAL NUMBER OF CONTAINERS	12
COC SEALS/INTACT? Y/N/NA	Y
RECEIVED GOOD COND./COLD	Y
RECEIVED VIA:	[illegible]

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

TAT: (NORMAL) ☐ 2WKS (RUSH) ☐ 24HR ☐ 48 HRS ☐ 72 HRS ☐ 1 WK

GREATER THAN 24 HR. NOTICE? YES ☐ NO ☐ (LAB USE ONLY)

SPECIAL INSTRUCTIONS: [illegible]

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Time: [illegible]	Signature: Time:	Signature: Time:
Printed Name: Date: [illegible]	Printed Name: Date:	Printed Name: Date:
Company: [illegible]	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: Time: [illegible]	Signature: Time:	Signature: Time:
Printed Name: Date: [illegible]	Printed Name: Date:	Printed Name: Date:
Company: ATI	Company:	Analytical Technologies, Inc.

ATI Labs: San Diego (619)458-9141 • Phoenix (602)438-1530 • Seattle (206)228-8335 • Pensacola (904)474-1001 **DISTRIBUTION:** White, Canary - ATI • Pink - ORIGINATOR

AnalyticalTechnologies, Inc.

560 Naches Avenue SW, Suite 101 Renton, WA 98055 (206)228-8335

Chain of Custody

SD

DATE 6/28/91 PAGE 1 OF 1

LABORATORY NUMBER: 106548

PROJECT MANAGER: LEE CARFIOLI
COMPANY: ATI - RENTON
ADDRESS:
PHONE: (206) 228-8335 SAMPLED BY:

SAMPLE DISPOSAL INSTRUCTIONS

☒ ATI Disposal @ $5.00 each ☒ Return See notes below

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
9106321 -1	6/25/91		Soil	
-2	↓			
-3	6/26/91			
-4	↓			
-5	6/27/91			
-6				
-7				
-8				
-9				
-10				
-11				
-12	↓		↓	

8010 Halogenated Volatiles	8020 Aromatic Volatiles	8020 BETX ONLY	8240 GCMS Volatiles	8270 GCMS BNA extraction	8310 HPLC PNA	8080 Pesticides & PCB's	8080 PCB's ONLY	8140 Phosphate Pesticides	8150 Herbicides	WDOE PAH/HH (WAC 173)	418.1 (TPH)	413.2 Grease & Oil	8015 (Modified)	TOC 9060	TOX 9020	% Moisture	EP TOX Metals (8) EP EXT	Priority Pollutant Metals (13)	TCLP ONLY: 8080 Pesticide (4)	TCLP ONLY: 8240 ZH-EXT	TCLP ONLY: 8270	TCLP ONLY: 8150 Herbicides (2)	TCLP ONLY: Metals (8)			NUMBER OF CONTAINERS
				X	X											X		X								1
					X											X		X								
					X											X		X								
				X	X											X		X								
					X											X		X								
				X	X											X		X								
					X											X		X								
				X	X											X		X								
					X											X		X								
				X	X											X		X								
					X											X		X								
				X	X											X		X								
					X											X		X								

8 soil 8oz jars
4 @ 8 oz
3 @ 4 oz
3 @ 8 oz
4 oz
8 oz
4 oz
8 oz
4 oz
8 oz
-4 oz jar

PROJECT INFORMATION

PROJECT NUMBER: 3351
PROJECT NAME: HCI/WSDOT - DUW.
PURCHASE ORDER NUMBER:
ONGOING PROJECT? YES ☐ NO ☐

SAMPLE RECEIPT

TOTAL NUMBER OF CONTAINERS	12
COC SEALS/INTACT? Y/N/NA	Y
RECEIVED GOOD COND./COLD	Y
RECEIVED VIA:	FX

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

(NORMAL) ☐ 2WKS (RUSH) ☐ 24HR ☐ 48 HRS ☐ 72 HRS ☐ 1 WK
ATER THAN 24 HR. NOTICE? YES ☐ NO ☐ (LAB USE ONLY)

AL INSTRUCTIONS:

Return COC to ATI Renton
Send sheets to WA
ASAP
7/12

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Time: Emily Carfioli 1415	Signature: Time:	Signature: Time:
Printed Name: Date: E Cochran 6/28/91	Printed Name: Date:	Printed Name: Date:
Company: ATI	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: Time:	Signature: Time:	Signature: Time: 1615
Printed Name: Date:	Printed Name: Date:	Printed Name: Date: Michael Hallman 6/28/91
Company:	Company:	Analytical Technologies, Inc.

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Thank you.

Analytical Technologies, Inc. 560 Naches Avenue, S.W., Suite 101, Renton, WA 98055, (206) 228-8335

ATI I.D. # 9107-026

August 1, 1991

Hart Crowser, Inc.
1910 Fairview Avenue East
Seattle, WA 98102-3699

Attention : Marian Wineman

Project Number : 3351

Project Name : WSDOT-Duwamish

On July 2, 1991, Analytical Technologies, Inc. received six water samples for analysis. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and the quality control data are enclosed.

Emily C. Carfioli
Senior Project Manager

Frederick W. Grothkopp
Technical Manager

FWG/ew

Analytical Technologies, Inc.

ATI I.D. # 9107-026

SAMPLE CROSS REFERENCE SHEET

CLIENT : HART CROWSER, INC.
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH

ATI #	CLIENT DESCRIPTION	DATE SAMPLED	MATRIX
9107-026-1	MW-1	07/01/91	WATER
9107-026-2	MW-2	07/01/91	WATER
9107-026-3	MW-3	07/01/91	WATER
9107-026-4	MW-4	07/01/91	WATER
9107-026-5	DUP	07/01/91	WATER
9107-026-6	TRIP BLANK	N/A	WATER

----- TOTALS -----

MATRIX	# SAMPLES
WATER	6

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

Analytical Technologies, Inc.

ATI I.D. # 9107-026

ANALYTICAL SCHEDULE

CLIENT : HART CROWSER, INC.
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH

ANALYSIS	TECHNIQUE	REFERENCE	LAB
VOLATILE ORGANIC COMPOUNDS	GCMS	EPA 8240	R
SEMI-VOLATILE COMPOUNDS	GCMS	EPA 8270	R/SD
POLYNUCLEAR AROMATIC HYDROCARBONS	HPLC/UV	EPA 8310	SD
ANTIMONY	ICAP	EPA 6010	SD
ARSENIC	AA/GF	EPA 7060	SD
BERYLLIUM	ICAP	EPA 6010	SD
CADMIUM	ICAP	EPA 6010	SD
CHROMIUM	ICAP	EPA 6010	SD
COPPER	ICAP	EPA 6010	SD
LEAD	AA/GF	EPA 7421	SD
MERCURY	AA/COLD VAPOR	EPA 7471	SD
NICKEL	ICAP	EPA 6010	SD
SELENIUM	AA/GF	EPA 7740	SD
SILVER	ICAP	EPA 6010	SD
THALLIUM	AA/GF	EPA 7841	SD
ZINC	ICAP	EPA 6010	SD
PETROLEUM HYDROCARBONS	IR	EPA 418.1	R

R = ATI - Renton
SD = ATI - San Diego
T = ATI - Tempe
PNR = ATI - Pensacola
FC = ATI - Fort Collins
SUB = Subcontract

Analytical Technologies, Inc.

ATI I.D. # 9107-026

VOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 3351	DATE RECEIVED	: N/A
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: N/A
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 07/10/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8240	DILUTION FACTOR	: 1

COMPOUND	RESULT
ACETONE	<10
BENZENE	<1
BROMODICHLOROMETHANE	<1
BROMOFORM	<5
BROMOMETHANE	<10
2-BUTANONE (MEK)	<10
CARBON DISULFIDE	<1
CARBON TETRACHLORIDE	<1
CHLOROBENZENE	<1
CHLOROETHANE	<1
CHLOROFORM	<1
CHLOROMETHANE	<10
DIBROMOCHLOROMETHANE	<1
1,1-DICHLOROETHANE	<1
1,2-DICHLOROETHANE	<1
1,1-DICHLOROETHENE	<1
1,2-DICHLOROETHENE (TOTAL)	<1
1,2-DICHLOROPROPANE	<1
CIS-1,3-DICHLOROPROPENE	<1
TRANS-1,3-DICHLOROPROPENE	<1
ETHYLBENZENE	<1
2-HEXANONE (MBK)	<10
4-METHYL-2-PENTANONE (MIBK)	<10
METHYLENE CHLORIDE	<5
STYRENE	<1
1,1,2,2-TETRACHLOROETHANE	<1
TETRACHLOROETHENE	<1
TOLUENE	<1
1,1,1-TRICHLOROETHANE	<1
1,1,2-TRICHLOROETHANE	<1
TRICHLOROETHENE	<1
VINYL ACETATE	<10
VINYL CHLORIDE	<1
TOTAL XYLENES	<1

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-D4	107
TOLUENE-D8	103
BROMOFLUOROBENZENE	105

Analytical Technologies, Inc.

ATI I.D. # 9107-026

VOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 3351	DATE RECEIVED	: N/A
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: N/A
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 07/10/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8240	DILUTION FACTOR	: 1

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION

NO NON-HSL COMPOUNDS FOUND > 10% OF NEAREST INTERNAL STANDARD

Analytical Technologies, Inc.

ATI I.D. # 9107-026-1

VOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 07/01/91
PROJECT #	: 3351	DATE RECEIVED	: 07/02/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-1	DATE ANALYZED	: 07/10/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8240	DILUTION FACTOR	: 1

COMPOUND	RESULT
ACETONE	<10
BENZENE	<1
BROMODICHLOROMETHANE	<1
BROMOFORM	<5
BROMOMETHANE	<10
2-BUTANONE (MEK)	<10
CARBON DISULFIDE	<1
CARBON TETRACHLORIDE	<1
CHLOROBENZENE	<1
CHLOROETHANE	<1
CHLOROFORM	<1
CHLOROMETHANE	<10
DIBROMOCHLOROMETHANE	<1
1,1-DICHLOROETHANE	<1
1,2-DICHLOROETHANE	<1
1,1-DICHLOROETHENE	<1
1,2-DICHLOROETHENE (TOTAL)	<1
1,2-DICHLOROPROPANE	<1
CIS-1,3-DICHLOROPROPENE	<1
TRANS-1,3-DICHLOROPROPENE	<1
ETHYLBENZENE	<1
2-HEXANONE (MBK)	<10
4-METHYL-2-PENTANONE (MIBK)	<10
METHYLENE CHLORIDE	<5
STYRENE	<1
1,1,2,2-TETRACHLOROETHANE	<1
TETRACHLOROETHENE	<1
TOLUENE	<1
1,1,1-TRICHLOROETHANE	<1
1,1,2-TRICHLOROETHANE	<1
TRICHLOROETHENE	<1
VINYL ACETATE	<10
VINYL CHLORIDE	<1
TOTAL XYLENES	<1

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-D4	113
TOLUENE-D8	108
BROMOFLUOROBENZENE	110

Analytical Technologies, Inc.

ATI I.D. # 9107-026-1

VOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 07/01/91
PROJECT #	: 3351	DATE RECEIVED	: 07/02/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-1	DATE ANALYZED	: 07/10/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8240	DILUTION FACTOR	: 1

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION

NO NON-HSL COMPOUNDS FOUND > 10% OF NEAREST INTERNAL STANDARD

Analytical Technologies, Inc.

ATI I.D. # 9107-026-2

VOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 07/01/91
PROJECT #	: 3351	DATE RECEIVED	: 07/02/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-2	DATE ANALYZED	: 07/11/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8240	DILUTION FACTOR	: 1

COMPOUND	RESULT
ACETONE	<10
BENZENE	<1
BROMODICHLOROMETHANE	<1
BROMOFORM	<5
BROMOMETHANE	<10
2-BUTANONE (MEK)	<10
CARBON DISULFIDE	<1
CARBON TETRACHLORIDE	<1
CHLOROBENZENE	<1
CHLOROETHANE	<1
CHLOROFORM	<1
CHLOROMETHANE	<10
DIBROMOCHLOROMETHANE	<1
1,1-DICHLOROETHANE	<1
1,2-DICHLOROETHANE	<1
1,1-DICHLOROETHENE	<1
1,2-DICHLOROETHENE (TOTAL)	<1
1,2-DICHLOROPROPANE	<1
CIS-1,3-DICHLOROPROPENE	<1
TRANS-1,3-DICHLOROPROPENE	<1
ETHYLBENZENE	<1
2-HEXANONE (MBK)	<10
4-METHYL-2-PENTANONE (MIBK)	<10
METHYLENE CHLORIDE	<5
STYRENE	<1
1,1,2,2-TETRACHLOROETHANE	<1
TETRACHLOROETHENE	<1
TOLUENE	<1
1,1,1-TRICHLOROETHANE	<1
1,1,2-TRICHLOROETHANE	<1
TRICHLOROETHENE	<1
VINYL ACETATE	<10
VINYL CHLORIDE	<1
TOTAL XYLENES	<1

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-D4	104
TOLUENE-D8	100
BROMOFLUOROBENZENE	103

Analytical Technologies, Inc.

ATI I.D. # 9107-026-2

VOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 07/01/91
PROJECT #	: 3351	DATE RECEIVED	: 07/02/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-2	DATE ANALYZED	: 07/11/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8240	DILUTION FACTOR	: 1

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION
DODECANE		1256	8.0

Analytical Technologies, Inc.

ATI I.D. # 9107-026-3

VOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 07/01/91
PROJECT #	: 3351	DATE RECEIVED	: 07/02/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-3	DATE ANALYZED	: 07/11/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8240	DILUTION FACTOR	: 1

COMPOUND	RESULT
ACETONE	8 J
BENZENE	<1
BROMODICHLOROMETHANE	<1
BROMOFORM	<5
BROMOMETHANE	<10
2-BUTANONE (MEK)	<10
CARBON DISULFIDE	<1
CARBON TETRACHLORIDE	<1
CHLOROBENZENE	<1
CHLOROETHANE	<1
CHLOROFORM	<1
CHLOROMETHANE	<10
DIBROMOCHLOROMETHANE	<1
1,1-DICHLOROETHANE	<1
1,2-DICHLOROETHANE	<1
1,1-DICHLOROETHENE	<1
1,2-DICHLOROETHENE (TOTAL)	<1
1,2-DICHLOROPROPANE	<1
CIS-1,3-DICHLOROPROPENE	<1
TRANS-1,3-DICHLOROPROPENE	<1
ETHYLBENZENE	<1
2-HEXANONE (MBK)	<10
4-METHYL-2-PENTANONE (MIBK)	<10
METHYLENE CHLORIDE	<5
STYRENE	<1
1,1,2,2-TETRACHLOROETHANE	<1
TETRACHLOROETHENE	<1
TOLUENE	<1
1,1,1-TRICHLOROETHANE	<1
1,1,2-TRICHLOROETHANE	<1
TRICHLOROETHENE	<1
VINYL ACETATE	<10
VINYL CHLORIDE	<1
TOTAL XYLENES	<1
SURROGATE PERCENT RECOVERIES	
1,2-DICHLOROETHANE-D4	110
TOLUENE-D8	108
BROMOFLUOROBENZENE	110

J = Estimated value.

Analytical Technologies, Inc.

ATI I.D. # 9107-026-3

VOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 07/01/91
PROJECT #	: 3351	DATE RECEIVED	: 07/02/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-3	DATE ANALYZED	: 07/11/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8240	DILUTION FACTOR	: 1

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION
DODECANE, 2,7,10-TRIMETHYL-		1236	19

Analytical Technologies, Inc.

ATI I.D. # 9107-026-4

VOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 07/01/91
PROJECT #	: 3351	DATE RECEIVED	: 07/02/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-4	DATE ANALYZED	: 07/11/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8240	DILUTION FACTOR	: 1

COMPOUND	RESULT
ACETONE	21
BENZENE	<1
BROMODICHLOROMETHANE	<1
BROMOFORM	<5
BROMOMETHANE	<10
2-BUTANONE (MEK)	<10
CARBON DISULFIDE	<1
CARBON TETRACHLORIDE	<1
CHLOROBENZENE	<1
CHLOROETHANE	<1
CHLOROFORM	<1
CHLOROMETHANE	<10
DIBROMOCHLOROMETHANE	<1
1,1-DICHLOROETHANE	<1
1,2-DICHLOROETHANE	<1
1,1-DICHLOROETHENE	<1
1,2-DICHLOROETHENE (TOTAL)	<1
1,2-DICHLOROPROPANE	<1
CIS-1,3-DICHLOROPROPENE	<1
TRANS-1,3-DICHLOROPROPENE	<1
ETHYLBENZENE	<1
2-HEXANONE (MBK)	<10
4-METHYL-2-PENTANONE (MIBK)	<10
METHYLENE CHLORIDE	3 J
STYRENE	<1
1,1,2,2-TETRACHLOROETHANE	<1
TETRACHLOROETHENE	<1
TOLUENE	1
1,1,1-TRICHLOROETHANE	<1
1,1,2-TRICHLOROETHANE	<1
TRICHLOROETHENE	<1
VINYL ACETATE	<10
VINYL CHLORIDE	<1
TOTAL XYLENES	<1
SURROGATE PERCENT RECOVERIES	
1,2-DICHLOROETHANE-D4	108
TOLUENE-D8	104
BROMOFLUOROBENZENE	105

J = Estimated value.

Analytical Technologies, Inc.

ATI I.D. # 9107-026-4

VOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 07/01/91
PROJECT #	: 3351	DATE RECEIVED	: 07/02/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-4	DATE ANALYZED	: 07/11/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8240	DILUTION FACTOR	: 1

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION
UNDECANE, 3,8-DIMETHYL-		1171	9.0

Analytical Technologies, Inc.

ATI I.D. # 9107-026-5

VOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 07/01/91
PROJECT #	: 3351	DATE RECEIVED	: 07/02/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: N/A
CLIENT I.D.	: DUP	DATE ANALYZED	: 07/11/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8240	DILUTION FACTOR	: 1

COMPOUND	RESULT
ACETONE	<10
BENZENE	<1
BROMODICHLOROMETHANE	<1
BROMOFORM	<5
BROMOMETHANE	<10
2-BUTANONE (MEK)	<10
CARBON DISULFIDE	<1
CARBON TETRACHLORIDE	<1
CHLOROBENZENE	<1
CHLOROETHANE	<1
CHLOROFORM	<1
CHLOROMETHANE	<10
DIBROMOCHLOROMETHANE	<1
1,1-DICHLOROETHANE	<1
1,2-DICHLOROETHANE	<1
1,1-DICHLOROETHENE	<1
1,2-DICHLOROETHENE (TOTAL)	<1
1,2-DICHLOROPROPANE	<1
CIS-1,3-DICHLOROPROPENE	<1
TRANS-1,3-DICHLOROPROPENE	<1
ETHYLBENZENE	<1
2-HEXANONE (MBK)	<10
4-METHYL-2-PENTANONE (MIBK)	<10
METHYLENE CHLORIDE	<5
STYRENE	<1
1,1,2,2-TETRACHLOROETHANE	<1
TETRACHLOROETHENE	<1
TOLUENE	<1
1,1,1-TRICHLOROETHANE	<1
1,1,2-TRICHLOROETHANE	<1
TRICHLOROETHENE	<1
VINYL ACETATE	<10
VINYL CHLORIDE	<1
TOTAL XYLENES	<1

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-D4	104
TOLUENE-D8	100
BROMOFLUOROBENZENE	100

Analytical Technologies, Inc.

ATI I.D. # 9107-026-5

VOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 07/01/91
PROJECT #	: 3351	DATE RECEIVED	: 07/02/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: N/A
CLIENT I.D.	: DUP	DATE ANALYZED	: 07/11/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8240	DILUTION FACTOR	: 1

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION

NO NON-HSL COMPOUNDS FOUND > 10% OF NEAREST INTERNAL STANDARD

Analytical Technologies, Inc.

ATI I.D. # 9107-026-6

VOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 3351	DATE RECEIVED	: 07/02/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: N/A
CLIENT I.D.	: TRIP BLANK	DATE ANALYZED	: 07/11/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8240	DILUTION FACTOR	: 1

COMPOUND	RESULT
ACETONE	8 J
BENZENE	<1
BROMODICHLOROMETHANE	<1
BROMOFORM	<5
BROMOMETHANE	<10
2-BUTANONE (MEK)	<10
CARBON DISULFIDE	<1
CARBON TETRACHLORIDE	<1
CHLOROBENZENE	<1
CHLOROETHANE	<1
CHLOROFORM	<1
CHLOROMETHANE	<10
DIBROMOCHLOROMETHANE	<1
1,1-DICHLOROETHANE	<1
1,2-DICHLOROETHANE	<1
1,1-DICHLOROETHENE	<1
1,2-DICHLOROETHENE (TOTAL)	<1
1,2-DICHLOROPROPANE	<1
CIS-1,3-DICHLOROPROPENE	<1
TRANS-1,3-DICHLOROPROPENE	<1
ETHYLBENZENE	<1
2-HEXANONE (MBK)	<10
4-METHYL-2-PENTANONE (MIBK)	<10
METHYLENE CHLORIDE	6
STYRENE	<1
1,1,2,2-TETRACHLOROETHANE	<1
TETRACHLOROETHENE	<1
TOLUENE	<1
1,1,1-TRICHLOROETHANE	<1
1,1,2-TRICHLOROETHANE	<1
TRICHLOROETHENE	<1
VINYL ACETATE	<10
VINYL CHLORIDE	<1
TOTAL XYLENES	<1
SURROGATE PERCENT RECOVERIES	
1,2-DICHLOROETHANE-D4	111
TOLUENE-D8	106
BROMOFLUOROBENZENE	107

J = Estimated value.

Analytical Technologies, Inc.

ATI I.D. # 9107-026-6

VOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 3351	DATE RECEIVED	: 07/02/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: N/A
CLIENT I.D.	: TRIP BLANK	DATE ANALYZED	: 07/11/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8240	DILUTION FACTOR	: 1

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION

NO NON-HSL COMPOUNDS FOUND > 10% OF NEAREST INTERNAL STANDARD

Analytical Technologies, Inc.

ATI I.D. # 9107-026

VOLATILE ORGANIC ANALYSIS
QUALITY CONTROL DATA

CLIENT : HART CROWSER, INC.
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH
EPA METHOD : 8240
SAMPLE MATRIX : WATER

SAMPLE I.D. # : 9107-026-1
DATE EXTRACTED : N/A
DATE ANALYZED : 07/10/91
UNITS : ug/L

COMPOUND	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
1,1-DICHLOROETHENE	<1.0	50.0	41.3	83	44.2	88	7
TRICHLOROETHENE	<1.0	50.0	48.9	98	51.5	103	5
BENZENE	<1.0	50.0	50.2	100	53.6	107	7
TOLUENE	<1.0	50.0	50.1	100	53.0	106	6
CHLOROBENZENE	<1.0	50.0	50.3	101	52.8	106	5

$$\% \text{ Recovery} = \frac{(\text{Spiked Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{\left|(\text{Spike Result} - \text{Dup. Spike Result})\right|}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

ATI I.D. # 9107-026

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 3351	DATE RECEIVED	: N/A
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/08/91
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 07/23/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUND	RESULT
N-NITROSODIMETHYLAMINE	<10
PHENOL	<10
ANILINE	<10
BIS(2-CHLOROETHYL)ETHER	<10
2-CHLOROPHENOL	<10
1,3-DICHLOROBENZENE	<10
1,4-DICHLOROBENZENE	<10
BENZYL ALCOHOL	<10
1,2-DICHLOROBENZENE	<10
2-METHYLPHENOL	<10
BIS(2-CHLOROISOPROPYL)ETHER	<10
4-METHYLPHENOL	<10
N-NITROSO-DI-N-PROPYLAMINE	<10
HEXACHLOROETHANE	<10
NITROBENZENE	<10
ISOPHORONE	<10
2-NITROPHENOL	<10
2,4-DIMETHYLPHENOL	<10
BENZOIC ACID	<50
BIS(2-CHLOROETHOXY)METHANE	<10
2,4-DICHLOROPHENOL	<10
1,2,4-TRICHLOROBENZENE	<10
NAPHTHALENE	<10
4-CHLOROANILINE	<10
HEXACHLOROBUTADIENE	<10
4-CHLORO-3-METHYLPHENOL	<10
2-METHYLNAPHTHALENE	<10
HEXACHLOROCYCLOPENTADIENE	<10
2,4,6-TRICHLOROPHENOL	<10
2,4,5-TRICHLOROPHENOL	<50
2-CHLORONAPHTHALENE	<10
2-NITROANILINE	<50
DIMETHYLPHTHALATE	<10
ACENAPHTHYLENE	<10
3-NITROANILINE	<50
ACENAPHTHENE	<10
2,4-DINITROPHENOL	<50
4-NITROPHENOL	<50

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Analytical Technologies, Inc.

ATI I.D. # 9107-026

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 3351	DATE RECEIVED	: N/A
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/08/91
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 07/23/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUND	RESULT
DIBENZOFURAN	<10
2,4-DINITROTOLUENE	<10
2,6-DINITROTOLUENE	<10
DIETHYLPHTHALATE	<10
4-CHLOROPHENYL-PHENYLETHER	<10
FLUORENE	<10
4-NITROANILINE	<50
4,6-DINITRO-2-METHYLPHENOL	<50
N-NITROSODIPHENYLAMINE	<10
4-BROMOPHENYL-PHENYLETHER	<10
HEXACHLOROBENZENE	<10
PENTACHLOROPHENOL	<50
PHENANTHRENE	<10
ANTHRACENE	<10
DI-N-BUTYLPHTHALATE	<10
FLUORANTHENE	<10
BENZIDINE	<100
PYRENE	<10
BUTYLBENZYLPHTHALATE	<10
3,3'-DICHLOROBENZIDINE	<20
BENZO(A)ANTHRACENE	<10
BIS(2-ETHYLHEXYL)PHTHALATE	<10
CHRYSENE	<10
DI-N-OCTYLPHTHALATE	<10
BENZO(B)FLUORANTHENE	<10
BENZO(K)FLUORANTHENE	<10
BENZO(A)PYRENE	<10
INDENO(1,2,3-CD)PYRENE	<10
DIBENZO(A,H)ANTHRACENE	<10
BENZO(G,H,I)PERYLENE	<10

SURROGATE PERCENT RECOVERIES

NITROBENZENE-D5	66
2-FLUOROBIPHENYL	76
TERPHENYL-D14	93
PHENOL-D5	72
2-FLUOROPHENOL	60
2,4,6-TRIBROMOPHENOL	59

Analytical Technologies, Inc.

ATI I.D. # 9107-026

SEMIVOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 3351	DATE RECEIVED	: N/A
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/08/91
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 07/23/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION

NO NON-HSL COMPOUNDS FOUND > 10% OF NEAREST INTERNAL STANDARD

Analytical Technologies, Inc.

ATI I.D. # 9107-026-1

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 07/01/91
PROJECT #	: 3351	DATE RECEIVED	: 07/02/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/08/91
CLIENT I.D.	: MW-1	DATE ANALYZED	: 07/23/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUND	RESULT
N-NITROSODIMETHYLAMINE	<10
PHENOL	<10
ANILINE	<10
BIS(2-CHLOROETHYL)ETHER	<10
2-CHLOROPHENOL	<10
1,3-DICHLOROBENZENE	<10
1,4-DICHLOROBENZENE	<10
BENZYL ALCOHOL	<10
1,2-DICHLOROBENZENE	<10
2-METHYLPHENOL	<10
BIS(2-CHLOROISOPROPYL)ETHER	<10
4-METHYLPHENOL	<10
N-NITROSO-DI-N-PROPYLAMINE	<10
HEXACHLOROETHANE	<10
NITROBENZENE	<10
ISOPHORONE	<10
2-NITROPHENOL	<10
2,4-DIMETHYLPHENOL	<10
BENZOIC ACID	<50
BIS(2-CHLOROETHOXY)METHANE	<10
2,4-DICHLOROPHENOL	<10
1,2,4-TRICHLOROBENZENE	<10
NAPHTHALENE	<10
4-CHLOROANILINE	<10
HEXACHLOROBUTADIENE	<10
4-CHLORO-3-METHYLPHENOL	<10
2-METHYLNAPHTHALENE	<10
HEXACHLOROCYCLOPENTADIENE	<10
2,4,6-TRICHLOROPHENOL	<10
2,4,5-TRICHLOROPHENOL	<50
2-CHLORONAPHTHALENE	<10
2-NITROANILINE	<50
DIMETHYLPHTHALATE	<10
ACENAPHTHYLENE	<10
3-NITROANILINE	<50
ACENAPHTHENE	<10
2,4-DINITROPHENOL	<50
4-NITROPHENOL	<50

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Analytical Technologies, Inc.

ATI I.D. # 9107-026-1

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 07/01/91
PROJECT #	: 3351	DATE RECEIVED	: 07/02/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/08/91
CLIENT I.D.	: MW-1	DATE ANALYZED	: 07/23/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUND	RESULT
DIBENZOFURAN	<10
2,4-DINITROTOLUENE	<10
2,6-DINITROTOLUENE	<10
DIETHYLPHTHALATE	<10
4-CHLOROPHENYL-PHENYLETHER	<10
FLUORENE	<10
4-NITROANILINE	<50
4,6-DINITRO-2-METHYLPHENOL	<50
N-NITROSODIPHENYLAMINE	<10
4-BROMOPHENYL-PHENYLETHER	<10
HEXACHLOROBENZENE	<10
PENTACHLOROPHENOL	<50
PHENANTHRENE	<10
ANTHRACENE	<10
DI-N-BUTYLPHTHALATE	<10
FLUORANTHENE	<10
BENZIDINE	<100
PYRENE	<10
BUTYLBENZYLPHTHALATE	<10
3,3'-DICHLOROBENZIDINE	<20
BENZO(A)ANTHRACENE	<10
BIS(2-ETHYLHEXYL)PHTHALATE	<10
CHRYSENE	<10
DI-N-OCTYLPHTHALATE	<10
BENZO(B)FLUORANTHENE	<10
BENZO(K)FLUORANTHENE	<10
BENZO(A)PYRENE	<10
INDENO(1,2,3-CD)PYRENE	<10
DIBENZO(A,H)ANTHRACENE	<10
BENZO(G,H,I)PERYLENE	<10

SURROGATE PERCENT RECOVERIES

NITROBENZENE-D5	62
2-FLUOROBIPHENYL	80
TERPHENYL-D14	94
PHENOL-D5	46
2-FLUOROPHENOL	35
2,4,6-TRIBROMOPHENOL	48

Analytical Technologies, Inc.

ATI I.D. # 9107-026-1

SEMIVOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 07/01/91
PROJECT #	: 3351	DATE RECEIVED	: 07/02/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/08/91
CLIENT I.D.	: MW-1	DATE ANALYZED	: 07/23/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION

NO NON-HSL COMPOUNDS FOUND > 10% OF NEAREST INTERNAL STANDARD

Analytical Technologies, Inc.

ATI I.D. # 9107-026-2

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 07/01/91
PROJECT #	: 3351	DATE RECEIVED	: 07/02/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/08/91
CLIENT I.D.	: MW-2	DATE ANALYZED	: 07/23/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUND	RESULT
N-NITROSODIMETHYLAMINE	<10
PHENOL	<10
ANILINE	<10
BIS(2-CHLOROETHYL)ETHER	<10
2-CHLOROPHENOL	<10
1,3-DICHLOROBENZENE	<10
1,4-DICHLOROBENZENE	<10
BENZYL ALCOHOL	<10
1,2-DICHLOROBENZENE	<10
2-METHYLPHENOL	<10
BIS(2-CHLOROISOPROPYL)ETHER	<10
4-METHYLPHENOL	<10
N-NITROSO-DI-N-PROPYLAMINE	<10
HEXACHLOROETHANE	<10
NITROBENZENE	<10
ISOPHORONE	<10
2-NITROPHENOL	<10
2,4-DIMETHYLPHENOL	<10
BENZOIC ACID	<50
BIS(2-CHLOROETHOXY)METHANE	<10
2,4-DICHLOROPHENOL	<10
1,2,4-TRICHLOROBENZENE	<10
NAPHTHALENE	<10
4-CHLOROANILINE	<10
HEXACHLOROBUTADIENE	<10
4-CHLORO-3-METHYLPHENOL	<10
2-METHYLNAPHTHALENE	<10
HEXACHLOROCYCLOPENTADIENE	<10
2,4,6-TRICHLOROPHENOL	<10
2,4,5-TRICHLOROPHENOL	<50
2-CHLORONAPHTHALENE	<10
2-NITROANILINE	<50
DIMETHYLPHTHALATE	<10
ACENAPHTHYLENE	<10
3-NITROANILINE	<50
ACENAPHTHENE	<10
2,4-DINITROPHENOL	<50
4-NITROPHENOL	<50

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Analytical Technologies, Inc.

ATI I.D. # 9107-026-2

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 07/01/91
PROJECT #	: 3351	DATE RECEIVED	: 07/02/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/08/91
CLIENT I.D.	: MW-2	DATE ANALYZED	: 07/23/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUND	RESULT
DIBENZOFURAN	<10
2,4-DINITROTOLUENE	<10
2,6-DINITROTOLUENE	<10
DIETHYLPHTHALATE	<10
4-CHLOROPHENYL-PHENYLETHER	<10
FLUORENE	<10
4-NITROANILINE	<50
4,6-DINITRO-2-METHYLPHENOL	<50
N-NITROSODIPHENYLAMINE	<10
4-BROMOPHENYL-PHENYLETHER	<10
HEXACHLOROBENZENE	<10
PENTACHLOROPHENOL	<50
PHENANTHRENE	<10
ANTHRACENE	<10
DI-N-BUTYLPHTHALATE	<10
FLUORANTHENE	<10
BENZIDINE	<100
PYRENE	<10
BUTYLBENZYLPHTHALATE	<10
3,3'-DICHLOROBENZIDINE	<20
BENZO(A)ANTHRACENE	<10
BIS(2-ETHYLHEXYL)PHTHALATE	<10
CHRYSENE	<10
DI-N-OCTYLPHTHALATE	<10
BENZO(B)FLUORANTHENE	<10
BENZO(K)FLUORANTHENE	<10
BENZO(A)PYRENE	<10
INDENO(1,2,3-CD)PYRENE	<10
DIBENZO(A,H)ANTHRACENE	<10
BENZO(G,H,I)PERYLENE	<10

SURROGATE PERCENT RECOVERIES

NITROBENZENE-D5	72	
2-FLUOROBIPHENYL	86	
TERPHENYL-D14	73	
PHENOL-D5	2	*
2-FLUOROPHENOL	0	*
2,4,6-TRIBROMOPHENOL	1	*

* Out of limits.

Analytical Technologies, Inc.

ATI I.D. # 9107-026-2

SEMIVOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 07/01/91
PROJECT #	: 3351	DATE RECEIVED	: 07/02/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/08/91
CLIENT I.D.	: MW-2	DATE ANALYZED	: 07/23/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION

NO NON-HSL COMPOUNDS FOUND > 10% OF NEAREST INTERNAL STANDARD

Analytical Technologies, Inc.

ATI I.D. # 9107-026-3

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 07/01/91
PROJECT #	: 3351	DATE RECEIVED	: 07/02/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/08/91
CLIENT I.D.	: MW-3	DATE ANALYZED	: 07/23/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUND	RESULT
N-NITROSODIMETHYLAMINE	<10
PHENOL	<10
ANILINE	<10
BIS(2-CHLOROETHYL)ETHER	<10
2-CHLOROPHENOL	<10
1,3-DICHLOROBENZENE	<10
1,4-DICHLOROBENZENE	<10
BENZYL ALCOHOL	<10
1,2-DICHLOROBENZENE	<10
2-METHYLPHENOL	<10
BIS(2-CHLOROISOPROPYL)ETHER	<10
4-METHYLPHENOL	<10
N-NITROSO-DI-N-PROPYLAMINE	<10
HEXACHLOROETHANE	<10
NITROBENZENE	<10
ISOPHORONE	<10
2-NITROPHENOL	<10
2,4-DIMETHYLPHENOL	<10
BENZOIC ACID	<50
BIS(2-CHLOROETHOXY)METHANE	<10
2,4-DICHLOROPHENOL	<10
1,2,4-TRICHLOROBENZENE	<10
NAPHTHALENE	<10
4-CHLOROANILINE	<10
HEXACHLOROBUTADIENE	<10
4-CHLORO-3-METHYLPHENOL	<10
2-METHYLNAPHTHALENE	<10
HEXACHLOROCYCLOPENTADIENE	<10
2,4,6-TRICHLOROPHENOL	<10
2,4,5-TRICHLOROPHENOL	<50
2-CHLORONAPHTHALENE	<10
2-NITROANILINE	<50
DIMETHYLPHTHALATE	<10
ACENAPHTHYLENE	<10
3-NITROANILINE	<50
ACENAPHTHENE	<10
2,4-DINITROPHENOL	<50
4-NITROPHENOL	<50

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Analytical Technologies, Inc.

ATI I.D. # 9107-026-3

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 07/01/91
PROJECT #	: 3351	DATE RECEIVED	: 07/02/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/08/91
CLIENT I.D.	: MW-3	DATE ANALYZED	: 07/23/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUND	RESULT
DIBENZOFURAN	<10
2,4-DINITROTOLUENE	<10
2,6-DINITROTOLUENE	<10
DIETHYLPHTHALATE	<10
4-CHLOROPHENYL-PHENYLETHER	<10
FLUORENE	<10
4-NITROANILINE	<50
4,6-DINITRO-2-METHYLPHENOL	<50
N-NITROSODIPHENYLAMINE	<10
4-BROMOPHENYL-PHENYLETHER	<10
HEXACHLOROBENZENE	<10
PENTACHLOROPHENOL	<50
PHENANTHRENE	<10
ANTHRACENE	<10
DI-N-BUTYLPHTHALATE	<10
FLUORANTHENE	<10
BENZIDINE	<100
PYRENE	<10
BUTYLBENZYLPHTHALATE	<10
3,3'-DICHLOROBENZIDINE	<20
BENZO(A)ANTHRACENE	<10
BIS(2-ETHYLHEXYL)PHTHALATE	<10
CHRYSENE	<10
DI-N-OCTYLPHTHALATE	<10
BENZO(B)FLUORANTHENE	<10
BENZO(K)FLUORANTHENE	<10
BENZO(A)PYRENE	<10
INDENO(1,2,3-CD)PYRENE	<10
DIBENZO(A,H)ANTHRACENE	<10
BENZO(G,H,I)PERYLENE	<10

SURROGATE PERCENT RECOVERIES

NITROBENZENE-D5	61
2-FLUOROBIPHENYL	76
TERPHENYL-D14	59
PHENOL-D5	25
2-FLUOROPHENOL	11 *
2,4,6-TRIBROMOPHENOL	12

* Out of limits.

Analytical Technologies, Inc.

ATI I.D. # 9107-026-3

SEMIVOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 07/01/91
PROJECT #	: 3351	DATE RECEIVED	: 07/02/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/08/91
CLIENT I.D.	: MW-3	DATE ANALYZED	: 07/23/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION

NO NON-HSL COMPOUNDS FOUND > 10% OF NEAREST INTERNAL STANDARD

Analytical Technologies, Inc.

ATI I.D. # 9107-026-4

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 07/01/91
PROJECT #	: 3351	DATE RECEIVED	: 07/02/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/08/91
CLIENT I.D.	: MW-4	DATE ANALYZED	: 07/23/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUND	RESULT
N-NITROSODIMETHYLAMINE	<10
PHENOL	<10
ANILINE	<10
BIS(2-CHLOROETHYL)ETHER	<10
2-CHLOROPHENOL	<10
1,3-DICHLOROBENZENE	<10
1,4-DICHLOROBENZENE	<10
BENZYL ALCOHOL	<10
1,2-DICHLOROBENZENE	<10
2-METHYLPHENOL	<10
BIS(2-CHLOROISOPROPYL)ETHER	<10
4-METHYLPHENOL	<10
N-NITROSO-DI-N-PROPYLAMINE	<10
HEXACHLOROETHANE	<10
NITROBENZENE	<10
ISOPHORONE	<10
2-NITROPHENOL	<10
2,4-DIMETHYLPHENOL	<10
BENZOIC ACID	<50
BIS(2-CHLOROETHOXY)METHANE	<10
2,4-DICHLOROPHENOL	<10
1,2,4-TRICHLOROBENZENE	<10
NAPHTHALENE	<10
4-CHLOROANILINE	<10
HEXACHLOROBUTADIENE	<10
4-CHLORO-3-METHYLPHENOL	<10
2-METHYLNAPHTHALENE	<10
HEXACHLOROCYCLOPENTADIENE	<10
2,4,6-TRICHLOROPHENOL	<10
2,4,5-TRICHLOROPHENOL	<50
2-CHLORONAPHTHALENE	<10
2-NITROANILINE	<50
DIMETHYLPHTHALATE	<10
ACENAPHTHYLENE	<10
3-NITROANILINE	<50
ACENAPHTHENE	<10
2,4-DINITROPHENOL	<50
4-NITROPHENOL	<50

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Analytical Technologies, Inc.

ATI I.D. # 9107-026-4

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 07/01/91
PROJECT #	: 3351	DATE RECEIVED	: 07/02/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/08/91
CLIENT I.D.	: MW-4	DATE ANALYZED	: 07/23/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUND	RESULT
DIBENZOFURAN	<10
2,4-DINITROTOLUENE	<10
2,6-DINITROTOLUENE	<10
DIETHYLPHTHALATE	<10
4-CHLOROPHENYL-PHENYLETHER	<10
FLUORENE	<10
4-NITROANILINE	<50
4,6-DINITRO-2-METHYLPHENOL	<50
N-NITROSODIPHENYLAMINE	<10
4-BROMOPHENYL-PHENYLETHER	<10
HEXACHLOROBENZENE	<10
PENTACHLOROPHENOL	<50
PHENANTHRENE	<10
ANTHRACENE	<10
DI-N-BUTYLPHTHALATE	<10
FLUORANTHENE	<10
BENZIDINE	<100
PYRENE	<10
BUTYLBENZYLPHTHALATE	<10
3,3'-DICHLOROBENZIDINE	<20
BENZO(A)ANTHRACENE	<10
BIS(2-ETHYLHEXYL)PHTHALATE	<10
CHRYSENE	<10
DI-N-OCTYLPHTHALATE	<10
BENZO(B)FLUORANTHENE	<10
BENZO(K)FLUORANTHENE	<10
BENZO(A)PYRENE	<10
INDENO(1,2,3-CD)PYRENE	<10
DIBENZO(A,H)ANTHRACENE	<10
BENZO(G,H,I)PERYLENE	<10

SURROGATE PERCENT RECOVERIES

NITROBENZENE-D5	71
2-FLUOROBIPHENYL	91
TERPHENYL-D14	91
PHENOL-D5	16
2-FLUOROPHENOL	75
2,4,6-TRIBROMOPHENOL	74

Analytical Technologies, Inc.

ATI I.D. # 9107-026-4

SEMIVOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 07/01/91
PROJECT #	: 3351	DATE RECEIVED	: 07/02/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/08/91
CLIENT I.D.	: MW-4	DATE ANALYZED	: 07/23/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION
BUTANOIC ACID, 2-METHYL-		257	14
UNKNOWN		375	28

Analytical Technologies, Inc.

ATI I.D. # 9107-026-5

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 07/01/91
PROJECT #	: 3351	DATE RECEIVED	: 07/02/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/08/91
CLIENT I.D.	: DUP	DATE ANALYZED	: 07/23/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUND	RESULT
N-NITROSODIMETHYLAMINE	<10
PHENOL	<10
ANILINE	<10
BIS(2-CHLOROETHYL)ETHER	<10
2-CHLOROPHENOL	<10
1,3-DICHLOROBENZENE	<10
1,4-DICHLOROBENZENE	<10
BENZYL ALCOHOL	<10
1,2-DICHLOROBENZENE	<10
2-METHYLPHENOL	<10
BIS(2-CHLOROISOPROPYL)ETHER	<10
4-METHYLPHENOL	<10
N-NITROSO-DI-N-PROPYLAMINE	<10
HEXACHLOROETHANE	<10
NITROBENZENE	<10
ISOPHORONE	<10
2-NITROPHENOL	<10
2,4-DIMETHYLPHENOL	<10
BENZOIC ACID	<50
BIS(2-CHLOROETHOXY)METHANE	<10
2,4-DICHLOROPHENOL	<10
1,2,4-TRICHLOROBENZENE	<10
NAPHTHALENE	<10
4-CHLOROANILINE	<10
HEXACHLOROBUTADIENE	<10
4-CHLORO-3-METHYLPHENOL	<10
2-METHYLNAPHTHALENE	<10
HEXACHLOROCYCLOPENTADIENE	<10
2,4,6-TRICHLOROPHENOL	<10
2,4,5-TRICHLOROPHENOL	<50
2-CHLORONAPHTHALENE	<10
2-NITROANILINE	<50
DIMETHYLPHTHALATE	<10
ACENAPHTHYLENE	<10
3-NITROANILINE	<50
ACENAPHTHENE	<10
2,4-DINITROPHENOL	<50
4-NITROPHENOL	<50

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Analytical Technologies, Inc.

ATI I.D. # 9107-026-5

SEMIVOLATILE ORGANIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 07/01/91
PROJECT #	: 3351	DATE RECEIVED	: 07/02/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/08/91
CLIENT I.D.	: DUP	DATE ANALYZED	: 07/23/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUND	RESULT
DIBENZOFURAN	<10
2,4-DINITROTOLUENE	<10
2,6-DINITROTOLUENE	<10
DIETHYLPHTHALATE	<10
4-CHLOROPHENYL-PHENYLETHER	<10
FLUORENE	<10
4-NITROANILINE	<50
4,6-DINITRO-2-METHYLPHENOL	<50
N-NITROSODIPHENYLAMINE	<10
4-BROMOPHENYL-PHENYLETHER	<10
HEXACHLOROBENZENE	<10
PENTACHLOROPHENOL	<50
PHENANTHRENE	<10
ANTHRACENE	<10
DI-N-BUTYLPHTHALATE	<10
FLUORANTHENE	<10
BENZIDINE	<100
PYRENE	<10
BUTYLBENZYLPHTHALATE	<10
3,3'-DICHLOROBENZIDINE	<20
BENZO(A)ANTHRACENE	<10
BIS(2-ETHYLHEXYL)PHTHALATE	<10
CHRYSENE	<10
DI-N-OCTYLPHTHALATE	<10
BENZO(B)FLUORANTHENE	<10
BENZO(K)FLUORANTHENE	<10
BENZO(A)PYRENE	<10
INDENO(1,2,3-CD)PYRENE	<10
DIBENZO(A,H)ANTHRACENE	<10
BENZO(G,H,I)PERYLENE	<10

SURROGATE PERCENT RECOVERIES

NITROBENZENE-D5	70
2-FLUOROBIPHENYL	84
TERPHENYL-D14	83
PHENOL-D5	10
2-FLUOROPHENOL	1 *
2,4,6-TRIBROMOPHENOL	2 *

* Out of limits.

Analytical Technologies, Inc.

ATI I.D. # 9107-026-5

SEMIVOLATILE ORGANIC ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 07/01/91
PROJECT #	: 3351	DATE RECEIVED	: 07/02/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/08/91
CLIENT I.D.	: DUP	DATE ANALYZED	: 07/23/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUND	FLAG	SCAN	ESTIMATED CONCENTRATION

NO NON-HSL COMPOUNDS FOUND > 10% OF NEAREST INTERNAL STANDARD

Analytical Technologies, Inc.

ATI I.D. # 9107-026

SEMIVOLATILE ORGANIC ANALYSIS
QUALITY CONTROL DATA

CLIENT : HART CROWSER, INC.
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH
EPA METHOD : 8270
SAMPLE MATRIX : WATER

SAMPLE I.D. # : BLANK SPIKE
DATE EXTRACTED : 07/08/91
DATE ANALYZED : 07/23/91
UNITS : ug/L

COMPOUND	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
1,2,4-TRICHLOROBENZENE	<10	100	77.1	77	70.4	70	9
ACENAPHTHENE	<10	100	76.0	76	68.8	69	10
2,4-DINITROTOLUENE	<10	100	56.3	56	53.7	54	5
PYRENE	<10	100	69.8	70	68.2	68	2
N-NITROSO-DI-N-PROPYLAMINE	<10	100	55.6	56	50.1	50	10
1,4-DICHLOROBENZENE	<10	100	64.7	65	60.2	60	7
PENTACHLOROPHENOL	<50	400	410	102	408	102	0
PHENOL	<10	200	140	70	140	70	0
2-CHLOROPHENOL	<10	200	145	73	145	73	0
4-CHLORO-3-METHYLPHENOL	<10	200	154	77	154	77	0
4-NITROPHENOL	<50	400	302	76	314	79	4

$$\% \text{ Recovery} = \frac{(\text{Spiked Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Spike Result} - \text{Dup. Spike Result})|}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

ATI I.D. # 9107-026

POLYNUCLEAR AROMATIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 3351	DATE RECEIVED	: N/A
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/08/91
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 07/18/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8310	DILUTION FACTOR	: 1

COMPOUND	RESULT
NAPHTHALENE	<0.50
ACENAPHTHYLENE	<1.0
ACENAPHTHENE	<1.0
FLUORENE	<0.10
PHENANTHRENE	<0.050
ANTHRACENE	<0.050
FLUORANTHENE	<0.10
PYRENE	<0.10
BENZO(A)ANTHRACENE	<0.10
CHRYSENE	<0.10
BENZO(B)FLUORANTHENE	<0.10
BENZO(K)FLUORANTHENE	<0.10
BENZO(A)PYRENE	<0.10
DIBENZO(A,H)ANTHRACENE	<0.20
BENZO(G,H,I)PERYLENE	<0.10
INDENO(1,2,3-CD)PYRENE	<0.10
SURROGATE PERCENT RECOVERIES	
2-CHLOROANTHRACENE	90

Analytical Technologies, Inc.

ATI I.D. # 9107-026-1

POLYNUCLEAR AROMATIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 07/01/91
PROJECT #	: 3351	DATE RECEIVED	: 07/02/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/08/91
CLIENT I.D.	: MW-1	DATE ANALYZED	: 07/18/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8310	DILUTION FACTOR	: 1

COMPOUND	RESULT
NAPHTHALENE	<0.50
ACENAPHTHYLENE	<1.0
ACENAPHTHENE	<1.0
FLUORENE	<0.10
PHENANTHRENE	<0.050
ANTHRACENE	<0.050
FLUORANTHENE	<0.10
PYRENE	<0.10
BENZO(A)ANTHRACENE	<0.10
CHRYSENE	<0.10
BENZO(B)FLUORANTHENE	<0.10
BENZO(K)FLUORANTHENE	<0.10
BENZO(A)PYRENE	<0.10
DIBENZO(A,H)ANTHRACENE	<0.20
BENZO(G,H,I)PERYLENE	<0.10
INDENO(1,2,3-CD)PYRENE	<0.10

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE	89

Analytical Technologies, Inc.

ATI I.D. # 9107-026-2

POLYNUCLEAR AROMATIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 07/01/91
PROJECT #	: 3351	DATE RECEIVED	: 07/02/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/08/91
CLIENT I.D.	: MW-2	DATE ANALYZED	: 07/18/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8310	DILUTION FACTOR	: 1

COMPOUND	RESULT
NAPHTHALENE	<0.50
ACENAPHTHYLENE	<1.0
ACENAPHTHENE	<1.0
FLUORENE	<0.10
PHENANTHRENE	<0.050
ANTHRACENE	<0.050
FLUORANTHENE	<0.10
PYRENE	<0.10
BENZO(A)ANTHRACENE	<0.10
CHRYSENE	<0.10
BENZO(B)FLUORANTHENE	<0.10
BENZO(K)FLUORANTHENE	<0.10
BENZO(A)PYRENE	<0.10
DIBENZO(A,H)ANTHRACENE	<0.20
BENZO(G,H,I)PERYLENE	<0.10
INDENO(1,2,3-CD)PYRENE	<0.10

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE	70

Analytical Technologies, Inc.

ATI I.D. # 9107-026-3

POLYNUCLEAR AROMATIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 07/01/91
PROJECT #	: 3351	DATE RECEIVED	: 07/02/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/08/91
CLIENT I.D.	: MW-3	DATE ANALYZED	: 07/18/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8310	DILUTION FACTOR	: 1

COMPOUND	RESULT
NAPHTHALENE	<0.50
ACENAPHTHYLENE	<1.0
ACENAPHTHENE	<1.0
FLUORENE	<0.10
PHENANTHRENE	0.092
ANTHRACENE	<0.050
FLUORANTHENE	<0.10
PYRENE	<0.10
BENZO(A)ANTHRACENE	<0.10
CHRYSENE	<0.10
BENZO(B)FLUORANTHENE	<0.10
BENZO(K)FLUORANTHENE	<0.10
BENZO(A)PYRENE	<0.10
DIBENZO(A,H)ANTHRACENE	<0.20
BENZO(G,H,I)PERYLENE	<0.10
INDENO(1,2,3-CD)PYRENE	<0.10

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE	87

Analytical Technologies, Inc.

ATI I.D. # 9107-026-4

POLYNUCLEAR AROMATIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 07/01/91
PROJECT #	: 3351	DATE RECEIVED	: 07/02/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/08/91
CLIENT I.D.	: MW-4	DATE ANALYZED	: 07/18/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8310	DILUTION FACTOR	: 1

COMPOUND	RESULT
NAPHTHALENE	<0.50
ACENAPHTHYLENE	<1.0
ACENAPHTHENE	<1.0
FLUORENE	<0.10
PHENANTHRENE	<0.050
ANTHRACENE	<0.050
FLUORANTHENE	<0.10
PYRENE	<0.10
BENZO(A)ANTHRACENE	<0.10
CHRYSENE	<0.10
BENZO(B)FLUORANTHENE	<0.10
BENZO(K)FLUORANTHENE	<0.10
BENZO(A)PYRENE	<0.10
DIBENZO(A,H)ANTHRACENE	<0.20
BENZO(G,H,I)PERYLENE	<0.10
INDENO(1,2,3-CD)PYRENE	<0.10

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE	73

Analytical Technologies, Inc.

ATI I.D. # 9107-026-5

POLYNUCLEAR AROMATIC ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 07/01/91
PROJECT #	: 3351	DATE RECEIVED	: 07/02/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE EXTRACTED	: 07/08/91
CLIENT I.D.	: DUP	DATE ANALYZED	: 07/19/91
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8310	DILUTION FACTOR	: 1

COMPOUND	RESULT
NAPHTHALENE	<0.50
ACENAPHTHYLENE	<1.0
ACENAPHTHENE	<1.0
FLUORENE	<0.10
PHENANTHRENE	<0.050
ANTHRACENE	<0.050
FLUORANTHENE	<0.10
PYRENE	<0.10
BENZO(A)ANTHRACENE	<0.10
CHRYSENE	<0.10
BENZO(B)FLUORANTHENE	<0.10
BENZO(K)FLUORANTHENE	<0.10
BENZO(A)PYRENE	<0.10
DIBENZO(A,H)ANTHRACENE	<0.20
BENZO(G,H,I)PERYLENE	<0.10
INDENO(1,2,3-CD)PYRENE	<0.10

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE	47

Analytical Technologies, Inc.

ATI I.D. # 9107-026

POLYNUCLEAR AROMATIC ANALYSIS
QUALITY CONTROL DATA

CLIENT	: HART CROWSER, INC.	SAMPLE I.D. #	: 107051
PROJECT #	: 3351	DATE EXTRACTED	: 07/08/91
PROJECT NAME	: WSDOT-DUWAMISH	DATE ANALYZED	: 07/19/91
EPA METHOD	: 8310	UNITS	: ug/L
SAMPLE MATRIX	: WATER		

COMPOUND	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
ACENAPHTHYLENE	<1.0	102	77	75	44	43	55*
PHENANTHRENE	<0.050	9.63	8.5	88	6.0	62	34*
PYRENE	<0.10	9.71	8.1	83	6.9	71	16
BENZO(K)FLUORANTHENE	<0.10	6.17	5.6	91	5.8	94	4

* Out of limits.

$$\% \text{ Recovery} = \frac{(\text{Spiked Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Spike Result} - \text{Dup. Spike Result})|}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

ATI I.D. # 9107-026

PRIORITY POLLUTANT METALS ANALYSIS

CLIENT : HART CROWSER, INC. MATRIX : WATER
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH

ELEMENT	DATE PREPARED	DATE ANALYZED
ANTIMONY (TOTAL)	07/10/91	07/11/91
ANTIMONY (DISSOLVED)	-	07/11/91
ARSENIC (TOTAL)	07/10/91	07/13/91
ARSENIC (DISSOLVED)	-	07/13/91
BERYLLIUM (TOTAL)	07/10/91	07/11/91
BERYLLIUM (DISSOLVED)	-	07/11/91
CADMIUM (TOTAL)	07/10/91	07/11/91
CADMIUM (DISSOLVED)	-	07/11/91
CHROMIUM (TOTAL)	07/10/91	07/11/91
CHROMIUM (DISSOLVED)	-	07/11/91
COPPER (TOTAL)	07/10/91	07/11/91
COPPER (DISSOLVED)	-	07/11/91
LEAD (TOTAL)	07/10/91	07/13/91
LEAD (DISSOLVED)	-	07/13/91
MERCURY (TOTAL)	07/10/91	07/12/91
MERCURY (DISSOLVED)	-	07/12/91
NICKEL (TOTAL)	07/10/91	07/11/91
NICKEL (DISSOLVED)	-	07/11/91
SELENIUM (TOTAL)	07/10/91	07/13/91
SELENIUM (DISSOLVED)	-	07/13/91

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Analytical Technologies, Inc.

ATI I.D. # 9107-026

PRIORITY POLLUTANT METALS ANALYSIS CONTINUED

CLIENT : HART CROWSER, INC. MATRIX : WATER
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH

ELEMENT	DATE PREPARED	DATE ANALYZED
SILVER (TOTAL)	07/10/91	07/11/91
SILVER (DISSOLVED)	-	07/11/91
THALLIUM (TOTAL)	07/10/91	07/14/91
THALLIUM (DISSOLVED)	-	07/14/91
ZINC (TOTAL)	07/10/91	07/11/91
ZINC (DISSOLVED)	-	07/11/91

Analytical Technologies, Inc.

ATI I.D. # 9107-026

PRIORITY POLLUTANT METALS ANALYSIS DATA SUMMARY (TOTAL)

CLIENT : HART CROWSER, INC. MATRIX : WATER
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH UNITS : mg/L

ELEMENT	MW-1 -1	MW-2 -2	MW-3 -3	MW-4 -4	DUP -5	REAGENT BLANK
ANTIMONY	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
ARSENIC	0.016	0.032	0.014	0.037	0.010	<0.002
BERYLLIUM	<0.005	<0.005	<0.005	0.006	<0.005	<0.005
CADMIUM	0.008	<0.005	0.008	0.01	0.006	<0.005
CHROMIUM	0.12	0.02	0.13	0.12	0.09	<0.01
COPPER	0.10	<0.02	0.10	0.24	0.08	<0.02
LEAD	0.022	0.11	0.025	0.20	0.021	0.003
MERCURY	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
NICKEL	0.16	<0.01	0.12	0.10	0.09	<0.01
SELENIUM	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SILVER	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
THALLIUM	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
ZINC	0.24	0.15	0.33	0.40	0.31	<0.05

Analytical Technologies, Inc.

ATI I.D. # 9107-026

PRIORITY POLLUTANT METALS ANALYSIS DATA SUMMARY (DISSOLVED)

CLIENT : HART CROWSER, INC. MATRIX : WATER
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH UNITS : mg/L

ELEMENT	MW-1 -1	MW-2 -2	MW-3 -3	MW-4 -4	DUP -5	REAGENT BLANK
ANTIMONY	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
ARSENIC	0.002	<0.002	0.003	0.009	0.002	<0.002
BERYLLIUM	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
CADMIUM	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
CHROMIUM	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
COPPER	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
LEAD	0.005	0.003	0.005	0.005	0.005	0.003
MERCURY	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
NICKEL	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
SELENIUM	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
SILVER	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
THALLIUM	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
ZINC	<0.05	0.11	0.09	<0.05	0.09	<0.05

Analytical Technologies, Inc.

ATI I.D. # 9107-026

PRIORITY POLLUTANT
METALS ANALYSIS
QUALITY CONTROL DATA

CLIENT : HART CROWSER, INC. MATRIX : WATER
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH UNITS : mg/L

ELEMENT	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED RESULT	SPIKE ADDED	% REC
ANTIMONY	9107-026-5	<0.03	<0.03	NC	1.9	2.0	95
ARSENIC	9107-026-4	0.009	0.009	0	1.6	2.0	80
BERYLLIUM	9107-026-5	<0.005	<0.005	NC	1.9	2.0	95
CADMIUM	9107-026-5	<0.005	<0.005	NC	1.8	2.0	90
CHROMIUM	9107-026-5	<0.01	<0.01	NC	1.8	2.0	90
COPPER	9107-026-5	<0.02	<0.02	NC	1.9	2.0	95
LEAD	9107-026-4	0.005	0.005	0	2.0	2.0	100
MERCURY	9107-026-3	<0.0005	<0.0005	NC	0.0043	0.0050	86
NICKEL	9107-026-5	<0.01	<0.01	NC	1.8	2.0	90
SELENIUM	9107-026-4	<0.002	<0.002	NC	1.4	1.2	117
SILVER	9107-026-5	<0.01	<0.01	NC	1.6	2.0	80
THALLIUM	9107-026-4	<0.002	<0.002	NC	1.8	2.0	90
ZINC	9107-026-5	0.09	0.09	0	1.9	2.0	91

NC = Not calculable.

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

ATI I.D. # 9107-026

GENERAL CHEMISTRY ANALYSIS

CLIENT : HART CROWSER, INC. MATRIX : WATER
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH

PARAMETER	DATE PREPARED	DATE ANALYZED
PETROLEUM HYDROCARBONS	07/16/91	07/16/91

Analytical Technologies, Inc.

ATI I.D. # 9107-026

GENERAL CHEMISTRY ANALYSIS
DATA SUMMARY

CLIENT : HART CROWSER, INC. MATRIX : WATER
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH UNITS : mg/L

ATI I.D. #	CLIENT I.D.	PETROLEUM HYDROCARBONS
9107-026-1	MW-1	<1
9107-026-2	MW-2	<1
9107-026-3	MW-3	<1
9107-026-4	MW-4	<1
9107-026-5	DUP	<1
REAGENT BLANK	-	<1

Analytical Technologies, Inc.

ATI I.D. # 9107-026

GENERAL CHEMISTRY ANALYSIS
QUALITY CONTROL DATA

CLIENT : HART CROWSER, INC. MATRIX : WATER
PROJECT # : 3351
PROJECT NAME : WSDOT-DUWAMISH UNITS : mg/L

PARAMETER	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED RESULT	SPIKE ADDED	% REC
PETROLEUM HYDROCARBONS	9107-131-4	<1	<1	NC	6.4	10	64

NC = Not calculable.

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

Analytical**Technologies**, Inc.

560 Naches Avenue SW, Suite 101 Renton, WA 98055 (206)228-8335

Chain of Custody

DATE 7/11/01 PAGE 1 OF 1

LABORATORY NUMBER: 1

PROJECT MANAGER:

COMPANY:

ADDRESS:

PHONE: SAMPLED BY:

SAMPLE DISPOSAL INSTRUCTIONS

☐ ATI Disposal @ $5.00 each ☐ Return

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	8010 Halogenated Volatiles	8020 Aromatic Volatiles	8020 BETX ONLY	8240 GCMS Volatiles	8270 GCMS BNA	8310 HPLC PNA	8080 Pesticides & PCB's	8080 PCB's ONLY	8140 Phosphate Pesticides	8150 Herbicides	WDOE PAH/HH (WAC 173)	418.1 (TPH)	413.2 Grease & Oil	8015 (Modified)	TOC 9060	TOX 9020	% Moisture	EP TOX Metals (8) EP EXT	Priority Pollutant Metals (13)[1]	TCLP ONLY: 8080 Pesticide (4)	TCLP ONLY: 8240 ZH-EXT	TCLP ONLY: 8270	TCLP ONLY: 8150 Herbicides (2)	TCLP ONLY: Metals (8)			NUMBER OF CONTAINERS
																															17

PROJECT INFORMATION	SAMPLE RECEIPT	
PROJECT NUMBER:	TOTAL NUMBER OF CONTAINERS	17
PROJECT NAME:	COC SEALS/INTACT? Y/N/NA	
PURCHASE ORDER NUMBER:	RECEIVED GOOD COND./COLD	11
ONGOING PROJECT? YES ☐ NO ☐	RECEIVED VIA:	

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

TAT: (NORMAL) ☐ 2WKS (RUSH) ☐ 24HR ☐ 48 HRS ☐ 72 HRS ☐ 1 WK

GREATER THAN 24 HR. NOTICE? YES ☐ NO ☐ (LAB USE ONLY)

SPECIAL INSTRUCTIONS:

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Time:	Signature: Time:	Signature: Time:
Printed Name: Date:	Printed Name: Date:	Printed Name: Date:
Company:	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: Time:	Signature: Time:	Signature: Time:
Printed Name: Date:	Printed Name: Date:	Printed Name: Date:
Company:	Company:	Analytical Technologies, Inc.

ATI Labs: San Diego (619)458-9141 • Phoenix (602)438-1530 • Seattle (206)228-8335 • Pensacola (904)474-1001 **DISTRIBUTION:** White, Canary - ATI • Pink - ORIGINATOR

Analytical**Technologies,**Inc.

560 Naches Avenue SW, Suite 101 Renton,WA 98055 (206)228-8335

Chain of Custody

DATE 7/2/91 PAGE ___ OF 1

LABORATORY NUMBER: 107051

PROJECT MANAGER:

COMPANY:

ADDRESS:

PHONE: 206 228-8335 SAMPLED BY:

SAMPLE DISPOSAL INSTRUCTIONS

☐ ATI Disposal @ $5.00 each ☐ Return

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
1			WATER	
2				
3				
4				
5				

ANALYSIS REQUEST

8010 Halogenated Volatiles	8020 Aromatic Volatiles	8020 BETX ONLY	8240 GCMS Volatiles	8270 GCMS BNA EXT	8310 HPLC PNA	8080 Pesticides & PCB's	8080 PCB's ONLY	8140 Phosphate Pesticides	8150 Herbicides	WDOE PAH/HH (WAC 173)	418.1 (TPH)	413.2 Grease & Oil	8015 (Modified)	TOC 9060	TOX 9020	% Moisture	EP TOX Metals (8) EP EXT	Priority Pollutant Metals (13)	TCLP ONLY: 8080 Pesticide (4)	TCLP ONLY: 8240 ZH-EXT	TCLP ONLY: 8270	TCLP ONLY: 8150 Herbicides (2)	TCLP ONLY: Metals (8)			NUMBER OF CONTAINERS
				X	X																					4
				X	X																					4
				X	X																					4
				X	X																					4
				X	X																					4

PROJECT INFORMATION

PROJECT NUMBER:

PROJECT NAME:

PURCHASE ORDER NUMBER:

ONGOING PROJECT? YES ☐ NO ☐

SAMPLE RECEIPT

TOTAL NUMBER OF CONTAINERS	10
COC SEALS/INTACT? Y/N/NA	Y
RECEIVED GOOD COND./COLD	Y
RECEIVED VIA:	

PRIOR AUTHORIZATION IS REQUIRED FOR RUSH PROJECTS

TAT: (NORMAL) ☐ 2WKS (RUSH) ☐ 24HR ☐ 48 HRS ☐ 72 HRS ☐ 1 WK

GREATER THAN 24 HR. NOTICE? YES ☐ NO ☐ (LAB USE ONLY)

SPECIAL INSTRUCTIONS:

Dist 7/10,

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Time:	Signature: Time:	Signature: Time:
Printed Name: Date: 7/2	Printed Name: Date:	Printed Name: Date:
Company: ATI	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2**	**RECEIVED BY: (LAB) 3.**
Signature: Time:	Signature: Time:	Signature: Time:
Printed Name: Date:	Printed Name: Date:	Printed Name: Date: 7/3/91
Company:	Company:	Analytical Technologies, Inc.

ATI Labs: San Diego (619)458-9141 • Phoenix (602)438-1530 • Seattle (206)228-8335 • [illegible] la (904)474-1001

DISTRIBUTION: White, Canary - ATI • Pink - ORIGINATOR

APPENDIX C
DISCUSSION OF MTCA CRITERIA

APPENDIX C
DISCUSSION OF MTCA CRITERIA

The Model Toxic Control Act (MTCA) has three methods (Methods A, B, and C) for determining cleanup levels which are protective of human health and the environment surrounding a contaminated site. Method A is designed for routine cleanups involving only a few contaminants. Method B is the standard method for determining cleanup levels for groundwater and soil and is applicable to all sites. Method C is used for some industrial sites, or when cleanup levels established using Method A or B are not technically feasible.

The Duwamish Fill Site is evaluated using the MTCA Method B residential criteria. MTCA method B requires that groundwater cleanup levels be at least as stringent as all applicable and appropriate state and federal laws which protect human health and the environment. When standards sufficiently protective of human health and the environment are not provided by applicable state and federal laws a cleanup level is calculated using the risk-based equations provided in WAC 173-340-720(3).

Soil Cleanup Levels

Because no applicable laws governing chemical concentrations in soils exist, soil quality is evaluated using the risk-based equations provided in the MTCA. The MTCA risk equations primarily protect children from consumption of contaminated sediments. In addition, soil cleanup levels under MTCA must also be protective of groundwater. Protection of groundwater resources is not directly included in our analysis of soil cleanup levels, however, because ample data are available to demonstrate groundwater quality.

A summary of the MTCA soil cleanup levels are listed in Table 5 for chemicals detected at the site. The polynuclear aromatic hydrocarbons (PAHs) are evaluated individually and grouped according to carcinogenic potential. Grouping by carcinogenic potential was necessary because insufficient toxicologic criteria are available to calculate criteria for several PAHs.

MTCA Method A values are selected as cleanup levels for carcinogenic PAHs and lead because insufficient toxicological criteria are available to calculate Method B cleanup levels.

Groundwater Cleanup Levels

Applicable laws governing groundwater are the EPA Water Quality Criteria established under the Clean Water Act and the Maximum Contaminant Levels (MCLs) established under the Safe Drinking Water Act. The Clean Water Act provides criteria which are protective of both human health and aquatic ecosystems, while the Safe Drinking Water Act provides criteria which are protective of human health from the consumption of contaminated water. Use of Clean Water Act criteria is applicable under MTCA because groundwater from the site potentially discharges to the surface waters of the nearby Duwamish River. Application of the Safe Drinking Water Act criteria is applicable under MTCA because groundwater at the site is a potential, future source of drinking water.

A summary of MTCA groundwater cleanup criteria are listed in Table 6 for chemicals detected at the site. Criteria are provided for dissolved metals rather than total metals because dissolved metals more appropriately represent the metal concentrations which are available for uptake by humans or aquatic organisms. Although Clean Water Act criteria are presented in Table 4, they are provided for comparison purposes only; these criteria were not incorporated into the selection of applicable MTCA cleanup levels because the project property is located about 1,000 feet from the river, and substantial attenuation and dilution of contaminants would likely occur before groundwater is discharged to the river.

Earth and Environmental Technologies

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San Francisco, California 94111
415.391.1885

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Long Beach, California 90831
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HARTCROWSER

Earth and Environmental Technologies

Hart Crowser, Inc.
1910 Fairview Avenue East
Seattle, Washington 98102
FAX 206.328.5581
206.324.9530

J-3351

March 27, 1992

Mr. Tom Lentz
Washington State Department of Transportation
15325 S.E. 30th Place
Bellevue, Washington 98007-6597

Re: Results of Wet-Season Groundwater Sampling
Duwamish Fill Site, Tukwila, Washington

Dear Mr. Lentz:

This letter report presents the results of our wet-season groundwater sampling at the Duwamish Fill site in Tukwila, Washington, near the intersection of SR-99 and SR-599. Groundwater samples were collected on February 13, 1992, from four monitoring wells installed at the site during the summer of 1991. The objective of the sampling program was to evaluate seasonal changes in water quality that may be related to higher groundwater discharges in the late winter months.

The results of the dry-season groundwater sampling event in July 1991, are presented in our previous report, "Environmental Assessment of Soil and Groundwater Quality, Duwamish Fill Site," dated August 26, 1991. Our field procedures are also described in that document.

SUMMARY OF FINDINGS

Copper and zinc were the only metals detected in filtered samples; both were detected at concentrations one hundred times lower than the federal drinking water standards. Aside from laboratory contaminants, the only positive identification of a volatile organic compound was tetrachloroethene (PCE) at 5 µg/L. PCE was detected

at, but not in exceedence of, the MTCA Method A cleanup level of 5 μg/L in only one sample from this or the previous sampling round and was not detected in a duplicate sample from the same well. Bis(2-ethylhexyl)phthalate, a common laboratory contaminant, was the only semivolatile organic compound detected, at 16 μg/L in only one sample from the two sampling rounds. No carcinogenic PAH compounds were detected in either of the groundwater sampling rounds, and only one low-level detection of a non-carcinogenic PAH compound was identified in the previous sampling round. Petroleum hydrocarbons were not detected in the summer or winter sampling rounds.

In summary, no significant detections of problem chemicals have been identified in groundwaters beneath the Duwamish Fill site. Our results are based on a comprehensive program of chemical testing, including trace metals and a wide range of organic compounds, during both dry-season (July 1991) and wet-season (February 1992) conditions.

Hydrogeology

Groundwater flows in a general northeasterly direction across the site toward the Duwamish River (Figure 1). The hydraulic gradient (slope of the water level surface) is about 0.06 ft/ft. Both the flow direction and the hydraulic gradient are consistent with our measurements last summer, and are evidently consistent throughout the year. Water level elevations are about 1.5 to 2 feet higher in February compared to July, however, indicating that the aquifer waters are under increased pressure, and the saturated zone has expanded during the wet season.

Groundwater Quality

One set of samples from each of the monitoring wells (samples MW-1 through MW-4) and a duplicate set of samples from well MW-3 (sample MW-3D) were submitted for chemical analysis of the following parameters:

- Total and Dissolved Priority Pollutant Metals (EPA Method 6010 and 7000 series);
- Volatile Organic Compounds (EPA Method 8240);
- Semivolatile Organic Compounds (EPA Method 8270);

- Polynuclear Aromatic Hydrocarbons (PAH) (EPA Method 8310); and
- Total Petroleum Hydrocarbons (TPH) (EPA Method 418.1).

A trip blank was also submitted for volatiles analysis. Chemical testing was performed by Analytical Technologies, Inc., of Renton, Washington.

Analytical results are summarized in Table 1. Note that only those chemicals with positive detections are included in this table, although the laboratory tested for the complete suite of inorganic and organic analytes included in the methods listed above. Laboratory certificates are attached in Appendix A. Data validation was performed by a qualified geochemist, and the validation report is attached in Appendix B. All data are valid and acceptable for the purpose of inclusion in this report with minor qualifications.

Total and Dissolved Metals. Groundwater samples were quite turbid. Metals concentrations were substantially reduced or undetected following filtration, indicating that total metals analyses were biased high by contributions from suspended particles. Because the wells were screened in very silty formations, the unfiltered samples are not representative of chemical species that are actively transported through the groundwater system. Suspended particles are derived from the aquifer framework eroding along the borehole walls, then migrating through the permeable filter pack and into the well screen. As such, our analysis of groundwater quality is based strictly on filtered (dissolved) metals concentrations. Justification for the use of filtered samples in the evaluation of inorganic substances is provided in Section 8 under WAC 173-340-720, "Ground Water Cleanup Standards".

Copper and zinc were the only metals detected in filtered samples. Copper was detected at a maximum concentration of 10 μg/L and zinc at a maximum concentration of 50 μg/L. Copper and zinc concentrations at the site fall substantially below the secondary maximum contaminant levels for drinking water of 1,000 μg/L and 5,000 μg/L, respectively, and well below MTCA groundwater cleanup levels of 500 μg/L and 3,000 μg/L, respectively. All other dissolved metals are non-detectable at or below MTCA Method A cleanup levels.

Volatile Organic Compounds. Methylene chloride was identified at concentrations below the detection limit in one sample and in the trip blank, as well as in laboratory

blanks. Acetone was detected only in the trip blank. Both compounds are common laboratory contaminants, as their presence in the field and laboratory sample blanks would indicate.

The only positive identification of a volatile organic compound was tetrachloroethene (PCE) at 5 μg/L in well MW-3. According to the Model Toxics Control Act (MTCA), the PCE concentration in this well is at, but not in exceedence of, the Method A groundwater cleanup level of 5 μg/L. PCE was not detected in a duplicate sample from the same well, however, at a detection limit of 1 μg/L. Aside from this one sample, PCE has not been detected in any other groundwater samples from this or the previous sampling round. Thus, we conclude that this isolated PCE detection does not represent a groundwater concern at the site.

Semivolatile Organic Compounds. The only compound detected in the 8270 analysis was bis(2-ethylhexyl)phthalate at 16 μg/L in well MW-4, slightly above the detection limit of 10 μg/L, and also above MTCA groundwater cleanup levels of 6 μg/L. Although not detected in the laboratory blanks, the compound is, nevertheless, a common false detection. The phthalate compound is likely derived from contact with plastic equipment utilized during field sampling or laboratory analysis. Bis(2-ethylhexyl)phthalate was not detected in any other groundwater samples from this or the previous sampling round. We have no information indicating activities associated with the Duwamish Fill site that would likely result in phthalate contamination. We therefore conclude that this isolated phthalate detection is not a groundwater concern at the site.

Polynuclear Aromatic Hydrocarbons. No carcinogenic or non-carcinogenic PAH compounds were detected in this round of groundwater sampling, and only one low-level detection of a non-carcinogenic PAH compound was detected in the previous round (phenanthrene at 0.09 μg/L). Although low concentrations of PAH compounds were detected in site soils, these results indicate that groundwaters at the site have not been impacted.

Petroleum Hydrocarbons. No petroleum hydrocarbons were detected in this or the previous round of groundwater sampling at a detection limit of 1 mg/L (1,000 μg/L).

CONCLUSIONS

As stated in our previous report, we uphold our conclusion that past and present practices at the Duwamish Fill site have not resulted in groundwater quality degradation beneath the property. Based on the data collected during our dry-season groundwater assessment last summer, and in this supplemental wet-season round of groundwater sampling, no corrective actions with respect to groundwater protection appear to be warranted at this site. According to the results of our study, continued monitoring is not necessary, and the wells should be abandoned as per state regulations.

The MTCA cleanup levels included in this report are used for screening and comparison purposes only and are based on our understanding of cleanup levels required by Ecology for similar projects. This comparison does not represent an interpretation of final MTCA cleanup standards for the site, since such standards are established by Ecology through a negotiation and public approval process. It should be understood that the MTCA Method B screening numbers were calculated using, to the best of our knowledge, the most current toxicity criteria available from EPA and Ecology. These criteria are continually being updated by EPA; and, as a result, the MTCA Method B levels used for screening purposes in this report may not be applicable for future use.

We trust that this report meets your needs. Please call us if you would like to discuss these results further, or if we can be of further assistance.

Sincerely,

HART CROWSER, INC.

TODD M. THORNBURG
Project Hydrogeologist

M. MARIAN WINEMAN
Associate

PerPKG

TMT/MMW:cmj
Duwafill.ltr

Attachments:

Table 1 - Summary of Groundwater Quality Data
Figure 1 - Exploration Plan and Groundwater Elevation Contour Map
Appendix A - Laboratory Certificates, Analytical Technologies, Inc.
Appendix B - Data Validation Summary

Table 1 - Summary of Groundwater Quality Data

Well Number	MW-1	MW-2	MW-3	MW-3D	MW-4	Trip Blank
Field Parameters						
Temperature in °C	13	12	11	NA	11	NA
pH	8.1	7.0	7.0	NA	6.7	NA
Elec. Conductivity in µmhos	500	1350	820	NA	1400	NA
Total Metals						
in µg/L (ppb)						
Arsenic	8.5	5	12	14	7.3	NA
Cadmium	2 U	2 U	2 U	2 U	2 U	NA
Chromium	60	74	120	120	54	NA
Copper	22	42	100	98	35	NA
Lead	5.8	8.4	33	34	35	NA
Nickel	43	43	100	120	14	NA
Zinc	180	130	320	300	180	NA
Dissolved Metals						
in µg/L (ppb)						
Arsenic	5 U	5 U	5 U	5 U	5 U	NA
Cadmium	2 U	2 U	2 U	2 U	2 U	NA
Chromium	10 U	10 U	10 U	10 U	10 U	NA
Copper	10	6.5	5 U	5 U	5 U	NA
Lead	3 U	3 U	3 U	3 U	3 U	NA
Nickel	10 U	10 U	10 U	10 U	10 U	NA
Zinc	39	50	22	22	32	NA
Total Petroleum Hydrocarbons						
in µg/L (ppb)						
TPH 418.1	1000 U	1000 U	1000 U	1000 U	1000 U	NA
Volatile Organics						
in µg/L (ppb)						
Acetone	10 U	10 U	10 U	10 U	10 U	67
Methylene Chloride	5 U	5 U	5 U	5 U	5 U	5 U
Tetrachloroethene	1 U	1 U	1 U	5	1 U	1 U
Semivolatile Organics						
in µg/L (ppb)						
Bis(2-ethylhexyl) Phthalate	10 U	10 U	10 U	10 U	16	NA
Polynuclear Aromatic Hydrocarbons (PAHs) (a)						
in µg/L (ppb)						
Non-carcinogenic	1.25 U	1.25 U	1.25 U	1.25 U	1.25 U	NA
Carcinogenic	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	NA

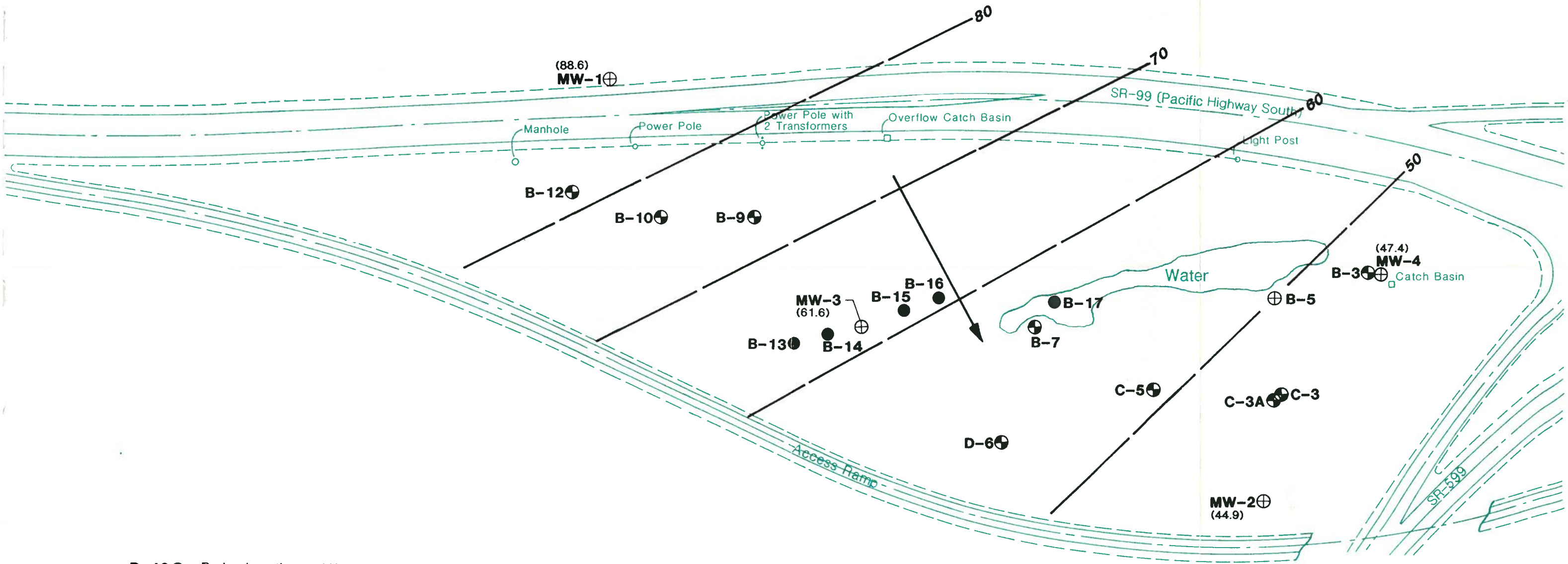
Notes:

U Not detected at indicated detection limit.

NA Not analyzed.

(a) Summed PAH concentrations are based on one-half of detection limit values for non-detected compounds.

Exploration Plan and Groundwater Elevation Contour Map



B-13 Boring Location and Number

MW-1 Monitoring Well Location and Number

(88.6) Relative Water Level Elevation in Feet (Measured 2/13/92)

B-5 Existing Phase 1 Boring Location and Number

—50— Relative Groundwater Elevation Contour in Feet

Generalized Groundwater Flow Direction

Note: Base map prepared from drawings entitled "SR 99 West Marginal Way to Burns Street, King County, Washington, Sheets 27 and 28" by Washington State Highway Commission, dated April 13, 1964. Field revised December, 1988.

N

0 100 200
Scale in Feet

HARTCROWSER
J-3351 3/92
Figure 1

APPENDIX A
LABORATORY CERTIFICATES
ANALYTICAL TECHNOLOGIES, INC.

Analytical Technologies, Inc. 560 Naches Avenue, S.W., Suite 101, Renton, WA 98055, (206) 228-8335

ATI I.D. # 9202-111

March 3, 1992

Hart Crowser, Inc.
1910 Fairview Ave. E.
Seattle, WA 98102-3699

Attention : Todd Thornburg

Project Number : 3351

Project Name : WSDOT/Duwamish

On February 13, 1992, Analytical Technologies, Inc., received six water samples for analysis. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and quality control data are enclosed.

Emily C. Carfioli
Senior Project Manager

Frederick W. Grothkopp
Laboratory Manager

FWG/hal/elf

Analytical Technologies, Inc.

ATI I.D. # 9202-111

SAMPLE CROSS REFERENCE SHEET

CLIENT : HART CROWSER, INC.
PROJECT # : 3351
PROJECT NAME : WSDOT/DUWAMISH

ATI #	CLIENT DESCRIPTION	DATE SAMPLED	MATRIX
9202-111-1	MW-1	02/13/92	WATER
9202-111-2	MW-2	02/13/92	WATER
9202-111-3	MW-3	02/13/92	WATER
9202-111-4	MW-3D	02/13/92	WATER
9202-111-5	MW-4	02/13/92	WATER
9202-111-6	TRIP BLANK	N/A	WATER

----- TOTALS -----

MATRIX	# SAMPLES
WATER	6

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of the report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

Analytical Technologies, Inc.

ATI I.D. # 9202-111

ANALYTICAL SCHEDULE

CLIENT : HART CROWSER, INC.
PROJECT # : 3351
PROJECT NAME : WSDOT/DUWAMISH

ANALYSIS	TECHNIQUE	REFERENCE	LAB
VOLATILE ORGANIC COMPOUNDS	GCMS	EPA 8240	R
SEMI-VOLATILE COMPOUNDS	GCMS	EPA 8270	R
POLYNUCLEAR AROMATIC HYDROCARBONS	HPLC/UV/FLUOR	EPA 8310	R
PETROLEUM HYDROCARBONS	IR	EPA 418.1	R
ANTIMONY	ICAP	EPA 6010	R
ARSENIC	AA/GF	EPA 7060	R
BERYLLIUM	ICAP	EPA 6010	R
CADMIUM	ICAP	EPA 6010	R
CHROMIUM	ICAP	EPA 6010	R
COPPER	ICAP	EPA 6010	R
LEAD	AA/GF	EPA 7421	R
MERCURY	AA/COLD VAPOR	EPA 7470	R
NICKEL	ICAP	EPA 6010	R
SELENIUM	AA/GF	EPA 7740	R
SILVER	ICAP	EPA 6010	R
THALLIUM	AA/GF	EPA 7841	R
ZINC	ICAP	EPA 6010	R

R = ATI - Renton
SD = ATI - San Diego
PHX = ATI - Phoenix
PNR = ATI - Pensacola
FC = ATI - Fort Collins
SUB = Subcontract

Analytical Technologies, Inc.

ATI I.D. # 9202-111

VOLATILE ORGANICS ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 3351	DATE RECEIVED	: N/A
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: N/A
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 02/15/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8240	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS	
ACETONE	<10	
BENZENE	<1	
BROMODICHLOROMETHANE	<1	
BROMOFORM	<5	
BROMOMETHANE	<10	
2-BUTANONE (MEK)	<10	
CARBON DISULFIDE	<1	
CARBON TETRACHLORIDE	<1	
CHLOROBENZENE	<1	
CHLOROETHANE	<1	
CHLOROFORM	<1	
CHLOROMETHANE	<10	
DIBROMOCHLOROMETHANE	<1	
1,1-DICHLOROETHANE	<1	
1,2-DICHLOROETHANE	<1	
1,1-DICHLOROETHENE	<1	
1,2-DICHLOROETHENE (TOTAL)	<1	
1,2-DICHLOROPROPANE	<1	
CIS-1,3-DICHLOROPROPENE	<1	
TRANS-1,3-DICHLOROPROPENE	<1	
ETHYLBENZENE	<1	
2-HEXANONE (MBK)	<10	
4-METHYL-2-PENTANONE (MIBK)	<10	
METHYLENE CHLORIDE	2	J
STYRENE	<1	
1,1,2,2-TETRACHLOROETHANE	<1	
TETRACHLOROETHENE	<1	
TOLUENE	<1	
1,1,1-TRICHLOROETHANE	<1	
1,1,2-TRICHLOROETHANE	<1	
TRICHLOROETHENE	<1	
VINYL ACETATE	<10	
VINYL CHLORIDE	<1	
TOTAL XYLENES	<1	

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-D4	97
TOLUENE-D8	98
BROMOFLUOROBENZENE	104

J = Estimated value.

Analytical Technologies, Inc.

ATI I.D. # 9202-111

VOLATILE ORGANICS ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 3351	DATE RECEIVED	: N/A
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: N/A
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 02/15/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8240	DILUTION FACTOR	: 1

COMPOUND	FLAG	SCAN	RESULTS
HEXANE		247	9.0

Analytical Technologies, Inc.

ATI I.D. # 9202-111

VOLATILE ORGANICS ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 3351	DATE RECEIVED	: N/A
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: N/A
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 02/16/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8240	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
ACETONE	<10
BENZENE	<1
BROMODICHLOROMETHANE	<1
BROMOFORM	<5
BROMOMETHANE	<10
2-BUTANONE (MEK)	<10
CARBON DISULFIDE	<1
CARBON TETRACHLORIDE	<1
CHLOROBENZENE	<1
CHLOROETHANE	<1
CHLOROFORM	<1
CHLOROMETHANE	<10
DIBROMOCHLOROMETHANE	<1
1,1-DICHLOROETHANE	<1
1,2-DICHLOROETHANE	<1
1,1-DICHLOROETHENE	<1
1,2-DICHLOROETHENE (TOTAL)	<1
1,2-DICHLOROPROPANE	<1
CIS-1,3-DICHLOROPROPENE	<1
TRANS-1,3-DICHLOROPROPENE	<1
ETHYLBENZENE	<1
2-HEXANONE (MBK)	<10
4-METHYL-2-PENTANONE (MIBK)	<10
METHYLENE CHLORIDE	<5
STYRENE	<1
1,1,2,2-TETRACHLOROETHANE	<1
TETRACHLOROETHENE	<1
TOLUENE	<1
1,1,1-TRICHLOROETHANE	<1
1,1,2-TRICHLOROETHANE	<1
TRICHLOROETHENE	<1
VINYL ACETATE	<10
VINYL CHLORIDE	<1
TOTAL XYLENES	<1

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-D4	98
TOLUENE-D8	96
BROMOFLUOROBENZENE	95

Analytical Technologies, Inc.

ATI I.D. # 9202-111

VOLATILE ORGANICS ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 3351	DATE RECEIVED	: N/A
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: N/A
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 02/16/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8240	DILUTION FACTOR	: 1

COMPOUND	FLAG	SCAN	RESULTS
HEXANE		248	9.0

Analytical Technologies, Inc.

ATI I.D. # 9202-111-1

VOLATILE ORGANICS ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 02/13/92
PROJECT #	: 3351	DATE RECEIVED	: 02/13/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-1	DATE ANALYZED	: 02/15/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8240	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
ACETONE	<10
BENZENE	<1
BROMODICHLOROMETHANE	<1
BROMOFORM	<5
BROMOMETHANE	<10
2-BUTANONE (MEK)	<10
CARBON DISULFIDE	<1
CARBON TETRACHLORIDE	<1
CHLOROBENZENE	<1
CHLOROETHANE	<1
CHLOROFORM	<1
CHLOROMETHANE	<10
DIBROMOCHLOROMETHANE	<1
1,1-DICHLOROETHANE	<1
1,2-DICHLOROETHANE	<1
1,1-DICHLOROETHENE	<1
1,2-DICHLOROETHENE (TOTAL)	<1
1,2-DICHLOROPROPANE	<1
CIS-1,3-DICHLOROPROPENE	<1
TRANS-1,3-DICHLOROPROPENE	<1
ETHYLBENZENE	<1
2-HEXANONE (MBK)	<10
4-METHYL-2-PENTANONE (MIBK)	<10
METHYLENE CHLORIDE	<5
STYRENE	<1
1,1,2,2-TETRACHLOROETHANE	<1
TETRACHLOROETHENE	<1
TOLUENE	<1
1,1,1-TRICHLOROETHANE	<1
1,1,2-TRICHLOROETHANE	<1
TRICHLOROETHENE	<1
VINYL ACETATE	<10
VINYL CHLORIDE	<1
TOTAL XYLENES	<1

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-D4	96
TOLUENE-D8	94
BROMOFLUOROBENZENE	98

Analytical Technologies, Inc.

ATI I.D. # 9202-111-1

VOLATILE ORGANICS ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 02/13/92
PROJECT #	: 3351	DATE RECEIVED	: 02/13/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-1	DATE ANALYZED	: 02/15/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8240	DILUTION FACTOR	: 1

COMPOUND	FLAG	SCAN	RESULTS
HEXANE	B	247	10
HYDROCARBON		1214	11
HYDROCARBON		1253	6.0
CYCLOHEXANE, 2-BUTYL-1,1,3-TRIMET		1272	7.0
HYDROCARBON		1306	10

B = Analyte is found in the associated blank as well as the sample.

Analytical Technologies, Inc.

ATI I.D. # 9202-111-2

VOLATILE ORGANICS ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 02/13/92
PROJECT #	: 3351	DATE RECEIVED	: 02/13/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-2	DATE ANALYZED	: 02/16/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8240	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
ACETONE	<10
BENZENE	<1
BROMODICHLOROMETHANE	<1
BROMOFORM	<5
BROMOMETHANE	<10
2-BUTANONE (MEK)	<10
CARBON DISULFIDE	<1
CARBON TETRACHLORIDE	<1
CHLOROBENZENE	<1
CHLOROETHANE	<1
CHLOROFORM	<1
CHLOROMETHANE	<10
DIBROMOCHLOROMETHANE	<1
1,1-DICHLOROETHANE	<1
1,2-DICHLOROETHANE	<1
1,1-DICHLOROETHENE	<1
1,2-DICHLOROETHENE (TOTAL)	<1
1,2-DICHLOROPROPANE	<1
CIS-1,3-DICHLOROPROPENE	<1
TRANS-1,3-DICHLOROPROPENE	<1
ETHYLBENZENE	<1
2-HEXANONE (MBK)	<10
4-METHYL-2-PENTANONE (MIBK)	<10
METHYLENE CHLORIDE	<5
STYRENE	<1
1,1,2,2-TETRACHLOROETHANE	<1
TETRACHLOROETHENE	<1
TOLUENE	<1
1,1,1-TRICHLOROETHANE	<1
1,1,2-TRICHLOROETHANE	<1
TRICHLOROETHENE	<1
VINYL ACETATE	<10
VINYL CHLORIDE	<1
TOTAL XYLENES	<1

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-D4	99
TOLUENE-D8	96
BROMOFLUOROBENZENE	96

Analytical Technologies, Inc.

ATI I.D. # 9202-111-2

VOLATILE ORGANICS ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 02/13/92
PROJECT #	: 3351	DATE RECEIVED	: 02/13/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-2	DATE ANALYZED	: 02/16/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8240	DILUTION FACTOR	: 1

COMPOUND	FLAG	SCAN	RESULTS
HEXANE	B	247	11

B = Analyte is found in the associated blank as well as the sample.

Analytical Technologies, Inc.

