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OFFSITE INVESTIGATION REPORT AND ADDITIONAL ACTION FEASIBILITY STUDY

Port of Longview Maintenance Facility

Prepared for

INTERNATIONAL PAPER

International Paper
Longview, Washington

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URS

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AAFS	Additional Action Feasibility Study
bgs	below ground surface
cPAH	carcinogenic polynuclear aromatic hydrocarbon
COCs	chemicals of concern
DQO	data quality objective
FID	flame ionization detector
GWPS	groundwater protection standard
LNAPL	light non-aqueous phase liquids
msl	mean sea level
MTCA	Model Toxics Control Act
ncPAH	non-carcinogenic polynuclear aromatic hydrocarbon
NGVD	National Geodetic Vertical Datum
PAH	polynuclear aromatic hydrocarbon
PCMP	Performance and Compliance Monitoring Plan
PCP	Pentachlorophenol
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
QAPP	quality assurance project plan
SOP	standard operating procedure
TPH	total petroleum hydrocarbons
TWP	treated wood products
VOC	volatile organic compound
WAC	Washington Administrative Code

This report presents the results from the field investigation on the parcel of land adjacent to the former treated wood products (TWP) area at the International Paper facility in Longview, Washington (Figure 1-1). The study area is located near the Port of Longview (Port) Maintenance Facility and is referred to in this report as the Maintenance Facility area.

The most recent phase of field work, which supplements several earlier work phases, was performed in February 2000. Results from both the historic and the February 2000 work activities are discussed in this report. Based on the results obtained from these investigations, an Additional Action Feasibility Study (AAFS) was prepared.

The investigation and the AAFS were both prepared in accordance with *the Performance and Compliance Monitoring Program Plan* (PCMP) (Woodward-Clyde 1997a) and with Consent Decree 97-2-01088-9, dated August 15, 1997, between the Washington State Department of Ecology (Ecology) and International Paper.

1.1 PROJECT BACKGROUND

International Paper implemented cleanup actions in 1997 at the former TWP area to ensure long-term protection of human health and the environment in an industrial setting. These cleanup actions are described in *Engineering Design Report* (Woodward-Clyde 1997c). Specific cleanup actions taken included the physical containment of contaminants by construction of a subsurface barrier wall, removal of light non-aqueous phase liquids (LNAPL) within the contained area, and *in situ* treatment of contaminants using a combined system of air sparging wells and bioventing wells.

Performance and compliance monitoring of groundwater is being performed to confirm the effectiveness of these cleanup actions. The PCMP was prepared to meet Ecology performance and compliance monitoring requirements for cleanup actions [Washington Administrative Code (WAC) 173-340-410, Compliance Monitoring; WAC 170-303-645(8), General Groundwater Monitoring Requirements; and WAC 173-303-645(11)(d), Corrective Action Monitoring].

The PCMP was based largely on the results of the *Focused Feasibility Study* (Woodward-Clyde 1997d) which discussed potential risks associated with the former TWP area and remedial options. The cleanup action for the former TWP area was designed to ensure long-term protection of human health and the environment in an industrial setting.

Ecology noted three areas of concern during the construction of the subsurface barrier wall in the former TWP area in the fall of 1997. Ecology described these areas in a letter dated November 7, 1997, and requested additional investigation of these areas. The three areas included an area along the west side of the barrier wall (Area 1 in Ecology's letter); the southwest corner of the barrier wall, near the location where a 24-inch-diameter fire control line was encountered during construction (Area 2 in Ecology's letter); and an area along the south side of the barrier wall, near the location of well PW-3 (Area 3 in Ecology's letter). These areas are located along the eastern side of the Maintenance Facility area. The observed impacts to these three areas indicated that chemicals of concern (COCs) associated with the TWP area, including total petroleum hydrocarbons (TPH) as diesel, pentachlorophenol (PCP), and polynuclear aromatic hydrocarbons (PAHs), may have migrated beyond the TWP boundaries towards the Maintenance Facility area.