ATI I.D. # 9202-111-3

VOLATILE ORGANICS ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 02/13/92
PROJECT #	: 3351	DATE RECEIVED	: 02/13/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-3	DATE ANALYZED	: 02/15/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8240	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
ACETONE	<10
BENZENE	<1
BROMODICHLOROMETHANE	<1
BROMOFORM	<5
BROMOMETHANE	<10
2-BUTANONE (MEK)	<10
CARBON DISULFIDE	<1
CARBON TETRACHLORIDE	<1
CHLOROBENZENE	<1
CHLOROETHANE	<1
CHLOROFORM	<1
CHLOROMETHANE	<10
DIBROMOCHLOROMETHANE	<1
1,1-DICHLOROETHANE	<1
1,2-DICHLOROETHANE	<1
1,1-DICHLOROETHENE	<1
1,2-DICHLOROETHENE (TOTAL)	<1
1,2-DICHLOROPROPANE	<1
CIS-1,3-DICHLOROPROPENE	<1
TRANS-1,3-DICHLOROPROPENE	<1
ETHYLBENZENE	<1
2-HEXANONE (MBK)	<10
4-METHYL-2-PENTANONE (MIBK)	<10
METHYLENE CHLORIDE	<5
STYRENE	<1
1,1,2,2-TETRACHLOROETHANE	<1
TETRACHLOROETHENE	<1
TOLUENE	<1
1,1,1-TRICHLOROETHANE	<1
1,1,2-TRICHLOROETHANE	<1
TRICHLOROETHENE	<1
VINYL ACETATE	<10
VINYL CHLORIDE	<1
TOTAL XYLENES	<1

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-D4	98
TOLUENE-D8	96
BROMOFLUOROBENZENE	99

Analytical Technologies, Inc.

ATI I.D. # 9202-111-3

VOLATILE ORGANICS ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 02/13/92
PROJECT #	: 3351	DATE RECEIVED	: 02/13/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-3	DATE ANALYZED	: 02/15/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8240	DILUTION FACTOR	: 1

COMPOUND	FLAG	SCAN	RESULTS
HEXANE	B	246	9.0

B = Analyte is found in the associated blank as well as the sample.

Analytical Technologies, Inc.

ATI I.D. # 9202-111-4

VOLATILE ORGANICS ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 02/13/92
PROJECT #	: 3351	DATE RECEIVED	: 02/13/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-3D	DATE ANALYZED	: 02/15/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8240	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS	
ACETONE	<10	
BENZENE	<1	
BROMODICHLOROMETHANE	<1	
BROMOFORM	<5	
BROMOMETHANE	<10	
2-BUTANONE (MEK)	<10	
CARBON DISULFIDE	<1	
CARBON TETRACHLORIDE	<1	
CHLOROBENZENE	<1	
CHLOROETHANE	<1	
CHLOROFORM	<1	
CHLOROMETHANE	<10	
DIBROMOCHLOROMETHANE	<1	
1,1-DICHLOROETHANE	<1	
1,2-DICHLOROETHANE	<1	
1,1-DICHLOROETHENE	<1	
1,2-DICHLOROETHENE (TOTAL)	<1	
1,2-DICHLOROPROPANE	<1	
CIS-1,3-DICHLOROPROPENE	<1	
TRANS-1,3-DICHLOROPROPENE	<1	
ETHYLBENZENE	<1	
2-HEXANONE (MBK)	<10	
4-METHYL-2-PENTANONE (MIBK)	<10	
METHYLENE CHLORIDE	3	JB
STYRENE	<1	
1,1,2,2-TETRACHLOROETHANE	<1	
TETRACHLOROETHENE	5	
TOLUENE	<1	
1,1,1-TRICHLOROETHANE	<1	
1,1,2-TRICHLOROETHANE	<1	
TRICHLOROETHENE	<1	
VINYL ACETATE	<10	
VINYL CHLORIDE	<1	
TOTAL XYLENES	<1	

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-D4	93
TOLUENE-D8	92
BROMOFLUOROBENZENE	96

B = Analyte is found in the associated blank as well as the sample.
J = Estimated value.

Analytical Technologies, Inc.

ATI I.D. # 9202-111-4

VOLATILE ORGANICS ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 02/13/92
PROJECT #	: 3351	DATE RECEIVED	: 02/13/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-3D	DATE ANALYZED	: 02/15/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8240	DILUTION FACTOR	: 1

COMPOUND	FLAG	SCAN	RESULTS
HEXANE	B	248	9.0

B = Analyte is found in the associated blank as well as the sample.

Analytical Technologies, Inc.

ATI I.D. # 9202-111-5

VOLATILE ORGANICS ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 02/13/92
PROJECT #	: 3351	DATE RECEIVED	: 02/13/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-4	DATE ANALYZED	: 02/15/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8240	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
ACETONE	<10
BENZENE	<1
BROMODICHLOROMETHANE	<1
BROMOFORM	<5
BROMOMETHANE	<10
2-BUTANONE (MEK)	<10
CARBON DISULFIDE	<1
CARBON TETRACHLORIDE	<1
CHLOROBENZENE	<1
CHLOROETHANE	<1
CHLOROFORM	<1
CHLOROMETHANE	<10
DIBROMOCHLOROMETHANE	<1
1,1-DICHLOROETHANE	<1
1,2-DICHLOROETHANE	<1
1,1-DICHLOROETHENE	<1
1,2-DICHLOROETHENE (TOTAL)	<1
1,2-DICHLOROPROPANE	<1
CIS-1,3-DICHLOROPROPENE	<1
TRANS-1,3-DICHLOROPROPENE	<1
ETHYLBENZENE	<1
2-HEXANONE (MBK)	<10
4-METHYL-2-PENTANONE (MIBK)	<10
METHYLENE CHLORIDE	<5
STYRENE	<1
1,1,2,2-TETRACHLOROETHANE	<1
TETRACHLOROETHENE	<1
TOLUENE	<1
1,1,1-TRICHLOROETHANE	<1
1,1,2-TRICHLOROETHANE	<1
TRICHLOROETHENE	<1
VINYL ACETATE	<10
VINYL CHLORIDE	<1
TOTAL XYLENES	<1

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-D4	97
TOLUENE-D8	93
BROMOFLUOROBENZENE	98

Analytical Technologies, Inc.

ATI I.D. # 9202-111-5

VOLATILE ORGANICS ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 02/13/92
PROJECT #	: 3351	DATE RECEIVED	: 02/13/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-4	DATE ANALYZED	: 02/15/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8240	DILUTION FACTOR	: 1

COMPOUND	FLAG	SCAN	RESULTS
HEXANE	B	248	10

B = Analyte is found in the associated blank as well as the sample.

Analytical Technologies, Inc.

ATI I.D. # 9202-111-6

VOLATILE ORGANICS ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 3351	DATE RECEIVED	: 02/13/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: N/A
CLIENT I.D.	: TRIP BLANK	DATE ANALYZED	: 02/15/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8240	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS	
ACETONE	67	
BENZENE	<1	
BROMODICHLOROMETHANE	<1	
BROMOFORM	<5	
BROMOMETHANE	<10	
2-BUTANONE (MEK)	<10	
CARBON DISULFIDE	<1	
CARBON TETRACHLORIDE	<1	
CHLOROBENZENE	<1	
CHLOROETHANE	<1	
CHLOROFORM	<1	
CHLOROMETHANE	<10	
DIBROMOCHLOROMETHANE	<1	
1,1-DICHLOROETHANE	<1	
1,2-DICHLOROETHANE	<1	
1,1-DICHLOROETHENE	<1	
1,2-DICHLOROETHENE (TOTAL)	<1	
1,2-DICHLOROPROPANE	<1	
CIS-1,3-DICHLOROPROPENE	<1	
TRANS-1,3-DICHLOROPROPENE	<1	
ETHYLBENZENE	<1	
2-HEXANONE (MBK)	<10	
4-METHYL-2-PENTANONE (MIBK)	<10	
METHYLENE CHLORIDE	4	JB
STYRENE	<1	
1,1,2,2-TETRACHLOROETHANE	<1	
TETRACHLOROETHENE	<1	
TOLUENE	<1	
1,1,1-TRICHLOROETHANE	<1	
1,1,2-TRICHLOROETHANE	<1	
TRICHLOROETHENE	<1	
VINYL ACETATE	<10	
VINYL CHLORIDE	<1	
TOTAL XYLENES	<1	

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-D4	94
TOLUENE-D8	93
BROMOFLUOROBENZENE	98

B = Analyte is found in the associated blank as well as the sample.
J = Estimated value.

Analytical Technologies, Inc.

ATI I.D. # 9202-111-6

VOLATILE ORGANICS ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 3351	DATE RECEIVED	: 02/13/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: N/A
CLIENT I.D.	: TRIP BLANK	DATE ANALYZED	: 02/15/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8240	DILUTION FACTOR	: 1

COMPOUND	FLAG	SCAN	RESULTS
HEXANE	B	248	10

B = Analyte is found in the associated blank as well as the sample.

Analytical Technologies, Inc.

ATI I.D. # 9202-111

VOLATILE ORGANICS ANALYSIS
QUALITY CONTROL DATA

CLIENT : HART CROWSER, INC.
PROJECT # : 3351
PROJECT NAME : WSDOT/DUWAMISH
EPA METHOD : 8240
SAMPLE MATRIX : WATER

SAMPLE I.D. # : 9202-111-1
DATE EXTRACTED : N/A
DATE ANALYZED : 02/15/92
UNITS : ug/L

COMPOUNDS	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
1,1-DICHLOROETHENE	<1.0	50.0	38.5	77	35.7	71	8
TRICHLOROETHENE	<1.0	50.0	54.5	109	49.6	99	9
BENZENE	<1.0	50.0	50.9	102	46.6	93	9
TOLUENE	<1.0	50.0	50.1	100	46.3	93	8
CHLOROBENZENE	<1.0	50.0	54.6	109	50.2	100	8

$$\%\text{Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Spike Result} - \text{Duplicate Result})|}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

ATI I.D. # 9202-111

VOLATILE ORGANICS ANALYSIS
QUALITY CONTROL DATA

CLIENT : HART CROWSER, INC.
PROJECT # : 3351
PROJECT NAME : WSDOT/DUWAMISH
EPA METHOD : 8240
SAMPLE MATRIX : WATER

SAMPLE I.D. # : BLANK SPIKE
DATE EXTRACTED : N/A
DATE ANALYZED : 02/15/92
UNITS : ug/L

COMPOUNDS	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
1,1-DICHLOROETHENE	<1.0	50.0	35.8	72	N/A	N/A	N/A
TRICHLOROETHENE	<1.0	50.0	50.0	100	N/A	N/A	N/A
BENZENE	<1.0	50.0	46.8	94	N/A	N/A	N/A
TOLUENE	<1.0	50.0	48.9	98	N/A	N/A	N/A
CHLOROBENZENE	<1.0	50.0	51.9	104	N/A	N/A	N/A

$$\%\text{Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Spike Result} - \text{Duplicate Result})|}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

ATI I.D. # 9202-111

VOLATILE ORGANICS ANALYSIS
QUALITY CONTROL DATA

CLIENT : HART CROWSER, INC.
PROJECT # : 3351
PROJECT NAME : WSDOT/DUWAMISH
EPA METHOD : 8240
SAMPLE MATRIX : WATER

SAMPLE I.D. # : BLANK SPIKE
DATE EXTRACTED : N/A
DATE ANALYZED : 02/16/92
UNITS : ug/L

COMPOUNDS	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
1,1-DICHLOROETHENE	<1.0	50.0	36.1	72	N/A	N/A	N/A
TRICHLOROETHENE	<1.0	50.0	48.8	98	N/A	N/A	N/A
BENZENE	<1.0	50.0	47.1	94	N/A	N/A	N/A
TOLUENE	<1.0	50.0	50.6	101	N/A	N/A	N/A
CHLOROBENZENE	<1.0	50.0	51.6	103	N/A	N/A	N/A

$$\%\text{Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Spike Result} - \text{Duplicate Result})|}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

ATI I.D. # 9202-111

CASE NARRATIVE

CLIENT : HART CROWSER, INC.
PROJECT # : 3351
PROJECT NAME : WSDOT/DUWAMISH

CASE NARRATIVE: SEMI-VOLATILE ORGANICS ANALYSIS

Samples 9202-111-2 (MW-2), 9202-111-2MS and 9202-111-2MSD had initial starting volumes of 900 milliliters (ml). Sample 9202-111-5 (MW-4) had an initial starting volume of 890 ml. Reporting limits are based on one liter starting volumes and have been adjusted appropriately for these variances. The recovery for 2-chlorophenol in sample 9202-111-2MSD is 109%, which is out of the control limits. The blank spike recovery for 2-chlorophenol is also outside of the control limits at 106%.

No other problems or discrepancies are noted with this accession number.

Analytical Technologies, Inc.

ATI I.D. # 9202-111

SEMI-VOLATILE ORGANICS ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 3351	DATE RECEIVED	: N/A
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: 02/14/92
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 02/25/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
N-NITROSODIMETHYLAMINE	<10
PHENOL	<10
ANILINE	<10
BIS(2-CHLOROETHYL)ETHER	<10
2-CHLOROPHENOL	<10
1,3-DICHLOROBENZENE	<10
1,4-DICHLOROBENZENE	<10
BENZYL ALCOHOL	<10
1,2-DICHLOROBENZENE	<10
2-METHYLPHENOL	<10
BIS(2-CHLOROISOPROPYL)ETHER	<10
4-METHYLPHENOL	<10
N-NITROSO-DI-N-PROPYLAMINE	<10
HEXACHLOROETHANE	<10
NITROBENZENE	<10
ISOPHORONE	<10
2-NITROPHENOL	<10
2,4-DIMETHYLPHENOL	<10
BENZOIC ACID	<10
BIS(2-CHLOROETHOXY)METHANE	<50
2,4-DICHLOROPHENOL	<10
1,2,4-TRICHLOROBENZENE	<10
NAPHTHALENE	<10
4-CHLOROANILINE	<10
HEXACHLOROBUTADIENE	<10
4-CHLORO-3-METHYLPHENOL	<10
2-METHYLNAPHTHALENE	<10
HEXACHLOROCYCLOPENTADIENE	<10
2,4,6-TRICHLOROPHENOL	<10
2,4,5-TRICHLOROPHENOL	<10
2-CHLORONAPHTHALENE	<50
2-NITROANILINE	<10
DIMETHYLPHTHALATE	<50
ACENAPHTHYLENE	<10
3-NITROANILINE	<10
ACENAPHTHENE	<50
2,4-DINITROPHENOL	<10
4-NITROPHENOL	<50
	<50

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Analytical Technologies, Inc.

ATI I.D. # 9202-111

SEMI-VOLATILE ORGANICS ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 3351	DATE RECEIVED	: N/A
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: 02/14/92
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 02/25/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
DIBENZOFURAN	<10
2,4-DINITROTOLUENE	<10
2,6-DINITROTOLUENE	<10
DIETHYLPHTHALATE	<10
4-CHLOROPHENYL-PHENYLETHER	<10
FLUORENE	<10
4-NITROANILINE	<50
4,6-DINITRO-2-METHYLPHENOL	<50
N-NITROSODIPHENYLAMINE	<10
4-BROMOPHENYL-PHENYLETHER	<10
HEXACHLOROBENZENE	<10
PENTACHLOROPHENOL	<10
PHENANTHRENE	<10
ANTHRACENE	<10
DI-N-BUTYLPHTHALATE	<10
FLUORANTHENE	<10
BENZIDINE	<100
PYRENE	<10
BUTYLBENZYLPHTHALATE	<10
3,3'-DICHLOROBENZIDINE	<20
BENZO(A)ANTHRACENE	<10
BIS(2-ETHYLHEXYL)PHTHALATE	<10
CHRYSENE	<10
DI-N-OCTYLPHTHALATE	<10
BENZO(B)FLUORANTHENE	<10
BENZO(K)FLUORANTHENE	<10
BENZO(A)PYRENE	<10
INDENO(1,2,3-CD)PYRENE	<10
DIBENZ(A,H)ANTHRACENE	<10
BENZO(G,H,I)PERYLENE	<10

SURROGATE PERCENT RECOVERIES

NITROBENZENE-D5	105
2-FLUOROBIPHENYL	102
TERPHENYL-D14	100
PHENOL-D5	99
2-FLUOROPHENOL	95
2,4,6-TRIBROMOPHENOL	130

Analytical Technologies, Inc.

ATI I.D. # 9202-111

SEMI-VOLATILE ORGANICS ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 3351	DATE RECEIVED	: N/A
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: 02/14/92
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 02/25/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUND	FLAG	SCAN	RESULTS
ACETIC ACID, PENTYL ESTER		84	59
UNKNOWN		130	10
2-PENTANONE, 4-HYDROXY-4-METHYL-		169	26
UNKNOWN		190	6.0
1-PROPENE, 3,3,3-TRICHLORO-		326	22
CYCLOHEXANE, BROMO		584	16

Analytical Technologies, Inc.

ATI I.D. # 9202-111-1

SEMI-VOLATILE ORGANICS ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 02/13/92
PROJECT #	: 3351	DATE RECEIVED	: 02/13/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: 02/14/92
CLIENT I.D.	: MW-1	DATE ANALYZED	: 02/25/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
N-NITROSODIMETHYLAMINE	<10
PHENOL	<10
ANILINE	<10
BIS(2-CHLOROETHYL)ETHER	<10
2-CHLOROPHENOL	<10
1,3-DICHLOROBENZENE	<10
1,4-DICHLOROBENZENE	<10
BENZYL ALCOHOL	<10
1,2-DICHLOROBENZENE	<10
2-METHYLPHENOL	<10
BIS(2-CHLOROISOPROPYL)ETHER	<10
4-METHYLPHENOL	<10
N-NITROSO-DI-N-PROPYLAMINE	<10
HEXACHLOROETHANE	<10
NITROBENZENE	<10
ISOPHORONE	<10
2-NITROPHENOL	<10
2,4-DIMETHYLPHENOL	<10
BENZOIC ACID	<50
BIS(2-CHLOROETHOXY)METHANE	<10
2,4-DICHLOROPHENOL	<10
1,2,4-TRICHLOROBENZENE	<10
NAPHTHALENE	<10
4-CHLOROANILINE	<10
HEXACHLOROBUTADIENE	<10
4-CHLORO-3-METHYLPHENOL	<10
2-METHYLNAPHTHALENE	<10
HEXACHLOROCYCLOPENTADIENE	<10
2,4,6-TRICHLOROPHENOL	<10
2,4,5-TRICHLOROPHENOL	<50
2-CHLORONAPHTHALENE	<10
2-NITROANILINE	<50
DIMETHYLPHTHALATE	<10
ACENAPHTHYLENE	<10
3-NITROANILINE	<50
ACENAPHTHENE	<10
2,4-DINITROPHENOL	<50
4-NITROPHENOL	<50

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Analytical Technologies, Inc.

ATI I.D. # 9202-111-1

SEMI-VOLATILE ORGANICS ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 02/13/92
PROJECT #	: 3351	DATE RECEIVED	: 02/13/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: 02/14/92
CLIENT I.D.	: MW-1	DATE ANALYZED	: 02/25/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
DIBENZOFURAN	<10
2,4-DINITROTOLUENE	<10
2,6-DINITROTOLUENE	<10
DIETHYLPHTHALATE	<10
4-CHLOROPHENYL-PHENYLETHER	<10
FLUORENE	<10
4-NITROANILINE	<50
4,6-DINITRO-2-METHYLPHENOL	<50
N-NITROSODIPHENYLAMINE	<10
4-BROMOPHENYL-PHENYLETHER	<10
HEXACHLOROBENZENE	<10
PENTACHLOROPHENOL	<10
PHENANTHRENE	<10
ANTHRACENE	<10
DI-N-BUTYLPHTHALATE	<10
FLUORANTHENE	<10
BENZIDINE	<100
PYRENE	<10
BUTYLBENZYLPHTHALATE	<10
3,3'-DICHLOROBENZIDINE	<20
BENZO(A)ANTHRACENE	<10
BIS(2-ETHYLHEXYL)PHTHALATE	<10
CHRYSENE	<10
DI-N-OCTYLPHTHALATE	<10
BENZO(B)FLUORANTHENE	<10
BENZO(K)FLUORANTHENE	<10
BENZO(A)PYRENE	<10
INDENO(1,2,3-CD)PYRENE	<10
DIBENZ(A,H)ANTHRACENE	<10
BENZO(G,H,I)PERYLENE	<10

SURROGATE PERCENT RECOVERIES

NITROBENZENE-D5	89
2-FLUOROBIPHENYL	93
TERPHENYL-D14	66
PHENOL-D5	83
2-FLUOROPHENOL	78
2,4,6-TRIBROMOPHENOL	107

Analytical Technologies, Inc.

ATI I.D. # 9202-111-1

SEMI-VOLATILE ORGANICS ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 02/13/92
PROJECT #	: 3351	DATE RECEIVED	: 02/13/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: 02/14/92
CLIENT I.D.	: MW-1	DATE ANALYZED	: 02/25/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUND	FLAG	SCAN	RESULTS
2-PENTANONE, 4-HYDROXY-4-METHYL-	B	168	6.0
ETHANOL, 2-BUTOXY-		265	6.0
1-PROPENE, 3,3,3-TRICHLORO-	B	326	20
CYCLOHEXANE, BROMO-	B	584	10
ETHANOL, 2-BUTOXY-, PHOSPHATE (3:1)		1599	39

B = Analyte is found in the associated blank as well as the sample.

Analytical Technologies, Inc.

ATI I.D. # 9202-111-2

SEMI-VOLATILE ORGANICS ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 02/13/92
PROJECT #	: 3351	DATE RECEIVED	: 02/13/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: 02/14/92
CLIENT I.D.	: MW-2	DATE ANALYZED	: 02/25/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
N-NITROSODIMETHYLAMINE	<11
PHENOL	<11
ANILINE	<11
BIS(2-CHLOROETHYL)ETHER	<11
2-CHLOROPHENOL	<11
1,3-DICHLOROBENZENE	<11
1,4-DICHLOROBENZENE	<11
BENZYL ALCOHOL	<11
1,2-DICHLOROBENZENE	<11
2-METHYLPHENOL	<11
BIS(2-CHLOROISOPROPYL)ETHER	<11
4-METHYLPHENOL	<11
N-NITROSO-DI-N-PROPYLAMINE	<11
HEXACHLOROETHANE	<11
NITROBENZENE	<11
ISOPHORONE	<11
2-NITROPHENOL	<11
2,4-DIMETHYLPHENOL	<11
BENZOIC ACID	<56
BIS(2-CHLOROETHOXY)METHANE	<11
2,4-DICHLOROPHENOL	<11
1,2,4-TRICHLOROBENZENE	<11
NAPHTHALENE	<11
4-CHLOROANILINE	<11
HEXACHLOROBUTADIENE	<11
4-CHLORO-3-METHYLPHENOL	<11
2-METHYLNAPHTHALENE	<11
HEXACHLOROCYCLOPENTADIENE	<11
2,4,6-TRICHLOROPHENOL	<11
2,4,5-TRICHLOROPHENOL	<56
2-CHLORONAPHTHALENE	<11
2-NITROANILINE	<56
DIMETHYLPHTHALATE	<11
ACENAPHTHYLENE	<11
3-NITROANILINE	<56
ACENAPHTHENE	<11
2,4-DINITROPHENOL	<56
4-NITROPHENOL	<56

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Analytical Technologies, Inc.

ATI I.D. # 9202-111-2

SEMI-VOLATILE ORGANICS ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 02/13/92
PROJECT #	: 3351	DATE RECEIVED	: 02/13/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: 02/14/92
CLIENT I.D.	: MW-2	DATE ANALYZED	: 02/25/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
DIBENZOFURAN	<11
2,4-DINITROTOLUENE	<11
2,6-DINITROTOLUENE	<11
DIETHYLPHTHALATE	<11
4-CHLOROPHENYL-PHENYLETHER	<11
FLUORENE	<11
4-NITROANILINE	<56
4,6-DINITRO-2-METHYLPHENOL	<56
N-NITROSODIPHENYLAMINE	<11
4-BROMOPHENYL-PHENYLETHER	<11
HEXACHLOROBENZENE	<11
PENTACHLOROPHENOL	<11
PHENANTHRENE	<11
ANTHRACENE	<11
DI-N-BUTYLPHTHALATE	<11
FLUORANTHENE	<11
BENZIDINE	<110
PYRENE	<11
BUTYLBENZYLPHTHALATE	<11
3,3'-DICHLOROBENZIDINE	<22
BENZO(A)ANTHRACENE	<11
BIS(2-ETHYLHEXYL)PHTHALATE	2.8 J
CHRYSENE	<11
DI-N-OCTYLPHTHALATE	<11
BENZO(B)FLUORANTHENE	<11
BENZO(K)FLUORANTHENE	<11
BENZO(A)PYRENE	<11
INDENO(1,2,3-CD)PYRENE	<11
DIBENZ(A,H)ANTHRACENE	<11
BENZO(G,H,I)PERYLENE	<11

SURROGATE PERCENT RECOVERIES

NITROBENZENE-D5	106
2-FLUOROBIPHENYL	105
TERPHENYL-D14	81
PHENOL-D5	96
2-FLUOROPHENOL	98
2,4,6-TRIBROMOPHENOL	130

J = Estimated value.

Analytical Technologies, Inc.

ATI I.D. # 9202-111-2

SEMI-VOLATILE ORGANICS ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 02/13/92
PROJECT #	: 3351	DATE RECEIVED	: 02/13/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: 02/14/92
CLIENT I.D.	: MW-2	DATE ANALYZED	: 02/25/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUND	FLAG	SCAN	RESULTS
UNKNOWN	B	189	4.4
1-PROPENE, 3,3,3-TRICHLORO-	B	325	16
CYCLOHEXANE, BROMO-	B	584	8.9
UNKNOWN		1434	6.7

B = Analyte is found in the associated blank as well as the sample.

Analytical Technologies, Inc.

ATI I.D. # 9202-111-3

SEMI-VOLATILE ORGANICS ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 02/13/92
PROJECT #	: 3351	DATE RECEIVED	: 02/13/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: 02/14/92
CLIENT I.D.	: MW-3	DATE ANALYZED	: 02/26/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
N-NITROSODIMETHYLAMINE	<10
PHENOL	<10
ANILINE	<10
BIS(2-CHLOROETHYL)ETHER	<10
2-CHLOROPHENOL	<10
1,3-DICHLOROBENZENE	<10
1,4-DICHLOROBENZENE	<10
BENZYL ALCOHOL	<10
1,2-DICHLOROBENZENE	<10
2-METHYLPHENOL	<10
BIS(2-CHLOROISOPROPYL)ETHER	<10
4-METHYLPHENOL	<10
N-NITROSO-DI-N-PROPYLAMINE	<10
HEXACHLOROETHANE	<10
NITROBENZENE	<10
ISOPHORONE	<10
2-NITROPHENOL	<10
2,4-DIMETHYLPHENOL	<10
BENZOIC ACID	<50
BIS(2-CHLOROETHOXY)METHANE	<10
2,4-DICHLOROPHENOL	<10
1,2,4-TRICHLOROBENZENE	<10
NAPHTHALENE	<10
4-CHLOROANILINE	<10
HEXACHLOROBUTADIENE	<10
4-CHLORO-3-METHYLPHENOL	<10
2-METHYLNAPHTHALENE	<10
HEXACHLOROCYCLOPENTADIENE	<10
2,4,6-TRICHLOROPHENOL	<10
2,4,5-TRICHLOROPHENOL	<50
2-CHLORONAPHTHALENE	<10
2-NITROANILINE	<50
DIMETHYLPHTHALATE	<10
ACENAPHTHYLENE	<10
3-NITROANILINE	<50
ACENAPHTHENE	<10
2,4-DINITROPHENOL	<50
4-NITROPHENOL	<50

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Analytical Technologies, Inc.

ATI I.D. # 9202-111-3

SEMI-VOLATILE ORGANICS ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 02/13/92
PROJECT #	: 3351	DATE RECEIVED	: 02/13/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: 02/14/92
CLIENT I.D.	: MW-3	DATE ANALYZED	: 02/26/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
DIBENZOFURAN	<10
2,4-DINITROTOLUENE	<10
2,6-DINITROTOLUENE	<10
DIETHYLPHTHALATE	<10
4-CHLOROPHENYL-PHENYLETHER	<10
FLUORENE	<10
4-NITROANILINE	<50
4,6-DINITRO-2-METHYLPHENOL	<50
N-NITROSODIPHENYLAMINE	<10
4-BROMOPHENYL-PHENYLETHER	<10
HEXACHLOROBENZENE	<10
PENTACHLOROPHENOL	<10
PHENANTHRENE	<10
ANTHRACENE	<10
DI-N-BUTYLPHTHALATE	<10
FLUORANTHENE	<10
BENZIDINE	<100
PYRENE	<10
BUTYLBENZYLPHTHALATE	<10
3,3'-DICHLOROBENZIDINE	<20
BENZO(A)ANTHRACENE	<10
BIS(2-ETHYLHEXYL)PHTHALATE	2.2 J
CHRYSENE	<10
DI-N-OCTYLPHTHALATE	<10
BENZO(B)FLUORANTHENE	<10
BENZO(K)FLUORANTHENE	<10
BENZO(A)PYRENE	<10
INDENO(1,2,3-CD)PYRENE	<10
DIBENZ(A,H)ANTHRACENE	<10
BENZO(G,H,I)PERYLENE	<10

SURROGATE PERCENT RECOVERIES

NITROBENZENE-D5	98
2-FLUOROBIPHENYL	120
TERPHENYL-D14	85
PHENOL-D5	102
2-FLUOROPHENOL	98
2,4,6-TRIBROMOPHENOL	100

J = Estimated value.

Analytical Technologies, Inc.

ATI I.D. # 9202-111-3

SEMI-VOLATILE ORGANICS ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 02/13/92
PROJECT #	: 3351	DATE RECEIVED	: 02/13/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: 02/14/92
CLIENT I.D.	: MW-3	DATE ANALYZED	: 02/26/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUND	FLAG	SCAN	RESULTS
2-PENTANONE, 4-HYDROXY-4-METHYL-	B	168	4.0
UNKNOWN	B	190	5.0
UNKNOWN		273	4.0
1-PROPENE, 3,3,3-TRICHLORO-	B	326	17
CYCLOHEXANE, BROMO-	B	584	10

B = Analyte is found in the associated blank as well as the sample.

Analytical Technologies, Inc.

ATI I.D. # 9202-111-4

SEMI-VOLATILE ORGANICS ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 02/13/92
PROJECT #	: 3351	DATE RECEIVED	: 02/13/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: 02/14/92
CLIENT I.D.	: MW-3D	DATE ANALYZED	: 02/26/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
N-NITROSODIMETHYLAMINE	<10
PHENOL	<10
ANILINE	<10
BIS(2-CHLOROETHYL)ETHER	<10
2-CHLOROPHENOL	<10
1,3-DICHLOROBENZENE	<10
1,4-DICHLOROBENZENE	<10
BENZYL ALCOHOL	<10
1,2-DICHLOROBENZENE	<10
2-METHYLPHENOL	<10
BIS(2-CHLOROISOPROPYL)ETHER	<10
4-METHYLPHENOL	<10
N-NITROSO-DI-N-PROPYLAMINE	<10
HEXACHLOROETHANE	<10
NITROBENZENE	<10
ISOPHORONE	<10
2-NITROPHENOL	<10
2,4-DIMETHYLPHENOL	<10
BENZOIC ACID	<50
BIS(2-CHLOROETHOXY)METHANE	<10
2,4-DICHLOROPHENOL	<10
1,2,4-TRICHLOROBENZENE	<10
NAPHTHALENE	<10
4-CHLOROANILINE	<10
HEXACHLOROBUTADIENE	<10
4-CHLORO-3-METHYLPHENOL	<10
2-METHYLNAPHTHALENE	<10
HEXACHLOROCYCLOPENTADIENE	<10
2,4,6-TRICHLOROPHENOL	<10
2,4,5-TRICHLOROPHENOL	<50
2-CHLORONAPHTHALENE	<10
2-NITROANILINE	<50
DIMETHYLPHTHALATE	<10
ACENAPHTHYLENE	<10
3-NITROANILINE	<50
ACENAPHTHENE	<10
2,4-DINITROPHENOL	<50
4-NITROPHENOL	<50

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Analytical Technologies, Inc.

ATI I.D. # 9202-111-4

SEMI-VOLATILE ORGANICS ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 02/13/92
PROJECT #	: 3351	DATE RECEIVED	: 02/13/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: 02/14/92
CLIENT I.D.	: MW-3D	DATE ANALYZED	: 02/26/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
DIBENZOFURAN	<10
2,4-DINITROTOLUENE	<10
2,6-DINITROTOLUENE	<10
DIETHYLPHTHALATE	<10
4-CHLOROPHENYL-PHENYLETHER	<10
FLUORENE	<10
4-NITROANILINE	<50
4,6-DINITRO-2-METHYLPHENOL	<50
N-NITROSODIPHENYLAMINE	<10
4-BROMOPHENYL-PHENYLETHER	<10
HEXACHLOROBENZENE	<10
PENTACHLOROPHENOL	<10
PHENANTHRENE	<10
ANTHRACENE	<10
DI-N-BUTYLPHTHALATE	<10
FLUORANTHENE	<10
BENZIDINE	<100
PYRENE	<10
BUTYLBENZYLPHTHALATE	<10
3,3'-DICHLOROBENZIDINE	<20
BENZO(A)ANTHRACENE	<10
BIS(2-ETHYLHEXYL)PHTHALATE	<10
CHRYSENE	<10
DI-N-OCTYLPHTHALATE	<10
BENZO(B)FLUORANTHENE	<10
BENZO(K)FLUORANTHENE	<10
BENZO(A)PYRENE	<10
INDENO(1,2,3-CD)PYRENE	<10
DIBENZ(A,H)ANTHRACENE	<10
BENZO(G,H,I)PERYLENE	<10

SURROGATE PERCENT RECOVERIES

NITROBENZENE-D5	111
2-FLUOROBIPHENYL	121
TERPHENYL-D14	77
PHENOL-D5	103
2-FLUOROPHENOL	100
2,4,6-TRIBROMOPHENOL	90

Analytical Technologies, Inc.

ATI I.D. # 9202-111-4

SEMI-VOLATILE ORGANICS ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 02/13/92
PROJECT #	: 3351	DATE RECEIVED	: 02/13/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: 02/14/92
CLIENT I.D.	: MW-3D	DATE ANALYZED	: 02/26/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUND	FLAG	SCAN	RESULTS
2-PENTANONE, 4-HYDROXY-4-METHYL-	B	169	5.0
UNKNOWN	B	191	4.0
1-PROPENE, 3,3,3-TRICHLORO-	B	327	21
CYCLOHEXANE, BROMO-	B	586	10

B = Analyte is found in the associated blank as well as the sample.

Analytical Technologies, Inc.

ATI I.D. # 9202-111-5

SEMI-VOLATILE ORGANICS ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 02/13/92
PROJECT #	: 3351	DATE RECEIVED	: 02/13/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: 02/14/92
CLIENT I.D.	: MW-4	DATE ANALYZED	: 02/26/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
N-NITROSODIMETHYLAMINE	<11
PHENOL	<11
ANILINE	<11
BIS(2-CHLOROETHYL)ETHER	<11
2-CHLOROPHENOL	<11
1,3-DICHLOROBENZENE	<11
1,4-DICHLOROBENZENE	<11
BENZYL ALCOHOL	<11
1,2-DICHLOROBENZENE	<11
2-METHYLPHENOL	<11
BIS(2-CHLOROISOPROPYL)ETHER	<11
4-METHYLPHENOL	<11
N-NITROSO-DI-N-PROPYLAMINE	<11
HEXACHLOROETHANE	<11
NITROBENZENE	<11
ISOPHORONE	<11
2-NITROPHENOL	<11
2,4-DIMETHYLPHENOL	<11
BENZOIC ACID	<56
BIS(2-CHLOROETHOXY)METHANE	<11
2,4-DICHLOROPHENOL	<11
1,2,4-TRICHLOROBENZENE	<11
NAPHTHALENE	<11
4-CHLOROANILINE	<11
HEXACHLOROBUTADIENE	<11
4-CHLORO-3-METHYLPHENOL	<11
2-METHYLNAPHTHALENE	<11
HEXACHLOROCYCLOPENTADIENE	<11
2,4,6-TRICHLOROPHENOL	<11
2,4,5-TRICHLOROPHENOL	<56
2-CHLORONAPHTHALENE	<11
2-NITROANILINE	<56
DIMETHYLPHTHALATE	<11
ACENAPHTHYLENE	<11
3-NITROANILINE	<56
ACENAPHTHENE	<11
2,4-DINITROPHENOL	<56
4-NITROPHENOL	<56

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Analytical Technologies, Inc.

ATI I.D. # 9202-111-5

SEMI-VOLATILE ORGANICS ANALYSIS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 02/13/92
PROJECT #	: 3351	DATE RECEIVED	: 02/13/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: 02/14/92
CLIENT I.D.	: MW-4	DATE ANALYZED	: 02/26/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
DIBENZOFURAN	<11
2,4-DINITROTOLUENE	<11
2,6-DINITROTOLUENE	<11
DIETHYLPHTHALATE	<11
4-CHLOROPHENYL-PHENYLETHER	<11
FLUORENE	<11
4-NITROANILINE	<56
4,6-DINITRO-2-METHYLPHENOL	<56
N-NITROSODIPHENYLAMINE	<11
4-BROMOPHENYL-PHENYLETHER	<11
HEXACHLOROBENZENE	<11
PENTACHLOROPHENOL	<11
PHENANTHRENE	<11
ANTHRACENE	<11
DI-N-BUTYLPHTHALATE	<11
FLUORANTHENE	<11
BENZIDINE	<110
PYRENE	<11
BUTYLBENZYLPHTHALATE	<11
3,3'-DICHLOROBENZIDINE	<22
BENZO(A)ANTHRACENE	<11
BIS(2-ETHYLHEXYL)PHTHALATE	16
CHRYSENE	<11
DI-N-OCTYLPHTHALATE	<11
BENZO(B)FLUORANTHENE	<11
BENZO(K)FLUORANTHENE	<11
BENZO(A)PYRENE	<11
INDENO(1,2,3-CD)PYRENE	<11
DIBENZ(A,H)ANTHRACENE	<11
BENZO(G,H,I)PERYLENE	<11

SURROGATE PERCENT RECOVERIES

NITROBENZENE-D5	107
2-FLUOROBIPHENYL	116
TERPHENYL-D14	66
PHENOL-D5	97
2-FLUOROPHENOL	94
2,4,6-TRIBROMOPHENOL	87

Analytical Technologies, Inc.

ATI I.D. # 9202-111-5

SEMI-VOLATILE ORGANICS ANALYSIS
TENTATIVELY IDENTIFIED COMPOUNDS

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 02/13/92
PROJECT #	: 3351	DATE RECEIVED	: 02/13/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: 02/14/92
CLIENT I.D.	: MW-4	DATE ANALYZED	: 02/26/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8270	DILUTION FACTOR	: 1

COMPOUND	FLAG	SCAN	RESULTS
UNKNOWN		273	5.6
1-PROPENE, 3,3,3-TRICHLORO-	B	325	17
CYCLOHEXANE, BROMO-	B	584	10

B = Analyte is found in the associated blank as well as the sample.

Analytical Technologies, Inc.

ATI I.D. # 9202-111

SEMI-VOLATILE ORGANICS ANALYSIS
QUALITY CONTROL DATA

CLIENT : HART CROWSER, INC.
PROJECT # : 3351
PROJECT NAME : WSDOT/DUWAMISH
EPA METHOD : 8270
SAMPLE MATRIX : WATER

SAMPLE I.D. # : 9202-111-2
DATE EXTRACTED : 02/14/92
DATE ANALYZED : 02/25/92
UNITS : ug/L

COMPOUNDS	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
1,2,4-TRICHLOROBENZENE	<11	111	98.9	89	97.4	88	2
ACENAPHTHENE	<11	111	109	98	123	111	12
2,4-DINITROTOLUENE	<11	111	110	99	122	110	10
PYRENE	<11	111	107	96	85.8	77	22
N-NITROSO-DI-N-PROPYLAMINE	<11	111	93.5	84	107	96	13
1,4-DICHLOROBENZENE	<11	111	98.0	88	103	93	5
PENTACHLOROPHENOL	<11	222	244	110	219	99	11
PHENOL	<11	222	226	102	239	108	6
2-CHLOROPHENOL	<11	222	226	102	241	109H	6
4-CHLORO-3-METHYLPHENOL	<11	222	232	105	242	109	4
4-NITROPHENOL	<56	222	256	115	318	143	22

H = Out of limits.

$$\%\text{Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Spike Result} - \text{Duplicate Result})|}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

ATI I.D. # 9202-111

SEMI-VOLATILE ORGANICS ANALYSIS
QUALITY CONTROL DATA

CLIENT : HART CROWSER, INC.
PROJECT # : 3351
PROJECT NAME : WSDOT/DUWAMISH
EPA METHOD : 8270
SAMPLE MATRIX : WATER

SAMPLE I.D. # : BLANK SPIKE
DATE EXTRACTED : 02/14/92
DATE ANALYZED : 02/25/92
UNITS : ug/L

COMPOUNDS	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
1,2,4-TRICHLOROBENZENE	<10	100	87.0	87	N/A	N/A	N/A
ACENAPHTHENE	<10	100	101	101	N/A	N/A	N/A
2,4-DINITROTOLUENE	<10	100	91.4	91	N/A	N/A	N/A
PYRENE	<10	100	98.9	99	N/A	N/A	N/A
N-NITROSO-DI-N-PROPYLAMINE	<10	100	92.9	93	N/A	N/A	N/A
1,4-DICHLOROBENZENE	<10	100	90.1	90	N/A	N/A	N/A
PENTACHLOROPHENOL	<10	200	183	92	N/A	N/A	N/A
PHENOL	<10	200	208	104	N/A	N/A	N/A
2-CHLOROPHENOL	<10	200	212	106H	N/A	N/A	N/A
4-CHLORO-3-METHYLPHENOL	<10	200	204	102	N/A	N/A	N/A
4-NITROPHENOL	<50	200	233	117	N/A	N/A	N/A

H = Out of limits.

$$\%\text{Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Spike Result} - \text{Duplicate Result})|}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

ATI I.D. # 9202-111

POLYNUCLEAR AROMATICS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: N/A
PROJECT #	: 3351	DATE RECEIVED	: N/A
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: 02/14/92
CLIENT I.D.	: REAGENT BLANK	DATE ANALYZED	: 02/26/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8310	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
NAPHTHALENE	<0.50
ACENAPHTHYLENE	<1.0
ACENAPHTHENE	<0.50
FLUORENE	<0.10
PHENANTHRENE	<0.050
ANTHRACENE	<0.050
FLUORANTHENE	<0.10
PYRENE	<0.10
BENZO(A)ANTHRACENE	<0.10
CHRYSENE	<0.10
BENZO(B)FLUORANTHENE	<0.10
BENZO(K)FLUORANTHENE	<0.10
BENZO(A)PYRENE	<0.10
DIBENZO(A,H)ANTHRACENE	<0.20
BENZO(G,H,I)PERYLENE	<0.10
INDENO(1,2,3-CD)PYRENE	<0.10

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE	83

Analytical Technologies, Inc.

ATI I.D. # 9202-111-1

POLYNUCLEAR AROMATICS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 02/13/92
PROJECT #	: 3351	DATE RECEIVED	: 02/13/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: 02/14/92
CLIENT I.D.	: MW-1	DATE ANALYZED	: 02/26/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8310	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
NAPHTHALENE	<0.50
ACENAPHTHYLENE	<1.0
ACENAPHTHENE	<0.50
FLUORENE	<0.10
PHENANTHRENE	<0.050
ANTHRACENE	<0.050
FLUORANTHENE	<0.10
PYRENE	<0.10
BENZO(A)ANTHRACENE	<0.10
CHRYSENE	<0.10
BENZO(B)FLUORANTHENE	<0.10
BENZO(K)FLUORANTHENE	<0.10
BENZO(A)PYRENE	<0.10
DIBENZO(A,H)ANTHRACENE	<0.20
BENZO(G,H,I)PERYLENE	<0.10
INDENO(1,2,3-CD)PYRENE	<0.10

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE	86

Analytical Technologies, Inc.

ATI I.D. # 9202-111-2

POLYNUCLEAR AROMATICS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 02/13/92
PROJECT #	: 3351	DATE RECEIVED	: 02/13/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: 02/14/92
CLIENT I.D.	: MW-2	DATE ANALYZED	: 02/26/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8310	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
NAPHTHALENE	<0.50
ACENAPHTHYLENE	<1.0
ACENAPHTHENE	<0.50
FLUORENE	<0.10
PHENANTHRENE	<0.050
ANTHRACENE	<0.050
FLUORANTHENE	<0.10
PYRENE	<0.10
BENZO(A)ANTHRACENE	<0.10
CHRYSENE	<0.10
BENZO(B)FLUORANTHENE	<0.10
BENZO(K)FLUORANTHENE	<0.10
BENZO(A)PYRENE	<0.10
DIBENZO(A,H)ANTHRACENE	<0.20
BENZO(G,H,I)PERYLENE	<0.10
INDENO(1,2,3-CD)PYRENE	<0.10

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE	88

Analytical Technologies, Inc.

ATI I.D. # 9202-111-3

POLYNUCLEAR AROMATICS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 02/13/92
PROJECT #	: 3351	DATE RECEIVED	: 02/13/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: 02/14/92
CLIENT I.D.	: MW-3	DATE ANALYZED	: 02/26/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8310	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
NAPHTHALENE	<0.50
ACENAPHTHYLENE	<1.0
ACENAPHTHENE	<0.50
FLUORENE	<0.10
PHENANTHRENE	<0.050
ANTHRACENE	<0.050
FLUORANTHENE	<0.10
PYRENE	<0.10
BENZO(A)ANTHRACENE	<0.10
CHRYSENE	<0.10
BENZO(B)FLUORANTHENE	<0.10
BENZO(K)FLUORANTHENE	<0.10
BENZO(A)PYRENE	<0.10
DIBENZO(A,H)ANTHRACENE	<0.20
BENZO(G,H,I)PERYLENE	<0.10
INDENO(1,2,3-CD)PYRENE	<0.10

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE	72

Analytical Technologies, Inc.

ATI I.D. # 9202-111-4

POLYNUCLEAR AROMATICS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 02/13/92
PROJECT #	: 3351	DATE RECEIVED	: 02/13/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: 02/14/92
CLIENT I.D.	: MW-3D	DATE ANALYZED	: 02/26/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8310	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
NAPHTHALENE	<0.50
ACENAPHTHYLENE	<1.0
ACENAPHTHENE	<0.50
FLUORENE	<0.10
PHENANTHRENE	<0.050
ANTHRACENE	<0.050
FLUORANTHENE	<0.10
PYRENE	<0.10
BENZO(A)ANTHRACENE	<0.10
CHRYSENE	<0.10
BENZO(B)FLUORANTHENE	<0.10
BENZO(K)FLUORANTHENE	<0.10
BENZO(A)PYRENE	<0.10
DIBENZO(A,H)ANTHRACENE	<0.20
BENZO(G,H,I)PERYLENE	<0.10
INDENO(1,2,3-CD)PYRENE	<0.10

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE	41

Analytical Technologies, Inc.

ATI I.D. # 9202-111-5

POLYNUCLEAR AROMATICS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE SAMPLED	: 02/13/92
PROJECT #	: 3351	DATE RECEIVED	: 02/13/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE EXTRACTED	: 02/14/92
CLIENT I.D.	: MW-4	DATE ANALYZED	: 02/26/92
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8310	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
NAPHTHALENE	<0.50
ACENAPHTHYLENE	<1.0
ACENAPHTHENE	<0.50
FLUORENE	<0.10
PHENANTHRENE	<0.050
ANTHRACENE	<0.050
FLUORANTHENE	<0.10
PYRENE	<0.10
BENZO(A)ANTHRACENE	<0.10
CHRYSENE	<0.10
BENZO(B)FLUORANTHENE	<0.10
BENZO(K)FLUORANTHENE	<0.10
BENZO(A)PYRENE	<0.10
DIBENZO(A,H)ANTHRACENE	<0.20
BENZO(G,H,I)PERYLENE	<0.10
INDENO(1,2,3-CD)PYRENE	<0.10

SURROGATE PERCENT RECOVERIES

2-CHLOROANTHRACENE	64

Analytical Technologies, Inc.

ATI I.D. # 9202-111

POLYNUCLEAR AROMATICS
QUALITY CONTROL DATA

CLIENT	: HART CROWSER, INC.	SAMPLE I.D. #	: 9202-098-1
PROJECT #	: 3351	DATE EXTRACTED	: 02/14/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE ANALYZED	: 02/26/92
EPA METHOD	: 8310	UNITS	: ug/L
SAMPLE MATRIX	: WATER		

COMPOUNDS	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
ACENAPHTHYLENE	<1.0	20.0	12.1	61	11.2	56	8
PHENANTHRENE	<0.050	2.00	1.60	80	1.45	73	10
PYRENE	<0.10	2.00	1.77	89	1.65	83	7
BENZO(K)FLUORANTHENE	<0.10	2.00	1.78	89	1.65	83	8
DIBENZO(A,H)ANTHRACENE	<0.20	2.00	1.51	76	1.39	70	8

$$\%\text{Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Spike Result} - \text{Duplicate Result})|}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

ATI I.D. # 9202-111

POLYNUCLEAR AROMATICS
QUALITY CONTROL DATA

CLIENT	: HART CROWSER, INC.	SAMPLE I.D. #	: BLANK SPIKE
PROJECT #	: 3351	DATE EXTRACTED	: 02/14/92
PROJECT NAME	: WSDOT/DUWAMISH	DATE ANALYZED	: 02/26/92
EPA METHOD	: 8310	UNITS	: ug/L
SAMPLE MATRIX	: WATER		

COMPOUNDS	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
ACENAPHTHYLENE	<1.0	20.0	12.5	63	N/A	N/A	N/A
PHENANTHRENE	<0.050	2.00	1.51	76	N/A	N/A	N/A
PYRENE	<0.10	2.00	1.61	81	N/A	N/A	N/A
BENZO(K)FLUORANTHENE	<0.10	2.00	1.63	82	N/A	N/A	N/A
DIBENZO(A,H)ANTHRACENE	<0.20	2.00	1.39	70	N/A	N/A	N/A

$$\%\text{Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Spike Result} - \text{Duplicate Result})|}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

ATI I.D. # 9202-111

TOTAL PETROLEUM HYDROCARBONS
DATA SUMMARY

CLIENT	: HART CROWSER, INC.	DATE EXTRACTED	: 02/19/92
PROJECT #	: 3351	DATE ANALYZED	: 02/19/92
PROJECT NAME	: WSDOT/DUWAMISH	UNITS	: mg/L
METHOD	: 418.1	SAMPLE MATRIX	: WATER

ATI I.D. #	CLIENT I.D.	TOTAL PETROLEUM HYDROCARBONS
9202-111-1	MW-1	<1
9202-111-2	MW-2	<1
9202-111-3	MW-3	<1
9202-111-4	MW-3D	<1
9202-111-5	MW-4	<1
REAGENT BLANK	-	<1

Analytical Technologies, Inc.

ATI I.D. # 9202-111

TOTAL PETROLEUM HYDROCARBONS
QUALITY CONTROL DATA

CLIENT : HART CROWSER, INC.
PROJECT # : 3351
PROJECT NAME : WSDOT/DUWAMISH
METHOD : 418.1
SAMPLE MATRIX : WATER

SAMPLE I.D. # : BLANK SPIKE
DATE EXTRACTED : 02/19/92
DATE ANALYZED : 02/19/92
UNITS : mg/L

COMPOUND	SAMPLE RESULT	SAMPLE DUP. RESULT	RPD	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
PETROLEUM HYDROCARBONS	<1	N/A	N/A	10	8.7	87	8.7	87	0

$$\% \text{ Recovery} = \frac{(\text{Spiked Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Spike Result} - \text{Dup. Spike Result})|}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

ATI I.D. # 9202-111

METALS ANALYSIS

CLIENT : HART CROWSER, INC. MATRIX : WATER
PROJECT # : 3351
PROJECT NAME : WSDOT/DUWAMISH

ELEMENT	DATE PREPARED	DATE ANALYZED
ANTIMONY	02/14/92	02/18/92
ARSENIC	02/14/92	02/14/92
BERYLLIUM	02/14/92	02/18/92
CADMIUM	02/14/92	02/18/92
CHROMIUM	02/14/92	02/18/92
COPPER	02/14/92	02/18/92
LEAD	02/14/92	02/14/92
MERCURY	02/14/92	02/17/92
NICKEL	02/14/92	02/18/92
SELENIUM	02/14/92	02/14/92
SILVER	02/14/92	02/18/92
THALLIUM	02/14/92	02/14/92
ZINC	02/14/92	02/18/92

Analytical Technologies, Inc.

ATI I.D. # 9202-111

DISSOLVED
METALS ANALYSIS
DATA SUMMARY

CLIENT : HART CROWSER, INC. MATRIX : WATER
PROJECT # : 3351
PROJECT NAME : WSDOT/DUWAMISH UNITS : mg/L

ELEMENT	MW-1 -1	MW-2 -2	MW-3 -3	MW-3D -4	MW-4 -5	REAGENT BLANK
ANTIMONY	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
ARSENIC	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
BERYLLIUM	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
CADMIUM	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
CHROMIUM	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
COPPER	0.010	0.0065	<0.0050	<0.0050	<0.0050	<0.0050
LEAD	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
MERCURY	<0.00040	<0.00040	<0.00020	<0.00020	<0.00020	<0.00020
NICKEL	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
SELENIUM	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
SILVER	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
THALLIUM	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
ZINC	0.039	0.050	0.022	0.022	0.032	<0.010

Analytical Technologies, Inc.

ATI I.D. # 9202-111

TOTAL
METALS ANALYSIS
DATA SUMMARY

CLIENT : HART CROWSER, INC. MATRIX : WATER
PROJECT # : 3351
PROJECT NAME : WSDOT/DUWAMISH UNITS : mg/L

ELEMENT	MW-1 -1	MW-2 -2	MW-3 -3	MW-3D -4	MW-4 -5	REAGENT BLANK
ANTIMONY	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
ARSENIC	0.0085	0.0050	0.012	0.014	0.0073	<0.0050
BERYLLIUM	<0.0020	<0.0020	0.0020	0.0022	<0.0020	<0.0020
CADMIUM	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
CHROMIUM	0.060	0.074	0.12	0.12	0.054	<0.010
COPPER	0.022	0.042	0.10	0.098	0.035	<0.0050
LEAD	0.0058	0.0084	0.033	0.034	0.035	<0.0030
MERCURY	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
NICKEL	0.043	0.043	0.10	0.12	0.014	<0.010
SELENIUM	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
SILVER	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
THALLIUM	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
ZINC	0.18	0.13	0.32	0.30	0.18	<0.010

Analytical Technologies, Inc.

ATI I.D. # 9202-111

METALS ANALYSIS
QUALITY CONTROL DATA

CLIENT : HART CROWSER, INC. MATRIX : WATER
PROJECT # : 3351
PROJECT NAME : WSDOT/DUWAMISH UNITS : mg/L

ELEMENT	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED RESULT	SPIKE ADDED	% REC
ANTIMONY	9202-111-1	<0.050	<0.050	NC	1.14	1.00	114
ANTIMONY	BLANK SPIKE	<0.050	N/A	N/A	1.14	1.00	114
ARSENIC	9202-111-2	<0.0050	<0.0050	NC	0.0191	0.0250	76
ARSENIC	BLANK SPIKE	<0.0050	N/A	N/A	0.0242	0.0250	97
BERYLLIUM	9202-111-1	<0.0020	<0.0020	NC	1.02	1.00	102
BERYLLIUM	BLANK SPIKE	<0.0020	N/A	N/A	1.02	1.00	102
CADMIUM	9202-111-1	<0.0020	<0.0020	NC	0.971	1.00	97
CADMIUM	BLANK SPIKE	<0.0020	N/A	N/A	1.02	1.00	102
CHROMIUM	9202-111-1	<0.010	<0.010	NC	1.07	1.00	107
CHROMIUM	BLANK SPIKE	<0.010	N/A	N/A	1.12	1.00	112
COPPER	9202-111-1	0.010	0.0050	67	1.04	1.00	103
COPPER	BLANK SPIKE	<0.0050	N/A	N/A	1.06	1.00	106
LEAD	9202-111-2	<0.0030	<0.0030	NC	0.0212	0.0250	85
LEAD	BLANK SPIKE	<0.0030	N/A	N/A	0.0219	0.0250	88
MERCURY	9202-111-4	<0.00020	<0.00020	NC	N/A	N/A	N/A
MERCURY	9202-111-5	<0.00020	N/A	N/A	0.00111	0.00100	111
MERCURY	BLANK SPIKE	<0.00020	N/A	N/A	0.00105	0.00100	105
NICKEL	9202-111-1	<0.010	<0.010	NC	1.04	1.00	104
NICKEL	BLANK SPIKE	<0.010	N/A	N/A	1.11	1.00	111
SELENIUM	9202-111-2	<0.0050	<0.0050	NC	0.0183	0.0250	73
SELENIUM	BLANK SPIKE	<0.0050	N/A	N/A	0.0222	0.0250	89
SILVER	9202-111-1	<0.0050	<0.0050	NC	1.02	1.00	102
SILVER	BLANK SPIKE	<0.0050	N/A	N/A	1.06	1.00	106

NC = Not Calculable.

CONTINUED NEXT PAGE

Analytical Technologies, Inc.

ATI I.D. # 9202-111

METALS ANALYSIS
QUALITY CONTROL DATA
CONTINUED

CLIENT : HART CROWSER, INC. MATRIX : WATER
PROJECT # : 3351
PROJECT NAME : WSDOT/DUWAMISH UNITS : mg/L

ELEMENT	ATI I.D.	SAMPLE RESULT	DUP RESULT	RPD	SPIKED RESULT	SPIKE ADDED	% REC
THALLIUM	9202-111-2	<0.0050	<0.0050	NC	0.0261	0.0250	104
THALLIUM	BLANK SPIKE	<0.0050	N/A	N/A	0.0255	0.0250	102
ZINC	9202-111-1	0.039	0.033	17	1.08	1.00	104
ZINC	BLANK SPIKE	<0.010	N/A	N/A	1.11	1.00	111

NC = Not Calculable.

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

APPENDIX B
DATA VALIDATION SUMMARY

APPENDIX B
DATA VALIDATION SUMMARY

This summary presents the data validation for the WSDOT Duwamish site, J-3351. Six groundwater samples were analyzed by Analytical Technologies, Inc. for the following constituents:

- Volatile organic compounds (EPA Method 8240);
- Semi-volatile organic compounds (EPA Method 8270);
- Polynuclear aromatic hydrocarbons (EPA Method 8310);
- Petroleum hydrocarbons (EPA Method 418.1); and
- Total and Dissolved Priority Pollutant metals (EPA Method 6010 and 7000 series).

Sample results were reviewed using the EPA Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses and EPA Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses.

Data are valid and acceptable for the purpose of use in this report with qualifications as discussed below.

Volatile Organics

All samples were analyzed within the recommended holding time. Laboratory quality assurance/quality control results for surrogate recovery, matrix spike, matrix spike duplicate and blank spike analyses were within the laboratory's control limits. Duplicate sample MW-3D, collected from MW-3 demonstrated good laboratory replication with one exception: tetrachloroethene was not detected in the sample (MW-3), but detected at 5 μg/L (ppb) in the duplicate (MW-3D).

In addition to the groundwater samples, a trip blank was collected and analyzed with the samples as a measure of the field contamination. Surrogate recoveries were within the laboratory control limits. Acetone and methylene chloride, common laboratory contaminants, were detected at 67 μg/L and 4 μg/L (estimated), respectively, in the trip blank.

Two reagent blanks were analyzed by the laboratory in conjunction with these samples. Surrogate recoveries were within the laboratory control

limits. Methylene chloride was estimated at a concentration of 2 μg/L in the blank analyzed on February 15, 1992. No compounds were detected in the blank analyzed on February 16, 1992.

Results for samples MW-3D and the trip blank had detected concentrations of methylene chloride at 3 μg/L and 4 μg/L, respectively. As this compound was also detected in the reagent blank and is detected at concentrations below the detection limit, the results are qualified as "U" , undetected at the sample detection limit (5 μg/L).

All data are valid and acceptable for use with the above qualifications.

Semivolatile Organics

All samples were analyzed within the recommended holding time. Four samples had an initial starting volume of less than one liter: Sample MW-2, the matrix spike and the matrix spike duplicate had volumes of 900 mL, while MW-4 had an initial starting volume of 890 mL. Reporting limits, normally based on one liter, have been adjusted for these variances for these samples.

Laboratory quality assurance/quality control results for surrogate recovery, matrix spike, matrix spike duplicate and blank spike analyses were within the laboratory's control limits with two exceptions. The recovery for 2-chlorophenol in the matrix spike duplicate sample is 109 percent, which is out of the laboratory control limits. The blank spike recovery for 2-chlorophenol is also outside of the control limits at 106 percent. Since the only recoveries that were outside of the laboratory control limits were for the matrix spike and blank spike, no qualification of the data are necessary.

Sample MW-3D, a duplicate of sample MW-3, demonstrated good laboratory replication with one exception: Bis(2-ethylhexyl)phthalate was detected at 2.2 μg/L in sample MW-3, but was not detected in the duplicate MW-3D.

A reagent blank was analyzed by the laboratory in conjunction with these samples. Surrogate recoveries were within the laboratory control limits. No compounds were detected in the blank.

Results for samples MW-2 and MW-3 had detected concentrations of bis(2-ethylhexyl)phthalate at 2.8 μg/L and 2.2 μg/L, respectively. This compound, a common laboratory contaminant, is detected at concentrations below the sample detection limit and the results are qualified as "U", undetected at the sample detection limit of 10 μg/L.

All data are valid and acceptable for use with the above qualifications.

Polynuclear Aromatic Hydrocarbons

All samples were analyzed within the recommended holding time. Laboratory quality assurance/quality control results for surrogate recovery, matrix spike, matrix spike duplicate and blank spike analyses were within the laboratory's control limits. Sample MW-3D, a duplicate of sample MW-3, demonstrated good laboratory replication.

A reagent blank was analyzed by the laboratory in conjunction with these samples. Surrogate recoveries were within the laboratory control limits. No compounds were detected in the blank. No carcinogenic or non-carcinogenic compounds were detected.

All data are valid and acceptable for use.

Total Petroleum Hydrocarbons

All samples were analyzed within the recommended holding time. Laboratory quality assurance/quality control results for matrix spike analyses were within the laboratory's control limits. Sample MW-3D, a duplicate of sample MW-3, demonstrated good laboratory replication.

A reagent blank was analyzed by the laboratory in conjunction with these samples. Surrogate recoveries were within the laboratory control limits. No compounds were detected in the blank.

All data are valid and acceptable for use.

Total Metals

All samples were analyzed within the recommended holding time. Laboratory quality assurance/quality control results for duplicate and spike analyses were within the laboratory's control limits. Sample

MW-3D, a duplicate of sample MW-3, demonstrated good laboratory replication.

A reagent blank was analyzed by the laboratory in conjunction with these samples. Surrogate recoveries were within the laboratory control limits. No compounds were detected in the blank.

All data are valid and acceptable for use.

Dissolved Metals

All samples were analyzed within the recommended holding time. Laboratory quality assurance/quality control results for duplicate and spike analyses were within the laboratory's control limits. Sample MW-3D, a duplicate of sample MW-3, demonstrated good laboratory replication.

A reagent blank was analyzed by the laboratory in conjunction with these samples. Surrogate recoveries were within the laboratory control limits. No compounds were detected in the blank.

All data are valid and acceptable for use.

Earth and Environmental Technologies

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received 5/3/88 from Jim Ganderson

February 3, 1988

State of Washington
Department of Transportation
6431 Corson Ave So, #C-81410
Seattle, Washington 98108
Attn: James G. Ganderson, P.E.

Test Report: #88-404

Process: Soil Anal/JO 23543
Specification: EPA Procedures
Date Tested: Jan 28 - Feb 2, 1988

Fourteen (14) samples of soil samples were received for heavy metal and oil/grease analyses. The heavy metal determinations were performed using EP Toxicity Extraction porcedures. The oil/grease analyses were performed with solvent extraction/gravimetric method 503A. No purchase order was received.

	Sample 4-1 (6)		Sample 9-1 (14)		Sample 7-1 (11)		Sample 3-1 (5)	
Arsenic	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm
Barium	0.38	ppm	0.85	ppm	2.67	ppm	0.70	ppm
Cadmium	<0.002	ppm	<0.002	ppm	0.20	ppm	0.036	ppm
Chromium	<0.005	ppm	<0.005	ppm	<0.005	ppm	<0.005	ppm
Copper	<0.002	ppm	<0.002	ppm	<0.002	ppm	<0.002	ppm
Lead	7.31	ppm	4.05	ppm	20.73	ppm	3.14	ppm
Mercury	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm
Nickel	0.48	ppm	0.055	ppm	0.10	ppm	0.14	ppm
Selenium	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm
Silver	<0.003	ppm	<0.003	ppm	<0.003	ppm	<0.003	ppm
Zinc	15.05	ppm	2.79	ppm	5.04	ppm	3.89	ppm
pH	7.11		7.58		6.09		7.92	
Oil/ grease	337.8	ppm	17.0	ppm	313.0	ppm	42.4	ppm

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	Sample 5-2 (8)		Sample 2-2 (4)		Sample 6-1 (9)		Sample 8-1 (13)		Sample 1-2 (2)	
Arsenic	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm
Barium	0.44	ppm	0.78	ppm	0.39	ppm	0.46	ppm	0.47	ppm
Cadmium	<0.002	ppm	<0.002	ppm	<0.002	ppm	<0.002	ppm	0.049	ppm
Chromium	<0.005	ppm	<0.005	ppm	<0.005	ppm	<0.005	ppm	<0.005	ppm
Copper	<0.002	ppm	<0.002	ppm	<0.002	ppm	<0.002	ppm	<0.002	ppm
Lead	<0.025	ppm	5.38	ppm	<0.025	ppm	2.66	ppm	0.96	ppm
Mercury	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm
Nickel	0.082	ppm	0.13	ppm	0.061	ppm	<0.01	ppm	0.26	ppm
Selenium	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm
Silver	<0.003	ppm	<0.003	ppm	<0.003	ppm	<0.003	ppm	<0.003	ppm
Zinc	1.45	ppm	8.57	ppm	0.12	ppm	0.61	ppm	3.62	ppm
pH	7.26		7.42		7.91		7.15		7.72	
/grease	6.4	ppm	28.4	ppm	8.2	ppm	1.4	ppm	27.6	ppm

	Sample 7-2 (12)		Sample 2-1 (3)		Sample 1-1 (1)		Sample 6-2 (10)		Sample 5-1 (7)	
Arsenic	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm
Barium	0.44	ppm	0.71	ppm	0.24	ppm	0.52	ppm	0.32	ppm
Cadmium	<0.002	ppm	<0.002	ppm	<0.002	ppm	<0.002	ppm	<0.002	ppm
Chromium	<0.005	ppm	<0.005	ppm	<0.005	ppm	<0.005	ppm	<0.005	ppm
Copper	<0.002	ppm	<0.002	ppm	<0.002	ppm	<0.002	ppm	<0.002	ppm
Lead	0.66	ppm	0.74	ppm	<0.025	ppm	0.85	ppm	<0.025	ppm
Mercury	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm
Nickel	0.039	ppm	0.084	ppm	<0.01	ppm	0.85	ppm	<0.01	ppm
Selenium	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm	<0.001	ppm
Silver	<0.003	ppm	<0.003	ppm	<0.003	ppm	<0.003	ppm	<0.003	ppm
Zinc	0.44	ppm	2.58	ppm	0.62	ppm	0.76	ppm	1.31	ppm
pH	7.39		7.41		6.17		7.80		7.61	
Oil/ grease	19.8	ppm	135.8	ppm	17.0	ppm	47.4	ppm	24.4	ppm

The detection limits for the ICP Spectrometer are the following: Arsenic: 0.001 ppm, Barium: 0.001 ppm, Cadmium: 0.002 ppm, Chromium: 0.005 ppm, Copper: 0.002 ppm, Lead: 0.025 ppm, Mercury: 0.001 ppm, Nickel: 0.01 ppm, Selenium: 0.001 ppm, Silver: 0.003 ppm, Zinc: 0.004 ppm.

FEDERAL TESTING LABORATORIES

Patrick P. Raney

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March 27, 1988

State of Washington
Department of Transportation
6431 Corson Ave So, #C-81410
Seattle, Washington 98108
Attn: James G. Ganderson, P.E.

Test Report: #88-899

Process: Soil Anal/JO 24019
Specification: EPA Procedures
Date Tested: Mar 15 - 24, 1988

Twenty (20) samples of soil samples were received for heavy metal and oil/grease analyses. The heavy metal determinations were performed using EP Toxicity Extraction porcedures. The oil/grease analyses were performed with solvent extraction/gravimetric method 503A.

	Sample 15SW	Sample 16SW	Sample 17SW	Sample 18SW	Sample 19SW
rsenic	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
arium	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
admium	<0.002 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm
hromium	<0.005 ppm	<0.005 ppm	<0.005 ppm	<0.005 ppm	<0.005 ppm
opper	0.16 ppm	0.46 ppm	0.31 ppm	0.16 ppm	0.13 ppm
ead	0.30 ppm	2.10 ppm	3.01 ppm	1.48 ppm	0.67 ppm
ercury	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
ickel	0.15 ppm	0.34 ppm	0.23 ppm	0.36 ppm	<0.01 ppm
elenium	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
ilver	<0.003 ppm	<0.003 ppm	<0.003 ppm	<0.003 ppm	<0.003 ppm
inc	1.06 ppm	14.06 ppm	6.27 ppm	4.59 ppm	3.48 ppm
H	7.66	7.20	6.79	6.19	7.95
il/ grease	83.6 ppm	145.6 ppm	36.0 ppm	295.2 ppm	26.8 ppm

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	Sample 20SW	Sample 21SW	Sample 22SW	Sample 23SW	Sample 24SW
Arsenic	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Barium	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Cadmium	<0.002 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm
Chromium	<0.005 ppm	<0.005 ppm	<0.005 ppm	<0.005 ppm	<0.005 ppm
Copper	0.33 ppm	0.10 ppm	<0.002 ppm	0.12 ppm	0.08 ppm
Lead	3.09 ppm	1.03 ppm	0.87 ppm	1.00 ppm	1.34 ppm
Mercury	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Nickel	0.50 ppm	0.08 ppm	<0.01 ppm	0.12 ppm	0.15 ppm
Selenium	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Silver	<0.003 ppm	<0.003 ppm	<0.003 ppm	<0.003 ppm	<0.003 ppm
Zinc	7.55 ppm	3.88 ppm	1.48 ppm	4.16 ppm	4.00 ppm
pH	7.32	7.45	8.66	7.54	7.51
oil/ grease	90.0 ppm	59.4 ppm	35.2 ppm	120.6 ppm	417.6 ppm

	Sample 25V	Sample 26V	Sample 27V	Sample 28V	Sample 29
Arsenic	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Barium	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Cadmium	0.04 ppm	<0.002 ppm	0.04 ppm	<0.002 ppm	<0.002 ppm
Chromium	<0.005 ppm	<0.005 ppm	<0.005 ppm	<0.005 ppm	<0.005 ppm
Copper	0.13 ppm	0.17 ppm	0.55 ppm	0.12 ppm	<0.002 ppm
Lead	1.38 ppm	<0.025 ppm	<0.025 ppm	1.05 ppm	<0.025 ppm
Mercury	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Nickel	0.29 ppm	0.30 ppm	0.36 ppm	0.32 ppm	<0.01 ppm
Selenium	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Silver	<0.003 ppm	<0.003 ppm	<0.003 ppm	<0.003 ppm	<0.003 ppm
Zinc	6.50 ppm	1.29 ppm	1.87 ppm	7.12 ppm	<0.004 ppm
pH	7.23	7.97	6.95	6.93	7.10
oil/ grease	353.2 ppm	83.0 ppm	286.0 ppm	134.6 ppm	1.8 ppm

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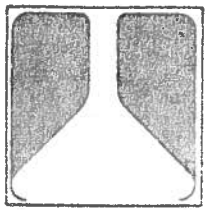

State of Washington
Department of Transportation
Material Anal, cont.
Test Report #88-899
page 2.

	Sample 30	Sample 31	Sample 32	Sample 33	Sample 34
Arsenic	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Barium	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Cadmium	<0.002 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm	<0.002 ppm
Chromium	<0.005 ppm	<0.005 ppm	<0.005 ppm	<0.005 ppm	<0.005 ppm
Copper	<0.002 ppm	0.46 ppm	<0.002 ppm	0.20 ppm	0.12 ppm
Lead	13.05 ppm	15.08 ppm	<0.025 ppm	22.01 ppm	<0.025 ppm
Mercury	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Nickel	0.31 ppm	0.16 ppm	<0.01 ppm	0.06 ppm	0.10 ppm
Selenium	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm	<0.001 ppm
Silver	<0.003 ppm	<0.003 ppm	<0.003 ppm	<0.003 ppm	<0.003 ppm
Zinc	4.71 ppm	11.52 ppm	1.63 ppm	4.19 ppm	2.26 ppm
pH	6.05	6.56	7.03	7.37	7.16
oil/ grease	21.4 ppm	52.6 ppm	7.2 ppm	31.8 ppm	33.4 ppm

The detection limits for the ICP Spectrometer are the following: Arsenic: 0.001 ppm, Barium: 0.001 ppm, Cadmium: 0.002 ppm, Chromium: 0.005 ppm, Copper: 0.002 ppm, Lead: 0.025 ppm, Mercury: 0.001 ppm, Nickel: 0.01 ppm, Selenium: 0.001 ppm Silver: 0.003 ppm, Zinc: 0.004 ppm.

FEDERAL TESTING LABORATORIES

Patrick P. Raney

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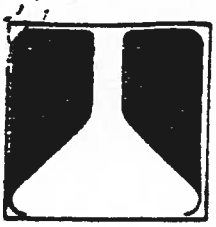

JAMES E. RICHARDS
MAY 2 : 1987
SUPERVISOR OF FACIL. MAINT.

May 20, 1987

Metro Transit
11911 East Marginal Way South, Bldg C.
Seattle, Washington 98036
Attn: E. Atkinson

Test Report: #87-1142

Process: Oil/pH /JO 20894
Specification: FTPS Anal Procedures
Date Tested: May 8 - 18, 1987

Sludge samples were tested for pH value electrometrically. The oil content is tested according to Standard Method 503A Partition Gravimetric Method.

Purchase order: B -23960

Sample Number	Date	Time	pH	Oil Content
Sludge	4/20/87		6.80	1400 ppm

Heavy metals:

Arsenic	<0.001	ppm
Cadmium	<0.002	ppm
Chromium	<0.005	ppm
Copper	<0.002	ppm
Iron	1194.5	ppm
Mercury	<0.001	ppm
Nickel	3.2	ppm
Lead	141.1	ppm
Selenium	<0.001	ppm
Silver	<0.001	ppm
Zinc	89.2	ppm

FEDERAL TESTING LABORATORIES

Patrick P. Raney

WDOT LANDFILL: WATER SAMPLES

ECOLOGY SECOLOGY SAMPLES

STATION	STATION	DATE	LOCATION	ANALYSES
SW-1	SW-1	1-30-90	Catch basin (tire around)	Priority pollutants *
SW-2	SW-2	1-30-90	Wetland	Priority pollutants *
SW-3	SW-3	1-30-90	Wetland	Priority pollutants *
SW-4	SW-4	1-30-90	East of SR-99 offramp (u/s Metro SB)	Priority pollutants *

* Metals samples not preserved: Metro did not analyze.
No organic compounds detected: analytical DLs 0.1-10 ug/L.

STATION	STATION	DATE	LOCATION	ANALYSES
SW-1	SW-1	5-08-90	Foot of upland site	Priority pollutants
SW-2	SW-2	5-08-90	20 ft north of SW-1	VOAs
SW-3	SW-3	5-08-90	North end of landfill	Priority pollutants
GW-2	GW-2	5-08-90	20 ft north of SW-1 (dug 3 ft hole)	Priority pollutants

Metals results missing from file.

WDOT SAMPWDOT SAMPLES

STATION	STATION	DATE	LOCATION	ANALYSES
Site 1	Site 1	2-06-90	South East Pond	Metals, PAH, PCBs, TOX, Pentachlorophenol
Site 2	Site 2	2-06-90	North West Pond	Metals, PAH, PCBs, TOX, Pentachlorophenol

WDOT LANDFILL: WATER SAMPLES

STATION

SW-1
SW-2
SW-3
SW-4

STATION	O&G (mg/L)	Hardness (mg/L as CaCO3)	Acetone (ug/L)	Carbon disulfide (ug/L)	Toluene (ug/L)	Bis(2-ethyl hexyl phthalate (ug/L)	Fluor-anthene (ug/L)	Pyrene (ug/L)
SW-1	8.1	327	3 J	5 U	5 U	1 J	10 U	10 U
SW-2	32.6	128	10 U	1 J	3 J	NA	NA	NA
SW-3	29.6	121	10 U	5 U	5 U	4 J	1 J	1 J
GW-2	3	282	10 U	5 U	5 U	10 U	10 U	10 U

WDOT SAMP

STATION	Cd (ug/L)	Cr (ug/L)	Cu (ug/L)	Pb (ug/L)	Hg (ug/L)	Ni (ug/L)	Zn (ug/L)	Penta (ug/L)	TOX (ug/L)	PCB (ug/L)	2-methyl naphthalene (ug/L)
Site 1	2 U	5 U	11	10 U	1 U	10	12	4	30	0.5 U	2
Site 2	2 U	5 U	5	10 U	1 U	10 U	12	1 U	20	0.5 U	2 U

WDOT LANDFILL SITE: SOIL DATA (ORGANICS, ug/kg) (a)

ECOLOGY SAMPLES		STATION ID			
	MTCA	S1	S2	S3	S5
DATE	Soil Cleanup	7-24-89	7-24-89	7-24-89	7-24-89
ORGANIC COMPOUND					
PESTICIDES/PCBS					
Aroclor 1254	1000	45	38	86	39
LPAH					
Acenaphthene		9.6	10	14 U	14 U
Anthracene		27	30	18 U	17
Fluorene		11	13	18 U	18 U
Phenanthrene		180	170	40	110
HPAH					
Benzo(a)anthracene		120	120	46	71
Benzo(a)pyrene		150	230	89	100
Benzo(b)fluoranthene		240	240	120	160
Benzo(g,h,i)perylene		150	110	70	59
Benzo(k)fluoranthene		210	310	130	160
Chrysene		190	190	66	110
Dibenzo(a,h)anthracene		220	52 U	54 U	53 U
Fluoranthene		340	380	57	190
Indeno(1,2,3-c,d)pyrene		230	120	73	110
Pyrene		270	310	76	220
PHTHALATES					
Benzyl butyl phthalate	NC	68	170	18 U	52
Bis(2-ethylhexyl)phthalate	NC	850	860	18 U	520
PHENOLS					
Pentachlorophenol	10,000	210	110	36 U	35 U

HART CROWSER SAMPLES (ug/kg)

STATION		C-3A-4.6	C-3A-6.5
DATE		12-09-88	12-09-88
VOAs			
Acetone		56	86
2-Butanone		6 U	9
Toluene	16,000	2	5

Total xylenes	2000	2 U	3

a) Samples analyzed for volatile and extractable organic compounds. Only parameters that exceed analytical detection limit reported.

U = Undetected

WDOT LANDFILL SITE: SOIL DATA (METALS)

ECOLOGY SAMPLES

Total metals (mg/kg)

	TYPE	DATE	As	Ba	Cd	Cr	Cu	Hg	Ni	Pb	Se	Ag	Zn
UPLAND S1	SOIL LF	7-24-89	9.3	NA	0.82	71	50	0.04	32	292	0.0587 U	NA	270
UPLAND S2	SOIL LF	7-24-89	10.6	NA	0.82	100	113	0.04	36	375	0.067	NA	216
UPLAND S3	SOIL LF	7-24-89	16	NA	0.86	42	388	0.04	54	73	0.2312	NA	208
WETLAND S5	SOIL LF	7-24-89	12.5	NA	0.74	42	45	0.08	33	122	0.0577 U	NA	238
WETLAND S6	SOIL LF	7-24-89	14.3	NA	0.62	48	45	0.04	27	728	0.0615 U	NA	127
MTCA SOIL			20	NC	8	80	500	1	NC	500	NC	NC	500

METRO SAMPLES

Total metals (mg/kg)

	TYPE	DATE	As	Ba	Cd	Cr	Cu	Hg	Ni	Pb	Se	Ag	Zn
87-1142	VACTOR	5-20-87	0.001 U		0.002 U	0.005 U	0.002 U	0.001 U	3.2	141.1	0.001 U	0.001 U	89.2

WDOT SAMPLES

EP TOX (mg/L)

	TYPE	DATE	As	Ba	Cd	Cr	Cu	Hg	Ni	Pb	Se	Ag	Zn
4-1	SOIL LF	1-28-88 *	0.001 U	0.38	0.002 U	0.005 U	0.002 U	0.001 U	0.480	7.31	0.001 U	0.003 U	15.05
9-1	SOIL IS	1-28-88 *	0.001 U	0.85	0.002 U	0.005 U	0.002 U	0.001 U	0.055	4.05	0.001 U	0.003 U	2.79
7-1	SOIL LF	1-28-88 *	0.001 U	2.67	0.200	0.005 U	0.002 U	0.001 U	0.100	20.73	0.001 U	0.003 U	5.04
3-1	SOIL LF	1-28-88 *	0.001 U	0.70	0.036	0.005 U	0.002 U	0.001 U	0.001 U	3.14	0.140	0.001 U	3.89
5-2	SOIL LF	1-28-88 *	0.001 U	0.44	0.002 U	0.005 U	0.002 U	0.001 U	0.082	0.025 U	0.001 U	0.003 U	1.45
2-2	SOIL LF	1-28-88 *	0.001 U	0.78	0.002 U	0.005 U	0.002 U	0.001 U	0.130	5.38	0.001 U	0.003 U	8.57
6-1	SOIL LF	1-28-88 *	0.001 U	0.39	0.002 U	0.005 U	0.002 U	0.001 U	0.061	0.025 U	0.001 U	0.003 U	0.12
8-1	SOIL IS	1-28-88 *	0.001 U	0.46	0.002 U	0.005 U	0.002 U	0.001 U	0.010 U	2.66	0.001 U	0.003 U	0.61
1-2	SOIL LF	1-28-88 *	0.001 U	0.47	0.049	0.005 U	0.002 U	0.001 U	0.260	0.96	0.001 U	0.003 U	3.62
7-2	SOIL LF	1-28-88 *	0.001 U	0.44	0.002 U	0.005 U	0.002 U	0.001 U	0.039	0.66	0.001 U	0.003 U	0.44
2-1	SOIL LF	1-28-88 *	0.001 U	0.71	0.002 U	0.005 U	0.002 U	0.001 U	0.084	0.74	0.001 U	0.003 U	2.58
1-1	SOIL LF	1-28-88 *	0.001 U	0.24	0.002 U	0.005 U	0.002 U	0.001 U	0.010 U	0.025 U	0.001 U	0.003 U	0.62
6-2	SOIL LF	1-28-88 *	0.001 U	0.52	0.002 U	0.005 U	0.002 U	0.001 U	0.850	0.85	0.001 U	0.003 U	0.76
5-1	SOIL LF	1-28-88 *	0.001 U	0.32	0.002 U	0.005 U	0.002 U	0.001 U	0.010 U	0.025 U	0.001 U	0.003 U	1.31

* WDOT considers this data invalid: No QA/QC, improper sample containers

Note: WDOT bulldozed site and mixed soils after these samples collected

	TYPE	DATE	As	Ba	Cd	Cr	Cu	Hg	Ni	Pb	Se	Ag	Zn
15SW	STREET	3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.16	0.001 U	0.15	0.30	0.001 U	0.003 U	1.06
16SW	STREET	3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.46	0.001 U	0.34	2.10	0.001 U	0.003 U	14.06
17SW	STREET	3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.31	0.001 U	0.23	3.01	0.001 U	0.003 U	6.27
18SW	STREET	3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.16	0.001 U	0.36	1.48	0.001 U	0.003 U	4.59
19SW	STREET	3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.13	0.001 U	0.01 U	0.67	0.001 U	0.003 U	3.48
20SW	STREET	3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.33	0.001 U	0.50	3.09	0.001 U	0.003 U	7.55

DOT LANDFILL SITE: SOIL DATA (METALS)

21SW	STREET	3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.1	0.001 U	0.08	1.03	0.001 U	0.003 U	3.88
22SW	STREET	3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.002 U	0.001 U	0.01 U	0.87	0.001 U	0.003 U	1.48
23SW	STREET	3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.12	0.001 U	0.12	1.00	0.001 U	0.003 U	4.16
24SW	STREET	3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.08	0.001 U	0.15	1.34	0.001 U	0.003 U	4.00
25V	VACTOR	3-15-88	0.001 U	0.001 U	0.04	0.005 U	0.13	0.001 U	0.29	1.38	0.001 U	0.003 U	6.50
26V	VACTOR	3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.17	0.001 U	0.30	0.03 U	0.001 U	0.003 U	1.29
27V	VACTOR	3-15-88	0.001 U	0.001 U	0.04	0.005 U	0.55	0.001 U	0.36	0.03 U	0.001 U	0.003 U	1.87
28V	VACTOR	3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.12	0.001 U	0.32	1.05	0.001 U	0.003 U	7.12
29	SOIL I5	3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.002 U	0.001 U	0.01 U	0.03 U	0.001 U	0.003 U	7.10
30		3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.002 U	0.001 U	0.31	13.05	0.001 U	0.003 U	4.71
31		3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.46	0.001 U	0.16	15.08	0.001 U	0.003 U	11.52
32		3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.002 U	0.001 U	0.01 U	0.03 U	0.001 U	0.003 U	7.03
33		3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.2	0.001 U	0.06 U	22.01	0.001 U	0.003 U	7.37
34		3-15-88	0.001 U	0.001 U	0.002 U	0.005 U	0.12	0.001 U	0.10	0.03 U	0.001 U	0.003 U	7.16
LAKEVIEW	STREET	3-6-89	0.1 U	0.1 U	0.1 U	0.1 U		0.05 U		0.20	0.1 U	0.1 U	
BELFAIR	STREET	1-25-89	0.1 U	0.4	0.1 U	0.1 U		0.05 U		0.10 U	0.1 U	0.1 U	
STAR LAKE	VACTOR	3-27-89	0.1 U	0.2	0.1 U	0.1 U		0.05 U		0.10 U	0.1	0.1 U	
L. GENEVA	VACTOR	3-27-89	0.1 U	0.2	0.1 U	0.1 U		0.05 U		0.10 U	0.1 U	0.1 U	
EP TOX	DW CRITERIA		5	100	1	5		0.2		5			

HART CROWSER DATA

EP TOX (mg/L)

	DEPTH	TYPE	DATE	Cd	Cu	Cr	Pb	Ni	Zn
B-3	2.5	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1
	5	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	8.5	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	10	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	12	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
B-5	0.3	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2
	0.8	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	3.2	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	5.0	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	7.0	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
B-7	0.3	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	2.8	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	4.5	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	6.5	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	8.9	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
B-9	2.5	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	5.0	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	7.5	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	10.0	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	12.5	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	15.0	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	17.5	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
B-10	2.5	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.6
	5.0	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.8	0.1 U	1.2

WDOT LANDFILL SITE: SOIL DATA (METALS)

	7.5	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.3	0.1 U	0.5
	10.0	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2
	12.5	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.5	0.1 U	1
	15.0	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	17.5	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	20.0	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
B-12	2.5	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.2
	5.0	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	10.0	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	12.5	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	15.0	SOIL LF	11-30-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
C-3	1.5	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.4
	2	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	2.2
	4.5	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1	0.1 U	0.3
	7.6	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	1.2	0.1 U	0.9
C-5	1.9	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1
	6	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	7	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	8	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
D-6	1	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.3	0.1 U	0.3
	2.3	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
	5.5	SOIL LF	12-6-88	0.01 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
EP TOX	DW CRITERIA			1	5	5	5		

WASHINGTON STATE DEPARTMENT OF ECOLOGY
ENVIRONMENTAL INVESTIGATIONS AND LABORATORY SERVICES
MANCHESTER LABORATORY

M E M O R A N D U M

RECEIVED
FEB 8 1990
DEPARTMENT OF ECOLOGY
NORTHWEST REGION

TO: Martha Turvey

FROM: Stuart Magoon SM

SUBJECT: Metro Data for Duwamish/Elliott Bay

DATE: February 7, 1990

As per your request, I have reviewed the semivolatile (BNA) data generated by Metro from the Duwamish/Elliot Bay site. This data was reviewed for qualitative and quantitative accuracy, validity and usefulness.

BNA Fraction (sediments)

Holding Times:

No holding time limits have been established from time of collection to time of extraction for soil/sediments. Samples were either collected on July 24, 1989 according to the "Sample Data & Analysis Required" form or July 25, 1989 according to the "Non Routine Fieldsheet" and extracted on August 4, 1989. Ten or eleven days from time of collection until extraction is reasonable and acceptable. The sample extracts were analyzed on August 15, 1989, within the US EPA CLP holding time of forty days from extraction.

Surrogates:

The surrogate recoveries reported for the method blank (MB890804) were incorrect. The values reported were twice what they should have been, with the exception of 2,4,6-Tribromophenol, reported as 27%, which is the correct value. I have made the appropriate corrections to the "BNA QA/QC Summary" sheet attached.
Although surrogate recoveries are within the United States Environmental Protection Agency Contract Laboratory Program Quality Control limits (US EPA CLP QC limits), with the exception of those recoveries highlighted in pink, the recoveries are low and combined with the matrix spike information this indicates that the reported values may be biased low.

Matrix Spikes

The matrix spike (MS) and matrix spike duplicate (MSD) values for 2-Chlorophenol were reported as twice what they should have been. I have made the appropriate corrections to the "BNA QA/QC Summary" sheet attached.
The values highlighted in pink fall outside of the US EPA CLP QC limits. As explained earlier these low recovery values are in good agreement with the surrogate recoveries. Together this information indicates that the values reported may be biased low, and that detection limits may not be realistic, ie, the actual detection limits may be higher.

Sample Data

No data summary sheets were provided for the method blank. The raw data shows that Di-n-butylphthalate and Bis(2-ethylhexyl)phthalate were in the blank at 20 ug/Kg. These two compounds are common laboratory contaminants, and do not constitute a problem. Sample values for these two compounds are considered real, because they are greater than ten times the levels found in the blank.

The two digits to the right of the decimal point for all of the compounds in every sample are insignificant and should not have been used.

There is another factor that may contribute to a bias in the values reported. The initial calibration and continuing calibration standards were not within acceptable agreement. The deviation between these standards is a second, but separate, indication that the values may be biased low. Due to the low surrogate and spike recoveries, and the discrepancy between standards, all of the BNA compounds listed as not detected (ND) have been flagged with an "R" to indicate that the data is rejected and unusable. All positives have been flagged with a "J" to indicate that the value reported is an estimate.

In summary, this data is of limited use because of the uncertainty with quantitation. Qualitatively however, this data may be of use, because compounds that were detected are present; that fact is confirmed with matching retention times and spectral data. Compounds that are reported as non detected (ND) may be present at a level above the reported detection limit. Therefore, since detection limits are questionable, data for these compounds has been rejected.

If you would like to discuss this project in further detail I can be reached at scan 744-4737.

State of Washington Department of Ecology

Program Code ☐☐☐

Project Code 4A1C4

Project/Name DOT Wetland

SAMPLE DATA & ANALYSIS REQUIRED

Page ___ of ___

☐ Enforcement/Custody ☐ Class II

☒ Possible Toxic/Hazardous Notes

Date Yr	Mo	Da	Time Hr	Mn	Field Station Identification	Lab Sample Number Wk	Seq	Matrix Code	Source Code	No. of Containers	TS, TNVS, TNVSS	Base/Neutrals/Acids	Volatile Organics	Pesticides/PCB's	Herbicides	Hydrocarbon Analysis	Phenolics (AAP)	Oil & Grease	Cu	Ni	Zn	Pb	Cd	Cr	Hg
89	07	24			UPLAND S1		S1	40		03	/	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
89	07	24			UPLAND S2		S2	40		03	/	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
89	07	24	UPLAND		~~[illegible]~~ S3		S3	40		03	/	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
~~89~~	~~07~~	~~24~~			~~LOWLAND S4~~		~~S4~~	~~40~~		~~03~~	/	~~✓~~	~~✓~~	~~✓~~		~~✓~~	~~✓~~	~~✓~~	~~✓~~	~~✓~~	~~✓~~	~~✓~~	~~✓~~	~~✓~~	~~✓~~
89	07	24			WETLAND S5		S5	40		02	/	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
89	07	24			UPLAND S6		S6			01	/	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

General Chemistry: Turbidity, pH, Conductivity, Total Hardness, Chloride, TS, TNVS, TNVSS, TSS, % Solids, Nutrients (4), Ammonia, Nitrate-Nitrite, Total Phosphorous, Ortho-Phosphate, BOD/5 Day, COD Chem Oxy Demand

Biology: Fecal Coliform Bacteria, Total Coliform Bacteria, Enterococcus, Fish Bioassay

Organic Chem.: Base/Neutrals/Acids, Volatile Organics, Pesticides/PCB's, PCB's Only, Purgeable Halocarbons, Herbicides, Hydrocarbon Analysis, Phenolics (AAP), Oil & Grease

METALS: P.P. Metals, EP Tox Metals

Specific List

Total

☐ Recoverable

☒ Totals

☐ Dissolved

Project Officer Martha Rosenberg

Sampler(s) Barbara Trejo

Lynn Coleman

867-
7208

Recorder Martha Rosenberg

Date 7/24/89

Chain Of Custody Record

Relinquished By:	Received By:	Yr	Mo	Da	Hr	Mn	Seal I.D.	Condition of Seals	Comments

Laboratory Copy White · Project Office Copy Yellow · Field or Office Copy Pink

Ecy 040-115 Rev. 7/87

Duwamish/Elliott Bay 6

NON ROUTINE FIELDSHEET

PROJECT: B53405 DATE: 890725 PERSONNEL: DoE

SAMP #	XXXXXXX	890726	890727	890728	890729	890730		
STA	AAAAAA							
STA DESCRI	AAAAA AAAAA	UPLAND S-1	UPLAND S-2	UPLAND S-3	Wetland S-5	UPLAND S-6		
DEPTH	XXX.X							
DATE	XXXXXX							
TIME	HHMM							
DELTA TIME	XXXX							
MATRIX	AAAA	SAME	→	→	→	→		
SUB MATRIX	XXX							
SAMP FUNC	AAAA	Samp	→	→	→	→		
TEMP	XX.X C							
FLOW	MGD							
COMMENTS								
comments								
comments								
pH								
turb								
cond								

METRO

BNA QA/QC Summary

Extraction Date: 8/4/89 Method: Sonic probe Matrix: Sediment Instrument/Analyst: 4500B / MKO

Comments: very heavy organic matter in samples

Surrogate Recoveries

Sample #	2-Fluoro Phenol	D6-Phenol	D5-Nitro Benzene	2-Fluoro Biphenyl	2,4,6-Tri Bromophenyol	D14-Terphenyl
MB890804	~~75~~	~~50~~	~~59~~	~~53~~	27	~~120~~
8900706	28	42	22	27	23	29
8900706MS	32	44	24	29	29	23
8900706MSD	29	42	24	31	29	30
8900707	23	26	21	27	28	34
8900708	22	34	17	22	23	31
8900709	25	29	23	29	24	38
QC Limits Water	21-100	10-94	35-114	43-116	10-123	33-141
QC Limits Solids	25-121	24-113	23-120	25-121	19-122	18-137

Sample/MS/MSD Nonspiked Comparison

Non-Spiked Compounds	Concentration		
	Sample	MS	MDS
Fluorene	.3	.4	.4
phenanthrene	5	6	6
anthracene	.8	.9	1
fluoranthene	10	13	13
Benzyl butyl phth.	2	3	2
Benzo(A)anthracene	3	4	4
chrysene	6	6	6
Bis (2EH) phth.	25	21	31
Benzo (B) fluoranthene	7	9	10
Benzo(k)fluoranthene	6	9	9
Benzo(A) pyrene	4	6	6
Indeno (1,2,3) pyrene	7	3	4
Dibenzo (A,H) anthracene	6	2	2
Benzo (G,H,I) perylene	4	3	3

Matrix Spike Recoveries

ADVISORY LIMIT

Matrix Spike Compounds	Spike Conc.	Sample Conc.	MS		MDS		RPD	QC Limits Water		QC Limits Solids	
			Conc.	% Rec.	Conc.	% Rec.		RPD	% Recovery	RPD	% Recovery
Phenol	50	0	10	20	10	20	0	42	12-89	35	26-90
2-Chlorophenol	50	0	12	~~24~~ 44	13	~~26~~ 52	8	40	27-123	50	25-102
1,4-Dichlorobenzene	25	0	4	16	5	20	22	28	36-97	27	28-104
N-Nitroso-Di-N-Propylamine	25	0	6	24	6	24	0	38	41-116	38	41-126
1,2,4-Trichlorobenzene	25	0	6	24	6	24	0	28	39-98	23	38-107
4-Chloro-3-Methylphenol	50	0	13	26	11	22	17	42	23-97	33	26-103
Acenaphthene	25	.3	7	28	7	28	0	31	46-118	19	31-137
4-Nitrophenol	50	0	9	18	6	12	53	50	10-80	50	11-114
2,4-Dinitrotoluene	25	0	6	24	5	20	18	38	24-96	47	28-89
Pentachlorophenol	50	6	20	28	19	26	8	50	9-103	47	17-109
~~Di-N-Butylphthalate~~								~~31~~	~~26-127~~	~~36~~	~~35-142~~
Pyrene	25	8	13	20	16	32	46	31	26-127	36	35-142

1129 (9/88)

Memo

August 24, 1989

TO: Joanne Davis

FROM: Lyn Faas

SUBJECT: Trace Organics Results for Duwamish/Elliott Bay Soils

Attached are pesticide/PCB, volatile, and base/neutral/acid (BNA) extractable semivolatile organic results for the following soil samples collected July 25 as part of the Duwamish/Elliott Bay project:

8900706	Upland, Station S1
8900707	Upland, Station S2
8900708	Upland, Station S3
8900709	Wetland, Station S5

The primary contaminants were polycyclic aromatic hydrocarbons (PAHs), phthalates, and low levels of PCBs (Arochlor 1254). In addition, samples 8900706 and 8900707 contained pentachlorophenol. No volatile organics were detected in any of the samples.

PAHs are associated with fuel and oils, and phthalates are ubiquitous plasticizers. Both of these are frequently found in environmental samples. However, PCBs and pentachlorophenol are detected less often, and are greater cause for concern. The PCB levels are well below the current federal regulatory level of 50 ppm for special disposal requirements. However, these materials have been banned for several years, are known carcinogens, and are persistent in the environment. Pentachlorophenol is a wood preservative that has also been banned for most uses and has been associated with dioxin contamination. In addition to being cause for concern, the presence of pentachlorophenol may be responsible for the chemical odor coming from this site.

If you have any questions or would like additional information, please let me know.

cc: Jody Heintzman

8270 Sm

GCMS METHOD ~~625~~ SEMI-VOLATILES ORGANIC ANALYSIS REPORT

SAMPLE NUMBER: 8900706 % SOLIDS: 97.00

MATRIX: SEDIMENT AMOUNT ANALYZED: 60.0 G Wet Sm

INSTRUMENT ID: 4500B DILN. FACTOR: 2.0

PRIORITY POLLUTANTS	Dry DL (ppb)	Dry Conc (ppb)
N-NITROSODIMETHYLAMINE	100.00	ND R Sm
PHENOL	100.00	ND
BIS(2-CHLOROETHYL)ETHER	17.00	ND
2-CHLOROPHENOL	69.00	ND
1,3-DICHLOROBENZENE	17.00	ND
1,4-DICHLOROBENZENE	17.00	ND
1,2-DICHLOROBENZENE	17.00	ND
BIS(2-CHLOROISOPROPYL)ETHER	69.00	ND
N-NITROSODI-N-PROPYLAMINE	34.00	ND
HEXACHLOROETHANE	34.00	ND
NITROBENZENE	34.00	ND
ISOPHORONE	34.00	ND
2-NITROPHENOL	34.00	ND
2,4-DIMETHYLPHENOL	34.00	ND
BIS(2-CHLOROETHOXY)METHANE	34.00	ND
2,4-DICHLOROPHENOL	34.00	ND
1,2,4-TRICHLOROBENZENE	17.00	ND
NAPHTHALENE	52.00	ND
HEXACHLOROBUTADIENE	34.00	ND
4-CHLORO-3-METHYLPHENOL	69.00	ND
HEXACHLOROCYCLOPENTADIENE	34.00	ND
2,4,6-TRICHLOROPHENOL	140.00	ND
2-CHLORONAPHTHALENE	17.00	ND
ACENAPHTHYLENE	17.00	ND
DIMETHYL PHTHALATE	10.00	ND
2,6-DINITROTOLUENE	14.00	ND
ACENAPHTHENE	14.00	9.60 J
2,4-DINITROPHENOL	69.00	ND R
4-NITROPHENOL	69.00	ND
2,4-DINITROTOLUENE	14.00	ND
FLUORENE	17.00	11.00 J
DIETHYL PHTHALATE	34.00	ND R
4-CHLOROPHENYL PHENYL ETHER	17.00	ND
4,6-DINITRO-O-CRESOL	69.00	ND
N-NITROSODIPHENYLAMINE *	34.00	ND
1,2-DIPHENYLHYDRAZINE **	69.00	ND
4-BROMOPHENYL PHENYL ETHER	10.00	ND
HEXACHLOROBENZENE	17.00	ND
PENTACHLOROPHENOL	34.00	210.00 J
PHENANTHRENE	17.00	180.00
ANTHRACENE	17.00	27.00

8270 sm

GCMS METHOD ~~625~~ SEMI-VOLATILES ORGANIC ANALYSIS REPORT

SAMPLE NUMBER: 8900706 % SOLIDS: 97.00

PRIORITY POLLUTANTS	Dry DL (ppb)	Dry Conc (ppb)
DI-N-BUTYLPHTHALATE	34.00	ND R
FLUORANTHENE	21.00	340.00 J
BENZIDINE	820.00	ND R
PYRENE	17.00	270.00 J
BENZYL BUTYL PHTHALATE	17.00	68.00
BENZO(A)ANTHRACENE	17.00	120.00
CHRYSENE	17.00	190.00
3,3'-DICHLOROBENZIDINE	34.00	ND R
BIS(2-ETHYLHEXYL)PHTHALATE	17.00	850.00 J
DI-N-OCTYL PHTHALATE	17.00	ND R
BENZO(B)FLUORANTHENE	52.00	240.00 J
BENZO(K)FLUORANTHENE	52.00	210.00
BENZO(A)PYRENE	34.00	150.00
INDENO(1,2,3-CD)PYRENE	34.00	230.00
DIBENZO(A,H)ANTHRACENE	52.00	220.00
BENZO(G,H,I)PERYLENE	34.00	150.00

HAZARDOUS SUBSTANCES LIST	Dry DL (ppb)	Dry Conc (ppb)
ANILINE	69.00	ND R
BENZYL ALCOHOL	34.00	ND
2-METHYLPHENOL	34.00	ND
4-METHYLPHENOL	34.00	ND
BENZOIC ACID	100.00	ND
4-CHLOROANILINE	69.00	ND
2-METHYLNAPHTHALENE	52.00	ND
2,4,5-TRICHLOROPHENOL	140.00	ND
2-NITROANILINE	100.00	ND
3-NITROANILINE	100.00	ND
DIBENZOFURAN	34.00	ND
4-NITROANILINE	100.00	ND

* - Compound detected as Diphenylamine
** - Compound detected as Azobenzene
Note - DL means Sample Detection Limits (based on 100% recovery).
NA means Not Analyzed, ND means Not Detected.

8270 Sm

GCMS METHOD ~~625~~ SEMI-VOLATILES ORGANIC ANALYSIS REPORT

SAMPLE NUMBER: 8900707 % SOLIDS: 97.00

MATRIX: SEDIMENT AMOUNT ANALYZED: 60.0 G wet Sm

INSTRUMENT ID: 4500B DILN. FACTOR: 2.0

PRIORITY POLLUTANTS	Dry DL (ppb)	Dry Conc (ppb)
N-NITROSODIMETHYLAMINE	100.~~00~~	ND R
PHENOL	100.~~00~~	ND
BIS(2-CHLOROETHYL)ETHER	17.~~00~~	ND
2-CHLOROPHENOL	69.~~00~~	ND
1,3-DICHLOROBENZENE	17.~~00~~	ND
1,4-DICHLOROBENZENE	17.~~00~~	ND
1,2-DICHLOROBENZENE	17.~~00~~	ND
BIS(2-CHLOROISOPROPYL)ETHER	69.~~00~~	ND
N-NITROSODI-N-PROPYLAMINE	34.~~00~~	ND
HEXACHLOROETHANE	34.~~00~~	ND
NITROBENZENE	34.~~00~~	ND
ISOPHORONE	34.~~00~~	ND
2-NITROPHENOL	34.~~00~~	ND
2,4-DIMETHYLPHENOL	34.~~00~~	ND
BIS(2-CHLOROETHOXY)METHANE	34.~~00~~	ND
2,4-DICHLOROPHENOL	34.~~00~~	ND
1,2,4-TRICHLOROBENZENE	17.~~00~~	ND
NAPHTHALENE	52.~~00~~	ND
HEXACHLOROBUTADIENE	34.~~00~~	ND
4-CHLORO-3-METHYLPHENOL	69.~~00~~	ND
HEXACHLOROCYCLOPENTADIENE	34.~~00~~	ND
2,4,6-TRICHLOROPHENOL	140.~~00~~	ND
2-CHLORONAPHTHALENE	17.~~00~~	ND
ACENAPHTHYLENE	17.~~00~~	ND
DIMETHYL PHTHALATE	10.~~00~~	ND
2,6-DINITROTOLUENE	14.~~00~~	ND
ACENAPHTHENE	14.~~00~~	10.~~00~~ J
2,4-DINITROPHENOL	69.~~00~~	ND R
4-NITROPHENOL	69.~~00~~	ND
2,4-DINITROTOLUENE	14.~~00~~	ND
FLUORENE	17.~~00~~	13.~~00~~ J
DIETHYL PHTHALATE	34.~~00~~	ND R
4-CHLOROPHENYL PHENYL ETHER	17.~~00~~	ND
4,6-DINITRO-O-CRESOL	69.~~00~~	ND
N-NITROSODIPHENYLAMINE *	34.~~00~~	ND
1,2-DIPHENYLHYDRAZINE **	69.~~00~~	ND
4-BROMOPHENYL PHENYL ETHER	10.~~00~~	ND
HEXACHLOROBENZENE	17.~~00~~	ND
PENTACHLOROPHENOL	34.~~00~~	110.~~00~~ J
PHENANTHRENE	17.~~00~~	170.~~00~~
ANTHRACENE	17.~~00~~	30.~~00~~

GCMS METHOD ~~625~~ 8270 SEMI-VOLATILES ORGANIC ANALYSIS REPORT

SAMPLE NUMBER: 8900707 % SOLIDS: 97.00

PRIORITY POLLUTANTS	Dry DL (ppb)	Dry Conc (ppb)	
DI-N-BUTYLPHTHALATE	34.00	ND	R
FLUORANTHENE	21.00	380.00	J
BENZIDINE	820.00	ND	R
PYRENE	17.00	310.00	J
BENZYL BUTYL PHTHALATE	17.00	170.00	
BENZO(A)ANTHRACENE	17.00	120.00	
CHRYSENE	17.00	190.00	
3,3'-DICHLOROBENZIDINE	34.00	ND	R
BIS(2-ETHYLHEXYL)PHTHALATE	17.00	860.00	J
DI-N-OCTYL PHTHALATE	17.00	ND	R
BENZO(B)FLUORANTHENE	52.00	240.00	J
BENZO(K)FLUORANTHENE	52.00	310.00	
BENZO(A)PYRENE	34.00	230.00	
INDENO(1,2,3-CD)PYRENE	34.00	120.00	
DIBENZO(A,H)ANTHRACENE	52.00	ND	R
BENZO(G,H,I)PERYLENE	34.00	110.00	J

HAZARDOUS SUBSTANCES LIST	Dry DL (ppb)	Dry Conc (ppb)	
ANILINE	69.00	ND	R
BENZYL ALCOHOL	34.00	ND	
2-METHYLPHENOL	34.00	ND	
4-METHYLPHENOL	34.00	ND	
BENZOIC ACID	100.00	ND	
4-CHLOROANILINE	69.00	ND	
2-METHYLNAPHTHALENE	52.00	ND	
2,4,5-TRICHLOROPHENOL	140.00	ND	
2-NITROANILINE	100.00	ND	
3-NITROANILINE	100.00	ND	
DIBENZOFURAN	34.00	ND	
4-NITROANILINE	100.00	ND	

* - Compound detected as Diphenylamine
** - Compound detected as Azobenzene
Note - DL means Sample Detection Limits (based on 100% recovery).
NA means Not Analyzed, ND means Not Detected.

8270 Sm

GCMS METHOD ~~625~~ SEMI-VOLATILES ORGANIC ANALYSIS REPORT

SAMPLE NUMBER: 8900708 % SOLIDS: 93.00

MATRIX: SEDIMENT AMOUNT ANALYZED: 60.0 G wet Sm

INSTRUMENT ID: 4500B DILN. FACTOR: 2.0

PRIORITY POLLUTANTS	Dry DL (ppb)	Dry Conc (ppb)
		Sm
N-NITROSODIMETHYLAMINE	110.~~00~~	ND R
PHENOL	110.~~00~~	ND
BIS(2-CHLOROETHYL)ETHER	18.~~00~~	ND
2-CHLOROPHENOL	72.~~00~~	ND
1,3-DICHLOROBENZENE	18.~~00~~	ND
1,4-DICHLOROBENZENE	18.~~00~~	ND
1,2-DICHLOROBENZENE	18.~~00~~	ND
BIS(2-CHLOROISOPROPYL)ETHER	72.~~00~~	ND
N-NITROSODI-N-PROPYLAMINE	36.~~00~~	ND
HEXACHLOROETHANE	36.~~00~~	ND
NITROBENZENE	36.~~00~~	ND
ISOPHORONE	36.~~00~~	ND
2-NITROPHENOL	36.~~00~~	ND
2,4-DIMETHYLPHENOL	36.~~00~~	ND
BIS(2-CHLOROETHOXY)METHANE	36.~~00~~	ND
2,4-DICHLOROPHENOL	36.~~00~~	ND
1,2,4-TRICHLOROBENZENE	18.~~00~~	ND
NAPHTHALENE	54.~~00~~	ND
HEXACHLOROBUTADIENE	36.~~00~~	ND
4-CHLORO-3-METHYLPHENOL	72.~~00~~	ND
HEXACHLOROCYCLOPENTADIENE	36.~~00~~	ND
2,4,6-TRICHLOROPHENOL	140.~~00~~	ND
2-CHLORONAPHTHALENE	18.~~00~~	ND
ACENAPHTHYLENE	18.~~00~~	ND
DIMETHYL PHTHALATE	11.~~00~~	ND
2,6-DINITROTOLUENE	14.~~00~~	ND
ACENAPHTHENE	14.~~00~~	ND
2,4-DINITROPHENOL	72.~~00~~	ND
4-NITROPHENOL	72.~~00~~	ND
2,4-DINITROTOLUENE	14.~~00~~	ND
FLUORENE	18.~~00~~	ND
DIETHYL PHTHALATE	36.~~00~~	ND
4-CHLOROPHENYL PHENYL ETHER	18.~~00~~	ND
4,6-DINITRO-O-CRESOL	72.~~00~~	ND
N-NITROSODIPHENYLAMINE *	36.~~00~~	ND
1,2-DIPHENYLHYDRAZINE **	72.~~00~~	ND
4-BROMOPHENYL PHENYL ETHER	11.~~00~~	ND
HEXACHLOROBENZENE	18.~~00~~	ND
PENTACHLOROPHENOL	36.~~00~~	ND
PHENANTHRENE	18.~~00~~	40.~~00~~ J
ANTHRACENE	18.~~00~~	ND R

GCMS METHOD ~~625~~ 8270 SEMI-VOLATILES ORGANIC ANALYSIS REPORT

SAMPLE NUMBER: 8900708 % SOLIDS: 93.00

PRIORITY POLLUTANTS	Dry DL (ppb)	Dry Conc (ppb)
DI-N-BUTYLPHTHALATE	36.00	ND R
FLUORANTHENE	22.00	57.00 J
BENZIDINE	860.00	ND R
PYRENE	18.00	76.00 J
BENZYL BUTYL PHTHALATE	18.00	ND R
BENZO(A)ANTHRACENE	18.00	46.00 J
CHRYSENE	18.00	66.00 J
3,3'-DICHLOROBENZIDINE	36.00	ND R
BIS(2-ETHYLHEXYL)PHTHALATE	18.00	ND
DI-N-OCTYL PHTHALATE	18.00	ND
BENZO(B)FLUORANTHENE	54.00	120.00 J
BENZO(K)FLUORANTHENE	54.00	130.00
BENZO(A)PYRENE	36.00	89.00
INDENO(1,2,3-CD)PYRENE	36.00	73.00
DIBENZO(A,H)ANTHRACENE	54.00	ND R
BENZO(G,H,I)PERYLENE	36.00	70.00 J

HAZARDOUS SUBSTANCES LIST	Dry DL (ppb)	Dry Conc (ppb)
ANILINE	72.00	ND R
BENZYL ALCOHOL	36.00	ND
2-METHYLPHENOL	36.00	ND
4-METHYLPHENOL	36.00	ND
BENZOIC ACID	110.00	ND
4-CHLOROANILINE	72.00	ND
2-METHYLNAPHTHALENE	54.00	ND
2,4,5-TRICHLOROPHENOL	140.00	ND
2-NITROANILINE	110.00	ND
3-NITROANILINE	110.00	ND
DIBENZOFURAN	36.00	ND
4-NITROANILINE	110.00	ND

* - Compound detected as Diphenylamine
** - Compound detected as Azobenzene
Note - DL means Sample Detection Limits (based on 100% recovery).
NA means Not Analyzed, ND means Not Detected.

8270 SIM

GCMS METHOD ~~625~~ SEMI-VOLATILES ORGANIC ANALYSIS REPORT

SAMPLE NUMBER: 8900709 % SOLIDS: 95.00

MATRIX: SEDIMENT AMOUNT ANALYZED: 60.0 G wet wt

INSTRUMENT ID: 4500B DILN. FACTOR: 2.0

PRIORITY POLLUTANTS	Dry DL (ppb)	Dry Conc (ppb)
N-NITROSODIMETHYLAMINE	110.00	ND R SIM
PHENOL	110.00	ND
BIS(2-CHLOROETHYL)ETHER	18.00	ND
2-CHLOROPHENOL	70.00	ND
1,3-DICHLOROBENZENE	18.00	ND
1,4-DICHLOROBENZENE	18.00	ND
1,2-DICHLOROBENZENE	18.00	ND
BIS(2-CHLOROISOPROPYL)ETHER	70.00	ND
N-NITROSODI-N-PROPYLAMINE	35.00	ND
HEXACHLOROETHANE	35.00	ND
NITROBENZENE	35.00	ND
ISOPHORONE	35.00	ND
2-NITROPHENOL	35.00	ND
2,4-DIMETHYLPHENOL	35.00	ND
BIS(2-CHLOROETHOXY)METHANE	35.00	ND
2,4-DICHLOROPHENOL	35.00	ND
1,2,4-TRICHLOROBENZENE	18.00	ND
NAPHTHALENE	53.00	ND
HEXACHLOROBUTADIENE	35.00	ND
4-CHLORO-3-METHYLPHENOL	70.00	ND
HEXACHLOROCYCLOPENTADIENE	35.00	ND
2,4,6-TRICHLOROPHENOL	140.00	ND
2-CHLORONAPHTHALENE	18.00	ND
ACENAPHTHYLENE	18.00	ND
DIMETHYL PHTHALATE	11.00	ND
2,6-DINITROTOLUENE	14.00	ND
ACENAPHTHENE	14.00	ND
2,4-DINITROPHENOL	70.00	ND
4-NITROPHENOL	70.00	ND
2,4-DINITROTOLUENE	14.00	ND
FLUORENE	18.00	ND
DIETHYL PHTHALATE	35.00	ND
4-CHLOROPHENYL PHENYL ETHER	18.00	ND
4,6-DINITRO-O-CRESOL	70.00	ND
N-NITROSODIPHENYLAMINE *	35.00	ND
1,2-DIPHENYLHYDRAZINE **	70.00	ND
4-BROMOPHENYL PHENYL ETHER	11.00	ND
HEXACHLOROBENZENE	18.00	ND
PENTACHLOROPHENOL	35.00	ND
PHENANTHRENE	18.00	110.00 J
ANTHRACENE	18.00	17.00 J

GCMS METHOD ~~625~~ 8270 SEMI-VOLATILES ORGANIC ANALYSIS REPORT

SAMPLE NUMBER: 8900709

% SOLIDS: 95.00

PRIORITY POLLUTANTS	Dry DL (ppb)	Dry Conc (ppb)
DI-N-BUTYLPHTHALATE	35.00	ND R
FLUORANTHENE	21.00	190.00 J
BENZIDINE	840.00	ND R
PYRENE	18.00	220.00 J
BENZYL BUTYL PHTHALATE	18.00	52.00
BENZO(A)ANTHRACENE	18.00	71.00
CHRYSENE	35.00	110.00
3,3'-DICHLOROBENZIDINE	18.00	ND R
BIS(2-ETHYLHEXYL)PHTHALATE	18.00	520.00 J
DI-N-OCTYL PHTHALATE	53.00	ND R
BENZO(B)FLUORANTHENE	53.00	160.00 J
BENZO(K)FLUORANTHENE	35.00	160.00
BENZO(A)PYRENE	35.00	100.00
INDENO(1,2,3-CD)PYRENE	53.00	110.00
DIBENZO(A,H)ANTHRACENE	35.00	ND R
BENZO(G,H,I)PERYLENE		59.00 J

HAZARDOUS SUBSTANCES LIST	Dry DL (ppb)	Dry Conc (ppb)
ANILINE	70.00	ND R
BENZYL ALCOHOL	35.00	ND
2-METHYLPHENOL	35.00	ND
4-METHYLPHENOL	35.00	ND
BENZOIC ACID	110.00	ND
4-CHLOROANILINE	70.00	ND
2-METHYLNAPHTHALENE	53.00	ND
2,4,5-TRICHLOROPHENOL	140.00	ND
2-NITROANILINE	110.00	ND
3-NITROANILINE	110.00	ND
DIBENZOFURAN	35.00	ND
4-NITROANILINE	110.00	ND

* - Compound detected as Diphenylamine

** - Compound detected as Azobenzene

Note - DL means Sample Detection Limits (based on 100% recovery).
NA means Not Analyzed, ND means Not Detected.

Memo

August 24, 1989

TO: Joanne Davis

FROM: Lyn Faas

SUBJECT: Trace Organics Results for Duwamish/Elliott Bay Soils

Attached are pesticide/PCB, volatile, and base/neutral/acid (BNA) extractable semivolatile organic results for the following soil samples collected July 25 as part of the Duwamish/Elliott Bay project:

8900706	Upland, Station S1
8900707	Upland, Station S2
8900708	Upland, Station S3
8900709	Wetland, Station S5

The primary contaminants were polycyclic aromatic hydrocarbons (PAHs), phthalates, and low levels of PCBs (Arochlor 1254). In addition, samples 8900706 and 8900707 contained pentachlorophenol. No volatile organics were detected in any of the samples.

PAHs are associated with fuel and oils, and phthalates are ubiquitous plasticizers. Both of these are frequently found in environmental samples. However, PCBs and pentachlorophenol are detected less often, and are greater cause for concern. The PCB levels are well below the current federal regulatory level of 50 ppm for special disposal requirements. However, these materials have been banned for several years, are known carcinogens, and are persistent in the environment. Pentachlorophenol is a wood preservative that has also been banned for most uses and has been associated with dioxin contamination. In addition to being cause for concern, the presence of pentachlorophenol may be responsible for the chemical odor coming from this site.

If you have any questions or would like additional information, please let me know.

cc: Jody Heintzman

STATION S1

GC/ECD PESTICIDES ORGANIC ANALYSIS REPORT

SAMPLE NUMBER: 8900706 % SOLIDS: 97.00

MATRIX: SEDIMENT AMOUNT ANALYZED: 30.0 G

INSTRUMENT ID: HP-5880 DILN. FACTOR: 50.0

COMPOUND NAME	Dry DL (ppb)	Dry Conc (ppb)
ALPHA-BHC	17.00	ND
BETA-BHC	17.00	ND
DELTA-BHC	17.00	ND
GAMMA-BHC (LINDANE)	17.00	ND
HEPTACHLOR	17.00	ND
ALDRIN	17.00	ND
HEPTACHLOR EPOXIDE	17.00	ND
ENDOSULFAN I	17.00	ND
DIELDRIN	17.00	ND
4,4-DDE	17.00	ND
ENDRIN	17.00	ND
ENDOSULFAN II	17.00	ND
4,4-DDD	17.00	ND
ENDRIN ALDEHYDE	17.00	ND
ENDOSULFAN SULFATE	17.00	ND
4,4-DDT	17.00	ND
METHOXYCHLOR	86.00	ND
CHLORDANE	86.00	ND
TOXAPHENE	170.00	ND

GC/ECD PCB ORGANIC ANALYSIS REPORT

MATRIX: SEDIMENT AMOUNT ANALYZED: 30.0 G

INSTRUMENT ID: HP-5880 DILN. FACTOR: 5.0

COMPOUND NAME	Dry DL (ppb)	Dry Conc (ppb)
AROCHLOR-1016	17.00	ND
AROCHLOR-1221	17.00	ND
AROCHLOR-1232	17.00	ND
AROCHLOR-1242	17.00	ND
AROCHLOR-1248	17.00	ND
AROCHLOR-1254	17.00	45.00
AROCHLOR-1260	17.00	ND

Note - DL means Sample Detection Limits (based on 100% recovery).
NA means Not Analyzed, ND means Not Detected.

GCMS METHOD 624 VOLATILES ORGANIC ANALYSIS REPORT Page 1 of 2

SAMPLE NUMBER: 8900706 % SOLIDS: 97.00

MATRIX: SEDIMENT AMOUNT ANALYZED: 5.0 G

INSTRUMENT ID: 4500C DILN. FACTOR: 50.0

PRIORITY POLLUTANTS	Dry DL (ppb)	Dry Conc (ppb)
CHLOROMETHANE	100.00	ND
VINYLCHLORIDE	100.00	ND
BROMOMETHANE	100.00	ND
CHLOROETHANE	100.00	ND
TRICHLOROFLUOROMETHANE	100.00	ND
ACROLEIN	520.00	ND
1,1-DICHLOROETHYLENE	100.00	ND
METHYLENE CHLORIDE	520.00	ND
ACRYLONITRILE	520.00	ND
TRANS-1,2-DICHLOROETHYLENE	100.00	ND
1,1-DICHLOROETHANE	100.00	ND
CHLOROFORM	100.00	ND
1,1,1-TRICHLOROETHANE	100.00	ND
CARBON TETRACHLORIDE	100.00	ND
BENZENE	100.00	ND
1,2-DICHLOROETHANE	100.00	ND
1,1,2-TRICHLOROETHYLENE	100.00	ND
1,2-DICHLOROPROPANE	100.00	ND
BROMODICHLOROMETHANE	100.00	ND
2-CHLOROETHYLVINYLETHER	100.00	ND
TRANS-1,3-DICHLOROPROPENE	100.00	ND
TOLUENE	100.00	ND
CIS-1,3-DICHLOROPROPENE	100.00	ND
1,1,2-TRICHLOROETHANE	100.00	ND
TETRACHLOROETHYLENE	100.00	ND
CHLORODIBROMOMETHANE	100.00	ND
CHLOROBENZENE	100.00	ND
ETHYL BENZENE	100.00	ND
BROMOFORM	100.00	ND
1,1,2,2-TETRACHLOROETHANE	100.00	ND

SAMPLE NUMBER: 8900706 % SOLIDS: 97.00

HAZARDOUS SUBSTANCES LIST	Dry DL (ppb)	Dry Conc (ppb)
ACETONE	520.00	ND
CARBON DISULFIDE	100.00	ND
VINYL ACETATE	520.00	ND
2-BUTANONE (MEK)	520.00	ND
4-METHYL-2-PENTANONE (MIBK)	520.00	ND
2-HEXANONE	520.00	ND
TOTAL XYLENE	100.00	ND
STYRENE	100.00	ND

Note - DL means Sample Detection Limits (based on 100% recovery).
NA means Not Analyzed, ND means Not Detected.

TICS: NONE

GCMS METHOD 625 SEMI-VOLATILES ORGANIC ANALYSIS REPORT

SAMPLE NUMBER: 8900706 % SOLIDS: 97.00

MATRIX: SEDIMENT AMOUNT ANALYZED: 60.0 G

INSTRUMENT ID: 4500B DILN. FACTOR: 2.0

PRIORITY POLLUTANTS	Dry DL (ppb)	Dry Conc (ppb)
N-NITROSODIMETHYLAMINE	100.00	ND
PHENOL	100.00	ND
BIS(2-CHLOROETHYL)ETHER	17.00	ND
2-CHLOROPHENOL	69.00	ND
1,3-DICHLOROBENZENE	17.00	ND
1,4-DICHLOROBENZENE	17.00	ND
1,2-DICHLOROBENZENE	17.00	ND
BIS(2-CHLOROISOPROPYL)ETHER	69.00	ND
N-NITROSODI-N-PROPYLAMINE	34.00	ND
HEXACHLOROETHANE	34.00	ND
NITROBENZENE	34.00	ND
ISOPHORONE	34.00	ND
2-NITROPHENOL	34.00	ND
2,4-DIMETHYLPHENOL	34.00	ND
BIS(2-CHLOROETHOXY)METHANE	34.00	ND
2,4-DICHLOROPHENOL	34.00	ND
1,2,4-TRICHLOROBENZENE	17.00	ND
NAPHTHALENE	52.00	ND
HEXACHLOROBUTADIENE	34.00	ND
4-CHLORO-3-METHYLPHENOL	69.00	ND
HEXACHLOROCYCLOPENTADIENE	34.00	ND
2,4,6-TRICHLOROPHENOL	140.00	ND
2-CHLORONAPHTHALENE	17.00	ND
ACENAPHTHYLENE	17.00	ND
DIMETHYL PHTHALATE	10.00	ND
2,6-DINITROTOLUENE	14.00	ND
ACENAPHTHENE	14.00	9.60
2,4-DINITROPHENOL	69.00	ND
4-NITROPHENOL	69.00	ND
2,4-DINITROTOLUENE	14.00	ND
FLUORENE	17.00	11.00
DIETHYL PHTHALATE	34.00	ND
4-CHLOROPHENYL PHENYL ETHER	17.00	ND
4,6-DINITRO-O-CRESOL	69.00	ND
N-NITROSODIPHENYLAMINE *	34.00	ND
1,2-DIPHENYLHYDRAZINE **	69.00	ND
4-BROMOPHENYL PHENYL ETHER	10.00	ND
HEXACHLOROBENZENE	17.00	ND
PENTACHLOROPHENOL	34.00	210.00
PHENANTHRENE	17.00	180.00
ANTHRACENE	17.00	27.00

SAMPLE NUMBER: 8900706 % SOLIDS: 97.00

PRIORITY POLLUTANTS	Dry DL (ppb)	Dry Conc (ppb)
DI-N-BUTYLPHTHALATE	34.00	ND
FLUORANTHENE	21.00	340.00
BENZIDINE	820.00	ND
PYRENE	17.00	270.00
BENZYL BUTYL PHTHALATE	17.00	68.00
BENZO(A)ANTHRACENE	17.00	120.00
CHRYSENE	17.00	190.00
3,3'-DICHLOROBENZIDINE	34.00	ND
BIS(2-ETHYLHEXYL)PHTHALATE	17.00	850.00
DI-N-OCTYL PHTHALATE	17.00	ND
BENZO(B)FLUORANTHENE	52.00	240.00
BENZO(K)FLUORANTHENE	52.00	210.00
BENZO(A)PYRENE	34.00	150.00
INDENO(1,2,3-CD)PYRENE	34.00	230.00
DIBENZO(A,H)ANTHRACENE	52.00	220.00
BENZO(G,H,I)PERYLENE	34.00	150.00

HAZARDOUS SUBSTANCES LIST	Dry DL (ppb)	Dry Conc (ppb)
ANILINE	69.00	ND
BENZYL ALCOHOL	34.00	ND
2-METHYLPHENOL	34.00	ND
4-METHYLPHENOL	34.00	ND
BENZOIC ACID	100.00	ND
4-CHLOROANILINE	69.00	ND
2-METHYLNAPHTHALENE	52.00	ND
2,4,5-TRICHLOROPHENOL	140.00	ND
2-NITROANILINE	100.00	ND
3-NITROANILINE	100.00	ND
DIBENZOFURAN	34.00	ND
4-NITROANILINE	100.00	ND

* - Compound detected as Diphenylamine
** - Compound detected as Azobenzene
Note - DL means Sample Detection Limits (based on 100% recovery).
NA means Not Analyzed, ND means Not Detected.

GC/ECD PESTICIDES ORGANIC ANALYSIS REPORT

STATION S2

SAMPLE NUMBER: 8900707 % SOLIDS: 97.00

MATRIX: SEDIMENT AMOUNT ANALYZED: 30.0 G

INSTRUMENT ID: HP-5880 DILN. FACTOR: 50.0

COMPOUND NAME	Dry DL (ppb)	Dry Conc (ppb)
ALPHA-BHC	17.00	ND
BETA-BHC	17.00	ND
DELTA-BHC	17.00	ND
GAMMA-BHC (LINDANE)	17.00	ND
HEPTACHLOR	17.00	ND
ALDRIN	17.00	ND
HEPTACHLOR EPOXIDE	17.00	ND
ENDOSULFAN I	17.00	ND
DIELDRIN	17.00	ND
4,4-DDE	17.00	ND
ENDRIN	17.00	ND
ENDOSULFAN II	17.00	ND
4,4-DDD	17.00	ND
ENDRIN ALDEHYDE	17.00	ND
ENDOSULFAN SULFATE	17.00	ND
4,4-DDT	17.00	ND
METHOXYCHLOR	86.00	ND
CHLORDANE	86.00	ND
TOXAPHENE	170.00	ND

GC/ECD PCB ORGANIC ANALYSIS REPORT

MATRIX: SEDIMENT AMOUNT ANALYZED: 30.0 G

INSTRUMENT ID: HP-5880 DILN. FACTOR: 5.0

COMPOUND NAME	Dry DL (ppb)	Dry Conc (ppb)
AROCHLOR-1016	17.00	ND
AROCHLOR-1221	17.00	ND
AROCHLOR-1232	17.00	ND
AROCHLOR-1242	17.00	ND
AROCHLOR-1248	17.00	ND
AROCHLOR-1254	17.00	38.00
AROCHLOR-1260	17.00	ND

Note - DL means Sample Detection Limits (based on 100% recovery).
NA means Not Analyzed, ND means Not Detected.

GCMS METHOD 624 VOLATILES ORGANIC ANALYSIS REPORT Page 1 of 2

SAMPLE NUMBER: 8900707 % SOLIDS: 97.00

MATRIX: SEDIMENT AMOUNT ANALYZED: 5.0 G

INSTRUMENT ID: 4500C DILN. FACTOR: 50.0

PRIORITY POLLUTANTS	Dry DL (ppb)	Dry Conc (ppb)
CHLOROMETHANE	100.00	ND
VINYLCHLORIDE	100.00	ND
BROMOMETHANE	100.00	ND
CHLOROETHANE	100.00	ND
TRICHLOROFLUOROMETHANE	100.00	ND
ACROLEIN	520.00	ND
1,1-DICHLOROETHYLENE	100.00	ND
METHYLENE CHLORIDE	520.00	ND
ACRYLONITRILE	520.00	ND
TRANS-1,2-DICHLOROETHYLENE	100.00	ND
1,1-DICHLOROETHANE	100.00	ND
CHLOROFORM	100.00	ND
1,1,1-TRICHLOROETHANE	100.00	ND
CARBON TETRACHLORIDE	100.00	ND
BENZENE	100.00	ND
1,2-DICHLOROETHANE	100.00	ND
1,1,2-TRICHLOROETHYLENE	100.00	ND
1,2-DICHLOROPROPANE	100.00	ND
BROMODICHLOROMETHANE	100.00	ND
2-CHLOROETHYLVINYLETHER	100.00	ND
TRANS-1,3-DICHLOROPROPENE	100.00	ND
TOLUENE	100.00	ND
CIS-1,3-DICHLOROPROPENE	100.00	ND
1,1,2-TRICHLOROETHANE	100.00	ND
TETRACHLOROETHYLENE	100.00	ND
CHLORODIBROMOMETHANE	100.00	ND
CHLOROBENZENE	100.00	ND
ETHYL BENZENE	100.00	ND
BROMOFORM	100.00	ND
1,1,2,2-TETRACHLOROETHANE	100.00	ND

SAMPLE NUMBER: 8900707 % SOLIDS: 97.00

HAZARDOUS SUBSTANCES LIST	Dry DL (ppb)	Dry Conc (ppb)
ACETONE	520.00	ND
CARBON DISULFIDE	100.00	ND
VINYL ACETATE	520.00	ND
2-BUTANONE (MEK)	520.00	ND
4-METHYL-2-PENTANONE (MIBK)	520.00	ND
2-HEXANONE	520.00	ND
TOTAL XYLENE	100.00	ND
STYRENE	100.00	ND

Note - DL means Sample Detection Limits (based on 100% recovery).
NA means Not Analyzed, ND means Not Detected.

TICS: NONE

GCMS METHOD 625 SEMI-VOLATILES ORGANIC ANALYSIS REPORT

SAMPLE NUMBER: 8900707 % SOLIDS: 97.00

MATRIX: SEDIMENT AMOUNT ANALYZED: 60.0 G

INSTRUMENT ID: 4500B DILN. FACTOR: 2.0

PRIORITY POLLUTANTS	Dry DL (ppb)	Dry Conc (ppb)
N-NITROSODIMETHYLAMINE	100.00	ND
PHENOL	100.00	ND
BIS(2-CHLOROETHYL)ETHER	17.00	ND
2-CHLOROPHENOL	69.00	ND
1,3-DICHLOROBENZENE	17.00	ND
1,4-DICHLOROBENZENE	17.00	ND
1,2-DICHLOROBENZENE	17.00	ND
BIS(2-CHLOROISOPROPYL)ETHER	69.00	ND
N-NITROSODI-N-PROPYLAMINE	34.00	ND
HEXACHLOROETHANE	34.00	ND
NITROBENZENE	34.00	ND
ISOPHORONE	34.00	ND
2-NITROPHENOL	34.00	ND
2,4-DIMETHYLPHENOL	34.00	ND
BIS(2-CHLOROETHOXY)METHANE	34.00	ND
2,4-DICHLOROPHENOL	34.00	ND
1,2,4-TRICHLOROBENZENE	17.00	ND
NAPHTHALENE	52.00	ND
HEXACHLOROBUTADIENE	34.00	ND
4-CHLORO-3-METHYLPHENOL	69.00	ND
HEXACHLOROCYCLOPENTADIENE	34.00	ND
2,4,6-TRICHLOROPHENOL	140.00	ND
2-CHLORONAPHTHALENE	17.00	ND
ACENAPHTHYLENE	17.00	ND
DIMETHYL PHTHALATE	10.00	ND
2,6-DINITROTOLUENE	14.00	ND
ACENAPHTHENE	14.00	10.00
2,4-DINITROPHENOL	69.00	ND
4-NITROPHENOL	69.00	ND
2,4-DINITROTOLUENE	14.00	ND
FLUORENE	17.00	13.00
DIETHYL PHTHALATE	34.00	ND
4-CHLOROPHENYL PHENYL ETHER	17.00	ND
4,6-DINITRO-O-CRESOL	69.00	ND
N-NITROSODIPHENYLAMINE *	34.00	ND
1,2-DIPHENYLHYDRAZINE **	69.00	ND
4-BROMOPHENYL PHENYL ETHER	10.00	ND
HEXACHLOROBENZENE	17.00	ND
PENTACHLOROPHENOL	34.00	110.00
PHENANTHRENE	17.00	170.00
ANTHRACENE	17.00	30.00

SAMPLE NUMBER: 8900707 % SOLIDS: 97.00

PRIORITY POLLUTANTS	Dry DL (ppb)	Dry Conc (ppb)
DI-N-BUTYLPHTHALATE	34.00	ND
FLUORANTHENE	21.00	380.00
BENZIDINE	820.00	ND
PYRENE	17.00	310.00
BENZYL BUTYL PHTHALATE	17.00	170.00
BENZO(A)ANTHRACENE	17.00	120.00
CHRYSENE	17.00	190.00
3,3'-DICHLOROBENZIDINE	34.00	ND
BIS(2-ETHYLHEXYL)PHTHALATE	17.00	860.00
DI-N-OCTYL PHTHALATE	17.00	ND
BENZO(B)FLUORANTHENE	52.00	240.00
BENZO(K)FLUORANTHENE	52.00	310.00
BENZO(A)PYRENE	34.00	230.00
INDENO(1,2,3-CD)PYRENE	34.00	120.00
DIBENZO(A,H)ANTHRACENE	52.00	ND
BENZO(G,H,I)PERYLENE	34.00	110.00

HAZARDOUS SUBSTANCES LIST	Dry DL (ppb)	Dry Conc (ppb)
ANILINE	69.00	ND
BENZYL ALCOHOL	34.00	ND
2-METHYLPHENOL	34.00	ND
4-METHYLPHENOL	34.00	ND
BENZOIC ACID	100.00	ND
4-CHLOROANILINE	69.00	ND
2-METHYLNAPHTHALENE	52.00	ND
2,4,5-TRICHLOROPHENOL	140.00	ND
2-NITROANILINE	100.00	ND
3-NITROANILINE	100.00	ND
DIBENZOFURAN	34.00	ND
4-NITROANILINE	100.00	ND

* - Compound detected as Diphenylamine
** - Compound detected as Azobenzene
Note - DL means Sample Detection Limits (based on 100% recovery).
NA means Not Analyzed, ND means Not Detected.

GC/ECD PESTICIDES ORGANIC ANALYSIS REPORT

STATION 53

SAMPLE NUMBER: 8900708 % SOLIDS: 93.00

MATRIX: SEDIMENT AMOUNT ANALYZED: 30.0 G

INSTRUMENT ID: HP-5880 DILN. FACTOR: 50.0

COMPOUND NAME	Dry DL (ppb)	Dry Conc (ppb)
ALPHA-BHC	18.00	ND
BETA-BHC	18.00	ND
DELTA-BHC	18.00	ND
GAMMA-BHC (LINDANE)	18.00	ND
HEPTACHLOR	18.00	ND
ALDRIN	18.00	ND
HEPTACHLOR EPOXIDE	18.00	ND
ENDOSULFAN I	18.00	ND
DIELDRIN	18.00	ND
4,4-DDE	18.00	ND
ENDRIN	18.00	ND
ENDOSULFAN II	18.00	ND
4,4-DDD	18.00	ND
ENDRIN ALDEHYDE	18.00	ND
ENDOSULFAN SULFATE	18.00	ND
4,4-DDT	18.00	ND
METHOXYCHLOR	90.00	ND
CHLORDANE	90.00	ND
TOXAPHENE	180.00	ND

GC/ECD PCB ORGANIC ANALYSIS REPORT

MATRIX: SEDIMENT AMOUNT ANALYZED: 30.0 G

INSTRUMENT ID: HP-5880 DILN. FACTOR: 5.0

COMPOUND NAME	Dry DL (ppb)	Dry Conc (ppb)
AROCHLOR-1016	18.00	ND
AROCHLOR-1221	18.00	ND
AROCHLOR-1232	18.00	ND
AROCHLOR-1242	18.00	ND
AROCHLOR-1248	18.00	ND
AROCHLOR-1254	18.00	86.00
AROCHLOR-1260	18.00	ND

Note - DL means Sample Detection Limits (based on 100% recovery).
NA means Not Analyzed, ND means Not Detected.

GCMS METHOD 624 VOLATILES ORGANIC ANALYSIS REPORT Page 1 of 2

SAMPLE NUMBER: 8900708 % SOLIDS: 93.00

MATRIX: SEDIMENT AMOUNT ANALYZED: 5.0 G

INSTRUMENT ID: 4500C DILN. FACTOR: 50.0

PRIORITY POLLUTANTS	Dry DL (ppb)	Dry Conc (ppb)
CHLOROMETHANE	110.00	ND
VINYLCHLORIDE	110.00	ND
BROMOMETHANE	110.00	ND
CHLOROETHANE	110.00	ND
TRICHLOROFLUOROMETHANE	110.00	ND
ACROLEIN	540.00	ND
1,1-DICHLOROETHYLENE	110.00	ND
METHYLENE CHLORIDE	540.00	ND
ACRYLONITRILE	540.00	ND
TRANS-1,2-DICHLOROETHYLENE	110.00	ND
1,1-DICHLOROETHANE	110.00	ND
CHLOROFORM	110.00	ND
1,1,1-TRICHLOROETHANE	110.00	ND
CARBON TETRACHLORIDE	110.00	ND
BENZENE	110.00	ND
1,2-DICHLOROETHANE	110.00	ND
1,1,2-TRICHLOROETHYLENE	110.00	ND
1,2-DICHLOROPROPANE	110.00	ND
BROMODICHLOROMETHANE	110.00	ND
2-CHLOROETHYLVINYLETHER	110.00	ND
TRANS-1,3-DICHLOROPROPENE	110.00	ND
TOLUENE	110.00	ND
CIS-1,3-DICHLOROPROPENE	110.00	ND
1,1,2-TRICHLOROETHANE	110.00	ND
TETRACHLOROETHYLENE	110.00	ND
CHLORODIBROMOMETHANE	110.00	ND
CHLOROBENZENE	110.00	ND
ETHYL BENZENE	110.00	ND
BROMOFORM	110.00	ND
1,1,2,2-TETRACHLOROETHANE	110.00	ND

SAMPLE NUMBER: 8900708 % SOLIDS: 93.00

HAZARDOUS SUBSTANCES LIST	Dry DL (ppb)	Dry Conc (ppb)
ACETONE	540.00	ND
CARBON DISULFIDE	110.00	ND
VINYL ACETATE	540.00	ND
2-BUTANONE (MEK)	540.00	ND
4-METHYL-2-PENTANONE (MIBK)	540.00	ND
2-HEXANONE	540.00	ND
TOTAL XYLENE	110.00	ND
STYRENE	110.00	ND

Note - DL means Sample Detection Limits (based on 100% recovery).
NA means Not Analyzed, ND means Not Detected.

TICS: NONE

GCMS METHOD 625 SEMI-VOLATILES ORGANIC ANALYSIS REPORT

SAMPLE NUMBER: 8900708 % SOLIDS: 93.00

MATRIX: SEDIMENT AMOUNT ANALYZED: 60.0 G

INSTRUMENT ID: 4500B DILN. FACTOR: 2.0

PRIORITY POLLUTANTS	Dry DL (ppb)	Dry Conc (ppb)
N-NITROSODIMETHYLAMINE	110.00	ND
PHENOL	110.00	ND
BIS(2-CHLOROETHYL)ETHER	18.00	ND
2-CHLOROPHENOL	72.00	ND
1,3-DICHLOROBENZENE	18.00	ND
1,4-DICHLOROBENZENE	18.00	ND
1,2-DICHLOROBENZENE	18.00	ND
BIS(2-CHLOROISOPROPYL)ETHER	72.00	ND
N-NITROSODI-N-PROPYLAMINE	36.00	ND
HEXACHLOROETHANE	36.00	ND
NITROBENZENE	36.00	ND
ISOPHORONE	36.00	ND
2-NITROPHENOL	36.00	ND
2,4-DIMETHYLPHENOL	36.00	ND
BIS(2-CHLOROETHOXY)METHANE	36.00	ND
2,4-DICHLOROPHENOL	36.00	ND
1,2,4-TRICHLOROBENZENE	18.00	ND
NAPHTHALENE	54.00	ND
HEXACHLOROBUTADIENE	36.00	ND
4-CHLORO-3-METHYLPHENOL	72.00	ND
HEXACHLOROCYCLOPENTADIENE	36.00	ND
2,4,6-TRICHLOROPHENOL	140.00	ND
2-CHLORONAPHTHALENE	18.00	ND
ACENAPHTHYLENE	18.00	ND
DIMETHYL PHTHALATE	11.00	ND
2,6-DINITROTOLUENE	14.00	ND
ACENAPHTHENE	14.00	ND
2,4-DINITROPHENOL	72.00	ND
4-NITROPHENOL	72.00	ND
2,4-DINITROTOLUENE	14.00	ND
FLUORENE	18.00	ND
DIETHYL PHTHALATE	36.00	ND
4-CHLOROPHENYL PHENYL ETHER	18.00	ND
4,6-DINITRO-O-CRESOL	72.00	ND
N-NITROSODIPHENYLAMINE *	36.00	ND
1,2-DIPHENYLHYDRAZINE **	72.00	ND
4-BROMOPHENYL PHENYL ETHER	11.00	ND
HEXACHLOROBENZENE	18.00	ND
PENTACHLOROPHENOL	36.00	ND
PHENANTHRENE	18.00	40.00
ANTHRACENE	18.00	ND

SAMPLE NUMBER: 8900708 % SOLIDS: 93.00

PRIORITY POLLUTANTS	Dry DL (ppb)	Dry Conc (ppb)
DI-N-BUTYLPHTHALATE	36.00	ND
FLUORANTHENE	22.00	57.00
BENZIDINE	860.00	ND
PYRENE	18.00	76.00
BENZYL BUTYL PHTHALATE	18.00	ND
BENZO(A)ANTHRACENE	18.00	46.00
CHRYSENE	18.00	66.00
3,3'-DICHLOROBENZIDINE	36.00	ND
BIS(2-ETHYLHEXYL)PHTHALATE	18.00	ND
DI-N-OCTYL PHTHALATE	18.00	ND
BENZO(B)FLUORANTHENE	54.00	120.00
BENZO(K)FLUORANTHENE	54.00	130.00
BENZO(A)PYRENE	36.00	89.00
INDENO(1,2,3-CD)PYRENE	36.00	73.00
DIBENZO(A,H)ANTHRACENE	54.00	ND
BENZO(G,H,I)PERYLENE	36.00	70.00

HAZARDOUS SUBSTANCES LIST	Dry DL (ppb)	Dry Conc (ppb)
ANILINE	72.00	ND
BENZYL ALCOHOL	36.00	ND
2-METHYLPHENOL	36.00	ND
4-METHYLPHENOL	36.00	ND
BENZOIC ACID	110.00	ND
4-CHLOROANILINE	72.00	ND
2-METHYLNAPHTHALENE	54.00	ND
2,4,5-TRICHLOROPHENOL	140.00	ND
2-NITROANILINE	110.00	ND
3-NITROANILINE	110.00	ND
DIBENZOFURAN	36.00	ND
4-NITROANILINE	110.00	ND

* - Compound detected as Diphenylamine
** - Compound detected as Azobenzene
Note - DL means Sample Detection Limits (based on 100% recovery).
NA means Not Analyzed, ND means Not Detected.

GC/ECD PESTICIDES ORGANIC ANALYSIS REPORT

STATION S5

SAMPLE NUMBER: 8900709 % SOLIDS: 95.00

MATRIX: SEDIMENT AMOUNT ANALYZED: 30.0 G

INSTRUMENT ID: HP-5880 DILN. FACTOR: 50.0

COMPOUND NAME	Dry DL (ppb)	Dry Conc (ppb)
ALPHA-BHC	18.00	ND
BETA-BHC	18.00	ND
DELTA-BHC	18.00	ND
GAMMA-BHC (LINDANE)	18.00	ND
HEPTACHLOR	18.00	ND
ALDRIN	18.00	ND
HEPTACHLOR EPOXIDE	18.00	ND
ENDOSULFAN I	18.00	ND
DIELDRIN	18.00	ND
4,4-DDE	18.00	ND
ENDRIN	18.00	ND
ENDOSULFAN II	18.00	ND
4,4-DDD	18.00	ND
ENDRIN ALDEHYDE	18.00	ND
ENDOSULFAN SULFATE	18.00	ND
4,4-DDT	18.00	ND
METHOXYCHLOR	88.00	ND
CHLORDANE	88.00	ND
TOXAPHENE	180.00	ND

GC/ECD PCB ORGANIC ANALYSIS REPORT

MATRIX: SEDIMENT AMOUNT ANALYZED: 30.0 G

INSTRUMENT ID: HP-5880 DILN. FACTOR: 5.0

COMPOUND NAME	Dry DL (ppb)	Dry Conc (ppb)
AROCHLOR-1016	18.00	ND
AROCHLOR-1221	18.00	ND
AROCHLOR-1232	18.00	ND
AROCHLOR-1242	18.00	ND
AROCHLOR-1248	18.00	ND
AROCHLOR-1254	18.00	39.00
AROCHLOR-1260	18.00	ND

Note - DL means Sample Detection Limits (based on 100% recovery).
NA means Not Analyzed, ND means Not Detected.

GCMS METHOD 624 VOLATILES ORGANIC ANALYSIS REPORT Page 1 of 2

SAMPLE NUMBER: 8900709 % SOLIDS: 95.00

MATRIX: SEDIMENT AMOUNT ANALYZED: 5.0 G

INSTRUMENT ID: 4500C DILN. FACTOR: 50.0

PRIORITY POLLUTANTS	Dry DL (ppb)	Dry Conc (ppb)
CHLOROMETHANE	110.00	ND
VINYLCHLORIDE	110.00	ND
BROMOMETHANE	110.00	ND
CHLOROETHANE	110.00	ND
TRICHLOROFLUOROMETHANE	110.00	ND
ACROLEIN	530.00	ND
1,1-DICHLOROETHYLENE	110.00	ND
METHYLENE CHLORIDE	530.00	ND
ACRYLONITRILE	530.00	ND
TRANS-1,2-DICHLOROETHYLENE	110.00	ND
1,1-DICHLOROETHANE	110.00	ND
CHLOROFORM	110.00	ND
1,1,1-TRICHLOROETHANE	110.00	ND
CARBON TETRACHLORIDE	110.00	ND
BENZENE	110.00	ND
1,2-DICHLOROETHANE	110.00	ND
1,1,2-TRICHLOROETHYLENE	110.00	ND
1,2-DICHLOROPROPANE	110.00	ND
BROMODICHLOROMETHANE	110.00	ND
2-CHLOROETHYLVINYLETHER	110.00	ND
TRANS-1,3-DICHLOROPROPENE	110.00	ND
TOLUENE	110.00	ND
CIS-1,3-DICHLOROPROPENE	110.00	ND
1,1,2-TRICHLOROETHANE	110.00	ND
TETRACHLOROETHYLENE	110.00	ND
CHLORODIBROMOMETHANE	110.00	ND
CHLOROBENZENE	110.00	ND
ETHYL BENZENE	110.00	ND
BROMOFORM	110.00	ND
1,1,2,2-TETRACHLOROETHANE	110.00	ND

SAMPLE NUMBER: 8900709 % SOLIDS: 95.00

HAZARDOUS SUBSTANCES LIST	Dry DL (ppb)	Dry Conc (ppb)
ACETONE	530.00	ND
CARBON DISULFIDE	110.00	ND
VINYL ACETATE	530.00	ND
2-BUTANONE (MEK)	530.00	ND
4-METHYL-2-PENTANONE (MIBK)	530.00	ND
2-HEXANONE	530.00	ND
TOTAL XYLENE	110.00	ND
STYRENE	110.00	ND

Note - DL means Sample Detection Limits (based on 100% recovery).
NA means Not Analyzed, ND means Not Detected.

TICS: NONE

GCMS METHOD 625 SEMI-VOLATILES ORGANIC ANALYSIS REPORT

SAMPLE NUMBER: 8900709 % SOLIDS: 95.00

MATRIX: SEDIMENT AMOUNT ANALYZED: 60.0 G

INSTRUMENT ID: 4500B DILN. FACTOR: 2.0

PRIORITY POLLUTANTS	Dry DL (ppb)	Dry Conc (ppb)
N-NITROSODIMETHYLAMINE	110.00	ND
PHENOL	110.00	ND
BIS(2-CHLOROETHYL)ETHER	18.00	ND
2-CHLOROPHENOL	70.00	ND
1,3-DICHLOROBENZENE	18.00	ND
1,4-DICHLOROBENZENE	18.00	ND
1,2-DICHLOROBENZENE	18.00	ND
BIS(2-CHLOROISOPROPYL)ETHER	70.00	ND
N-NITROSODI-N-PROPYLAMINE	35.00	ND
HEXACHLOROETHANE	35.00	ND
NITROBENZENE	35.00	ND
ISOPHORONE	35.00	ND
2-NITROPHENOL	35.00	ND
2,4-DIMETHYLPHENOL	35.00	ND
BIS(2-CHLOROETHOXY)METHANE	35.00	ND
2,4-DICHLOROPHENOL	35.00	ND
1,2,4-TRICHLOROBENZENE	18.00	ND
NAPHTHALENE	53.00	ND
HEXACHLOROBUTADIENE	35.00	ND
4-CHLORO-3-METHYLPHENOL	70.00	ND
HEXACHLOROCYCLOPENTADIENE	35.00	ND
2,4,6-TRICHLOROPHENOL	140.00	ND
2-CHLORONAPHTHALENE	18.00	ND
ACENAPHTHYLENE	18.00	ND
DIMETHYL PHTHALATE	11.00	ND
2,6-DINITROTOLUENE	14.00	ND
ACENAPHTHENE	14.00	ND
2,4-DINITROPHENOL	70.00	ND
4-NITROPHENOL	70.00	ND
2,4-DINITROTOLUENE	14.00	ND
FLUORENE	18.00	ND
DIETHYL PHTHALATE	35.00	ND
4-CHLOROPHENYL PHENYL ETHER	18.00	ND
4,6-DINITRO-O-CRESOL	70.00	ND
N-NITROSODIPHENYLAMINE *	35.00	ND
1,2-DIPHENYLHYDRAZINE **	70.00	ND
4-BROMOPHENYL PHENYL ETHER	11.00	ND
HEXACHLOROBENZENE	18.00	ND
PENTACHLOROPHENOL	35.00	ND
PHENANTHRENE	18.00	110.00
ANTHRACENE	18.00	17.00

SAMPLE NUMBER: 8900709 % SOLIDS: 95.00

PRIORITY POLLUTANTS	Dry DL (ppb)	Dry Conc (ppb)
DI-N-BUTYLPHTHALATE	35.00	ND
FLUORANTHENE	21.00	190.00
BENZIDINE	840.00	ND
PYRENE	18.00	220.00
BENZYL BUTYL PHTHALATE	18.00	52.00
BENZO(A)ANTHRACENE	18.00	71.00
CHRYSENE	18.00	110.00
3,3'-DICHLOROBENZIDINE	35.00	ND
BIS(2-ETHYLHEXYL)PHTHALATE	18.00	520.00
DI-N-OCTYL PHTHALATE	18.00	ND
BENZO(B)FLUORANTHENE	53.00	160.00
BENZO(K)FLUORANTHENE	53.00	160.00
BENZO(A)PYRENE	35.00	100.00
INDENO(1,2,3-CD)PYRENE	35.00	110.00
DIBENZO(A,H)ANTHRACENE	53.00	ND
BENZO(G,H,I)PERYLENE	35.00	59.00

HAZARDOUS SUBSTANCES LIST	Dry DL (ppb)	Dry Conc (ppb)
ANILINE	70.00	ND
BENZYL ALCOHOL	35.00	ND
2-METHYLPHENOL	35.00	ND
4-METHYLPHENOL	35.00	ND
BENZOIC ACID	110.00	ND
4-CHLOROANILINE	70.00	ND
2-METHYLNAPHTHALENE	53.00	ND
2,4,5-TRICHLOROPHENOL	140.00	ND
2-NITROANILINE	110.00	ND
3-NITROANILINE	110.00	ND
DIBENZOFURAN	35.00	ND
4-NITROANILINE	110.00	ND

* - Compound detected as Diphenylamine
** - Compound detected as Azobenzene
Note - DL means Sample Detection Limits (based on 100% recovery).
NA means Not Analyzed, ND means Not Detected.

AMETAL1DRDMTL.890725

D #	KEY	STATION #	DESCRIPTION	DATE	TIME	DEPTH	FLOW	PH	Q	CODE	ANCODE
706	AA	S1	UPLAND	890725						JAAE	
0706	AS	= 9.0500 M/KW BY BDM ON 890901	WT= 1.0100GM VOL= 50.OML DIL= 1.								HE
0706	CD	= 0.8 M/KW BY BDM ON 890823	WT= 1.0000GM VOL= 50.OML DIL= 1.								PE
0706	CR	= 68.8 M/KW BY BDM ON 890823	WT= 1.0000GM VOL= 50.OML DIL= 1.								PE
0706	CU	= 48.8 M/KW BY BDM ON 890823	WT= 1.0000GM VOL= 50.OML DIL= 1.								PE
0706	HG	= 0.04 M/KW BY CTG ON 890829	WT= 1.0000GM VOL= 100.OML DIL= 1.								CV
0706	NI	= 31. M/KW BY BDM ON 890823	WT= 1.0000GM VOL= 50.OML DIL= 1.								PE
0706	PB	= 283. M/KW BY BDM ON 890823	WT= 1.0000GM VOL= 50.OML DIL= 1.								PE
0706	SE	= < 0.0569 M/KW BY BDM ON 890901	WT= 1.0100GM VOL= 50.OML DIL= 1.								HE
0706	ZN	= 262. M/KW BY BDM ON 890823	WT= 1.0000GM VOL= 50.OML DIL= 1.								PE

D #	KEY	STATION #	DESCRIPTION	DATE	TIME	DEPTH	FLOW	PH	Q	CODE	ANCODE
707	AA	S2	UPLAND	890725						JAAE	
0707	AS	= 10.3000 M/KW BY BDM ON 890901	WT= 1.0000GM VOL= 50.OML DIL= 1.								HE
0707	CD	= 0.8 M/KW BY BDM ON 890823	WT= 1.0000GM VOL= 50.OML DIL= 1.								PE
0707	CR	= 96.9 M/KW BY BDM ON 890823	WT= 1.0000GM VOL= 50.OML DIL= 1.								PE
0707	CU	= 110. M/KW BY BDM ON 890823	WT= 1.0000GM VOL= 50.OML DIL= 1.								PE
0707	HG	= 0.04 M/KW BY CTG ON 890829	WT= 1.0000GM VOL= 100.OML DIL= 1.								CV
0707	NI	= 35. M/KW BY BDM ON 890823	WT= 1.0000GM VOL= 50.OML DIL= 1.								PE
0707	PB	= 364. M/KW BY BDM ON 890823	WT= 1.0000GM VOL= 50.OML DIL= 1.								PE
0707	SE	= 0.0650 M/KW BY BDM ON 890901	WT= 1.0000GM VOL= 50.OML DIL= 1.								HE
0707	ZN	= 210. M/KW BY BDM ON 890823	WT= 1.0000GM VOL= 50.OML DIL= 1.								PE

D #	KEY	STATION #	DESCRIPTION	DATE	TIME	DEPTH	FLOW	PH	Q	CODE	ANCODE
708	AA	S3	UPLAND	890725						JAAE	
0708	AS	= 14.9000 M/KW BY BDM ON 890901	WT= 1.0000GM VOL= 50.OML DIL= 1.								HE
0708	CD	= 0.8 M/KW BY BDM ON 890823	WT= 1.0000GM VOL= 50.OML DIL= 1.								PE
0708	CR	= 39.3 M/KW BY BDM ON 890823	WT= 1.0000GM VOL= 50.OML DIL= 1.								PE
0708	CU	= 361. M/KW BY BDM ON 890823	WT= 1.0000GM VOL= 50.OML DIL= 1.								PE
0708	HG	= 0.04 M/KW BY CTG ON 890829	WT= 1.0000GM VOL= 100.OML DIL= 1.								CV
0708	NI	= 50. M/KW BY BDM ON 890823	WT= 1.0000GM VOL= 50.OML DIL= 1.								PE
0708	PB	= 68. M/KW BY BDM ON 890823	WT= 1.0000GM VOL= 50.OML DIL= 1.								PE
0708	SE	= 0.2150 M/KW BY BDM ON 890901	WT= 1.0000GM VOL= 50.OML DIL= 1.								HE
0708	ZN	= 193. M/KW BY BDM ON 890823	WT= 1.0000GM VOL= 50.OML DIL= 1.								PE

D #	KEY	STATION #	DESCRIPTION	DATE	TIME	DEPTH	FLOW	PH	Q	CODE	ANCODE
709	AA	S5	WETLAND	890725						JAAE	
0709	AS	= 11.9000 M/KW BY BDM ON 890901	WT= 1.0000GM VOL= 50.OML DIL= 1.								HE
0709	CD	= 0.7 M/KW BY BDM ON 890823	WT= 1.0100GM VOL= 50.OML DIL= 1.								PE
0709	CR	= 39.9 M/KW BY BDM ON 890823	WT= 1.0100GM VOL= 50.OML DIL= 1.								PE
0709	CU	= 43.0 M/KW BY BDM ON 890823	WT= 1.0100GM VOL= 50.OML DIL= 1.								PE
0709	HG	= 0.08 M/KW BY CTG ON 890829	WT= 1.0000GM VOL= 100.OML DIL= 1.								CV
0709	NI	= 31. M/KW BY BDM ON 890823	WT= 1.0100GM VOL= 50.OML DIL= 1.								PE
0709	PB	= 116. M/KW BY BDM ON 890823	WT= 1.0100GM VOL= 50.OML DIL= 1.								PE
0709	SE	= < 0.0548 M/KW BY BDM ON 890901	WT= 1.0000GM VOL= 50.OML DIL= 1.								HE
0709	ZN	= 226. M/KW BY BDM ON 890823	WT= 1.0100GM VOL= 50.OML DIL= 1.								PE

D #	KEY	STATION #	DESCRIPTION	DATE	TIME	DEPTH	FLOW	PH	Q	CODE	ANCODE
710	AA	S6	UPLAND	890725						JAAE	
0710	AS	= 13.9000 M/KW BY BDM ON 890901	WT= 1.0100GM VOL= 50.OML DIL= 1								HE
0710	CD	= 0.6 M/KW BY BDM ON 890823	WT= 1.0000GM VOL= 50.OML DIL= 1.								PE
0710	CR	= 46.3 M/KW BY BDM ON 890823	WT= 1.0000GM VOL= 50 OML DIL= 1.								PE

710	CU	=	43.2	M/KW	BY BDM	ON 890823	WT= 1.0000GM	VOL=	50.0ML	DIL=	1.	PE
710	HG	=	0.04	M/KW	BY CTG	ON 890829	WT= 1.0000GM	VOL=	100.0ML	DIL=	1.	CV
00710	NI	=	26.	M/KW	BY BDM	ON 890823	WT= 1.0000GM	VOL=	50.0ML	DIL=	1.	PE
00710	PB	=	706.	M/KW	BY BDM	ON 890901	WT= 1.0100GM	VOL=	50.0ML	DIL=	1.	PE
00710	SE	= <	0.0597	M/KW	BY BDM	ON 890823	WT= 1.0000GM	VOL=	50.0ML	DIL=	1.	HE
00710	ZN	=	123.	M/KW	BY BDM	ON 890823	WT= 1.0000GM	VOL=	50.0ML	DIL=	1.	PE

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DEPARTMENT OF ECOLOGY
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June 7, 1990

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DEPT. OF ECOLOGY

TO: ~~Ching Wang~~ Ching Yi Wang

FROM: Janet Hyre

SUBJECT: Sample for DOT Landfill

The TCLP leaching procedure was the one actually used for the DOT Landfill sample, even though the report states that the sample was analyzed by the EPTOX method. Our computer does not yet know about TCLP, but it will be learning soon. The price for the extraction procedures is the same.

The sample, an oily sediment, was ground, dried and sieved as required. It was then analyzed for priority pollutant metals by the "total" digestion method and 100 grams of material was leached via the TCLP. The oil sample matrix presented some challenges, as evidenced by the low matrix spike recoveries for copper and lead. Assuming that sample concentrations are recovered at a level similar to the matrix spikes, the range for "total" recovery-corrected metal values for copper and lead can be calculated at:

Lead	218	- 450 mg/kg dry weight
Copper	78.8	- 107 mg/kg dry weight

Although we don't report recovery-corrected data, these values are an indication that the reported values are probably biased low.

I hope that this is helpful. Please don't hesitate to contact us if we can be of assistance.

JH:mb

cc: Steve Twiss

State of Washington
Department of Ecology

Program Code J 1 K 23
Project Code J1K 23
Project/Name DOT-Landfill, Seattle

SAMPLE DATA & ANALYSIS REQUIRED

Contract: 2250
Invoice: 642
Page 1 of 1

☐ Enforcement/Custody ☐ Class II
☑ Possible Toxic/Hazardous Notes Petroleum constituents; sands have petro odor

SAMPLING DATE Yr	Mo	Da	TIME Hr	Mn	FIELD STATION IDENTIFICATION	LAB SAMPLE NUMBER Wk	Seq	Matrix Code	Source Code	No. of Containers
90	04	13	12	05	DOT-011	16	1266	40	48	02

General Chemistry: Turbidity, pH, Conductivity, Total Hardness, Chloride, TS, TSS, TNVS, TNVSS, TSS, % Solids, Nutrients (4), Ammonia, Nitrate-Nitrite, Total Phosphorous, Ortho-Phosphate, BOD/5 Day, COD Chem Oxy Demand

Biology: Fecal Coliform Bacteria, Total Coliform Bacteria, Enterococcus, Fish Bioassay

Organic Chem.: Base/Neutrals/Acids ✓, Volatile Organics ✓, Pesticides/PCB's ✓, PCB's Only, Purgeable Halocarbons, Herbicides, Hydrocarbon Analysis ✓, Phenolics (AAP), Oil & Grease, ✓ PP metals

METALS: P.P. Metals ✓, EP Tox Metals
Specific List
Total
☐ Recoverable
☐ Totals
☐ Dissolved

Project Officer NW M. Turvey
Sampler(s) CP Wang
Recorder CP Wang
Date 4/13/90

Chain Of Custody Record

Relinquished By:	Received By:	Yr	Mo	Da	Hr	Mn	Seal I.D.	Condition of Seals	Comments
Ching-Pi Wang	To lock NWAD refrigerator	90	04	13	15	20			
	Catherine Bietle	90	04	18	10	06	010206	intact	
Catherine Bietle		90	04	18	11	40			
	Sam Crue	90	04	18	11	[illegible]	000624	Intact	

Laboratory Copy White
Project Office Copy Yellow
Field or Office Copy Pink

Ecy 040-115 Rev. 7/87

Sample/Project Analysis Results

Project: DOE-105B DOT LANDFILL - SEATTLE

Officer: CPW Account: J1K23

Laboratory: Ecology, Manchester

Sample No: 90 167066 Description: DOT-OIL

Source: Soil (General)

Begin Date: 90/04/13 :

All lab. contract data

Metals - PP		Sediment Result	Units
Mercury	Hg-Sedmt	0.002U	mg/kg-wt

Metals - PP Matrix Spike #1		Sediment Result	Units
Mercury	Hg-Sedmt	80	% Recov

Metals - PP Matrix Spike #2		Sediment Result	Units
Mercury	Hg-Sedmt	84	% Recov

Metals - ICP Scan		Sediment Result	Units
Arsenic	As-Sedmt	35.4 *	mg/kg-dr
Berylium	Be-Sedmt	0.2U	mg/kg-dr
Cadmium	Cd-Sedmt	1.0U	mg/kg-dr
Chromium	Cr-Sedmt	83.7 *	mg/kg-dr
Copper	Cu-Sedmt	56.7J*	mg/kg-dr
Lead	Pb-Sedmt	144J*	mg/kg-dr
Nickel	Ni-Sedmt	49.0 *	mg/kg-dr
Silver	Ag-Sedmt	0.3U	mg/kg-dr
Zinc	Zn-Sedmt	1270 *	mg/kg-dr
Antimony	Sb-Sedmt	20.0U	mg/kg-dr
Selenium	Se-Sedmt	20.0U	mg/kg-dr
Thallium	Tl-Sedmt	25U	mg/kg-dr

Metals - ICP Scan Matrix Spike #1		Sediment Result	Units
Arsenic	As-Sedmt	88	% Recov
Berylium	Be-Sedmt	112	% Recov
Cadmium	Cd-Sedmt	146	% Recov
Chromium	Cr-Sedmt	71	% Recov
Copper	Cu-Sedmt	72	% Recov
Lead	Pb-Sedmt	32	% Recov
Nickel	Ni-Sedmt	109	% Recov
Silver	Ag-Sedmt	NO SPIKE	% Recov
Zinc	Zn-Sedmt	NA	% Recov
Antimony	Sb-Sedmt	70	% Recov

Metals - ICP Scan *** Continued *** Matrix Spike #1		Sediment Result	Units
Selenium	Se-Sedmt	92	% Recov
Thallium	Tl-Sedmt	86	% Recov

Metals - ICP Scan Matrix Spike #2		Sediment Result	Units
Arsenic	As-Sedmt	93	% Recov
Berylium	Be-Sedmt	113	% Recov
Cadmium	Cd-Sedmt	145	% Recov
Chromium	Cr-Sedmt	91	% Recov
Copper	Cu-Sedmt	55	% Recov
Lead	Pb-Sedmt	66	% Recov
Nickel	Ni-Sedmt	102	% Recov
Silver	Ag-Sedmt	NO SPIKE	% Recov
Zinc	Zn-Sedmt	NA	% Recov
Antimony	Sb-Sedmt	86	% Recov
Selenium	Se-Sedmt	90	% Recov
Thallium	Tl-Sedmt	77	% Recov

Metals - EP-Tox, ICP		EPT-Sld Result	Units
Arsenic	As-Total	500U	ug/l
Barium	Ba-Total	1180 *	ug/l
Cadmium	Cd-Total	70J*	ug/l
Chromium	Cr-Total	100U	ug/l
Lead	Pb-Total	789 *	ug/l
Silver	Ag-Total	50U	ug/l
Selenium	Se-Total	100U	ug/l

Metals - EP-Tox, ICP Matrix Spike #1		EPT-Sld Result	Units
Arsenic	As-Total	116	% Recov
Barium	Ba-Total	101	% Recov
Cadmium	Cd-Total	110	% Recov
Chromium	Cr-Total	100	% Recov
Lead	Pb-Total	106	% Recov
Silver	Ag-Total	14	% Recov
Selenium	Se-Total	121	% Recov

Metals - EP-Tox, ICP Matrix Spike #2		EPT-Sld Result	Units
Arsenic	As-Total	113	% Recov
Barium	Ba-Total	102	% Recov
Cadmium	Cd-Total	120	% Recov
Chromium	Cr-Total	102	% Recov
Lead	Pb-Total	110	% Recov
Silver	Ag-Total	30	% Recov
Selenium	Se-Total	123	% Reco

Organics - General		Sediment Result	Units
H-Carbon	ID	KEROSENE	

Contract Lab Program		Sediment Result	Units
B/N/Acid	GC/MS	REQ	CLP
VOA	GC/MS	REQ	CLP
P/PCBs	GC	REQ	CLP

(Sample Complete)

Project: DOE-105B DOT LANDFILL - SEATTLE

Officer: CPW Account: J1K23

Blank ID: PB 18.11

Metals - ICP Scan Blank #1		Sediment Result	Units
Arsenic	As-Sedmt	10.0U	mg/kg-dr
Berylium	Be-Sedmt	0.2U	mg/kg-dr
Cadmium	Cd-Sedmt	1.3J*	mg/kg-dr
Chromium	Cr-Sedmt	0.5U	mg/kg-dr
Copper	Cu-Sedmt	1.6 *	mg/kg-dr
Lead	Pb-Sedmt	6.0U	mg/kg-dr
Nickel	Ni-Sedmt	4.0U	mg/kg-dr
Silver	Ag-Sedmt	0.3U	mg/kg-dr
Zinc	Zn-Sedmt	1.2J*	mg/kg-dr
Antimony	Sb-Sedmt	20.0U	mg/kg-dr
Selenium	Se-Sedmt	20.0U	mg/kg-dr
Thallium	Tl-Sedmt	25.0U	mg/kg-dr

(Sample Complete)

Project: DOE-105B DOT LANDFILL - SEATTLE Officer: CPW Account: J1K23

Blank ID: PB 19.17

Metals - EP-Tox, ICP Blank #1		EPT-Sld Result	Units
Arsenic	As-Total	500U	ug/l
Barium	Ba-Total	50U	ug/l
Cadmium	Cd-Total	50U	ug/l
Chromium	Cr-Total	100U	ug/l
Lead	Pb-Total	500U	ug/l
Silver	Ag-Total	50U	ug/l
Selenium	Se-Total	100U	ug/l

(Sample Complete)

STATE OF WASHINGTON DEPARTMENT OF ECOLOGY
MANCHESTER ENVIRONMENTAL LABORATORY
P.O. Box 307, Manchester WA 98353

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DATA REVIEW
September 20, 1990

Project: DOT Landfill, Seattle

Samples: 278005

Laboratory: Laucks Testing Laboratories 7188

By: Stuart Magoon SM

CASE SUMMARY

These analyses were reviewed for qualitative and quantitative accuracy, validity, and usefulness. Specific methods used and problems incurred during the analysis of these samples are detailed in the case narrative and will not be addressed here. Specific problems with QC will be noted and referenced to the case narrative.

There is no need to assimilate the "dilution factor" or "sample wt/vol" into the final values reported; these calculations have already been figured into the reported values.

QUALIFIER DEFINITIONS

U - The material was analyzed for but was not detected, the associated numerical value is the sample quantitation limit.

B - The associated compound was also detected in the method blank.

J - The associated numerical value is an estimated quantity.

UJ - The material was analyzed for, but was not detected. The sample quantitation limit is an estimated quantity.

NR - Not Reported

Note: If this data is entered into some other format an "N" flag should be added to the compounds reported as tentatively identified compounds. The "N" flag indicates that the compound is "tentatively identified".

VOA analysis (soil)

Holding Times:

Sample	Date Collect	Date Man Lab Rec'd	Date Cntr Lab Rec'd	Date Extd	Date Anlz	#Days From Collect
278005	7/3	7/6	7/13	NA	7/16	13 of 14

This sample was analyzed within the recommended SW-846 holding time of fourteen (14) days from the date of collection.

Surrogates:

Surrogate recoveries for this sample, the matrix spikes, and the method blank are within the recovery control limits.

Matrix Spike & Matrix Spike Duplicate (MS/MSD):

Matrix spike/spike duplicate recovery and precision data is acceptable and within QC limits.

Sample Data:

This data is acceptable for use.

Some of the "JB" flags have been changed to "UJ" because their presence is probably the result of contamination and is not native to the sample.

BNA's in soil

Holding times:

Sample	Date Collect	Date Man Lab Rec'd	Date Cntr Lab Rec'd	Date Extd	Date Anlz	#Days Collect to ext.	#Days ext to Analysis
278005	7/3	7/6	7/13	7/16	7/26	13 of 14	10 of 40

This sample was extracted and analyzed within the recommended SW-846 holding time of fourteen (14) days from the date of collection.

Surrogates:

Surrogate recoveries for these samples, and the method blank are within QC recovery limits.

Matrix Spike & Matrix Spike Duplicate (MS/MSD):

Matrix spike/spike duplicate recovery and precision data is acceptable and within QC limits, with two exceptions. Matrix interferences resulted in a slight recovery enhancement for 2,4-Dinitrotoluene. These two outliers do not signal the need for reanalysis nor do they establish the need for data qualifiers.

Sample Data:

This data is acceptable for use.

ORGANOCHLORINE PESTICIDES/PCB'S on Soil

Holding times

Sample	Date Collect	Date Man Lab Rec'd	Date Cntr Lab Rec'd	Date Extd	Date Anlz	#Days Collect to ext.	#Days ext to Analysis
278005	7/3	7/6	7/13	7/16	8/7	13 of 14	22 of 40

This sample was extracted and analyzed within the recommended SW-846 holding time of fourteen (14) days from the date of collection.

Surrogates:

DBC surrogate recoveries for these samples, and the method blank are within the EPA advisory QC limits.

Matrix Spike & Matrix Spike Duplicate (MS/MSD):

Matrix spike/spike duplicate recovery and precision data are acceptable and within QC limits, with one exception.
This outlier does not signal the need for reanalysis nor does it constitute the need for data qualifiers.

Sample Data:

This data is acceptable for use without the need for additional qualifiers.

State of Washington
Department of Ecology

Contract: 2554
In house: 642

SAMPLE DATA & ANALYSIS REQUIRED

Page 1 of 1

Program Code ☐☐☐
Project Code JIK23
Project/Name DOT-Landfill, Seattle

☑ Enforcement/Custody ☐ Class II
☑ Possible Toxic/Hazardous Notes Petroleum constituents, Sands have petro odor

SAMPLING DATE Yr	Mo	Da	TIME Hr	Mn	FIELD STATION IDENTIFICATION	LAB SAMPLE NUMBER Wk	Seq	Matrix Code	Source Code	No. of Containers
90	07	03	13	30	DOT-01L	27	8005	40	48	0~~2~~5

FIELD STATION IDENTIFICATION	General Chemistry: Turbidity	pH	Conductivity	Total Hardness	Chloride	TS, TSS, TNVS, TNVSS	TSS	% Solids	Nutrients (4)	Ammonia	Nitrate-Nitrite	Total Phosphorous	Ortho-Phosphate	BOD/5 Day	COD Chem Oxy Demand
DOT-01L															

FIELD STATION IDENTIFICATION	Biology: Fecal Coliform Bacteria	Total Coliform Bacteria	Enterococcus	Fish Bioassay
DOT-01L				

FIELD STATION IDENTIFICATION	Organic Chem.: Base/Neutrals/Acids	Volatile Organics	Pesticides/PCB's	PCB's Only	Purgeable Halocarbons	Herbicides	Hydrocarbon Analysis	Phenolics (AAP)	Oil & Grease	PP metals
DOT-01L	✓	✓	✓				✓			✓

FIELD STATION IDENTIFICATION	METALS: P.P. Metals	EP Tox Metals
DOT-01L	✓	✓

METALS Specific List
Total
☐ Recoverable
☐ Totals
☐ Dissolved

MT
Project Officer M. Turvey
Sampler(s) M. Turvey
Recorder M. Turvey
Date 7/3/90

Chain Of Custody Record

Relinquished By:	Received By:	Yr	Mo	Da	Hr	Mn	Seal I.D.	Condition of Seals	Comments
Martha Turvey									
	Catherine Bickle	90	07	06	12	10			in locked fridg.

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Project Office Copy Yellow
Field or Office Copy Pink

Cx

LAUCKS TESTING LABORATORIES
940 S. Harney
Seattle, WA 98108

TO: **Washington Department of Ecology**
Project Name: DOT Landfill Seattle
Laboratory No.: 9007188
Date of this report: September 06, 1990

GENERAL REMARKS ON ORGANIC ANALYSES:

One laboratory number was assigned to this project (9007188).

The following samples were analyzed under this laboratory number:

Client Sample I.D.	LTL Sample Number	Analysis Request
278005	9007188-1	VOA/ABN/PEST

When completing forms created through the CLP software, every attempt is made to use both your sample IDs as well as the laboratory sample IDs on the forms. The forms have varied default sizes to their sample identification fields, and are not amenable to alteration or editing. When it is not possible to use your complete sample ID, because of field length limitations, Laucks will use as much of your ID as will fit, beginning from the RIGHT hand side of the sample ID number. In addition, ALL forms will contain our sample IDs, which can be cross-referenced from the table above.

Many of the CLP-package forms will include the words "EPA Sample No.," or some variation of this, which again cannot be edited. Where a reference is made to the EPA, you may take this to mean more generally, "the client." These data are not part of an actual EPA case.

GC/MS Fractions:

Compounds may be called out as hits on the computerized printout. However, if they are not reported on the OADS (sample results) form, the mass spectral data have been manually searched and the compounds have been eliminated as hits based on this search.

ABN Fraction:

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Seattle, WA 98108

The data system which is used to perform the searches for ABN Tentatively Identified Compounds (TICs) is set with a threshold of 5% fit for TICs. In some cases less than three compounds in the NBS library pass this threshold setting. When this occurs there will not be spectra and fits for the associated unknown compound. This will be called out on the first page of the data system report and will be reflected in the spectra which are drawn; i.e., there will be less than three best-fit spectra. This generally has one of two meanings. First, that there are no compounds passing the fit criteria; or, second, that one or more compounds pass the fit criteria. It is our opinion that the threshold setting for fit is set low enough that all reasonable and possible hits will be reported (up to a maximum of three).

Two optional ABN surrogates are used for recovery purposes, recoveries for one of which (2-Bromophenol) are listed under "Other" on Form II. The second optional surrogate is d10-Azobenzene. The recoveries for samples in this set are as listed:

Sample	% Recovery
SBLKL1	98
278005	82
278005MS	90
278005MSD	87

Volatile Fraction:

All volatile analyses were performed using a DB-624 megabore capillary. The elution order and retention times differ from those stated for packed column analysis in the U.S.E.P.A.'s Statement of Work for organic CLP analyses. Listed below are the correct elution order and the internal standard with which each compound is associated.

Bromochloromethane(IS)	1,4-Difluorobenzene(IS)	d5-Chlorobenzene(IS)
Chloromethane	Benzene	4-Methyl-2-Pentanone
Vinyl Chloride	Trichloroethylene	Toluene
Bromomethane	1,2-Dichloropropane	d8-Toluene(SURR)
Chloroethane	Bromodichloromethane	Trans-1,3-Dichloropropene
1,1-Dichloroethylene	Cis-1,3-Dichloropropene	1,1,2-Trichloroethane
Acetone		Tetrachloroethylene
Carbon Disulfide		2-Hexanone
Methylene Chloride		Dibromochloromethane
Trans-1,2-Dichloroethylene		Chlorobenzene

1,1-Dichloroethane
Vinyl Acetate
Cis-1,2-Dichloroethylene
2-Butanone
Chloroform
1,1,1-Trichloroethane
Carbon Tetrachloride
1,2-Dichloroethane
d4-1,2-Dichloroetnane(SURR)

Ethylbenzene
Styrene
M,P-Xylene
O-xylene
Bromoform
1,1,2,2-Tetrachloroethane
Bromofluorobenzene(SURR)

The analytes listed above were assigned to their respective internal standards on the basis of relative retention time (RRT). For all compounds except cis-1,3-dichloropropene, the RRTs fall between 0.8 and 1.2. Cis-1,2-dichloropropene was the only compound to fall outside of this range, and was assigned to the internal standard closest to its retention time.

Separation of cis- and trans- dichloroethylene isomers is achievable on a DB-624 megabore capillary column. These compounds have been found to coelute on the packed column specified in the U.S.E.P.A.'s Statement of Work. When these isomers are found in a sample, they will be reported as total-1,2-dichloroethylene.

A holding blank was analyzed in the same QC period with the samples from this set. The raw data were not submitted with the case. It will be held on file at Laucks should future review be necessary.

Pesticide/PCB Fraction:

The compound isodrin was added as a second, optional surrogate in the pesticide/PCB analyses. Recovery values are reported on the appropriate FORM II - PEST.

SPECIFIC REMARKS ON ORGANIC ANALYSES:

VOA Fraction:

No comments.

ABN Fraction:

No comments.

Pesticide/PCB Fraction:

On Form 3F (soil Pesticide MS/MSD recovery), gamma-BHC was quantitated from the DB-17 column due to co-elution of ~~sample analytes~~ interfering compounds on the DB1701 channel.

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Seattle, WA 98108

Dieldrin spike recoveries were outside control limits and were elevated on both columns due to ~~these same analyte interferences.~~ matrix interference.

Careful comparison of all multicomponent patterns on both channels with the sample showed that the sample does not contain PCBs. ~~Assuming that the compound present responds like a PCB on an electron capture detector, its estimated concentration is approximately 3000 ug/kg.~~

SOIL VOLATILE SURROGATE RECOVERY

b Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:_____ SAS No.: _____ SDG No.:_____

Level:(low/med)MED

	DOE SAMPLE NO.	S1 (TOL)#	S2 (BFB)#	S3 (DCE)#	OTHER	TOT OUT
01	VBLKJ2	102	94	101		0
02	278005	91	103	105		0
03	278005MS	94	104	99		0
04	278005MSD	98	103	98		0
05						0
06						
07						
08						
09						
10						
11						
12						
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29						
30						

	QC LIMITS
S1 (TOL) = Toluene-d8	(81-117)
S2 (BFB) = Bromofluorobenzene	(74-121)
S3 (DCE) = 1,2-Dichloroethane-d4	(70-121)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogates diluted out

SOIL VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:_____ SAS No.: _____ SDG No.:_____

Matrix Spike - DOE Sample No.: 278005 Level:(low/med) MED

COMPOUND	SPIKE ADDED (ug/Kg)	SAMPLE CONCENTRATION (ug/Kg)	MS CONCENTRATION (ug/Kg)	MS % REC #	QC LIMITS REC.
1,1-Dichloroethene	25879.000	0.000	27559.500	106	59-172
Trichloroethene	25879.000	0.000	24858.600	96	62-137
Benzene	25879.000	0.000	26835.000	104	66-142
Toluene	25879.000	1403.200	25127.500	92	59-139
Chlorobenzene	25879.000	0.000	25503.800	99	60-133

COMPOUND	SPIKE ADDED (ug/Kg)	MSD CONCENTRATION (ug/Kg)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
1,1-Dichloroethene	25879.000	27707.400	107	1	22	59-172
Trichloroethene	25879.000	25519.000	99	3	24	62-137
Benzene	25879.000	27791.000	107	4	21	66-142
Toluene	25879.000	26894.200	98	7	21	59-139
Chlorobenzene	25879.000	26567.000	103	4	21	60-133

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD:0 out of 5 outside limits
Spike Recovery:0 out of 10 outside limits

Comments: _____

4A

VOLATILE METHOD BLANK SUMMARY

b Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.: _____ SAS No.: _____ SDG No.: _____

Lab File ID: B0716MVOWJ2 Lab Sample ID: B0716MVOWJ2

Date Analyzed: 07/16/90 Time Analyzed: 11:44

Matrix: (soil/water) SOIL Level:(low/med) MED

Instrument ID: 1020J

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, AND MSD:

	DOE SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	TIME ANALYZED
01	278005	07188-01	07188V01	13:27
02	278005MS	07188-01MS	07188V01MS	14:10
03	278005MSD	07188-01MSD	07188V01MSD	14:50
04				
05				
06				
07				
08				
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30				

COMMENTS: _____

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

DOE SAMPLE NO. 278005

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:_____ SAS No. _____ SDG No.:_____

Matrix: (soil/water)SOIL Lab Sample ID: 07188-01

Sample wt/vol: 4.0 (g/ml)G Lab File ID: 07188V01

Level: (low/med) MED Date Received: 07/13/90

% Moisture: not dec.3 Date Analyzed: 07/16/90

Column: (pack/cap) CAP Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)UG/KG	Q	
74-87-3	Chloromethane	5200	U	
74-83-9	Bromomethane	5200	U	
75-01-4	Vinyl Chloride	5200	U	
75-00-3	Chloroethane	5200	U	
75-09-2	Methylene Chloride	450	~~J~~ UJ	fm fm
67-64-1	Acetone	8400	~~J~~ UJ	
75-15-0	Carbon Disulfide	2600	U	
75-35-4	1,1-Dichloroethene	2600	U	
75-34-3	1,1-Dichloroethane	2600	U	
540-59-0	1,2-Dichloroethene (total)	2600	U	
67-66-3	Chloroform	2600	U	
107-06-2	1,2-Dichloroethane	2600	U	
78-93-3	2-Butanone	5200	U	
71-55-6	1,1,1-Trichloroethane	2600	U	
56-23-5	Carbon Tetrachloride	2600	U	
108-05-4	Vinyl Acetate	5200	U	
75-27-4	Bromodichloromethane	2600	U	
78-87-5	1,2-Dichloropropane	2600	U	
10061-01-5	cis-1,3-Dichloropropene	2600	U	
79-01-6	Trichloroethene	2600	U	
124-48-1	Dibromochloromethane	2600	U	
79-00-5	1,1,2-Trichloroethane	2600	U	
71-43-2	Benzene	2600	U	
10061-02-6	Trans-1,3-Dichloropropene	2600	U	
75-25-2	Bromoform	2600	U	
108-10-1	4-Methyl-2-Pentanone	5200	U	
591-78-6	2-Hexanone	5200	U	
127-18-4	Tetrachloroethene	2600	U	
79-34-5	1,1,2,2-Tetrachloroethane	2600	U	
108-88-3	Toluene	1400 J ~~1400~~ JMR		fm
108-90-7	Chlorobenzene	2600	U	
100-41-4	Ethylbenzene	3500		
100-42-5	Styrene	2600	U	
1330-20-7	Xylene (total)	24000		

1E

DOE SAMPLE NO.

278005

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:_____ SAS No.: _____ SDG No.:_____

Matrix: (soil/water)SOIL Lab Sample ID: 07188-01

Sample wt/vol: 4.0 (g/ml)G Lab File ID: 07188V01

Level: (low/med) MED Date Received: 07/13/90

% Moisture: not dec.3 Date Analyzed: 07/16/90

Column: (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 10

CONCENTRATION UNITS:
(ug/L or ug/Kg)UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	1.3913-81-3	2-DECENAL, (E)-	14.95	4200	J
2.	2.15869-93-9	OCTANE, 3,5-DIMETHYL-	16.80	7900	J
3.	3.5911-04-6	NONANE, 3-METHYL-	17.05	3800	J
4.	4.611-14-3	BENZENE, 1-ETHYL-2-METHYL-	17.37	17000	J
5.	5.95-63-6	BENZENE, 1,2,4-TRIMETHYL-	17.55	6600	J
6.	6.98-82-8	BENZENE, (1-METHYLETHYL)-	17.90	9100	J
7.	7.526-73-8	BENZENE, 1,2,3-TRIMETHYL-	18.32	28000	J
8.	8.622-96-8	BENZENE, 1-ETHYL-4-METHYL-	19.17	6700	J
9.	9.300-57-2	BENZENE, 2-PROPENYL-	19.52	12000	J
10.	10.1074-55-1	BENZENE, 1-METHYL-4-PROPYL-	19.80	8500	J
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
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1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

DOE SAMPLE NO.

VBLKJ2

b Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:_____ SAS No. _____ SDG No.:_____

Matrix: (soil/water)SOIL Lab Sample ID: B0716MVOWJ2

Sample wt/vol: 4.0 (g/ml)G Lab File ID: B0716MVOWJ2

Level: (low/med) MED Date Received: 07/13/90

% Moisture: not dec.0 Date Analyzed: 07/16/90

Column: (pack/cap) CAP Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)UG/KG	Q
74-87-3	Chloromethane	1300	U
74-83-9	Bromomethane	1300	U
75-01-4	Vinyl Chloride	1300	U
75-00-3	Chloroethane	1300	U
75-09-2	Methylene Chloride	79	J
67-64-1	Acetone	1200	J
75-15-0	Carbon Disulfide	630	U
75-35-4	1,1-Dichloroethene	630	U
75-34-3	1,1-Dichloroethane	630	U
540-59-0	1,2-Dichloroethene (total)	630	U
67-66-3	Chloroform	630	U
107-06-2	1,2-Dichloroethane	630	U
78-93-3	2-Butanone	1300	U
71-55-6	1,1,1-Trichloroethane	630	U
56-23-5	Carbon Tetrachloride	630	U
108-05-4	Vinyl Acetate	1300	U
75-27-4	Bromodichloromethane	630	U
78-87-5	1,2-Dichloropropane	630	U
10061-01-5	cis-1,3-Dichloropropene	630	U
79-01-6	Trichloroethene	630	U
124-48-1	Dibromochloromethane	630	U
79-00-5	1,1,2-Trichloroethane	630	U
71-43-2	Benzene	630	U
10061-02-6	Trans-1,3-Dichloropropene	630	U
75-25-2	Bromoform	630	U
108-10-1	4-Methyl-2-Pentanone	1300	U
591-78-6	2-Hexanone	1300	U
127-18-4	Tetrachloroethene	630	U
79-34-5	1,1,2,2-Tetrachloroethane	630	U
108-88-3	Toluene	630	U
108-90-7	Chlorobenzene	630	U
100-41-4	Ethylbenzene	630	U
100-42-5	Styrene	630	U
1330-20-7	Xylene (total)	630	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

DOE SAMPLE NO.
VBLKJ2

b Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:_____ SAS No.: _____ SDG No.:_____

Matrix: (soil/water)SOIL Lab Sample ID: B0716MVOWJ2

Sample wt/vol: 4.0 (g/ml)G Lab File ID: B0716MVOWJ2

Level: (low/med) MED Date Received: 07/13/90

% Moisture: not dec.0 Date Analyzed: 07/16/90

Column: (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg)UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
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28.					
29.					
30.					

VOLATILE ORGANICS ANALYSIS DATA SHEET

DOE SAMPLE NO.: 278005MS

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:_____ SAS No. _____ SDG No.:_____

Matrix: (soil/water)SOIL Lab Sample ID: 07188-01MS

Sample wt/vol: 4.0 (g/ml)G Lab File ID: 07188V01MS

Level: (low/med) MED Date Received: 07/13/90

% Moisture: not dec.3 Date Analyzed: 07/16/90

Column: (pack/cap) CAP Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)UG/KG	Q	
74-87-3	Chloromethane	5200	U	
74-83-9	Bromomethane	5200	U	
75-01-4	Vinyl Chloride	5200	U	
75-00-3	Chloroethane	5200	U	
75-09-2	Methylene Chloride	520	~~J~~ ~~UJ~~	
67-64-1	Acetone	5000	~~J~~ ~~UJ~~	
75-15-0	Carbon Disulfide	2600	U	
75-35-4	1,1-Dichloroethene	~~2600~~	~~U~~ NR	
75-34-3	1,1-Dichloroethane	2600	U	
540-59-0	1,2-Dichloroethene (total)	2600	U	
67-66-3	Chloroform	2600	U	
107-06-2	1,2-Dichloroethane	2600	U	
78-93-3	2-Butanone	5200	U	
71-55-6	1,1,1-Trichloroethane	2600	U	
56-23-5	Carbon Tetrachloride	2600	U	
108-05-4	Vinyl Acetate	5200	U	
75-27-4	Bromodichloromethane	2600	U	
78-87-5	1,2-Dichloropropane	2600	U	
10061-01-5	cis-1,3-Dichloropropene	2600	U	
79-01-6	Trichloroethene	~~2600~~	~~U~~ NR	
124-48-1	Dibromochloromethane	2600	U	
79-00-5	1,1,2-Trichloroethane	2600	U	
71-43-2	Benzene	~~2600~~	~~U~~ NR	
10061-02-6	Trans-1,3-Dichloropropene	2600	U	
75-25-2	Bromoform	2600	U	
108-10-1	4-Methyl-2-Pentanone	5200	U	
591-78-6	2-Hexanone	5200	U	
127-18-4	Tetrachloroethene	2600	U	
79-34-5	1,1,2,2-Tetrachloroethane	2600	U	
108-88-3	Toluene	~~1400~~	~~J~~ NR	
108-90-7	Chlorobenzene	~~2600~~	~~U~~ NR	
100-41-4	Ethylbenzene	3800		
100-42-5	Styrene	2600	U	
1330-20-7	Xylene (total)	26000		

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

DOE SAMPLE NO.

278005MSD

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:_____ SAS No. _____ SDG No.:_____

Matrix: (soil/water)SOIL Lab Sample ID: 07188-01MSD

Sample wt/vol: 4.0 (g/ml)G Lab File ID: 07188V01MSD

Level: (low/med) MED Date Received: 07/13/90

% Moisture: not dec.3 Date Analyzed: 07/16/90

Column: (pack/cap) CAP Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)UG/KG	Q	
74-87-3	Chloromethane	5200	U	
74-83-9	Bromomethane	5200	U	
75-01-4	Vinyl Chloride	5200	U	
75-00-3	Chloroethane	5200	U	
75-09-2	Methylene Chloride	540	~~J~~ UJ	sm
67-64-1	Acetone	4100	~~J~~ UJ	sm
75-15-0	Carbon Disulfide	2600	U	
75-35-4	1,1-Dichloroethene	~~2600~~	~~U~~ NR	sm
75-34-3	1,1-Dichloroethane	2600	U	
540-59-0	1,2-Dichloroethene (total)	2600	U	
67-66-3	Chloroform	2600	U	
107-06-2	1,2-Dichloroethane	2600	U	
78-93-3	2-Butanone	5200	U	
71-55-6	1,1,1-Trichloroethane	2600	U	
56-23-5	Carbon Tetrachloride	2600	U	
108-05-4	Vinyl Acetate	5200	U	
75-27-4	Bromodichloromethane	2600	U	
78-87-5	1,2-Dichloropropane	2600	U	
10061-01-5	cis-1,3-Dichloropropene	2600	U	
79-01-6	Trichloroethene	~~2600~~	~~U~~ NR	sm
124-48-1	Dibromochloromethane	2600	U	
79-00-5	1,1,2-Trichloroethane	2600	U	
71-43-2	Benzene	~~2600~~	~~U~~ NR	sm
10061-02-6	Trans-1,3-Dichloropropene	2600	U	
75-25-2	Bromoform	2600	U	
108-10-1	4-Methyl-2-Pentanone	5200	U	
591-78-6	2-Hexanone	5200	U	
127-18-4	Tetrachloroethene	2600	U	
79-34-5	1,1,2,2-Tetrachloroethane	2600	U	
108-88-3	Toluene	~~1400~~	~~J~~ NR	sm
108-90-7	Chlorobenzene	~~2600~~	~~U~~ NR	sm
100-41-4	Ethylbenzene	4100		
100-42-5	Styrene	2600	U	
1330-20-7	Xylene (total)	27000		

3D

SOIL SEMIVOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: Laucks Testing Labs Contract:_____

Lab Code: LAUCKS Case No.:07188 SAS No.: _____ SDG No.:_____

Matrix Spike - Sample No.: 278005 Level:(low/med) MED

COMPOUND	SPIKE ADDED (ug/Kg)	SAMPLE CONCENTRATION (ug/Kg)	MS CONCENTRATION (ug/Kg)	MS % REC #	QC LIMITS REC.
Phenol	205339	0	171425	83 _	26- 90
2-Chlorophenol	205339	0	162369	79 _	25-102
1,4-Dichlorobenzene	102669	0	67716	66 _	28-104
N-Nitroso-di-n-prop.(1)	102669	0	91680	89 _	41-126
1,2,4-Trichlorobenzene	102669	0	85014	83 _	38-107
4-Chloro-3-methylphenol	205339	0	181532	88 _	26-103
Acenaphthene	102669	0	84556	82 _	31-137
4-Nitrophenol	205339	0	166624	81 _	11-114
2,4-Dinitrotoluene	102669	0	98252	96 *	28- 89
Pentachlorophenol	205339	0	144423	70 _	17-109
Pyrene	102669	0	92484	90 _	35-142

COMPOUND	SPIKE ADDED (ug/Kg)	MSD CONCENTRATION (ug/Kg)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
Phenol	205339	159424	78 _	7 _	35	26- 90
2-Chlorophenol	205339	149388	73 _	8 _	50	25-102
1,4-Dichlorobenzene	102669	66076	64 _	2 _	27	28-104
N-Nitroso-di-n-prop.(1)	102669	89197	87 _	3 _	38	41-126
1,2,4-Trichlorobenzene	102669	79155	77 _	7 _	23	38-107
4-Chloro-3-methylphenol	205339	167260	81 _	8 _	33	26-103
Acenaphthene	102669	78102	76 _	8 _	19	31-137
4-Nitrophenol	205339	149669	73 _	11 _	50	11-114
2,4-Dinitrotoluene	102669	92793	90 *	6 _	47	28- 89
Pentachlorophenol	205339	109290	53 _	28 _	47	17-109
Pyrene	102669	85868	84 _	7 _	36	35-142

(1) N-Nitroso-di-n-propylamine

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD:0 out of 11 outside limits
Spike Recovery:2 out of 22 outside limits

Comments: _____
_____

SEMIVOLATILE METHOD BLANK SUMMARY

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.: 07188 SAS No.: _____ SDG No.: _____

Lab File ID: >LG260::SS Lab Sample ID: B0716MSVSMI

Date Extracted: 07/16/90 Extraction:(SepF/Cont/Sonc) SONC

Date Analyzed: 07/26/90 Time Analyzed: 16:40

Matrix: (soil/water) SOIL Level:(low/med) MED

Instrument ID: 5970L

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, AND MSD:

	SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
01	278005	07188-01	>LG266::SS	07/26/90
02	278005MS	07188-01MS	>LG267::SS	07/27/90
03	278005MSD	07188-01MSD	>LG268::SS	07/27/90
04				
05				
06				
07				
08				
09				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
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23				
24				
25				
26				
27				
28				
29				
30				

COMMENTS: _____

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

278005

Lab Name: Laucks Testing Labs Contract:_____

Lab Code: LAUCKS Case No.:07188 SAS No.: _____ SDG No.: _____

Matrix: (soil/water)SOIL Lab Sample ID: 07188-01

Sample wt/vol: 1.0 (g/ml)G Lab File ID: >LG266::SS

Level: (low/med) MED Date Received: 07/13/90

% Moisture: not dec.3 dec.__ Date Extracted:07/16/90

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 07/26/90

GPC Cleanup: (Y/N)N pH:8.7 Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)UG/KG	Q
108-95-2	Phenol	20000	U
111-44-4	bis (2-Chloroethyl)ether	20000	U
95-57-8	2-Chlorophenol	20000	U
541-73-1	1,3-Dichlorobenzene	20000	U
106-46-7	1,4-Dichlorobenzene	20000	U
100-51-6	Benzyl alcohol	20000	U
95-50-1	1,2-Dichlorobenzene	20000	U
95-48-7	2-Methylphenol	20000	U
108-60-1	bis (2-Chloroisopropyl)ether	20000	U
106-44-5	4-Methylphenol	20000	U
621-64-7	N-Nitroso-di-n-propylamine	20000	U
67-72-1	Hexachloroethane	20000	U
98-95-3	Nitrobenzene	20000	U
78-59-1	Isophorone	20000	U
88-75-5	2-Nitrophenol	20000	U
105-67-9	2,4-Dimethylphenol	20000	U
65-85-0	Benzoic acid	99000	U
111-91-1	bis (2-Chloroethoxy)methane	20000	U
120-83-2	2,4-Dichlorophenol	20000	U
120-82-1	1,2,4-Trichlorobenzene	20000	U
91-20-3	Naphthalene	73000	
106-47-8	4-Chloroaniline	20000	U
87-68-3	Hexachlorobutadiene	20000	U
59-50-7	4-Chloro-3-methylphenol	20000	U
91-57-6	2-Methylnaphthalene	100000	
77-47-4	Hexachlorocyclopentadiene	20000	U
88-06-2	2,4,6-Trichlorophenol	20000	U
95-95-4	2,4,5-Trichlorophenol	99000	U
91-58-7	2-Chloronaphthalene	20000	U
88-74-4	2-Nitroaniline	99000	U
131-11-3	Dimethylphthalate	1900	J
208-96-8	Acenaphthylene	20000	U
606-20-2	2,6-Dinitrotoluene	20000	U

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

278005

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:07188 SAS No.: _____ SDG No.: _____

Matrix: (soil/water)SOIL Lab Sample ID: 07188-01

Sample wt/vol: 1.0 (g/ml)G Lab File ID: >LG266::SS

Level: (low/med) MED Date Received: 07/13/90

% Moisture: not dec.3 dec.__ Date Extracted:07/16/90

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 07/26/90

GPC Cleanup: (Y/N)N pH:8.7 Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)UG/KG	Q
99-09-2	3-Nitroaniline	99000	U
83-32-9	Acenaphthene	20000	U
51-28-5	2,4-Dinitrophenol	99000	U
100-02-7	4-Nitrophenol	99000	U
132-64-9	Dibenzofuran	20000	U
121-14-2	2,4-Dinitrotoluene	20000	U
84-66-2	Diethylphthalate	20000	U
7005-72-3	4-Chlorophenyl-phenylether	20000	U
86-73-7	Fluorene	20000	U
100-01-6	4-Nitroaniline	99000	U
534-52-1	4,6-Dinitro-2-methylphenol	99000	U
86-30-6	N-Nitrosodiphenylamine	20000	U
101-55-3	4-Bromophenyl-phenylether	20000	U
118-74-1	Hexachlorobenzene	20000	U
87-86-5	Pentachlorophenol	99000	U
85-01-8	Phenanthrene	20000	U
120-12-7	Anthracene	20000	U
84-74-2	Di-n-butylphthalate	20000	U
206-44-0	Fluoranthene	20000	U
129-00-0	Pyrene	20000	U
85-68-7	Butylbenzylphthalate	20000	U
91-94-1	3,3'-Dichlorobenzidine	41000	U
56-55-3	Benzo(a)anthracene	20000	U
218-01-9	Chrysene	20000	U
117-81-7	bis(2-Ethylhexyl)phthalate	2200	J
117-84-0	Di-n-octylphthalate	20000	U
205-99-2	Benzo(b)fluoranthene	20000	U
207-08-9	Benzo(k)fluoranthene	20000	U
50-32-8	Benzo(a)pyrene	20000	U
193-39-5	Indeno(1,2,3-cd)pyrene	20000	U
53-70-3	Dibenzo(a,h)anthracene	20000	U
191-24-2	Benzo(g,h,i)perylene	20000	U

(1) - Cannot be separated from diphenylamine

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

SAMPLE NO.
278005

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:07188 SAS No.: _____ SDG No.:_____

Matrix: (soil/water)SOIL Lab Sample ID: 07188-01

Sample wt/vol: 1.0 (g/ml)G Lab File ID: >LG266::SS

Level: (low/med) MED Date Received: 07/13/90

% Moisture: not dec. 3 dec.__ Date Extracted:07/16/90

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 07/26/90

GPC Cleanup: (Y/N)N pH:8.7 Dilution Factor: 1.0

Number TICs found: 20

CONCENTRATION UNITS:
(ug/L or ug/Kg)UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.611143	BENZENE, 1-ETHYL-2-METHYL-	11.96	29000	J
2.620144	BENZENE, 1-ETHYL-3-METHYL-	12.74	47000	J
3.611154	BENZENE, 1-ETHENYL-2-METHYL-	13.74	26000	J
4.1074437	BENZENE, 1-METHYL-3-PROPYL-	14.12	30000	J
5.1758889	BENZENE, 2-ETHYL-1,4-DIMETHY	14.27	38000	J
6.535773	BENZENE, 1-METHYL-3-(METHYLE	14.71	31000	J
7.1120214	UNDECANE	15.18	29000	J
8.527537	BENZENE, 1,2,3,5-TETRAMETHYL	15.55	34000	J
9.488233	BENZENE, 1,2,3,4-TETRAMETHYL	15.65	41000	J
10.874351	1H-INDENE, 2,3-DIHYDRO-5-MET	16.06	47000	J
11._____	UNKNOWN	16.16	25000	J
12._____	UNKNOWN	16.43	29000	J
13.25550134	BENZENE, DIETHYLMETHYL-	16.67	28000	J
14._____	UNKNOWN	17.10	210000	J
15.36875102	BENZENE, 1-(CHLOROMETHYL)-4-	17.20	27000	J
16.54120626	BENZENE, ETHYL-1,2,4-TRIMETH	17.27	56000	J
17._____	UNKNOWN	18.02	28000	J
18.6682719	1H-INDENE, 2,3-DIHYDRO-4,7-D	18.33	50000	J
19.17057828	1H-INDENE, 2,3-DIHYDRO-1,2-D	18.59	26000	J
20.90120	NAPHTHALENE, 1-METHYL-	19.53	46000	J
21._____				
22._____				
23._____				
24._____				
25._____				
26._____				
27._____				
28._____				
29._____				
30._____				

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

SBLKL1

Lab Name: Laucks Testing Labs Contract:_____

Lab Code: LAUCKS Case No.:07188 SAS No.: _____ SDG No.: _____

Matrix: (soil/water)SOIL Lab Sample ID: B0716MSVSMI

Sample wt/vol: 1.0 (g/ml)G Lab File ID: >LG260::SS

Level: (low/med) MED Date Received: 07/13/90

% Moisture: not dec.0 dec.__ Date Extracted:07/16/90

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 07/26/90

GPC Cleanup: (Y/N)N pH:7.0 Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)UG/KG	Q
108-95-2	Phenol	20000	U
111-44-4	bis (2-Chloroethyl)ether	20000	U
95-57-8	2-Chlorophenol	20000	U
541-73-1	1,3-Dichlorobenzene	20000	U
106-46-7	1,4-Dichlorobenzene	20000	U
100-51-6	Benzyl alcohol	20000	U
95-50-1	1,2-Dichlorobenzene	20000	U
95-48-7	2-Methylphenol	20000	U
108-60-1	bis (2-Chloroisopropyl)ether	20000	U
106-44-5	4-Methylphenol	20000	U
621-64-7	N-Nitroso-di-n-propylamine	20000	U
67-72-1	Hexachloroethane	20000	U
98-95-3	Nitrobenzene	20000	U
78-59-1	Isophorone	20000	U
88-75-5	2-Nitrophenol	20000	U
105-67-9	2,4-Dimethylphenol	20000	U
65-85-0	Benzoic acid	96000	U
111-91-1	bis (2-Chloroethoxy)methane	20000	U
120-83-2	2,4-Dichlorophenol	20000	U
120-82-1	1,2,4-Trichlorobenzene	20000	U
91-20-3	Naphthalene	20000	U
106-47-8	4-Chloroaniline	20000	U
87-68-3	Hexachlorobutadiene	20000	U
59-50-7	4-Chloro-3-methylphenol	20000	U
91-57-6	2-Methylnaphthalene	20000	U
77-47-4	Hexachlorocyclopentadiene	20000	U
88-06-2	2,4,6-Trichlorophenol	20000	U
95-95-4	2,4,5-Trichlorophenol	96000	U
91-58-7	2-Chloronaphthalene	20000	U
88-74-4	2-Nitroaniline	96000	U
131-11-3	Dimethylphthalate	20000	U
208-96-8	Acenaphthylene	20000	U
606-20-2	2,6-Dinitrotoluene	20000	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

SBLKL1

Lab Name: Laucks Testing Labs Contract:_____

Lab Code: LAUCKS Case No.:07188 SAS No.: _____ SDG No.: _____

Matrix: (soil/water)SOIL Lab Sample ID: B0716MSVSMI

Sample wt/vol: 1.0 (g/ml)G Lab File ID: >LG260::SS

Level: (low/med) MED Date Received: 07/13/90

% Moisture: not dec.0 dec.__ Date Extracted:07/16/90

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 07/26/90

GPC Cleanup: (Y/N)N pH:7.0 Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)UG/KG	Q
99-09-2	3-Nitroaniline	96000	U
83-32-9	Acenaphthene	20000	U
51-28-5	2,4-Dinitrophenol	96000	U
100-02-7	4-Nitrophenol	96000	U
132-64-9	Dibenzofuran	20000	U
121-14-2	2,4-Dinitrotoluene	20000	U
84-66-2	Diethylphthalate	20000	U
7005-72-3	4-Chlorophenyl-phenylether	20000	U
86-73-7	Fluorene	20000	U
100-01-6	4-Nitroaniline	96000	U
534-52-1	4,6-Dinitro-2-methylphenol	96000	U
86-30-6	N-Nitrosodiphenylamine	20000	U
101-55-3	4-Bromophenyl-phenylether	20000	U
118-74-1	Hexachlorobenzene	20000	U
87-86-5	Pentachlorophenol	96000	U
85-01-8	Phenanthrene	20000	U
120-12-7	Anthracene	20000	U
84-74-2	Di-n-butylphthalate	20000	U
206-44-0	Fluoranthene	20000	U
129-00-0	Pyrene	20000	U
85-68-7	Butylbenzylphthalate	20000	U
91-94-1	3,3'-Dichlorobenzidine	40000	U
56-55-3	Benzo(a)anthracene	20000	U
218-01-9	Chrysene	20000	U
117-81-7	bis(2-Ethylhexyl)phthalate	20000	U
117-84-0	Di-n-octylphthalate	20000	U
205-99-2	Benzo(b)fluoranthene	20000	U
207-08-9	Benzo(k)fluoranthene	20000	U
50-32-8	Benzo(a)pyrene	20000	U
193-39-5	Indeno(1,2,3-cd)pyrene	20000	U
53-70-3	Dibenzo(a,h)anthracene	20000	U
191-24-2	Benzo(g,h,i)perylene	20000	U

(1) - Cannot be separated from diphenylamine

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

SAMPLE NO.
SBLKL1

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:07188 SAS No.: _____ SDG No.:_____

Matrix: (soil/water)SOIL Lab Sample ID: B0716MSVSMI

Sample wt/vol: 1.0 (g/ml)G Lab File ID: >LG260::SS

Level: (low/med) MED Date Received: 07/13/90

% Moisture: not dec. 0 dec.__ Date Extracted:07/16/90

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 07/26/90

GPC Cleanup: (Y/N)N pH:7.0 Dilution Factor: 1.0

Number TICs found: 1

CONCENTRATION UNITS:
(ug/L or ug/Kg)UG/KG

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.		UNKNOWN	39.04	12000	J
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

278005MS

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:07188 SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: 07188-01MS

Sample wt/vol: 1.0 (g/ml) G Lab File ID: >LG267::SS

Level: (low/med) MED Date Received: 07/13/90

% Moisture: not dec. 3 dec. __ Date Extracted: 07/16/90

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 07/27/90

GPC Cleanup: (Y/N) N pH: 8.7 Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
108-95-2	Phenol	~~20000~~	~~U NR~~	Sm
111-44-4	bis (2-Chloroethyl) ether	20000	U	
95-57-8	2-Chlorophenol	~~20000~~	~~U NR~~	Sm
541-73-1	1,3-Dichlorobenzene	20000	U	
106-46-7	1,4-Dichlorobenzene	~~20000~~	~~U NR~~	Sm
100-51-6	Benzyl alcohol	20000	U	
95-50-1	1,2-Dichlorobenzene	20000	U	
95-48-7	2-Methylphenol	20000	U	
108-60-1	bis (2-Chloroisopropyl) ether	20000	U	
106-44-5	4-Methylphenol	20000	U	Sm
621-64-7	N-Nitroso-di-n-propylamine	~~20000~~	~~U NR~~	
67-72-1	Hexachloroethane	20000	U	
98-95-3	Nitrobenzene	20000	U	
78-59-1	Isophorone	20000	U	
88-75-5	2-Nitrophenol	20000	U	
105-67-9	2,4-Dimethylphenol	20000	U	
65-85-0	Benzoic acid	99000	U	
111-91-1	bis (2-Chloroethoxy) methane	20000	U	
120-83-2	2,4-Dichlorophenol	20000	U	Sm
120-82-1	1,2,4-Trichlorobenzene	~~20000~~	~~U NR~~	Sm
91-20-3	Naphthalene	86000		
106-47-8	4-Chloroaniline	20000	U	
87-68-3	Hexachlorobutadiene	20000	U	
59-50-7	4-Chloro-3-methylphenol	20000	U	
91-57-6	2-Methylnaphthalene	120000		
77-47-4	Hexachlorocyclopentadiene	20000	U	
88-06-2	2,4,6-Trichlorophenol	20000	U	
95-95-4	2,4,5-Trichlorophenol	99000	U	
91-58-7	2-Chloronaphthalene	20000	U	
88-74-4	2-Nitroaniline	99000	U	
131-11-3	Dimethylphthalate	20000	U	
208-96-8	Acenaphthylene	20000	U	
606-20-2	2,6-Dinitrotoluene	20000	U	

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

278005MS

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:07188 SAS No.: _____ SDG No.: _____

Matrix: (soil/water)SOIL Lab Sample ID: 07188-01MS

Sample wt/vol: 1.0 (g/ml)G Lab File ID: >LG267::SS

Level: (low/med) MED Date Received: 07/13/90

% Moisture: not dec.3 dec.__ Date Extracted:07/16/90

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 07/27/90

GPC Cleanup: (Y/N)N pH:8.7 Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)UG/KG	Q	
99-09-2	3-Nitroaniline	99000	U	
83-32-9	Acenaphthene	~~20000~~	~~U~~ NR	SR
51-28-5	2,4-Dinitrophenol	99000	U	
100-02-7	4-Nitrophenol	~~99000~~	~~U~~ NR	SR
132-64-9	Dibenzofuran	20000	U	
121-14-2	2,4-Dinitrotoluene	~~20000~~	~~U~~ NR	SR
84-66-2	Diethylphthalate	20000	U	
7005-72-3	4-Chlorophenyl-phenylether	20000	U	
86-73-7	Fluorene	20000	U	
100-01-6	4-Nitroaniline	99000	U	
534-52-1	4,6-Dinitro-2-methylphenol	99000	U	
86-30-6	N-Nitrosodiphenylamine	20000	U	
101-55-3	4-Bromophenyl-phenylether	20000	U	
118-74-1	Hexachlorobenzene	20000	U	
87-86-5	Pentachlorophenol	~~99000~~	~~U~~ NR	SR
85-01-8	Phenanthrene	20000	U	
120-12-7	Anthracene	20000	U	
84-74-2	Di-n-butylphthalate	20000	U	
206-44-0	Fluoranthene	20000	U	
129-00-0	Pyrene	~~20000~~	~~U~~ NR	SR
85-68-7	Butylbenzylphthalate	20000	U	
91-94-1	3,3'-Dichlorobenzidine	41000	U	
56-55-3	Benzo(a)anthracene	20000	U	
218-01-9	Chrysene	20000	U	
117-81-7	bis(2-Ethylhexyl)phthalate	2300	J	
117-84-0	Di-n-octylphthalate	20000	U	
205-99-2	Benzo(b)fluoranthene	20000	U	
207-08-9	Benzo(k)fluoranthene	20000	U	
50-32-8	Benzo(a)pyrene	20000	U	
193-39-5	Indeno(1,2,3-cd)pyrene	20000	U	
53-70-3	Dibenzo(a,h)anthracene	20000	U	
191-24-2	Benzo(g,h,i)perylene	20000	U	

(1) - Cannot be separated from diphenylamine

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.: 278005MSD

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:07188 SAS No.: _____ SDG No.: _____

Matrix: (soil/water)SOIL Lab Sample ID: 07188-01MSD

Sample wt/vol: 1.0 (g/ml)G Lab File ID: >LG268::SS

Level: (low/med) MED Date Received: 07/13/90

% Moisture: not dec.3 dec.__ Date Extracted:07/16/90

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 07/27/90

GPC Cleanup: (Y/N)N pH:8.7 Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)UG/KG	Q
108-95-2	Phenol	~~20000~~	~~U~~ NR
111-44-4	bis (2-Chloroethyl)ether	20000	U
95-57-8	2-Chlorophenol	~~20000~~	~~U~~ NR
541-73-1	1,3-Dichlorobenzene	20000	U
106-46-7	1,4-Dichlorobenzene	~~20000~~	~~U~~ NR
100-51-6	Benzyl alcohol	20000	U
95-50-1	1,2-Dichlorobenzene	20000	U
95-48-7	2-Methylphenol	20000	U
108-60-1	bis (2-Chloroisopropyl)ether	20000	U
106-44-5	4-Methylphenol	20000	U
621-64-7	N-Nitroso-di-n-propylamine	~~20000~~	~~U~~ NR
67-72-1	Hexachloroethane	20000	U
98-95-3	Nitrobenzene	20000	U
78-59-1	Isophorone	20000	U
88-75-5	2-Nitrophenol	20000	U
105-67-9	2,4-Dimethylphenol	20000	U
65-85-0	Benzoic acid	99000	U
111-91-1	bis (2-Chloroethoxy)methane	20000	U
120-83-2	2,4-Dichlorophenol	20000	U
120-82-1	1,2,4-Trichlorobenzene	~~20000~~	~~U~~ NR
91-20-3	Naphthalene	72000	
106-47-8	4-Chloroaniline	20000	U
87-68-3	Hexachlorobutadiene	20000	U
59-50-7	4-Chloro-3-methylphenol	20000	U
91-57-6	2-Methylnaphthalene	100000	
77-47-4	Hexachlorocyclopentadiene	20000	U
88-06-2	2,4,6-Trichlorophenol	20000	U
95-95-4	2,4,5-Trichlorophenol	99000	U
91-58-7	2-Chloronaphthalene	20000	U
88-74-4	2-Nitroaniline	99000	U
131-11-3	Dimethylphthalate	20000	U
208-96-8	Acenaphthylene	20000	U
606-20-2	2,6-Dinitrotoluene	20000	U

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

278005MSD

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:07188 SAS No.: _____ SDG No.: _____

Matrix: (soil/water)SOIL Lab Sample ID: 07188-01MSD

Sample wt/vol: 1.0 (g/ml)G Lab File ID: >LG268::SS

Level: (low/med) MED Date Received: 07/13/90

% Moisture: not dec.3 dec.__ Date Extracted:07/16/90

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 07/27/90

GPC Cleanup: (Y/N)N pH:8.7 Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)UG/KG	Q	
99-09-2	3-Nitroaniline	99000	U	
83-32-9	Acenaphthene	~~20000~~	~~U~~ NR	Sa
51-28-5	2,4-Dinitrophenol	99000	U	
100-02-7	4-Nitrophenol	~~99000~~	~~U~~ NR	Sa
132-64-9	Dibenzofuran	20000	U	
121-14-2	2,4-Dinitrotoluene	~~20000~~	~~U~~ NR	Sa
84-66-2	Diethylphthalate	20000	U	
7005-72-3	4-Chlorophenyl-phenylether	20000	U	
86-73-7	Fluorene	20000	U	
100-01-6	4-Nitroaniline	99000	U	
534-52-1	4,6-Dinitro-2-methylphenol	99000	U	
86-30-6	N-Nitrosodiphenylamine	20000	U	
101-55-3	4-Bromophenyl-phenylether	20000	U	
118-74-1	Hexachlorobenzene	20000	U	
87-86-5	Pentachlorophenol	~~99000~~	~~U~~ NR	Sa
85-01-8	Phenanthrene	20000	U	
120-12-7	Anthracene	20000	U	
84-74-2	Di-n-butylphthalate	20000	U	
206-44-0	Fluoranthene	20000	U	
129-00-0	Pyrene	~~20000~~	~~U~~ NR	Sa
85-68-7	Butylbenzylphthalate	20000	U	
91-94-1	3,3'-Dichlorobenzidine	41000	U	
56-55-3	Benzo(a)anthracene	20000	U	
218-01-9	Chrysene	20000	U	
117-81-7	bis(2-Ethylhexyl)phthalate	2000	J	
117-84-0	Di-n-octylphthalate	20000	U	
205-99-2	Benzo(b)fluoranthene	20000	U	
207-08-9	Benzo(k)fluoranthene	20000	U	
50-32-8	Benzo(a)pyrene	20000	U	
193-39-5	Indeno(1,2,3-cd)pyrene	20000	U	
53-70-3	Dibenzo(a,h)anthracene	20000	U	
191-24-2	Benzo(g,h,i)perylene	20000	U	

(1) - Cannot be separated from diphenylamine

SOIL PESTICIDE SURROGATE RECOVERY

Lab Name: Laucks Testing Labs Contract:N/A

Lab Code: LAUCKS Lab No.:7188 SAS No.:N/A SDG No.:278005

Level: (low/med)LOW

	DOE SAMPLE NO.	S1 (DBC)#	OTHER @ #
01	PBLKD1	96	88
02	278005	85	224 $
03	278005MS	81	219 $
04	278005MSD	78	227 $
05			
06			
07			
08			
09			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			

ADVISORY QC LIMITS

S1 (DBC) = Dibutylchlorendate (20-150)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogates diluted out

ADVISORY QC LIMITS

@ Isodrin (Secondary surrogate) (20-146)

$ Analytes in sample are co-eluting with Isodrin and elevating its recovery

3F

SOIL PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Name: LAUCKS TESTING LABS Contract:N/A

ab Code: LAUCKS Lab No.:7188 SAS No.: N/A SDG No.:278005

atrix Spike - DOE Sample No.: 278005 Level:(low/med) LOW

COMPOUND	SPIKE ADDED (ug/Kg)	SAMPLE CONCENTRATION (ug/Kg)	MS CONCENTRATION (ug/Kg)	MS % REC #	QC LIMITS REC.
gamma-BHC (Lindane)	27.6	0.00	21.3	77	46-127
Heptachlor	27.6	0.00	25.7	93	35-130
Aldrin	27.6	0.00	26.0	94	34-132
Dieldrin	69.1	0.00	101.0	146*	31-134
Endrin	69.1	0.00	86.7	125	42-139
4,4' DDT	69.1	0.00	64.6	93	23-134

COMPOUND	SPIKE ADDED (ug/Kg)	MSD CONCENTRATION (ug/Kg)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
gamma-BHC (Lindane)	27.6	19.7	71	8	50	46-127
Heptachlor	27.6	22.8	83	12	31	35-130
Aldrin	27.6	23.1	84	12	43	34-132
Dieldrin	69.1	99.9	145*	1	38	31-134
Endrin	69.1	83.4	121	4	45	42-139
4,4' DDT	69.1	62.4	90	3	50	23-134

Column to be used to flag recovery and RPD values with an asterisk

Values outside of QC limits

PD: 0 out of 6 outside limits
ike Recovery: 2 out of 12 outside limits

mments: Gamma-BHC was quantitated from the DB-17 column due to co-elution of sample analytes on the DB1701 channel. Dieldrin spike recoveries were out and elevated on both columns due to these same sample analyte interferences.

4C

PESTICIDE METHOD BLANK SUMMARY

Lab Name: LAUCKS TESTING LABS Contract: N/A

Lab Code: LAUCKS Lab No.: 7188 SAS No.: N/A SDG No.: 278005

Lab Sample ID: B0713GPXSLE Lab File ID:

Matrix: (soil/water) SOIL Level: (low/med) LOW

Date Extracted: 07/13/90 Extraction: (SepF/Cont/Sonc) SONC

Date Analyzed (1): 08/07/90 Date Analyzed (2): 08/07/90

Time Analyzed (1): 20:53 Time Analyzed (2): 20:53

Instrument ID (1): A Instrument ID (2): A

GC Column ID (1): DB1701 GC Column ID (2): DB-17

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, AND MSD:

	DOE SAMPLE NO.	LAB SAMPLE ID	DATE ANALYZED 1	DATE ANALYZED 2
01	278005	7188-01	08/07/90	08/07/90
02	278005MS	7188-01MS	08/07/90	08/07/90
03	278005MSD	7188-01MSD	08/07/90	08/07/90
04				
05				
06				
07				
08				
09				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				

COMMENTS: _____

1D

PESTICIDE ORGANICS ANALYSIS DATA SHEET

DOE SAMPLE NO.

278005

Lab Name: Laucks Testing Labs Contract:N/A

Lab Code: LAUCKS Lab No.:7188 SAS No.:N/A SDG No.:278005

Matrix: (soil/water)SOIL Lab Sample ID: 7188-01

Sample wt/vol: 30.0 (g/mL)G Lab File ID: F080715F.PRN

Level: (low/med) LOW Date Received: 07/13/90

% Moisture: not dec.4 Date Extracted: 07/13/90

Extraction: (sepF/Cont/Sonc) SONC Date Analyzed: 08/07/90

GPC Cleanup: (Y/N)N pH:8.7 Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	8.3	U
319-85-7	beta-BHC	8.3	U
319-86-8	delta-BHC	8.3	U
58-89-9	gamma-BHC (Lindane)	8.3	U
76-44-8	Heptachlor	8.3	U
309-00-2	Aldrin	8.3	U
1024-57-3	Heptachlor epoxide	8.3	U
959-98-8	Endosulfan I	8.3	U
60-57-1	Dieldrin	17	U
72-55-9	4,4'-DDE	17	U
72-20-8	Endrin	17	U
33213-65-9	Endosulfan II	17	U
72-54-8	4,4'-DDD	17	U
1031-07-8	Endosulfan sulfate	17	U
50-29-3	4,4'-DDT	17	U
72-43-5	Methoxychlor	83	U
53494-70-5	Endrin ketone	17	U
5103-71-9	alpha-Chlordane	83	U
5103-74-2	gamma-Chlordane	83	U
8001-35-2	Toxaphene	170	U
12674-11-2	Aroclor-1016	83	U
11104-28-2	Aroclor-1221	83	U
11141-16-5	Aroclor-1232	83	U
53469-21-9	Aroclor-1242	83	U
12672-29-6	Aroclor-1248	83	U
11097-69-1	Aroclor-1254	170	U
11096-82-5	Aroclor-1260	170	U

1D

PESTICIDE ORGANICS ANALYSIS DATA SHEET

DOE SAMPLE NO.

PBLKD1

ab Name: Laucks Testing Labs Contract:N/A

Lab Code: LAUCKS Lab No.:7188 SAS No.:N/A SDG No.:278005

Matrix: (soil/water)SOIL Lab Sample ID: B0713GPXSLE

Sample wt/vol: 30.0 (g/mL)G Lab File ID: F080713F.PRN

Level: (low/med) LOW Date Received: 07/13/90

% Moisture: not dec.0 Date Extracted: 07/13/90

Extraction: (sepF/Cont/Sonc) SONC Date Analyzed: 08/07/90

GPC Cleanup: (Y/N)N pH:7.0 Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	8.0	U
319-85-7	beta-BHC	8.0	U
319-86-8	delta-BHC	8.0	U
58-89-9	gamma-BHC (Lindane)	8.0	U
76-44-8	Heptachlor	8.0	U
309-00-2	Aldrin	8.0	U
1024-57-3	Heptachlor epoxide	8.0	U
959-98-8	Endosulfan I	8.0	U
60-57-1	Dieldrin	16	U
72-55-9	4,4'-DDE	16	U
72-20-8	Endrin	16	U
33213-65-9	Endosulfan II	16	U
72-54-8	4,4'-DDD	16	U
1031-07-8	Endosulfan sulfate	16	U
50-29-3	4,4'-DDT	16	U
72-43-5	Methoxychlor	80	U
53494-70-5	Endrin ketone	16	U
5103-71-9	alpha-Chlordane	80	U
5103-74-2	gamma-Chlordane	80	U
8001-35-2	Toxaphene	160	U
12674-11-2	Aroclor-1016	80	U
11104-28-2	Aroclor-1221	80	U
11141-16-5	Aroclor-1232	80	U
53469-21-9	Aroclor-1242	80	U
12672-29-6	Aroclor-1248	80	U
11097-69-1	Aroclor-1254	160	U
11096-82-5	Aroclor-1260	160	U

1D

PESTICIDE ORGANICS ANALYSIS DATA SHEET

DOE SAMPLE NO.

278005MS

Lab Name: Laucks Testing Labs Contract:N/A

Lab Code: LAUCKS Lab No.:7188 SAS No.:N/A SDG No.:278005

Matrix: (soil/water)SOIL Lab Sample ID: 7188-01MS

Sample wt/vol: 30.0 (g/mL)G Lab File ID: F080716F.PRN

Level: (low/med) LOW Date Received: 07/13/90

% Moisture: not dec.4 Date Extracted: 07/13/90

Extraction: (sepF/Cont/Sonc) SONC Date Analyzed: 08/07/90

GPC Cleanup: (Y/N)N pH:8.7 Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	8.3	U
319-85-7	beta-BHC	8.3	U
319-86-8	delta-BHC	8.3	U
58-89-9	gamma-BHC (Lindane)	~~8.3~~	~~U~~ NR
76-44-8	Heptachlor	~~8.3~~	~~U~~ NR
309-00-2	Aldrin	~~8.3~~	~~U~~ NR
1024-57-3	Heptachlor epoxide	8.3	U
959-98-8	Endosulfan I	8.3	U
60-57-1	Dieldrin	~~17~~	~~U~~ NR
72-55-9	4,4'-DDE	17	U
72-20-8	Endrin	~~17~~	~~U~~ NR
33213-65-9	Endosulfan II	17	U
72-54-8	4,4'-DDD	17	U
1031-07-8	Endosulfan sulfate	17	U
50-29-3	4,4'-DDT	~~17~~	~~U~~ NR
72-43-5	Methoxychlor	83	U
53494-70-5	Endrin ketone	17	U
5103-71-9	alpha-Chlordane	83	U
5103-74-2	gamma-Chlordane	83	U
8001-35-2	Toxaphene	170	U
12674-11-2	Aroclor-1016	83	U
11104-28-2	Aroclor-1221	83	U
11141-16-5	Aroclor-1232	83	U
53469-21-9	Aroclor-1242	83	U
12672-29-6	Aroclor-1248	83	U
11097-69-1	Aroclor-1254	170	U
11096-82-5	Aroclor-1260	170	U

1D

PESTICIDE ORGANICS ANALYSIS DATA SHEET

DOE SAMPLE NO.: 278005MSD

Lab Name: Laucks Testing Labs Contract: N/A

Lab Code: LAUCKS Lab No.: 7188 SAS No.: N/A SDG No.: 278005

Matrix: (soil/water) SOIL Lab Sample ID: 7188-01MSD

Sample wt/vol: 30.0 (g/mL) G Lab File ID: F080717F.PRN

Level: (low/med) LOW Date Received: 07/13/90

% Moisture: not dec. 4 Date Extracted: 07/13/90

Extraction: (sepF/Cont/Sonc) SONC Date Analyzed: 08/07/90

GPC Cleanup: (Y/N) N pH: 8.7 Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q	
319-84-6	alpha-BHC	8.3	U	
319-85-7	beta-BHC	8.3	U	
319-86-8	delta-BHC	8.3	U	
58-89-9	gamma-BHC (Lindane)	~~8.3~~	~~U~~ NR	Sm
76-44-8	Heptachlor	~~8.3~~	~~U~~ NR	Sm
309-00-2	Aldrin	~~8.3~~	~~U~~ NR	Sm
1024-57-3	Heptachlor epoxide	8.3	U	
959-98-8	Endosulfan I	8.3	U	
60-57-1	Dieldrin	~~17~~	~~U~~ NR	Sm
72-55-9	4,4'-DDE	17	U	
72-20-8	Endrin	~~17~~	~~U~~ N2	Sm
33213-65-9	Endosulfan II	17	U	
72-54-8	4,4'-DDD	17	U	
1031-07-8	Endosulfan sulfate	17	U	
50-29-3	4,4'-DDT	~~17~~	~~U~~ N2	Sm
72-43-5	Methoxychlor	83	U	
53494-70-5	Endrin ketone	17	U	
5103-71-9	alpha-Chlordane	83	U	
5103-74-2	gamma-Chlordane	83	U	
8001-35-2	Toxaphene	170	U	
12674-11-2	Aroclor-1016	83	U	
11104-28-2	Aroclor-1221	83	U	
11141-16-5	Aroclor-1232	83	U	
53469-21-9	Aroclor-1242	83	U	
12672-29-6	Aroclor-1248	83	U	
11097-69-1	Aroclor-1254	170	U	
11096-82-5	Aroclor-1260	170	U	

*** Lab Analysis Report ***

Transaction #: 08090904 Seq #: 02 (40) Organics - General
(WE) Ecology, Manchester Lab
Project: (DOE-939Z) DOT - LANDFILL, SEATTLE J1K23 MZT
Param: (82180 S) HYDROCBN ,PET MUD MG/KG

QA Code: (LBK1) Lab Blank Sample #1 Blank ID: BS0219
Instrument: (FTIR-1) FTIR, Laser Precision RFX-40 (DOE)
Method: (EP3-9073) Total Petroleum Hydrocarbons, Recoverable
Chemist: (BLC) Carrell, Bob DOE Hours Worked:
Lab Prep: ( ) Unspecifed
Matrix: (40) Sediment Date Preprd:
Units: (20) mg/kg Date Anlyzd: 900808

Line	Sample #	Result	Sample Location/Description	#Days to Anl
1	90 278005	ND (80)	DOT-OIL	900703 (36)

Record Type: TRNIN2 Date Verified: Aug 9, 1990 By: Carrell
Transaction Status: New Transaction...First Printing...Unverified.
Processed: 9-AUG-90 09:07:13 Status: N Batch: (In CUR DB)

*** Lab Analysis Report ***

ransaction #: 08090904 Seq #: 03 (40) Organics - General
(WE) Ecology, Manchester Lab
roject: (DOE-939Z) DOT - LANDFILL, SEATTLE J1K23 MZT
aram: (82180 S) HYDROCBN ,PET MUD MG/KG

QA Code: (LBK2) Lab Blank Sample #2 Blank ID: BS0219D
Instrument: (FTIR-1) FTIR, Laser Precision RFX-40 (DOE)
Method: (EP3-9073) Total Petroleum Hydrocarbons, Recoverable
Chemist: (BLC) Carrell, Bob DOE Hours Worked:
Lab Prep: ( ) Unspecifed
Matrix: (40) Sediment Date Preprd:
Units: (20) mg/kg Date Anlyzd: 900808

ine	Sample #	Result	Sample Location/Description	#Days to Anl
1	90 278005	ND (80)	DOT-OIL	900703 (36)

ecord Type: TRNIN2 Date Verified: Aug 9, 1990 By: Carrell
ansaction Status: New Transaction...First Printing...Unverified.
ocessed: 9-AUG-90 09:07:13 Status: N Batch: (In CUR DB)

*** Lab Analysis Report ***

Transaction #: 07101634 Seq #: 01 (40) Organics - General
(WE) Ecology, Manchester Lab
Project: (DOE-939Z) DOT - LANDFILL, SEATTLE J1K23 MZT
Param: (99960 S) H-Carbon ID

QA Code: ( ) Normal Data
Instrument: (GCHPFIDD) Hewlett Packard GC; FID Detector (DO
Method: (RX1-GO) Organics, General
Chemist: (BLC) Carrell, Bob DOE Hours Worked:
Lab Prep: ( ) Unspecifed
Matrix: (40) Sediment Date Preprd:
Units: (00) Date Anlyzd: 900710

Line	Sample #	Result	Sample Location/Description	#Days to Anl
1	90 278005	GASOLINE	DOT-OIL	900703 (7)

Record Type: TRNIN2 Date Verified: July 11, 1990 By: Carrell
Transaction Status: New Transaction...First Printing...Unverified.
Processed: 10-JUL-90 16:36:01 Status: N Batch: (In CUR DB)

*** Lab Analysis Report ***

ansaction #: 08090904 Seq #: 01 (40) Organics - General
(WE) Ecology, Manchester Lab
oject: (DOE-939Z) DOT - LANDFILL, SEATTLE J1K23 MZT
ram: (82180 S) HYDROCBN ,PET MUD MG/KG

QA Code: ( ) Normal Data
Instrument: (FTIR-1) FTIR, Laser Precision RFX-40 (DOE)
Method: (EP3-9073) Total Petroleum Hydrocarbons, Recoverable
Chemist: (BLC) Carrell, Bob DOE Hours Worked:
Lab Prep: ( ) Unspecifed
Matrix: (40) Sediment Date Preprd:
Units: (20) mg/kg Date Anlyzd: 900808

ne	Sample #	Result	Sample Location/Description	#Days to Anl
1	90 278005	1700	DOT-OIL	900703 (36)

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ecord Type: TRNIN2 Date Verified: Aug 9, 1990 By: Carrell
ansaction Status: New Transaction...First Printing...Unverified.
ocessed: 9-AUG-90 09:07:13 Status: N Batch: (In CUR DB)

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CITY OF TUKWILA
6200 SOUTHCENTER BOULEVARD, TUKWILA, WASHINGTON 98188 *PHONE # (206) 433-1800* *Gary L. VanDusen, Mayor*

Mr. Carl Osaki
Seattle-King County Dept. of Health
Room 201 Smith Tower
Seattle, WA 98104

March 15, 1991

Dear Mr. Osaki:

The City of Tukwila would appreciate your help in analyzing a potentially dangerous situation in our city. The Washington State Department of Transportation (WSDOT) uses one of their properties in Tukwila as a dump site to dispose of street sweepings and other materials. This site is located along Highway 99 at the Northbound exit to East Marginal Way and has been the focus of some controversy between the State Department of Ecology, WSDOT, and Tukwila. This controversy is primarily due to the fact that the dumping is unregulated, has been occurring for almost thirty years, and is on the uphill edge of a wetland that drains directly (less than 1/2 mile) into the Green River.

WSDOT has agreed to stop using the site by January, and have a landscape architect restore the vegetation on the site. In the meantime they have requested being able to continue to dump the materials on the upper end of the site, totally unregulated. WSDOT has committed to drill three wells and test the groundwater at the lower end of the site this spring.

Tukwila's concern is fairly simple. We need to know if the material being dumped now is dangerous in the short-term, and does it contain material that would pose a long-term threat to the public, the wetland, and the Green River if not removed?

On February 8 of this year we took a physical sample of the sandy material that had been dumped within the preceding two weeks, and had Lauck's Testing Laboratories analyze it. We did not "grid" the area or take extensive samples. Instead we took the samples from the low spots between the dump piles where the rain water running off of the piles had gathered. We utilized containers and sampling procedures provided by the laboratory.

We would like to assume, for the purposes of these questions, that the sample is accurately taken and fairly represents the materials being dumped. We would then like Seattle-King County Public Health

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to answer the following questions:

1. Does the material being dumped qualify as clean sand, and is it safe for an unregulated landfill?

2. Does the material pose any immediate or long-term public health threat? Should there be limitations as to continued present or future use of the site?

3. If one assumes that the sand material, being uphill of the wetland, drains into the wetland and then into the Green river, is merely revegetating the dump site adequate, or does it need to be removed or somehow stabilized?

The laboratory analysis is attached. We realize that the sampling technique may not be adequate for any extraordinary actions on our part. But it, with your help, should guide us in deciding if further sampling and other actions are necessary.

Please feel free to contact myself (234-5869) or our City Attorney, Mike Kenyon (433-1872) if you have any questions. We would appreciate your prompt attention to this matter.

Sincerely,

Dennis L. Robertson
Council President

Laucks 82
Testing Laboratories, Inc.
940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063
Chemistry, Microbiology, and Technical Services

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CLIENT: City Of Tukwilla
P.O. Box 24346 MS 77-47
Seattle, WA 98124

ATTN : Dennis Robertson

Work ID : -
Taken By : Client
Transported by: Hand Delivered
Type : Soil

Certificate of Analysis

Work Order# : 91-02-110
DATE RECEIVED : 02/08/91
DATE OF REPORT: 03/12/91

SAMPLE IDENTIFICATION:

	Sample Description
01	#1
02	#2
03	#3
04	Method Blank
05	Method Blank

Unless otherwise instructed all samples will be discarded on 04/24/91

Respectfully submitted,
Laucks Testing Laboratories, Inc.

J. M. Owens

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USING OUR REPORTS

Laucks has installed an electronic Laboratory Information Management System which now produces both our reports and invoices. The following information and definitions will help you use the new formats; and we encourage you to call us if your questions are not answered here.

SAMPLE IDENTIFICATION - Sample IDs are recorded as they appear on your sample containers or chain-of-custody documents. One "sample" may have several "fractions" (different analytical tasks), so a sample's ID may appear more than once on the cover page. You may notice "extra" samples, not submitted by you. These were added by Laucks to allow our electronic system to accommodate quality control analyses, such as method blanks and matrix spikes.

TEST RESULTS - Analyses which result in a single data point are shown in alphabetical order in the body of the report. Tests which yield multiple results are generally reported on separate pages, on a sample-by-sample basis.

MEASUREMENT UNITS - The reporting units are shown to the right of the analyte name. In the event that a different unit was more appropriate to a specific sample, that exception is shown immediately beneath the test result. Units commonly employed are mg/kg (solids) or mg/L (liquids), comparable to parts per million; ug/kg (solids) or ug/L (liquids), comparable to parts per billion; and percent (%).

METHODS OF ANALYSIS - The EPA or Standard Methods method number is now shown in parentheses after the analyte name; or, for analyses which yield multiple data points, in the header information on the individual report page.

ABBREVIATIONS - Several abbreviations can appear in our reports. The most commonly employed abbreviations are:

U : The analyte of interest was not detected, to the limit of detection indicated.

B : The analyte of interest was detected in the method blank associated with the sample, as well as in the sample itself. The B flag is applied without regard to the relative concentrations detected in the blank and sample.

J : The analyte of interest was detected below the routine reporting limit. This value should be regarded as an estimate.

This report is submitted for the exclusive use of the person, partnership, or corporation to whom it is addressed. Subsequent use of the name of this company or any member of its staff in connection with the advertising or sale of any product or process will be granted only on contract. This company accepts no responsibility except for the due performance of inspection and/or analysis in good faith and according to the rules of the trade and of science.

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T : The flagged values represent the SUM of two co-eluting compounds. The SUM of these two values is shown as though it were a result for each of them, but in fact it represents the total and the two figures should not be further added together.

D : The value reported derives from analysis of a diluted sample or sample extract.

SDL : Sample Detection Limit. The SDL can vary from sample to sample, depending on sample size, matrix interferences, moisture content and other sample-specific conditions.

PQL : Practical Quantitation Limit. This limit is drawn from the test method and usually represents the SDL multiplied by a matrix-specific factor.

CRQL : Client Requested Quantitation Limit, usually the limit of detection specified at your request. Might also be referred to as Contract Required Quantitation Limit.

DB : Dry Basis. The value reported has been back-calculated to normalize for the moisture content of the sample.

AR : As-Received. The value has NOT been normalized for moisture.

Other abbreviations, used in special applications, are defined where they appear.

DISPOSAL DATE - Our reports now include the date on which we will dispose of your samples. (In limited instances, we may require that the samples be returned to your custody.) If you wish to have the samples back, or would like to have them stored for a longer period, please notify us before the disposal date.

This report is submitted for the exclusive use of the person, partnership, or corporation to whom it is addressed. Subsequent use of the name of this company or any member of its staff in connection with the advertising or sale of any product or process will be granted only on contract. This company accepts no responsibility except for the due performance of inspection and/or analysis in good faith and according to the rules of the trade and of science.

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Chemistry, Microbiology, and Technical Services

CLIENT : City Of Tukwilla

Certificate of Analysis

Work Order # 91-02-110

TESTS PERFORMED AND RESULTS:

Analyte	Units	01	02	03
Aluminum (Method 6010)	mg/kg DB	12000.		
Antimony (Method 6010)	mg/kg DB	6. U		
Arsenic (Method 6010)	mg/kg DB	20. U		
Barium (Method 6010)	mg/kg DB	87.		
Beryllium (Method 6010)	mg/kg DB	1. U		
Cadmium (Method 6010)	mg/kg DB	3.2		
Calcium (Method 6010)	mg/kg DB	12000.		
Chromium (Method 6010)	mg/kg DB	32.		
Cobalt (Method 6010)	mg/kg DB	9.		
Copper (Method 6010)	mg/kg DB	38.		
Iron (Method 6010)	mg/kg DB	21000.		
Lead (Method 6010)	mg/kg DB	93.		
Magnesium (Method 6010)	mg/kg DB	6400.		
Manganese (Method 6010)	mg/kg DB	410.		
Mercury (Method 6010)	mg/kg DB	20.		
Nickel (Method 6010)	mg/kg DB	36.		
Potassium (Method 6010)	mg/kg DB	830.		
Selenium (Method 6010)	mg/kg DB	20. U		
Silver (Method 6010)	mg/kg DB	1. U		
Sodium (Method 6010)	mg/kg DB	430.		

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Chemistry, Microbiology, and Technical Services

CLIENT : City Of Tukwilla

Certificate of Analysis

Work Order # 91-02-110
Continued From Above

TESTS PERFORMED AND RESULTS:

Analyte	Units	01	02	03
Method 418.1 TPH Oil & Grease	mg/kg DB	1300.	460.	1600.
Thallium (Method 6010)	mg/kg DB	20. U		
Total Solids	%	77.9	75.1	79.5
Vanadium (Method 6010)	mg/kg DB	44.		
Zinc (Method 6010)	mg/kg DB	170.		

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GC/MS ABN surrogate recovery report for sample 9102110-04A

Surrogate	Percent Recovery	Limits: Min.	Max.
Nitrobenzene d5.....	76	32	102
2-Fluorobiphenyl.....	88	42	113
Terphenyl d14.....	104	48	124
Phenol d6.....	81	28	108
2-Fluorophenol.....	81	25	106
2,4,6-Tribromophenol.	90	22	128
D10-Azobenzene.....	97	48	113
2-Bromophenol.....	75	34	100

* = Surrogate recovery outside control limits

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REPORT ON SAMPLE: 9102110-04A
Client Sample ID: Method Blank

Date Received : 02/08/91
Date Extracted : N/A
Test Code : LXTCVS

Collection Date :
Date Analyzed : 02/11/91
Test Method : SW8240

Compound	Result (ug/Kg DB)	SDL (ug/Kg DB)	Compound	Result (ug/Kg DB)	SDL (ug/Kg DB)
Chloromethane	1 U	1	Bromodichloromethane	1 U	1
Bromomethane	1 U	1	1,2-Dichloropropane	1 U	1
Vinyl chloride	1 U	1	Trichloroethene	1 U	1
Chloroethane	3 U	3	Benzene	1 U	1
Methylene chloride	1 U	1	Dibromochloromethane	3 U	3
Acetone	5 U	5	1,1,2-Trichloroethane	1 U	1
Carbon disulfide	1 U	1	Bromoform	1 U	1
1,1-Dichloroethene	1 U	1	4-Methyl-2-pentanone	3 U	3
1,1-Dichloroethane	1 U	1	2-Hexanone	3 U	3
trans-1,2-Dichloroethene	1 U	1	1,1,2,2-Tetrachloroethane	3 U	3
cis-1,2-Dichloroethene	1 U	1	Tetrachloroethene	1 U	1
Total 1,2-Dichloroethene	1 U	1	Toluene	1 U	1
Chloroform	1 U	1	Chlorobenzene	3 U	3
2-Butanone	3 U	3	trans-1,3-Dichloropropene	3 U	3
1,2-Dichloroethane	1 U	1	Ethylbenzene	1 U	1
1,1,1-Trichloroethane	1 U	1	cis-1,3-Dichloropropene	3 U	3
Carbon tetrachloride	1 U	1	Styrene	1 U	1
Vinyl acetate	1 U	1	Total Xylene	1 U	1

Surrogate Recovery Report

Surrogate Compound	Percent Recovery	Limits: Min.	Max.
1,2-Dichloroethane d4	94	76	121
Toluene d8	99	74	128
p-Bromofluorobenzene	92	72	118

* Surrogate recovery is outside of control limits. See comments.

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REPORT ON SAMPLE: 9102110-01C
Client Sample ID: #1

Date Received : 02/08/91
Date Extracted : 02/08/91
Test Code : 8080

Collection Date : N/A
Date Analyzed : 02/20/91
Test Method : SW 8080
Extraction Method : SW 3550

Report Units : ug/kg DB

Compound	Result		SDL	Analysis Date	Confirmation Date
Alpha-BHC	10	U	10	02/20/91	02/20/91
Beta-BHC	25		10	02/20/91	02/20/91
Delta-BHC	10	U	10	02/20/91	02/20/91
Gamma-BHC	10	U	10	02/20/91	02/20/91
Heptachlor	10	U	10	02/20/91	02/20/91
Aldrin	10	U	10	02/20/91	02/20/91
Heptachlor Epoxide .	10	U	10	02/20/91	02/20/91
Endosulfan I	10	U	10	02/20/91	02/20/91
Dieldrin	21	U	21	02/20/91	02/20/91
4,4'-DDE	21	U	21	02/20/91	02/20/91
Endrin	21	U	21	02/20/91	02/20/91
Endosulfan II	21	U	21	02/20/91	02/20/91
4,4'-DDD	21	U	21	02/20/91	02/20/91
Endosulfan Sulfate .	21	U	21	02/20/91	02/20/91
4,4'-DDT	21	U	21	02/20/91	02/20/91
Methoxychlor	100	U	100	02/20/91	02/20/91
Endrin Ketone	21	U	21	02/20/91	02/20/91
Alpha Chlordane	100	U	100	02/20/91	02/20/91
Gamma Chlordane	100	U	100	02/20/91	02/20/91
Toxaphene	210	U	210	02/20/91	02/20/91
Aroclor-1016	100	U	100	02/20/91	02/20/91
Aroclor-1221	100	U	100	02/20/91	02/20/91
Aroclor-1232	100	U	100	02/20/91	02/20/91
Aroclor-1242	100	U	100	02/20/91	02/20/91
Aroclor-1248	100	U	100	02/20/91	02/20/91
Aroclor-1254	210	U	210	02/20/91	02/20/91
Aroclor-1260	210	U	210	02/20/91	02/20/91

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Chemistry Microbiology and Technical Services

Surrogate recovery report for sample 9102110-01C

Surrogate	Percent Recovery	Limits: Min.	Max.
Dibutylchlorendate	75	43	152
Isodrin	83	32	96
Tetrachloro-m-xylene	74.	60	150
Decachlorobiphenyl	65.	60	150

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REPORT ON SAMPLE: 9102110-01C
Client Sample ID: #1

Date Received : 02/08/91
Date Extracted : 02/08/91
Test Code : LXTCSS

Collection Date : N/A
Date Analyzed : 02/15/91
Test Method : SW8270
Extraction Method : SW3550

Compound	Result (ug/kg DB)	SDL (ug/kg DB)	Compound	Result (ug\kg DB)	SDL (ug/kg DB)
Phenol	420 U	420	3-Nitroaniline	2100 U	2100
Aniline	2100 U	2100	Acenaphthene	420 U	420
Bis(2-chloroethyl)ether	420 U	420	2,4-Dinitrophenol	4200 U	4200
2-Chlorophenol	420 U	420	4-Nitrophenol	4200 U	4200
1,3-Dichlorobenzene	420 U	420	Dibenzofuran	420 U	420
1,4-Dichlorobenzene	420 U	420	2,4-Dinitrotoluene	850 U	850
Benzyl alcohol	420 U	420	Diethyl phthalate	420 U	420
1,2-Dichlorobenzene	420 U	420	4-Chlorophenyl phenylether	420 U	420
2-Methylphenol	420 U	420	Fluorene	420 U	420
Bis(2-chloroisopropyl)ether	420 U	420	4-Nitroaniline	850 U	850
4-Methylphenol	420 U	420	4,6-Dinitro-2-methylphenol	420 U	420
N-Nitroso-di-n-propylamine	420 U	420	N-Nitrosodiphenylamine	420 U	420
Hexachloroethane	850 U	850	1,2-Diphenylhydrazine	850 U	850
Nitrobenzene	420 U	420	4-Bromophenyl phenylether	850 U	850
Isophorone	420 U	420	Hexachlorobenzene	850 U	850
2-Nitrophenol	850 U	850	Pentachlorophenol	4200 U	4200
2,4-Dimethylphenol	420 U	420	Phenanthrene	1400	420
Benzoic acid	11000 U	11000	Anthracene	420 U	420
Bis(2-chloroethoxy)methane	420 U	420	Di-n-butyl phthalate	420 U	420
2,4-Dichlorophenol	850 U	850	Fluoranthene	1900	420
1,2,4-Trichlorobenzene	420 U	420	Pyrene	1500	420
Naphthalene	420 U	420	Benzidine	11000 U	11000
4-Chloroaniline	420 U	420	Butylbenzylphthalate	420 U	420
Hexachlorobutadiene	420 U	420	3,3'-Dichlorobenzidine	8500 U	8500
4-Chloro-3-methylphenol	850 U	850	Benzo(a)anthracene	770	420
2-Methylnaphthalene	420 U	420	Chrysene	900	420
Hexachlorocyclopentadiene	850 U	850	Bis(2-ethylhexyl)phthalate	1400 B	420
2,4,6-Trichlorophenol	850 U	850	Di-n-octyl phthalate	420 U	420
2,4,5-Trichlorophenol	850 U	850	Benzo(b)fluoranthene	1400 T	420
2-Chloronaphthalene	420 U	420	Benzo(k)fluoranthene	1400 T	420
2-Nitroaniline	850 U	850	Benzo(a)pyrene	900	420
Dimethyl phthalate	420 U	420	Indeno(1,2,3-cd)pyrene	560	420
Acenaphthylene	420 U	420	Dibenzo(a,h)anthracene	420 U	420
2,6-Dinitrotoluene	850 U	850	Benzo(g,h,i)perylene	510	420

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GC/MS ABN surrogate recovery report for sample 9102110-01C

Surrogate	Percent Recovery	Limits: Min.	Max.
Nitrobenzene d5.....	66	32	102
2-Fluorobiphenyl.....	96	42	113
Terphenyl d14.....	108	48	124
Phenol d6.....	68	28	108
2-Fluorophenol.....	74	25	106
2,4,6-Tribromophenol.	84	22	128
D10-Azobenzene.....	84	48	113
2-Bromophenol.....	79	34	100

* = Surrogate recovery outside control limits

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REPORT ON SAMPLE: 9102110-01C
Client Sample ID: #1

Date Received : 02/08/91
Date Extracted : N/A
Test Code : LXTCVS

Collection Date :
Date Analyzed : 02/11/91
Test Method : SW8240

Compound	Result (ug/Kg DB)	SDL (ug/Kg DB)	Compound	Result (ug/Kg DB)	SDL (ug/Kg DB)
Chloromethane	2 U	2	Bromodichloromethane	2 U	2
Bromomethane	2 U	2	1,2-Dichloropropane	2 U	2
Vinyl chloride	2 U	2	Trichloroethene	2 U	2
Chloroethane	7 U	7	Benzene	2 U	2
Methylene chloride	4	2	Dibromochloromethane	7 U	7
Acetone	17	11	1,1,2-Trichloroethane	2 U	2
Carbon disulfide	2 U	2	Bromoform	2 U	2
1,1-Dichloroethene	2 U	2	4-Methyl-2-pentanone	7 U	7
1,1-Dichloroethane	2 U	2	2-Hexanone	7 U	7
trans-1,2-Dichloroethene	2 U	2	1,1,2,2-Tetrachloroethane	7 U	7
cis-1,2-Dichloroethene	2 U	2	Tetrachloroethene	2 U	2
Total 1,2-Dichloroethene	2 U	2	Toluene	2 U	2
Chloroform	2 U	2	Chlorobenzene	7 U	7
2-Butanone	7 U	7	trans-1,3-Dichloropropene	7 U	7
1,2-Dichloroethane	2 U	2	Ethylbenzene	2 U	2
1,1,1-Trichloroethane	2 U	2	cis-1,3-Dichloropropene	7 U	7
Carbon tetrachloride	2 U	2	Styrene	2 U	2
Vinyl acetate	2 U	2	Total Xylene	2 U	2

Surrogate Recovery Report

Surrogate Compound	Percent Recovery	Limits: Min.	Max.
1,2-Dichloroethane d4	88	76	121
Toluene d8	101	74	128
p-Bromofluorobenzene	77	72	118

* Surrogate recovery is outside of control limits. See comments.

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REPORT ON WORK ORDER 9102110 PREPARATION BLANKS

Test : **TPH Oil & Grease**
Blank Name : B02130G_S01 Preparation Date: 02/13/91
Conc Found : 20.000 U Control Limit : 40.000
Units : mg/kg DB

This blank and comments, if any, apply to the following sample(s):
1-3

Test : **Silver (Method 6010)**
Blank Name : B0213ICP_S01 Preparation Date: 02/13/91
Conc Found : 1.000 U Control Limit : 2.000
Units : mg/kg DB

This blank and comments, if any, apply to the following sample(s):
1

Test : **Aluminum (Method 6010)**
Blank Name : B0213ICP_S01 Preparation Date: 02/13/91
Conc Found : 10.000 Control Limit : 20.000
Units : mg/kg DB

This blank and comments, if any, apply to the following sample(s):
1

Test : **Arsenic (Method 6010)**
Blank Name : B0213ICP_S01 Preparation Date: 02/13/91
Conc Found : 20.000 U Control Limit : 20.000
Units : mg/kg DB

This blank and comments, if any, apply to the following sample(s):
1

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Test : **Barium (Method 6010)**
Blank Name : B0213ICP_S01 Preparation Date: 02/13/91
Conc Found : 2.000 U Control Limit : 4.000
Units : mg/kg DB

This blank and comments, if any, apply to the following sample(s):
1

Test : **Beryllium (Method 6010)**
Blank Name : B0213ICP_S01 Preparation Date: 02/13/91
Conc Found : 1.000 U Control Limit : 2.000
Units : mg/kg DB

This blank and comments, if any, apply to the following sample(s):
1

Test : **Calcium (Method 6010)**
Blank Name : B0213ICP_S01 Preparation Date: 02/13/91
Conc Found : 100.000 U Control Limit : 100.000
Units : mg/kg DB

This blank and comments, if any, apply to the following sample(s):
1

Test : **Cadmium (Method 6010)**
Blank Name : B0213ICP_S01 Preparation Date: 02/13/91
Conc Found : 0.500 U Control Limit : 1.000
Units : mg/kg DB

This blank and comments, if any, apply to the following sample(s):
1

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Test : **Cobalt (Method 6010)**
Blank Name : B0213ICP_S01 Preparation Date: 02/13/91
Conc Found : 5.000 U Control Limit : 10.000
Units : mg/kg DB

This blank and comments, if any, apply to the following sample(s):
1

Test : **Chromium (Method 6010)**
Blank Name : B0219ICP_S01 Preparation Date: 02/19/91
Conc Found : 1.000 U Control Limit : 2.000
Units : mg/kg DB

This blank and comments, if any, apply to the following sample(s):
1

Test : **Copper (Method 6010)**
Blank Name : B0219ICP_S01 Preparation Date: 02/19/91
Conc Found : 1.000 U Control Limit : 2.000
Units : mg/kg DB

This blank and comments, if any, apply to the following sample(s):
1

Test : **Iron (Method 6010)**
Blank Name : B0213ICP_S01 Preparation Date: 02/13/91
Conc Found : 10.000 U Control Limit : 50.000
Units : mg/kg DB

This blank and comments, if any, apply to the following sample(s):
1

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Test : **Mercury (Method 6010)**
Blank Name : B0213ICP_S01 Control Limit : 10.000
Conc Found : 10.000 U
Units : mg/kg DB Preparation Date: 02/13/91

This blank applies to the following samples:
1

Test : **Potassium (Method 6010)**
Blank Name : B0213ICP_S01 Preparation Date: 02/13/91
Conc Found : 100.000 U Control Limit : 100.000
Units : mg/kg DB

This blank applies to the following samples:
1

Test : **Magnesium (Method 6010)**
Blank Name : B0213ICP_S01 Preparation Date: 02/13/91
Conc Found : 100.000 U Control Limit : 100.000
Units : mg/kg DB

This blank applies to the following samples:
1

* = outside control limits
U = analtye not detected

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Test : **Manganese (Method 6010)**
Blank Name : B0213ICP_S01 Preparation Date: 02/13/91
Conc Found : 1.000 U Control Limit : 2.000
Units : mg/kg DB

This blank and comments, if any, apply to the following sample(s):
1

Test : **Sodium (Method 6010)**
Blank Name : B0213ICP_S01 Preparation Date: 02/13/91
Conc Found : 100.000 U Control Limit : 100.000
Units : mg/kg DB

This blank and comments, if any, apply to the following sample(s):
1

Test : **Nickel (Method 6010)**
Blank Name : B0213ICP_S01 Preparation Date: 02/13/91
Conc Found : 2.000 U Control Limit : 4.000
Units : mg/kg DB

This blank and comments, if any, apply to the following sample(s):
1

Test : **Lead (Method 6010)**
Blank Name : B0213ICP_S01 Preparation Date: 02/13/91
Conc Found : 10.000 U Control Limit : 10.000
Units : mg/kg DB

This blank and comments, if any, apply to the following sample(s):
1

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Test : **Antimony (Method 6010)**
Blank Name : B0213ICP_S01 Preparation Date: 02/13/91
Conc Found : 6.000 U Control Limit : 6.000
Units : mg/kg DB

This blank and comments, if any, apply to the following sample(s):
1

Test : **Selenium (Method 6010)**
Blank Name : B0213ICP_S01 Preparation Date: 02/13/91
Conc Found : 20.000 U Control Limit : 20.000
Units : mg/kg DB

This blank and comments, if any, apply to the following sample(s):
1

Test : **Thallium (Method 6010)**
Blank Name : B0213ICP_S01 Preparation Date: 02/13/91
Conc Found : 20.000 U Control Limit : 20.000
Units : mg/kg DB

This blank and comments, if any, apply to the following sample(s):
1

Test : **Vanadium (Method 6010)**
Blank Name : B0213ICP_S01 Preparation Date: 02/13/91
Conc Found : 5.000 U Control Limit : 10.000
Units : mg/kg DB

This blank and comments, if any, apply to the following sample(s):
1

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REPORT ON WORK ORDER 9102110 PREPARATION BLANKS

Test : Zinc (Method 6010)
Blank Name : B0213ICP_S01 Preparation Date: 02/13/91
Conc Found : 1.000 U Control Limit : 5.000
Units : mg/kg DB

This blank and comments, if any, apply to the following sample(s):
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* = outside control limits
U = analtye not detected

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REPORT ON SAMPLE: 9102110-04A
Client Sample ID: Method Blank

Date Received : 02/08/91
Date Extracted : 02/08/91
Test Code : 8080

Collection Date : N/A
Date Analyzed : 02/20/91
Test Method : SW 8080
Extraction Method : SW 3550

Report Units : ug/kg DB

Compound	Result		SDL	Analysis Date	Confirmation Date
Alpha-BHC	8.0	U	8.0	02/20/91	02/20/91
Beta-BHC	8.0	U	8.0	02/20/91	02/20/91
Delta-BHC	8.0	U	8.0	02/20/91	02/20/91
Gamma-BHC	8.0	U	8.0	02/20/91	02/20/91
Heptachlor	8.0	U	8.0	02/20/91	02/20/91
Aldrin	8.0	U	8.0	02/20/91	02/20/91
Heptachlor Epoxide .	8.0	U	8.0	02/20/91	02/20/91
Endosulfan I	8.0	U	8.0	02/20/91	02/20/91
Dieldrin	16	U	16	02/20/91	02/20/91
4,4'-DDE	16	U	16	02/20/91	02/20/91
Endrin	16	U	16	02/20/91	02/20/91
Endosulfan II	16	U	16	02/20/91	02/20/91
4,4'-DDD	16	U	16	02/20/91	02/20/91
Endosulfan Sulfate .	16	U	16	02/20/91	02/20/91
4,4'-DDT	16	U	16	02/20/91	02/20/91
Methoxychlor	80	U	80	02/20/91	02/20/91
Endrin Ketone	16	U	16	02/20/91	02/20/91
Alpha Chlordane	80	U	80	02/20/91	02/20/91
Gamma Chlordane	80	U	80	02/20/91	02/20/91
Toxaphene	160	U	160	02/20/91	02/20/91
Aroclor-1016	80	U	80	02/20/91	02/20/91
Aroclor-1221	80	U	80	02/20/91	02/20/91
Aroclor-1232	80	U	80	02/20/91	02/20/91
Aroclor-1242	80	U	80	02/20/91	02/20/91
Aroclor-1248	80	U	80	02/20/91	02/20/91
Aroclor-1254	160	U	160	02/20/91	02/20/91
Aroclor-1260	160	U	160	02/20/91	02/20/91

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Surrogate recovery report for sample 9102110-04A

Surrogate	Percent Recovery	Limits: Min.	Max.
Dibutylchlorendate	75	43	152
Isodrin	83	32	96
Tetrachloro-m-xylene	74.	60	150
Decachlorobiphenyl	80.	60	150

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REPORT ON SAMPLE: 9102110-04A
Client Sample ID: Method Blank

Date Received : 02/08/91
Date Extracted : 02/08/91
Test Code : LXTCSS

Collection Date : N/A
Date Analyzed : 02/15/91
Test Method : SW8270
Extraction Method : SW3550

Compound	Result (ug/kg DB)	SDL (ug/kg DB)	Compound	Result (ug\kg DB)	SDL (ug/kg DB)
Phenol	33 U	33	3-Nitroaniline	160 U	160
Aniline	170 U	170	Acenaphthene	33 U	33
Bis(2-chloroethyl)ether	33 U	33	2,4-Dinitrophenol	330 U	330
2-Chlorophenol	33 U	33	4-Nitrophenol	330 U	330
1,3-Dichlorobenzene	33 U	33	Dibenzofuran	33 U	33
1,4-Dichlorobenzene	33 U	33	2,4-Dinitrotoluene	66 U	66
Benzyl alcohol	33 U	33	Diethyl phthalate	33 U	33
1,2-Dichlorobenzene	33 U	33	4-Chlorophenyl phenylether	33 U	33
2-Methylphenol	33 U	33	Fluorene	33 U	33
Bis(2-chloroisopropyl)ether	33 U	33	4-Nitroaniline	66 U	66
4-Methylphenol	33 U	33	4,6-Dinitro-2-methylphenol	33 U	33
N-Nitroso-di-n-propylamine	33 U	33	N-Nitrosodiphenylamine	33 U	33
Hexachloroethane	66 U	66	1,2-Diphenylhydrazine	66 U	66
Nitrobenzene	33 U	33	4-Bromophenyl phenylether	66 U	66
Isophorone	33 U	33	Hexachlorobenzene	66 U	66
2-Nitrophenol	66 U	66	Pentachlorophenol	330 U	330
2,4-Dimethylphenol	33 U	33	Phenanthrene	33 U	33
Benzoic acid	830 U	830	Anthracene	33 U	33
Bis(2-chloroethoxy)methane	33 U	33	Di-n-butyl phthalate	33 U	33
2,4-Dichlorophenol	66 U	66	Fluoranthene	33 U	33
1,2,4-Trichlorobenzene	33 U	33	Pyrene	33 U	33
Naphthalene	33 U	33	Benzidine	830 U	830
4-Chloroaniline	33 U	33	Butylbenzylphthalate	33 U	33
Hexachlorobutadiene	33 U	33	3,3'-Dichlorobenzidine	660 U	660
4-Chloro-3-methylphenol	66 U	66	Benzo(a)anthracene	33 U	33
2-Methylnaphthalene	33 U	33	Chrysene	33 U	33
Hexachlorocyclopentadiene	66 U	66	Bis(2-ethylhexyl)phthalate	73	33
2,4,6-Trichlorophenol	66 U	66	Di-n-octyl phthalate	33 U	33
2,4,5-Trichlorophenol	66 U	66	Benzo(b)fluoranthene	33 U	33
2-Chloronaphthalene	33 U	33	Benzo(k)fluoranthene	33 U	33
2-Nitroaniline	66 U	66	Benzo(a)pyrene	33 U	33
Dimethyl phthalate	33 U	33	Indeno(1,2,3-cd)pyrene	33 U	33
Acenaphthylene	33 U	33	Dibenzo(a,h)anthracene	33 U	33
2,6-Dinitrotoluene	66 U	66	Benzo(g,h,i)perylene	33 U	33

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: King County Health Department
Client Sample Number: See below
Date of Sample Receipt: 4/16/91
Matrix: Soil

Alden Job Number: 9104025/1
Alden Sample Number: See below
Analysis Method: 8015-Modified
Reporting Units: mg/kg

Client Sample ID	Alden Sample Number	Extraction Date	Analysis Date	Total Extractable Hydrocarbons
N/A	Blank	4/26/91	4/29/91	9.2
9104001	6973	4/26/91	4/29/91	1800
9104002 DOT	6974	4/26/91	4/29/91	1100
9104003	6975	4/26/91	4/29/91	1400

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: King County Department of Health
Client Sample Number: N/A
Date of Sample Receipt: N/A
Date of Sample Extraction: 4/25/91
Date of Sample Analysis: 5/1/91

Alden Job Number: 9104025/1
Alden Sample Number: Blank
Analysis Method: EPA 8270
Matrix: Soil
Reporting Units: ug/kg

Compound Name	CAS No.	Reporting Limit	Result
BASE/NEUTRAL EXTRACTABLE COMPOUNDS			
Acenaphthene	83-32-9	170	< 170
Acenaphthylene	208-96-8	170	< 170
Anthracene	120-12-7	170	< 170
Benzo(a)anthracene	56-55-3	170	< 170
Benzo(b)fluoranthene	205-99-2	170	< 170
Benzo(k)fluoranthene	207-08-9	170	< 170
Benzo(a)pyrene	50-32-8	170	< 170
Benzo(g,h,i)perylene	191-24-2	170	< 170
Chrysene	218-01-9	170	< 170
Dibenzo(a,h)anthracene	53-70-3	170	< 170
Dibenzofuran	132-64-9	170	< 170
Fluoranthene	206-44-0	170	< 170
Fluorene	86-73-7	170	< 170
Indeno(1,2,3-c,d)pyrene	193-39-5	170	< 170
2-Methylnaphthalene	91-57-6	170	< 170
Naphthalene	91-20-3	170	< 170
Phenanthrene	85-01-8	170	< 170
Pyrene	129-00-0	170	< 170

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: King County Department of Health
Client Sample Number: 9104001
Date of Sample Receipt: 4/16/91
Date of Sample Extraction: 4/25/91
Date of Sample Analysis: 5/1/91

Alden Job Number: 9104025/1
Alden Sample Number: 6973A
Analysis Method: EPA 8270
Matrix: Soil
Reporting Units: ug/kg

Compound Name	CAS No.	Reporting Limit	Result
BASE/NEUTRAL EXTRACTABLE COMPOUNDS			
Acenaphthene	83-32-9	190	< 190
Acenaphthylene	208-96-8	190	< 190
Anthracene	120-12-7	190	190
Benzo(a)anthracene	56-55-3	190	550
Benzo(b)fluoranthene	205-99-2	190	550
Benzo(k)fluoranthene	207-08-9	190	550
Benzo(a)pyrene	50-32-8	190	470
Benzo(g,h,i)perylene	191-24-2	190	340
Chrysene	218-01-9	190	880
Dibenzo(a,h)anthracene	53-70-3	190	< 190
Dibenzofuran	132-64-9	190	< 190
Fluoranthene	206-44-0	190	1300
Fluorene	86-73-7	190	< 190
Indeno(1,2,3-c,d)pyrene	193-39-5	190	300
2-Methylnaphthalene	91-57-6	190	< 190
Naphthalene	91-20-3	190	< 190
Phenanthrene	85-01-8	190	870
Pyrene	129-00-0	190	1400

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: King County Department of Health	Alden Job Number: 9104025/1
Client Sample Number: 9104002	Alden Sample Number: 6974A
Date of Sample Receipt: 4/16/91	Analysis Method: EPA 8270
Date of Sample Extraction: 4/25/91	Matrix: Soil
Date of Sample Analysis: 5/1/91	Reporting Units: ug/kg

Compound Name	CAS No.	Reporting Limit	Result
BASE/NEUTRAL EXTRACTABLE COMPOUNDS			
Acenaphthene	83-32-9	180	< 180
Acenaphthylene	208-96-8	180	< 180
Anthracene	120-12-7	180	< 180
Benzo(a)anthracene	56-55-3	180	200
Benzo(b)fluoranthene	205-99-2	180	280
Benzo(k)fluoranthene	207-08-9	180	220
Benzo(a)pyrene	50-32-8	180	220
Benzo(g,h,i)perylene	191-24-2	180	200
Chrysene	218-01-9	180	310
Dibenzo(a,h)anthracene	53-70-3	180	< 180
Dibenzofuran	132-64-9	180	< 180
Fluoranthene	206-44-0	180	530
Fluorene	86-73-7	180	< 180
Indeno(1,2,3-c,d)pyrene	193-39-5	180	180
2-Methylnaphthalene	91-57-6	180	< 180
Naphthalene	91-20-3	180	< 180
Phenanthrene	85-01-8	180	330
Pyrene	129-00-0	180	500

Alden Analytical
Laboratories, Inc.

REPORT OF ANALYTICAL RESULTS

Client: King County Department of Health	Alden Job Number: 9104025/1
Client Sample Number: 9104003	Alden Sample Number: 6975A
Date of Sample Receipt: 4/16/91	Analysis Method: EPA 8270
Date of Sample Extraction: 4/25/91	Matrix: Soil
Date of Sample Analysis: 5/1/91	Reporting Units: ug/kg

Compound Name	CAS No.	Reporting Limit	Result
BASE/NEUTRAL EXTRACTABLE COMPOUNDS			
Acenaphthene	83-32-9	210	< 210
Acenaphthylene	208-96-8	210	< 210
Anthracene	120-12-7	210	< 210
Benzo(a)anthracene	56-55-3	210	370
Benzo(b)fluoranthene	205-99-2	210	370
Benzo(k)fluoranthene	207-08-9	210	410
Benzo(a)pyrene	50-32-8	210	370
Benzo(g,h,i)perylene	191-24-2	210	260
Chrysene	218-01-9	210	520
Dibenzo(a,h)anthracene	53-70-3	210	< 210
Dibenzofuran	132-64-9	210	< 210
Fluoranthene	206-44-0	210	1000
Fluorene	86-73-7	210	< 210
Indeno(1,2,3-c,d)pyrene	193-39-5	210	260
2-Methylnaphthalene	91-57-6	210	< 210
Naphthalene	91-20-3	210	< 210
Phenanthrene	85-01-8	210	740
Pyrene	129-00-0	210	980

SOUND ANALYTICAL SERVICES, INC.

SPECIALIZING IN INDUSTRIAL & TOXIC WASTE ANALYSIS

4813 PACIFIC HIGHWAY EAST, TACOMA, WASHINGTON 98424 - TELEPHONE (206)922-2310 - FAX (206)922-5047

Report To: Alden Analytical Labs Date: April 22, 1991

Report On: Analysis of Soil Lab No.: 17095

IDENTIFICATION:
Samples Received on 04-17-91
Project: 9104025/1

TOTAL METALS

ANALYSIS:

	DOT	DOT	RBT
Lab Sample No.	1	2	3
Client Identification	6973B	6974B	6975B
Units	ppm	ppm	ppm
Total Metals:			
Arsenic	< 7.3	10.1	< 7.3
Barium	62.5	100	114
Cadmium	0.43	0.79	0.84
Chromium	26.4	90.1	36.0
Lead	87.9	282	624
Mercury*	0.34	0.38	0.35
Selenium	< 11.0	< 11.0	< 11.0
Silver	8.8	6.6	9.1

Lab Sample No.	4	5	6
Client Identification	6976B	6977B	6978B
Units	ppm	ppm	ppm
Total Metals:			
Arsenic	< 7.3	< 7.3	< 7.3
Barium	40.4	44.9	47.9
Cadmium	0.50	< 0.18	< 0.18
Chromium	21.5	23.1	20.0
Lead	95.9	74.5	44.2
Mercury*	0.23	0.25	0.36
Selenium	< 11.0	< 11.0	< 11.0
Silver	6.2	3.9	0.73

*by Cold Vapor

Continued . . .

is report is issued solely for the use of the person or company to whom it is addressed. This laboratory accepts responsibility only for the due performance of analysis in accordance with lustry acceptable practice. In no event shall Sound Analytical Services, Inc. or its employees be responsible for consequential or special damages in any kind or in any amount.

Memo

March 1, 1989 1990

TO: Tim Sample

FROM: Lyn Faas

SUBJECT: Trace Organics Results for Duwamish/Elliott Bay Wetlands Samples

Attached are pesticide/PCB, volatile, and base/neutral/acid (BNA) extractable semivolatile organic results for the following wetlands water samples collected January 30 as part of the Duwamish/Elliott Bay project:

9000201	Station SW-1
9000202	Station SW-2
9000203	Station SW-3
9000204	Station SW-4

No priority pollutants or hazardous substance list compounds were detected in any of the samples. Two tentatively identified compounds (TICs) were found in the semivolatile fraction of each of the first three stations, but the levels were low and the compounds do not appear to be cause for concern. Please note that the TICs are qualified by a confidence value in the column headed "Q" which rates the degree of similarity between the unknown and the reported compound. A description of the confidence values is attached for your information. The only TIC I was able to locate in the Merck Index was dimethoxymethane, which is also known as methylal. They list uses as perfumery and manufacture of artificial resins.

If you have any questions or would like additional information, please let me know.

cc: Jody Heintzman

METRO

Washington Department of Ecology

Program Code ☐☐☐

Project Code 1K23

Project/Name

SAMPLE DATA & ANALYSIS REQUIRED

☒ Enforcement/Custody ☐ Class II

☐ Possible Toxic/Hazardous Notes

Page 1 of 1

VOA'S
Priority Poll. metals
PCB/Pesticides if sufficient material

SAMPLING DATE Yr	Mo	Da	TIME Hr	Mn	FIELD STATION IDENTIFICATION	LAB SAMPLE NUMBER Wk	Seq	Matrix Code	Source Code	No. of Containers	Turbidity	pH	Conductivity	Total Hardness	Chloride	TS, TSS, TNVS, TNVSS	TSS	% Solids	Nutrients (4)	Ammonia	Nitrate-Nitrite	Total Phosphorous	Ortho-Phosphate	BOD/5 Day	COD Chem Oxy Demand	Fecal Coliform Bacteria	Total Coliform Bacteria	Enterococcus	Fish Bioassay	Base/Neutrals/Acids	Volatile Organics	Pesticides/PCB's	PCB's Only	Purgeable Halocarbons	Herbicides	Hydrocarbon Analysis	Phenolics (AAP)	Oil & Grease	P.P. Metals	EP Tox Metals
90	01	30	11	50	SW-1			10	38	04																				1	1								1	
90	01	30	12	25	SW-2			10	38	04																				1	1								1	
90	01	30	12	40	SW-3			10	38	04																				1	1								1	
90	01	30	13	30	SW-4			10	38	04																				1	1								1	

METALS Specific List
Total
☐ Recoverable
☒ Totals
☐ Dissolved

Project Officer M. Turvey

Sampler(s) B. Trejo
D. Cargill
M. Turvey

Recorder D. Cart

Date 1/30/90

Chain Of Custody Record

Relinquished By:	Received By:	Yr	Mo	Da	Hr	Mn	Seal I.D.	Condition of Seals	Comments
Martha Turvey	Daniel	90	01	30	15	21			

Ecy 040-115 Rev. 7/87

Laboratory Copy White
Project Office Copy Yellow
Field or Office Copy Pink

GC/ECD PESTICIDES ORGANIC ANALYSIS REPORT

SAMPLE NUMBER: 9000201

MATRIX: Wetlands Water | AMOUNT ANALYZED: 500.0 ml

INSTRUMENT ID: HP-5880 | DILN. FACTOR: 5.0

COMPOUND NAME	Wet DL (ppb)	Wet Conc (ppb)
ALPHA-BHC	0.10	ND
BETA-BHC	0.10	ND
DELTA-BHC	0.10	ND
GAMMA-BHC (LINDANE)	0.10	ND
HEPTACHLOR	0.10	ND
ALDRIN	0.10	ND
HEPTACHLOR EPOXIDE	0.10	ND
ENDOSULFAN I	0.10	ND
DIELDRIN	0.10	ND
4,4-DDE	0.10	ND
ENDRIN	0.10	ND
ENDOSULFAN II	0.10	ND
4,4-DDD	0.10	ND
ENDRIN ALDEHYDE	0.10	ND
ENDOSULFAN SULFATE	0.10	ND
4,4-DDT	0.10	ND
METHOXYCHLOR	0.50	ND
CHLORDANE	0.50	ND
TOXAPHENE	1.00	ND

GC/ECD PCB ORGANIC ANALYSIS REPORT

MATRIX: Wetlands Water | AMOUNT ANALYZED: 500.0 ml

INSTRUMENT ID: HP-5880 | DILN. FACTOR: 5.0

COMPOUND NAME	Wet DL (ppb)	Wet Conc (ppb)
AROCHLOR-1016	1.00	ND
AROCHLOR-1221	1.00	ND
AROCHLOR-1232	1.00	ND
AROCHLOR-1242	1.00	ND
AROCHLOR-1248	1.00	ND
AROCHLOR-1254	1.00	ND
AROCHLOR-1260	1.00	ND

Note - DL means Sample Detection Limits (based on 100% recovery).
NA means Not Analyzed, ND means Not Detected.

GCMS METHOD 624 VOLATILES ORGANIC ANALYSIS REPORT Page 1 of 2

SAMPLE NUMBER: 9000201

MATRIX: WASTEWATER AMOUNT ANALYZED: 5.0 ML

INSTRUMENT ID: 4500C DILN. FACTOR: 1.0

PRIORITY POLLUTANTS	Wet DL (ppb)	Wet Conc (ppb)
CHLOROMETHANE	2.00	ND
VINYLCHLORIDE	2.00	ND
BROMOMETHANE	2.00	ND
CHLOROETHANE	2.00	ND
TRICHLOROFLUOROMETHANE	2.00	ND
ACROLEIN	10.00	ND
1,1-DICHLOROETHYLENE	2.00	ND
METHYLENE CHLORIDE	10.00	ND
ACRYLONITRILE	10.00	ND
TRANS-1,2-DICHLOROETHYLENE	2.00	ND
1,1-DICHLOROETHANE	2.00	ND
CHLOROFORM	2.00	ND
1,1,1-TRICHLOROETHANE	2.00	ND
CARBON TETRACHLORIDE	2.00	ND
BENZENE	2.00	ND
1,2-DICHLOROETHANE	2.00	ND
1,1,2-TRICHLOROETHYLENE	2.00	ND
1,2-DICHLOROPROPANE	2.00	ND
BROMODICHLOROMETHANE	2.00	ND
2-CHLOROETHYLVINYLETHER	2.00	ND
TRANS-1,3-DICHLOROPROPENE	2.00	ND
TOLUENE	2.00	ND
CIS-1,3-DICHLOROPROPENE	2.00	ND
1,1,2-TRICHLOROETHANE	2.00	ND
TETRACHLOROETHYLENE	2.00	ND
CHLORODIBROMOMETHANE	2.00	ND
CHLOROBENZENE	2.00	ND
ETHYL BENZENE	2.00	ND
BROMOFORM	2.00	ND
1,1,2,2-TETRACHLOROETHANE	2.00	ND

SAMPLE NUMBER: 9000201

HAZARDOUS SUBSTANCES LIST	Wet DL (ppb)	Wet Conc (ppb)
ACETONE	10.00	ND
CARBON DISULFIDE	2.00	ND
VINYL ACETATE	10.00	ND
2-BUTANONE (MEK)	10.00	ND
4-METHYL-2-PENTANONE (MIBK)	10.00	ND
2-HEXANONE	10.00	ND
TOTAL XYLENE	2.00	ND
STYRENE	2.00	ND

Note - DL means Sample Detection Limits (based on 100% recovery).
NA means Not Analyzed, ND means Not Detected.

TICS: NONE

GCMS METHOD 625 SEMI-VOLATILES ORGANIC ANALYSIS REPORT

SAMPLE NUMBER: 9000201

MATRIX: WASTEWATER AMOUNT ANALYZED: 500.0 ML

INSTRUMENT ID: 4500B DILN. FACTOR: 1.0

PRIORITY POLLUTANTS	Wet DL (ppb)	Wet Conc (ppb)
N-NITROSODIMETHYLAMINE	6.00	ND
PHENOL	6.00	ND
BIS(2-CHLOROETHYL)ETHER	1.00	ND
2-CHLOROPHENOL	4.00	ND
1,3-DICHLOROBENZENE	1.00	ND
1,4-DICHLOROBENZENE	1.00	ND
1,2-DICHLOROBENZENE	1.00	ND
BIS(2-CHLOROISOPROPYL)ETHER	4.00	ND
N-NITROSODI-N-PROPYLAMINE	2.00	ND
HEXACHLOROETHANE	2.00	ND
NITROBENZENE	2.00	ND
ISOPHORONE	2.00	ND
2-NITROPHENOL	2.00	ND
2,4-DIMETHYLPHENOL	2.00	ND
BIS(2-CHLOROETHOXY)METHANE	2.00	ND
2,4-DICHLOROPHENOL	2.00	ND
1,2,4-TRICHLOROBENZENE	1.00	ND
NAPHTHALENE	3.00	ND
HEXACHLOROBUTADIENE	2.00	ND
4-CHLORO-3-METHYLPHENOL	4.00	ND
HEXACHLOROCYCLOPENTADIENE	2.00	ND
2,4,6-TRICHLOROPHENOL	8.00	ND
2-CHLORONAPHTHALENE	1.00	ND
ACENAPHTHYLENE	1.00	ND
DIMETHYL PHTHALATE	0.60	ND
2,6-DINITROTOLUENE	0.80	ND
ACENAPHTHENE	0.80	ND
2,4-DINITROPHENOL	4.00	ND
4-NITROPHENOL	4.00	ND
2,4-DINITROTOLUENE	0.80	ND
FLUORENE	1.00	ND
DIETHYL PHTHALATE	2.00	ND
4-CHLOROPHENYL PHENYL ETHER	1.00	ND
4,6-DINITRO-O-CRESOL	4.00	ND
N-NITROSODIPHENYLAMINE *	2.00	ND
1,2-DIPHENYLHYDRAZINE **	4.00	ND
4-BROMOPHENYL PHENYL ETHER	0.60	ND
HEXACHLOROBENZENE	1.00	ND
PENTACHLOROPHENOL	2.00	ND
PHENANTHRENE	1.00	ND
ANTHRACENE	1.00	ND

SAMPLE NUMBER: 9000201

PRIORITY POLLUTANTS	Wet DL (ppb)	Wet Conc (ppb)
DI-N-BUTYLPHTHALATE	2.00	ND
FLUORANTHENE	1.20	ND
BENZIDINE	48.00	ND
PYRENE	1.00	ND
BENZYL BUTYL PHTHALATE	1.00	ND
BENZO(A)ANTHRACENE	1.00	ND
CHRYSENE	1.00	ND
3,3'-DICHLOROBENZIDINE	2.00	ND
BIS(2-ETHYLHEXYL)PHTHALATE	1.00	ND
DI-N-OCTYL PHTHALATE	1.00	ND
BENZO(B)FLUORANTHENE	3.00	ND
BENZO(K)FLUORANTHENE	3.00	ND
BENZO(A)PYRENE	2.00	ND
INDENO(1,2,3-CD)PYRENE	2.00	ND
DIBENZO(A,H)ANTHRACENE	3.00	ND
BENZO(G,H,I)PERYLENE	2.00	ND

HAZARDOUS SUBSTANCES LIST	Wet DL (ppb)	Wet Conc (ppb)
ANILINE	4.00	ND
BENZYL ALCOHOL	2.00	ND
2-METHYLPHENOL	2.00	ND
4-METHYLPHENOL	2.00	ND
BENZOIC ACID	6.00	ND
4-CHLOROANILINE	4.00	ND
2-METHYLNAPHTHALENE	3.00	ND
2,4,5-TRICHLOROPHENOL	8.00	ND
2-NITROANILINE	6.00	ND
3-NITROANILINE	6.00	ND
DIBENZOFURAN	2.00	ND
4-NITROANILINE	6.00	ND

* - Compound detected as Diphenylamine
** - Compound detected as Azobenzene
Note - DL means Sample Detection Limits (based on 100% recovery).
NA means Not Analyzed, ND means Not Detected.

SEMIVOLATILE TENTATIVELY IDENTIFIED COMPOUNDS

le No.: 9000201 Sample: DOT WETLANDS SW1
ethod: EPA 625 Matrix: WASTEWATER
Init. Amt.: 500.0 ML Dilution: 1.0 % Solids: 0.0

No.	Compound Name	CAS#	Scan	Q	Est Conc
1	METHANE, DIMETHOXY-	109-87-5	450	2	48ppb
2	1,2-BENZENEDICARBOXYLIC ACID, DIISOO*	27554-26-3	2144	2	13ppb

GC/ECD PESTICIDES ORGANIC ANALYSIS REPORT

SAMPLE NUMBER: 9000202

MATRIX: Wetlands Water | AMOUNT ANALYZED: 500.0 ml

INSTRUMENT ID: HP-5880 | DILN. FACTOR: 5.0

COMPOUND NAME	Wet DL (ppb)	Wet Conc (ppb)
ALPHA-BHC	0.10	ND
BETA-BHC	0.10	ND
DELTA-BHC	0.10	ND
GAMMA-BHC (LINDANE)	0.10	ND
HEPTACHLOR	0.10	ND
ALDRIN	0.10	ND
HEPTACHLOR EPOXIDE	0.10	ND
ENDOSULFAN I	0.10	ND
DIELDRIN	0.10	ND
4,4-DDE	0.10	ND
ENDRIN	0.10	ND
ENDOSULFAN II	0.10	ND
4,4-DDD	0.10	ND
ENDRIN ALDEHYDE	0.10	ND
ENDOSULFAN SULFATE	0.10	ND
4,4-DDT	0.10	ND
METHOXYCHLOR	0.50	ND
CHLORDANE	0.50	ND
TOXAPHENE	1.00	ND

GC/ECD PCB ORGANIC ANALYSIS REPORT

MATRIX: Wetlands Water | AMOUNT ANALYZED: 500.0 ml

INSTRUMENT ID: HP-5880 | DILN. FACTOR: 5.0

COMPOUND NAME	Wet DL (ppb)	Wet Conc (ppb)
AROCHLOR-1016	1.00	ND
AROCHLOR-1221	1.00	ND
AROCHLOR-1232	1.00	ND
AROCHLOR-1242	1.00	ND
AROCHLOR-1248	1.00	ND
AROCHLOR-1254	1.00	ND
AROCHLOR-1260	1.00	ND

Note - DL means Sample Detection Limits (based on 100% recovery).
NA means Not Analyzed, ND means Not Detected.

GCMS METHOD 624 VOLATILES ORGANIC ANALYSIS REPORT Page 1 of 2

SAMPLE NUMBER: 9000202

MATRIX: WASTEWATER AMOUNT ANALYZED: 5.0 ML

INSTRUMENT ID: 4500C DILN. FACTOR: 1.0

PRIORITY POLLUTANTS	Wet DL (ppb)	Wet Conc (ppb)
CHLOROMETHANE	2.00	ND
VINYLCHLORIDE	2.00	ND
BROMOMETHANE	2.00	ND
CHLOROETHANE	2.00	ND
TRICHLOROFLUOROMETHANE	2.00	ND
ACROLEIN	10.00	ND
1,1-DICHLOROETHYLENE	2.00	ND
METHYLENE CHLORIDE	10.00	ND
ACRYLONITRILE	10.00	ND
TRANS-1,2-DICHLOROETHYLENE	2.00	ND
1,1-DICHLOROETHANE	2.00	ND
CHLOROFORM	2.00	ND
1,1,1-TRICHLOROETHANE	2.00	ND
CARBON TETRACHLORIDE	2.00	ND
BENZENE	2.00	ND
1,2-DICHLOROETHANE	2.00	ND
1,1,2-TRICHLOROETHYLENE	2.00	ND
1,2-DICHLOROPROPANE	2.00	ND
BROMODICHLOROMETHANE	2.00	ND
2-CHLOROETHYLVINYLETHER	2.00	ND
TRANS-1,3-DICHLOROPROPENE	2.00	ND
TOLUENE	2.00	ND
CIS-1,3-DICHLOROPROPENE	2.00	ND
1,1,2-TRICHLOROETHANE	2.00	ND
TETRACHLOROETHYLENE	2.00	ND
CHLORODIBROMOMETHANE	2.00	ND
CHLOROBENZENE	2.00	ND
ETHYL BENZENE	2.00	ND
BROMOFORM	2.00	ND
1,1,2,2-TETRACHLOROETHANE	2.00	ND

GCMS METHOD 624 VOLATILES ORGANIC ANALYSIS REPORT

SAMPLE NUMBER: 9000202

HAZARDOUS SUBSTANCES LIST	Wet DL (ppb)	Wet Conc (ppb)
ACETONE	10.00	ND
CARBON DISULFIDE	2.00	ND
VINYL ACETATE	10.00	ND
2-BUTANONE (MEK)	10.00	ND
4-METHYL-2-PENTANONE (MIBK)	10.00	ND
2-HEXANONE	10.00	ND
TOTAL XYLENE	2.00	ND
STYRENE	2.00	ND

Note - DL means Sample Detection Limits (based on 100% recovery).
NA means Not Analyzed, ND means Not Detected.

TICS: NONE

GCMS METHOD 625 SEMI-VOLATILES ORGANIC ANALYSIS REPORT

SAMPLE NUMBER: 9000202

MATRIX: WASTEWATER AMOUNT ANALYZED: 500.0 ML

INSTRUMENT ID: 4500B DILN. FACTOR: 1.0

PRIORITY POLLUTANTS	Wet DL (ppb)	Wet Conc (ppb)
N-NITROSODIMETHYLAMINE	6.00	ND
PHENOL	6.00	ND
BIS(2-CHLOROETHYL)ETHER	1.00	ND
2-CHLOROPHENOL	4.00	ND
1,3-DICHLOROBENZENE	1.00	ND
1,4-DICHLOROBENZENE	1.00	ND
1,2-DICHLOROBENZENE	1.00	ND
BIS(2-CHLOROISOPROPYL)ETHER	4.00	ND
N-NITROSODI-N-PROPYLAMINE	2.00	ND
HEXACHLOROETHANE	2.00	ND
NITROBENZENE	2.00	ND
ISOPHORONE	2.00	ND
2-NITROPHENOL	2.00	ND
2,4-DIMETHYLPHENOL	2.00	ND
BIS(2-CHLOROETHOXY)METHANE	2.00	ND
2,4-DICHLOROPHENOL	2.00	ND
1,2,4-TRICHLOROBENZENE	1.00	ND
NAPHTHALENE	3.00	ND
HEXACHLOROBUTADIENE	2.00	ND
4-CHLORO-3-METHYLPHENOL	4.00	ND
HEXACHLOROCYCLOPENTADIENE	2.00	ND
2,4,6-TRICHLOROPHENOL	8.00	ND
2-CHLORONAPHTHALENE	1.00	ND
ACENAPHTHYLENE	1.00	ND
DIMETHYL PHTHALATE	0.60	ND
2,6-DINITROTOLUENE	0.80	ND
ACENAPHTHENE	0.80	ND
2,4-DINITROPHENOL	4.00	ND
4-NITROPHENOL	4.00	ND
2,4-DINITROTOLUENE	0.80	ND
FLUORENE	1.00	ND
DIETHYL PHTHALATE	2.00	ND
4-CHLOROPHENYL PHENYL ETHER	1.00	ND
4,6-DINITRO-O-CRESOL	4.00	ND
N-NITROSODIPHENYLAMINE *	2.00	ND
1,2-DIPHENYLHYDRAZINE **	4.00	ND
4-BROMOPHENYL PHENYL ETHER	0.60	ND
HEXACHLOROBENZENE	1.00	ND
PENTACHLOROPHENOL	2.00	ND
PHENANTHRENE	1.00	ND
ANTHRACENE	1.00	ND

SAMPLE NUMBER: 9000202

PRIORITY POLLUTANTS	Wet DL (ppb)	Wet Conc (ppb)
DI-N-BUTYLPHTHALATE	2.00	ND
FLUORANTHENE	1.20	ND
BENZIDINE	48.00	ND
PYRENE	1.00	ND
BENZYL BUTYL PHTHALATE	1.00	ND
BENZO(A)ANTHRACENE	1.00	ND
CHRYSENE	1.00	ND
3,3'-DICHLOROBENZIDINE	2.00	ND
BIS(2-ETHYLHEXYL)PHTHALATE	1.00	ND
DI-N-OCTYL PHTHALATE	1.00	ND
BENZO(B)FLUORANTHENE	3.00	ND
BENZO(K)FLUORANTHENE	3.00	ND
BENZO(A)PYRENE	2.00	ND
INDENO(1,2,3-CD)PYRENE	2.00	ND
DIBENZO(A,H)ANTHRACENE	3.00	ND
BENZO(G,H,I)PERYLENE	2.00	ND

HAZARDOUS SUBSTANCES LIST	Wet DL (ppb)	Wet Conc (ppb)
ANILINE	4.00	ND
BENZYL ALCOHOL	2.00	ND
2-METHYLPHENOL	2.00	ND
4-METHYLPHENOL	2.00	ND
BENZOIC ACID	6.00	ND
4-CHLOROANILINE	4.00	ND
2-METHYLNAPHTHALENE	3.00	ND
2,4,5-TRICHLOROPHENOL	8.00	ND
2-NITROANILINE	6.00	ND
3-NITROANILINE	6.00	ND
DIBENZOFURAN	2.00	ND
4-NITROANILINE	6.00	ND

* - Compound detected as Diphenylamine
** - Compound detected as Azobenzene
Note - DL means Sample Detection Limits (based on 100% recovery).
NA means Not Analyzed, ND means Not Detected.

SEMIVOLATILE TENTATIVELY IDENTIFIED COMPOUNDS

le No.: 9000202 Sample: DOT WETLANDS SW2
ethod: EPA 625 Matrix: WASTEWATER
Init. Amt.: 500.1 ML Dilution: 1.0 % Solids: 0.0

No.	Compound Name	CAS#	Scan	Q	Est Conc
1	6,10,14-HEXADECATRIEN-1-OL, 3,7,11,1*	36237-66-8	2195	3	12ppb
2	OCTANE, 2,4,6-TRIMETHYL-	62016-37-9	1976	2	8ppb

GC/ECD PESTICIDES ORGANIC ANALYSIS REPORT

SAMPLE NUMBER: 9000203

MATRIX: Wetlands Water | AMOUNT ANALYZED: 500.0 ml

INSTRUMENT ID: HP-5880 | DILN. FACTOR: 5.0

COMPOUND NAME	Wet DL (ppb)	Wet Conc (ppb)
ALPHA-BHC	0.10	ND
BETA-BHC	0.10	ND
DELTA-BHC	0.10	ND
GAMMA-BHC (LINDANE)	0.10	ND
HEPTACHLOR	0.10	ND
ALDRIN	0.10	ND
HEPTACHLOR EPOXIDE	0.10	ND
ENDOSULFAN I	0.10	ND
DIELDRIN	0.10	ND
4,4-DDE	0.10	ND
ENDRIN	0.10	ND
ENDOSULFAN II	0.10	ND
4,4-DDD	0.10	ND
ENDRIN ALDEHYDE	0.10	ND
ENDOSULFAN SULFATE	0.10	ND
4,4-DDT	0.10	ND
METHOXYCHLOR	0.50	ND
CHLORDANE	0.50	ND
TOXAPHENE	1.00	ND

GC/ECD PCB ORGANIC ANALYSIS REPORT

MATRIX: Wetlands Water | AMOUNT ANALYZED: 500.0 ml

INSTRUMENT ID: HP-5880 | DILN. FACTOR: 5.0

COMPOUND NAME	Wet DL (ppb)	Wet Conc (ppb)
AROCHLOR-1016	1.00	ND
AROCHLOR-1221	1.00	ND
AROCHLOR-1232	1.00	ND
AROCHLOR-1242	1.00	ND
AROCHLOR-1248	1.00	ND
AROCHLOR-1254	1.00	ND
AROCHLOR-1260	1.00	ND

Note - DL means Sample Detection Limits (based on 100% recovery).
NA means Not Analyzed, ND means Not Detected.

GCMS METHOD 624 VOLATILES ORGANIC ANALYSIS REPORT Page 1 of 2

SAMPLE NUMBER: 9000203

MATRIX: WASTEWATER AMOUNT ANALYZED: 5.0 ML

INSTRUMENT ID: 4500C DILN. FACTOR: 1.0

PRIORITY POLLUTANTS	Wet DL (ppb)	Wet Conc (ppb)
CHLOROMETHANE	2.00	ND
VINYLCHLORIDE	2.00	ND
BROMOMETHANE	2.00	ND
CHLOROETHANE	2.00	ND
TRICHLOROFLUOROMETHANE	2.00	ND
ACROLEIN	10.00	ND
1,1-DICHLOROETHYLENE	2.00	ND
METHYLENE CHLORIDE	10.00	ND
ACRYLONITRILE	10.00	ND
TRANS-1,2-DICHLOROETHYLENE	2.00	ND
1,1-DICHLOROETHANE	2.00	ND
CHLOROFORM	2.00	ND
1,1,1-TRICHLOROETHANE	2.00	ND
CARBON TETRACHLORIDE	2.00	ND
BENZENE	2.00	ND
1,2-DICHLOROETHANE	2.00	ND
1,1,2-TRICHLOROETHYLENE	2.00	ND
1,2-DICHLOROPROPANE	2.00	ND
BROMODICHLOROMETHANE	2.00	ND
2-CHLOROETHYLVINYLETHER	2.00	ND
TRANS-1,3-DICHLOROPROPENE	2.00	ND
TOLUENE	2.00	ND
CIS-1,3-DICHLOROPROPENE	2.00	ND
1,1,2-TRICHLOROETHANE	2.00	ND
TETRACHLOROETHYLENE	2.00	ND
CHLORODIBROMOMETHANE	2.00	ND
CHLOROBENZENE	2.00	ND
ETHYL BENZENE	2.00	ND
BROMOFORM	2.00	ND
1,1,2,2-TETRACHLOROETHANE	2.00	ND

SAMPLE NUMBER: 9000203

HAZARDOUS SUBSTANCES LIST	Wet DL (ppb)	Wet Conc (ppb)
ACETONE	10.00	ND
CARBON DISULFIDE	2.00	ND
VINYL ACETATE	10.00	ND
2-BUTANONE (MEK)	10.00	ND
4-METHYL-2-PENTANONE (MIBK)	10.00	ND
2-HEXANONE	10.00	ND
TOTAL XYLENE	2.00	ND
STYRENE	2.00	ND

Note - DL means Sample Detection Limits (based on 100% recovery).
NA means Not Analyzed, ND means Not Detected.

TICS: NONE

GCMS METHOD 625 SEMI-VOLATILES ORGANIC ANALYSIS REPORT

SAMPLE NUMBER: 9000203

MATRIX: WASTEWATER AMOUNT ANALYZED: 500.0 ML

INSTRUMENT ID: 4500B DILN. FACTOR: 1.0

PRIORITY POLLUTANTS	Wet DL (ppb)	Wet Conc (ppb)
N-NITROSODIMETHYLAMINE	6.00	ND
PHENOL	6.00	ND
BIS(2-CHLOROETHYL)ETHER	1.00	ND
2-CHLOROPHENOL	4.00	ND
1,3-DICHLOROBENZENE	1.00	ND
1,4-DICHLOROBENZENE	1.00	ND
1,2-DICHLOROBENZENE	1.00	ND
BIS(2-CHLOROISOPROPYL)ETHER	4.00	ND
N-NITROSODI-N-PROPYLAMINE	2.00	ND
HEXACHLOROETHANE	2.00	ND
NITROBENZENE	2.00	ND
ISOPHORONE	2.00	ND
2-NITROPHENOL	2.00	ND
2,4-DIMETHYLPHENOL	2.00	ND
BIS(2-CHLOROETHOXY)METHANE	2.00	ND
2,4-DICHLOROPHENOL	2.00	ND
1,2,4-TRICHLOROBENZENE	1.00	ND
NAPHTHALENE	3.00	ND
HEXACHLOROBUTADIENE	2.00	ND
4-CHLORO-3-METHYLPHENOL	4.00	ND
HEXACHLOROCYCLOPENTADIENE	2.00	ND
2,4,6-TRICHLOROPHENOL	8.00	ND
2-CHLORONAPHTHALENE	1.00	ND
ACENAPHTHYLENE	1.00	ND
DIMETHYL PHTHALATE	0.60	ND
2,6-DINITROTOLUENE	0.80	ND
ACENAPHTHENE	0.80	ND
2,4-DINITROPHENOL	4.00	ND
4-NITROPHENOL	4.00	ND
2,4-DINITROTOLUENE	0.80	ND
FLUORENE	1.00	ND
DIETHYL PHTHALATE	2.00	ND
4-CHLOROPHENYL PHENYL ETHER	1.00	ND
4,6-DINITRO-O-CRESOL	4.00	ND
N-NITROSODIPHENYLAMINE *	2.00	ND
1,2-DIPHENYLHYDRAZINE **	4.00	ND
4-BROMOPHENYL PHENYL ETHER	0.60	ND
HEXACHLOROBENZENE	1.00	ND
PENTACHLOROPHENOL	2.00	ND
PHENANTHRENE	1.00	ND
ANTHRACENE	1.00	ND

SAMPLE NUMBER: 9000203

PRIORITY POLLUTANTS	Wet DL (ppb)	Wet Conc (ppb)
DI-N-BUTYLPHTHALATE	2.00	ND
FLUORANTHENE	1.20	ND
BENZIDINE	48.00	ND
PYRENE	1.00	ND
BENZYL BUTYL PHTHALATE	1.00	ND
BENZO(A)ANTHRACENE	1.00	ND
CHRYSENE	1.00	ND
3,3'-DICHLOROBENZIDINE	2.00	ND
BIS(2-ETHYLHEXYL)PHTHALATE	1.00	ND
DI-N-OCTYL PHTHALATE	1.00	ND
BENZO(B)FLUORANTHENE	3.00	ND
BENZO(K)FLUORANTHENE	3.00	ND
BENZO(A)PYRENE	2.00	ND
INDENO(1,2,3-CD)PYRENE	2.00	ND
DIBENZO(A,H)ANTHRACENE	3.00	ND
BENZO(G,H,I)PERYLENE	2.00	ND

HAZARDOUS SUBSTANCES LIST	Wet DL (ppb)	Wet Conc (ppb)
ANILINE	4.00	ND
BENZYL ALCOHOL	2.00	ND
2-METHYLPHENOL	2.00	ND
4-METHYLPHENOL	2.00	ND
BENZOIC ACID	6.00	ND
4-CHLOROANILINE	4.00	ND
2-METHYLNAPHTHALENE	3.00	ND
2,4,5-TRICHLOROPHENOL	8.00	ND
2-NITROANILINE	6.00	ND
3-NITROANILINE	6.00	ND
DIBENZOFURAN	2.00	ND
4-NITROANILINE	6.00	ND

* - Compound detected as Diphenylamine
** - Compound detected as Azobenzene
Note - DL means Sample Detection Limits (based on 100% recovery).
NA means Not Analyzed, ND means Not Detected.

SEMIVOLATILE TENTATIVELY IDENTIFIED COMPOUNDS

le No.: 9000203 Sample: DOT WETLANDS SW3
ethod: EPA 625 Matrix: WASTEWATER
Init. Amt.: 500.0 ML Dilution: 1.0 % Solids: 0.0

No.	Compound Name	CAS#	Scan	Q	Est Conc
1	METHANE, DIMETHOXY-	109-87-5	460	2	57ppb
2	1,2-BENZENEDICARBOXYLIC ACID, DIISOO*	27554-26-3	2145	2	9ppb

GC/ECD PESTICIDES ORGANIC ANALYSIS REPORT

SAMPLE NUMBER: 9000204

MATRIX: Wetlands Water

AMOUNT ANALYZED: 500.0 ml

INSTRUMENT ID: HP-5880

DILN. FACTOR: 5.0

COMPOUND NAME	Wet DL (ppb)	Wet Conc (ppb)
ALPHA-BHC	0.10	ND
BETA-BHC	0.10	ND
DELTA-BHC	0.10	ND
GAMMA-BHC (LINDANE)	0.10	ND
HEPTACHLOR	0.10	ND
ALDRIN	0.10	ND
HEPTACHLOR EPOXIDE	0.10	ND
ENDOSULFAN I	0.10	ND
DIELDRIN	0.10	ND
4,4-DDE	0.10	ND
ENDRIN	0.10	ND
ENDOSULFAN II	0.10	ND
4,4-DDD	0.10	ND
ENDRIN ALDEHYDE	0.10	ND
ENDOSULFAN SULFATE	0.10	ND
4,4-DDT	0.10	ND
METHOXYCHLOR	0.50	ND
CHLORDANE	0.50	ND
TOXAPHENE	1.00	ND

GC/ECD PCB ORGANIC ANALYSIS REPORT

MATRIX: Wetlands Water

AMOUNT ANALYZED: 500.0 ml

INSTRUMENT ID: HP-5880

DILN. FACTOR: 5.0

COMPOUND NAME	Wet DL (ppb)	Wet Conc (ppb)
AROCHLOR-1016	1.00	ND
AROCHLOR-1221	1.00	ND
AROCHLOR-1232	1.00	ND
AROCHLOR-1242	1.00	ND
AROCHLOR-1248	1.00	ND
AROCHLOR-1254	1.00	ND
AROCHLOR-1260	1.00	ND

Note - DL means Sample Detection Limits (based on 100% recovery).
NA means Not Analyzed, ND means Not Detected.

GCMS METHOD 624 VOLATILES ORGANIC ANALYSIS REPORT Page 1 of 2

SAMPLE NUMBER: 9000204

MATRIX: WASTEWATER AMOUNT ANALYZED: 5.0 ML

INSTRUMENT ID: 4500C DILN. FACTOR: 1.0

PRIORITY POLLUTANTS	Wet DL (ppb)	Wet Conc (ppb)
CHLOROMETHANE	2.00	ND
VINYLCHLORIDE	2.00	ND
BROMOMETHANE	2.00	ND
CHLOROETHANE	2.00	ND
TRICHLOROFLUOROMETHANE	2.00	ND
ACROLEIN	10.00	ND
1,1-DICHLOROETHYLENE	2.00	ND
METHYLENE CHLORIDE	10.00	ND
ACRYLONITRILE	10.00	ND
TRANS-1,2-DICHLOROETHYLENE	2.00	ND
1,1-DICHLOROETHANE	2.00	ND
CHLOROFORM	2.00	ND
1,1,1-TRICHLOROETHANE	2.00	ND
CARBON TETRACHLORIDE	2.00	ND
BENZENE	2.00	ND
1,2-DICHLOROETHANE	2.00	ND
1,1,2-TRICHLOROETHYLENE	2.00	ND
1,2-DICHLOROPROPANE	2.00	ND
BROMODICHLOROMETHANE	2.00	ND
2-CHLOROETHYLVINYLETHER	2.00	ND
TRANS-1,3-DICHLOROPROPENE	2.00	ND
TOLUENE	2.00	ND
CIS-1,3-DICHLOROPROPENE	2.00	ND
1,1,2-TRICHLOROETHANE	2.00	ND
TETRACHLOROETHYLENE	2.00	ND
CHLORODIBROMOMETHANE	2.00	ND
CHLOROBENZENE	2.00	ND
ETHYL BENZENE	2.00	ND
BROMOFORM	2.00	ND
1,1,2,2-TETRACHLOROETHANE	2.00	ND

GCMS METHOD 624 VOLATILES ORGANIC ANALYSIS REPORT

SAMPLE NUMBER: 9000204

HAZARDOUS SUBSTANCES LIST	Wet DL (ppb)	Wet Conc (ppb)
ACETONE	10.00	ND
CARBON DISULFIDE	2.00	ND
VINYL ACETATE	10.00	ND
2-BUTANONE (MEK)	10.00	ND
4-METHYL-2-PENTANONE (MIBK)	10.00	ND
2-HEXANONE	10.00	ND
TOTAL XYLENE	2.00	ND
STYRENE	2.00	ND

Note - DL means Sample Detection Limits (based on 100% recovery).
NA means Not Analyzed, ND means Not Detected.

TICS:NONE

GCMS METHOD 625 SEMI-VOLATILES ORGANIC ANALYSIS REPORT

SAMPLE NUMBER: 9000204

MATRIX: WASTEWATER AMOUNT ANALYZED: 500.0 ML

INSTRUMENT ID: 4500B DILN. FACTOR: 1.0

PRIORITY POLLUTANTS	Wet DL (ppb)	Wet Conc (ppb)
N-NITROSODIMETHYLAMINE	6.00	ND
PHENOL	6.00	ND
BIS(2-CHLOROETHYL)ETHER	1.00	ND
2-CHLOROPHENOL	4.00	ND
1,3-DICHLOROBENZENE	1.00	ND
1,4-DICHLOROBENZENE	1.00	ND
1,2-DICHLOROBENZENE	1.00	ND
BIS(2-CHLOROISOPROPYL)ETHER	4.00	ND
N-NITROSODI-N-PROPYLAMINE	2.00	ND
HEXACHLOROETHANE	2.00	ND
NITROBENZENE	2.00	ND
ISOPHORONE	2.00	ND
2-NITROPHENOL	2.00	ND
2,4-DIMETHYLPHENOL	2.00	ND
BIS(2-CHLOROETHOXY)METHANE	2.00	ND
2,4-DICHLOROPHENOL	2.00	ND
1,2,4-TRICHLOROBENZENE	1.00	ND
NAPHTHALENE	3.00	ND
HEXACHLOROBUTADIENE	2.00	ND
4-CHLORO-3-METHYLPHENOL	4.00	ND
HEXACHLOROCYCLOPENTADIENE	2.00	ND
2,4,6-TRICHLOROPHENOL	8.00	ND
2-CHLORONAPHTHALENE	1.00	ND
ACENAPHTHYLENE	1.00	ND
DIMETHYL PHTHALATE	0.60	ND
2,6-DINITROTOLUENE	0.80	ND
ACENAPHTHENE	0.80	ND
2,4-DINITROPHENOL	4.00	ND
4-NITROPHENOL	4.00	ND
2,4-DINITROTOLUENE	0.80	ND
FLUORENE	1.00	ND
DIETHYL PHTHALATE	2.00	ND
4-CHLOROPHENYL PHENYL ETHER	1.00	ND
4,6-DINITRO-O-CRESOL	4.00	ND
N-NITROSODIPHENYLAMINE *	2.00	ND
1,2-DIPHENYLHYDRAZINE **	4.00	ND
4-BROMOPHENYL PHENYL ETHER	0.60	ND
HEXACHLOROBENZENE	1.00	ND
PENTACHLOROPHENOL	2.00	ND
PHENANTHRENE	1.00	ND
ANTHRACENE	1.00	ND

SAMPLE NUMBER: 9000204

PRIORITY POLLUTANTS	Wet DL (ppb)	Wet Conc (ppb)
DI-N-BUTYLPHTHALATE	2.00	ND
FLUORANTHENE	1.20	ND
BENZIDINE	48.00	ND
PYRENE	1.00	ND
BENZYL BUTYL PHTHALATE	1.00	ND
BENZO(A)ANTHRACENE	1.00	ND
CHRYSENE	1.00	ND
3,3'-DICHLOROBENZIDINE	2.00	ND
BIS(2-ETHYLHEXYL)PHTHALATE	1.00	ND
DI-N-OCTYL PHTHALATE	1.00	ND
BENZO(B)FLUORANTHENE	3.00	ND
BENZO(K)FLUORANTHENE	3.00	ND
BENZO(A)PYRENE	2.00	ND
INDENO(1,2,3-CD)PYRENE	2.00	ND
DIBENZO(A,H)ANTHRACENE	3.00	ND
BENZO(G,H,I)PERYLENE	2.00	ND

HAZARDOUS SUBSTANCES LIST	Wet DL (ppb)	Wet Conc (ppb)
ANILINE	4.00	ND
BENZYL ALCOHOL	2.00	ND
2-METHYLPHENOL	2.00	ND
4-METHYLPHENOL	2.00	ND
BENZOIC ACID	6.00	ND
4-CHLOROANILINE	4.00	ND
2-METHYLNAPHTHALENE	3.00	ND
2,4,5-TRICHLOROPHENOL	8.00	ND
2-NITROANILINE	6.00	ND
3-NITROANILINE	6.00	ND
DIBENZOFURAN	2.00	ND
4-NITROANILINE	6.00	ND

* - Compound detected as Diphenylamine
** - Compound detected as Azobenzene
Note - DL means Sample Detection Limits (based on 100% recovery).
NA means Not Analyzed, ND means Not Detected.

Laucks 82 YEARS
Testing Laboratories, Inc.
940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063
Chemistry, Microbiology, and Technical Services

CLIENT: Wa. Dept. Of Transportation
15325 S.E. 30th Pl.
Bellevue, WA. 98007

ATTN : Joe Marteeny/Mail Stop 119

Work ID : -
Taken By : Laucks
Transported by: Laucks
Type : Water

Certificate of Analysis

Work Order# : 90-02-103
DATE RECEIVED : 02/06/90
DATE OF REPORT: REOPENED

SAMPLE IDENTIFICATION:

	Sample Description	Collection Date		Sample Description	Collection Date
01A	Site 1 South East Pond	02/06/90	02B	Site 2 North West Pond	02/06/90
01B	Site 1 South East Pond	02/06/90	02C	Site 2 North West Pond	02/06/90
01C	Site 1 South East Pond	02/06/90	03AQ	Method Blank	N/A
02A	Site 2 North West Pond	02/06/90	04AQ	Method Blank	N/A

Samples were taken by Laucks on 02/06/90 at a site 1/2 mile south of 509 & 116th cut-off on the east side of Hwy 99.
The flag "U" indicates the analyte of interest was not detected, to the limit of detection shown.

Unless otherwise instructed all samples will be discarded on 04/06/90

Respectfully submitted,
Laucks Testing Laboratories, Inc.

J. M. Owens

Laucks 82 YEARS
Testing Laboratories, Inc.
940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063
Chemistry, Microbiology, and Technical Services

CLIENT : Wa. Dept. Of Transportation

Certificate of Analysis

Work Order # 90-02-103

TESTS PERFORMED AND RESULTS:

Analyte	Units	01	02
Cadmium (Method 213.1)	mg/L	0.002 U	0.002 U
Chromium (Method 218.1)	mg/L	0.005 U	0.005 U
Copper (Method 220.1)	mg/L	0.011	0.005
Lead	mg/L	0.01 U	0.01 U
Mercury (Method 245.1)	mg/L	0.001 U	0.001 U
Nickel (Method 249.1)	mg/L	0.01	0.01 U
Pentachlorophenol	ug/L	4.0	1.0 U
Total Organic Halogens TOX	mg/L	0.03	0.02
Total PCBs	ug/L	0.5 U	0.5 U
Zinc (Method 289.1)	mg/L	0.012	0.012

Laucks 82 years
Testing Laboratories, Inc.
940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063
Chemistry, Microbiology, and Technical Services

REPORT ON SAMPLE: 9002103-01A
Client Sample ID: Site 1 South East Pond

Date Received : 02/06/90
Date Extracted : 02/08/90
Test Code : 8100

Collection Date : 02/06/90
Date Analyzed : N/A
Test Method : SW8100
Extraction Method : 3510GP

Report Units : ug/L

Compound	Result		SDL	Analysis Date	Confirmation Date
Naphthalene.....	2	U	2.0	02/15/90	N/A
2-Methylnaphthalene....	2		2.0	02/15/90	N/A
Acenaphthylene.....	2	U	2.0	02/15/90	N/A
Acenaphthene.....	2	U	2.0	02/15/90	N/A
Fluorene.....	2	U	2.0	02/15/90	N/A
Phenanthrene.....	2	U	2.0	02/15/90	N/A
Anthracene.....	2	U	2.0	02/15/90	N/A
Fluoranthene.....	2	U	2.0	02/15/90	N/A
Pyrene.....	2	U	2.0	02/15/90	N/A
Benzo(a)anthracene.....	2	U	2.0	02/15/90	N/A
Chrysene.....	2	U	2.0	02/15/90	N/A
Benzo(b)fluoranthene...	4	U	4.0	02/15/90	N/A
Benzo(k)fluoranthene...	4	U	4.0	02/15/90	N/A
Benzo(a)pyrene.....	4	U	4.0	02/15/90	N/A
Indeno(123,cd)pyrene...	4	U	4.0	02/15/90	N/A
Dibenzo(ah)anthracene..	4	U	4.0	02/15/90	N/A
Benzo(ghi)perylene.....	4	U	4.0	02/15/90	N/A

Surrogate recovery report for sample 9002103-01A

Surrogate	Percent Recovery	Limits: Min.	Max.
3-methylcholanthrene.....	23.	20.0	160.0
Biphenyl.....	81.	30.0	131.0
Indene.....	67.	20.0	160.0

Laucks 82
Testing Laboratories, Inc.
940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063
Chemistry, Microbiology, and Technical Services

REPORT ON SAMPLE: 9002103-02A
Client Sample ID: Site 2 North West Pond

Date Received : 02/06/90
Date Extracted : 02/08/90
Test Code : 8100

Collection Date : 02/06/90
Date Analyzed : N/A
Test Method : SW8100
Extraction Method : 3510GP

Report Units : ug/L

Compound	Result		SDL	Analysis Date	Confirmation Date
Naphthalene.....	2	U	2.0	02/15/90	N/A
2-Methylnaphthalene....	2	U	2.0	02/15/90	N/A
Acenaphthylene.....	2	U	2.0	02/15/90	N/A
Acenaphthene.....	2	U	2.0	02/15/90	N/A
Fluorene.....	2	U	2.0	02/15/90	N/A
Phenanthrene.....	2	U	2.0	02/15/90	N/A
Anthracene.....	2	U	2.0	02/15/90	N/A
Fluoranthene.....	2	U	2.0	02/15/90	N/A
Pyrene.....	2	U	2.0	02/15/90	N/A
Benzo(a)anthracene.....	2	U	2.0	02/15/90	N/A
Chrysene.....	2	U	2.0	02/15/90	N/A
Benzo(b)fluoranthene...	4	U	4.0	02/15/90	N/A
Benzo(k)fluoranthene...	4	U	4.0	02/15/90	N/A
Benzo(a)pyrene.....	4	U	4.0	02/15/90	N/A
Indeno(123,cd)pyrene...	4	U	4.0	02/15/90	N/A
Dibenzo(ah)anthracene..	4	U	4.0	02/15/90	N/A
Benzo(ghi)perylene.....	4	U	4.0	02/15/90	N/A

Surrogate recovery report for sample 9002103-02A

Surrogate	Percent Recovery	Limits: Min.	Max.
3-methylcholanthrene.....	27.	20.0	160.0
Biphenyl.....	78.	30.0	131.0
Indene.....	75.	20.0	160.0

Laucks 82 years
Testing Laboratories, Inc.
940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063
Chemistry, Microbiology, and Technical Services

REPORT ON SAMPLE: 9002103-04A
Client Sample ID: Method Blank

Date Received : 02/06/90
Date Extracted : 02/08/90
Test Code : 8100

Collection Date :
Date Analyzed : N/A
Test Method : SW8100
Extraction Method : 3510GF

Report Units : ug/L

Compound	Result		SDL	Analysis Date	Confirmation Date
Naphthalene	2	U	2.0	02/15/90	N/A
2-Methylnaphthalene	2	U	2.0	02/15/90	N/A
Acenaphthylene	2	U	2.0	02/15/90	N/A
Acenaphthene	2	U	2.0	02/15/90	N/A
Fluorene	2	U	2.0	02/15/90	N/A
Phenanthrene	2	U	2.0	02/15/90	N/A
Anthracene	2	U	2.0	02/15/90	N/A
Fluoranthene	2	U	2.0	02/15/90	N/A
Pyrene	2	U	2.0	02/15/90	N/A
Benzo(a)anthracene	2	U	2.0	02/15/90	N/A
Chrysene	2	U	2.0	02/15/90	N/A
Benzo(b)fluoranthene	4	U	4.0	02/15/90	N/A
Benzo(k)fluoranthene	4	U	4.0	02/15/90	N/A
Benzo(a)pyrene	4	U	4.0	02/15/90	N/A
Indeno(123,cd)pyrene	4	U	4.0	02/15/90	N/A
Dibenzo(ah)anthracene	4	U	4.0	02/15/90	N/A
Benzo(ghi)perylene	4	U	4.0	02/15/90	N/A

Surrogate recovery report for sample 9002103-04A

Surrogate	Percent Recovery	Limits: Min.	Max.
3-methylcholanthrene	44.	20.0	160.0
Biphenyl	80.	30.0	131.0
Indene	81.	20.0	160.0

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Chemistry, Microbiology, and Technical Services

REPORT ON WORK ORDER 9002103 PREPARATION BLANKS

Test : **Mercury (Method 245.1)**
Blank Name : B0209HGW01 Preparation Date: 02/08/90
Conc Found : 0.001 U Control Limit : 0.002
Units : mg/L

This blank and comments, if any, apply to the following sample(s): 1-2

Test : **Cadmium (Method 213.1)**
Blank Name : B0212AA01 Preparation Date: 02/12/90
Conc Found : 0.002 U Control Limit : 0.004
Units : mg/L

This blank and comments, if any, apply to the following sample(s): 1-2

Test : **Lead**
Blank Name : B0212AA01 Preparation Date: 02/12/90
Conc Found : 0.010 U Control Limit : 0.020
Units : mg/L

This blank and comments, if any, apply to the following sample(s): 1-2

Test : **Zinc (Method 289.1)**
Blank Name : B0212AA01 Preparation Date: 02/12/90
Conc Found : 0.002 U Control Limit : 0.004
Units : mg/L

This blank and comments, if any, apply to the following sample(s): 1-2

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Chemistry, Microbiology, and Technical Services

REPORT ON WORK ORDER 9002103 PREPARATION BLANKS

Test : Copper (Method 220.1)
Blank Name : B0212AA01 Preparation Date: 02/12/90
Conc Found : 0.002 U Control Limit : 0.004
Units : mg/L

This blank and comments, if any, apply to the following sample(s): 1-2

Test : Chromium (Method 218.1)
Blank Name : B0212AA01 Preparation Date: 02/12/90
Conc Found : 0.005 U Control Limit : 0.010
Units : mg/L

This blank and comments, if any, apply to the following sample(s): 1-2

Test : Nickel (Method 249.1)
Blank Name : B0212AA01 Preparation Date: 02/12/90
Conc Found : 0.010 U Control Limit : 0.020
Units : mg/L

This blank and comments, if any, apply to the following sample(s): 1-2

Test : Total Organic Halogens TOX
Blank Name : B0212TOX_WO1 Preparation Date: 02/12/90
Conc Found : 0.020 U Control Limit : 0.040
Units : mg/L

This blank and comments, if any, apply to the following sample(s): 1-2

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REPORT ON WORK ORDER 9002103 PREPARATION BLANKS

Test : Total PCBs
Blank Name : B0208GFXWLG Preparation Date: 02/08/90
Conc Found : 0.500 U Control Limit : 1.000
Units : ug/L

This blank and comments, if any, apply to the following sample(s): 1,2

Test : Pentachlorophenol
Blank Name : B0209GSV_WLA Preparation Date: 02/09/90
Conc Found : 1.000 U Control Limit : 2.000
Units : ug/L

This blank and comments, if any, apply to the following sample(s): 1-2

* = outside control limits
U = analtye not detected

t

STATE OF WASHINGTON DEPARTMENT OF ECOLOGY
MANCHESTER ENVIRONMENTAL LABORATORY
P.O. Box 3Ø7, Manchester WA 98353

DATA REVIEW
June 29, 199Ø

RECEIVED
JUL 13 1990
DEPT. OF ECOLOGY

Project: DOT Duwamish Wetlands Site

Samples: 198155 198156 198157 198158

Laboratory: Laucks Testing Laboratory

By: Greg Perez
Through: Stuart Magoon

CASE SUMMARY

Specific methods used and problems incurred during the analysis of these samples are detailed in the case narrative and will not be addressed here. Specific problems with QC will be noted and referenced to the case narrative.

QUALIFIER DEFINITIONS

J - The reported number is an estimated value

VOA FRACTION

Matrix: Water

Holding times

Sample	Date Collect	Date Man Lab Recd	Date Cntr Lab Recd	Date Anlz	#Days from Collect
198155	5/8	5/9	5/1Ø	5/14	6 of 14
198156	5/8	5/9	5/1Ø	5/14	6 of 14
198157	5/8	5/9	5/1Ø	5/14	6 of 14
198158	5/8	5/9	5/1Ø	5/14	6 of 14

These samples have been analyzed within the recommended holding times.

Surrogates:

Surrogate recoveries for these samples, the matrix spikes and the method blank are within the QC recovery limits.

Matrix Spike and Matrix Spike Duplicate (MS/MSD):

Matrix spike and spike duplicate recoveries and precision data are acceptable and within limits.

Sample Data:

This data is acceptable for use.

BNA FRACTION

Matrix: Water

Holding times

Sample	Date Collect	Date Man Lab Recd	Date Cntr Lab Recd	Date Extd	Date Anlz	#Days from Collect
198155	5/8	5/9	5/1Ø	5/12	5/15	4 of 7
198156	5/8	5/9	5/1Ø	5/12	5/15	4 of 7
198157	5/8	5/9	5/1Ø	5/12	5/15	4 of 7
198158	5/8	5/9	5/1Ø	5/12	5/15	4 of 7

These samples have been extracted and analyzed within the recommended holding times.

Surrogates:

Surrogate recoveries for these samples, the matrix spikes and the method blank are within the QC recovery limits.

Matrix Spike and Matrix Spike Duplicate (MS/MSD):

Matrix spike and spike duplicate recoveries and precision data are acceptable and within limits, with the exception of 2,4 Dinitrotoluene. Recoveries for this compound were slightly above the recommended limits in both the MS and the MSD. In my opinion, the values did not exceed the limits by an amount significant enough to be of concern.

Sample Data:

This data is acceptable for use.

PESTICIDE/PCB FRACTION

Holding times

Sample	Date Collect	Date Man Lab Rec'd	Date Cntr Lab Rec'd	Date Extd	Date Anlz	#Days from Collect
198155	5/8	5/9	5/1Ø	5/11	5/23	3 of 7
198156	5/8	5/9	5/1Ø	5/11	5/23	3 of 7
198157	5/8	5/9	5/1Ø	5/11	5/23	3 of 7
198158	5/8	5/9	5/1Ø	5/11	5/23	3 of 7

These samples have been extracted within the recommended holding times.

Surrogates:

Surrogate recoveries for these samples and the method blank are within recovery limits.

Matrix Spike and Matrix Spike Duplicate (MS/MSD):

Matrix spike and spike duplicate recoveries and precision data are acceptable and within limits.

Sample Data:

This data is acceptable for use.

State of Washington Department of Ecology

Program Code ☐☐☐ JIK23

Project Code ______

Project/Name DOT Duwamish

SAMPLE DATA & ANALYSIS REQUIRED

contract: 3106
sh harest: 40

Page 1 of 1

☐ Enforcement/Custody ☐ Class II

☐ Possible Toxic/Hazardous Notes: are not preserved please do so in Lab.

SAMPLING DATE Yr	Mo	Da	TIME Hr	Mn	FIELD STATION IDENTIFICATION	LAB SAMPLE NUMBER Wk	Seq	Matrix Code	Source Code	No. of Containers
			14	45	SW-1	19	8155	10	15	05
			15	00	SW-2	19	8156	10	15	05
			15	50	SW-3	19	8157	10	15	05
			15	00	GW-2	19	8158	10	15	05

General Chemistry:

FIELD STATION IDENTIFICATION	Turbidity	pH	Conductivity	Total Hardness	Chloride	TS, TSS, TNVS, TNVSS	TSS	% Solids	Nutrients (4)	Ammonia	Nitrate-Nitrite	Total Phosphorous	Ortho-Phosphate	BOD/5 Day	COD Chem Oxy Demand
SW-1				x											
SW-2				x											
SW-3				x											
GW-2				x											

Biology / Organic Chem. / Metals:

FIELD STATION IDENTIFICATION	Fecal Coliform Bacteria	Total Coliform Bacteria	Enterococcus	Fish Bioassay	Base/Neutrals/Acids	Volatile Organics	Pesticides/PCB's	PCB's Only	Purgeable Halocarbons	Herbicides	Hydrocarbon Analysis	Phenolics (AAP)	Oil & Grease	P.P. Metals	EP Tox Metals
SW-1					x	x	x					x	x	x	
SW-2					x	x	x					x	x	x	
SW-3					x	x	x					x	x	x	
GW-2					x	x	x					x	x	x	

no sample R

no sample R

no bottle

no bottle R

METALS Specific List
Total
☐ Recoverable
☐ Totals
☐ Dissolved

Project Officer NW M. Turvey

Sampler(s) M. Turvey
CP Wang

Recorder CP Wang

Date 5/8/90

Chain Of Custody Record

Relinquished By:	Received By:	Yr	Mo	Da	Hr	Mn	Seal I.D.	Condition of Seals	Comments
Martha Turvey		90	05	09	[illegible]	[illegible]			
	Catherine Bickle	90	05	09	14	40			
Catherine Bickle		90	05	10	[illegible]	[illegible]			
	Pam Covra	90	05	10	[illegible]	[illegible]			no BNA, Pest/PCB for 8156

Laboratory Copy White | Project Office Copy Yellow | Field or Office Copy Pink

Ecy 040-115 Rev. 7/87

✓X

LAUCKS TESTING LABORATORIES
940 S. Harney
Seattle, WA 98108

TO: **WASHINGTON DEPARTMENT OF ECOLOGY**
Project Name: DOT Duwamish (Drummond)
Laboratory No.: 9005182
Date of this report: June 05, 1990

GENERAL REMARKS ON ORGANIC ANALYSES:

The following samples were analyzed under the above lab number:

Client Sample I.D.	LTL Sample Number	Analysis Request
198155	9005182-1	VOA/ABN/PEST/PCB
198156	9005182-2	VOA
198157	9005182-3	VOA/ABN/PEST/PCB
198158	9005182-4	VOA/ABN/PEST/PCB

GC/MS Fractions:

Compounds may be called out as hits on the computerized printout. However, if they are not reported on the OADS (sample results) form, the mass spectral data have been manually searched and the compounds have been eliminated as hits based on this search.

ABN Fraction:

The data system which is used to perform the searches for ABN Tentatively Identified Compounds (TICs) is set with a threshold of 5% fit for TICs. In some cases less than three compounds in the NDS library pass this threshold setting. When this occurs there will not be spectra and fits for the associated unknown compound. This will be called out on the first page of the data system report and will be reflected in the spectra which are drawn; i.e., there will be less than three best-fit spectra. This generally has one of two meanings. First, that there are no compounds passing the fit criteria; or, second, that one or more compounds pass the fit criteria. It is our opinion that the threshold setting for fit is set low enough that all reasonable and possible hits will be reported (up to a maximum of three).

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Seattle, WA 98108

Two optional ABN surrogates are used for recovery purposes, recoveries for one of which (2-Bromophenol) are listed under "Other" on Form II. The second optional surrogate is d10-Azobenzene. The recoveries for samples in this set are as listed:

Sample	% Recovery
SBLKH1	88
198155	89
198157	82
198158	84
198158MS	84
198158MSD	84

Volatile Fraction:

All volatile analyses were performed using a DB-624 megabore capillary. The elution order and retention times differ from those stated for packed column analysis in the U.S.E.P.A.'s Statement of Work for organic CLP analyses. Listed below are the correct elution order and the internal standard with which each compound is associated.

Bromochloromethane(IS)	1,4-Difluorobenzene(IS)	d5-Chlorobenzene(IS)
Chloromethane	Benzene	4-Methyl-2-Pentanone
Vinyl Chloride	Trichloroethylene	Toluene
Bromomethane	1,2-Dichloropropane	d8-Toluene(SURR)
Chloroethane	Bromodichloromethane	Trans-1,3-Dichloropropene
1,1-Dichloroethylene	Cis-1,3-Dichloropropene	1,1,2-Trichloroethane
Acetone		Tetrachloroethylene
Carbon Disulfide		2-Hexanone
Methylene Chloride		Dibromochloromethane
Trans-1,2-Dichloroethylene		Chlorobenzene
1,1-Dichloroethane		Ethylbenzene
Vinyl Acetate		Styrene
Cis-1,2-Dichloroethylene		M,P-Xylene
2-Butanone		O-xylene
Chloroform		Bromoform
1,1,1-Trichloroethane		1,1,2,2-Tetrachloroethane
Carbon Tetrachloride		Bromofluorobenzene(SURR)
1,2-Dichloroethane		
d4-1,2-Dichloroethane(SURR)		

The analytes listed above were assigned to their respective internal standards on the basis of relative retention time (RRT). For all compounds except cis-1,3-dichloropropene, the RRTs fall between 0.8 and 1.2. Cis-1,2-dichloropropene was the only compound to fall outside of this range, and was assigned to the internal standard closest to its retention time.

Separation of cis- and trans- dichloroethylene isomers is achievable on a DB-624 megabore capillary column. These compounds have been found to coelute on the packed column specified in the U.S.E.P.A.'s Statement of Work. When these isomers are found in a sample, they will be reported as total-1,2-dichloroethylene.

A holding blank was analyzed in the same QC period with the samples from this set. The raw data were not submitted with the case. It will be held on file at Laucks should future review be necessary.

Pesticide/PCB Fraction:

The compound isodrin was added as a second, optional surrogate in the pesticide/PCB analyses. Recovery values are reported on the appropriate FORM II - PEST.

SPECIFIC REMARKS ON ORGANIC ANALYSES:

VOA Fraction:

No comments.

ABN Fraction:

No comments.

Pesticide/PCB Fraction:

No comments.

Sample Preparation:

The following observations were made during extraction of the samples:

Sample 198155:

Greenish water which contained brown sediment (thought to be plant particles) as well as branches and pieces of leaf.

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940 S. Harney
Seattle, WA 98108

Sample 198157:

Brownish-green water which contained soil, leaves, water snails, beetles and various other particles.

Sample 198158:

Murky brown water with very little sediment present.

WATER VOLATILE SURROGATE RECOVERY

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:_____ SAS No.: _____ SDG No.:19815

	DOE SAMPLE NO.	S1 (TOL)#	S2 (BFB)#	S3 (DCE)#	OTHER	TOT OUT
01	VBLKJ1	98	97	89		0
02	198155	101	98	93		0
03	198156	97	96	91		0
04	198157	97	96	92		0
05	198158	98	97	89		0
06	198158MS	91	89	90		0
07	198158MSD	91	90	91		0
08						
09						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						

	QC LIMITS
S1 (TOL) = Toluene-d8	(88-110)
S2 (BFB) = Bromofluorobenzene	(86-115)
S3 (DCE) = 1,2-Dichloroethane-d4	(76-114)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogates diluted out

3A

WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:_____ SAS No.: _____ SDG No.:19815

Matrix Spike - DOE Sample No.: 198158

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC #	QC LIMITS REC.
1,1-Dichloroethene	50.000	0.000	31.400	63	61-145
Trichloroethene	50.000	0.000	57.900	116	71-120
Benzene	50.000	0.000	46.200	92	76-127
Toluene	50.000	0.000	51.000	102	76-125
Chlorobenzene	50.000	0.000	54.200	108	75-130

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
1,1-Dichloroethene	50.000	30.500	61	3	14	61-145
Trichloroethene	50.000	55.700	111	4	14	71-120
Benzene	50.000	47.500	95	3	11	76-127
Toluene	50.000	51.300	103	1	13	76-125
Chlorobenzene	50.000	55.000	110	1	13	75-130

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD:0 out of 5 outside limits
Spike Recovery:0 out of 10 outside limits

Comments: _____
_____

4A

VOLATILE METHOD BLANK SUMMARY

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.: _____ SAS No.: _____ SDG No.: 19815

Lab File ID: B0514MVOWJ1 Lab Sample ID: B0514MVOWJ1

Date Analyzed: 05/14/90 Time Analyzed: 16:38

Matrix: (soil/water) WATER Level:(low/med) LOW

Instrument ID: 1020J

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, AND MSD:

	DOE SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	TIME ANALYZED
01	198155	05182-01A	05182V01	17:18
02	198156	05182-02A	05182V02	18:01
03	198157	05182-03A	05182V03	18:43
04	198158	05182-04A	05182V04	19:26
05	198158MS	05182-04AMS	05182V04MSD	20:45
06	198158MSD	05182-04AMSD	05182V04MST	21:36
07				
08				
09				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				
30				

COMMENTS: _____

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

DOE SAMPLE NO.

198155

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:_____ SAS No. _____ SDG No.:19815

Matrix: (soil/water)WATER Lab Sample ID: 05182-01A

Sample wt/vol: 5.0 (g/ml)ML Lab File ID: 05182V01

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec.__ Date Analyzed: 05/14/90

Column: (pack/cap) CAP Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	3	J
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	Trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

DOE SAMPLE NO.
198155

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:_____ SAS No.: _____ SDG No.:19815

Matrix: (soil/water)WATER Lab Sample ID: 05182-01A

Sample wt/vol: 5.0 (g/ml)ML Lab File ID: 05182V01

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec.__ Date Analyzed: 05/14/90

Column: (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg)UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

DOE SAMPLE NO.

198156

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:_____ SAS No. _____ SDG No.:19815

Matrix: (soil/water)WATER Lab Sample ID: 05182-02A

Sample wt/vol: 5.0 (g/ml)ML Lab File ID: 05182V02

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec.__ Date Analyzed: 05/14/90

Column: (pack/cap) CAP Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	1	J
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	Trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	3	J
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

DOE SAMPLE NO.: 198156

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:_____ SAS No.: _____ SDG No.:19815

Matrix: (soil/water)WATER Lab Sample ID: 05182-02A

Sample wt/vol: 5.0 (g/ml)ML Lab File ID: 05182V02

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec.__ Date Analyzed: 05/14/90

Column: (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg)UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
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1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

DOE SAMPLE NO.

198157

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:_____ SAS No. _____ SDG No.:19815

Matrix: (soil/water)WATER Lab Sample ID: 05182-03A

Sample wt/vol: 5.0 (g/ml)ML Lab File ID: 05182V03

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec.__ Date Analyzed: 05/14/90

Column: (pack/cap) CAP Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	Trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

DOE SAMPLE NO.: 198157

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.: _____ SAS No.: _____ SDG No.: 19815

Matrix: (soil/water) WATER Lab Sample ID: 05182-03A

Sample wt/vol: 5.0 (g/ml) ML Lab File ID: 05182V03

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec. __ Date Analyzed: 05/14/90

Column: (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
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1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

DOE SAMPLE NO.

198158

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:_____ SAS No. _____ SDG No.:19815

Matrix: (soil/water)WATER Lab Sample ID: 05182-04A

Sample wt/vol: 5.0 (g/ml)ML Lab File ID: 05182V04

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec.__ Date Analyzed: 05/14/90

Column: (pack/cap) CAP Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	Trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

DOE SAMPLE NO.: 198158

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:_____ SAS No.: _____ SDG No.:19815

Matrix: (soil/water)WATER Lab Sample ID: 05182-04A

Sample wt/vol: 5.0 (g/ml)ML Lab File ID: 05182V04

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec.__ Date Analyzed: 05/14/90

Column: (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg)UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
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1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

DOE SAMPLE NO.

VBLKJ1

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:_____ SAS No. _____ SDG No.:19815

Matrix: (soil/water)WATER Lab Sample ID: B0514MVOWJ1

Sample wt/vol: 5.0 (g/ml)ML Lab File ID: B0514MVOWJ1

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec.__ Date Analyzed: 05/14/90

Column: (pack/cap) CAP Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	Trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

DOE SAMPLE NO.: VBLKJ1

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:_____ SAS No.: _____ SDG No.:19815

Matrix: (soil/water)WATER Lab Sample ID: B0514MVOWJ1

Sample wt/vol: 5.0 (g/ml)ML Lab File ID: B0514MVOWJ1

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec.__ Date Analyzed: 05/14/90

Column: (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg)UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
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1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

DOE SAMPLE NO.

198158MS

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:_____ SAS No. _____ SDG No.:19815

Matrix: (soil/water)WATER Lab Sample ID: 05182-04AMS

Sample wt/vol: 5.0 (g/ml)ML Lab File ID: 05182V04MSD

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec.__ Date Analyzed: 05/14/90

Column: (pack/cap) CAP Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	Trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

DOE SAMPLE NO.

198158MSD

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:_____ SAS No. _____ SDG No.:19815

Matrix: (soil/water)WATER Lab Sample ID: 05182-04AMSD

Sample wt/vol: 5.0 (g/ml)ML Lab File ID: 05182V04MST

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec.__ Date Analyzed: 05/14/90

Column: (pack/cap) CAP Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS. (ug/L or ug/Kg)UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	2	J
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	Trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

2C

WATER SEMIVOLATILE SURROGATE RECOVERY

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.: 05182 SAS No.: _____ SDG No.: _____

	SAMPLE NO.	S1 (NBZ) #	S2 (FBP) #	S3 (TPH) #	S4 (PHL) #	S5 (2FP) #	S6 (TBP) #	OTHER	TOT OUT
01	SBLKH1	85	80	92	36	53	103	76	0
02	198158	80	77	93	29	42	87	64	0
03	198158MS	83	80	100	37	51	96	70	0
04	198158MSD	82	80	88	36	52	97	69	0
05	198155	77	82	96	26	35	74	58	0
06	198157	59	72	85	32	43	95	67	0
07									
08									
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	QC LIMITS
S1 (NBZ) = Nitrobenzene-d5	(35-114)
S2 (FBP) = 2-Fluorobiphenyl	(43-116)
S3 (TPH) = Terphenyl-d14	(33-141)
S4 (PHL) = Phenol-d5	(10-94)
S5 (2FP) = 2-Fluorophenol	(21-100)
S6 (TBP) = 2,4,6-Tribromophenol	(10-123)

\# Column to be used to flag recovery values
* Values outside of contract required QC limits
D Surrogates diluted out

SEMIVOLATILE METHOD BLANK SUMMARY

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.: 05182 SAS No.: _____ SDG No.: _____

Lab File ID: >HE150::D2 Lab Sample ID: B0512MSVWLA

Date Extracted: 05/12/90 Extraction:(SepF/Cont/Sonc) SEPF

Date Analyzed: 05/15/90 Time Analyzed: 17:26

Matrix: (soil/water) WATER Level:(low/med) LOW

Instrument ID: 5970H

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, AND MSD:

	SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
01	198158	05182-4	>HE151::D2	05/15/90
02	198158MS	05182-4MS	>HE152::D2	05/15/90
03	198158MSD	05182-4MSD	>HE153::D2	05/15/90
04	198155	05182-1	>HE154::D2	05/15/90
05	198157	05182-3	>HE155::D2	05/15/90
06				
07				
08				
09				
10				
11				
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COMMENTS: _____

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

198155

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:05182 SAS No.: _____ SDG No.: _____

Matrix: (soil/water)WATER Lab Sample ID: 05182-1

Sample wt/vol: 1000.(g/ml)ML Lab File ID: >HE154::D2

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec.__ dec.__ Date Extracted:05/12/90

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 05/15/90

GPC Cleanup: (Y/N)N pH:0.0 Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)UG/L	Q
108-95-2	Phenol	10	U
111-44-4	bis (2-Chloroethyl)ether	10	U
95-57-8	2-Chlorophenol	10	U
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
100-51-6	Benzyl alcohol	10	U
95-50-1	1,2-Dichlorobenzene	10	U
95-48-7	2-Methylphenol	10	U
108-60-1	bis (2-Chloroisopropyl)ether	10	U
106-44-5	4-Methylphenol	10	U
621-64-7	N-Nitroso-di-n-propylamine	10	U
67-72-1	Hexachloroethane	10	U
98-95-3	Nitrobenzene	10	U
78-59-1	Isophorone	10	U
88-75-5	2-Nitrophenol	10	U
105-67-9	2,4-Dimethylphenol	10	U
65-85-0	Benzoic acid	50	U
111-91-1	bis (2-Chloroethoxy)methane	10	U
120-83-2	2,4-Dichlorophenol	10	U
120-82-1	1,2,4-Trichlorobenzene	10	U
91-20-3	Naphthalene	10	U
106-47-8	4-Chloroaniline	10	U
87-68-3	Hexachlorobutadiene	10	U
59-50-7	4-Chloro-3-methylphenol	10	U
91-57-6	2-Methylnaphthalene	10	U
77-47-4	Hexachlorocyclopentadiene	10	U
88-06-2	2,4,6-Trichlorophenol	10	U
95-95-4	2,4,5-Trichlorophenol	50	U
91-58-7	2-Chloronaphthalene	10	U
88-74-4	2-Nitroaniline	50	U
131-11-3	Dimethylphthalate	10	U
208-96-8	Acenaphthylene	10	U
606-20-2	2,6-Dinitrotoluene	10	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

198155

Lab Name: Laucks Testing Labs Contract:_____

Lab Code: LAUCKS Case No.:05182 SAS No.: _____ SDG No.: _____

Matrix: (soil/water)WATER Lab Sample ID: 05182-1

Sample wt/vol: 1000.(g/ml)ML Lab File ID: >HE154::D2

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec.__ dec.__ Date Extracted:05/12/90

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 05/15/90

GPC Cleanup: (Y/N)N pH:0.0 Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)UG/L	Q
99-09-2	3-Nitroaniline	50	U
83-32-9	Acenaphthene	10	U
51-28-5	2,4-Dinitrophenol	50	U
100-02-7	4-Nitrophenol	50	U
132-64-9	Dibenzofuran	10	U
121-14-2	2,4-Dinitrotoluene	10	U
84-66-2	Diethylphthalate	10	U
7005-72-3	4-Chlorophenyl-phenylether	10	U
86-73-7	Fluorene	10	U
100-01-6	4-Nitroaniline	50	U
534-52-1	4,6-Dinitro-2-methylphenol	50	U
86-30-6	N-Nitrosodiphenylamine	10	U
101-55-3	4-Bromophenyl-phenylether	10	U
118-74-1	Hexachlorobenzene	10	U
87-86-5	Pentachlorophenol	50	U
85-01-8	Phenanthrene	10	U
120-12-7	Anthracene	10	U
84-74-2	Di-n-butylphthalate	10	U
206-44-0	Fluoranthene	10	U
129-00-0	Pyrene	10	U
85-68-7	Butylbenzylphthalate	10	U
91-94-1	3,3'-Dichlorobenzidine	20	U
56-55-3	Benzo(a)anthracene	10	U
218-01-9	Chrysene	10	U
117-81-7	bis(2-Ethylhexyl)phthalate	1	J
117-84-0	Di-n-octylphthalate	10	U
205-99-2	Benzo(b)fluoranthene	10	U
207-08-9	Benzo(k)fluoranthene	10	U
50-32-8	Benzo(a)pyrene	10	U
193-39-5	Indeno(1,2,3-cd)pyrene	10	U
53-70-3	Dibenzo(a,h)anthracene	10	U
191-24-2	Benzo(g,h,i)perylene	10	U

(1) - Cannot be separated from diphenylamine

3C

WATER SEMIVOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: Laucks Testing Labs Contract:_____

Lab Code: LAUCKS Case No.:05182 SAS No.: _____ SDG No.:_____

Matrix Spike - Sample No.: 198158

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC	#	QC LIMITS REC.
Phenol	267	0	104	39		12- 89
2-Chlorophenol	267	0	185	69		27-123
1,4-Dichlorobenzene	133	0	112	84		36- 97
N-Nitroso-di-n-prop.(1)	133	0	112	84		41-116
1,2,4-Trichlorobenzene	133	0	107	80		39- 98
4-Chloro-3-methylphenol	267	0	221	83		23- 97
Acenaphthene	133	0	118	88		46-118
4-Nitrophenol	267	0	129	48		10- 80
2,4-Dinitrotoluene	133	0	135	101	*	24- 96
Pentachlorophenol	267	0	231	86		9-103
Pyrene	133	0	131	98		26-127

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC	#	% RPD	#	QC LIMITS RPD	QC LIMITS REC.
Phenol	267	105	39		1		42	12- 89
2-Chlorophenol	267	188	70		2		40	27-123
1,4-Dichlorobenzene	133	113	85		1		28	36- 97
N-Nitroso-di-n-prop.(1)	133	115	86		3		38	41-116
1,2,4-Trichlorobenzene	133	108	81		1		28	39- 98
4-Chloro-3-methylphenol	267	216	81		3		42	23- 97
Acenaphthene	133	119	89		1		31	46-118
4-Nitrophenol	267	130	49		1		50	10- 80
2,4-Dinitrotoluene	133	140	105	*	3		38	24- 96
Pentachlorophenol	267	226	85		2		50	9-103
Pyrene	133	117	88		11		31	26-127

(1) N-Nitroso-di-n-propylamine

Column to be used to flag recovery and RPD values with an asterisk
* Values outside of QC limits

RPD:0 out of 11 outside limits
Spike Recovery:2 out of 22 outside limits

Comments: _____
_____

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

SAMPLE NO.
198155

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:05182 SAS No.: _____ SDG No.:_____

Matrix: (soil/water)WATER Lab Sample ID: 05182-1

Sample wt/vol: 1000.(g/ml)ML Lab File ID: >HE154::D2

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec.__ dec.__ Date Extracted:05/12/90

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 05/15/90

GPC Cleanup: (Y/N)N pH:0.0 Dilution Factor: 1.0

Number TICs found: 17

CONCENTRATION UNITS:
(ug/L or ug/Kg)UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	1.544638	TETRADECANOIC ACID	25.00	8	J
2.	2.2422857	CYCLOBUTANE, 1,2-DIETHENYL-	27.35	10	J
3.	3.2091294	9-HEXADECANOIC ACID	27.49	14	J
4.	4.74744302	5-UNDECEN-3-YNE, (Z)-	28.74	11	J
5.	_____	UNKNOWN	28.82	18	J
6.	_____	UNKNOWN	29.64	11	J
7.	2.2213607	CYCLOOCTENE, 3-ETHENYL-	29.92	17	J
8.	6.6971400	17-PENTATRIACONTENE	34.56	10	J
9.	_____	UNKNOWN	35.54	10	J
10.	629970	DOCOSANE	35.83	9	J
11.	_____	UNKNOWN	36.48	12	J
12.	_____	UNKNOWN	37.09	9	J
13.	_____	UNKNOWN	38.28	12	J
14.	13360617	1-PENTADECENE	39.24	14	J
15.	295658	CYCLOHEXADECANE	40.34	21	J
16.	_____	UNKNOWN	41.59	9	J
17.	_____	UNKNOWN	43.73	8	J
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

198157

Lab Name: Laucks Testing Labs Contract:_____

Lab Code: LAUCKS Case No.:05182 SAS No.: _____ SDG No.: _____

Matrix: (soil/water)WATER Lab Sample ID: 05182-3

Sample wt/vol: 1000.(g/ml)ML Lab File ID: >HE155::D2

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec.__ dec.__ Date Extracted:05/12/90

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 05/15/90

GPC Cleanup: (Y/N)N pH:0.0 Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)UG/L	Q
108-95-2	Phenol	10	U
111-44-4	bis (2-Chloroethyl)ether	10	U
95-57-8	2-Chlorophenol	10	U
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
100-51-6	Benzyl alcohol	10	U
95-50-1	1,2-Dichlorobenzene	10	U
95-48-7	2-Methylphenol	10	U
108-60-1	bis (2-Chloroisopropyl)ether	10	U
106-44-5	4-Methylphenol	10	U
621-64-7	N-Nitroso-di-n-propylamine	10	U
67-72-1	Hexachloroethane	10	U
98-95-3	Nitrobenzene	10	U
78-59-1	Isophorone	10	U
88-75-5	2-Nitrophenol	10	U
105-67-9	2,4-Dimethylphenol	10	U
65-85-0	Benzoic acid	50	U
111-91-1	bis (2-Chloroethoxy)methane	10	U
120-83-2	2,4-Dichlorophenol	10	U
120-82-1	1,2,4-Trichlorobenzene	10	U
91-20-3	Naphthalene	10	U
106-47-8	4-Chloroaniline	10	U
87-68-3	Hexachlorobutadiene	10	U
59-50-7	4-Chloro-3-methylphenol	10	U
91-57-6	2-Methylnaphthalene	10	U
77-47-4	Hexachlorocyclopentadiene	10	U
88-06-2	2,4,6-Trichlorophenol	10	U
95-95-4	2,4,5-Trichlorophenol	50	U
91-58-7	2-Chloronaphthalene	10	U
88-74-4	2-Nitroaniline	50	U
131-11-3	Dimethylphthalate	10	U
208-96-8	Acenaphthylene	10	U
606-20-2	2,6-Dinitrotoluene	10	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

198157

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:05182 SAS No.: _____ SDG No.: _____

Matrix: (soil/water)WATER Lab Sample ID: 05182-3

Sample wt/vol: 1000.(g/ml)ML Lab File ID: >HE155::D2

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec.__ dec.__ Date Extracted:05/12/90

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 05/15/90

GPC Cleanup: (Y/N)N pH:0.0 Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)UG/L	Q
99-09-2	3-Nitroaniline	50	U
83-32-9	Acenaphthene	10	U
51-28-5	2,4-Dinitrophenol	50	U
100-02-7	4-Nitrophenol	50	U
132-64-9	Dibenzofuran	10	U
121-14-2	2,4-Dinitrotoluene	10	U
84-66-2	Diethylphthalate	10	U
7005-72-3	4-Chlorophenyl-phenylether	10	U
86-73-7	Fluorene	10	U
100-01-6	4-Nitroaniline	50	U
534-52-1	4,6-Dinitro-2-methylphenol	50	U
86-30-6	N-Nitrosodiphenylamine	10	U
101-55-3	4-Bromophenyl-phenylether	10	U
118-74-1	Hexachlorobenzene	10	U
87-86-5	Pentachlorophenol	50	U
85-01-8	Phenanthrene	10	U
120-12-7	Anthracene	10	U
84-74-2	Di-n-butylphthalate	10	U
206-44-0	Fluoranthene	1	J
129-00-0	Pyrene	1	J
85-68-7	Butylbenzylphthalate	10	U
91-94-1	3,3'-Dichlorobenzidine	20	U
56-55-3	Benzo(a)anthracene	10	U
218-01-9	Chrysene	10	U
117-81-7	bis(2-Ethylhexyl)phthalate	4	J
117-84-0	Di-n-octylphthalate	10	U
205-99-2	Benzo(b)fluoranthene	10	U
207-08-9	Benzo(k)fluoranthene	10	U
50-32-8	Benzo(a)pyrene	10	U
193-39-5	Indeno(1,2,3-cd)pyrene	10	U
53-70-3	Dibenzo(a,h)anthracene	10	U
191-24-2	Benzo(g,h,i)perylene	10	U

(1) - Cannot be separated from diphenylamine

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

SAMPLE NO.
198157

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:05182 SAS No.: _____ SDG No.:_____

Matrix: (soil/water)WATER Lab Sample ID: 05182-3

Sample wt/vol: 1000.(g/ml)ML Lab File ID: >HE155::D2

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec.__ dec.__ Date Extracted:05/12/90

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 05/15/90

GPC Cleanup: (Y/N)N pH:0.0 Dilution Factor: 1.0

Number TICs found: 20

CONCENTRATION UNITS:
(ug/L or ug/Kg)UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 10544500	SULFUR, MOL.	27.75	93	J
2. _____	UNKNOWN	30.33	27	J
3. 630024	OCTACOSANE	31.74	29	J
4. 7098228	TETRATETRACONTANE	33.86	81	J
5. 638664	OCTADECANAL	35.21	22	J
6. 593497	HEPTACOSANE	35.85	120	J
7. 66244799	1-DOTRIACONTANOL	36.89	25	J
8. 629801	HEXADECANAL	37.14	90	J
9. 7098217	TRITETRACONTANE	37.71	100	J
10. 6971400	17-PENTATRIACONTENE	38.31	21	J
11. 40710427	1-HENTETRACONTANOL	38.72	19	J
12. 629801	HEXADECANAL	39.02	68	J
13. _____	UNKNOWN	39.27	24	J
14. 630079	PENTATRIACONTANE	39.60	21	J
15. _____	UNKNOWN	40.19	54	J
16. 295658	CYCLOHEXADECANE	40.38	57	J
17. 83476	.GAMMA.-SITOSTEROL	42.90	44	J
18. _____	UNKNOWN	43.08	52	J
19. _____	UNKNOWN	43.21	30	J
20. _____	UNKNOWN	43.80	43	J
21. _____				
22. _____				
23. _____				
24. _____				
25. _____				
26. _____				
27. _____				
28. _____				
29. _____				
30. _____				

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

198158

Lab Name: Laucks Testing Labs Contract:_____

Lab Code: LAUCKS Case No.:05182 SAS No.: _____ SDG No.: _____

Matrix: (soil/water)WATER Lab Sample ID: 05182-4

Sample wt/vol: 1000.(g/ml)ML Lab File ID: >HE151::D2

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec.__ dec.__ Date Extracted:05/12/90

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 05/15/90

GPC Cleanup: (Y/N)N pH:0.0 Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)UG/L	Q
108-95-2	Phenol	10	U
111-44-4	bis (2-Chloroethyl)ether	10	U
95-57-8	2-Chlorophenol	10	U
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
100-51-6	Benzyl alcohol	10	U
95-50-1	1,2-Dichlorobenzene	10	U
95-48-7	2-Methylphenol	10	U
108-60-1	bis (2-Chloroisopropyl)ether	10	U
106-44-5	4-Methylphenol	10	U
621-64-7	N-Nitroso-di-n-propylamine	10	U
67-72-1	Hexachloroethane	10	U
98-95-3	Nitrobenzene	10	U
78-59-1	Isophorone	10	U
88-75-5	2-Nitrophenol	10	U
105-67-9	2,4-Dimethylphenol	10	U
65-85-0	Benzoic acid	50	U
111-91-1	bis (2-Chloroethoxy)methane	10	U
120-83-2	2,4-Dichlorophenol	10	U
120-82-1	1,2,4-Trichlorobenzene	10	U
91-20-3	Naphthalene	10	U
106-47-8	4-Chloroaniline	10	U
87-68-3	Hexachlorobutadiene	10	U
59-50-7	4-Chloro-3-methylphenol	10	U
91-57-6	2-Methylnaphthalene	10	U
77-47-4	Hexachlorocyclopentadiene	10	U
88-06-2	2,4,6-Trichlorophenol	10	U
95-95-4	2,4,5-Trichlorophenol	50	U
91-58-7	2-Chloronaphthalene	10	U
88-74-4	2-Nitroaniline	50	U
131-11-3	Dimethylphthalate	10	U
208-96-8	Acenaphthylene	10	U
606-20-2	2,6-Dinitrotoluene	10	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

198158

Lab Name: Laucks Testing Labs Contract:_____

Lab Code: LAUCKS Case No.:05182 SAS No.: _____ SDG No.: _____

Matrix: (soil/water)WATER Lab Sample ID: 05182-4

Sample wt/vol: 1000.(g/ml)ML Lab File ID: >HE151::D2

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec.__ dec.__ Date Extracted:05/12/90

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 05/15/90

GPC Cleanup: (Y/N)N pH:0.0 Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)UG/L	Q
99-09-2	3-Nitroaniline	50	U
83-32-9	Acenaphthene	10	U
51-28-5	2,4-Dinitrophenol	50	U
100-02-7	4-Nitrophenol	50	U
132-64-9	Dibenzofuran	10	U
121-14-2	2,4-Dinitrotoluene	10	U
84-66-2	Diethylphthalate	10	U
7005-72-3	4-Chlorophenyl-phenylether	10	U
86-73-7	Fluorene	10	U
100-01-6	4-Nitroaniline	50	U
534-52-1	4,6-Dinitro-2-methylphenol	50	U
86-30-6	N-Nitrosodiphenylamine	10	U
101-55-3	4-Bromophenyl-phenylether	10	U
118-74-1	Hexachlorobenzene	10	U
87-86-5	Pentachlorophenol	50	U
85-01-8	Phenanthrene	10	U
120-12-7	Anthracene	10	U
84-74-2	Di-n-butylphthalate	10	U
206-44-0	Fluoranthene	10	U
129-00-0	Pyrene	10	U
85-68-7	Butylbenzylphthalate	10	U
91-94-1	3,3'-Dichlorobenzidine	20	U
56-55-3	Benzo(a)anthracene	10	U
218-01-9	Chrysene	10	U
117-81-7	bis(2-Ethylhexyl)phthalate	10	U
117-84-0	Di-n-octylphthalate	10	U
205-99-2	Benzo(b)fluoranthene	10	U
207-08-9	Benzo(k)fluoranthene	10	U
50-32-8	Benzo(a)pyrene	10	U
193-39-5	Indeno(1,2,3-cd)pyrene	10	U
53-70-3	Dibenzo(a,h)anthracene	10	U
191-24-2	Benzo(g,h,i)perylene	10	U

(1) - Cannot be separated from diphenylamine

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

SAMPLE NO.

198158

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:05182 SAS No.: _____ SDG No.:_____

Matrix: (soil/water)WATER Lab Sample ID: 05182-4

Sample wt/vol: 1000.(g/ml)ML Lab File ID: >HE151::D2

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec.__ dec.__ Date Extracted:05/12/90

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 05/13/90

GPC Cleanup: (Y/N)N pH:0.0 Dilution Factor: 1.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg)UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
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9.					
10.					
11.					
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27.					
28.					
29.					
30.					

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

SBLKH1

Lab Name: Laucks Testing Labs Contract:_____

Lab Code: LAUCKS Case No.:05182 SAS No.: _____ SDG No.: _____

Matrix: (soil/water)WATER Lab Sample ID: B0512MSVWLA

Sample wt/vol: 1000.(g/ml)ML Lab File ID: >HE150::D2

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec.__ dec.__ Date Extracted:05/12/90

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 05/15/90

GPC Cleanup: (Y/N)N pH:0.0 Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)UG/L	Q
108-95-2	Phenol	10	U
111-44-4	bis (2-Chloroethyl)ether	10	U
95-57-8	2-Chlorophenol	10	U
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
100-51-6	Benzyl alcohol	10	U
95-50-1	1,2-Dichlorobenzene	10	U
95-48-7	2-Methylphenol	10	U
108-60-1	bis (2-Chloroisopropyl)ether	10	U
106-44-5	4-Methylphenol	10	U
621-64-7	N-Nitroso-di-n-propylamine	10	U
67-72-1	Hexachloroethane	10	U
98-95-3	Nitrobenzene	10	U
78-59-1	Isophorone	10	U
88-75-5	2-Nitrophenol	10	U
105-67-9	2,4-Dimethylphenol	10	U
65-85-0	Benzoic acid	50	U
111-91-1	bis (2-Chloroethoxy)methane	10	U
120-83-2	2,4-Dichlorophenol	10	U
120-82-1	1,2,4-Trichlorobenzene	10	U
91-20-3	Naphthalene	10	U
106-47-8	4-Chloroaniline	10	U
87-68-3	Hexachlorobutadiene	10	U
59-50-7	4-Chloro-3-methylphenol	10	U
91-57-6	2-Methylnaphthalene	10	U
77-47-4	Hexachlorocyclopentadiene	10	U
88-06-2	2,4,6-Trichlorophenol	10	U
95-95-4	2,4,5-Trichlorophenol	50	U
91-58-7	2-Chloronaphthalene	10	U
88-74-4	2-Nitroaniline	50	U
131-11-3	Dimethylphthalate	10	U
208-96-8	Acenaphthylene	10	U
606-20-2	2,6-Dinitrotoluene	10	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

SBLKH1

Lab Name: Laucks Testing Labs Contract:_____

Lab Code: LAUCKS Case No.:05182 SAS No.: _____ SDG No.: _____

Matrix: (soil/water)WATER Lab Sample ID: B0512MSVWLA

Sample wt/vol: 1000.(g/ml)ML Lab File ID: >HE150::D2

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec.__ dec.__ Date Extracted:05/12/90

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 05/15/90

GPC Cleanup: (Y/N)N pH:0.0 Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)UG/L	Q
99-09-2	3-Nitroaniline	50	U
83-32-9	Acenaphthene	10	U
51-28-5	2,4-Dinitrophenol	50	U
100-02-7	4-Nitrophenol	50	U
132-64-9	Dibenzofuran	10	U
121-14-2	2,4-Dinitrotoluene	10	U
84-66-2	Diethylphthalate	10	U
7005-72-3	4-Chlorophenyl-phenylether	10	U
86-73-7	Fluorene	10	U
100-01-6	4-Nitroaniline	50	U
534-52-1	4,6-Dinitro-2-methylphenol	50	U
86-30-6	N-Nitrosodiphenylamine	10	U
101-55-3	4-Bromophenyl-phenylether	10	U
118-74-1	Hexachlorobenzene	10	U
87-86-5	Pentachlorophenol	50	U
85-01-8	Phenanthrene	10	U
120-12-7	Anthracene	10	U
84-74-2	Di-n-butylphthalate	10	U
206-44-0	Fluoranthene	10	U
129-00-0	Pyrene	10	U
85-68-7	Butylbenzylphthalate	10	U
91-94-1	3,3'-Dichlorobenzidine	20	U
56-55-3	Benzo(a)anthracene	10	U
218-01-9	Chrysene	10	U
117-81-7	bis(2-Ethylhexyl)phthalate	10	U
117-84-0	Di-n-octylphthalate	10	U
205-99-2	Benzo(b)fluoranthene	10	U
207-08-9	Benzo(k)fluoranthene	10	U
50-32-8	Benzo(a)pyrene	10	U
193-39-5	Indeno(1,2,3-cd)pyrene	10	U
53-70-3	Dibenzo(a,h)anthracene	10	U
191-24-2	Benzo(g,h,i)perylene	10	U

(1) - Cannot be separated from diphenylamine

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

SAMPLE NO.: SBLKH1

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:05182 SAS No.: _____ SDG No.:_____

Matrix: (soil/water)WATER Lab Sample ID: B0512MSVWLA

Sample wt/vol: 1000.(g/ml)ML Lab File ID: >HE150::D2

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec.__ dec.__ Date Extracted:05/12/90

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 05/15/90

GPC Cleanup: (Y/N)N pH:0.0 Dilution Factor: 1.0

Number TICs found: 0 CONCENTRATION UNITS: (ug/L or ug/Kg)UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
21.					
22.					
23.					
24.					
25.					
26.					
27.					
28.					
29.					
30.					

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

198158MS

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:05182 SAS No.: _____ SDG No.: _____

Matrix: (soil/water)WATER Lab Sample ID: 05182-4MS

Sample wt/vol: 750.0(g/ml)ML Lab File ID: >HE152::D2

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec.__ dec.__ Date Extracted:05/12/90

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 05/15/90

GPC Cleanup: (Y/N)N pH:0.0 Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)UG/L	Q
108-95-2	Phenol	13	U
111-44-4	bis (2-Chloroethyl)ether	13	U
95-57-8	2-Chlorophenol	13	U
541-73-1	1,3-Dichlorobenzene	13	U
106-46-7	1,4-Dichlorobenzene	13	U
100-51-6	Benzyl alcohol	13	U
95-50-1	1,2-Dichlorobenzene	13	U
95-48-7	2-Methylphenol	13	U
108-60-1	bis (2-Chloroisopropyl)ether	13	U
106-44-5	4-Methylphenol	13	U
621-64-7	N-Nitroso-di-n-propylamine	13	U
67-72-1	Hexachloroethane	13	U
98-95-3	Nitrobenzene	13	U
78-59-1	Isophorone	13	U
88-75-5	2-Nitrophenol	13	U
105-67-9	2,4-Dimethylphenol	13	U
65-85-0	Benzoic acid	67	U
111-91-1	bis (2-Chloroethoxy)methane	13	U
120-83-2	2,4-Dichlorophenol	13	U
120-82-1	1,2,4-Trichlorobenzene	13	U
91-20-3	Naphthalene	13	U
106-47-8	4-Chloroaniline	13	U
87-68-3	Hexachlorobutadiene	13	U
59-50-7	4-Chloro-3-methylphenol	13	U
91-57-6	2-Methylnaphthalene	13	U
77-47-4	Hexachlorocyclopentadiene	13	U
88-06-2	2,4,6-Trichlorophenol	13	U
95-95-4	2,4,5-Trichlorophenol	67	U
91-58-7	2-Chloronaphthalene	13	U
88-74-4	2-Nitroaniline	67	U
131-11-3	Dimethylphthalate	13	U
208-96-8	Acenaphthylene	13	U
606-20-2	2,6-Dinitrotoluene	13	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

198158MS

Lab Name: Laucks Testing Labs Contract:_____

Lab Code: LAUCKS Case No.:05182 SAS No.: _____ SDG No.: _____

Matrix: (soil/water)WATER Lab Sample ID: 05182-4MS

Sample wt/vol: 750.0(g/ml)ML Lab File ID: >HE152::D2

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec.__ dec.__ Date Extracted:05/12/90

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 05/15/90

GPC Cleanup: (Y/N)N pH:0.0 Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)UG/L	Q
99-09-2	3-Nitroaniline	67	U
83-32-9	Acenaphthene	13	U
51-28-5	2,4-Dinitrophenol	67	U
100-02-7	4-Nitrophenol	67	U
132-64-9	Dibenzofuran	13	U
121-14-2	2,4-Dinitrotoluene	13	U
84-66-2	Diethylphthalate	13	U
7005-72-3	4-Chlorophenyl-phenylether	13	U
86-73-7	Fluorene	13	U
100-01-6	4-Nitroaniline	67	U
534-52-1	4,6-Dinitro-2-methylphenol	67	U
86-30-6	N-Nitrosodiphenylamine	13	U
101-55-3	4-Bromophenyl-phenylether	13	U
118-74-1	Hexachlorobenzene	13	U
87-86-5	Pentachlorophenol	67	U
85-01-8	Phenanthrene	13	U
120-12-7	Anthracene	13	U
84-74-2	Di-n-butylphthalate	13	U
206-44-0	Fluoranthene	13	U
129-00-0	Pyrene	13	U
85-68-7	Butylbenzylphthalate	13	U
91-94-1	3,3'-Dichlorobenzidine	27	U
56-55-3	Benzo(a)anthracene	13	U
218-01-9	Chrysene	13	U
117-81-7	bis(2-Ethylhexyl)phthalate	13	U
117-84-0	Di-n-octylphthalate	13	U
205-99-2	Benzo(b)fluoranthene	13	U
207-08-9	Benzo(k)fluoranthene	13	U
50-32-8	Benzo(a)pyrene	13	U
193-39-5	Indeno(1,2,3-cd)pyrene	13	U
53-70-3	Dibenzo(a,h)anthracene	13	U
191-24-2	Benzo(g,h,i)perylene	13	U

(1) - Cannot be separated from diphenylamine

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

198158MSD

Lab Name: Laucks Testing Labs Contract:_____

Lab Code: LAUCKS Case No.:05182 SAS No.: _____ SDG No.: _____

Matrix: (soil/water)WATER Lab Sample ID: 05182-4MSD

Sample wt/vol: 750.0(g/ml)ML Lab File ID: >HE153::D2

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec.__ dec.__ Date Extracted:05/12/90

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 05/15/90

GPC Cleanup: (Y/N)N pH:0.0 Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)UG/L	Q
108-95-2	Phenol	13	U
111-44-4	bis (2-Chloroethyl)ether	13	U
95-57-8	2-Chlorophenol	13	U
541-73-1	1,3-Dichlorobenzene	13	U
106-46-7	1,4-Dichlorobenzene	13	U
100-51-6	Benzyl alcohol	13	U
95-50-1	1,2-Dichlorobenzene	13	U
95-48-7	2-Methylphenol	13	U
108-60-1	bis (2-Chloroisopropyl)ether	13	U
106-44-5	4-Methylphenol	13	U
621-64-7	N-Nitroso-di-n-propylamine	13	U
67-72-1	Hexachloroethane	13	U
98-95-3	Nitrobenzene	13	U
78-59-1	Isophorone	13	U
88-75-5	2-Nitrophenol	13	U
105-67-9	2,4-Dimethylphenol	13	U
65-85-0	Benzoic acid	67	U
111-91-1	bis (2-Chloroethoxy)methane	13	U
120-83-2	2,4-Dichlorophenol	13	U
120-82-1	1,2,4-Trichlorobenzene	13	U
91-20-3	Naphthalene	13	U
106-47-8	4-Chloroaniline	13	U
87-68-3	Hexachlorobutadiene	13	U
59-50-7	4-Chloro-3-methylphenol	13	U
91-57-6	2-Methylnaphthalene	13	U
77-47-4	Hexachlorocyclopentadiene	13	U
88-06-2	2,4,6-Trichlorophenol	13	U
95-95-4	2,4,5-Trichlorophenol	67	U
91-58-7	2-Chloronaphthalene	13	U
88-74-4	2-Nitroaniline	67	U
131-11-3	Dimethylphthalate	13	U
208-96-8	Acenaphthylene	13	U
606-20-2	2,6-Dinitrotoluene	13	U

1D

PESTICIDE ORGANICS ANALYSIS DATA SHEET

~~EPA~~ SAMPLE NO.

~~198155~~ 5182-1

Lab Name: Laucks Testing Labs Contract:N/A

Lab Code: LAUCKS Lab No.:5182 SAS No.:N/A SDG No.:N/A

Matrix: (soil/water)WATER Lab Sample ID: 5182-1

Sample wt/vol: 100.0 (g/mL)ML Lab File ID: F05233F.PRN

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec. Date Extracted: 05/11/90

Extraction: (sepF/Cont/Sonc) SEPF Date Analyzed: 05/23/90

GPC Cleanup: (Y/N)N pH:7.9 Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
5103-71-9	alpha-Chlordane	0.50	U
5103-74-2	gamma-Chlordane	0.50	U
8001-35-2	Toxaphene	1.0	U
12674-11-2	Aroclor-1016	0.50	U
11104-28-2	Aroclor-1221	0.50	U
11141-16-5	Aroclor-1232	0.50	U
53469-21-9	Aroclor-1242	0.50	U
12672-29-6	Aroclor-1248	0.50	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1D

PESTICIDE ORGANICS ANALYSIS DATA SHEET

~~EPA~~ SAMPLE NO.

198550

5182-1 @ 1/5

Lab Name: Laucks Testing Labs Contract:N/A

Lab Code: LAUCKS Lab No.:5182 SAS No.:N/A SDG No.:N/A

Matrix: (soil/water)WATER Lab Sample ID: 5182-1 @ 1/5

Sample wt/vol: 100.0 (g/mL)ML Lab File ID: F05231F.PRN

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec. Date Extracted: 05/11/90

Extraction: (sepF/Cont/Sonc) SEPF Date Analyzed: 05/23/90

GPC Cleanup: (Y/N)N pH:7.9 Dilution Factor: 5

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.25	U
319-85-7	beta-BHC	0.25	U
319-86-8	delta-BHC	0.25	U
58-89-9	gamma-BHC (Lindane)	0.25	U
76-44-8	Heptachlor	0.25	U
309-00-2	Aldrin	0.25	U
1024-57-3	Heptachlor epoxide	0.25	U
959-98-8	Endosulfan I	0.25	U
60-57-1	Dieldrin	0.50	U
72-55-9	4,4'-DDE	0.50	U
72-20-8	Endrin	0.50	U
33213-65-9	Endosulfan II	0.50	U
72-54-8	4,4'-DDD	0.50	U
1031-07-8	Endosulfan sulfate	0.50	U
50-29-3	4,4'-DDT	0.50	U
72-43-5	Methoxychlor	2.5	U
53494-70-5	Endrin ketone	0.50	U
5103-71-9	alpha-Chlordane	2.5	U
5103-74-2	gamma-Chlordane	2.5	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	2.5	U
11104-28-2	Aroclor-1221	2.5	U
11141-16-5	Aroclor-1232	2.5	U
53469-21-9	Aroclor-1242	2.5	U
12672-29-6	Aroclor-1248	2.5	U
11097-69-1	Aroclor-1254	5.0	U
11096-82-5	Aroclor-1260	5.0	U

1D

PESTICIDE ORGANICS ANALYSIS DATA SHEET

~~EPA~~ SAMPLE NO.

198155D2
5182-1 @ 1/10

Lab Name: Laucks Testing Labs Contract:N/A

Lab Code: LAUCKS Lab No.:5182 SAS No.:N/A SDG No.:N/A

Matrix: (soil/water)WATER Lab Sample ID: 5182-1 @ 1/10

Sample wt/vol: 100.0 (g/mL)ML Lab File ID: F052148F.PRN

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec. Date Extracted: 05/11/90

Extraction: (sepF/Cont/Sonc) SEPF Date Analyzed: 05/22/90

GPC Cleanup: (Y/N)N pH:7.9 Dilution Factor: 10

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.50	U
319-85-7	beta-BHC	0.50	U
319-86-8	delta-BHC	0.50	U
58-89-9	gamma-BHC (Lindane)	0.50	U
76-44-8	Heptachlor	0.50	U
309-00-2	Aldrin	0.50	U
1024-57-3	Heptachlor epoxide	0.50	U
959-98-8	Endosulfan I	0.50	U
60-57-1	Dieldrin	1.0	U
72-55-9	4,4'-DDE	1.0	U
72-20-8	Endrin	1.0	U
33213-65-9	Endosulfan II	1.0	U
72-54-8	4,4'-DDD	1.0	U
1031-07-8	Endosulfan sulfate	1.0	U
50-29-3	4,4'-DDT	1.0	U
72-43-5	Methoxychlor	5.0	U
53494-70-5	Endrin ketone	1.0	U
5103-71-9	alpha-Chlordane	5.0	U
5103-74-2	gamma-Chlordane	5.0	U
8001-35-2	Toxaphene	10	U
12674-11-2	Aroclor-1016	5.0	U
11104-28-2	Aroclor-1221	5.0	U
11141-16-5	Aroclor-1232	5.0	U
53469-21-9	Aroclor-1242	5.0	U
12672-29-6	Aroclor-1248	5.0	U
11097-69-1	Aroclor-1254	10	U
11096-82-5	Aroclor-1260	10	U

1D

PESTICIDE ORGANICS ANALYSIS DATA SHEET

~~EPA~~ SAMPLE NO.

198157

5182-3

Lab Name: Laucks Testing Labs Contract:N/A

Lab Code: LAUCKS Lab No.:5182 SAS No.:N/A SDG No.:N/A

Matrix: (soil/water)WATER Lab Sample ID: 5182-3

Sample wt/vol: 100.0 (g/mL)ML Lab File ID: F05234F.PRN

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec. Date Extracted: 05/11/90

Extraction: (sepF/Cont/Sonc) SEPF Date Analyzed: 05/23/90

GPC Cleanup: (Y/N)N pH:7.9 Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
5103-71-9	alpha-Chlordane	0.50	U
5103-74-2	gamma-Chlordane	0.50	U
8001-35-2	Toxaphene	1.0	U
12674-11-2	Aroclor-1016	0.50	U
11104-28-2	Aroclor-1221	0.50	U
11141-16-5	Aroclor-1232	0.50	U
53469-21-9	Aroclor-1242	0.50	U
12672-29-6	Aroclor-1248	0.50	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1D

PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

198157D

5182-3 @ 1/5

Lab Name: Laucks Testing Labs Contract:N/A

Lab Code: LAUCKS Lab No.:5182 SAS No.:N/A SDG No.:N/A

Matrix: (soil/water)WATER Lab Sample ID: 5182-3 @ 1/5

Sample wt/vol: 100.0 (g/mL)ML Lab File ID: F05232F.PRN

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec. Date Extracted: 05/11/90

Extraction: (sepF/Cont/Sonc) SEPF Date Analyzed: 05/23/90

GPC Cleanup: (Y/N)N pH:7.9 Dilution Factor: 5

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.25	U
319-85-7	beta-BHC	0.25	U
319-86-8	delta-BHC	0.25	U
58-89-9	gamma-BHC (Lindane)	0.25	U
76-44-8	Heptachlor	0.25	U
309-00-2	Aldrin	0.25	U
1024-57-3	Heptachlor epoxide	0.25	U
959-98-8	Endosulfan I	0.25	U
60-57-1	Dieldrin	0.50	U
72-55-9	4,4'-DDE	0.50	U
72-20-8	Endrin	0.50	U
33213-65-9	Endosulfan II	0.50	U
72-54-8	4,4'-DDD	0.50	U
1031-07-8	Endosulfan sulfate	0.50	U
50-29-3	4,4'-DDT	0.50	U
72-43-5	Methoxychlor	2.5	U
53494-70-5	Endrin ketone	0.50	U
5103-71-9	alpha-Chlordane	2.5	U
5103-74-2	gamma-Chlordane	2.5	U
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	2.5	U
11104-28-2	Aroclor-1221	2.5	U
11141-16-5	Aroclor-1232	2.5	U
53469-21-9	Aroclor-1242	2.5	U
12672-29-6	Aroclor-1248	2.5	U
11097-69-1	Aroclor-1254	5.0	U
11096-82-5	Aroclor-1260	5.0	U

1D

PESTICIDE ORGANICS ANALYSIS DATA SHEET

~~EPA~~ SAMPLE NO.

198157 D2
5182-3 @ 1/10

Lab Name: Laucks Testing Labs Contract:N/A

Lab Code: LAUCKS Lab No.:5182 SAS No.:N/A SDG No.:N/A

Matrix: (soil/water)WATER Lab Sample ID: 5182-3 @ 1/10

Sample wt/vol: 100.0 (g/mL)ML Lab File ID: F052149F.PRN

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec. Date Extracted: 05/11/90

Extraction: (sepF/Cont/Sonc) SEPF Date Analyzed: 05/22/90

GPC Cleanup: (Y/N)N pH:7.9 Dilution Factor: 10

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.50	U
319-85-7	beta-BHC	0.50	U
319-86-8	delta-BHC	0.50	U
58-89-9	gamma-BHC (Lindane)	0.50	U
76-44-8	Heptachlor	0.50	U
309-00-2	Aldrin	0.50	U
1024-57-3	Heptachlor epoxide	0.50	U
959-98-8	Endosulfan I	0.50	U
60-57-1	Dieldrin	1.0	U
72-55-9	4,4'-DDE	1.0	U
72-20-8	Endrin	1.0	U
33213-65-9	Endosulfan II	1.0	U
72-54-8	4,4'-DDD	1.0	U
1031-07-8	Endosulfan sulfate	1.0	U
50-29-3	4,4'-DDT	1.0	U
72-43-5	Methoxychlor	5.0	U
53494-70-5	Endrin ketone	1.0	U
5103-71-9	alpha-Chlordane	5.0	U
5103-74-2	gamma-Chlordane	5.0	U
8001-35-2	Toxaphene	10	U
12674-11-2	Aroclor-1016	5.0	U
11104-28-2	Aroclor-1221	5.0	U
11141-16-5	Aroclor-1232	5.0	U
53469-21-9	Aroclor-1242	5.0	U
12672-29-6	Aroclor-1248	5.0	U
11097-69-1	Aroclor-1254	10	U
11096-82-5	Aroclor-1260	10	U

1D

PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

198158

5182-4

Lab Name: Laucks Testing Labs Contract:N/A

Lab Code: LAUCKS Lab No.:5182 SAS No.:N/A SDG No.:N/A

Matrix: (soil/water)WATER Lab Sample ID: 5182-4

Sample wt/vol: 100.0 (g/mL)ML Lab File ID: F052141F.PRN

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec. Date Extracted: 05/11/90

Extraction: (sepF/Cont/Sonc) SEPF Date Analyzed: 05/22/90

GPC Cleanup: (Y/N)N pH:8.2 Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
5103-71-9	alpha-Chlordane	0.50	U
5103-74-2	gamma-Chlordane	0.50	U
8001-35-2	Toxaphene	1.0	U
12674-11-2	Aroclor-1016	0.50	U
11104-28-2	Aroclor-1221	0.50	U
11141-16-5	Aroclor-1232	0.50	U
53469-21-9	Aroclor-1242	0.50	U
12672-29-6	Aroclor-1248	0.50	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

ID

PESTICIDE ORGANICS ANALYSIS DATA SHEET

~~EPA~~ SAMPLE NO.

PBLKDI

METHOD BLANK on

Lab Name: Laucks Testing Labs Contract:N/A

Lab Code: LAUCKS Lab No.:5182 SAS No.:N/A SDG No.:N/A

Matrix: (soil/water)WATER Lab Sample ID: B0511GPXWLW

Sample wt/vol: 100.0 (g/mL)ML Lab File ID: F052140F.PRN

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec. Date Extracted: 05/11/90

Extraction: (sepF/Cont/Sonc) SEPF Date Analyzed: 05/22/90

GPC Cleanup: (Y/N)N pH:7.0 Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
5103-71-9	alpha-Chlordane	0.50	U
5103-74-2	gamma-Chlordane	0.50	U
8001-35-2	Toxaphene	1.0	U
12674-11-2	Aroclor-1016	0.50	U
11104-28-2	Aroclor-1221	0.50	U
11141-16-5	Aroclor-1232	0.50	U
53469-21-9	Aroclor-1242	0.50	U
12672-29-6	Aroclor-1248	0.50	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1D

PESTICIDE ORGANICS ANALYSIS DATA SHEET

~~EPA~~ SAMPLE NO.

198158MS
5182-4MS

Lab Name: Laucks Testing Labs Contract:N/A

Lab Code: LAUCKS Lab No.:5182 SAS No.:N/A SDG No.:N/A

Matrix: (soil/water)WATER Lab Sample ID: 5182-4MS

Sample wt/vol: 100.0 (g/mL)ML Lab File ID: F052142F.PRN

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec. Date Extracted: 05/11/90

Extraction: (sepF/Cont/Sonc) SEPF Date Analyzed: 05/22/90

GPC Cleanup: (Y/N)N pH:8.2 Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
5103-71-9	alpha-Chlordane	0.50	U
5103-74-2	gamma-Chlordane	0.50	U
8001-35-2	Toxaphene	1.0	U
12674-11-2	Aroclor-1016	0.50	U
11104-28-2	Aroclor-1221	0.50	U
11141-16-5	Aroclor-1232	0.50	U
53469-21-9	Aroclor-1242	0.50	U
12672-29-6	Aroclor-1248	0.50	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1D

PESTICIDE ORGANICS ANALYSIS DATA SHEET

~~EPA~~ SAMPLE NO.

198158 MSD
5182-4MSD

Lab Name: Laucks Testing Labs Contract:N/A

Lab Code: LAUCKS Lab No.:5182 SAS No.:N/A SDG No.:N/A

Matrix: (soil/water)WATER Lab Sample ID: 5182-4MSD

Sample wt/vol: 100.0 (g/mL)ML Lab File ID: F052143F.PRN

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec. Date Extracted: 05/11/90

Extraction: (sepF/Cont/Sonc) SEPF Date Analyzed: 05/22/90

GPC Cleanup: (Y/N)N pH:8.2 Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
319-84-6	alpha-BHC	0.050	U
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.10	U
72-43-5	Methoxychlor	0.50	U
53494-70-5	Endrin ketone	0.10	U
5103-71-9	alpha-Chlordane	0.50	U
5103-74-2	gamma-Chlordane	0.50	U
8001-35-2	Toxaphene	1.0	U
12674-11-2	Aroclor-1016	0.50	U
11104-28-2	Aroclor-1221	0.50	U
11141-16-5	Aroclor-1232	0.50	U
53469-21-9	Aroclor-1242	0.50	U
12672-29-6	Aroclor-1248	0.50	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

SAMPLE NO.

198158MSD

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:05182 SAS No.: _____ SDG No.: _____

Matrix: (soil/water)WATER Lab Sample ID: 05182-4MSD

Sample wt/vol: 750.0(g/ml)ML Lab File ID: >HE153::D2

Level: (low/med) LOW Date Received: 05/10/90

% Moisture: not dec.__ dec.__ Date Extracted:05/12/90

Extraction: (SepF/Cont/Sonc) SEPF Date Analyzed: 05/15/90

GPC Cleanup: (Y/N)N pH:0.0 Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)UG/L	Q
99-09-2	3-Nitroaniline	67	U
83-32-9	Acenaphthene	13	U
51-28-5	2,4-Dinitrophenol	67	U
100-02-7	4-Nitrophenol	67	U
132-64-9	Dibenzofuran	13	U
121-14-2	2,4-Dinitrotoluene	13	U
84-66-2	Diethylphthalate	13	U
7005-72-3	4-Chlorophenyl-phenylether	13	U
86-73-7	Fluorene	13	U
100-01-6	4-Nitroaniline	67	U
534-52-1	4,6-Dinitro-2-methylphenol	67	U
86-30-6	N-Nitrosodiphenylamine	13	U
101-55-3	4-Bromophenyl-phenylether	13	U
118-74-1	Hexachlorobenzene	13	U
87-86-5	Pentachlorophenol	67	U
85-01-8	Phenanthrene	13	U
120-12-7	Anthracene	13	U
84-74-2	Di-n-butylphthalate	13	U
206-44-0	Fluoranthene	13	U
129-00-0	Pyrene	13	U
85-68-7	Butylbenzylphthalate	13	U
91-94-1	3,3'-Dichlorobenzidine	27	U
56-55-3	Benzo(a)anthracene	13	U
218-01-9	Chrysene	13	U
117-81-7	bis(2-Ethylhexyl)phthalate	1	J
117-84-0	Di-n-octylphthalate	13	U
205-99-2	Benzo(b)fluoranthene	13	U
207-08-9	Benzo(k)fluoranthene	13	U
50-32-8	Benzo(a)pyrene	13	U
193-39-5	Indeno(1,2,3-cd)pyrene	13	U
53-70-3	Dibenzo(a,h)anthracene	13	U
191-24-2	Benzo(g,h,i)perylene	13	U

(1) - Cannot be separated from diphenylamine

2E

WATER PESTICIDE SURROGATE RECOVERY

Lab Name: Laucks Testing Labs Contract:N/A

Lab Code: LAUCKS Lab No.:5182 SAS No.:N/A SDG No.:N/A

	EPA LTL SAMPLE NO.	S1 (DBC)#	OTHER @
01	PBLKDI	83	70
02	5182-4	75	82
03	5182-4MS	74	81
04	5182-4MSD	66	75
05	5182-1@1/10	66	54
06	5182-3@1/10	77	50
07	5182-1 @1/5	72	69
08	5182-3 @1/5	70	52
09	5182-1	72	62
10	5182-3	69	46
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30			

ADVISORY QC LIMITS (24-154)

S1 (DBC) = Dibutylchlorendate

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogates diluted out

@ Isodrin (Secondary surrogate)

*** Lab Analysis Report ***

Transaction #: 06041721 Seq #: 01 (10) Gen Inorg/Phys-Specified
(WE) Ecology, Manchester Lab
Project: (DOE-013Z) DUWAMISH WETLANDS J1K23 MZT
Param: (900 S) Hard-Tot CaCO3 mg/l

Partial

QA Code: ( ) Normal Data
Instrument: (TITRIT) Titrimetric Measurement
Method: (EP1-130.2) Hardness, Total (mg/l as CaCO3), Titrimetric, EDTA
Chemist: (MOH) O'Herron, Mary DOE Hours Worked:
Lab Prep: ( ) Unspecifed
Matrix: (10) Water-Total Date Preprd:
Units: (10) mg/l Date Anlyzd: 900531

Line	Sample #	Result	Sample Location/Description	#Days to Anl
1	90 198155	327	SW-1	900508 (23)
2	90 198156	128	SW-2	900508 (23)
3	90 198157	121	SW-3	900508 (23)
4	90 198158	282	GW-3	900508 (23)

Record Type: TRNIN2 Date Verified: 6/5/90 By: [signature]
Transaction Status: New Transaction...First Printing...Unverified.
Processed: 4-JUN-90 17:24:09 Status: N Batch: (In CUR DB)

AMTEST

Amtest Inc.

Professional
Analytical
Services

14603 N.E. 87th St.
Redmond, WA
98052

Fax: 206 883 3495

Tel: 206 885 1664

ANALYSIS REPORT

CLIENT: Washington State
Department of Ecology

REPORT TO: Craig Smith
P.O. Box 307
Manchester, WA 98353

DATE RECEIVED: 5/10/90

DATE REPORTED: 5/18/90

PROJECT: J1K23

DDWS - DRUMMOND WETLANDS

Laboratory Sample No.	Client Identification	Oil & Grease (mg/l)
010510	198155	8.1
010511	198156	32.6
010512	198157	29.6
010513	198158	3.0

STANDARD REFERENCE MATERIAL

	Ran	Known	Percent Recovered
ERA 9927	65.6	57.	115.

JTD/ja

REPORTED BY: John T. Dailey

WASHINGTON STATE DEPARTMENT OF ECOLOGY
ENVIRONMENTAL INVESTIGATIONS AND LABORATORY SERVICES
MANCHESTER LABORATORY

September 5, 1991

TO: Ching Pi Wang

FROM: Randy Knox RK

SUBJECT: QA Summary on Water Samples - Total and Dissolved

SAMPLE RECEIPT:

The samples from the DOT Tukwila project were received by the Manchester Laboratory on 7/12/91 in good condition.

HOLDING TIMES:

All analyses were performed within the specified holding times for metals analysis (28 days for mercury, 180 days for all other metals).

INSTRUMENT CALIBRATION:

Instrument calibration was performed before each analytical run and checked by initial calibration verification standards and blanks. Continuing calibration standards and blanks were analyzed at a frequency of 10% during the run and again at the end of the analytical run. All initial and continuing calibration verification standards were within the control limits of +/- 10%. AA calibration gave correlation coefficients greater than the criteria of 0.995. A correlation coefficient of 0.995 or higher means that the calibration is acceptable.

PROCEDURAL BLANKS:

The procedural blanks associated with these samples showed no detectable levels of analytes.

SPIKED SAMPLE ANALYSIS:

Spiked sample and duplicate spiked sample analysis were performed on sample number(s) 287146 and 287145. All spike recoveries were within the acceptable limits of +/- 25% for water sample analysis. The exceptions were silver in both the total and disolved preps, and selenium and lead in the dissolved prep. Low recovery of silver from water samples is not unusual. Silver was not detected in the samples but low spike recovery shows the possibility

of silver levels being above the usual detection level. Silver data is flagged with an N to indicate it is estimated as the result of low recovery. Recovery of selenium with the filtered samples was 68% and 73%. Selenium data in the filtered samples is flagged with a N to indicate the low recovery. Since selenium was not detected in the total samples detectable levels should not occur in the filtered samples. Recovery of one lead spike was high, 132% with the filtered samples. Data on two samples whose lead levels are detectable is flagged with an N to indicate it is estimated due to high recovery of the spike.

PRECISION DATA:

The duplicate results of the spiked and duplicate spiked sample were used to calculate precision related to the analysis of these samples. The % RPD for all parameters was well within the +/- 20% window for duplicate analysis.

ICP SERIAL DILUTION ANALYSIS:

The low analyte levels in these samples make serial dilution analysis not appropriate.

SUMMARY:

The data generated by the analysis of the above referenced samples can be used with qualification of silver, dissolved selenium, and some dissolved lead data for recoveries outside the accepted window.

If you have any questions about the results or the methods used to obtain these results please call me at SCAN 744-4737.

cc Bill Kammin

Sample/Project Analysis Results

Project: DOE-105F DOT - TUKWILA Officer: CPW Account: J1K23

Laboratory: Ecology, Manchester

Sample No: 91 287143 Description: MW-3 Source: Well (Test/Observation)

Begin Date: 91/07/11 :

all but Contract Data

Metals - PP		Water-Total Result	Units
Arsenic	As-Total	2.5P*	ug/l
Lead	Pb-Total	4.0P*	ug/l
Thallium	Tl-Total	2.5U	ug/l
Selenium	Se-Total	2.0U	ug/l
Mercury	Hg-Total	0.19P*	ug/l

Metals - PP		Water-Filtere Result	Units
Arsenic	As-Diss	1.5U	ug/l
Lead	Pb-Diss	1.9NJ*	ug/l
Thallium	Tl-Diss	2.5U	ug/l
Selenium	Se-Diss	2.0UN	ug/l
Mercury	Hg-Diss	0.052P*	ug/l

Metals - ICP Scan		Water-Total Result	Units
Berylium	Be-Total	1.0U	ug/l
Cadmium	Cd-Total	2.0U	ug/l
Chromium	Cr-Total	7.4P*	ug/l
Copper	Cu-Total	7.9P*	ug/l
Lead	Pb-Total	20U	ug/l
Nickel	Ni-Total	10P*	ug/l
Silver	Ag-Total	3.0UN	ug/l
Zinc	Zn-Total	47.6 *	ug/l
Antimony	Sb-Total	30U	ug/l

Metals - ICP Scan		Water-Filtere Result	Units
Berylium	Be-Diss	1.0U	ug/l
Cadmium	Cd-Diss	2.0U	ug/l
Chromium	Cr-Diss	5.0U	ug/l
Copper	Cu-Diss	3.0U	ug/l
Lead	Pb-Diss	20U	ug/l
Nickel	Ni-Diss	10U	ug/l
Silver	Ag-Diss	3.0UN	ug/l
Zinc	Zn-Diss	25 *	ug/l
Antimony	Sb-Diss	30U	ug/l

Organics - General		Water-Total Result	Units
H-Carbon	ID	ND	
Ethylene	Glycol	20U	%

Contract Lab Program		Water-Total Result	Units
VOA	GC/MS	REQ	CLP
P/PCBs	GC	REQ	CLP
P/A/H Sc	an	REQ	CLP

(Sample Complete)

Project: DOE-105F DOT - TUKWILA Officer: CPW Account: J1K23

Laboratory: Ecology, Manchester

Sample No: 91 287144 Description: MW-1 Source: Well (Test/Observation)

Begin Date: 91/07/11 :

Metals - PP		Water-Total Result	Units
Arsenic	As-Total	5.06 *	ug/l
Lead	Pb-Total	3.8P*	ug/l
Thallium	Tl-Total	2.5U	ug/l
Selenium	Se-Total	2.0U	ug/l
Mercury	Hg-Total	0.083P*	ug/l

Metals - PP		Water-Filtere Result	Units
Arsenic	As-Diss	2.7P*	ug/l
Lead	Pb-Diss	1.0U	ug/l
Thallium	Tl-Diss	2.5U	ug/l
Selenium	Se-Diss	2.0UN	ug/l
Mercury	Hg-Diss	0.030U	ug/l

Metals - ICP Scan		Water-Total Result	Units
Berylium	Be-Total	1.0U	ug/l
Cadmium	Cd-Total	2.0U	ug/l
Chromium	Cr-Total	14P*	ug/l
Copper	Cu-Total	20 *	ug/l
Lead	Pb-Total	20U	ug/l
Nickel	Ni-Total	29P*	ug/l
Silver	Ag-Total	3.0UN	ug/l
Zinc	Zn-Total	36 *	ug/l
Antimony	Sb-Total	30U	ug/l

Metals - ICP Scan		Water-Filtere Result	Units
Berylium	Be-Diss	1.0U	ug/l
Cadmium	Cd-Diss	2.0U	ug/l
Chromium	Cr-Diss	5.0U	ug/l
Copper	Cu-Diss	3.0U	ug/l
Lead	Pb-Diss	20U	ug/l
Nickel	Ni-Diss	10U	ug/l
Silver	Ag-Diss	3.0UN	ug/l
Zinc	Zn-Diss	10P*	ug/l
Antimony	Sb-Diss	30U	ug/l

Organics - General		Water-Total Result	Units
H-Carbon	ID	ND	
Ethylene	Glycol	20U	%

Contract Lab Program		Water-Total Result	Units
VOA	GC/MS	REQ	CLP
P/PCBs	GC	REQ	CLP
P/A/H Sc	an	REQ	CLP

(Sample Complete)

Project: DOE-105F DOT - TUKWILA Officer: CPW Account: J1K23

Laboratory: Ecology, Manchester

Sample No: 91 287145 Description: MW-4 Source: Well (Test/Observation)

Begin Date: 91/07/11 :

Metals - PP		Water-Total Result	Units
Arsenic	As-Total	6.19 *	ug/l
Lead	Pb-Total	7.6 *	ug/l
Thallium	Tl-Total	2.5U	ug/l
Selenium	Se-Total	2.0U	ug/l
Mercury	Hg-Total	0.20P*	ug/l

Metals - PP		Water-Filtere Result	Units
Arsenic	As-Diss	3.4P*	ug/l
Lead	Pb-Diss	1.0U	ug/l
Thallium	Tl-Diss	2.5U	ug/l
Selenium	Se-Diss	2.0UN	ug/l
Mercury	Hg-Diss	0.051P*	ug/l

Metals - PP Matrix Spike #1		Water-Filtere Result	Units
Arsenic	As-Diss	87	% Recov
Lead	Pb-Diss	132	% Recov
Thallium	Tl-Diss	100	% Recov
Selenium	Se-Diss	68	% Recov
Mercury	Hg-Diss	104	% Recov

Metals - PP Matrix Spike #2		Water-Filtere Result	Units
Arsenic	As-Diss	87	% Recov
Lead	Pb-Diss	122	% Recov
Thallium	Tl-Diss	100	% Recov
Selenium	Se-Diss	73	% Recov
Mercury	Hg-Diss	99	% Recov

Metals - ICP Scan		Water-Total Result	Units
Berylium	Be-Total	1.0U	ug/l
Cadmium	Cd-Total	2.5P*	ug/l
Chromium	Cr-Total	5.0U	ug/l
Copper	Cu-Total	5.5P*	ug/l
Lead	Pb-Total	20U	ug/l

Metals - ICP Scan *** Continued ***		Water-Total Result	Units
Nickel	Ni-Total	10U	ug/l
Silver	Ag-Total	3.0UN	ug/l
Zinc	Zn-Total	20 *	ug/l
Antimony	Sb-Total	30U	ug/l

Metals - ICP Scan Matrix Spike #1		Water-Total Result	Units
Berylium	Be-Total	104	% Recov
Cadmium	Cd-Total	110	% Recov
Chromium	Cr-Total	89	% Recov
Copper	Cu-Total	95	% Recov
Lead	Pb-Total	90	% Recov
Nickel	Ni-Total	90	% Recov
Silver	Ag-Total	28	% Recov
Zinc	Zn-Total	90	% Recov
Antimony	Sb-Total	87	% Recov

Metals - ICP Scan Matrix Spike #2		Water-Total Result	Units
Berylium	Be-Total	102	% Recov
Cadmium	Cd-Total	113	% Recov
Chromium	Cr-Total	87	% Recov
Copper	Cu-Total	94	% Recov
Lead	Pb-Total	87	% Recov
Nickel	Ni-Total	90	% Recov
Silver	Ag-Total	33	% Recov
Zinc	Zn-Total	89	% Recov
Antimony	Sb-Total	81	% Recov

Metals - ICP Scan		Water-Filtere Result	Units
Berylium	Be-Diss	1.0U	ug/l
Cadmium	Cd-Diss	2.0U	ug/l
Chromium	Cr-Diss	5.0U	ug/l
Copper	Cu-Diss	3.0U	ug/l
Lead	Pb-Diss	20U	ug/l
Nickel	Ni-Diss	10U	ug/l
Silver	Ag-Diss	3.0UN	ug/l

Metals - ICP Scan *** Continued ***		Water-Filtere Result	Units
Zinc	Zn-Diss	8.8P*	ug/l
Antimony	Sb-Diss	30U	ug/l

Organics - General		Water-Total Result	Units
H-Carbon	ID	ND	
Ethylene	Glycol	20U	%

Contract Lab Program		Water-Total Result	Units
VOA	GC/MS	REQ	CLP
P/PCBs	GC	REQ	CLP
P/A/H Sc	an	REQ	CLP

(Sample Complete)

Project: DOE-105F DOT - TUKWILA Officer: CPW Account: J1K23

Laboratory: Ecology, Manchester

Sample No: 91 287146 Description: MW-2 Source: Well (Test/Observation)

Begin Date: 91/07/11 :

Metals - PP		Water-Total Result	Units
Arsenic	As-Total	3.5P*	ug/l
Lead	Pb-Total	5.2 *	ug/l
Thallium	Tl-Total	2.5U	ug/l
Selenium	Se-Total	2.0U	ug/l
Mercury	Hg-Total	0.13P*	ug/l

Metals - PP Matrix Spike #1		Water-Total Result	Units
Arsenic	As-Total	85	% Recov
Lead	Pb-Total	91	% Recov
Thallium	Tl-Total	90	% Recov
Selenium	Se-Total	88	% Recov
Mercury	Hg-Total	91	% Recov

Metals - PP Matrix Spike #2		Water-Total Result	Units
Arsenic	As-Total	84	% Recov
Lead	Pb-Total	106	% Recov
Thallium	Tl-Total	89	% Recov
Selenium	Se-Total	85	% Recov
Mercury	Hg-Total	88	% Recov

Metals - PP		Water-Filtere Result	Units
Arsenic	As-Diss	1.5U	ug/l
Lead	Pb-Diss	5.4N*	ug/l
Thallium	Tl-Diss	2.5U	ug/l
Selenium	Se-Diss	2.0UN	ug/l
Mercury	Hg-Diss	0.030U	ug/l

Metals - ICP Scan		Water-Total Result	Units
Berylium	Be-Total	1.0U	ug/l
Cadmium	Cd-Total	2.0U	ug/l
Chromium	Cr-Total	5.0U	ug/l
Copper	Cu-Total	10P*	ug/l
Lead	Pb-Total	20U	ug/l

Metals - ICP Scan *** Continued ***		Water-Total Result	Units
Nickel	Ni-Total	10U	ug/l
Silver	Ag-Total	3.0UN	ug/l
Zinc	Zn-Total	55.6 *	ug/l
Antimony	Sb-Total	30U	ug/l

Metals - ICP Scan		Water-Filtere Result	Units
Berylium	Be-Diss	1.0U	ug/l
Cadmium	Cd-Diss	2.0U	ug/l
Chromium	Cr-Diss	5.0U	ug/l
Copper	Cu-Diss	3.0U	ug/l
Lead	Pb-Diss	20U	ug/l
Nickel	Ni-Diss	10U	ug/l
Silver	Ag-Diss	3.0UN	ug/l
Zinc	Zn-Diss	28 *	ug/l
Antimony	Sb-Diss	30U	ug/l

Metals - ICP Scan Matrix Spike #1		Water-Filtere Result	Units
Berylium	Be-Diss	103	% Recov
Cadmium	Cd-Diss	98	% Recov
Chromium	Cr-Diss	86	% Recov
Copper	Cu-Diss	94	% Recov
Lead	Pb-Diss	82	% Recov
Nickel	Ni-Diss	88	% Recov
Silver	Ag-Diss	12	% Recov
Zinc	Zn-Diss	88	% Recov
Antimony	Sb-Diss	90	% Recov

Metals - ICP Scan Matrix Spike #2		Water-Filtere Result	Units
Berylium	Be-Diss	103	% Recov
Cadmium	Cd-Diss	101	% Recov
Chromium	Cr-Diss	86	% Recov
Copper	Cu-Diss	95	% Recov
Lead	Pb-Diss	86	% Recov
Nickel	Ni-Diss	89	% Recov
Silver	Ag-Diss	13	% Recov

Metals - ICP Scan *** Continued *** Matrix Spike #2		Water-Filtere Result	Units
Zinc	Zn-Diss	89	% Recov
Antimony	Sb-Diss	97	% Recov

Organics - General		Water-Total Result	Units
H-Carbon	ID	ND	
Ethylene	Glycol	20U	%

Contract Lab Program		Water-Total Result	Units
VOA	GC/MS	REQ	CLP
P/PCBs	GC	REQ	CLP
P/A/H Sc	an	REQ	CLP

(Sample Complete)

Project: DOE-105F DOT - TUKWILA Officer: CPW Account: J1K23

Blank ID: PB 31.20

Metals - PP Blank #1		Water-Total Result	Units
Arsenic	As-Total	1.5U	ug/l
Lead	Pb-Total	1.0U	ug/l
Thallium	Tl-Total	2.5U	ug/l
Selenium	Se-Total	2.0U	ug/l

Metals - PP Blank #1		Water-Filtere Result	Units
Arsenic	As-Diss	1.5U	ug/l
Lead	Pb-Diss	1.0U	ug/l
Thallium	Tl-Diss	2.5U	ug/l
Selenium	Se-Diss	2.0U	ug/l

Metals - ICP Scan Blank #1		Water-Total Result	Units
Berylium	Be-Total	1.0U	ug/l
Cadmium	Cd-Total	2.0U	ug/l
Chromium	Cr-Total	5.0U	ug/l
Copper	Cu-Total	3.0U	ug/l
Lead	Pb-Total	20U	ug/l
Nickel	Ni-Total	10U	ug/l
Silver	Ag-Total	3.0UN	ug/l
Zinc	Zn-Total	4.0U	ug/l
Antimony	Sb-Total	30U	ug/l

Metals - ICP Scan Blank #1		Water-Filtere Result	Units
Berylium	Be-Diss	1.0U	ug/l
Cadmium	Cd-Diss	2.0U	ug/l
Chromium	Cr-Diss	5.0U	ug/l
Copper	Cu-Diss	3.0U	ug/l
Lead	Pb-Diss	20U	ug/l
Nickel	Ni-Diss	10U	ug/l
Silver	Ag-Diss	3.0UN	ug/l
Zinc	Zn-Diss	4.0U	ug/l
Antimony	Sb-Diss	30U	ug/l

(Sample Complete)

State of Washington Department of Ecology
Manchester Environmental Laboratory
7411 Beach Dr. East Port Orchard WA. 98366

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Data Review
September 23, 1991

Project: **DOT - TUKWILA**

	MW-03	MW-01	MW-04	MW-02
Samples:	287143	287144	287145	287146

Laboratory: Laucks Testing Laboratory 7506

By: Stuart Magoon SM

Case Summary

These analyses were reviewed for qualitative and quantitative accuracy, validity, and usefulness.

There is no need to assimilate the "dilution factor" or "sample wt/vol" into the final values reported; these calculations have already been figured into the reported values.

DATA QUALIFIER DEFINITIONS

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

J - The analyte was positively identified. The associated numerical result is an estimate.

UJ - The analyte was not detected at or above the reported estimated result.

D - The result was derived from an analysis of a sample that required a secondary dilution.

NR - Not Reported. These compounds are added as part of the Matrix Spike solution.

NJ - There is evidence that the analyte is present. The associated numerical value is an estimate.

R - The data is unusable for all purposes.

Volatiles

Sample	Date Collect	Date Extd	Date Anlz	#Days ext anal	#Days Collect to anal
287143	7/11	NA	7/16	NA	5 of 14
287144	7/11	NA	7/16	NA	5 of 14
287145	7/11	NA	7/16	NA	5 of 14
287146	7/11	NA	7/16	NA	5 of 14

These samples were analyzed within the SW-846 recommended holding time.

Method Blank:

Methylene Chloride was detected in the method blank (VBLKU1) associated with these samples. Methylene Chloride, however, was not detected in any of the samples.

No other target or non-target analytes were detected in the method blank (VBLKU1)

Surrogates:

Surrogate recoveries for these samples, the matrix spikes, and the associated method blank are reasonable, acceptable and within the QC limits.

Matrix Spike/Matrix Spike Duplicate (MS/MSD):

Matrix spike/spike duplicate recovery and precision data are reasonable and acceptable, and within QC limits.

Sample Data:

This data is acceptable for use, without further qualification.

Polynuclear Aromatic Hydrocarbons (PAH)

Sample	Date Collect	Date Extd	Date Anlz	#Days Collect to ext	#Days Extract to anal
287143	7/11	7/18	7/23	8 of 14	5 of 40
287144	7/11	7/18	7/23	8 of 14	5 of 40
287145	7/11	7/18	7/23	8 of 14	5 of 40
287146	7/11	7/18	7/23	8 of 14	5 of 40

These samples were extracted and analyzed within the SW-846 recommended holding time.

Method Blank:

No PAH's were detected in the method blank.

Surrogates:

Surrogate recoveries for these samples, the matrix spikes, and the associated method blank are reasonable, acceptable and within QC limits, with one exception. The surrogate recovery for sample 287145 was below QC limits. Since a re-extraction of this sample gave similar low surrogate recoveries, the low recoveries may be due to the sample matrix. As a result of this low recovery all the non-detected analytes have been qualified with a "UJ" and all the detected analytes have been qualified with a "J".

Matrix Spike/Matrix Spike Duplicate (MS/MSD):

Matrix spike/spike duplicate recovery and precision data are acceptable and within QC limits.

Sample Data:

This data is acceptable for use. Note that data qualifiers may modify the usefulness of the individual values.

Pesticides and PCB's

Sample	Date Collect	Date Extd	Date Anlz	#Days Collect to ext	#Days Extract to anal
287143	7/11	7/16	7/27	5 of 7	11 of 40
287144	7/11	7/16	7/27	5 of 7	11 of 40
287145	7/11	7/16	7/27	5 of 7	11 of 40
287146	7/11	7/16	7/27	5 of 7	11 of 40

These samples were extracted and analyzed within the SW-846 recommended holding time.

Method Blank:

No pesticides or polychloronated biphenyls were detected in the method blank.

Surrogates:

All three surrogates for every sample, the matrix spikes, and the method blank were within control limits. As the Case Narrative states the isodrin ("other") surrogate recovery on the DB1701 column for sample 287145 was effected by the sample matrix; no corrective action was necessary.

Matrix Spike/Matrix Spike Duplicate (MS/MSD):

All matrix spike/spike duplicate recovery and precision data are acceptable and within QC limits.

Sample Data:

This data is acceptable for use.
Heptachlor was detected in sample 287126, it was the only pesticide/PCB detected in this sample set.

sent directly to CX lab.

Sm

State of Washington Department of Ecology

Program Code ☐☐☐

Project Code JIK23

Project/Name DOT-Tukwila

SAMPLE DATA & ANALYSIS REQUIRED

4410

Page 1 of 1

☒ Enforcement/Custody ☐ Class II

☐ Possible Toxic/Hazardous Notes Hydrocarbons & ...

SAMPLING DATE Yr	Mo	Da	TIME Hr	Mn	FIELD STATION IDENTIFICATION	LAB SAMPLE NUMBER Wk	Seq	Matrix Code	Source Code	No. of Containers
91	07	11	12	00	MW-3	28	7143	10/11	23	06
91	07	11	14	15	MW-1	(	(44	(	(	06
91	07	11	15	20	MW-4	(	(45	(	(	06
91	07	11	16	15	MW-2	↓	↓46	↓	↓	06

General Chemistry: Turbidity; pH; Conductivity; Total Hardness; Chloride; TS, TSS, TNVS, TNVSS; TSS; % Solids; Nutrients (4); Ammonia; Nitrate-Nitrite; Total Phosphorous; Ortho-Phosphate; BOD/5 Day; COD Chem Oxy Demand

Biology: Fecal Coliform Bacteria; Total Coliform Bacteria; Enterococcus; Fish Bioassay

Organic Chem.	MW-3 (row 1)
Base/Neutrals/Acids	
Volatile Organics OUT 8240	x
Pesticides/PCB's OUT 8180	x
PCB's Only	
Purgeable Halocarbons	
Herbicides	
Hydrocarbon Analysis	x
Phenolics (AAP)	
Oil & Grease	
Antifreeze	✓
PAH OUT 8310	✓
Metals: Total Dissolved	x

METALS: P.P. Metals; EP Tox Metals

Specific List: Total ☐ Recoverable ☐ Totals ☐ Dissolved

Cu Cd Pb Zn Ni

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RW

Project Officer CPWang

Sampler(s) CPWang

Recorder CPWang

Date 7/11/91

Chain Of Custody Record

Relinquished By:	Received By:	Yr	Mo	Da	Hr	Mn	Seal I.D.	Condition of Seals	Comments
[illegible]	into NWRO locked refrig	91	07	12	08	00			
	Catherine Crake	91	07	12	13	15			Locked frig

Ecy 040-115 Rev. 7/87

Laboratory Copy White / Project Office Copy Yellow / Field or Office Copy Pink

CX

NARRATIVE

LAUCKS TESTING LABORATORIES
940 S. Harney
Seattle, WA 98108

TO: Washington State Department of Ecology
Project Name: DOT Tukwila
Laboratory No.: 9107505
Date of this report: August 13, 1991

GENERAL REMARKS:

The following samples were analyzed under the above lab number:

Client Sample I.D.	LTL Sample Number	Analysis Request
287143	9107505-01	VOA/PEST/PCB/PAH
287144	9107505-02	VOA/PEST/PCB/PAH
287144MS	9107505-02MS	VOA/PEST/PCB/PAH
287144MSD	9107505-02MSD	VOA/PEST/PCB/PAH
287145	9107505-03	VOA/PEST/PCB/PAH
287146	9107505-04	VOA/PEST/PCB/PAH

When completing forms created through the CLP software, every attempt is made to use both your sample IDs as well as the laboratory sample IDs on the forms. The forms have varied default sizes to their sample identification fields, and are not amenable to alteration or editing. When it is not possible to use your complete sample ID, because of field length limitations, Laucks will use as much of your ID as will fit, beginning from the RIGHT hand side of the sample ID number. In addition, ALL forms will contain our sample IDs, which can be cross referenced from the table above.

Many of the CLP-package forms will include the words "EPA Sample No.," or some variation of this, which again cannot be edited. Where a reference is made to the EPA, you may take this to mean more generally, "the client". These data are not part of an actual EPA case.

GENERAL REMARKS ON ORGANIC ANALYSES:

GC/MS Fractions:

Compounds may be called out as hits on the computerized printout. However, if they are not reported on the OADS (sample results) form, the mass spectral data have been manually searched and the compounds have been eliminated as hits based on this search.

LAUCKS TESTING LABORATORIES
940 S. Harney
Seattle, WA 98108

Volatile Fraction:

All volatile analyses were performed using a DB-624 megabore capillary. The elution order and retention times differ from those stated for packed column analysis in the U.S.E.P.A.'s Statement of Work for organic CLP analyses. Listed below are the correct elution order and the internal standard with which each compound is associated.

Bromochloromethane(IS)	1,4-Difluorobenzene(IS)	d5-Chlorobenzene(IS)
Chloromethane	Benzene	Cis-1,3-Dichloropropene
Vinyl Chloride	1,2-Dichloroethane	4-Methyl-2-Pentanone
Bromomethane	Trichloroethene	d8-Toluene(SURR)
Chloroethane	1,2-Dichloropropane	Toluene
1,1-Dichloroethene	Bromodichloromethane	Trans-1,3-Dichloropropene
Acetone		1,1,2-Trichloroethane
Carbon Disulfide		Tetrachloroethene
Methylene Chloride		2-Hexanone
Trans-1,2-Dichloroethene		Dibromochloromethane
1,1-Dichloroethane		Chlorobenzene
Cis-1,2-Dichloroethene		Ethylbenzene
2-Butanone		M,P-Xylene
Chloroform		O-Xylene
1,1,1-Trichloroethane		Styrene
Carbon Tetrachloride		Bromoform
d4-1,2-Dichloroethane(SURR)		Bromofluorobenzene(SURR)
		1,1,2,2-Tetrachloroethane

The analytes listed above were assigned to their respective internal standards on the basis of relative retention time (RRT). For all compounds except cis-1,3-dichloropropene, the RRTs fall between 0.8 and 1.2. Cis-1,2-dichloropropene was the only compound to fall outside of this range, and was assigned to the internal standard closest to its retention time.

Separation of cis- and trans- dichloroethylene isomers is achievable on a DB-624 megabore capillary column. These compounds have been found to coelute on the packed column specified in the U.S.E.P.A.'s Statement of Work. When these isomers are found in a sample, they will be reported as total-1,2-dichloroethylene.

Pesticide/PCB Fraction:

The compound isodrin was added as an optional surrogate in the pesticide/PCB analyses. Recovery values are reported on the appropriate FORM II - PEST.

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940 S. Harney
Seattle, WA 98108

SPECIFIC REMARKS ON ORGANIC ANALYSES:

VOA Fraction:

The earliest eluting peak on the chromatograms for the samples and blanks is a solvent peak, an artifact of the megabore capillary column, and, therefore, TICs have not been submitted for it.

Pesticide/PCB Fraction:

Surrogate Recoveries:

In sample number 287145 the surrogate Isodrin could not be quantitated on the DB-1701 channel due to matrix interference.

Standards Data:

In Performance Evaluation Mix (PEM03) the analyte beta-BHC was above the RPD control limit on the DB-17 and the DB-1701 channels.

Instrument Blanks:

The form OADS-Pest for the instrument blanks reports SDL's assuming a default sample basis for waters. The instrument blanks were inspected down to 1/2 the CRQL for pesticides and PCB's. The "Raw QC" section of the data packet includes the OADs for all instrument blanks. The instrument blanks use lab identifications such as PIBLK01 and PIBLK02.

PAH Fraction:

Surrogate Recovery:

Samples 287143, 287145, and 287146 showed low surrogate recovery on acquisition sequence SA747, and for this reason were reextracted and analyzed again on acquisition sequence SA748. These samples again showed low surrogate recovery, with sample 287145 outside control limits. This is believed to be a sample matrix effect. Surrogate recovery was otherwise satisfactory.

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Seattle, WA 98108

Standards Data:

A complete set of Initial Calibration Standards and Continuing Calibration Verification Standards for sequences SA747 and SA748 have been included in this package, as well as Instrument Blanks and Method Detection Limit Standard Reports.

Retention Time:

Elution time shift was noted on both acquisition sequences. This is believed to be a sample matrix effect. It was necessary to enlarge the window for Pyrene to recover that spiking compound in the matrix spike duplicate sample. Samples 287143, 287145, 287146 on sequence SA748 were bracketed with standards to maximize accuracy in identifying analytes.

Sample Confirmation:

Fluorescence detection is used to confirm most, but not all target analytes. It is used to confirm the presence of those analytes which are visable on both the ultra violet (UV) and fluorescence detectors. All target analyte quantitation is done with UV detector responses.

Sample Results:

Samples have been analyzed in two acquisition sequences, SA747 and SA748. Sample 287144, as well as the matrix spike and matrix spike duplicate of that sample, were acquired on sequence SA747. Samples 287143, 287145 and 287146 were acquired on sequence SA748 (see comments under "Surrogate Recovery" above). Sample 287144 showed a low-level hit of Anthracene. Sample 287145 showed hits of Fluoranthene, Benzo (b)fluoranthene, Indeno(123cd)pyrene, and Benzo(ghi)perylene.

VOLATILE

QC SUMMARY DATA

2A

WATER VOLATILE SURROGATE RECOVERY

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:_____ SAS No.: _____ SDG No.:_____

	DOE SAMPLE NO.	S1 (TOL) #	S2 (BFB) #	S3 (DCE) #	OTHER	TOT OUT
01	VBLKU1	101	104	101		0
02	287143	100	103	102		0
03	287144	100	105	103		0
04	287145	99	105	102		0
05	287144MS	101	105	104		0
06	287144MSD	100	105	104		0
07	287146	101	106	103		0
08						
09						
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	QC LIMITS
S1 (TOL) = Toluene-d8	(88-110)
S2 (BFB) = Bromofluorobenzene	(86-115)
S3 (DCE) = 1,2-Dichloroethane-d4	(76-114)

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogates diluted out

3A

WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix Spike - DOE Sample No.: 287144

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONCENTRATION (ug/L)	MS CONCENTRATION (ug/L)	MS % REC	#	QC LIMITS REC.
1,1-Dichloroethene	50.000	0.000	58.700	117	_	61-145
Trichloroethene	50.000	0.000	59.400	119	_	71-120
Benzene	50.000	0.000	56.600	113	_	76-127
Toluene	50.000	0.000	56.200	112	_	76-125
Chlorobenzene	50.000	0.000	57.600	115	_	75-130

COMPOUND	SPIKE ADDED (ug/L)	MSD CONCENTRATION (ug/L)	MSD % REC	#	% RPD	#	QC LIMITS RPD	QC LIMITS REC.
1,1-Dichloroethene	50.000	58.400	117	_	1	_	14	61-145
Trichloroethene	50.000	59.700	119	_	1	_	14	71-120
Benzene	50.000	56.200	112	_	1	_	11	76-127
Toluene	50.000	55.800	112	_	1	_	13	76-125
Chlorobenzene	50.000	58.100	116	_	1	_	13	75-130

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD:0 out of 5 outside limits
Spike Recovery:0 out of 10 outside limits

Comments: _____

4A

VOLATILE METHOD BLANK SUMMARY

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.: _____ SAS No.: _____ SDG No.: _____

Lab File ID: >UG16E Lab Sample ID: B0716MVOWU1

Date Analyzed: 07/16/91 Time Analyzed: 12:50

Matrix: (soil/water) WATER Level: (low/med) LOW

Instrument ID: 5970U

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS, AND MSD:

	DOE SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	TIME ANALYZED
01	287143	07505-01	>UG16F	13:29
02	287144	07505-02	>UG16G	14:01
03	287145	07505-03	>UG16H	14:35
04	287144MS	07505-02MS	>UG16I	15:06
05	287144MSD	07505-02MSD	>UG16J	15:45
06	287146	07505-04	>UG16K	16:25
07				
08				
09				
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COMMENTS: _____

VOLATILE

SAMPLE DATA

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

DOE SAMPLE NO.: 287143

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.: _____ SAS No. _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 07505-01

Sample wt/vol: 5.0 (g/ml) ML Lab File ID: >UG16F

Level: (low/med) LOW Date Received: 07/12/91

% Moisture: not dec. __ Date Analyzed: 07/16/91

Column: (pack/cap) CAP Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	Trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

DOE SAMPLE NO.: 287143

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water)WATER Lab Sample ID: 07505-01

Sample wt/vol: 5.0 (g/ml)ML Lab File ID: >UG16F

Level: (low/med) LOW Date Received: 07/12/91

% Moisture: not dec.__ Date Analyzed: 07/16/91

Column: (pack/cap) CAP Dilution Factor: 1.0

Number TICs found. 0 CONCENTRATION UNITS: (ug/L or ug/Kg)UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
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1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

DOE SAMPLE NO.: 287144

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.: _____ SAS No. _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 07505-02

Sample wt/vol: 5.0 (g/ml) ML Lab File ID: >UG16G

Level: (low/med) LOW Date Received: 07/12/91

% Moisture: not dec. __ Date Analyzed: 07/16/91

Column: (pack/cap) CAP Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	Trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

DOE SAMPLE NO.: 287144

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 07505-02

Sample wt/vol: 5.0 (g/ml) ML Lab File ID: >UG16G

Level: (low/med) LOW Date Received: 07/12/91

% Moisture: not dec. __ Date Analyzed: 07/16/91

Column: (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
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VOLATILE ORGANICS ANALYSIS DATA SHEET

DOE SAMPLE NO.

287145

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:_____ SAS No. _____ SDG No.:_____

Matrix: (soil/water)WATER Lab Sample ID: 07505-03

Sample wt/vol: 5.0 (g/ml)ML Lab File ID: >UG16H

Level: (low/med) LOW Date Received: 07/12/91

% Moisture: not dec.__ Date Analyzed: 07/16/91

Column: (pack/cap) CAP Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	21	
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	Trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

DOE SAMPLE NO.: 287145

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 07505-03

Sample wt/vol: 5.0 (g/ml) ML Lab File ID: >UG16H

Level: (low/med) LOW Date Received: 07/12/91

% Moisture: not dec. __ Date Analyzed: 07/16/91

Column: (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
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10.					
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VOLATILE ORGANICS ANALYSIS DATA SHEET

DOE SAMPLE NO.: 287146

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.: _____ SAS No. _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 07505-04

Sample wt/vol: 5.0 (g/ml) ML Lab File ID: >UG16K

Level: (low/med) LOW Date Received: 07/12/91

% Moisture: not dec. __ Date Analyzed: 07/16/91

Column: (pack/cap) CAP Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	U
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	Trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

DOE SAMPLE NO.: 287146

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 07505-04

Sample wt/vol: 5.0 (g/ml) ML Lab File ID: >UG16K

Level: (low/med) LOW Date Received: 07/12/91

% Moisture: not dec. __ Date Analyzed: 07/16/91

Column: (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
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1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

DOE SAMPLE NO.: VBLKU1

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.:_____ SAS No. _____ SDG No.:_____

Matrix: (soil/water)WATER Lab Sample ID: B0716MVOWU1

Sample wt/vol: 5.0 (g/ml)ML Lab File ID: >UG16E

Level: (low/med) LOW Date Received: 07/12/91

% Moisture: not dec.__ Data Analyzed: 07/16/91

Column: (pack/cap) CAP Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg)UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	1	J
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	5	U
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	5	U
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	5	U
10061-02-6	Trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	5	U
108-90-7	Chlorobenzene	5	U
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

DOE SAMPLE NO.: VBLKU1

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: B0716MVOWU1

Sample wt/vol: 5.0 (g/ml) ML Lab File ID: >UG16E

Level: (low/med) LOW Date Received: 07/12/91

% Moisture: not dec. __ Date Analyzed: 07/16/91

Column: (pack/cap) CAP Dilution Factor: 1.0

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

	CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
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1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

DOE SAMPLE NO.

287144MS

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.: _____ SAS No. _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 07505-02MS

Sample wt/vol: 5.0 (g/ml) ML Lab File ID: >UG16I

Level: (low/med) LOW Date Received: 07/12/91

% Moisture: not dec. __ Date Analyzed: 07/16/91

Column: (pack/cap) CAP Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q	
74-87-3	Chloromethane	10	U	
74-83-9	Bromomethane	10	U	
75-01-4	Vinyl Chloride	10	U	
75-00-3	Chloroethane	10	U	
75-09-2	Methylene Chloride	5	U	
67-64-1	Acetone	10	U	
75-15-0	Carbon Disulfide	5	U	
75-35-4	1,1-Dichloroethene	~~5~~	~~U~~ NR	L
75-34-3	1,1-Dichloroethane	5	U	
540-59-0	1,2-Dichloroethene (total)	5	U	
67-66-3	Chloroform	5	U	
107-06-2	1,2-Dichloroethane	5	U	
78-93-3	2-Butanone	10	U	
71-55-6	1,1,1-Trichloroethane	5	U	
56-23-5	Carbon Tetrachloride	5	U	
108-05-4	Vinyl Acetate	10	U	
75-27-4	Bromodichloromethane	5	U	
78-87-5	1,2-Dichloropropane	5	U	
10061-01-5	cis-1,3-Dichloropropene	5	U	
79-01-6	Trichloroethene	~~5~~	~~U~~ NR	L
124-48-1	Dibromochloromethane	5	U	
79-00-5	1,1,2-Trichloroethane	5	U	
71-43-2	Benzene	~~5~~	~~U~~ NR	L
10061-02-6	Trans-1,3-Dichloropropene	5	U	
75-25-2	Bromoform	5	U	
108-10-1	4-Methyl-2-Pentanone	10	U	
591-78-6	2-Hexanone	10	U	
127-18-4	Tetrachloroethene	5	U	
79-34-5	1,1,2,2-Tetrachloroethane	5	U	
108-88-3	Toluene	~~5~~	~~U~~ NR	L
108-90-7	Chlorobenzene	~~5~~	~~U~~ NR	L
100-41-4	Ethylbenzene	5	U	
100-42-5	Styrene	5	U	
1330-20-7	Xylene (total)	5	U	

1A

VOLATILE ORGANICS ANALYSIS DATA SHEET

DOE SAMPLE NO.

287144MSD

Lab Name: Laucks Testing Labs Contract: _____

Lab Code: LAUCKS Case No.: _____ SAS No. _____ SDG No.: _____

Matrix: (soil/water) WATER Lab Sample ID: 07505-02MSD

Sample wt/vol: 5.0 (g/ml) ML Lab File ID: >UG16J

Level: (low/med) LOW Date Received: 07/12/91

% Moisture: not dec. __ Date Analyzed: 07/16/91

Column: (pack/cap) CAP Dilution Factor: 1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	104 ~~11~~ JB	Sm
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	5	U
75-35-4	1,1-Dichloroethene	~~5~~ U NR	S
75-34-3	1,1-Dichloroethane	5	U
540-59-0	1,2-Dichloroethene (total)	5	U
67-66-3	Chloroform	5	U
107-06-2	1,2-Dichloroethane	5	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	5	U
56-23-5	Carbon Tetrachloride	5	U
108-05-4	Vinyl Acetate	10	U
75-27-4	Bromodichloromethane	5	U
78-87-5	1,2-Dichloropropane	5	U
10061-01-5	cis-1,3-Dichloropropene	5	U
79-01-6	Trichloroethene	~~5~~ U NR	Sm
124-48-1	Dibromochloromethane	5	U
79-00-5	1,1,2-Trichloroethane	5	U
71-43-2	Benzene	~~5~~ U NR	
10061-02-6	Trans-1,3-Dichloropropene	5	U
75-25-2	Bromoform	5	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	5	U
79-34-5	1,1,2,2-Tetrachloroethane	5	U
108-88-3	Toluene	~~5~~ U NR	
108-90-7	Chlorobenzene	~~5~~ U NR	
100-41-4	Ethylbenzene	5	U
100-42-5	Styrene	5	U
1330-20-7	Xylene (total)	5	U

SDG 9107AL Job 9107505

PNAs by HPLC

QC SUMMARY

Surrogate Recovery Summary Report, SA747

Lab Name: LAUCKS TESTING LABS

Matrix: WATER

Lab Sample ID	Client Sample ID	Rec (1)	Rec (2)	Rec (3)	Rec (4)
B0715HPNWLV	METHOD BLANK	60			
9107505-02	287144	66			
9107505-02MS	287144MS	72			
9107505-02MD	287144MSD	73			

Surrogate Recovery Control Limits

	Compound	LCL	UCL
1	9,10-Diphenylanthracene	20	147
2			
3			
4			

* = values outside of recovery limits
D = surrogate diluted out
LCL = Lower Control Limit
UCL = Upper Control Limit

FORM SURR GC

Surrogate Recovery Summary Report, SA748

Lab Name: LAUCKS TESTING LABS

Matrix: WATER

Lab Sample ID	Client Sample ID	Rec (1)	Rec (2)	Rec (3)	Rec (4)
B0722HPNWLU	METHOD BLANK	65			
9107505-01RX	287143	31			
9107505-04RX	287146	30			
9107505-03RX	287145	12*			

Surrogate Recovery Control Limits

	Compound	LCL	UCL
1	9,10-Diphenylanth	20	147
2			
3			
4			

* = values outside of recovery limits
D = surrogate diluted out
LCL = Lower Control Limit
UCL = Upper Control Limit

FORM SURR GC

MS/MSD Report

Lab Name : LAUCKS TESTING LABS

Client ID : 287144

Description : PNAs by HPLC

Lab ID : 9107505-02MS
Matrix : WATER
Units : UG/ML

Matrix Spike Data

Analyte	Spike Added	Sample Found	MS Found	MS Rec %	Recovery Limits
Napthalene	8.00	0	5.17	65	20 160
Phenanthrene	8.00	0	7.46	93	20 160
Pyrene	8.00	0	7.36	92	20 160
Chrysene	8.00	0	6.71	84	20 160

Matrix Spike Duplicate Data

Analyte	Spike Added	MSD Found	MSD Rec %	RPD	Control Limits Recov		RPD
Naphthalene	8.00	5.90	74	14	20	160	50
Phenanthrene	8.00	7.41	93	0	20	160	50
Pyrene	8.00	7.49	94	2	20	160	50
Chrysene	8.00	6.69	84	0	20	160	50

Comments

* = Recovery or RPD exceeded control limit

SDG 9107AL Job 9107505

PNAs by HPLC

SAMPLE DATA

Organics Analysis Data Sheet

Lab Name: LAUCKS TESTING LABS

Lab Sample ID : 9107505-01RX
Client ID : 287143

Matrix : WATER
Reporting Units: ug/L

Sample Size : 1000 ml
Final Ext Vol : 2.0
Percent Moist : 0

Collection Date: 07/11/91
Date Received : 07/12/91
Ext Started : 07/22/91
Ext Completed : 07/22/91
Date Analyzed : 07/24/91
Date Confirmed : N/A
Dil Factor : 1.0

CAS No.	Compound	Result	SDL
91-20-3	Naphthalene	1.8 U	1.8
208-96-8	Acenaphthylene	2.3 U	2.3
86-73-7	Fluorene	0.21 U	0.21
83-32-9	Acenaphthene	1.8 U	1.8
85-01-8	Phenanthrene	0.64 U	0.64
120-12-7	Anthracene	0.66 U	0.66
206-44-0	Fluoranthene	0.21 U	0.21
129-00-0	Pyrene	0.27 U	0.27
218-01-9	Chrysene	0.15 U	0.15
56-55-3	Benzo(a)anthracene	0.010U	0.010
205-99-2	Benzo(b)fluoranthe	0.010U	0.010
207-08-9	Benzo(k)fluoranthe	0.010U	0.010
50-32-8	Benzo(a)pyrene	0.020U	0.020
53-70-3	Dibenzo(ah)anthra	0.030U	0.030
193-39-5	Indeno(123cd)pyren	0.040U	0.040
191-24-2	Benzo(ghi)perylene	0.070U	0.070

SDL = Sample Detection Limit

Organics Analysis Data Sheet

Lab Name: LAUCKS TESTING LABS

Lab Sample ID : 9107505-02
Client ID : 287144

Matrix : WATER
Reporting Units: ug/L

Sample Size : 1000 ml
Final Ext Vol : 2.0
Percent Moist : 0

Collection Date: 07/11/91
Date Received : 07/12/91
Ext Started : 07/15/91
Ext Completed : 07/15/91
Date Analyzed : 07/19/91
Date Confirmed : N/A
Dil Factor : 1.0

CAS No.	Compound	Result	SDL
91-20-3	Naphthalene	1.8 U	1.8
208-96-8	Acenaphthylene	2.3 U	2.3
86-73-7	Fluorene	0.21 U	0.21
83-32-9	Acenaphthene	1.8 U	1.8
85-01-8	Phenanthrene	0.64 U	0.64
120-12-7	Anthracene	0.097J	0.66
206-44-0	Fluoranthene	0.21 U	0.21
129-00-0	Pyrene	0.27 U	0.27
218-01-9	Chrysene	0.15 U	0.15
56-55-3	Benzo(a)anthracene	0.010U	0.010
205-99-2	Benzo(b)fluoranthene	0.010U	0.010
207-08-9	Benzo(k)fluoranthene	0.010U	0.010
50-32-8	Benzo(a)pyrene	0.020U	0.020
53-70-3	Dibenzo(ah)anthracene	0.030U	0.030
193-39-5	Indeno(1,2,3-c,d)pyrene	0.040U	0.040
191-24-2	Benzo(g,h,i)perylene	0.070U	0.070

SDL = Sample Detection Limit

Organics Analysis Data Sheet

Lab Name: LAUCKS TESTING LABS

Lab Sample ID : 9107505-03RX
Client ID : 287145

Matrix : WATER
Reporting Units: ug/L

Sample Size : 1000 ml
Final Ext Vol : 2.0
Percent Moist : 0

Collection Date: 07/11/91
Date Received : 07/12/91
Ext Started : 07/22/91
Ext Completed : 07/22/91
Date Analyzed : 07/24/91
Date Confirmed : N/A
Dil Factor : 1.0

CAS No.	Compound	Result	SDL
91-20-3	Naphthalene	1.8 UJ	1.8
208-96-8	Acenaphthylene	2.3 UJ	2.3
86-73-7	Fluorene	0.21 UJ	0.21
83-32-9	Acenaphthene	1.8 UJ	1.8
85-01-8	Phenanthrene	0.64 UJ	0.64
120-12-7	Anthracene	0.66 UJ	0.66
206-44-0	Fluoranthene	0.14 J	0.21
129-00-0	Pyrene	0.27 UJ	0.27
218-01-9	Chrysene	0.15 UJ	0.15
56-55-3	Benzo(a)anthracene	0.010UJ	0.010
205-99-2	Benzo(b)fluoranthe	0.075J	0.010
207-08-9	Benzo(k)fluoranthe	0.010UJ	0.010
50-32-8	Benzo(a)pyrene	0.020UJ	0.020
53-70-3	Dibenzo(ah)anthra	0.030UJ	0.030
193-39-5	Indeno(123cd)pyren	0.032J	0.040
191-24-2	Benzo(ghi)perylene	0.042J	0.070

SDL = Sample Detection Limit

Organics Analysis Data Sheet

Lab Name: LAUCKS TESTING LABS

Lab Sample ID : 9107505-04RX
Client ID : 287146

Matrix : WATER
Reporting Units: ug/L

Sample Size : 1000 ml
Final Ext Vol : 2.0
Percent Moist : 0

Collection Date: 07/11/91
Date Received : 07/12/91
Ext Started : 07/22/91
Ext Completed : 07/22/91
Date Analyzed : 07/24/91
Date Confirmed : N/A
Dil Factor : 1.0

CAS No.	Compound	Result	SDL
91-20-3	Naphthalene	1.8 U	1.8
208-96-8	Acenaphthylene	2.3 U	2.3
86-73-7	Fluorene	0.21 U	0.21
83-32-9	Acenaphthene	1.8 U	1.8
85-01-8	Phenanthrene	0.64 U	0.64
120-12-7	Anthracene	0.66 U	0.66
206-44-0	Fluoranthene	0.21 U	0.21
129-00-0	Pyrene	0.27 U	0.27
218-01-9	Chrysene	0.15 U	0.15
56-55-3	Benzo(a)anthracene	0.010U	0.010
205-99-2	Benzo(b)fluoranthe	0.010U	0.010
207-08-9	Benzo(k)fluoranthe	0.010U	0.010
50-32-8	Benzo(a)pyrene	0.020U	0.020
53-70-3	Dibenzo(ah)anthra	0.030U	0.030
193-39-5	Indeno(123cd)pyren	0.040U	0.040
191-24-2	Benzo(ghi)perylene	0.070U	0.070

SDL = Sample Detection Limit

Form OADS GC

Organics Analysis Data Sheet

Lab Name: LAUCKS TESTING LABS

Lab Sample ID : B0715HPNWLV
Client ID : METHOD BLANK

Matrix : WATER
Reporting Units: ug/L

Sample Size : 1000 ml
Final Ext Vol : 2.0
Percent Moist : 0

Collection Date: N/A
Date Received : N/A
Ext Started : 07/15/91
Ext Completed : 07/15/91
Date Analyzed : 07/19/91
Date Confirmed : N/A
Dil Factor : 1.0

CAS No.	Compound	Result	SDL
91-20-3	Naphthalene	1.8 U	1.8
208-96-8	Acenaphthylene	2.3 U	2.3
86-73-7	Fluorene	0.21 U	0.21
83-32-9	Acenaphthene	1.8 U	1.8
85-01-8	Phenanthrene	0.64 U	0.64
120-12-7	Anthracene	0.66 U	0.66
206-44-0	Fluoranthene	0.21 U	0.21
129-00-0	Pyrene	0.27 U	0.27
218-01-9	Chrysene	0.15 U	0.15
56-55-3	Benzo(a)anthracene	0.010U	0.010
205-99-2	Benzo(b)fluoranthene	0.010U	0.010
207-08-9	Benzo(k)fluoranthene	0.010U	0.010
50-32-8	Benzo(a)pyrene	0.020U	0.020
53-70-3	Dibenzo(ah)anthracene	0.030U	0.030
193-39-5	Indeno(1,2,3-c,d)pyrene	0.040U	0.040
191-24-2	Benzo(g,h,i)perylene	0.070U	0.070

SDL = Sample Detection Limit

Organics Analysis Data Sheet

Lab Name: LAUCKS TESTING LABS

Lab Sample ID : B0722HPNWLU
Client ID : METHOD BLANK

Matrix : WATER
Reporting Units: ug/L

Sample Size : 1000 ml
Final Ext Vol : 2.0
Percent Moist : 0

Collection Date: N/A
Date Received : N/A
Ext Started : 07/22/91
Ext Completed : 07/22/91
Date Analyzed : 07/22/91
Date Confirmed : N/A
Dil Factor : 1.0

CAS No.	Compound	Result	SDL
91-20-3	Naphthalene	1.8 U	1.8
208-96-8	Acenaphthylene	2.3 U	2.3
86-73-7	Fluorene	0.21 U	0.21
83-32-9	Acenaphthene	1.8 U	1.8
85-01-8	Phenanthrene	0.64 U	0.64
120-12-7	Anthracene	0.66 U	0.66
206-44-0	Fluoranthene	0.21 U	0.21
129-00-0	Pyrene	0.27 U	0.27
218-01-9	Chrysene	0.15 U	0.15
56-55-3	Benzo(a)anthracene	0.010U	0.010
205-99-2	Benzo(b)fluoranthe	0.010U	0.010
207-08-9	Benzo(k)fluoranthe	0.010U	0.010
50-32-8	Benzo(a)pyrene	0.020U	0.020
53-70-3	Dibenzo(ah)anthra	0.030U	0.030
193-39-5	Indeno(123cd)pyren	0.040U	0.040
191-24-2	Benzo(ghi)perylene	0.070U	0.070

SDL = Sample Detection Limit

Organics Analysis Data Sheet

Lab Name: LAUCKS TESTING LABS

Lab Sample ID : 9107505-02MS
Client ID : 287144MS

Matrix : WATER
Reporting Units: ug/L

Sample Size : 750 ml
Final Ext Vol : 2.0
Percent Moist : 0

Collection Date: 07/11/91
Date Received : 07/12/91
Ext Started : 07/15/91
Ext Completed : 07/15/91
Date Analyzed : 07/19/91
Date Confirmed : N/A
Dil Factor : 1.0

CAS No.	Compound	Result	SDL
91-20-3	Naphthalene	5.2	2.4
208-96-8	Acenaphthylene	3.1 U	3.1
86-73-7	Fluorene	0.28 U	0.28
83-32-9	Acenaphthene	2.4 U	2.4
85-01-8	Phenanthrene	7.5	0.85
120-12-7	Anthracene	0.11 J	0.88
206-44-0	Fluoranthene	0.064J	0.28
129-00-0	Pyrene	7.4	0.36
218-01-9	Chrysene	6.7	0.20
56-55-3	Benzo(a)anthracene	0.013U	0.013
205-99-2	Benzo(b)fluoranthene	0.013U	0.013
207-08-9	Benzo(k)fluoranthene	0.013U	0.013
50-32-8	Benzo(a)pyrene	0.027U	0.027
53-70-3	Dibenzo(ah)anthracene	0.040U	0.040
193-39-5	Indeno(1,2,3-c,d)pyrene	0.053U	0.053
191-24-2	Benzo(g,h,i)perylene	0.093U	0.093

SDL = Sample Detection Limit

Organics Analysis Data Sheet

Lab Name: LAUCKS TESTING LABS

Lab Sample ID : 9107505-02MD,
Client ID : 287144MSD

Matrix : WATER
Reporting Units: ug/L

Sample Size : 750 ml
Final Ext Vol : 2.0
Percent Moist : 0

Collection Date: 07/11/91
Date Received : 07/12/91
Ext Started : 07/15/91
Ext Completed : 07/15/91
Date Analyzed : 07/19/91
Date Confirmed : N/A
Dil Factor : 1.0

CAS No.	Compound	Result	SDL
91-20-3	Naphthalene	5.9	2.4
208-96-8	Acenaphthylene	3.1 U	3.1
86-73-7	Fluorene	0.28 U	0.28
83-32-9	Acenaphthene	2.4 U	2.4
85-01-8	Phenanthrene	7.4	0.85
120-12-7	Anthracene	0.11 J	0.88
206-44-0	Fluoranthene	0.28 U	0.28
129-00-0	Pyrene	7.5	0.36
218-01-9	Chrysene	6.7	0.20
56-55-3	Benzo(a)anthracene	0.013U	0.013
205-99-2	Benzo(b)fluoranthene	0.013U	0.013
207-08-9	Benzo(k)fluoranthene	0.013U	0.013
50-32-8	Benzo(a)pyrene	0.027U	0.027
53-70-3	Dibenzo(ah)anthracene	0.040U	0.040
193-39-5	Indeno(1,2,3-c,d)pyrene	0.053U	0.053
191-24-2	Benzo(g,h,i)perylene	0.093U	0.093

SDL = Sample Detection Limit

Form OADS GC

PESTICIDE/PCB

QC SUMMARY DATA

2E

WATER PESTICIDE SURROGATE RECOVERY

Lab Name: LAUCKS TESTING LABS Contract: 68D00153

Lab Code: LAUCKS SDG No.:WADOEP

GC Column (1): DB17 ID: 0.53(mm) GC Column(2): DB1701 ID: 0.53(mm)

	CLIENT ID	TCX 1 %REC #	TCX 2 %REC #	DCB 1 %REC #	DCB 2 %REC #	OTHER (1)	OTHER (2)	TOT OUT
01	PIBLK01	104	107	108	108	114	117	0
02	PBLK01W	71	85	98	97	94	96	0
03	287143	72	95	88	87	93	86	0
04	287144	64	71	95	96	86	86	0
05	287144-MS	65	85	105	106	93	94	0
06	287144-MSD	72	87	104	102	93	96	0
07	287145	61	84	92	92	91	*	1
08	287146	69	91	90	89	89	89	0
09	PIBLK02	104	103	108	103	116	117	0
10	PIBLK03	105	103	96	93	115	110	0

	ADVISORY QC LIMITS
TCX = Tetrachloro-m-xylene	(60-150)
DCB = Decachlorobiphenyl	(60-150)
Other = Isodrin	(27-123)

\# Column to be used to flag recovery values
* Values outside of QC limits
D Surrogate diluted out

MS/MSD Report

Lab Name : LAUCKS TESTING LABS

Client ID : 287144

Lab ID : 9107505-02

Matrix : WATER

Description : CLP Pesticides, Low Level

Units : UG/L

(Database Reference: K080191_GPXW01)

Matrix Spike Data

Analyte	Spike Added	Sample Found	MS Found	MS Rec	Recovery Limits
gamma-BHC (Lindane)	0.5000	0	0.3130	63	56 123
Heptachlor	0.5000	0	0.3990	80	40 131
Aldrin	0.5000	0	0.4060	81	40 120
Dieldrin	1.0000	0	0.9430	94	52 126
Endrin	1.0000	0	0.9570	96	56 121
4,4'-DDT	1.0000	0	0.9490	95	38 127

Matrix Spike Duplicate Data

Analyte	Spike Added	MSD Found	MSD Rec	RPD	Control Limits Recov	Control Limits RPD
gamma-BHC (Lindane)	0.5000	0.3080	62	2	56 123	15
Heptachlor	0.5000	0.3940	79	1	40 131	20
Aldrin	0.5000	0.4020	80	1	40 120	22
Dieldrin	1.0000	0.8920	89	5	52 126	18
Endrin	1.0000	0.9170	92	4	56 121	21
4,4'-DDT	1.0000	0.9180	92	3	38 127	27

Comments

* = Recovery or RPD exceeded control limit

Pesticide Organics Analysis Data Sheet

Lab Name: LAUCKS TESTING LABS

File Name	RI0720		
SDG Number	WADOEP	Client ID	287143
Matrix	WATER	Lab ID	9107505-01
Sample size	200 ~~gm/ml~~ ML		
Moisture	100% Decanted N	Date Received	07/12/91
Ext Method	SEPF	Extract Date	07/16/91
Ext Vol	2000 µL	Analysis Date	07/27/91
ul inj	1.0 µL	Diln Factor	1.0
GPC Cleanup	N pH:	Sulfur Clean	N

Concentration Units: UG/L

CAS No.	Analyte	Ext. Conc	Sample Conc
319-84-6	alpha-BHC		0.05U
319-85-7	beta-BHC		0.05U
319-86-8	delta-BHC		0.05U
58-89-9	gamma-BHC (Lindane)		0.05U
76-44-8	Heptachlor		0.05U
309-00-2	Aldrin		0.05U
1024-57-3	Heptachlor Epoxide		0.05U
959-98-8	Endosulfan I		0.05U
60-57-1	Dieldrin		0.10U
72-55-9	4,4'-DDE		0.10U
72-20-8	Endrin		0.10U
33213-65-9	Endosulfan II		0.10U
72-54-8	4,4'-DDD		0.10U
1031-07-8	Endosulfan sulfate		0.10U
50-29-3	4,4'-DDT		0.10U
72-43-5	Methoxychlor		0.50U
53494-70-5	Endrin ketone		0.10U
7421-36-3	Endrin aldehyde		0.10U
5103-71-9	alpha-Chlordane		0.05U
5103-74-2	gamma-Chlordane		0.05U
8001-35-2	Toxaphene		5.0 U
12674-11-2	Aroclor-1016		1.0 U
11104-28-2	Aroclor-1221		2.0 U
11141-16-5	Aroclor-1232		1.0 U
53469-21-9	Aroclor-1242		1.0 U
12672-29-6	Aroclor-1248		1.0 U
11097-69-1	Aroclor-1254		1.0 U
11096-82-5	Aroclor-1260		1.0 U

Surrogate Recoveries	Column 1		Column 2		
Analyte	Res Conc	% Rec	Res Conc	% Rec	Def Conc
Tetrachloro-m-xylene	14.3	72	18.9	95	20.0
Decachlorobiphenyl	17.5	88	17.4	87	20.0
Isodrin	46.6	93	43.1	86	50.0

Pesticide Organics Analysis Data Sheet

Lab Name: LAUCKS TESTING LABS

File Name	RI0721		
SDG Number	WADOEP	Client ID	287144
Matrix	WATER	Lab ID	9107505-02
Sample size	200 gm/ml ML		
Moisture	100% Decanted N	Date Received	07/12/91
Ext Method	SEPF	Extract Date	07/16/91
Ext Vol	2000 µL	Analysis Date	07/27/91
ul inj	1.0 µL	Diln Factor	1.0
GPC Cleanup	N pH:	Sulfur Clean	N

Concentration Units: UG/L

CAS No.	Analyte	Ext. Conc	Sample Conc
319-84-6	alpha-BHC		0.05U
319-85-7	beta-BHC		0.05U
319-86-8	delta-BHC		0.05U
58-89-9	gamma-BHC (Lindane)		0.05U
76-44-8	Heptachlor		0.05U
309-00-2	Aldrin		0.05U
1024-57-3	Heptachlor Epoxide		0.05U
959-98-8	Endosulfan I		0.05U
60-57-1	Dieldrin		0.10U
72-55-9	4,4'-DDE		0.10U
72-20-8	Endrin		0.10U
33213-65-9	Endosulfan II		0.10U
72-54-8	4,4'-DDD		0.10U
1031-07-8	Endosulfan sulfate		0.10U
50-29-3	4,4'-DDT		0.10U
72-43-5	Methoxychlor		0.50U
53494-70-5	Endrin ketone		0.10U
7421-36-3	Endrin aldehyde		0.10U
5103-71-9	alpha-Chlordane		0.05U
5103-74-2	gamma-Chlordane		0.05U
8001-35-2	Toxaphene		5.0 U
12674-11-2	Aroclor-1016		1.0 U
11104-28-2	Aroclor-1221		2.0 U
11141-16-5	Aroclor-1232		1.0 U
53469-21-9	Aroclor-1242		1.0 U
12672-29-6	Aroclor-1248		1.0 U
11097-69-1	Aroclor-1254		1.0 U
11096-82-5	Aroclor-1260		1.0 U

Surrogate Recoveries	Column 1		Column 2		
Analyte	Res Conc	% Rec	Res Conc	% Rec	Def Conc
Tetrachloro-m-xylene	12.7	64	14.2	71	20.0
Decachlorobiphenyl	19.0	95	19.2	96	20.0
Isodrin	42.9	86	42.8	86	50.0

Pesticide Organics Analysis Data Sheet

Lab Name: LAUCKS TESTING LABS

File Name	RI0724		
SDG Number	WADOEP	Client ID	287145
Matrix	WATER	Lab ID	9107505-03
Sample size	200 gm/ml ML		
Moisture	100% Decanted N	Date Received	07/12/91
Ext Method	SEPF	Extract Date	07/16/91
Ext Vol	2000 µL	Analysis Date	07/27/91
ul inj	1.0 µL	Diln Factor	1.0
GPC Cleanup	N pH:	Sulfur Clean	N

Concentration Units: UG/L

CAS No.	Analyte	Ext. Conc	Sample Conc
319-84-6	alpha-BHC		0.05U
319-85-7	beta-BHC		0.05U
319-86-8	delta-BHC		0.05U
58-89-9	gamma-BHC (Lindane)		0.05U
76-44-8	Heptachlor		0.05U
309-00-2	Aldrin		0.05U
1024-57-3	Heptachlor Epoxide		0.05U
959-98-8	Endosulfan I		0.05U
60-57-1	Dieldrin		0.10U
72-55-9	4,4'-DDE		0.10U
72-20-8	Endrin		0.10U
33213-65-9	Endosulfan II		0.10U
72-54-8	4,4'-DDD		0.10U
1031-07-8	Endosulfan sulfate		0.10U
50-29-3	4,4'-DDT		0.10U
72-43-5	Methoxychlor		0.50U
53494-70-5	Endrin ketone		0.10U
7421-36-3	Endrin aldehyde		0.10U
5103-71-9	alpha-Chlordane		0.05U
5103-74-2	gamma-Chlordane		0.05U
8001-35-2	Toxaphene		5.0 U
12674-11-2	Aroclor-1016		1.0 U
11104-28-2	Aroclor-1221		2.0 U
11141-16-5	Aroclor-1232		1.0 U
53469-21-9	Aroclor-1242		1.0 U
12672-29-6	Aroclor-1248		1.0 U
11097-69-1	Aroclor-1254		1.0 U
11096-82-5	Aroclor-1260		1.0 U

Surrogate Recoveries	Column 1		Column 2		
Analyte	Res Conc	% Rec	Res Conc	% Rec	Def Conc
Tetrachloro-m-xylene	12.1	61	16.8	84	20.0
Decachlorobiphenyl	18.3	92	18.4	92	20.0
Isodrin	45.4	91	*	*	50.0

Pesticide Organics Analysis Data Sheet

Lab Name: LAUCKS TESTING LABS

File Name	RI0725		
SDG Number	WADOEP	Client ID	287146
Matrix	WATER	Lab ID	9107505-04
Sample size	200 gm/ml ML		
Moisture	100% Decanted N	Date Received	07/12/91
Ext Method	SEPF	Extract Date	07/16/91
Ext Vol	2000 µL	Analysis Date	07/27/91
ul inj	1.0 µL	Dil Factor	1.0
GPC Cleanup	N pH:	Sulfur Clean	N

Concentration Units: UG/L

CAS No.	Analyte	Ext. Conc	Sample Conc
319-84-6	alpha-BHC		0.05U
319-85-7	beta-BHC		0.05U
319-86-8	delta-BHC		0.05U
58-89-9	gamma-BHC (Lindane)		0.05U
76-44-8	Heptachlor	28.7	0.29
309-00-2	Aldrin		0.05U
1024-57-3	Heptachlor Epoxide		0.05U
959-98-8	Endosulfan I		0.05U
60-57-1	Dieldrin		0.10U
72-55-9	4,4'-DDE		0.10U
72-20-8	Endrin		0.10U
33213-65-9	Endosulfan II		0.10U
72-54-8	4,4'-DDD		0.10U
1031-07-8	Endosulfan sulfate		0.10U
50-29-3	4,4'-DDT		0.10U
72-43-5	Methoxychlor		0.50U
53494-70-5	Endrin ketone		0.10U
7421-36-3	Endrin aldehyde		0.10U
5103-71-9	alpha-Chlordane		0.05U
5103-74-2	gamma-Chlordane		0.05U
8001-35-2	Toxaphene		5.0 U
12674-11-2	Aroclor-1016		1.0 U
11104-28-2	Aroclor-1221		2.0 U
11141-16-5	Aroclor-1232		1.0 U
53469-21-9	Aroclor-1242		1.0 U
12672-29-6	Aroclor-1248		1.0 U
11097-69-1	Aroclor-1254		1.0 U
11096-82-5	Aroclor-1260		1.0 U

Surrogate Recoveries	Column 1		Column 2		
Analyte	Res Conc	% Rec	Res Conc	% Rec	Def Conc
Tetrachloro-m-xylene	13.8	69	18.1	91	20.0
Decachlorobiphenyl	18.0	90	17.7	89	20.0
Isodrin	44.5	89	44.3	89	50.0

Method blank

Pesticide Organics Analysis Data Sheet

Lab Name: LAUCKS TESTING LABS

File Name	RI0719		
SDG Number	WADOEP	Client ID	PBLK01W
Matrix	WATER	Lab ID	80716GPXWLU
Sample size	200 gm/ml ML		
Moisture	100% Decanted N	Date Received	07/12/91
Ext Method	SEPF	Extract Date	07/16/91
Ext Vol	2000 µL	Analysis Date	07/27/91
ul inj	1.0 µL	Diln Factor	1.0
GPC Cleanup	N pH:	Sulfur Clean	N

Concentration Units: UG/L

CAS No.	Analyte	Ext. Conc	Sample Conc
319-84-6	alpha-BHC		0.05U
319-85-7	beta-BHC		0.05U
319-86-8	delta-BHC		0.05U
58-89-9	gamma-BHC (Lindane)		0.05U
76-44-8	Heptachlor		0.05U
309-00-2	Aldrin		0.05U
1024-57-3	Heptachlor Epoxide		0.05U
959-98-8	Endosulfan I		0.05U
60-57-1	Dieldrin		0.10U
72-55-9	4,4'-DDE		0.10U
72-20-8	Endrin		0.10U
33213-65-9	Endosulfan II		0.10U
72-54-8	4,4'-DDD		0.10U
1031-07-8	Endosulfan sulfate		0.10U
50-29-3	4,4'-DDT		0.10U
72-43-5	Methoxychlor		0.50U
53494-70-5	Endrin ketone		0.10U
7421-36-3	Endrin aldehyde		0.10U
5103-71-9	alpha-Chlordane		0.05U
5103-74-2	gamma-Chlordane		0.05U
8001-35-2	Toxaphene		5.0 U
12674-11-2	Aroclor-1016		1.0 U
11104-28-2	Aroclor-1221		2.0 U
11141-16-5	Aroclor-1232		1.0 U
53469-21-9	Aroclor-1242		1.0 U
12672-29-6	Aroclor-1248		1.0 U
11097-69-1	Aroclor-1254		1.0 U
11096-82-5	Aroclor-1260		1.0 U

Surrogate Recoveries	Column 1		Column 2		
Analyte	Res Conc	% Rec	Res Conc	% Rec	Def Conc
Tetrachloro-m-xylene	14.1	71	16.9	85	20.0
Decachlorobiphenyl	19.6	98	19.3	97	20.0
Isodrin	47.1	94	47.8	96	50.0

MATRIX SPIKE

Pesticide Organics Analysis Data Sheet

Lab Name: LAUCKS TESTING LABS

File Name	RI0722		
SDG Number	WADOEP	Client ID	287144MS
Matrix	WATER	Lab ID	9107505-02MS
Sample size	200 gm/ml ML		
Moisture	100% Decanted N	Date Received	07/12/91
Ext Method	SEPF	Extract Date	07/16/91
Ext Vol	2000 µL	Analysis Date	07/27/91
ul inj	1.0 µL	Diln Factor	1.0
GPC Cleanup	N pH:	Sulfur Clean	N

Concentration Units: UG/L

CAS No.	Analyte	Ext. Conc	Sample Conc
319-84-6	alpha-BHC		0.05U
319-85-7	beta-BHC		0.05U
319-86-8	delta-BHC		0.05U
58-89-9	gamma-BHC (Lindane)	31.3	0.31
76-44-8	Heptachlor	39.9	0.40
309-00-2	Aldrin	40.6	0.41
1024-57-3	Heptachlor Epoxide		0.05U
959-98-8	Endosulfan I		0.05U
60-57-1	Dieldrin	94.3	0.94
72-55-9	4,4'-DDE		0.10U
72-20-8	Endrin	95.7	0.96
33213-65-9	Endosulfan II		0.10U
72-54-8	4,4'-DDD		0.10U
1031-07-8	Endosulfan sulfate		0.10U
50-29-3	4,4'-DDT	94.9	0.95
72-43-5	Methoxychlor		0.50U
53494-70-5	Endrin ketone		0.10U
7421-36-3	Endrin aldehyde		0.10U
5103-71-9	alpha-Chlordane		0.05U
5103-74-2	gamma-Chlordane		0.05U
8001-35-2	Toxaphene		5.0 U
12674-11-2	Aroclor-1016		1.0 U
11104-28-2	Aroclor-1221		2.0 U
11141-16-5	Aroclor-1232		1.0 U
53469-21-9	Aroclor-1242		1.0 U
12672-29-6	Aroclor-1248		1.0 U
11097-69-1	Aroclor-1254		1.0 U
11096-82-5	Aroclor-1260		1.0 U

Surrogate Recoveries Analyte	Column 1 Res Conc	Column 1 % Rec	Column 2 Res Conc	Column 2 % Rec	Def Conc
Tetrachloro-m-xylene	13.0	65	16.9	85	20.0
Decachlorobiphenyl	21.0	105	21.1	106	20.0
Isodrin	46.5	93	46.8	94	50.0

MATRIX SPIKE DUPLICATE

Pesticide Organics Analysis Data Sheet

Lab Name: LAUCKS TESTING LABS

File Name	RI0723		
SDG Number	WADOEP	Client ID	287144MD
Matrix	WATER	Lab ID	9107505-02MD
Sample size	200 gm/ml ML		
Moisture	100% Decanted N	Date Received	07/12/91
Ext Method	SEPF	Extract Date	07/16/91
Ext Vol	2000 µL	Analysis Date	07/27/91
ul inj	1.0 µL	Diln Factor	1.0
GPC Cleanup	N pH:	Sulfur Clean	N

Concentration Units: UG/L

CAS No.	Analyte	Ext. Conc	Sample Conc
319-84-6	alpha-BHC		0.05U
319-85-7	beta-BHC		0.05U
319-86-8	delta-BHC		0.05U
58-89-9	gamma-BHC (Lindane)	30.8	0.31P
76-44-8	Heptachlor	39.4	0.39
309-00-2	Aldrin	40.2	0.40
1024-57-3	Heptachlor Epoxide		0.05U
959-98-8	Endosulfan I		0.05U
60-57-1	Dieldrin	89.2	0.89
72-55-9	4,4'-DDE		0.10U
72-20-8	Endrin	91.7	0.92
33213-65-9	Endosulfan II		0.10U
72-54-8	4,4'-DDD		0.10U
1031-07-8	Endosulfan sulfate		0.10U
50-29-3	4,4'-DDT	91.8	0.92
72-43-5	Methoxychlor		0.50U
53494-70-5	Endrin ketone		0.10U
7421-36-3	Endrin aldehyde		0.10U
5103-71-9	alpha-Chlordane		0.05U
5103-74-2	gamma-Chlordane		0.05U
8001-35-2	Toxaphene		5.0 U
12674-11-2	Aroclor-1016		1.0 U
11104-28-2	Aroclor-1221		2.0 U
11141-16-5	Aroclor-1232		1.0 U
53469-21-9	Aroclor-1242		1.0 U
12672-29-6	Aroclor-1248		1.0 U
11097-69-1	Aroclor-1254		1.0 U
11096-82-5	Aroclor-1260		1.0 U

Surrogate Recoveries Analyte	Column 1 Res Conc	Column 1 % Rec	Column 2 Res Conc	Column 2 % Rec	Def Conc
Tetrachloro-m-xylene	14.3	72	17.4	87	20.0
Decachlorobiphenyl	20.7	104	20.4	102	20.0
Isodrin	46.7	93	48.2	96	50.0


87 5 12


97 6 12


97 6 12


87 5 19


87 5 19


87 5 19


87 5 19


87 5 19


87 5 19


61 5 19


OIL
HEAVY
FUEL


87 5 19


87 5 19


87 5 19


87 5 19


87 5 19


87 5 19


87 5 19


87 5 19


87 6 12

DEPARTMENT OF ECOLOGY
INSPECTION REPORT

TO: the file
DATE OF VISIT: 6/16/89
NEW INDUSTRY: State of Wash. DOT

INSPECTOR Martha Rosenberg
PERMIT NO.: N/A
PERMIT EXPIRES: N/A

TYPE OF INSPECTION:

___ PERMIT APPLICATION ___ PERMIT RENEWAL ___ COMPLAINT
___ PERMIT COMPLIANCE ___ ENFORCEMENT ✓ DROP-IN/SITE VISIT
___ PERMIT CANCELLATION

FACILITY: DOT Wetland
ADDRESS: South 124th + 99
CITY: Seattle ZIP: _____ COUNTY: _____

T _____ R _____
MAP: ___ QUAD: ___
TEL: _____

PERSON CONTACTED: Terra Prodan Shorelands Prgm, WDOE, SWRO
TYPE OF FACILITY: Wetland - highway right of way
RECEIVING WATER: Duwamish River
TYPE OF TREATMENT SYSTEM: _____

OPERATION Satis ____ Fair ____ Unsat ✓
COMPLIES WITH PERMIT CONDITIONS: N/A

DESCRIPTION: I arranged in advance to meet with Terra at 10:00 a.m. to help survey the wetland area of the site + look over general conditions. We parked at the north end which is described in the recent Sampling + Analysis report as an upland area. Heading south is the lowland area where the wetland area was identified. There are separate roadways to both. The upland area appeared to be recently disturbed. Piles of waste had been smoothed out. In addition to the sludge waste there was evidence of the site being used to dump garbage + cement debris. We back tracked to the 2nd roadway + headed for the lowland area, over more piles of tractor sludge. The lowland area was more overgrown + appeared less disturbed. Closer examination showed the sludge piles to be

Cont'd on reverse

Martha Rosenberg
Inspector, EBAT

older with areas where grass did not grow. Several stakes were found in these bald spots showing location of core samples. The wetland area was confined to an area where the dumping ended & the terrain dropped about 3 feet, to the original grade. The change in grade accounts for the difference in vegetative species from wetland to upland grasses. Terra said that this area is probably hydrologically cut off from the Duwamish due to the highway fill and is beyond the distance limit for Shoreland Prgm. jurisdiction.

The wetland appeared to support a variety of species of birds which shows its providing habitat despite its surroundings. Drainage from highway is probably being filtered partly before reaching the catch basin at the south end.

We departed the site about 12:15 p.m.

PHOTO NO.: 1

DATE: 6/16/89

TIME: 10:00 A.m.

TAKEN BY:
Martha Rosenberg, EBAT

WITNESS:
Terra Prodan, WDOE

FILM: Kodak 400

CAMERA: Pentax 35mm SLR

LOCATION:
DOT Wetland
124th St. So. + 99

DESCRIPTION:
Lowland area, wetland area in background. Shows height of grasses & overgrowth. Not a wetland where Terra is standing.

PHOTO NO.: 2

DATE: 6/16/89

TIME: 10:05 A.m.

TAKEN BY:
Martha Rosenberg, EBAT

WITNESS:
Terra Prodan, WDOE

FILM: Kodak 400

CAMERA: Pentax 35 mm SLR

LOCATION:
DOT Wetland
124th St SOUTH + 99

DESCRIPTION:
Dumped material. Appeared to be cedar chips on surface area. Growth inhibited indicates either new dumped material or contamination

PHOTO NO.: 3
DATE: 6/16/89
TIME: 10-12:00 am.
TAKEN BY:
Martha Rosenberg
WITNESS:
Terra Prodan
FILM: Kodak 400
CAMERA: Pentax 35mm
LOCATION:
DOT wetland
124th St & 99
DESCRIPTION:
Close up of grasses -

PHOTO NO.: 4
DATE: 6/16/89
TIME: 10-12:00 A.M.
TAKEN BY:
Martha Rosenberg, EBAT
WITNESS:
Terra Prodan
FILM: Kodak 400
CAMERA: Pentax 35 mm.
LOCATION:
DOT Wetland
124th St & 99
DESCRIPTION:
Located in lowland area - rusted, abandoned empty drum.

PHOTO NO.: 5
DATE: 6/16/89
TIME: 10-12:00 a.m.
TAKEN BY: Martha Rosenberg
WITNESS: Terra Prodan
FILM: Kodak 400
CAMERA: Pentax 35mm
LOCATION: DOT Wetland 124th St. So. + 99
DESCRIPTION: Facing lowland area, piles of vactor sludge in foreground. Note lack of vegetation on piles.

PHOTO NO.: 6
DATE: 6/16/89
TIME: 10-12:00 a.m.
TAKEN BY: Martha Rosenberg
WITNESS: Terra Prodan
FILM: Kodak 400
CAMERA: Pentax 35 mm
LOCATION: DOT Wetland 124th St. So. + 99
DESCRIPTION: Roadway to lowland area. Roadway not overgrown indicating recent use or contaminated soils.

PHOTO NO.: 7
DATE: 6/16/89
TIME: 10:-12:00 Am
TAKEN BY:
Martha Rosenberg
WITNESS:
Terra Prodan
FILM: Kodak 400
CAMERA: Pentax
LOCATION:
DOT Wetland
124th St. So. & 99
DESCRIPTION:
From edge of upland looking towards lowland. Foreground shows edge of bulldozed pile

PHOTO NO.: 8
DATE: 6/16/89
TIME: 10:00-12:00Am
TAKEN BY:
Martha Rosenberg
WITNESS:
Terra Prodan
FILM: Kodak 400
CAMERA: Pentax
LOCATION:
DOT Wetland
124th St & 99So.
DESCRIPTION:
Edge of upland area. Appears to be yard waste

PHOTO NO.: 9
DATE: 6/16/89
TIME: 10-12:00 hrs.
TAKEN BY: Martha Rosenberg
WITNESS: Terra Prodan
FILM: Kodak 400
CAMERA: Pentax 35 mm
LOCATION: DOT Wetland 124th St. So + 99
DESCRIPTION: Terra looking at a yellow painted cement disks dumped in upland area where sludge piles had been bulldozed flat.

PHOTO NO.: 10
DATE: 6/16/89
TIME: 10:00-12:00 a.m.
TAKEN BY: Martha Rosenberg
WITNESS: Terra Prodan
FILM: Kodak 400
CAMERA: Pentax
LOCATION: DOT Wetland 124th St So. + 99
DESCRIPTION: View of upland area shows part of bulldozed area described above + evidence of additional garbage dumping

PHOTO NO.: 11
DATE: 6/16/89
TIME: 10-12:00 a.m.
TAKEN BY:
Martha Rosenberg
WITNESS:
Terra Prodan
FILM: Kodak 400
CAMERA: Pentax
LOCATION:
DOT wetland
124th St. So + 99
DESCRIPTION:
Sludge piles bulldozed in upland area.

PHOTO NO.: 12
DATE: 6/16/89
TIME: 10-12:00 A.M.
TAKEN BY:
Martha Rosenberg
WITNESS:
Terra Prodan
FILM: Kodak 400
CAMERA: Pentax
LOCATION:
DOT Wetland
124th St So. + 99
DESCRIPTION:
Lowland area. Terra standing on abandoned pipe.

PHOTO NO.: 13
DATE: 6/16/89
TIME: 10-12:00 A.M.
TAKEN BY:
Martha Rosenberg
WITNESS:
Terra Prodan
FILM: Kodak 400
CAMERA: Pentax
LOCATION:
DOT Wetland
124th St. So + 99
DESCRIPTION:
View of lowland area. Can see change of grade to roadway + upland. Upland plant species

PHOTO NO.: 14
DATE: 6/16/89
TIME: 10:-12:00 A.M.
TAKEN BY:
Martha Rosenberg
WITNESS:
Terra Prodan
FILM: Kodak 400
CAMERA: Pentax
LOCATION:
DOT Wetland
124th St. So + 99
DESCRIPTION:
Wetland area in background. Terra in foreground. Can see change of grade + where wetland begins.

PHOTO NO.: 15
DATE: 6/16/89
TIME: 10-12:00 A.M.
TAKEN BY:
Martha Rosenberg
WITNESS:
Terra Prodan
FILM: Kodak 400
CAMERA: Pentax 35mm
LOCATION:
DOT Wetland
124th St. So. + 99
DESCRIPTION:
Lowland area showing wetland vegetation.

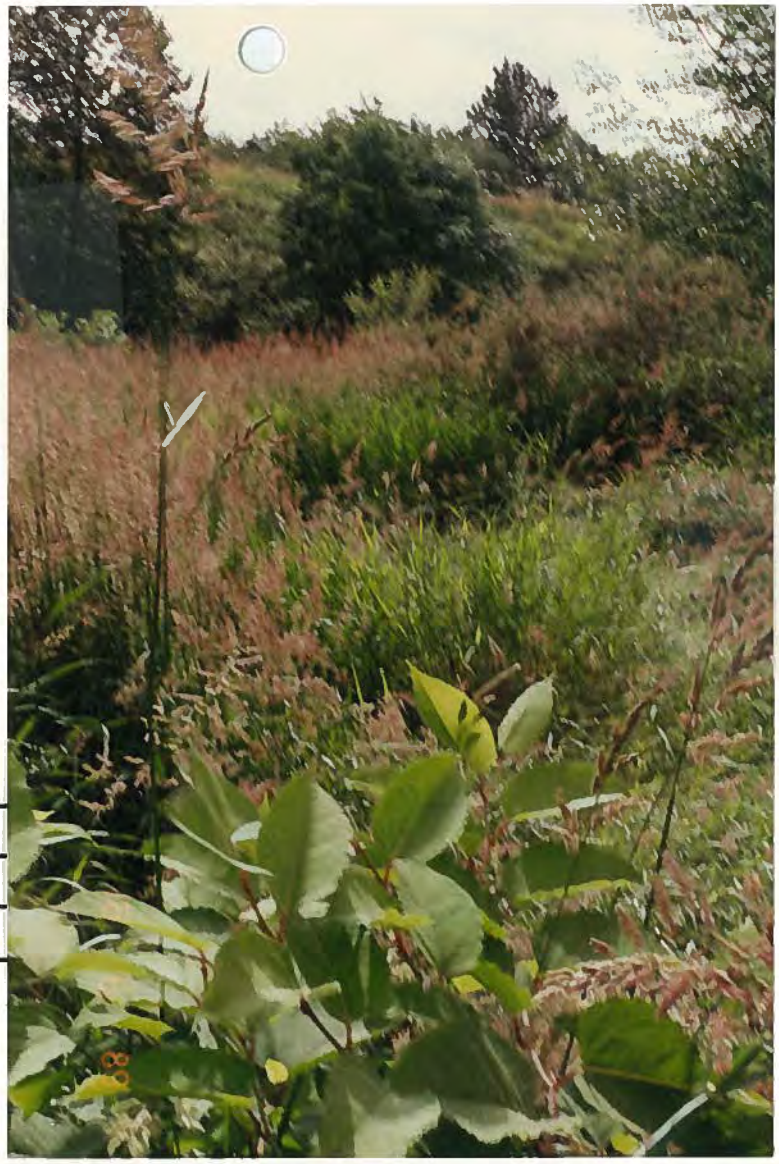


PHOTO NO.: 16
DATE: 6/16/89
TIME: 10-12:00 A.M.
TAKEN BY:
Martha Rosenberg
WITNESS:
Terra Prodan
FILM: Kodak 400
CAMERA: Pentax 35mm
LOCATION:
DOT Wetland
124th St. So. + 99
DESCRIPTION:
Lowland vegetation

PHOTO NO.: 17
DATE: 6/16/89
TIME: 10-12:00 A.M.
TAKEN BY: Martha Rosenberg
WITNESS: Terra Prodan
FILM: Kodak 400
CAMERA: Pentax 35mm
LOCATION: DOT Wetland 124th St. So. + 99
DESCRIPTION: lowland vegetation

PHOTO NO.: 18
DATE: 6/16/89
TIME: 10-12:00 A.M.
TAKEN BY: Martha Rosenberg
WITNESS: Terra Prodan
FILM: Kodak 400
CAMERA: Pentax 35mm
LOCATION: DOT Wetland 124th St. So. & 99
DESCRIPTION: Wetland vegetation in background to midground. Upland plants in foreground. Picture taken in Lowland area.

PHOTO NO.: 19
DATE: 6/16/89
TIME: 10-12:00 A.M
TAKEN BY: Martha Rosenberg
WITNESS: Terra Prodan
FILM: Kodak 400
CAMERA: Pentax 35mm
LOCATION: DOT Wetland 124th St. So. + 99
DESCRIPTION: Looking back towards upland area. Lowland vegetation

PHOTO NO.: 20
DATE: 6/16/89
TIME: 10-12:00 A.M.
TAKEN BY: Martha Rosenberg
WITNESS: Terra Prodan
FILM: Kodak 400
CAMERA: Pentax 35 mm
LOCATION: DOT Wetland 124th St. So. & 99
DESCRIPTION: Lowland vegetation

PHOTO NO.: 19
DATE: 6/16/89
TIME: 10-12:00 A.M
TAKEN BY: Martha Rosenberg
WITNESS: Terra Prodan
FILM: Kodak 400
CAMERA: Pentax 35mm
LOCATION: DOT Wetland 124th St. So. & 99
DESCRIPTION: Roadway to lowland area. Sparse vegetation indicative of possible contamination

PHOTO NO.: 20
DATE: 6/16/89
TIME: 10-12:00 A.M.
TAKEN BY: Martha Rosenberg
WITNESS: Terra Prodan
FILM: Kodak 400
CAMERA: Pentax 35mm
LOCATION: DOT Wetland 124th St. So. & 99
DESCRIPTION: Concrete debris looking north towards upland area

PHOTO NO.: 21

DATE: 6/16/89

TIME: 10-12:00 A.M.

TAKEN BY:
Martha Rosenberg

WITNESS:
Terra Prodan

FILM: Kodak 400

CAMERA: Pentax 35mm

LOCATION:
DOT Wetland
124th St. So. + 99

DESCRIPTION:
Looking towards lowland area. Concrete debris in foreground + possibly vactor sludge waste.

PHOTO NO.: 22

DATE: 6/16/89

TIME: 10-12:00 A.M.

TAKEN BY:
Martha Rosenberg

WITNESS:
Terra Prodan

FILM: Kodak 400

CAMERA: Pentax 35mm.

LOCATION:
DOT Wetland
124th St. So. & 99

DESCRIPTION:
Catch basin in upland area.

PHOTO NO.: 23

DATE: 6/16/89

TIME: 10-12:00 A.M.

TAKEN BY: Martha Rosenberg

WITNESS: Terra Prodan

FILM: Kodak 400

CAMERA: Pentax 35mm

LOCATION: DOT Wetland 124th St. So. + 99

DESCRIPTION: Upland area. Discarded wood waste, containers + other material next to bulldozed vactor sludge.

PHOTO NO.: 24

DATE: 6/16/89

TIME: 10-12:00 A.M.

TAKEN BY: Martha Rosenberg

WITNESS: Terra Prodan

FILM: Kodak 400

CAMERA: Pentax 35mm

LOCATION: DOT Wetland 124th St. So. + 99

DESCRIPTION: Vactor sludge deposit area in upland.

FIELD SAMPLING REPORT

Site: DOT Wetland Date: July 24, 1989

Address: 124th St. South and I-99
Seattle, Washington

Inspectors: Martha Rosenberg, EBAT MR
Barbara Trejo, EBAT
Lynn Coleman, HWICP

The DOT Wetland site is presently an active dump site for DOT vactor sludge and street sweepings. The site is approximately 8 acres of highway right of way located at the above address. Waste has been dumped throughout the site over a period of approximately 20 years. The quantity of waste is unknown at this time.

Vactor sludge and street sweepings are known to contain a variety of contaminants, such as metals, solvents, herbicides, pesticides, and PAH's. The purpose of this limited sampling was to confirm the presence of suspected contaminants at this site. Prior sampling has shown waste to contain EP tox levels for lead in freshly dumped waste. Additional sampling of weathered waste piles showed metal levels at much lower levels or below EP tox, indicating possible leaching. Sampling for priority pollutants other than metals was not pursued under the Ecology Order to DOT. Prior sampling has shown evidence of solvents. DOT also reported an unknown quantity of paint waste buried on site in the northern end of the upland area.

This sampling effort was limited to 5 locations. Three composite samples were taken at each location. Samples will be analyzed for priority pollutants and some additional scans based on lab availability at METRO. Sample locations were determined by reviewing prior sampling efforts and previous field reconaissance by EBAT. The five locations originally chosen were two samples from the upland area containing fresh waste piles (S1 and S2), two samples from the wetland located in the lower field (S4 and S5) and one sample from a "bald spot" in the lower field (S3) where no vegetation has taken root (which is indicative of contaminants such as herbicides.)

All sample jars were preped for the field by METRO prior to sampling. In addition, all field gear was decontaminated at the Ecology office before going to the field. Field conditions consisted of dry weather, clear skies, 70 to 80 degree F temperatures with light winds. We

arrived on site at approximately 9:00 a.m. and proceeded to the upper area to collect two samples. The upper area contains the most recent deposits of waste, spread out in rows along the length of the site. The material is mostly brown silty sand with small debris (i.e. car chains, wood, paint chips, metal scraps, concrete and glass). A pile of treated timber is piled at the southern end next to a catch basin. Two samples were collected (see attached map samples S1 and S2) and returned to the car and the cooler.

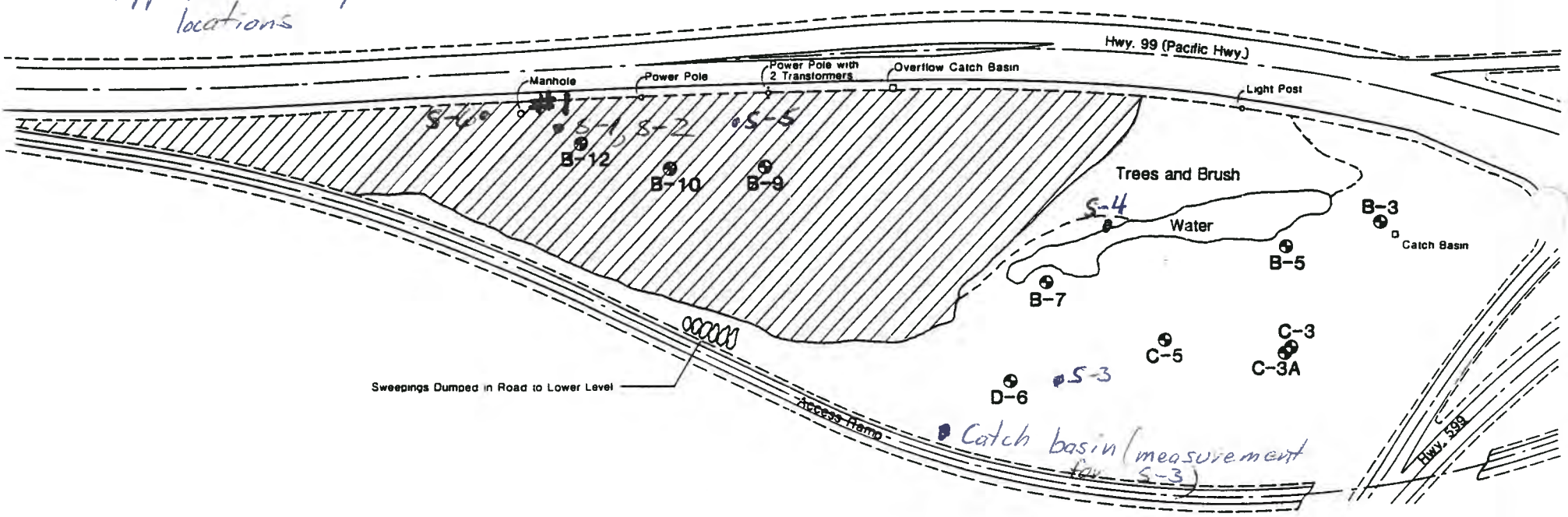
We than proceeded to the lower area along the access road and collected a sample from a "bald spot". The soil in this area was dark brown, loose, moist, silty sand with trace gravel pockets of silty clay. It also contained wood and other debris. The sample was located 208 feet North and 25 feet West of the catch basin indicated on attached map for sample S3. We headed to the southwest end of the wetland for sampling which is closest to the upper area. We attempted to take one series of samples but found the field equipment inadequate to collect the material. We collected two samples but contaminated both samples in the process. At this point we abandoned the original plan to collect two series of samples in the wetland and decided to collect additional samples of upper area with the remaining set of four jars. One of the composite samples (S6) was collected at deposits located near the treated wood pile described above.

While packing the vehicle for departure, a truck driver for WDOT stopped to see what we were doing. In conversation, he mentioned that he had been dumping at this site for sixteen years. The site had originally been more of a bowl shape and marshy and had been filled in alot. We departed the site at approximately 3:30 p.m.

Site and Exploration Plan

DOT Wetland Sampling
7/24/89

Approximate sample locations



B-5 Phase I Boring Location and Number

Approximate Location of Upper Area

Base Map Prepared from Drawings Entitled "SR 99 West Marginal Way to Burns Street, King County, Washington, Sheets 27 and 28", by Washington State Highway Commission, Dated April 13, 1964 Field Revised December, 1988

S

0 100
Scale in Feet

HARTCROWSER
J-2228 1/89
Figure 2

DOT Wetland
sampling

7/24/89

9am Arrived on-site
M. Rosenberg
B. Trejo
L Coleman

Visually, area has received new deposits in the last week. Site material is mostly br. silty sand w/ small debris (eg. car chains, 1 dead bird, wood, paint chips, metal scraps, glass, RR ties & concrete also dumped (See also site map)

↓

Sample area: ≈23' E of 31' N of MH #1 (S1 & S4)

Sampling

#	Time	
S-1	0920	
S-2	0900	(dup of S-1)
S-3	1020	
S-4	1350	
S-5	1430	

S-1 & S-2 description:
"Material brown, silty sand; trace gravel. moist. [redacted] Paint chips, ~~metal~~ glass, wood debris.

S-3 Bold Spot –
DK brown, silty sand trace gravel w/ pockets of silty clay; trace wood debris; moist; loose ≈ 6" deep

Sample located ≈

208' N' & 25' W

of catch basin at toe slope of path from upper area to lower area

S-4 X SW end of marshy area

VOA } only samples
glass jar }

Lunch & decon

Back @ marsh
1:30 pm 7/24/89

Still unable to collect undisturbed sample

S-5 Collected sample of sludge @ upper level. Appeared to be one of newer deposits. Located 35' E and 27' S of ~~the~~ pole w/ two transformers (see site plan)

DEPARTMENT OF ECOLOGY
INSPECTION REPORT

TO: the file
DATE OF VISIT: 12/19/89
NEW INDUSTRY:

INSPECTOR Martha Turney
PERMIT NO.:
PERMIT EXPIRES:

TYPE OF INSPECTION:

___ PERMIT APPLICATION ___ PERMIT RENEWAL ___ COMPLAINT
___ PERMIT COMPLIANCE ✓ ENFORCEMENT ___ DROP-IN
___ PERMIT CANCELLATION

FACILITY: METRO So. BASE / DOT-Duwamish
ADDRESS: SR-99 + 124th So. / Fill Site
CITY: Seattle ZIP: ___ COUNTY: King
T ___ R ___
MAP: ___ QUAD: ___
TEL: 684-2264

PERSON CONTACTED: David Waddell
TYPE OF FACILITY: Bus maintenance / DOT dump site
RECEIVING WATER: Duwamish waterway
TYPE OF TREATMENT SYSTEM: Oil/water seperator + wetland

OPERATION Satis ___ Fair ___ Unsat ___
COMPLIES WITH PERMIT CONDITIONS:

DESCRIPTION: This inspection had 2 purposes: 1) To inspect the new wetland installed by Metro to further treat water discharged from the oil/water seperator. 2) To try + determine whether the DOT Fill Site next door drains to the same ditch as Metro. At 9:30 a.m. I met with David Waddell + was given a tour of the wetland. Planting had been completed the week before. Drainage from the parking lots is collected + passed through an oil/water seperator system. It is then discharged to the wetland. The "S" pattern shown in the photographs is to slow water progress + detain to increase contact time with the vegetation. They have been within the permit limits & expect improved results once the vegetation becomes established. They

Cont'd on reverse

Martha Turney
Inspector, EBAT

use floating booms to help skim off surface oils that may be present. This system drains to a ditch which is covered with vegetation.

We next went south of the DOT Fill site. Adjacent to Boeing property we could see that the DOT site was considerably higher than Metro property. The flow gradient may therefore be towards Metro for both surface + groundwater. We stopped off at the upland area. This area had been flattened and a new pile of garbage (See photo #5) had been dumped next to the catch basin. We then proceeded to the lowland area. Observed standing water in the wetland. The lowland was predominanetly covered with Canary grass which is a wetland species (photo #13). We walked along the ditch at the bottom of the DOT site towards Metro So. Base. The change in vegetation was indicative of the drainage. It appears that water flows along this ditch (photo #11) towards Metro. Connects to an outfall which carries salmon fry. David W. said the fry die + he's not sure of the cause. We followed the ditch + crossed the roadway (photo #9) to the collection pond. This pond empties to another culvert + eventually the Duwamish according to David. (photo #12). We retraced our path + concluded the meeting.

PHOTO NO.: 4
DATE: 12/19/89
TIME: 10:30 A.m.
TAKEN BY: Martha Turvey
WITNESS: Metro, David Waddell
FILM: ASA 200
CAMERA: Automatic
LOCATION: Between SR-99 + Boeing. So. of Metro So. Base
DESCRIPTION: Shows gradient of DOT wetland facility to Metro So. Base. Looking North, Boeing facility is white + blue windowless buildings. DOT wetland facility is in left portion of photo + Metro is center where there is a parking lot.

PHOTO NO.: 5
DATE: 12/19/89
TIME: 10:30 a.m.
TAKEN BY: MARTHA Turvey
WITNESS: David Waddell
FILM: ASA 200
CAMERA: Automatic
LOCATION: DOT Landfill Site SR-99 + S. 124th St.
DESCRIPTION: Upland disposal area, looking north. Shows garbage disposed next to catch basin.

PHOTO NO.: 6
DATE: 12/19/89
TIME: 10:30 a.m.
TAKEN BY: Martha Turvey
WITNESS: Metro, David Waddell
FILM: ASA 200
CAMERA: Automatic
LOCATION: DOT Landfill Site SR-99 + So. 124th St.
DESCRIPTION: Upland disposal area, looking north. Past deposits of street sweepings had been leveled. New deposits are right of photo.

PHOTO NO.: 7
DATE: 12/19/89
TIME: 10:30 a.m.
TAKEN BY: Martha Turvey
WITNESS: Metro, David Waddell
FILM: ASA 200
CAMERA: Automatic
LOCATION: DOT Landfill Site + Metro So. Base.
DESCRIPTION: Corner of lowland area of DOT Landfill Site + Metro So. Base facility. Grass + shrub covered ditch which drains lowland area. Looking south towards Metro.

PHOTO NO.: 8
DATE: 12/19/89
TIME: 10:30 a.m.
TAKEN BY:
Martha Turvey
WITNESS:
David Waddell
FILM: ASA 200
CAMERA: Automatic
LOCATION:
Metro So. Base

DESCRIPTION:
Drainage ditch along northern edge of metro facility. Flow in ditch is east-west. Collects from DOT wetland site & Metro.

PHOTO NO.: 9
DATE: 12/19/89
TIME: 10:30 a.m.
TAKEN BY:
Martha Turvey
WITNESS:
David Waddell
FILM: ASA 200
CAMERA: Automatic
LOCATION:
Metro So. Base & SR-599.
DESCRIPTION:
Shows general area where culvert crosses roadway (where red car is). Ditch to right of photo. Drains to Duwamish waterway.

PHOTO NO.: 10
DATE: 12/19/89
TIME: 10:30 a.m.
TAKEN BY: Martha Turvey
WITNESS: David Waddell
FILM: ASA 200
CAMERA: Automatic
LOCATION: Metro So. Base. & SR-599
DESCRIPTION: Drainage ditch north of facility gate. Shows water in ditch, collects from metro facility + DOT wetland site, adjacent property.

PHOTO NO.: 11
DATE: 12/19/89
TIME: 10:30 a.m.
TAKEN BY: Martha Turvey
WITNESS: David Waddell
FILM: ASA 200
CAMERA: Automatic
LOCATION: Metro So. Base
DESCRIPTION: Culvert empties into drainage ditch. Stream is a salmon run. Culvert runs under paved areas in Metro.

PHOTO NO.: 12
DATE: 12/19/89
TIME: 10:30 a.m.
TAKEN BY:
MARTHA Turvey
WITNESS:
David Waddell
FILM: ASA 200
CAMERA: Automatic
LOCATION:
SR-599 across from METRO
DESCRIPTION:
Drainage collection pond across SR-599 from METRO So. Base. This drains to Duwamish waterway.

PHOTO NO.: 13
DATE: 12/19/89
TIME: 10:30. a.m.
TAKEN BY:
MARTHA Turvey
WITNESS:
David Waddell
FILM: ASA 200
CAMERA: Automatic
LOCATION:
DOT Landfill Site SR-99 + So. 124th
DESCRIPTION:
Lowland area showing site covered with canary grass.
Canary Grass is a wetland species

PHOTO NO.: 14

DATE: 12/19/89

TIME: 10:30 am.

TAKEN BY:
Martha Turney

WITNESS: Metro:
David Waddell

FILM: ASA 200

CAMERA: Automatic

LOCATION:
DOT Landfill Site
SR-99 & So. 124th

DESCRIPTION:
Lowland area as viewed from SR-99. Shows submerged wetland area. Standing water is bright green. May be duckweed.

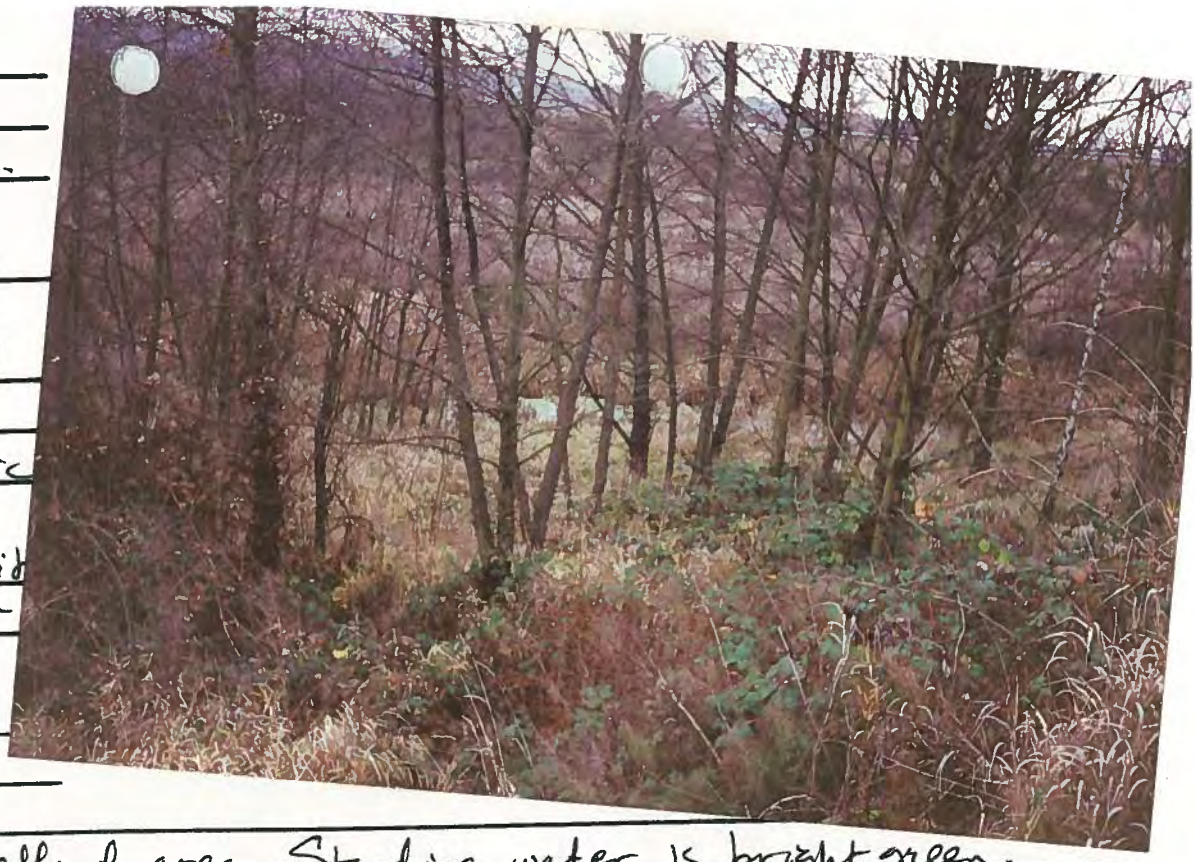


PHOTO NO.: _____

DATE: _____

TIME: _____

TAKEN BY:

_____

WITNESS:

_____

FILM: _____

CAMERA: _____

LOCATION:

_____

_____

DESCRIPTION:

_____

_____

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF CRIMINAL INVESTIGATIONS

REPORT OF INVESTIGATION

1. TITLE	2. CONTROL NUMBER
WDOT, Seattle	90-10-10-9
3. PERIOD COVERED	**4. REPORTING OFFICE**
	Seattle 1/8/90

SYNOPSIS:

During 1987 and 1988, the WA Dept. of Ecology (WDOE) conducted several inspections at a landfill site owned and operated by the WA Dept. of Transportation (WDOT). Reportedly, the landfill site, located at State Route 99 (SR-99) and S. 124th St., Seattle, WA was being used by the WDOT as a solid waste disposal site for sediment collected from storm drain basins throughout the greater Seattle area. During the WDOE inspections numerous samples of the sediment dumped at the WDOT landfill site were collected.

As a result of WDOE inspections and sampling that were conducted at the WDOT landfill site the WDOE issued Order No. DE 88-N161 (Order), dated 8/4/88, to the WDOT. The Order required that the WDOT characterize and sample their landfill site. In response to the Order, WDOT contracted with Hart Crowser, Inc., 1910 Fairview Ave. E., Seattle, WA 98102 to conduct an inspection and take samples at the WDOT landfill site. As a result of the Hart Crowser inspection and sampling, Hart Crowser Report J-2228 (J-2228) was prepared.

J-2228 reported, in part, that "WDOT employees were able to locate an area containing buried drums of paint waste." Reportedly, the buried drums were empty-to-partially full of paint waste and were located near the southern boundry of the WDOT landfill site. The report also stated that the "paint waste might be a source of lead, chromium, or other metals."

On 5/26/89, Martha Turvey, WDOE, gave S/A Gerd Hattwig a copy of J-2228. Turvey told S/A Hattwig about the buried drums of paint waste located at the WDOT landfill site. Turvey told S/A Hattwig that she was going to be meeting with WDOT representatives to discuss the buried drums and the WDOE Order. Turvey said that she would contact S/A Hattwig after her meeting to advise him about the disposition of the buried drums.

On 10/11/89, Turvey contacted S/A Hattwig regarding the WDOT landfill site. Turvey told S/A Hattwig that the WDOT and the WDOE were having difficulty coming to terms about the sampling that needed to be conducted at the WDOT landfill site. Turvey said that WDOT was not willing to take the type of samples that WDOE requested WDOT to take at the WDOT landfill site. Turvey also said that WDOT had not acknowledged the existence of the buried drums at the WDOT landfill site. Turvey added that her contact with the WDOT was Edwin (Ed) Hannus, WDOT Emergency Response Program Manager.

On 12/21/89, S/A Commodore Mann contacted John Stephenson, WDOT Assistant District Administrator, District 1, 15325 SE 30th Pl., Bellevue, WA 98007-

REPORT MADE BY	DATE
S/A Commodore Mann	Jan 23, 1990
REVIEWING OFFICIAL	DATE
SAIC Dixon McClary	1/23/90

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CONTINUED:

6538, (206) 562-4022. The WDOT landfill site is part of WDOT District 1. S/A Mann asked Stephenson for information regarding the alleged drums of buried paint waste. Stephenson said that he would have Jerry Smith, District 1 Maintenance Supervisor, contact S/A Mann about the buried drums.

On 1/4/90, Smith telephoned S/A Mann. Smith said that Jim Kessack, WDOT Maintenance Assistant Superintendent, Highways, 26620-68th Ave. S., Kent, WA (206) 872-6470 was the WDOT employee who identified the location of the buried drums for Hart Crowser Inc.

On 1/6/90, S/A's Mann and Hattwig interviewed Kessack at the WDOT Hqs., Kent, WA. S/A's Mann and Hattwig identified themselves to Kessack. Kessack said that he was responsible for the drums that had been buried at the WDOT landfill site. Kessack said that he had ordered Bill Robinson, a WDOT employee to dispose of the drums at the WDOT landfill site.

Kessack told the two agents that during the late 70's he was the maintenance supervisor of the WDOT Spokane St. yard, Seattle, WA. Kessack said that it was during the late 70's that he ordered Bill Robinson to dispose of several 55 gallon drums of road paint that had been stored at the WDOT yard. Kessack said that drums of paint had been purchased during the mid 70's and had dried to the extent that they could no longer be used. Kessack said that he thought the drums contained both white and yellow paint.

Kessack said that he first told Robinson to dispose of the drums of paint at a local landfill. Kessack said that Robinson took the drums to the landfill but later returned and said that the landfill would not accept the drums because they contained paint. Kessack said that he then told Robinson to take the drums to the WDOT landfill site and leave them at that location. Kessack said that he did not accompany Robinson to the WDOT landfill site when the drums were disposed of. Kessack added that Robinson died in 1979.

Kessack said that the drums were left in a low area of the landfill and over a period of time the drums were covered with sediment recovered from the storm drain areas. Kessack said that Robinson took three to five 55 gallon drums to the WDOT site. Kessack also said that he did not inspect the drums prior to their disposal. Kessack added that he only assumed that the drums contained dried paint and, in fact, they could possibly have contained liquid paint.

Kessack said that he discussed the buried drums with Ed Hannus during late summer or early fall of 1988. Kessack said that he told Hannus that he had ordered the drums to be left at the WDOT landfill site and they were subsequently buried at that location. Kessack also said that he told Hannus that WDOT should excavate the drums at that location because he was concerned that the drums might contain liquid paint.

S/A Mann told Kessack that Hannus had been meeting with the WDOE about the WDOT landfill site and Hannus had not acknowledged the existence of the buried drums. Hannus reportedly stated to the WDOE that there were no environmental problems

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CONTINUED:

at the WDOT landfill site. Kessack said that he was surprised that Hannus would not say anything about the buried drums. Kessack added that it was possible that Hannus was trying to protect him (Kessack) from getting in trouble and therefore was not saying anything.

Kessack said that at the time he told Robinson to take the drums to the WDOT landfill site he did not consider it to be illegal. Kessack said that he later learned about an individual who was convicted of burying drums of paint waste at a sewage treatment plant in Ocean Shores. Kessack said that he had never intended to violate any laws or regulations.

Kessack said that he showed the Hart Crowser employees where the paint drums were buried. Kessack also said that after he told the Hart Crowser employee (name not recalled) where the buried drums were located he also told that employee that sampling wells should be dug at that location to determine if the drums were leaking.

On 1/8/90, S/A Mann discussed the above information with J. Manning, WA State Assistant Attorney General and Martha Turvey, WDOE. Turvey was given Kessack's phone number.

It is recommended that this investigation be closed and retained for intelligence purposes. The act of burying the drums occurred beyond the statute of limitations for the offense.

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ORIGINATING OFFICE

Department of Ecology - Northwest Regional Office

February 13, 1990

Project: Duwamish Fill Site - SR-99 and South 124th Street, Seattle, WA.

Date of Sampling: January 30, 1990

Sampling Team: Cargill, Trejo, Friedman-Thomas, Munt, Turvey

Subject: Sampling Report and Protocol

Water samples were collected from three areas at the above site to assist in characterizing the quality of surface water runoff which discharges to the Duwamish River. Initially, the team intended to take samples from only the wetland area and the ditch which runs along the north end of the site. Despite heavy rainfall, no water appeared in the ditch. Further examination of the site revealed a partially covered catch basin in the center of the lowland area which was collecting runoff from the surrounding area. Using dye tracing the samplers discovered that the runoff from this catch basin runs eastward and reappears at the surface just outside the METRO South Base facility fence, flows to the METRO culverts and discharges to a stream. This stream flows, northward and eventually discharges to the Duwamish River less than a 1/2 mile away.

Samples were submitted to the METRO lab on January 30 for total metals, Volatile Organics (VOA), base/neutral/acid analyses (B/N/A), Pesticides and PCB's. Clean sample jars were received from the METRO lab and consisted of the following containers for each sampling station:

(2) 40 ml Amber glass jars with septum lids for VOA's
(1) 1 liter Polyethylene cubitainer for metals
(1) 1 gallon Glass jar for BNA, Pesticides and PCB's

Each sample container was clearly marked in the field with station name, sample number, time of sample collection, samplers name, and analyses to be performed. HCl was added to the VOA samples as a preservative. For safety reasons, metal samples were not preserved in the field with HNO3. This would be delayed till the samples were received in the METRO lab.

At each station, pH, ambient temperature, conductivity and chlorine measurements were collected directly from the water, at the same depth which was about one inch below the surface. A laboratory thermometer (degrees Centigrade) was inserted into the sample area and allowed to equilibriate;

pH values were obtained with pH paper; conductivity was obtained using a precalibriated Beckman conductivity meter and allowed to equilibriate; and chlorine level tested with a HACH Model CN-66 test kit. All values including sample appearance were recorded for each station.

Samples were collected by hand at each location. The following describes the sampling location, condition of the site and the technique used at each site:

SW-1 - These samples were located in the lowland area adjacent to and east of the wetland. It was measured at 174 ft. North and 109.7 ft. East of the catch basin (See Attached map). This sampling location consisted of a catch basin, mouth at ground level. The opening to the basin was rimmed with an abandoned rubber tire. Soaked marsh grasses and a pile of wood chips surrounded the tire. The one-liter polyethylene cubitainer was filled first by allowing the water, which was cascading from the lip of the catch basin, to fill the sample jar. Care was taken to not disturb the ground upstream and around the tire. The VOA and BNA sample jars were filled the same way.

SW-2 - These samples were located in the wetland where standing water was observed. Specifically, it was 136 ft. North and 82.4 ft. West of SW-1. Samples were collected by gently lowering the samples into the water and allowing the containers to slowly fill reducing air bubbles and disturbance. Sample jars were filled in the same order as described in SW-1.

SW-3 - These samples were taken in the same area as SW-2. All the above procedures were followed as in SW-2.

SW-4 - The location for these samples were east of the SR-99 on ramp approximately 12 feet from the METRO South Base fence. Dye tracing of SW-1 showed SW-4 location to be where the flow surfaced before flowing eastward toward METRO. Samples were collected by gently lowering the jars, facing upgradient, and allowing them to fill slowly. Temperature, pH, chlorine and conductivity were taken directly from the sampling location and repeating the procedure described above.

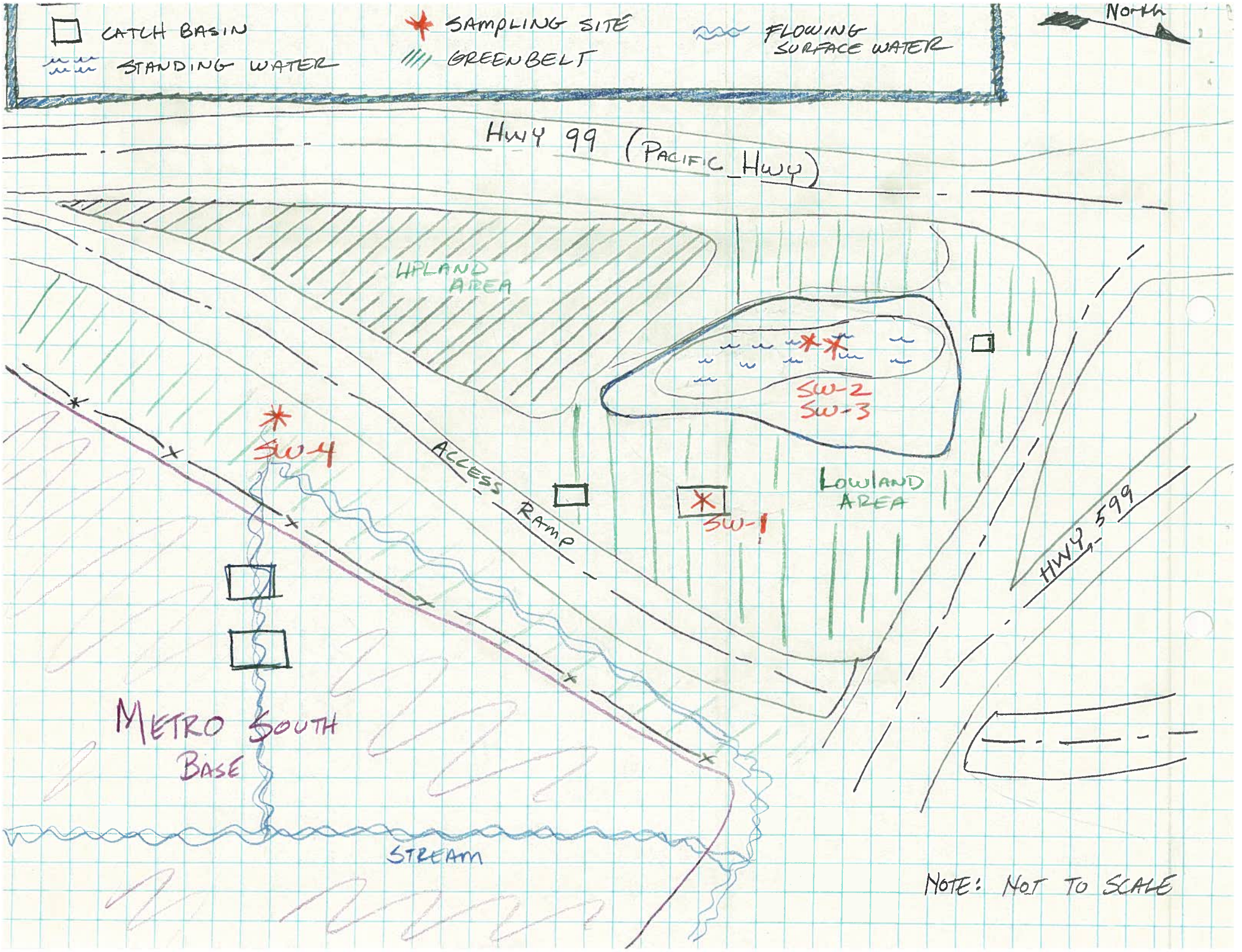

CATCH BASIN
STANDING WATER
SAMPLING SITE
GREENBELT
FLOWING SURFACE WATER
North
HWY 99 (PACIFIC HWY)
UPLAND AREA
SW-2
SW-3
SW-4
SW-1
ACCESS RAMP
LOWLAND AREA
HWY 599
METRO SOUTH BASE
STREAM
NOTE: NOT TO SCALE

PHOTO NO.: 1
DATE: 1/30/90
TIME: 1:30 pm
TAKEN BY:
Deborah Munt
WITNESS:
Martha Turvey
FILM: 35 mm
CAMERA: instamatic
LOCATION:
Duwamish Fill Site - DOT Landfill
DESCRIPTION:
Sample location SW-4, 12' from Metro South Base-fence. Metro fence shown in background. Samplers surround upwelling.

PHOTO NO.: 2
DATE: 1/30/90
TIME: 1:30 p.m.
TAKEN BY:
Deborah Munt
WITNESS:
Martha Turvey
FILM: 35 mm
CAMERA: instamatic
LOCATION:
Duwamish Fill Site - DOT Landfill
DESCRIPTION:
Sample location SW-4. Metro So. Base plant in background. Water flows towards metro & through fenced areas seen in background & empties to stream which runs along channel outlined by shrubs seen on Metro property.

PHOTO NO.: 3
DATE: 1/30/90
TIME: 1:30 p.m.
TAKEN BY: Deborah Munt
WITNESS: Martha Turvey
FILM: 35 mm
CAMERA: instamatic
LOCATION: Duwamish Fill Site-DOT
DESCRIPTION: Shows sampler taking temperature by submerging tip about 1½" below water surface. Sample location - SW-4.

PHOTO NO.: 4
DATE: 1/30/90
TIME: 1:30 p.m.
TAKEN BY: Deborah Munt
WITNESS: Martha Turvey
FILM: 35 mm.
CAMERA: Instamatic
LOCATION: Duwamish Fill Site - DOT Landfill SE-99 + So. 124'
DESCRIPTION: Same as photo 2. Shows proximity to Metro South Base facility in background.

1/30/90

SAMPLE # - SW-1

SAMPLE LOCATION - CATCH BASIN ADJACENT TO WETLAND, NO. OF UPLAND, 174'N + 109.7'E of catch basin

SAMPLING DATE - 1/30/90

SAMPLING TIME - 11:510

SAMPLE DEPTH - surface

SAMPLE APPEARANCE - clear, light yellow tinge

TEMP 6°C

pH 5.5

CONDUCTIVITY 572 µm

CONTAINERS: (2) 40 ML AMBER GLASS - VOA
(1) 1 GAL CLEAR GLASS - BNA PEST/PCB
(1) POLY CUBIT CONTAINER - METALS

PRESERVATIVE - VOA's - HCl

SAMPLERS Barbara Trejo
Dan Cargill
Martha Turney

1/30/90

SAMPLE # SW-2
SAMPLE LOCATION - WETLAND 136'N of catchbasin & 82.4' W. of catchbasin
SAMPLING DATE - 1/30/90
SAMPLING TIME - 12:25 p.m
SAMPLE DEPTH - surface

SAMPLE APPEARANCE - Turbid
TEMP - 6.5 °C
pH 5.5
CONDUCTIVITY - 248 µm

CONTAINERS: (2) 40ML AMBER GLASS - VOA
(1) 1 GAL CLEAR GLASS - BNA PEST/PCB
(1) POLY LIQUIT CONTAINER - METALS

PRESERVATIVE HCl for VOA's

SAMPLERS Barbara Trejo
Dan Cargill
Martha Turney

1/30/90

SAMPLE # SW-3

SAMPLE LOCATION - WETLAND Duplicate

SAMPLING DATE - 1/30/90

SAMPLING TIME - 12:40 p m

SAMPLE DEPTH - Surface

SAMPLE APPEARANCE - turbid

TEMP 6.5°C

pH 5.5

CONDUCTIVITY - 248 µm

CONTAINERS - (2) 40 ML AMBER GLASS - VOA

(1) 1 GAL CLEAR GLASS - BNA PEST/PCB

(1) POLY QUART CONTAINER

PRESERVATIVE - VOA's - HCL

SAMPLER - Barbara Trejo
Dan Cargill

1/30/90

SAMPLE # SW-4
SAMPLE LOCATION - OUTSIDE METRO FENCE
12' from fence
SAMPLING DATE 1/30/90
SAMPLING TIME 1:30
SAMPLE DEPTH SURFACE

SAMPLE APPEARANCE - Slightly turbid
TEMP 6.5 °C
pH 5.5
CONDUCTIVITY 181 µm

CONTAINERS (2) 40 ML AMBER GLASS - VOA
(1) 1 GAL CLEAR GLASS - BNA PEST/PCB
(1) POLY CUBIT CONTAINER - METALS

PRESERVATIVE HCl for VOA

SAMPLERS Deb Munt
Barbara Trejo
Martha Turney
Rachael Friedman Thompson
Dan Cargill

11/30/96

SAMPLE #

SAMPLE LOCATION

SAMPLING DATE

SAMPLING TIME

SAMPLE DEPTH

SAMPLE APPEARANCE

TEMP

PH

CONDUCTIVITY

CONTAINERS (2) 40 ML AMBER GLASS - VOA

(1) 1 GAL CLEAR GLASS - BNA PEST/PCB

(1) POLY CLEAR CONTAINER - METALS

PRESERVATIVE

SAMPLERS

SW-1

Testing for Chlorine using HACH model CN-66 Test kit

0 Chlorine

SW-2

Testing for chlorine using same meter as above

0 Chlorine

SW-3

Testing for chlorine using same meter as above

0 Chlorine

SW-4

Testing for Chlorine using same meter

0 Chlorine

SW-4 location

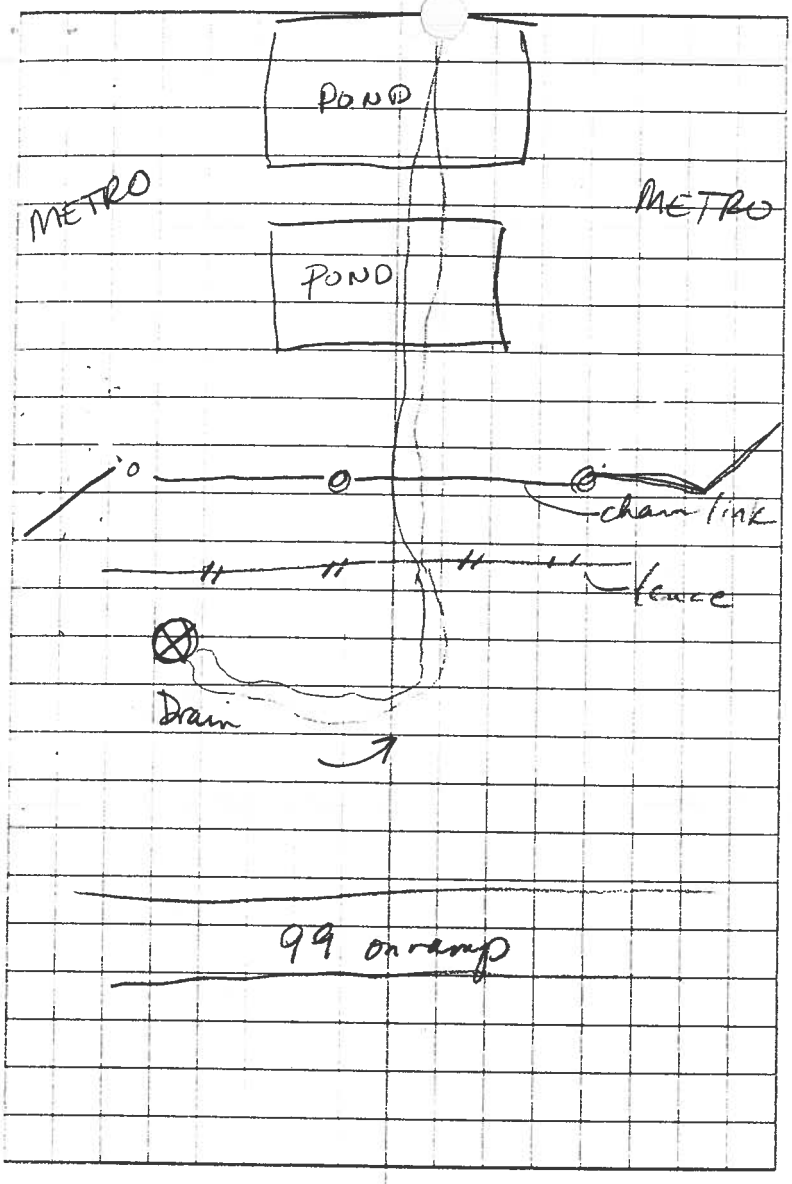


PHOTO NO.: 1
DATE: 4/13/90
TIME: 12:00
TAKEN BY:
Ching Pi Wang
WITNESS:
Martha Turvey
FILM: ASA 200
CAMERA: 35 mm.
LOCATION:
DOT Wetland Site - SR99 + 124th.
DESCRIPTION:
Waste pile located at upland area south end. Pile 6'x6'x3' approximately. Waste smelled like petroleum contamination, covered with visquine.

PHOTO NO.: Duplicate of #1
DATE:
TIME:
TAKEN BY:
WITNESS:
FILM:
CAMERA:
LOCATION:
DESCRIPTION:

Department of Ecology - Northwest Regional Office

October 2, 1990

Project: Duwamish Fill Site - SR-99 and SOuth 124th Street, Tukwila, WA

Date of Sampling: May 8, 1990

Sampling Team: Martha Turvey
Ching Pi Wang

Subject: Sampling Report and Protocol

Water samples were collected from four areas at the above site to assist in characterizing the quality of surface water runoff and ground water which may be discharging to the Duwamish River. Initially, the team had intended to take samples from a catch basin at the foot of the upland site and several ground water samples. Dry conditions limited the scope of sampling and no samples were taken from the catch basin. Instead the team took samples from existing surface water sources and dug one ground water sampling hole next to the catch basin. The hole was approximately 3-4 feet deep. The team waited for the hole to fill in with groundwater. A second ground water hole was dug but did not fill in during the sampling episode so this hole was back filled.

Samples were stored at Ecology refrigerator and picked up by the Manchester Laboratory for analysis. Analysis consisted of Total Metals, Volatile Organics (VOA), Base/Neutral/Acids (BNA), Pesticides, and PCB's. Clean sample jars were received from the Manchester Lab and consisted of the following containers for each sampling station:

(2) 40 ml Amber glass jars with septum lids for VOA's
(1) 1 liter Polyethylene cubitainers for metals
(1) 1 gallon Glass jars for BNA, Pesticides and PCB's.

Each sample container was clearly marked in the field with station name, sample number, time of sample collection, samplers name, and analyses to be performed. HCl was added to the VOA samples as a preservative. Other preservatives were delayed till samples were received in the Manchester Lab.

At each station, pH, and ambient temperature were collected directly from the water at the same depth, about 1 inch below the surface. A laboratory thermometer (degrees centigrade) was inserted into the sample area and allowed to equilibriate; and pH values were obtained with pH paper.

Samples were collected by hand at each location. The following describes the sampling location, condition, of the site and the technique used at each site:

SW-1 - These samples were taken in the lowland area, at the south end of the wetland at toe of upland fill area. All samples were collected by carefully dipping the jars into the water to avoid creating air bubbles. For VOA samples, the sample was topped off using a second VOA container to pour the sample. Once the VOA sample was collected, the sample was checked for air bubbles. If an air bubble was found, the sample was discarded and another taken. The samples appeared brown and turbid from organic matter or decayed vegetation.

SW-2 - These samples were located 20 feet north of SW-1. The samples were collected the same as in SW-1.

GW-2 - These samples were collected from a 3-4 foot hole dug next to SW-2 sampling site. The hole was allowed time to fill up with water which seeped into it from the walls of the hole or from groundwater. The samples were collected as in SW-1 and SW-2.

SW-3 - These samples were collected approximately 140 feet from SW-1 site closer to the center of the wetland. The sampling procedures were repeated as described above. The sample appeared brown, murky and contained alot of decayed vegetation.

All samples were immediately refrigerated once returned to the car and transported to Ecology in coolers.

PHOTO NO.: 1

DATE: 5/8/90

TIME: 14:45

TAKEN BY:
Ching Pi Wang, NWRO

WITNESS:
Martha Turney

FILM: Fujichrome

CAMERA: 35 mm

LOCATION:
Duwamish Fill Site, So. 124th St & 99, Tukwila, WASH.

DESCRIPTION:
Sampling at foot of upland area. Sampling site located at lowland creek. Water conditions, turbid, brown, algae slime on surface, wood debris.

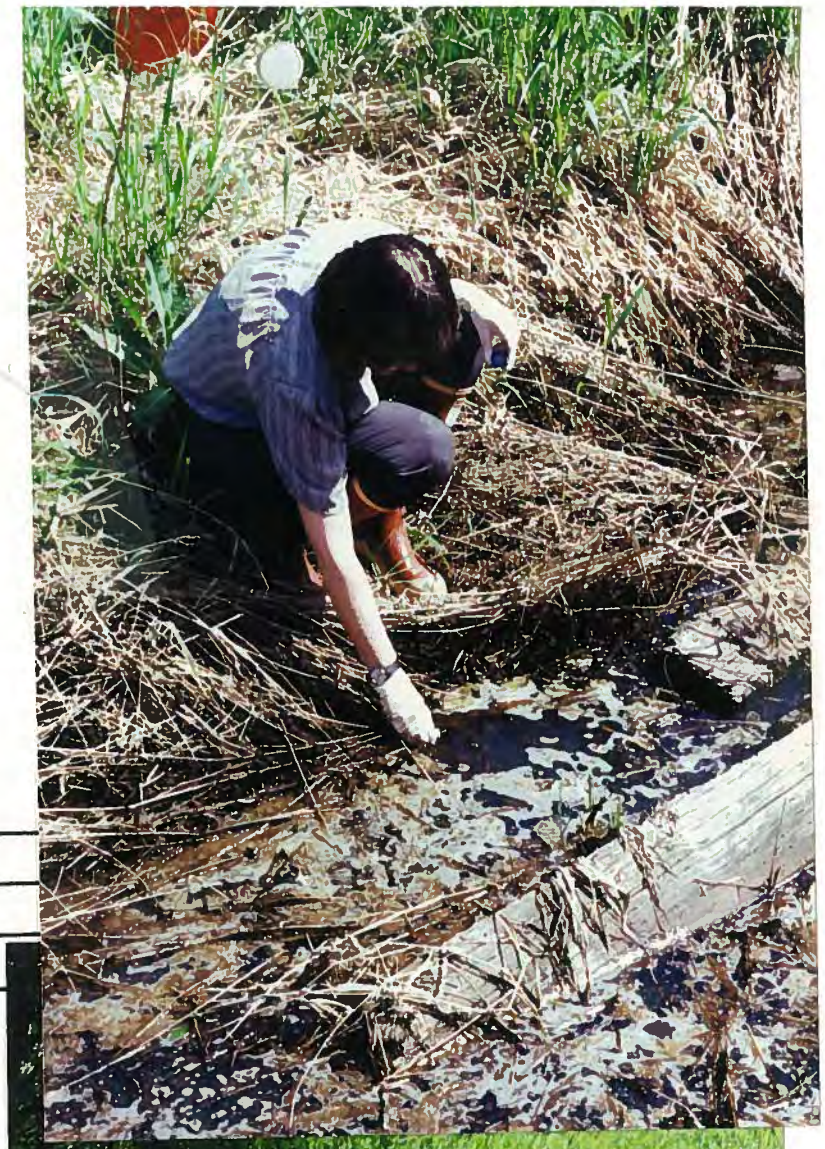


PHOTO NO.: 2

DATE: 5/8/90

TIME: 14:45

TAKEN BY:
Ching Pi Wang

WITNESS:
MARTHA Turney

FILM: Fujichrome

CAMERA: 35mm

LOCATION:
Same as above

DESCRIPTION:
Same location as above, looking south toward upland slope. Sampler holding VOA bottle.

PHOTO NO.: 3
DATE: 5/8/90
TIME: 15:00
TAKEN BY:
Martha Turvey
WITNESS:
Ching Pi Wang
FILM: Fujichrome
CAMERA: 35 mm
LOCATION:
Duwamish Fill Site, So. 124th St + I99, Tukwila, WA.
DESCRIPTION:
Sampling GW-2. Shows pit dug to collect groundwater sample. Empty collection container being held. Soil appears damp.

PHOTO NO.: 4
DATE: 5/8/90
TIME: 15:00
TAKEN BY:
Martha Turvey
WITNESS:
Ching Pi Wang
FILM: Fujichrome
CAMERA: 35 mm
LOCATION:
Duwamish Fill Site, So. 124th St. + I99, Tukwila, WA.
DESCRIPTION:
Ching Pi Wang next to GW-2 sampling location. Waiting for pit to fill with water. Located in lowland area of site 20' N of 1st sampling area at foot/toe of upland

PHOTO NO.: 5
DATE: 5/8/90
TIME: 15:00
TAKEN BY:
Chung Pi Wang
WITNESS:
Martha Turvey
FILM: Fujichrome
CAMERA: 35mm
LOCATION:
Duwamish Fill Site, So. 124+99
DESCRIPTION:
VOA sample being taken at Bowlero area.
Technique shows capping off top of bottle using a second VOA bottle & slow pouring liquid.

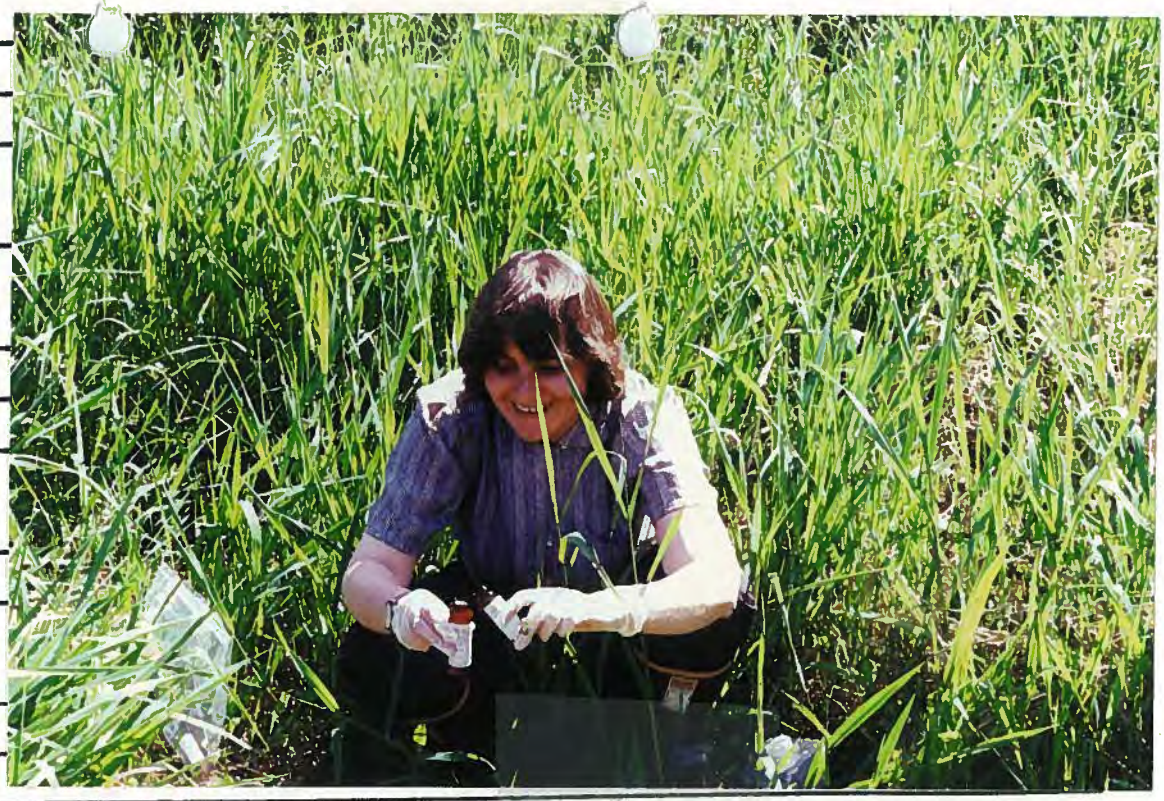


PHOTO NO.: 6.
DATE: 5/8/90
TIME: 15:00
TAKEN BY:
Chung Pi Wang
WITNESS:
Martha Turvey
FILM: Fujichrome
CAMERA: 35 mm
LOCATION:
Duwamish Fill Site, So. 124+99, Tukwila, WA.
DESCRIPTION:
Sample of Wetland surface water.
Same as above photo #5.

PHOTO NO.: 7
DATE: 5/8/90
TIME: 15:00
TAKEN BY: ~~[illegible]~~ Ching Pi Wang
WITNESS: Martha Turvey
FILM: Fujichrome
CAMERA: 35mm
LOCATION: Duwamish Fill Site So. 124th + I99
DESCRIPTION: Tukwila WA. Located in lowland area, wetland in background. Showing surface water sample. Looking northward

PHOTO NO.: 8
DATE: 5/8/90
TIME: 15:00
TAKEN BY: Ching Pi Wang
WITNESS: Martha Turvey
FILM: Fujichrome
CAMERA: 35 mm
LOCATION: Duwamish Fill Site, So. 124 & I99 Tukwila, WA.
DESCRIPTION: Same as photo #7. Sample taken of surface water at wetland.

PHOTO NO.: 9
DATE: 5/8/90
TIME: 15:00
TAKEN BY:
Martha Turvey, NWRO
WITNESS:
Ching Pi Wang, NWRO
FILM: Fujichrome
CAMERA: 35 mm.
LOCATION:
Duwamish Fill Site, So. 124th St. + I99, Tukwila, WA.
DESCRIPTION:
Sampling in lowland area. Ching Pi holding plastic cubitainer used to collect water samples for metal analysis.

PHOTO NO.: 10
DATE: 5/8/90
TIME: 15:00
TAKEN BY:
Martha Turvey, NWRO
WITNESS:
Ching Pi Wang, NWRO
FILM: Fujichrome
CAMERA: 35 mm
LOCATION:
Duwamish Fill Site (see above #9)
DESCRIPTION:
Sampler taking temperature of GW-2 sample location, or groundwater. Shows temp. taken directly from site.

PHOTO NO.: 11

DATE: 5/8/90

TIME: 15:00

TAKEN BY:

Martha Turvey, NWRO

WITNESS:

Ching Pi Wang, NWRO

FILM: Fujichrome

CAMERA: 35 mm

LOCATION:

Duwamish Fill Site, S 124th St. & I99, Tukwila, WA.

DESCRIPTION:

Lowland area, shows Ching Pi holding a glass sample bottle @ Site GW-2 to right of Ching Pi.

PHOTO NO.:

DATE:

TIME:

TAKEN BY:

WITNESS:

FILM:

CAMERA:

LOCATION:

DESCRIPTION:

FIELD REPORT

Name of Site: Duwamish Fill Site

Location: South 124th Street and Pacific Hwy. South, Seattle, WA.

Date: July 3, 1990

Inspector: Martha Turvey, Elliot Bay Action Team, NWRO

Introduction:

This site is owned and operated by the Department of Transportation. It is an 8 acre highway right-of-way which presently receives street sweepings, road maintenance debris and garbage in unknown quantities. The site has been receiving this material and vactor sludges for at least twenty years. The site is divided into two segments, an upland area which is still receiving waste and a lowland area which is no longer receiving waste. The purpose of this field inspection was to sample a visquine covered pile in the upland area.

Prior to this inspection I had arranged to meet DOT representative Galen H. Tritt, Hart Crowser Inc. on site to split samples with me. Mr. Tritt and I met at the parking area at approximately 13:30 and proceeded to the pile. The pile is located at the south end of the upland area. It is approximately 3 feet high and 6 feet long. Removing the visquine, we found the soil to appear blackish in color and had a petroleum odor. The material looked weathered and of sandy consistency.

Method:

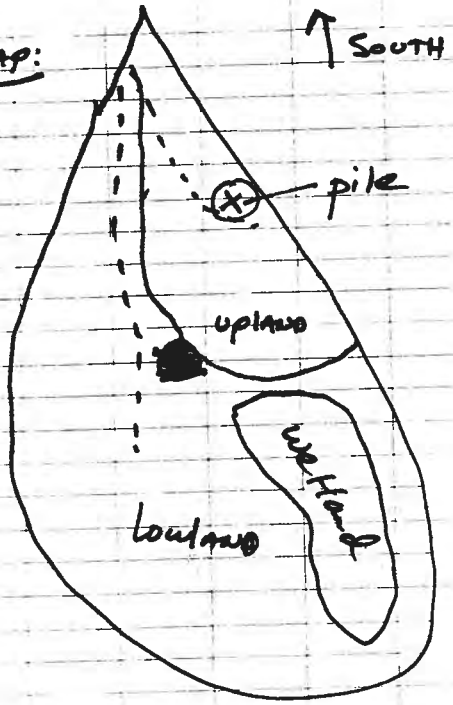
Composite samples were taken using a decontaminated stainless steel spoon and bowl. Utensils were decontaminated using alconox soap, followed by deionized water rinse, acetone rinse, deionized water second rinse and air dried. The utensils were than wrapped in plastic for transport to the site. All sample jars were prepared by the laboratory.

Volatile Organic samples were taken from a single site on the pile by digging down approximately 6 inches and splitting spoonfuls of soil. The pesticide/BNA/PCB and oil and grease samples were taken by compositing material from about 4 seperate sites, 6 inches down on the pile and mixing in a stainless steel bowl. Two duplicate samples were taken of this material. A third set of samples were taken by Ecology incase of breakage problems. Samples were immediately returned to the car and the cooler. Samples were kept cool using ice.

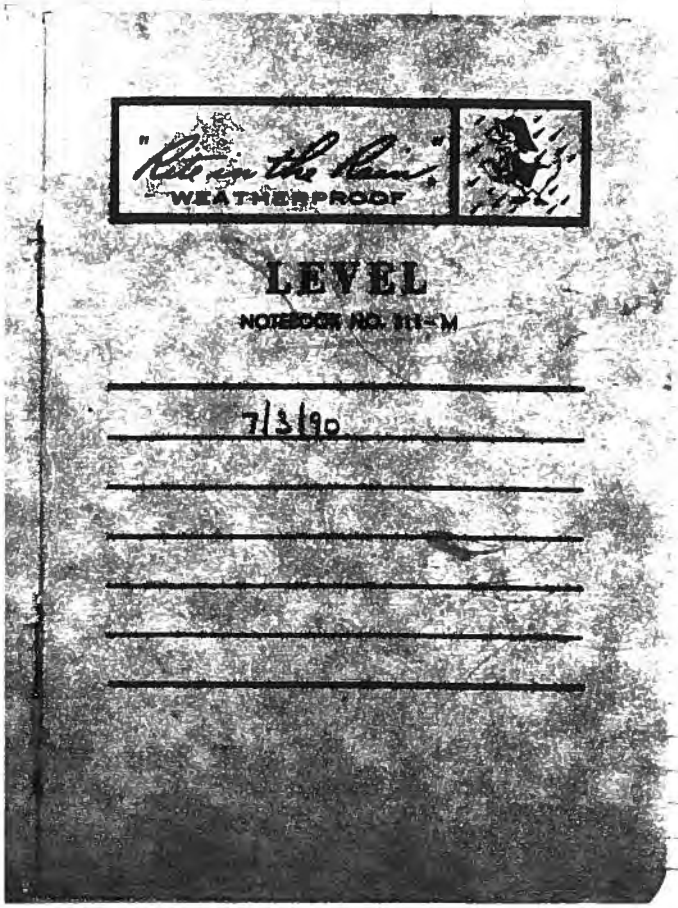
Observations:

Weather conditions were warm temperatures, light breeze and dry. Part of the pile had been exposed. Samples were taken from covered areas only to avoid weathered materials. Pile had a petroleum odor which got stronger when soil was disturbed. Sampling ended at approximately 13:45.

Map:



DOT Landfill Site



Soil Sample

Method: Used stainless steel spoons that had been decontaminated using:

deionized water
alconox soap rinse
deionized water
methanol
deionized water

wrapped in plastic to protect it & prevent further contamination.

Used one spoon to expose surface material.

Sample taken 6" below the surface.

Site: DOT Landfill - Seattle

Date: 7/3/90

Time: 1330

Location of Samples:

Southwest edge of upland area

Observations: pile covered mostly w/viscosine. Partly exposed

Petroleum fuel odor

Blackish colored soils.

PHOTO NO.: 1
DATE: 7/3/90
TIME: ~~0000~~ 1:30
TAKEN BY:
Martha Turvey
WITNESS:
Galen Tritt
FILM: Kodak
CAMERA: 35 mm
LOCATION:
Duwamish Fill Site, So. 124th & I-99, Tukwila, WA.
DESCRIPTION:
Southwest edge of upland area. Visquine covered pile of petroleum contaminated soils.

PHOTO NO.: 2
DATE: 7/3/90
TIME: 1:30
TAKEN BY:
Martha Turvey
WITNESS:
Galen Tritt
FILM: Kodak
CAMERA: 35 mm
LOCATION:
Duwamish Fill Site So. 124th & I-99, Tukwila, WA.
DESCRIPTION:
Same location & pile shown in photo #1.
Galen Tritt, Hart Crowser, taking soil sample. Stored immediately in small cooler shown in foreground

PHOTO NO.: 3

DATE: 7/3/90

TIME: 1:30

TAKEN BY: Martha Turney

WITNESS: Galen Tritt

FILM: Kodak

CAMERA: 35 mm

LOCATION: Duwamish Fill Site, So. 124th St + I-99

DESCRIPTION: Tukwila WA. Petroleum Contaminated Soil located at Southwest edge of upland area. Galen Tritt, Hart Crowser shown taking composite sample using pre cleaned bowl + spoon to collect soil from 4-5 spots on pile at 6" beneath surface.

PHOTO NO.: _____

DATE: _____

TIME: _____

TAKEN BY:

_____

WITNESS:

_____

FILM: _____

CAMERA: _____

LOCATION:

_____

_____

DESCRIPTION:

_____

_____

SUBJECT: Site Inspection Report for Green River Dump Site, Tukwila, WA. and Duwamish Wetland Fill Site.

DATE: September 7, 1990

INSPECTORS: Martha Turvey, TCP, NWRO
Dennis Robertson, City of Tukwila Council Member
Lucy Lauterbach, Assistant to Tukwila City Council

TIME: 9:00 a.m.

LOCATION: Green River site - Intersection of Southcenter Blvd. and Interurban Ave., Tukwila, WA.

INTRODUCTION:

I was contacted by Dennis Robertson concerning the Duwamish Wetland Fill Site located at Pacific Hwy South and 124th Street. The City of Tukwila has annexed this property as of September 1, 1990. The Duwamish site presently receives street sweepings and garbage from Washington Department of Transportation road maintenance activities. The Tukwila City Council identified the Green River Dump Site as a staging area for the Duwamish Wetland Site.

SITE VISIT:

At 8:00 a.m. I met Dennis Robertson and Lucy Lauterbach at the Duwamish Wetland site. We conducted a brief tour of the site which included looking at the upland area piles of sand and garbage that had been pushed to the north end of the property. Mr. Robertson pointed out that at the base of the upland area he found empty drums. In addition, he pointed out that there is a ditch that runs from the upland area through the middle of the property. He believes this ditch carries runoff from the upland area northward but does not know where it dumps out to. We proceeded to the lowland area. Heavy ground cover and blackberry bushes made it very difficult to walk on the site off the roadway. Mr. Robertson proceeded independently toward the ditch and reported that there was water in the ditch and it had an oily sheen. He pointed out that the property west of the site across Pacific Hwy. South is a trucking operation. A culvert that leads from this property to the Duwamish site is contaminated with oily looking material and it appears to drain to the Duwamish site. He suspects that the trucking company operation has contamination problems. It is also part of the cities recent annexation.

From this site we proceeded to the Green River site which is reportedly a staging area for the Duwamish site. This site was located off Southcenter Blvd. and was the location of a METRO bus stop. Piles of sand and gravel similar to what is located at the Duwamish site were piled there. The piles contain chunks of asphalt and road litter. There were weeds growing on the piles so it is questionable how long they have been there. Part of the site

looked like material had been removed since the surface appeared freshly scraped. Mr. Robertson indicated that he thought other side road pockets near this site were also being used by DOT to store road debris until they could be removed to the larger site.

There were no containment structures around these piles and it was clearly upgradient from the river. Blackberries covered the hillside which sloped towards the river so it was not possible to determine if there was additional dump material.

We departed the site at approximately 9:15.

PHOTO NO.: 2
DATE: 9/7/90
TIME: 9:00 A.m.
TAKEN BY:
Martha Turvey
WITNESS:
Dennis Robertson
FILM: ASA 200 Kod.
CAMERA: 35 mm
LOCATION:
Green River DOT
Dump Site, Tukwila, WA.

DESCRIPTION:
Site located at Intersection of Southcenter Blvd. & Interurban Ave, Tukwila, WA. Facing Green Rv. Shows piles of street sweepings. Piles have weed growth. Piles not uniform color, may contain some asphalt chunks. Extends towards Green Rv.

PHOTO NO.: 3
DATE: 9/7/90
TIME: 9:00 A.m.
TAKEN BY:
Martha Turvey
WITNESS:
Dennis Robertson
FILM: ASA 200 Kodak
CAMERA: 35 mm
LOCATION:
Green Rv.-DOT
Dump Site, Tukwila, WA

DESCRIPTION:
Same location as above. Shows area where piles may have been removed & reportedly hauled to Duwamish site at 99 So. & 124th St. Looking towards 405. Piles to right of photo.

PHOTO NO.: 4
DATE: 9/7/90
TIME: 9:00 A.M.
TAKEN BY:
Martha Turvey
WITNESS:
Dennis Robertson
FILM: ASA 200
CAMERA: 35 mm
LOCATION:
Green Ru. Dump Site.
Tukwila, WA.
DESCRIPTION:
Looking towards river, shows piles of street sweepings. Dark patches may be asphalt. Weeds indicate may have been left over extended period of time.

PHOTO NO.: 5
DATE: 9/7/90
TIME: 9:00 A.M.
TAKEN BY:
MARTHA Turvey
WITNESS:
Dennis Robertson
FILM: ASA 200
CAMERA: 35 mm
LOCATION:
Green Rv. Dump Site
Tukwila, WA.
DESCRIPTION:
Taken from top of pile looking down at river. Asphalt pile to right of photo. Blackberries covering hillside may be covering additional piles of ~~street~~ street sweepings.

PHOTO NO.: 6
DATE: 9/7/90
TIME: 9:00 A.m.
TAKEN BY:
Martha Turvey
WITNESS:
Dennis Robertson
FILM: ASA 200
CAMERA: 35 mm
LOCATION:
Green Ru. Dump Site
Tukwila, WA.
DESCRIPTION:
Street sweeping piles. Asphalt pile to right/center of photo. Green river upper right of photo.

PHOTO NO.: 7
DATE: 9/7/90
TIME: 9:00 A.m.
TAKEN BY:
Martha Turvey
WITNESS:
Dennis Robertson
FILM: ASA 200
CAMERA: 35 mm.
LOCATION:
Green Ru. Dump Site,
Tukwila, WA.
DESCRIPTION:
Looking towards Interurban Ave. Shows approximate height of street sweeping piles shown in center of photo.

PHOTO NO.: 8
DATE: 9/7/90
TIME: 9:00 A m
TAKEN BY:
Martha Turvey
WITNESS:
Dennis Robertson
FILM: 200 ASA
CAMERA: 35 mm
LOCATION:
Green Rv. Dump Site, Tukwila, WA.
DESCRIPTION:
Looking towards Interurban Ave. Shows slope of land towards Green Rv. Street sweeping piles to left of photo. Blackberries prevented further investigation of hillside.

PHOTO NO.: 9
DATE: 9/7/90
TIME: 9:00 A.M.
TAKEN BY:
Martha Turvey
WITNESS:
Dennis Robertson
FILM: 200 ASA.
CAMERA: 35 mm.
LOCATION:
Green Rv. Dump Site, Tukwila, WA.
DESCRIPTION:
Looking towards Interurban Ave. Piles of street sweepings.

HARTCROWSER

Earth and Environmental Technologies

RECEIVED
APR 28 1989
DEPARTMENT OF ECOLOGY
NORTHWEST REGION

Phase I Sampling and Analysis
WSDOT Solid Waste Disposal Site
SR-99 and South 124th Street
Seattle, Washington

Prepared for
Washington State
Department of Transportation

J-2228

1910 Fairview Avenue East Seattle, Washington 98102-3699 206.324.9530

Site and Exploration Plan

boundary appears approx. correct
Addtnl soil samples would further define wetland edge

Hwy. 99 (Pacific Hwy.)

Manhole

Power Pole

Power Pole with 2 Transformers

Overflow Catch Basin

Light Post

B-12

B-10

B-9

Trees and Brush

Water

B-3

Catch Basin

B-5

B-7

3' of fill - upland weedy species - irregular surface, previously filled

C-3

C-5

C-3A

D-6

Sweepings Dumped in Road to Lower Level

Access Ramp

Hwy. 599

B-5 Phase I Boring Location and Number

Approximate Location of Upper Area

Base Map Prepared from Drawings Entitled "SR 99 West Marginal Way to Burns Street, King County, Washington, Sheets 27 and 28", by Washington State Highway Commission, Dated April 13, 1964. Field Revised December, 1988

N

0 100 200

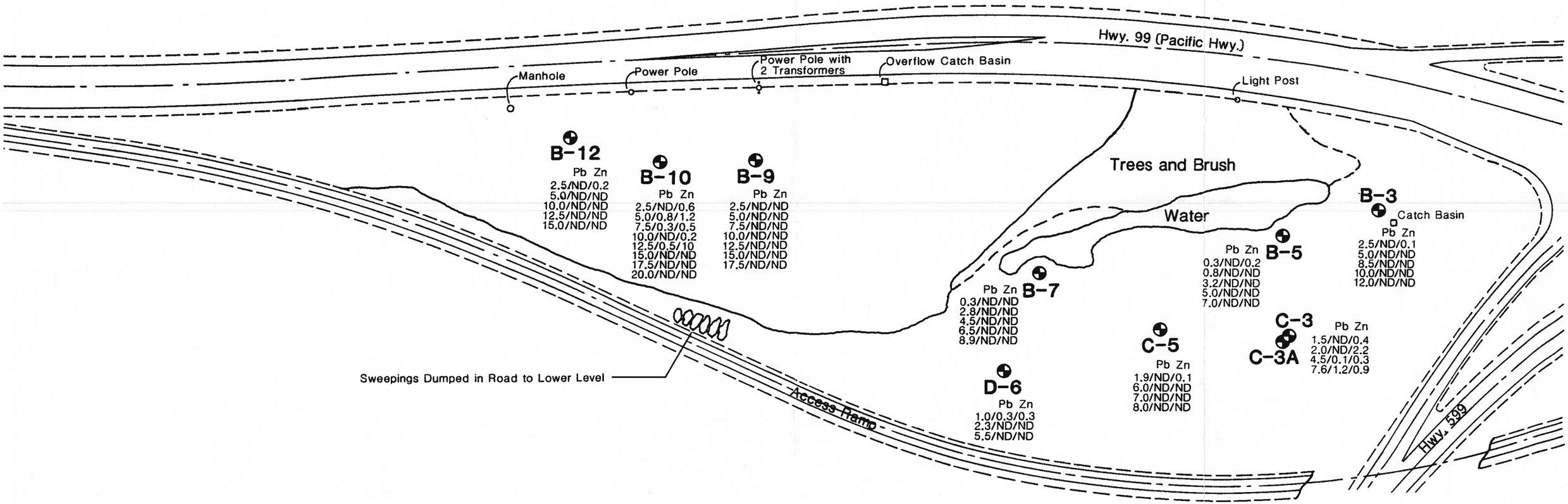
Scale in Feet

HARTCROWSER

J-2228 1/89

Figure 2

Extractable Lead and Zinc Concentrations Versus Depth



B-5 Phase I Boring Location and Number

Approximate Location of Upper Area

2.5/ND/0.6 Sample Depth in Feet/Extractable Lead Concentration in ppm / Extractable Zinc Concentration in ppm

ND Not Detected

Base Map Prepared from Drawings Entitled "SR 99 West Marginal Way to Burns Street, King County, Washington, Sheets 27 and 28", by Washington State Highway Commission, Dated April 13, 1964. Field Revised December, 1988

N

0 100 200
Scale in Feet

HARTCROWSER
J-2228 1/89
Figure 3

Key to Exploration Logs

Sample Descriptions

Classification of soils in this report is based on visual field and laboratory observations which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field nor laboratory testing unless presented herein. Visual-manual classification methods of ASTM D 2488 were used as an identification guide.

Soil descriptions consist of the following:
Density/consistency, moisture, color, minor constituents, MAJOR CONSTITUENT, additional remarks.

Density/Consistency

Soil density/consistency in borings is related primarily to the Standard Penetration Resistance. Soil density/consistency in test pits is estimated based on visual observation and is presented parenthetically on the test pit logs.

SAND or GRAVEL Density	Standard Penetration Resistance in Blows/Foot	SILT or CLAY Consistency	Standard Penetration Resistance in Blows/Foot	Approximate Shear Strength in TSF
Very loose	0 - 4	Very soft	0 - 2	<0.125
Loose	4 - 10	Soft	2 - 4	0.125 - 0.25
Medium dense	10 - 30	Medium stiff	4 - 8	0.25 - 0.5
Dense	30 - 50	Stiff	8 - 15	0.5 - 1.0
Very dense	>50	Very stiff	15 - 30	1.0 - 2.0
		Hard	>30	>2.0

Moisture

Dry	Little perceptible moisture
Damp	Some perceptible moisture, probably below optimum
Moist	Probably near optimum moisture content
Wet	Much perceptible moisture, probably above optimum

Minor Constituents

	Estimated Percentage
Not identified in description	0 - 5
Slightly (clayey, silty, etc.)	5 - 12
Clayey, silty, sandy, gravelly	12 - 30
Very (clayey, silty, etc.)	30 - 50

Legends

Sampling

BORING SAMPLES

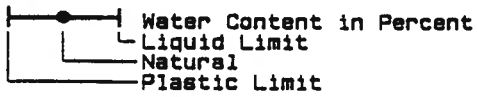
- Split Spoon
- Shelby Tube
- Cuttings
- Core Run
- * No Sample Recovery
- P Tube Pushed, Not Driven

TEST PIT SAMPLES

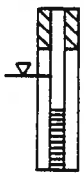
- Grab (Jar)
- Bag
- Shelby Tube

Test Symbols

GS	Grain Size Classification
CN	Consolidation
TUU	Triaxial Unconsolidated Undrained
TCU	Triaxial Consolidated Undrained
TCD	Triaxial Consolidated Drained
QU	Unconfined Compression
DS	Direct Shear
K	Permeability
PP	Pocket Penetrometer Approximate Compressive Strength in TSF
TV	Torvane Approximate Shear Strength in TSF
CBR	California Bearing Ratio
MD	Moisture Density Relationship
AL	Atterberg Limits



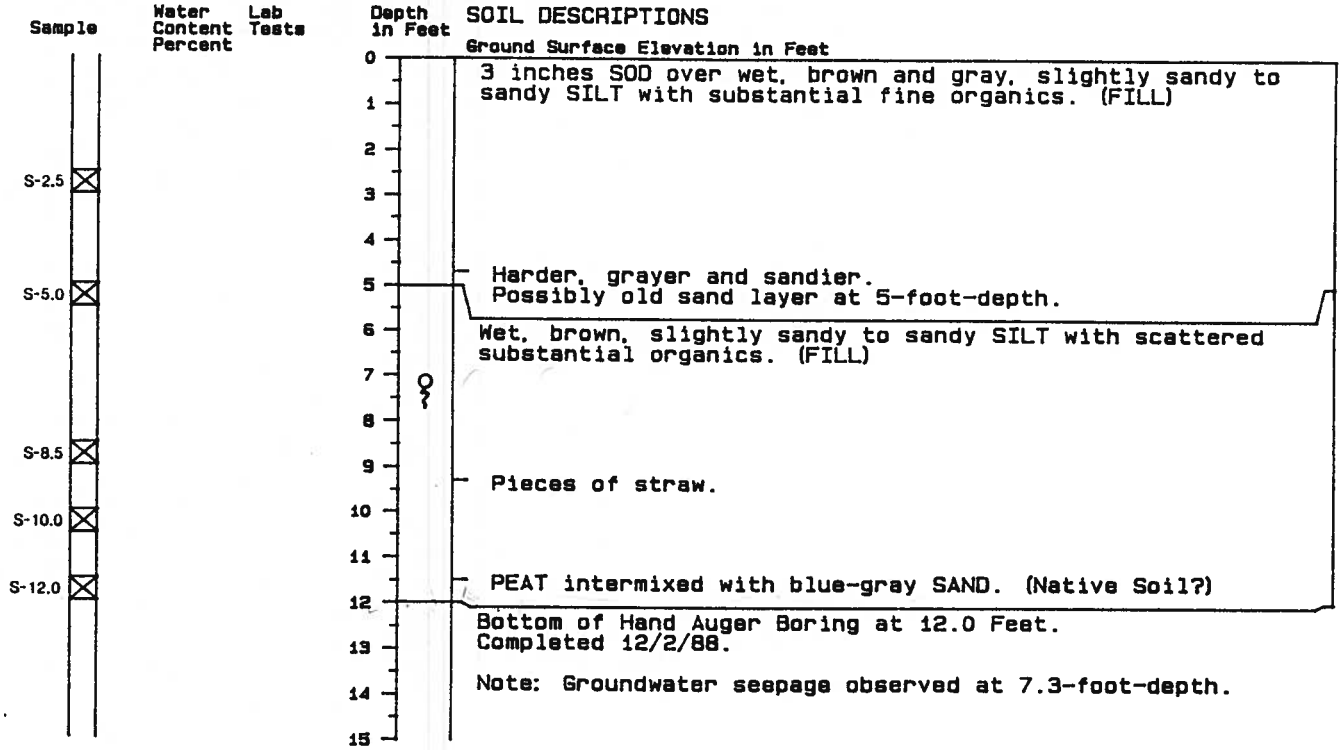
Ground Water Observations



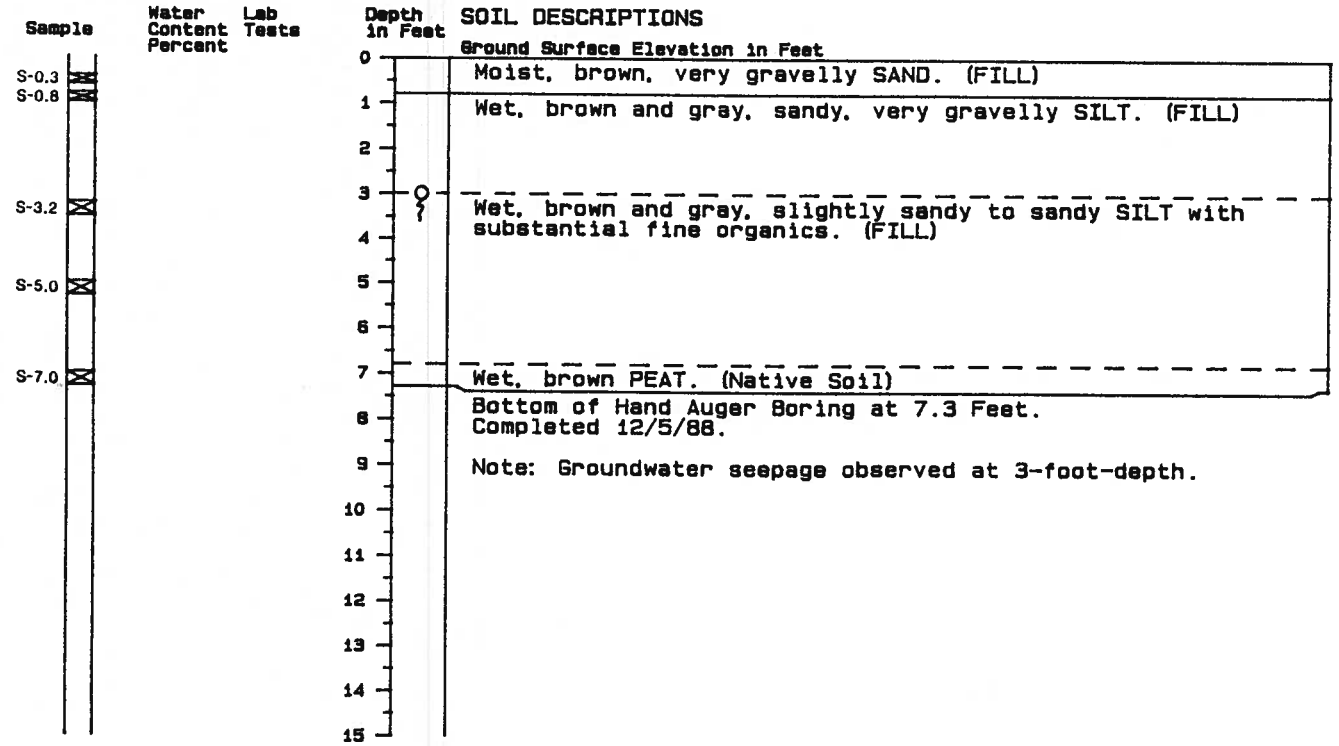
- Surface Seal
- Ground Water Level on Date (ATD) At Time of Drilling
- Observation Well Tip or Slotted Section
- Ground Water Seepage (Test Pits)

J-2228 January 1989
HART-CROWSER & associates, inc.
Figure B-1

Hand Auger Boring Log B-3

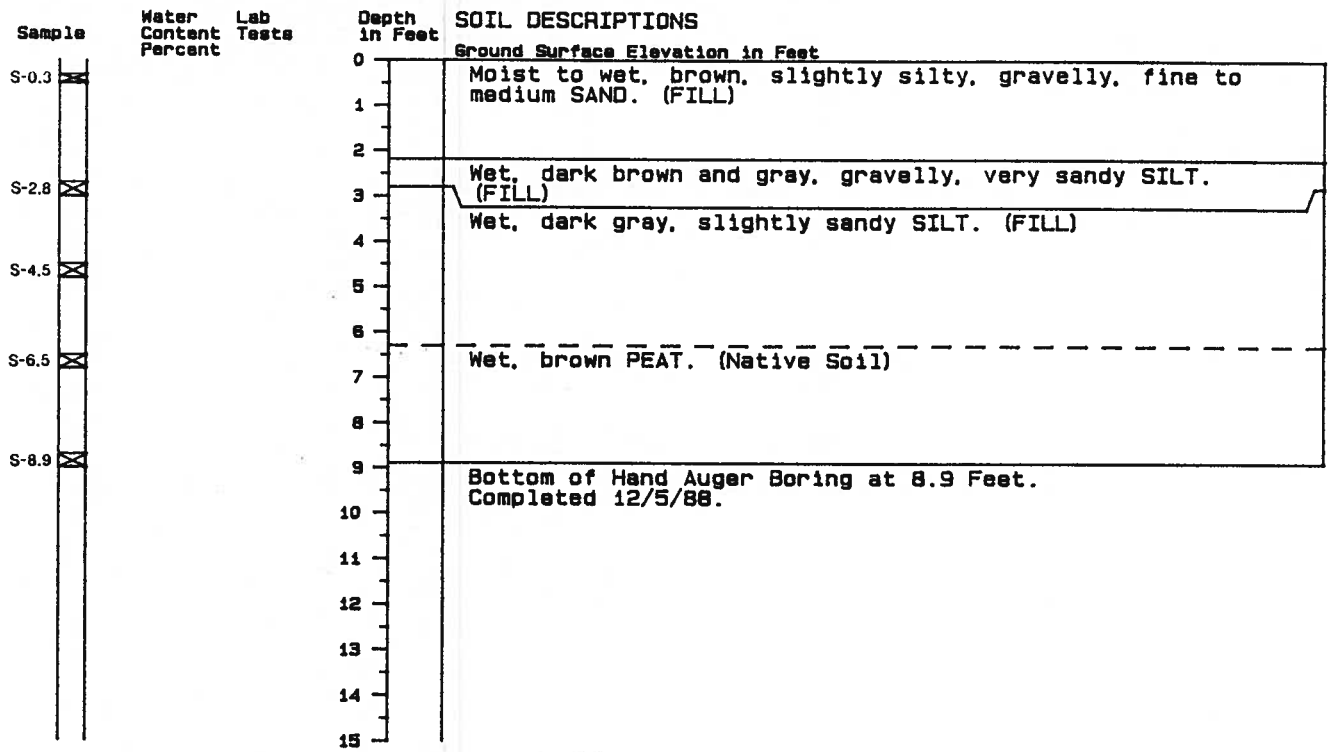


Hand Auger Boring Log B-5



1. Refer to Figure B-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water conditions, if indicated, are at time of excavation. Conditions may vary with time.

Hand Auger Boring Log B-7



1. Refer to Figure B-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water conditions, if indicated, are at time of excavation. Conditions may vary with time.

J-2228 December 1988
HART-CROWSER & associates, inc.
Figure B-3

Boring Log B-9

SOIL DESCRIPTIONS

Ground Surface Elevation in Feet

Stiff, damp to moist, brown and gray slightly sandy SILT with scattered fine organics. (FILL)

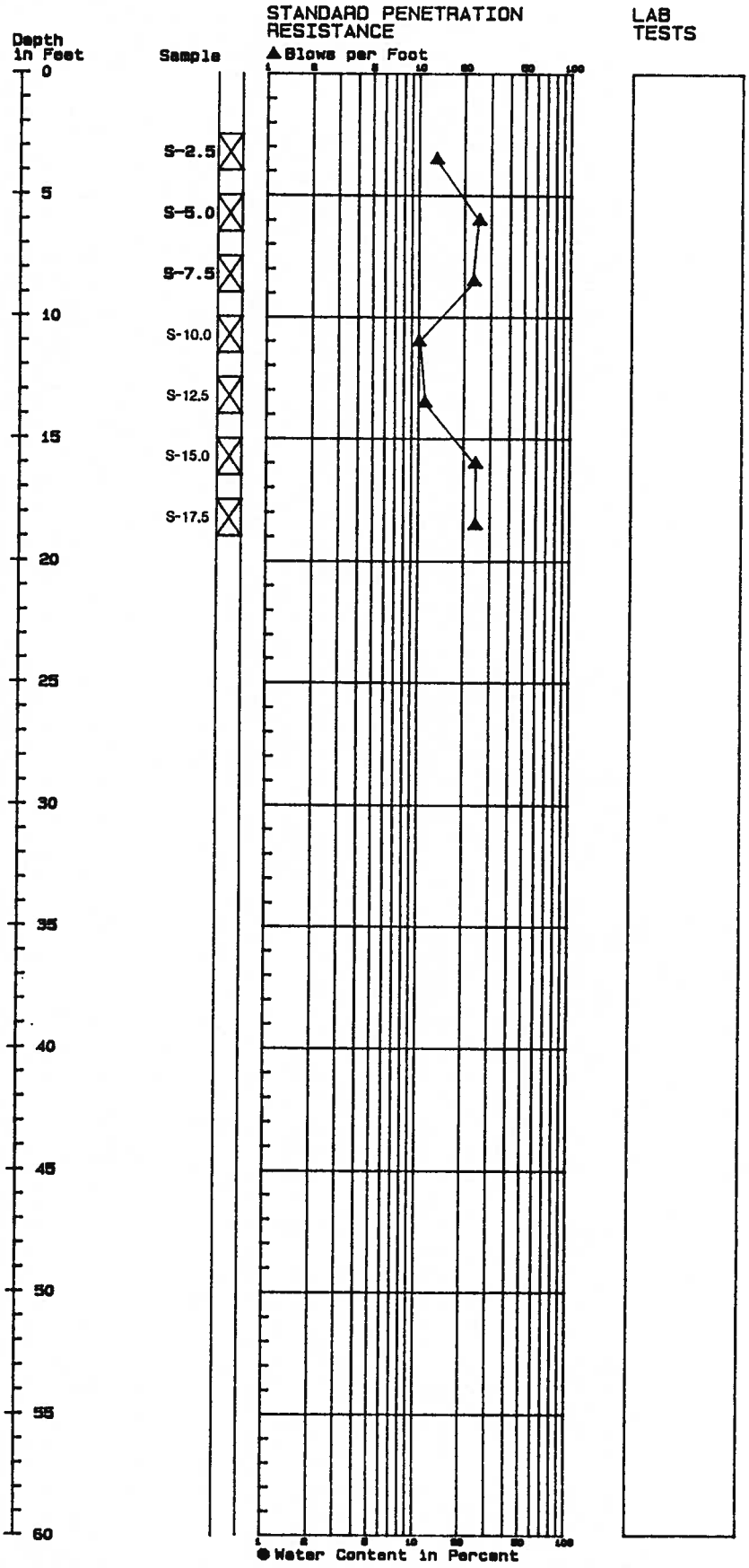
- Grades to very stiff.
- Orange sand stringers.

Loose to medium dense, wet, brown, slightly sandy SILT with some black mottling and pieces of wood. (Possibly FILL)

Medium dense, moist, gray, slightly gravelly to gravelly, silty, fine to medium SAND. (Native Soil?)

- Large gravels/cobbles.

Bottom of Boring at 19.0 Feet.
Completed 11/30/88.



1. Refer to Figure B-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

J-2228 November 1988

HART-CROWSER & associates, inc.

Figure B-4

Boring Log B-10

SOIL DESCRIPTIONS

Ground Surface Elevation in Feet

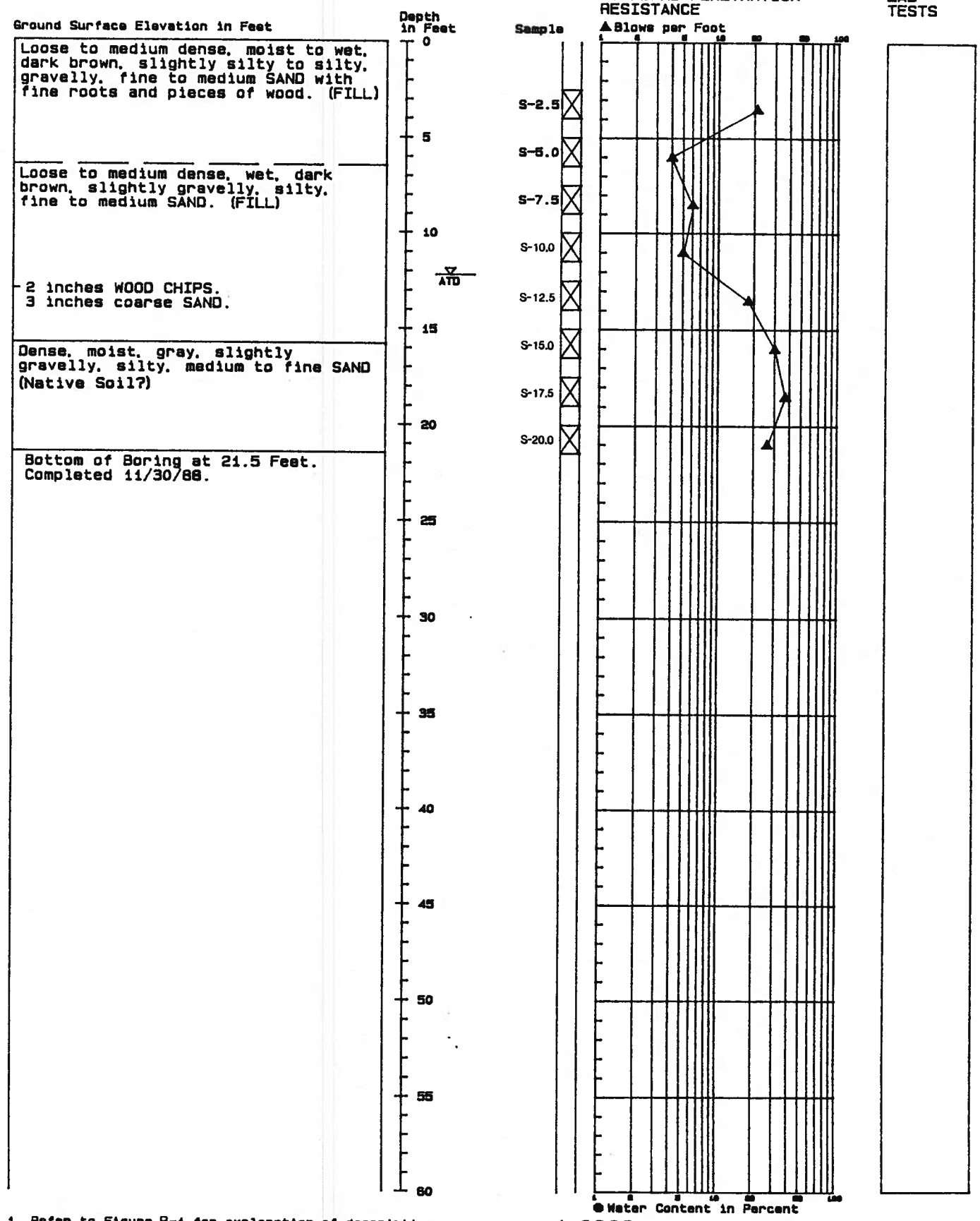
Loose to medium dense, moist to wet, dark brown, slightly silty to silty, gravelly, fine to medium SAND with fine roots and pieces of wood. (FILL)

Loose to medium dense, wet, dark brown, slightly gravelly, silty, fine to medium SAND. (FILL)

2 inches WOOD CHIPS.
3 inches coarse SAND.

Dense, moist, gray, slightly gravelly, silty, medium to fine SAND (Native Soil?)

Bottom of Boring at 21.5 Feet.
Completed 11/30/88.



1. Refer to Figure B-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

J-2228 November 1988

HART-CROWSER & associates, inc.

Figure B-5

Boring Log B-12

SOIL DESCRIPTIONS

Ground Surface Elevation in Feet

Loose to medium dense, moist to wet, dark brown, gravelly, silty, medium to fine SAND with fine roots.

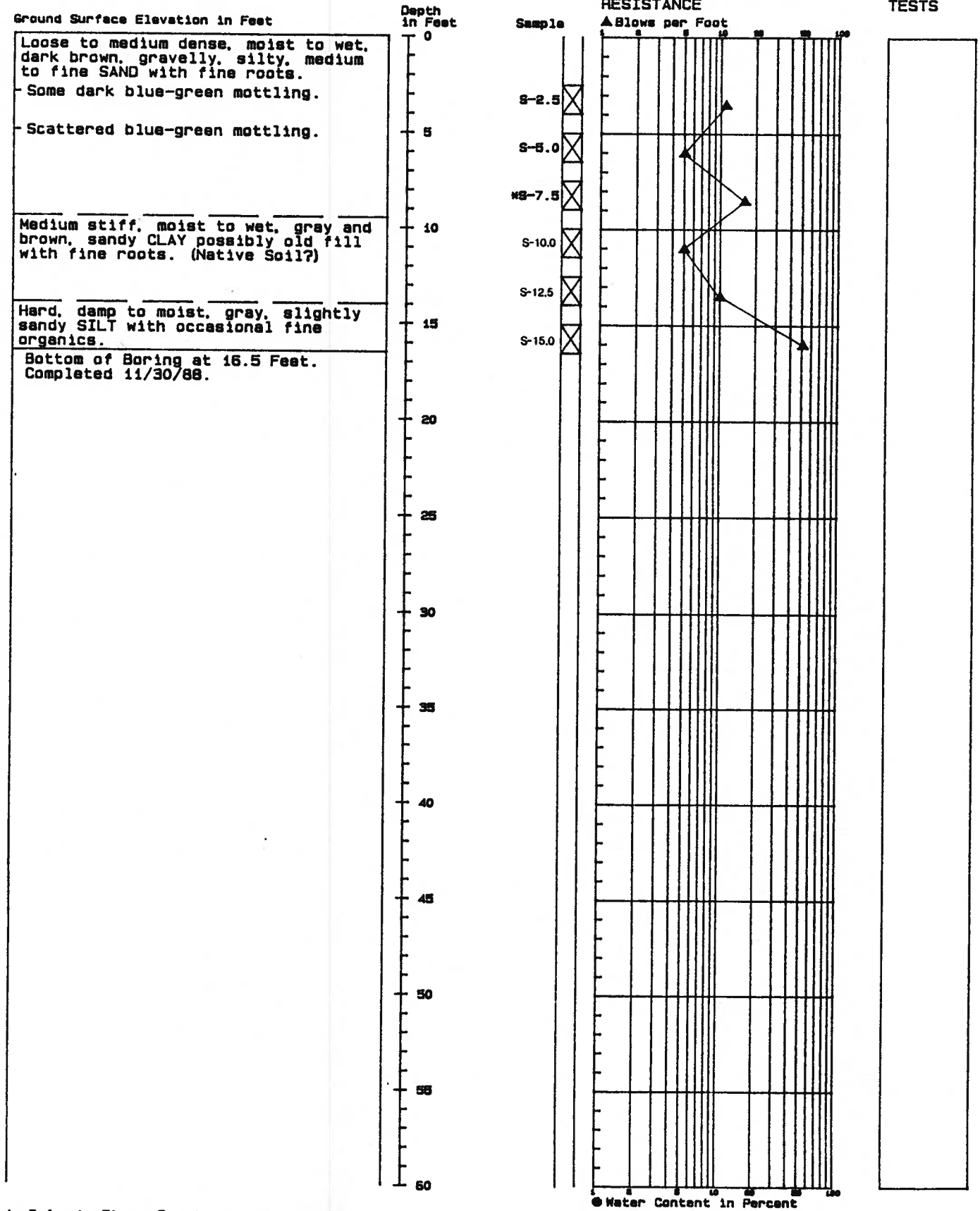
- Some dark blue-green mottling.

- Scattered blue-green mottling.

Medium stiff, moist to wet, gray and brown, sandy CLAY possibly old fill with fine roots. (Native Soil?)

Hard, damp to moist, gray, slightly sandy SILT with occasional fine organics.

Bottom of Boring at 16.5 Feet. Completed 11/30/88.



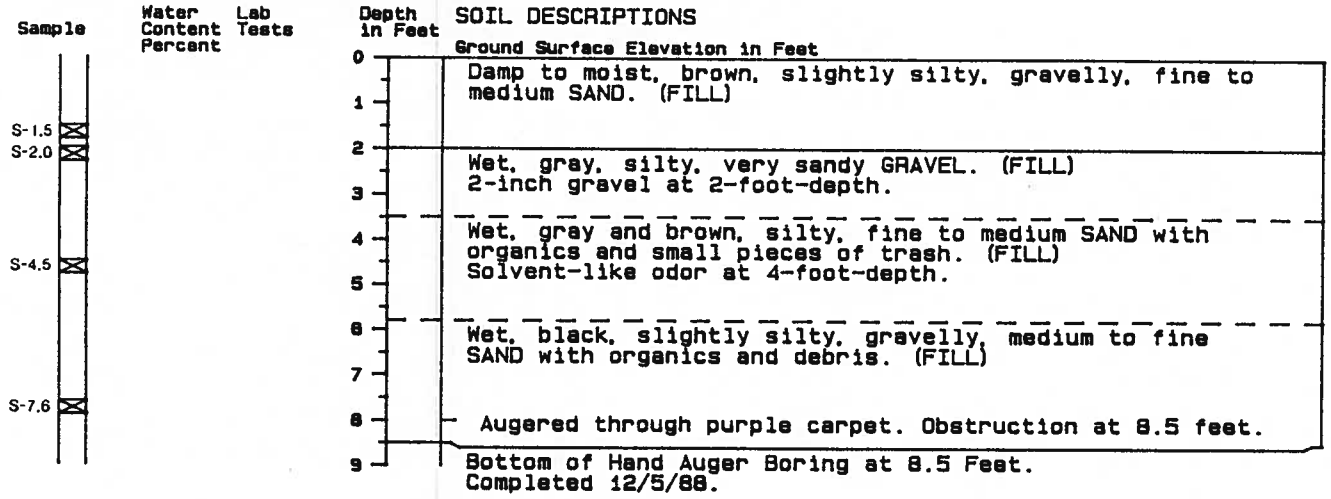
1. Refer to Figure B-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

J-2228 November 1 1988

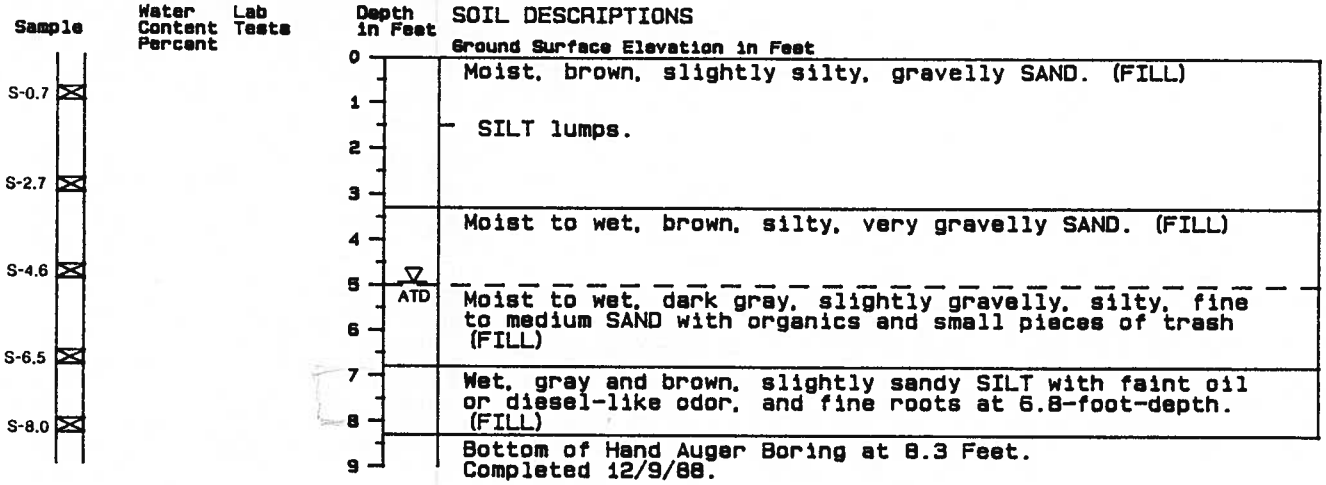
HART-CROWSER & associates, inc.

Figure B-6

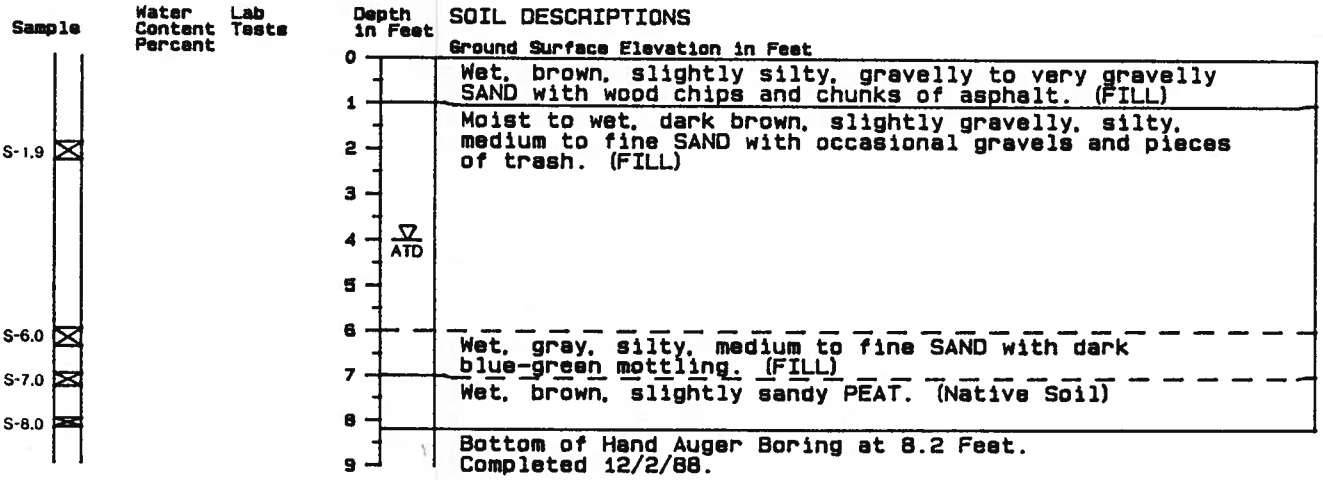
Hand Auger Boring Log C-3



Hand Auger Boring Log C-3A



Hand Auger Boring Log C-5

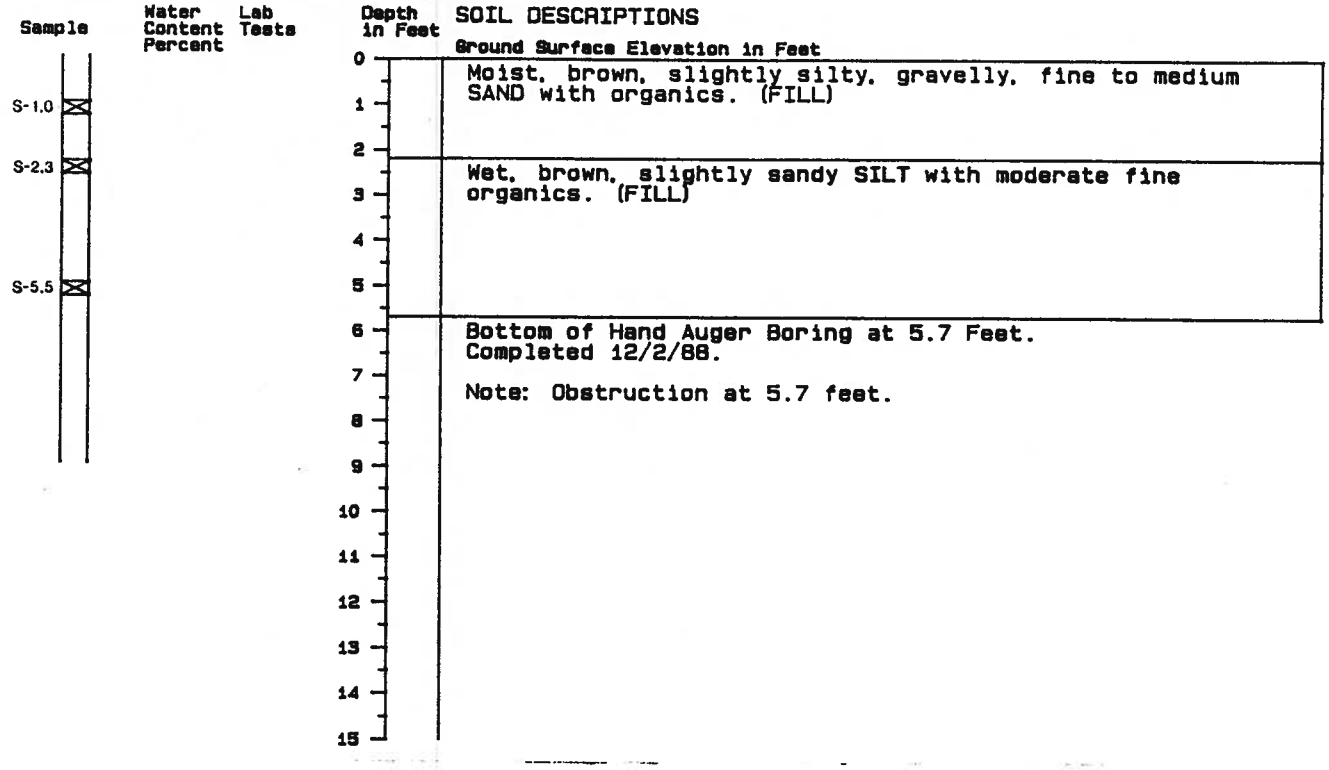


Note: Unable to continue due to sands collapsing above and below water table.

1. Refer to Figure B-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water conditions, if indicated, are at time of excavation. Conditions may vary with time.

J-2228 December 1988
HART-CROWSER & associates, inc.
Figure B-7

Hand Auger Boring Log D-6



1. Refer to Figure B-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water conditions, if indicated, are at time of excavation. Conditions may vary with time.

J-2228 December 1988
HART-CROWSER & associates, inc.
Figure B-8

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Earth and Environmental Technologies

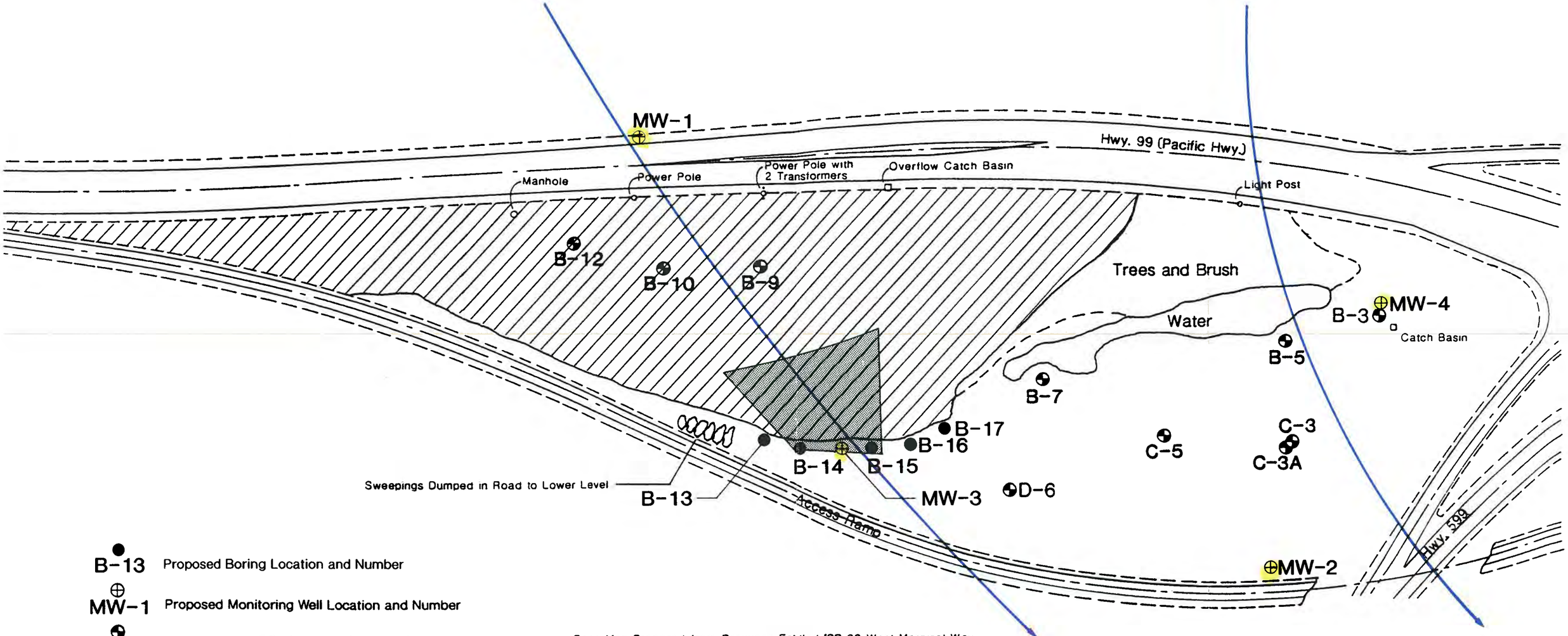
Work Plan Monitoring Well Installation and Groundwater Sampling Duwamish Fill Site Tukwila, Washington

Prepared for WSDOT

January 16, 1991
J-2228

DRAFT

Proposed Exploration Plan



B-13 Proposed Boring Location and Number

MW-1 Proposed Monitoring Well Location and Number

B-5 Existing Phase I Boring Location and Number

Approximate Location of Upper Area

Reported Drum Disposal Area

Approximate Direction of Groundwater Flows

Base Map Prepared from Drawings Entitled "SR 99 West Marginal Way to Burns Street, King County, Washington, Sheets 27 and 28", by Washington State Highway Commission, Dated April 13, 1964. Field Revised December, 1988

N

0 100 200

Scale in Feet

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J-2228 1/91

Figure 2

HARTCROWSER

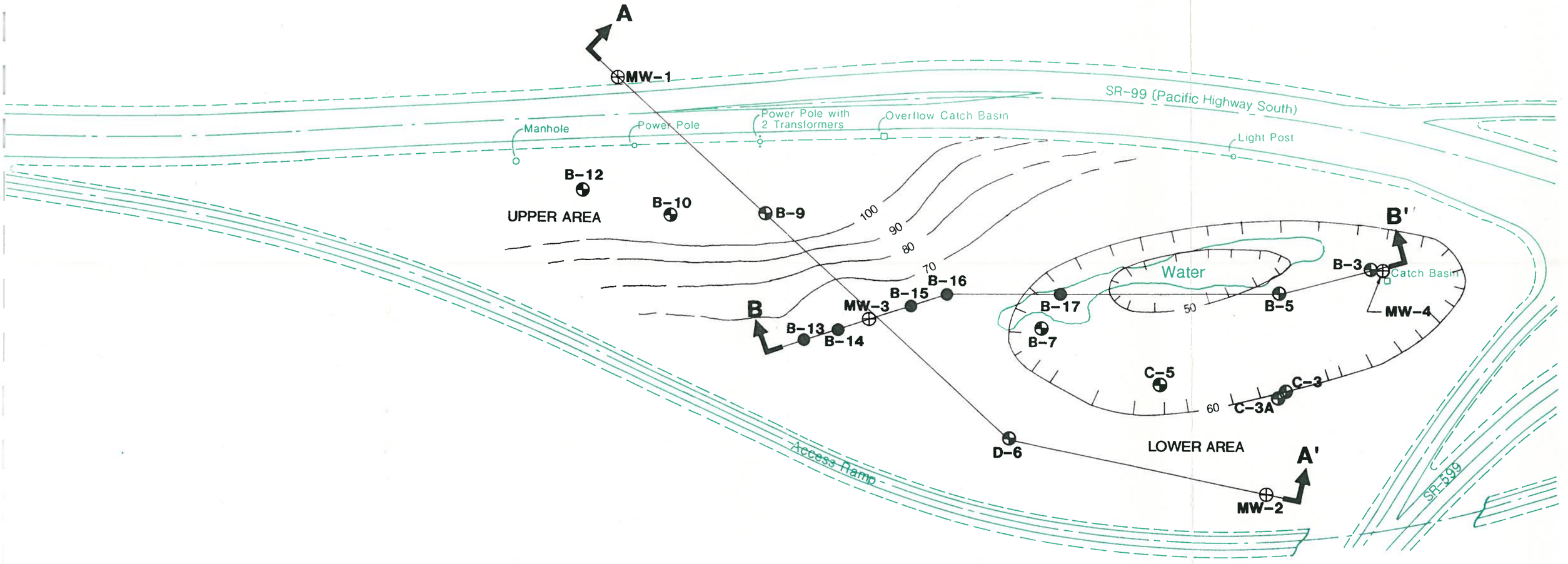
Earth and Environmental Technologies

Environmental Assessment of Soil and Groundwater Quality Duwamish Fill Site Tukwila, Washington

Prepared for Washington State Department of Transportation

August 26, 1991
J-3351

Site and Exploration Plan



- ● **B-13** Boring Location and Number
- ⊕ **MW-1** Monitoring Well Location and Number
- ◒ **B-5** Existing Phase I Boring Location and Number (Hart Crowser, 1989)
- — 90 — Relative Ground Surface Elevation Contour in Feet
- A A' Geologic Cross Section Location and Designation

Base map prepared from drawings entitled "SR 99 West Marginal Way to Burns Street, King County, Washington, Sheets 27 and 28", by Washington State Highway Commission, dated April 13, 1964. Field revised December, 1988.

N

0 100 200

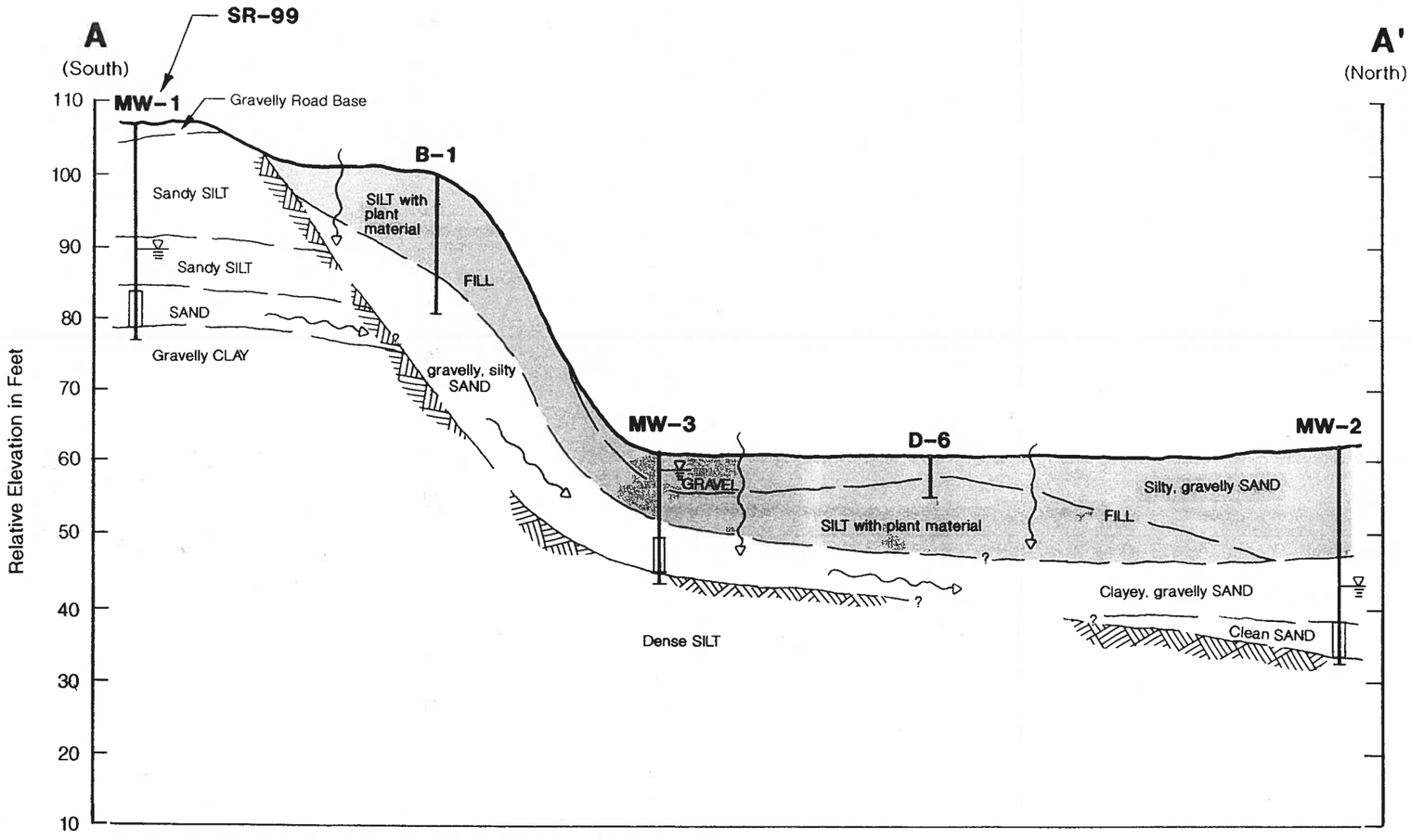
Scale in Feet

HARTCROWSER

J-3351 7/91

Figure 2

Generalized Geologic Cross Section A – A'



Note: Contacts between soil units are based upon interpolation between borings and represent our interpretation of subsurface conditions based on currently available data.

B–13 Soil Boring Number
Boring Location

MW–3 Well Number
Well Location

Water Level (July 1, 1991)

Screened Interval

Inferred Contact between Glacial and Modern Soils

Conceptual Groundwater Flow Paths

Fill Material

Horizontal Scale in Feet
0 100 200
0 20 40
Vertical Scale in Feet
Vertical Exaggeration x 5

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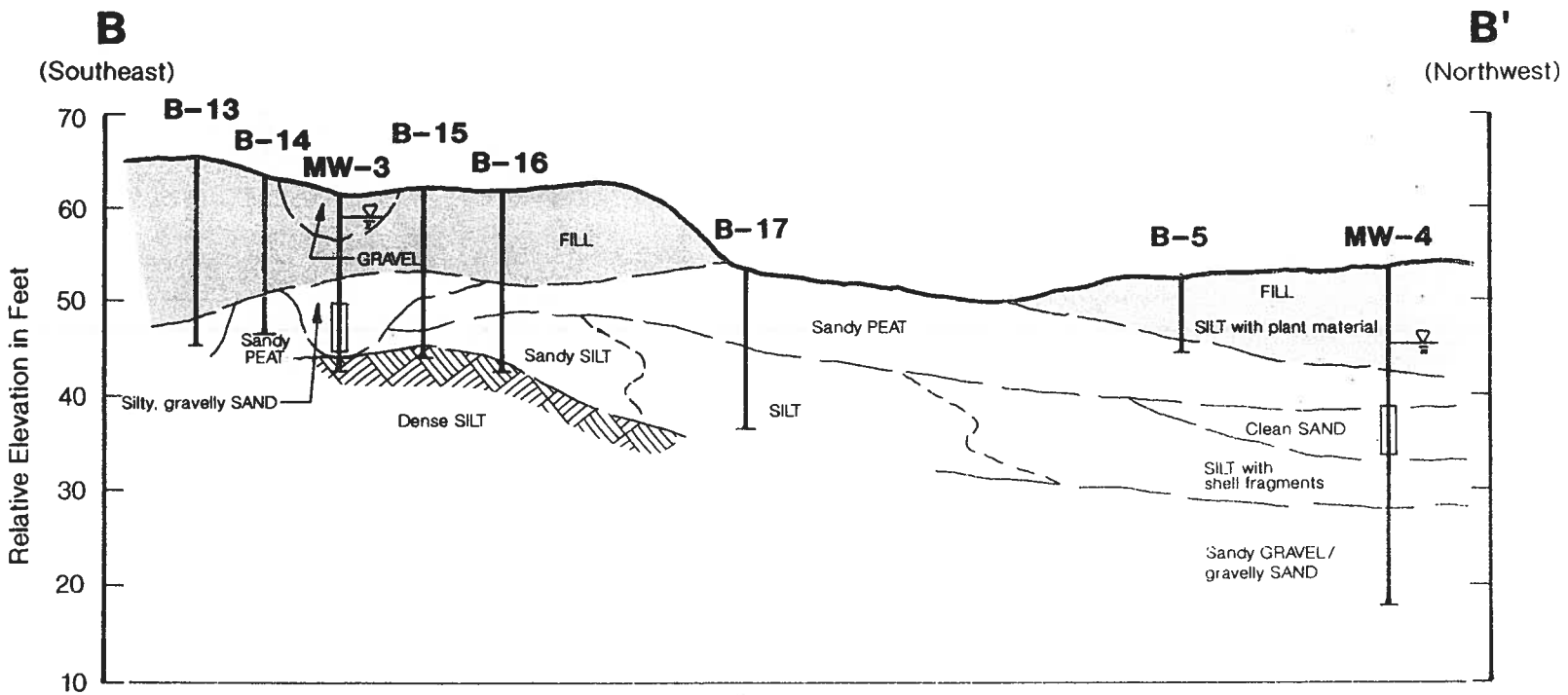
J–3351 7/91
Figure 3

Generalized Geologic Cross Section B – B'



Note: Contacts between soil units are based upon interpolation between borings and represent our interpretation of subsurface conditions based on currently available data.

B-13 Soil Boring Number

Boring Location

Fill Material

MW-3 Well Number

Well Location

Water Level (July 1, 1991)

Screened Interval

Inferred Contact between Glacial and Modern Soils

Horizontal Scale in Feet

0 100 200

0 20 40

Vertical Scale in Feet

Vertical Exaggeration x 5

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Figure 4

Key to Exploration Logs

Sample Description

Classification of soils in this report is based on visual field and laboratory observations which include density/consistency, moisture condition, grain size, and plasticity estimates and should not be construed to imply field nor laboratory testing unless presented herein. Visual–manual classification methods of ASTM D 2488 were used as an identification guide.

Soil descriptions consist of the following:
Density/consistency, moisture, color, minor constituents, MAJOR CONSTITUENT, additional remarks.

Density/Consistency

Soil density/consistency in borings is related primarily to the Standard Penetration Resistance.
Soil density/consistency in test pits is estimated based on visual observation and is presented parenthetically on the test pit logs.

SAND or GRAVEL Density	Standard Penetration Resistance (N) in Blows/Foot	SILT or CLAY Consistency	Standard Penetration Resistance (N) in Blows/Foot	Approximate Shear Strength in TSF
Very loose	0 – 4	Very soft	0 – 2	<0.125
Loose	4 – 10	Soft	2 – 4	0.125 – 0.25
Medium dense	10 – 30	Medium stiff	4 – 8	0.25 – 0.5
Dense	30 – 50	Stiff	8 – 15	0.5 – 1.0
Very dense	>50	Very stiff	15 – 30	1.0 – 2.0
		Hard	>30	>2.0

Moisture

Dry	Little perceptable moisture
Damp	Some perceptable moisture, probably below optimum
Moist	Probably near optimum moisture content
Wet	Much perceptable moisture, probably above optimum

Minor Constituents

	Estimated Percentage
Not identified in description	0 – 5
Slightly (clayey, silty, etc.)	5 – 12
Clayey, silty, sandy, gravelly	12 – 30
Very (clayey, silty, etc.)	30 – 50

Legends

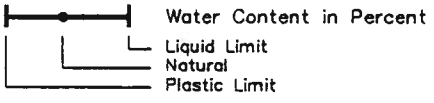
Sampling Test Symbols

BORING SAMPLES

☒	Split Spoon
⧅	Shelby Tube
▥	Cuttings
*	No Sample Recovery
⊛	Chemical Analysis
P	Tube Pushed, Not Driven

Test Symbols

GS	Grain Size Classification
CN	Consolidation
TUU	Triaxial Unconsolidated Undrained
TCU	Triaxial Consolidated Undrained
TCD	Triaxial Consolidated Drained
QU	QU
DS	Direct Shear
K	Permeability
PP	Pocket Penetrometer Approximate Compressive Strength in TSF
TV	Torvane Approximate Shear Strength in TSF
CBR	California Bearing Ratio
MD	Moisture Density Relationship
AL	Atterberg Limits



Groundwater Observations

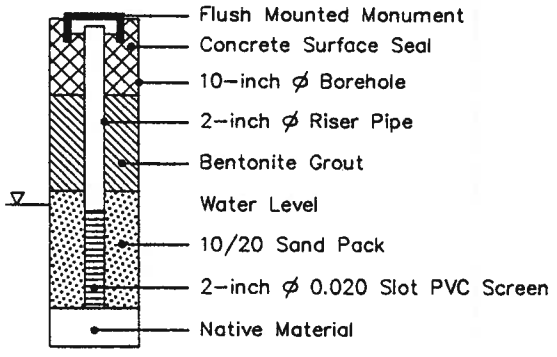


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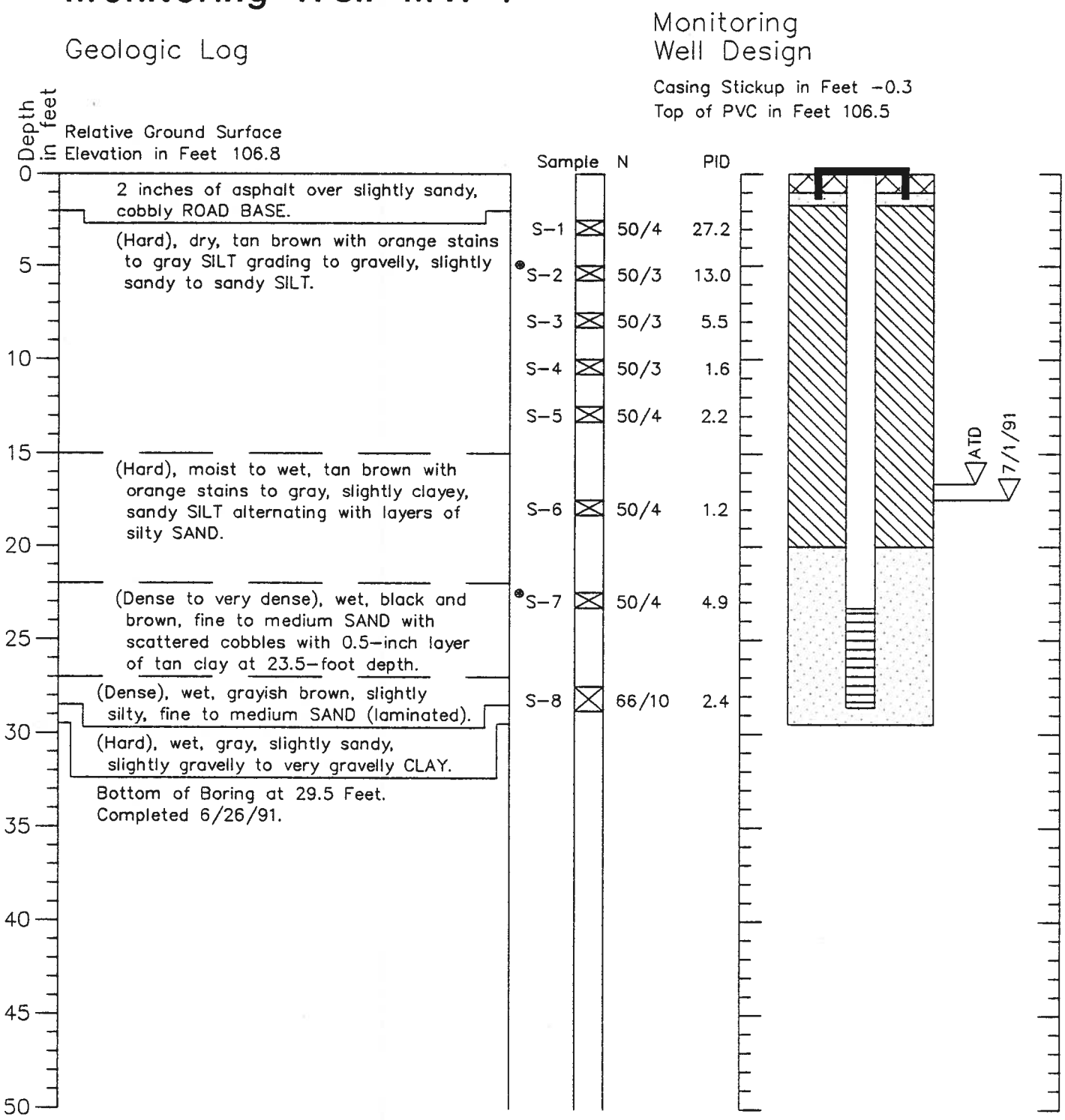
Figure A-1

Boring Log and Construction Data for Monitoring Well MW-1



1. Refer to Figure A−1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

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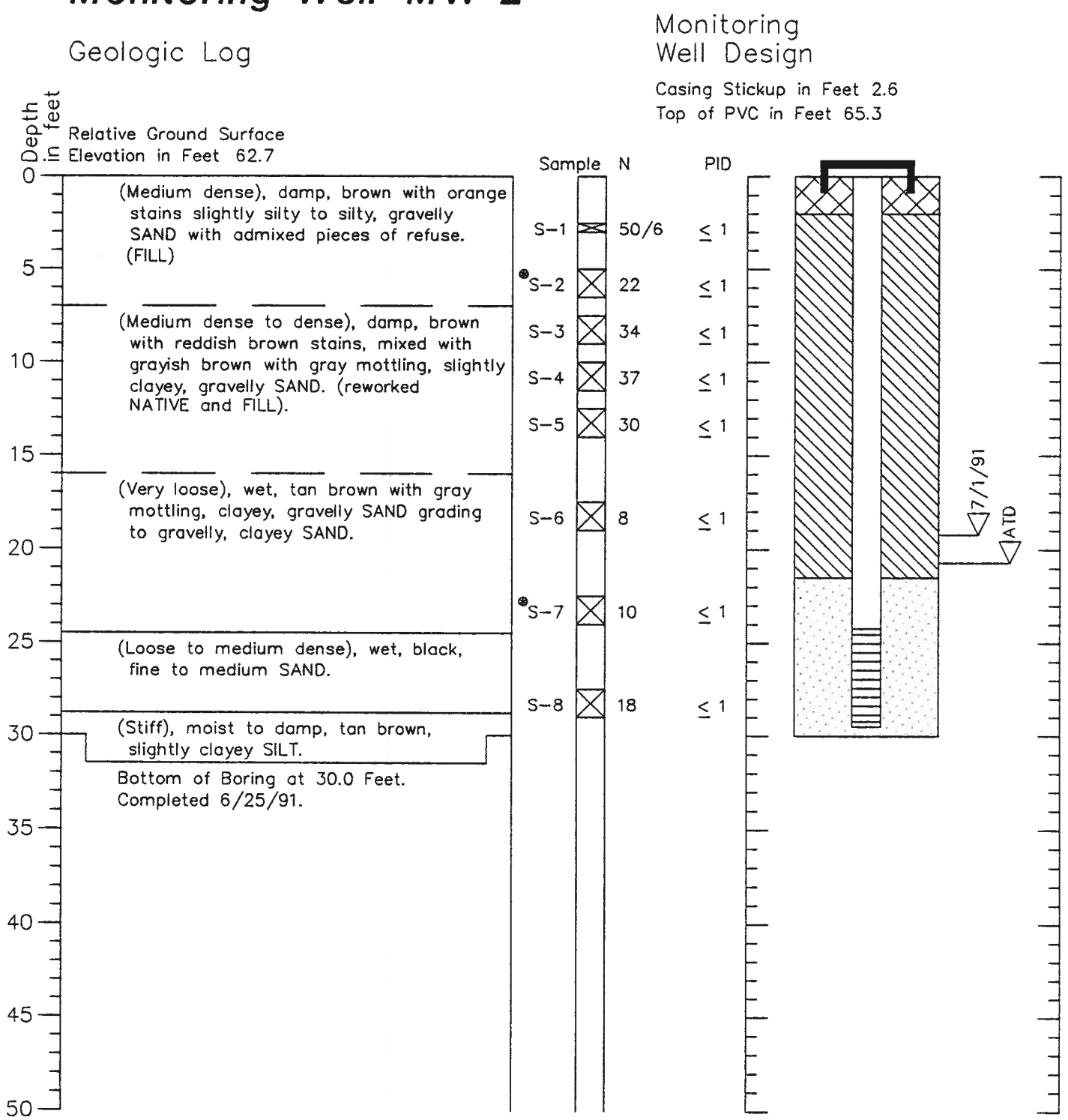
Figure A-2

Boring Log and Construction Data for Monitoring Well MW-2



1. Refer to Figure A–1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

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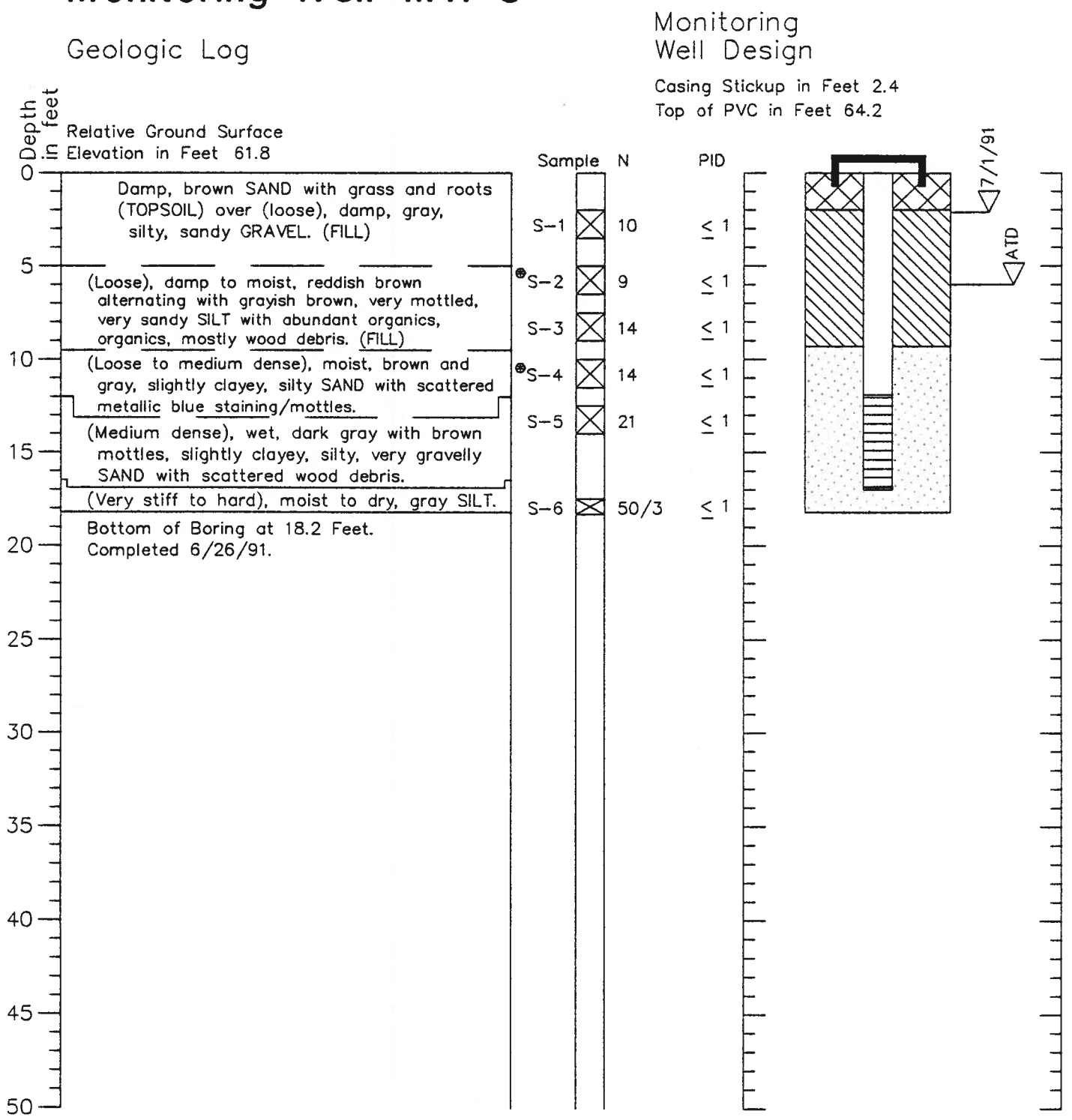
Figure A-3

Boring Log and Construction Data for Monitoring Well MW-3



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

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Figure A-4

Boring Log and Construction Data for Monitoring Well MW-4

Geologic Log

Relative Ground Surface Elevation in Feet 54.0

Depth in feet

0 — SOD over (soft), damp to moist, brown, slightly sandy SILT very organic-rich with large wood fragments and fines. (FILL)

5 — (Soft), damp to moist, brown, clayey SILT with grass mixed with (loose), damp to wet, gray, medium SAND with scattered gravel. (FILL)

10 — (Soft), damp, brown PEAT with gray, slightly silty SAND laminations increasing with depth.

15 — (Medium dense), wet, black, fine to medium SAND.

20 — (Very soft), wet, grayish black, slightly sandy, clayey SILT with abundant shell fragments.

25 — Wet, sandy GRAVEL to gravelly SAND.

30

35 — Bottom of Boring at 35.0 Feet. Completed 6/24/91.

40

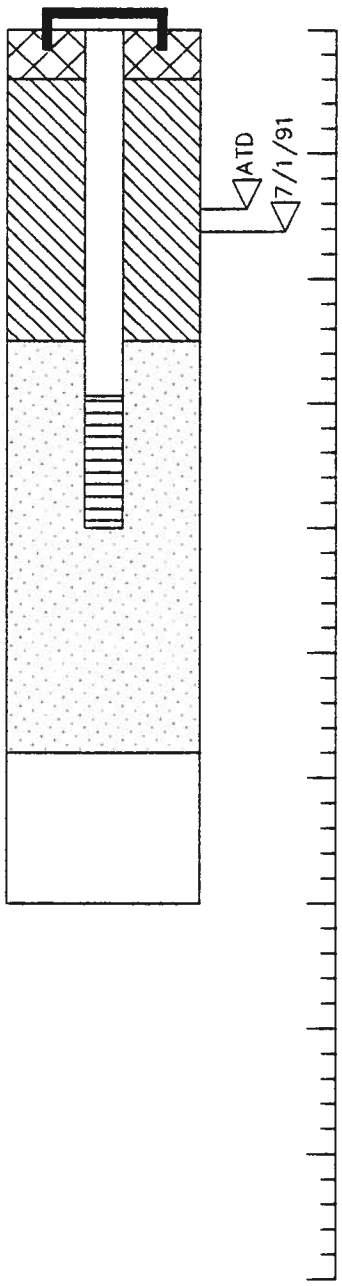
45

50

Sample	N	PID
S-1	20	≤ 1
⊛S-2	11	≤ 1
S-3	11	≤ 1
S-4	15	≤ 1
⊛S-5	25	≤ 1
S-6	25	≤ 1
S-7	4	≤ 1
S-8	100/6	≤ 1

Monitoring Well Design

Casing Stickup in Feet 2.1
Top of PVC in Feet 56.1



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

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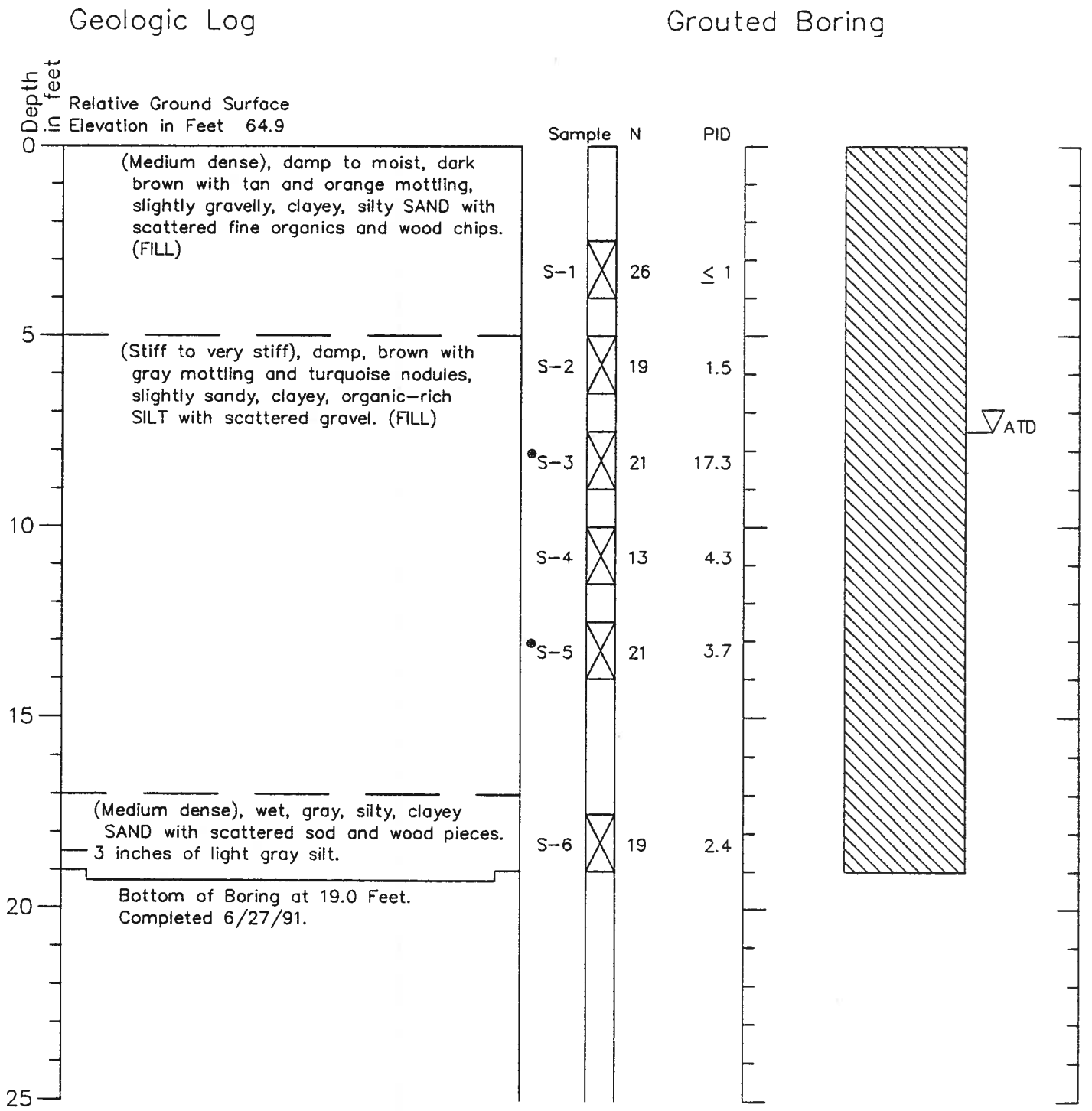
Figure A-5

Boring Log B-13



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

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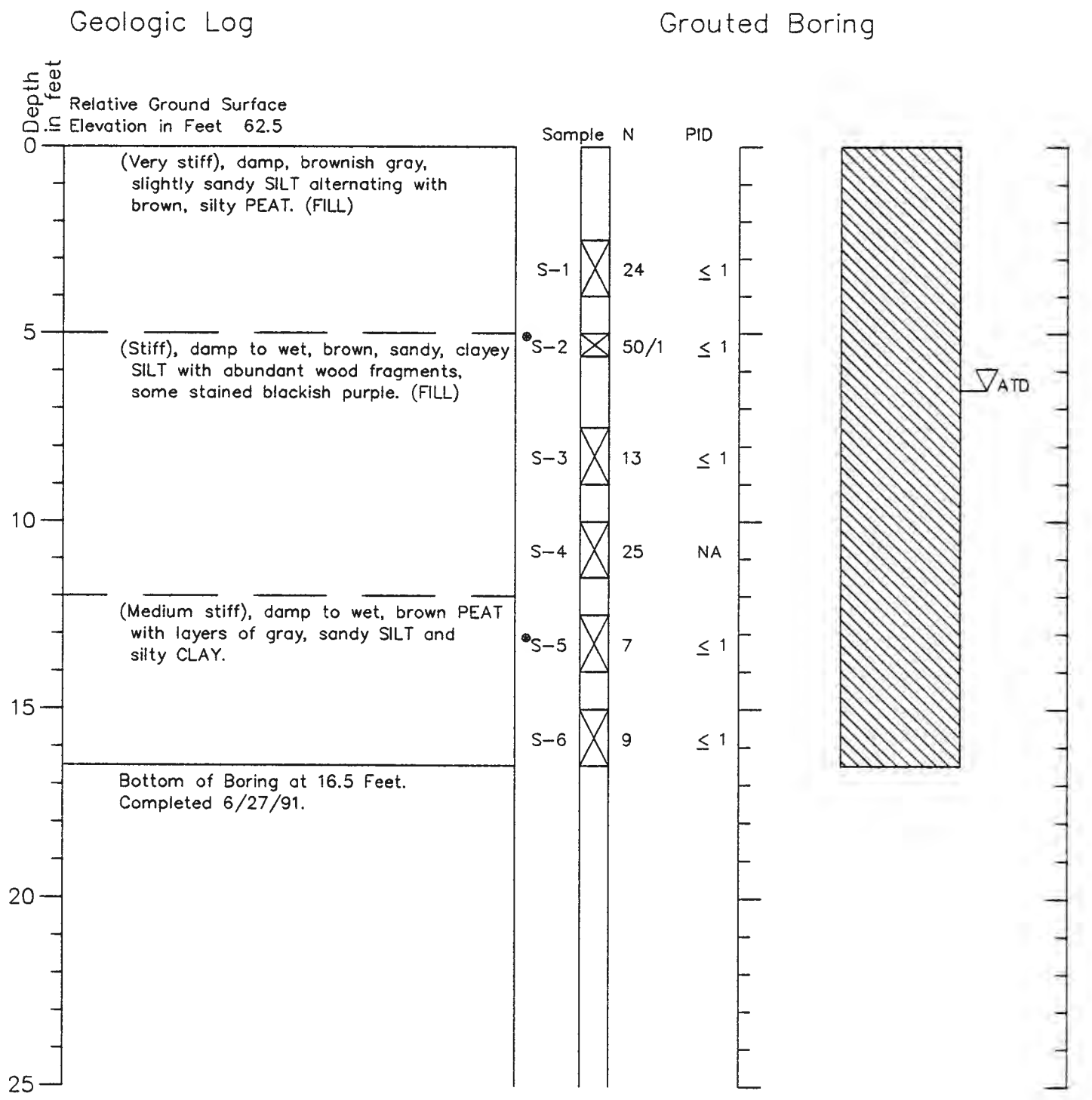
Figure A-6

Boring Log B-14



1. Refer to Figure A–1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

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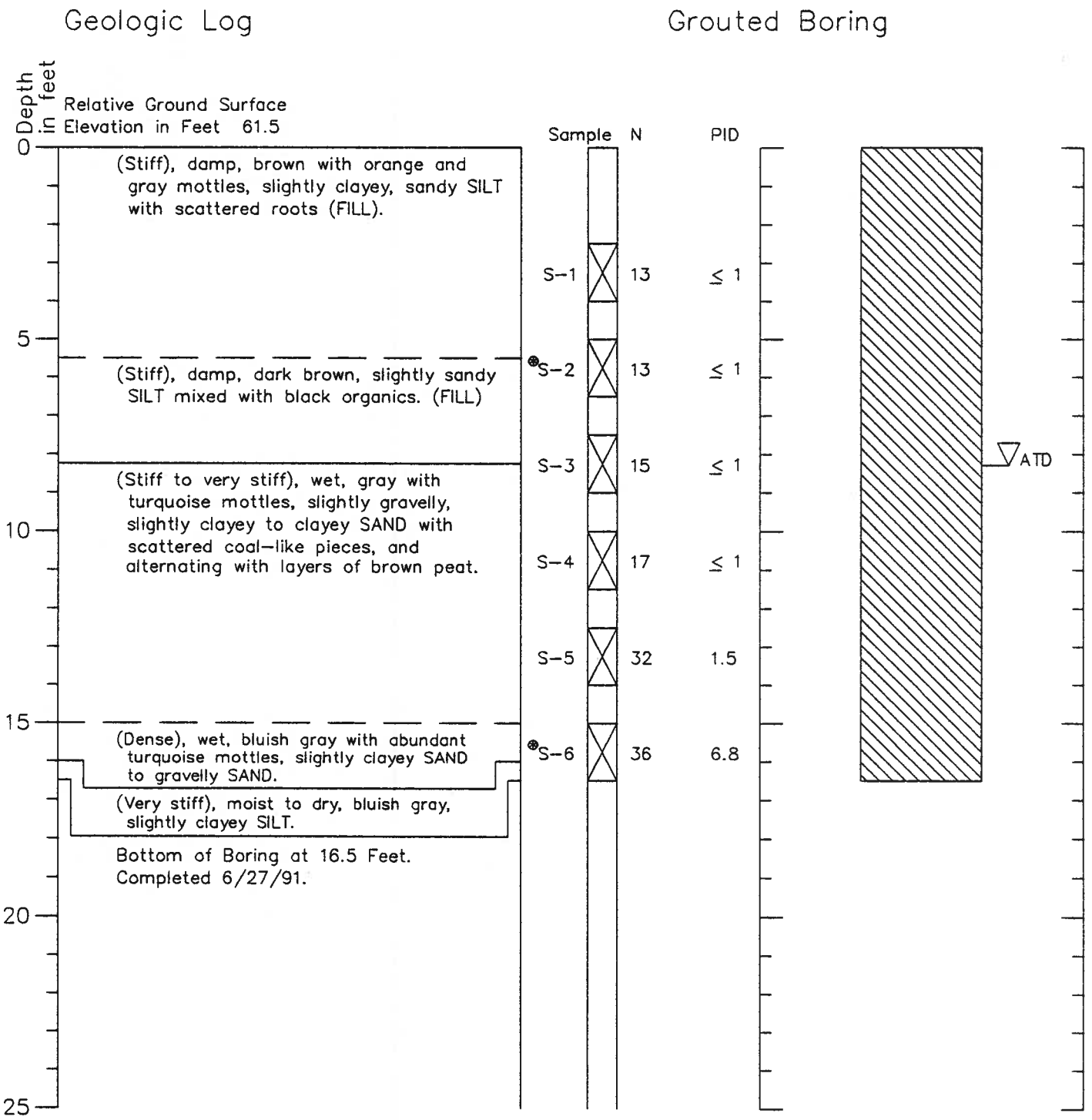
Figure A-7

Boring Log B-15



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

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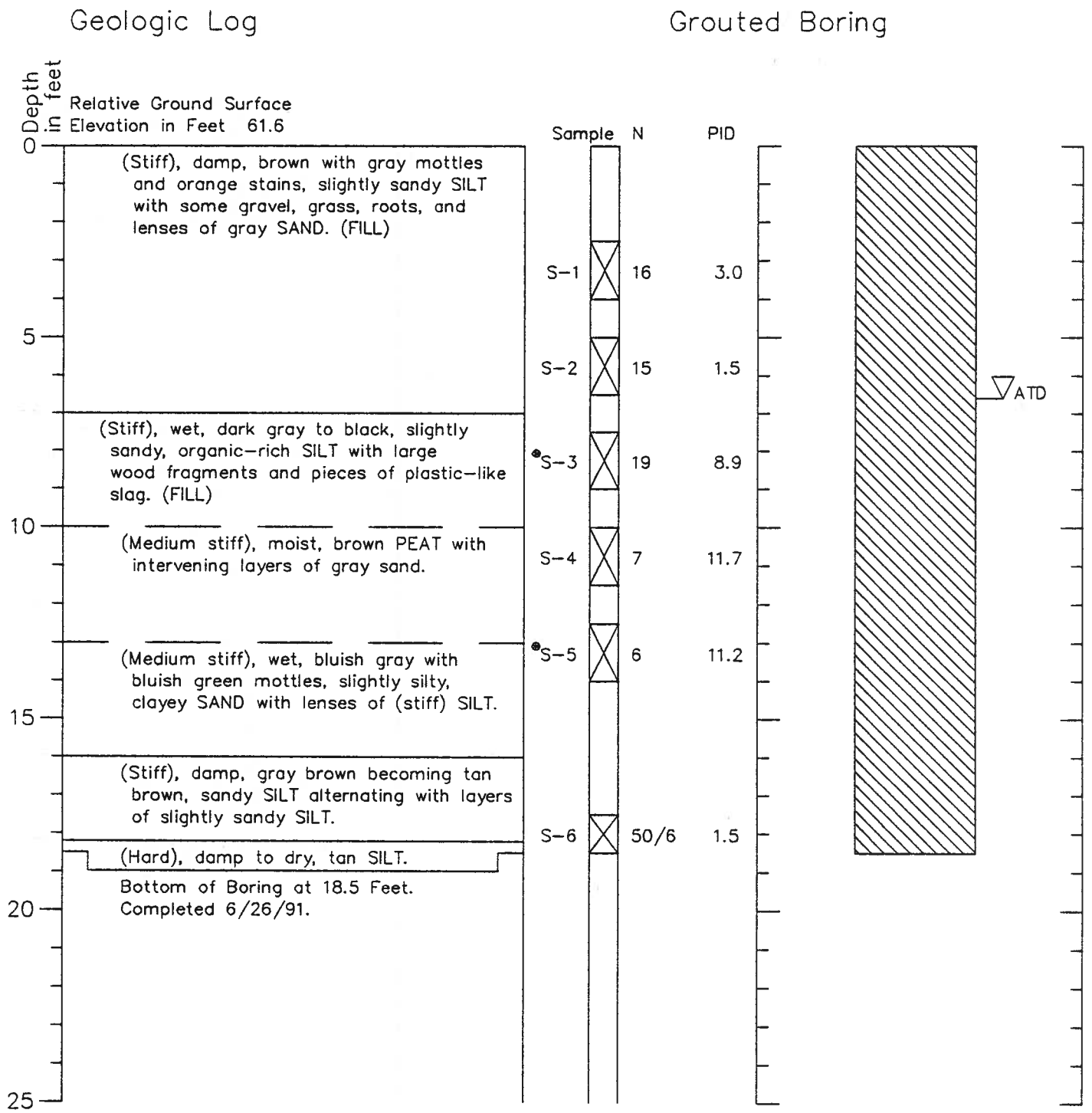
Figure A-8

Boring Log B-16



1. Refer to Figure A-1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

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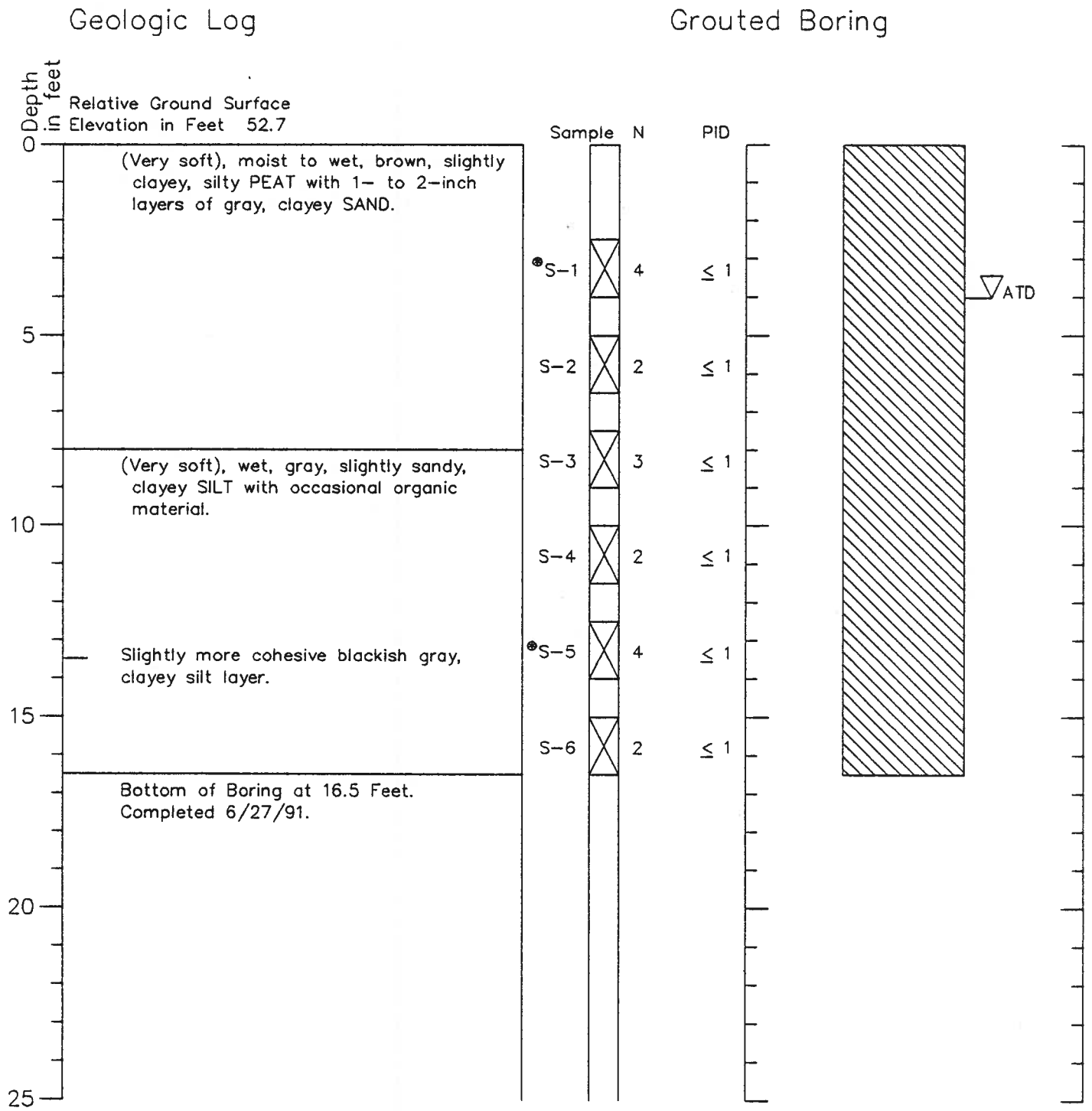
Figure A-9

Boring Log B-17



1. Refer to Figure A–1 for explanation of descriptions and symbols.
2. Soil descriptions and stratum lines are interpretive and actual changes may be gradual.
3. Ground water level, if indicated, is at time of drilling (ATD) or for date specified. Level may vary with time.

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Figure A-10

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Earth and Environmental Technologies

Hart Crowser, Inc.
1910 Fairview Avenue East
Seattle, Washington 98102
FAX 206.328.5581
206.324.9530

J-3351

March 27, 1992

Mr. Tom Lentz
Washington State Department of Transportation
15325 S.E. 30th Place
Bellevue, Washington 98007-6597

Re: Results of Wet-Season Groundwater Sampling
Duwamish Fill Site, Tukwila, Washington

Dear Mr. Lentz:

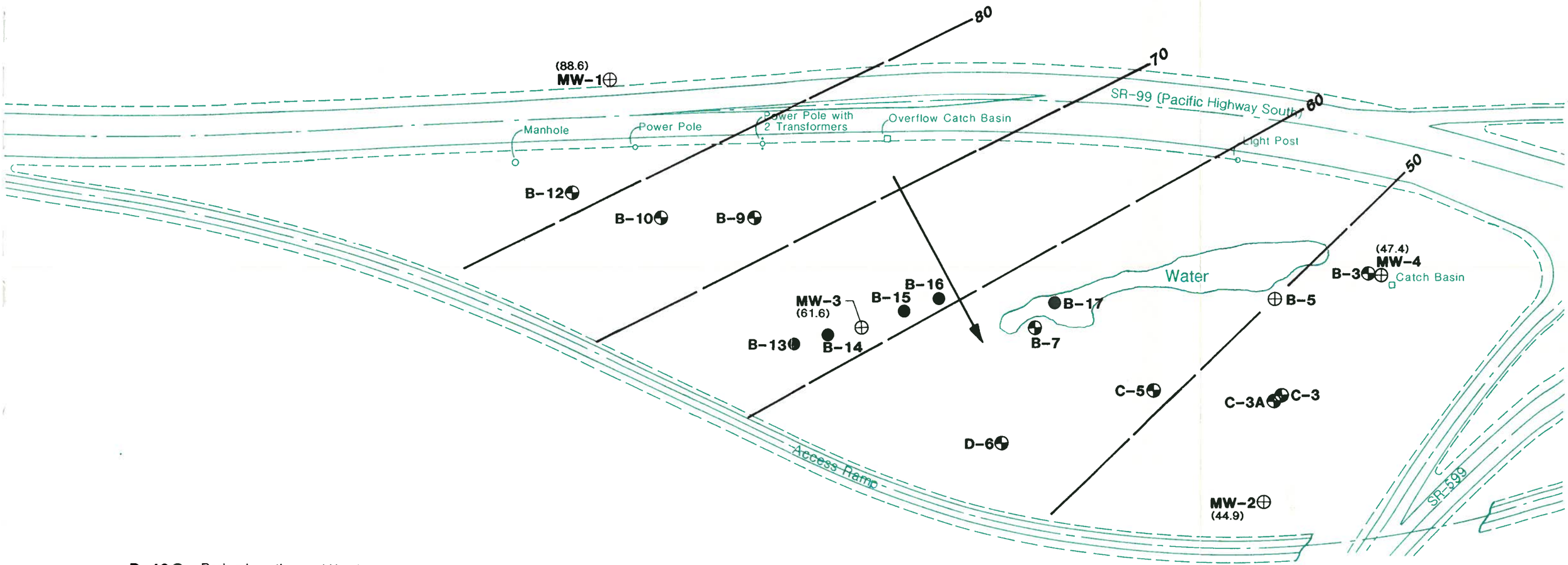
This letter report presents the results of our wet-season groundwater sampling at the Duwamish Fill site in Tukwila, Washington, near the intersection of SR-99 and SR-599. Groundwater samples were collected on February 13, 1992, from four monitoring wells installed at the site during the summer of 1991. The objective of the sampling program was to evaluate seasonal changes in water quality that may be related to higher groundwater discharges in the late winter months.

The results of the dry-season groundwater sampling event in July 1991, are presented in our previous report, "Environmental Assessment of Soil and Groundwater Quality, Duwamish Fill Site," dated August 26, 1991. Our field procedures are also described in that document.

SUMMARY OF FINDINGS

Copper and zinc were the only metals detected in filtered samples; both were detected at concentrations one hundred times lower than the federal drinking water standards. Aside from laboratory contaminants, the only positive identification of a volatile organic compound was tetrachloroethene (PCE) at 5 µg/L. PCE was detected

Exploration Plan and Groundwater Elevation Contour Map



B-13 Boring Location and Number

MW-1 Monitoring Well Location and Number

(88.6) Relative Water Level Elevation in Feet (Measured 2/13/92)

B-5 Existing Phase 1 Boring Location and Number

—50— Relative Groundwater Elevation Contour in Feet

Generalized Groundwater Flow Direction

Note: Base map prepared from drawings entitled "SR 99 West Marginal Way to Burns Street, King County, Washington, Sheets 27 and 28" by Washington State Highway Commission, dated April 13, 1964. Field revised December, 1988.

N

0 100 200
Scale in Feet

HARTCROWSER
J-3351 3/92
Figure 1

DUWAMISH FILL SITE
REMEDIAL INVESTIGATION WORK PLAN

October 1990

Prepared By:

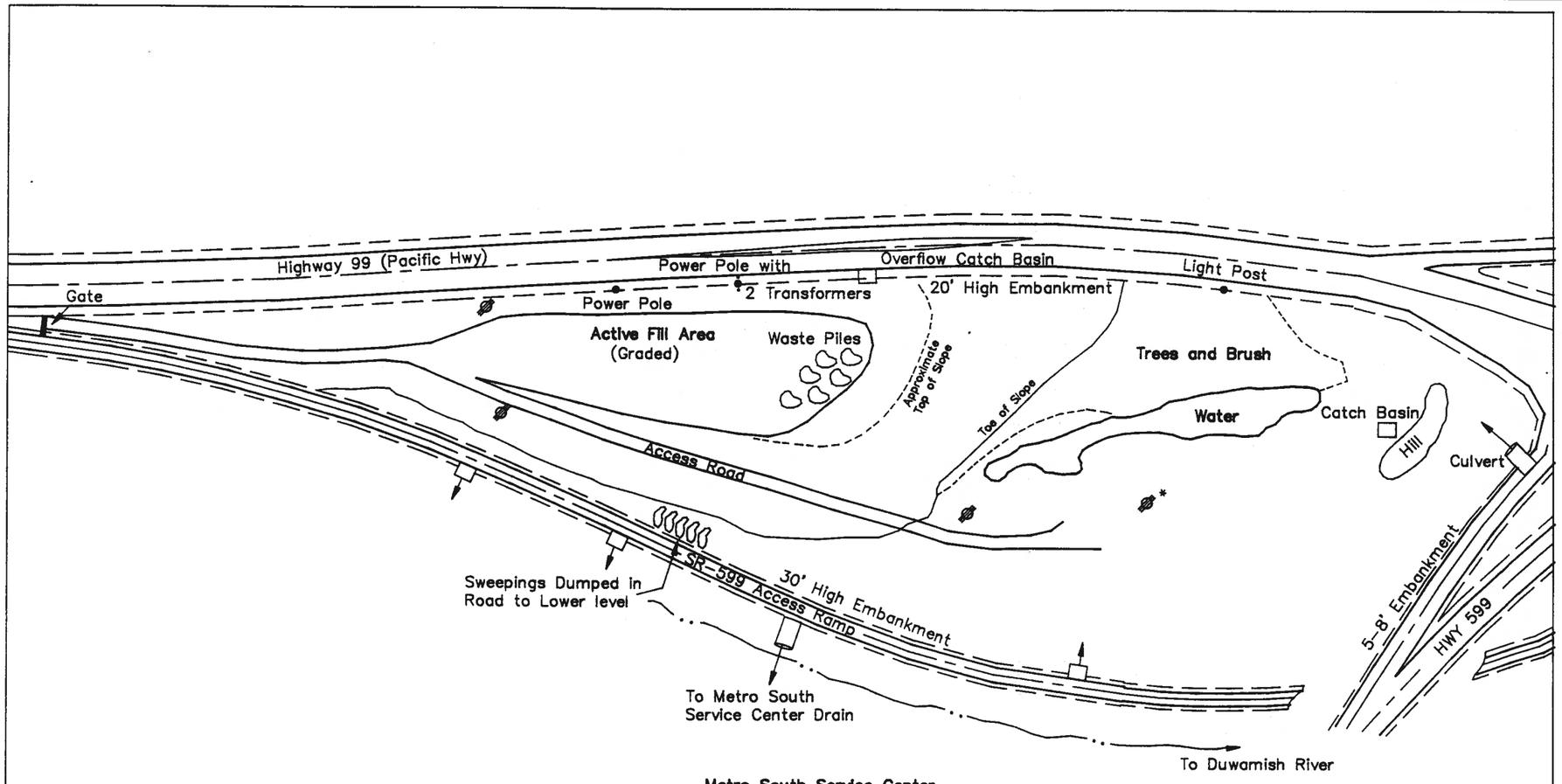
ECOLOGY AND ENVIRONMENT, INC.

Prepared For:

WASHINGTON STATE DEPARTMENT OF ECOLOGY
Toxic Cleanup Program
Northwest Regional Office
Redmond, Washington

ecology and environment, inc.
101 YESLER WAY, SEATTLE, WASHINGTON, 98104, TEL. 206/624-9537
International Specialists in the Environment

recycled paper



Metro South Service Center

LEGEND

DRAINAGE PATHWAYS
CATCH BASIN AND DRAINAGE DIRECTION
MANHOLE

NOTE: LOCATIONS OF MANHOLES, CATCH BASINS, AND CULVERTS ARE APPROXIMATE.

* DISCHARGES TO CULVERT UNDER SR-599 ACCESS RAMP

0 70 140
scale in feet

ecology & environment, inc.
international Specialists in the Environment

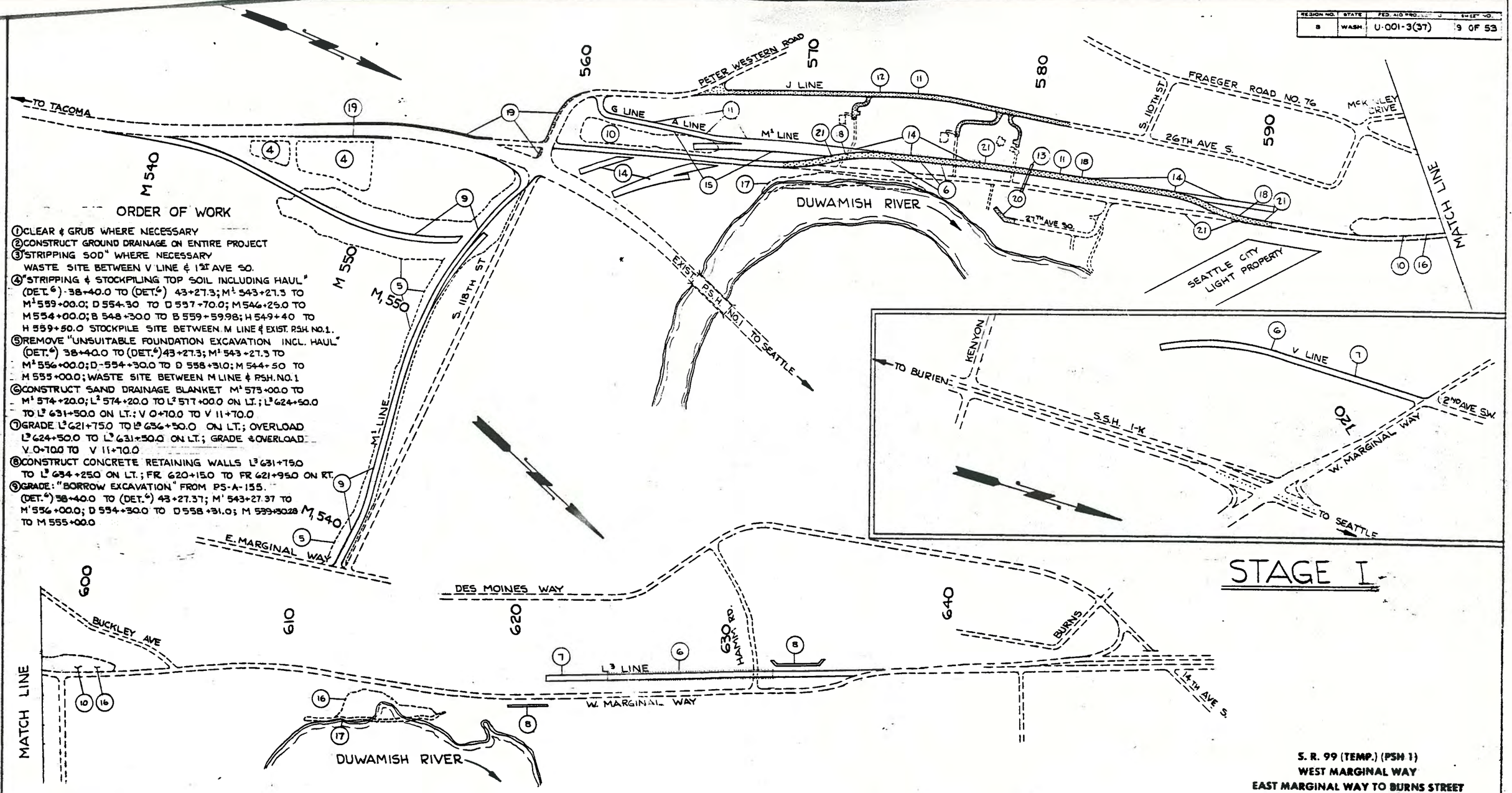
DESIGNED BY	CHECKED BY
B. SCHMOYER	L. DIEDIKER
DRAWN BY	APPROVED BY
C.S.	L. DIEDIKER

FIGURE 1-1

WDOT DUWAMISH FILL SITE

SCALE	DATE ISSUED	CAD FILE NO.	DRAWING NO.
1"=140'	9/14/90	WB9040	1

REGION NO.	STATE	FED. AID PROJ.	SHEET NO.
8	WASH.	U-001-3(37)	9 OF 53



ORDER OF WORK

① CLEAR & GRUB WHERE NECESSARY

② CONSTRUCT GROUND DRAINAGE ON ENTIRE PROJECT

③ STRIPPING SOD" WHERE NECESSARY
WASTE SITE BETWEEN V LINE & 1ST AVE SO.

④ "STRIPPING & STOCKPILING TOP SOIL INCLUDING HAUL"
(DET.⁶) 38+40.0 TO (DET.⁶) 43+27.3; M¹ 543+27.3 TO M¹ 559+00.0; D 554.30 TO D 557+70.0; M 546+25.0 TO M 554+00.0; B 548+30.0 TO B 559+59.98; H 549+40 TO H 559+50.0 STOCKPILE SITE BETWEEN M LINE & EXIST. P.S.H. NO.1.

⑤ REMOVE "UNSUITABLE FOUNDATION EXCAVATION INCL. HAUL"
(DET.⁶) 38+40.0 TO (DET.⁶) 43+27.3; M¹ 543+27.3 TO M¹ 556+00.0; D-554+30.0 TO D 558+31.0; M 544+50 TO M 555+00.0; WASTE SITE BETWEEN M LINE & P.S.H. NO. 1

⑥ CONSTRUCT SAND DRAINAGE BLANKET M¹ 573+00.0 TO M¹ 574+20.0; L² 574+20.0 TO L² 577+00.0 ON LT.; L³ 624+50.0 TO L³ 631+50.0 ON LT.; V 0+70.0 TO V 11+70.0

⑦ GRADE L³ 621+75.0 TO L³ 634+50.0 ON LT.; OVERLOAD L³ 624+50.0 TO L³ 631+50.0 ON LT.; GRADE & OVERLOAD V 0+70.0 TO V 11+70.0

⑧ CONSTRUCT CONCRETE RETAINING WALLS L³ 631+75.0 TO L³ 634+25.0 ON LT.; FR 620+15.0 TO FR 621+95.0 ON RT.

⑨ GRADE: "BORROW EXCAVATION" FROM PS-A-155.
(DET.⁶) 38+40.0 TO (DET.⁶) 43+27.37; M' 543+27.37 TO M' 556+00.0; D 554+30.0 TO D 558+31.0; M 539+30.28 TO M 555+00.0

⑩ REMOVE "UNSUITABLE FOUNDATION EXCAVATION INCL. HAUL"
A 559+75.0 TO A 566+00.0; L³ 594+0.00 TO L³ 601+50.0; WASTE SITE BETWEEN V LINE & 1ST AVE. SO.

⑪ GRADE J0+00.0 TO J16+33.0 AND APPROACHES; G 560+36 TO G 562+88; A 562+88 TO A 569+09.0; M' 569+09.0 TO M' 574+20.0.

⑫ PAVE J0+00.0 TO J16+33.0 & APPROACHES & PLACE TRAFFIC OVER J LINE.

⑬ CONST. 48" WATER MAIN L³ 579+51.6

⑭ GRADE L³ 574+20.0 – L³ 590+80 ON LT. HAUL TO & GRADE M' 559+80.0 TO M' 562+30.0(PART); M 561+30.0 TO M 566+00.0 (PART).

⑮ EXCAVATE SOLID ROCK A 563+50.0 T A 569+09.0; M' 569+09.0 TO M' 573+00.0.

⑯ CONSTRUCT SOLID ROCK BACKFILL & EMBANKMENT
A 561+25.0 TO A 566+00.0; L³ 594+00.0 TO L³ 601+50.0; FR 612+25.0. TO FR 616+75.0.

⑰ CONSTRUCT "LIGHT LOOSE RIPRAP" F 4+80.0 TO F 8+09.17 ON RT.; M 571+134 TO M 574+20.0 ON RT.; L² 574+20.0 TO L² 575+00.0 ON RT; FR 611+00 TO FR 617+10 ON RT.

⑱ PAVE L² 574+20 TO L² 586+00; CONSTRUCT & PAVE (DET.¹) 10+00.0 TO (DET.¹) 16+26.08; (DET.²) 0+00.0 TO (DET.²) 5+11.16

⑲ WIDENING & CHANNELIZATION EXIST (P.S.H. 1) 546+90.5 TO (P.S.H. 1) 550+78.0 ON RT.; EXIST (P.S.H. 1) 546+90.5 TO (P.S.H. 1) 558+10.0 ON LT.; EXIST PETER WESTERN RD. P.W. 9+00.0 TO P.W. 12+42 ON LT.

㉔ GRADE & SURFACE W.S. ROAD APPROACH

㉑ PLACE TRAFFIC OVER (DET.¹) 10+00.0 TO (DET.¹) 16+26.08; L² 574+20.0 TO L² 586+00.0; (DET.²) 0+00.0 TO (DET.²) 5+11.6; W. MARGINAL NORTH OF 27TH AVE. SO.

THIS PRINT HAS BEEN REDUCED
DO NOT SCALE

STAGE I

S. R. 99 (TEMP.) (PSH 1)
WEST MARGINAL WAY
EAST MARGINAL WAY TO BURNS STREET
KING COUNTY

STAGE I CONSTRUCTION DETAILS

WASHINGTON STATE HIGHWAY COMMISSION
DEPARTMENT OF HIGHWAYS
OLYMPIA, WASHINGTON

APPROVED April 13, 1964

SHEET 9 OF 53 SHEETS

L-1168 Sheet 4 of 46 Sheets

201
427

REGION NO.	STATE	FED. A.D. PROJECT NO.	SHEET NO.
8	WASH.	U-001-3 (37)	37 of 53

T. 23 N., R. 4 E. W.M.

SW¼ NE¼ SEC. 9

NE¼ NE¼ SEC. 9

NW¼ NE¼ SEC. 9

SE¼ NE¼ SEC. 9

SW¼ NW¼ SEC. 10

MATCH LINE

32ND AVE. S.

34TH AVE. S.

DUWAMISH RIVER

GOVT. MEANDER LINE

M 540

M 550

M 560

M 570

M 580

M 1550

M 8550

N 12° 23' W

N 24° 28' W

N 12° 40' W

N 18° 44' 30" W

N 24° 29' W

N 12° 40' W

N 3° 55' 30" E

N 45° 44' 30" W

N 89° 15' 04" W

S 89° 20' W

N 84° 57' W

S 81° 45' 30" W

S 89° 20' W

N 89° 15' 15" W

N 15° 47' W

N 18° 44' 32" W

N 9° 44' 30" W

N 46° 44' 30" W

N 21° 01' 32" W

N 64° 57' W

N 56° 07' W

S 81° 45' 30" W

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THIS PRINT HAS BEEN REDUCED

DO NOT SCALE

S. R. 99 (TEMP.) (PSH 1)

WEST MARGINAL WAY

EAST MARGINAL WAY TO BURNS STREET

KING COUNTY

DRAINAGE PLAN & PROFILE

118 TH ST. INTERSECTION

WASHINGTON STATE HIGHWAY COMMISSION

DEPARTMENT OF HIGHWAYS

OLYMPIA, WASHINGTON

APPROVED April 13, 1964

SHEET 37 OF 53 SHEETS

ALIGNMENT CHECKED

DRAWN

TRACED

CHECKED

QUANTITIES

DIST. ENGR.

DATE

BY

R. Hinkley '64

L-1166

Sheet 32 of 48 sheets

T. 23N. R.4E. W.M.

STA M'558 + 03.56 TO STA. M'560 + 23.0
NOT INCLUDED IN THIS PROJECT

STA. M'560+23.0 TO STA.M'565+25
NOT INCLUDED IN FED. AID LENGTH

SW¼ NE¼ SEC. 9

NW¼ NE¼ SEC.9

NE¼ NE¼ SEC. 9

SE¼ NE¼ SEC.9

SW¼ NW¼ SEC.10

See Detail Sheet No.28 For Approach Alignment

See Detail Sheet No. 30 For Detour Alignment

STA. L² 574+20 TO STA. L² 578+00
NOT INCLUDED IN FED. AID LENGTH

Sta. M 559+59.63 TO Sta. M 561+75.33
Not Included in This Project

FEDERAL AID NO.	STATE	FED. AID PROJECT NO.	SHEET NO.
•	WASH.	U-001-3(37)	41 of 53

STA. M'543+27.34
BEG. OF PROJECT
BEG. OF FAP NO. U-001-3(37)

STA. M'538+45 (Base Line)
BEG. OF CONSTRUCTION

STOCKPILE SITE (Unsuitable Material FOR TOP SOIL)

UNSUITABLE WASTE SITE 32,250 CY.
Sta. M 553+85.3 To Sta. M 556+42.75
Not Included in This Project

Unsuitable Material

Unsuitable Waste Site No. 1

Wire Fence Type No. 1

Wire Fence Type No. 2

Chain Link Fence Type 1

Const. Ident. Sign (See Special Provisions)

MATCH LINE

32ND AVE. S.

34TH AVE. S.

(DETOUR)

M-LINE

B-LINE

H-LINE

J-LINE

L² LINE

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REGION NO.	STATE	FED. AID PROJECT NO.	SHEET NO.
8	WASH.	U-001-3(39)	53 of 88

T. 23N. R.4E. W.M.

SW¼ NE¼ SEC. 9

Gov't Lot No. 1, Sec 9

Note: Rainier Vista Sewer District Sewer Line (By Others) See Special Provisions

Sta A 558+28 To Sta A559+86 Not Included In This Project

Sta M 553+78.50 To Sta M 556+41.50 Not Included In This Project

Sta M 559+47.3 To Sta M 561+93.0 Not Included In This Project

Sta M' 558+01.85 To Sta M' 560+37.6 Not Included In This Project

SE¼ NE¼ Sec. 9

Detour F and Detour A (See Sheet No. 65 for Alignment)

BEGINNING OF PROJECT
BEGIN U-001-3(39)
STA B 544+50.0

- Settlement Indicating Device To Be Constructed
- Existing Settlement Device

CURVE DATA

P.I. STATION	Δ	R	T	L	D	S
E' 90+06.11	86°05'	1,500.00	1400.81	2253.66		0.08
B 555+85.65	44°55.30'	1010.00	417.58	791.93		0.09
M543+53.48	16°35.30'	1600.00	233.30	463.33		0.06
M553+49.06	49°40'	1040.00	481.78	901.57		0.08
M566+17.3	27°00'	1146.00	775.13	540.0	5°00'	0.09
M' 559+14.03	79°27.34'	437.50	1190.66	1986.63	4°00'	0.07
A 552+95.30	2°58'	6000.00	155.59	310.67		0.02
A 568+07.90	7°02.30'	2300.00	140.84	281.35		0.03
A 571+54.73	4°15'	2300.00	85.34	170.61		0.03
E 5+54.57	142°40.15'	16.4	276.7	190.7	75°00'	0.10
E 5+45.6	2°30'	1146.0	25.0	50.0	5°00'	0.09
E 7+93.74	8°30'	570.0	47.36	84.56		0.03
E 5+81.0	47°45.30'	474.44	169.73	327.90	13°30'	0.10
G 561+23.09	77°51'	80.0	64.61	108.7		0.06
H 554+88.34	43°37'	800.0	241.66	463.38		0.08
H 560+44.5	63°34.30'	238.75	147.36	264.9	24°00'	0.10
[illegible]	44°57'	1910.0	783.7	1487.3	3°00'	Existing R/W Only
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	2°30'	-
B 556+418 R/W	47°30.45'	818.6	518.5	607.3	7°00'	-
M 542+42.5 R/W	16°18.30'	1146.0	164.2	326.2	5°00'	-
M 553+47.2 R/W	49°40'	1146.0	530.3	993.5	5°00'	-
M' 559+13.9 R/W	79°30'	437.5	1191.4	1987.5	4°00'	-
M' 540+34.6 R/W	9°59.15'	573.0	50.1	99.9	10°00'	-
A 559+17.7 R/W	5°43.30'	11,460.0	57.30	114.5.0	0°30'	-
H 554+18.6 R/W	32°30'	818.6	254.7	497.8	7°00'	-
H 560+73.6 R/W	67°30'	90.0				-
D 556+49.0	12°07.30'	955.0	101.4	202.1	6°00'	0.04
D 554+57.1	2°52'	14325	35.84	71.7	4°00'	

PSH 1 (SR 99 TEMP.)
E. MARGINAL WAY TO 2ND AVE. SOUTH
KING COUNTY

PLAN

WASHINGTON STATE HIGHWAY COMMISSION
DEPARTMENT OF HIGHWAYS
OLYMPIA, WASHINGTON

Feb. 25, 1966.

SHEET 53 OF 88 SHEETS

REGION NO	STATE	FED AID PROJECT NO.	SHEET NO
8	WASH.	U-001-3(39)	54 of 88

T. 23N. R.4E. W.M.

M-LINE

EXIST. P.S.H. 1

A-LINE

G LINE

M LINE

E-LINE

F-LINE

H-LINE

B-LINE

M'-LINE

M' 550

M'-LINE

550

540

570

A550+61 Ditch 0+00

A552+00 Ditch 1+48

A553+00 Ditch 2+66

A553+50 Ditch 3+33

Ditch 5+90 A556+00

A556+25 Ditch 6+26

A557+00 Ditch 7+03

A558+00 Ditch 8+70

120'

175'

200'

214'

200'

175'

PSH 1 (SR 99 TEMP.)
E. MARGINAL WAY TO 2ND AVE. SOUTH
KING COUNTY

PLAN.

WASHINGTON STATE HIGHWAY COMMISSION
DEPARTMENT OF HIGHWAYS
OLYMPIA, WASHINGTON

APPROVED Feb. 25, 1966

SHEET 54 OF 88 SHEETS

FED. ROAD DIV. NO.	STATE	FED. AID PROJ. NO.		SHEET NO.	TOTAL SHEETS
8	WASH.	U-001-3(39)		55	88

Roadway Section E

Guide Posts Type A On Lt. 2 Only

Guide Posts Type B On Rt. 2 Only

Single Beam Guard Rail On Lt 704 Lin. Ft.

Single Beam Guard Rail On Rt 954 Lin. Ft.

Road Approach to B-Line 100 Lin. Ft.
80 Tons Crushed Surfacing Top Course
100 Tons Gravel Base Class B
70 Tons Asphalt Concrete Pavement Class B

EQUATION

STA B 544+500 BEGINNING OF PROJECT BEGIN U-001-3(39)

STA B 553+59.98 END OF B LINE

Asphalt Concrete Curb On Lt 550 Lin. Ft.

Asphalt Concrete Curb On Rt. 1140 Lin. Ft.

Haul 2330 Units

F LINE

B-LINE

4.016%

-.061%

400' VC.

450' VC.

600' VC.

0.00%

USC&GS DATUM

CITY SEATTLE DATUM

Roadway Section G

Guide Posts Type B On Lt. & Rt. 4 Only

M-LINE

2.00%

350' VC.

-4.858%

STA M 539+30.28 BEGINNING OF M LINE

Single Beam Guard Rail On Lt.

Single Beam Guard Rail On Rt.

Asphalt Concrete Curb On Lt.

Asphalt Concrete Curb On Rt 300 Lin. Ft.

Roadway Section G

Sta M-553+78.50 To Sta M-556-41.50
Not Included In This Project

Sta 559+45.00 To Sta 561+93.00
Not Included In This Project

Guide Posts Type B On Rt. 1 Only

M'-LINE

-0.40%

500' VC.

80' VC.

M-LINE

Single Beam Guard Rail on Lt. 1,079 Lin. Ft.

Single Beam Guard Rail on Rt. 1,054 Lin. Ft.

Asphalt Concrete Curb On Lt. 590 Lin. Ft.

Single Beam Guard Rail On Lt. 267 Lin. Ft.

Single Beam Guard Rail On Rt. 129 Lin. Ft.

29 Lin. Ft.

Pneumatically Placed Cement Concrete Concrete Class B — 130 Sq. Yd. 0.75 Cu. Yd. — 130 Sq. Yd. 0.75 Cu. Yd.

Asphalt Concrete Curb On Rt. 20 Lin. Ft. — 400 Sq. Yd. 2.0 Cu. Yd.

Roadway Section F

Single Beam Guard Rail on Lt. 75 Lin. Ft.

Single Beam Guard Rail on Rt. 300 Lin. Ft.

Guide Posts Type A On Lt. & Rt. 4 Only

Guide Posts Type B On Rt. 2 Only

M-LINE

-3.663%

0.836%

0.836%

450' VC.

P.S.H. No. 1

Ground Line

Overload

STA M 574+20 END OF M LINE

STA L² 574+20.00 BEGINNING OF L² LINE

Removing Bituminous Pavement On Lt. 510 S.Y. (Detour A)

Removing Bituminous Pavement On Rt. 1460 S.Y. (Detour F)

Excavation 2,310 Cu. Yds.

Single Beam Guard Rail On Lt. 379 Lin. Ft.

Single Beam Guard Rail On Rt. 329 Lin. Ft.

Asphalt Concrete Curb On Rt 32 Lin. Ft.

Asphalt Concrete Curb On Rt 350 Lin. Ft.

270 Sq. Yd. 2.0 Cu. Yd. Pneumatically Placed Cement Concrete Concrete Class B

Haul (From Sta. L³ 630+61.24)

Haul 1,070 Units

Roadway Embankment 28,150 Cu. Yds.

Roadway Sect A.

Remove & Reset Guide Posts Type B Guide Post Type B On Rt. 1 Only — 4.0

Single Beam Guard Rail On Rt. 257 Lin. Ft. — 1.6

Asph. Conc. Curb On Lt. — 2.0

Removing Bituminous Pav't. On Lt. — 1.0

L² LINE

PSH 1 (SR 99 TEMP.)
E. MARGINAL WAY TO 2ND AVE. SOUTH
KING COUNTY

PROFILES

WASHINGTON STATE HIGHWAY COMMISSION
DEPARTMENT OF HIGHWAYS
OLYMPIA, WASHINGTON

APPROVED Feb. 25, 1966

SHEET 55 OF 88 SHEETS