In addition, groundwater samples collected quarterly from some of the PCMP monitoring wells along the northwest boundary of the former TWP area have contained concentrations of TPH, PCP, and PAHs at concentrations exceeding regulatory criteria.

1.2 SITE DESCRIPTION

The former International Paper Longview facility is located in Sections 8.0 and 9.0, Township 7 North, Range 2 West, in Cowlitz County, near Longview, Washington. The facility is on the north side of the Columbia River, approximately 66 miles upriver from the Pacific Ocean. This location is located less than 2 miles downstream (west) of the confluence of the Columbia and Cowlitz Rivers. The facility lies within a 100-year floodplain but is protected by control levees. The site area is relatively level and ranges in elevation from 10 to 15 feet above mean sea level (msl).

The former TWP area consists of about 4 acres and is currently being purchased by the Port. The Port's property borders the TWP area on all sides. Port operations border the former TWP area to the south and northwest, a paved log deck is located to the north, and vacant Port property is located to the northeast. The Columbia River is located approximately 300 feet southwest of the former TWP area.

Vehicles operated by the Port are serviced and washed at the Maintenance Facility building. The building includes separate areas for maintenance, washing, storage, and office space, totaling about 15,000 square feet. According to Port personnel, no underground storage tanks are present beneath or in the vicinity of the building. A security fence surrounds the building, parking lot, and the immediately surrounding area, as shown on Figure 1-2.

The area northeast of the fence is used by the Port for log storage. The area is flat and paved with asphalt. A lineament was observed in historic aerial photographs of this area, taken between 1957 and 1965, which was interpreted to be a trench connected to the former TWP area. The lineament is shown in Figure 1-2. The investigation focused largely on evaluating whether TWP constituents, including PCP, PAHs and TPH had been present in the interpreted trench and released to the subsurface. The approximate dimensions of this portion of the study area are 400 by 200 square feet.

1.3 PROJECT OBJECTIVES

The overall objectives of the investigation activities in the Maintenance Facility area include:

- Delineating the boundaries of soil having TWP constituents at concentrations exceeding applicable regulatory criteria, including those specified in the *Cleanup Action Plan, International Paper Facility, Longview, Washington* (Woodward-Clyde 1997b)
- Delineating the boundaries of groundwater beneath the Upper Silt (Aquifer A) having TWP constituents at concentrations exceeding applicable regulatory criteria, including those specified in the 1997 *Cleanup Action Plan*
- Evaluating the necessity of potential remedial actions in the Maintenance Facility area

In addition, specific objectives of the February 2000 field work were to fill in data gaps not addressed by previous work phases. These objectives include the following:

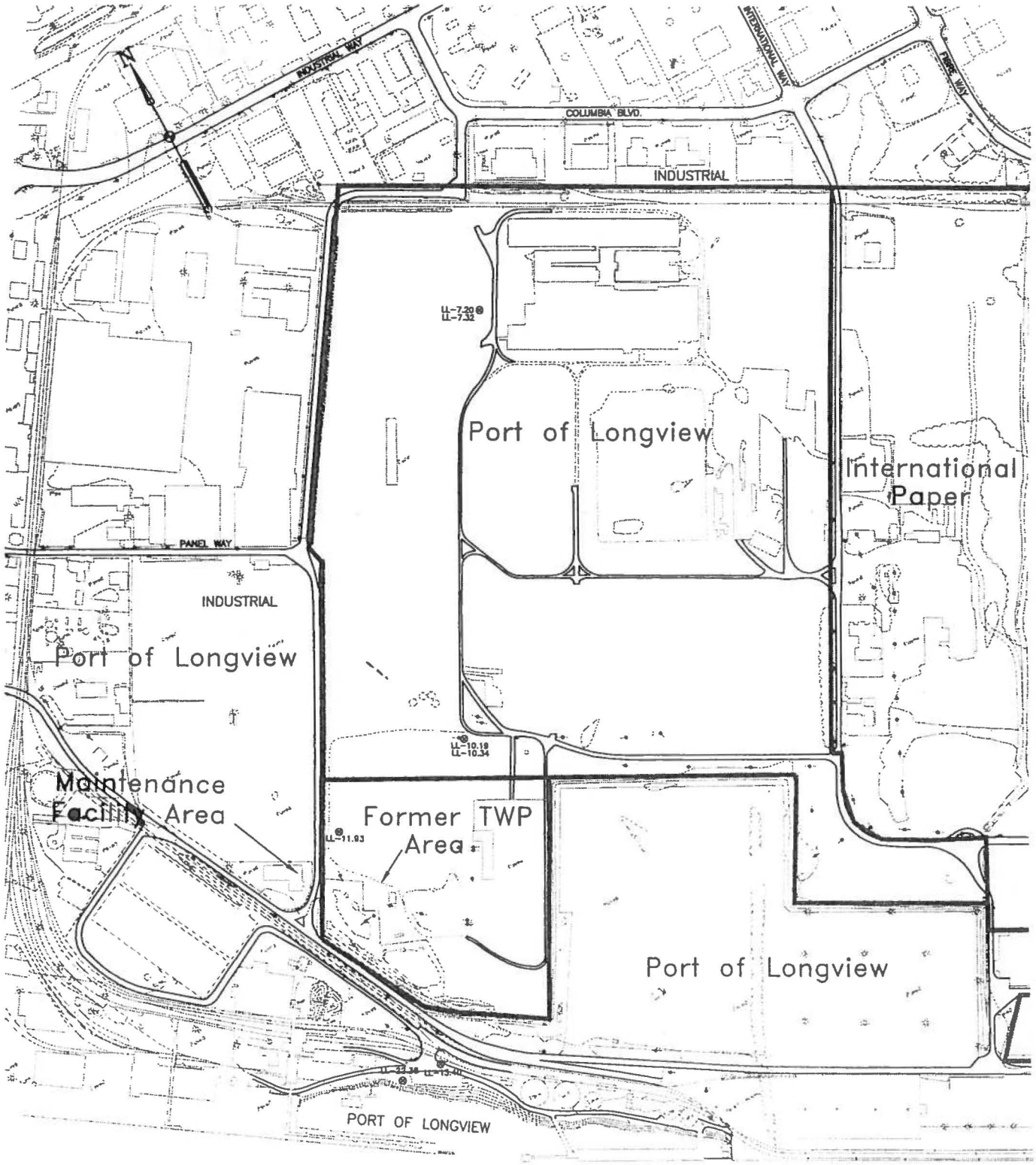
- Delineating the extent of PAH, PCP, and TPH compounds under the Port's Maintenance Facility building and in the area north of the building
- Delineating the extent of PCP at one location along the eastern side of the Port's Maintenance Facility building
- Delineating the extent of TPH and PAHs in groundwater
- Evaluating the necessity of performing remediation in the study area
- Evaluating alternatives for performing remediation in the study area, as warranted

The project strategy, discussed in Section 4.0, was designed to meet these objectives.

1.4 REPORT ORGANIZATION

Regulatory standards for the site and results from historic investigations in the study area are presented in Sections 2.0 and 3.0, respectively. Descriptions of the field and laboratory methods are presented in Section 4.0. Geology and hydrogeology results are presented in Section 5.0. Analytical results are presented in Section 6.0. An AAFS for the study area is presented in Section 7.0. References are provided in Section 8.0.

Boring logs from the most recent round of Geoprobe sampling are provided in Appendix A. Laboratory data sheets from the most recent round of Geoprobe samples are provided in Appendix B. A Quality Assurance/Quality Control (QA/QC) review of these data is provided Appendix C. Cost estimates for remediation alternatives, developed as part of the AAFS, are presented in Appendix D.



LEGEND

- LIGHTS
- ROAD
- UTILITY POLES
- UNPAVED ROAD
- TREES/VEGETATION
- RAILROAD
- DITCH
- LL-11.93 MONITORING WELL
- PROPERTY BOUNDARY

SCALE 0 600 1200 FEET

APPROX 1"=600'

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INTERNATIONAL PAPER LONGVIEW, WA	Project No. 91C0796B	International Paper Facility Layout	Figure 1-1
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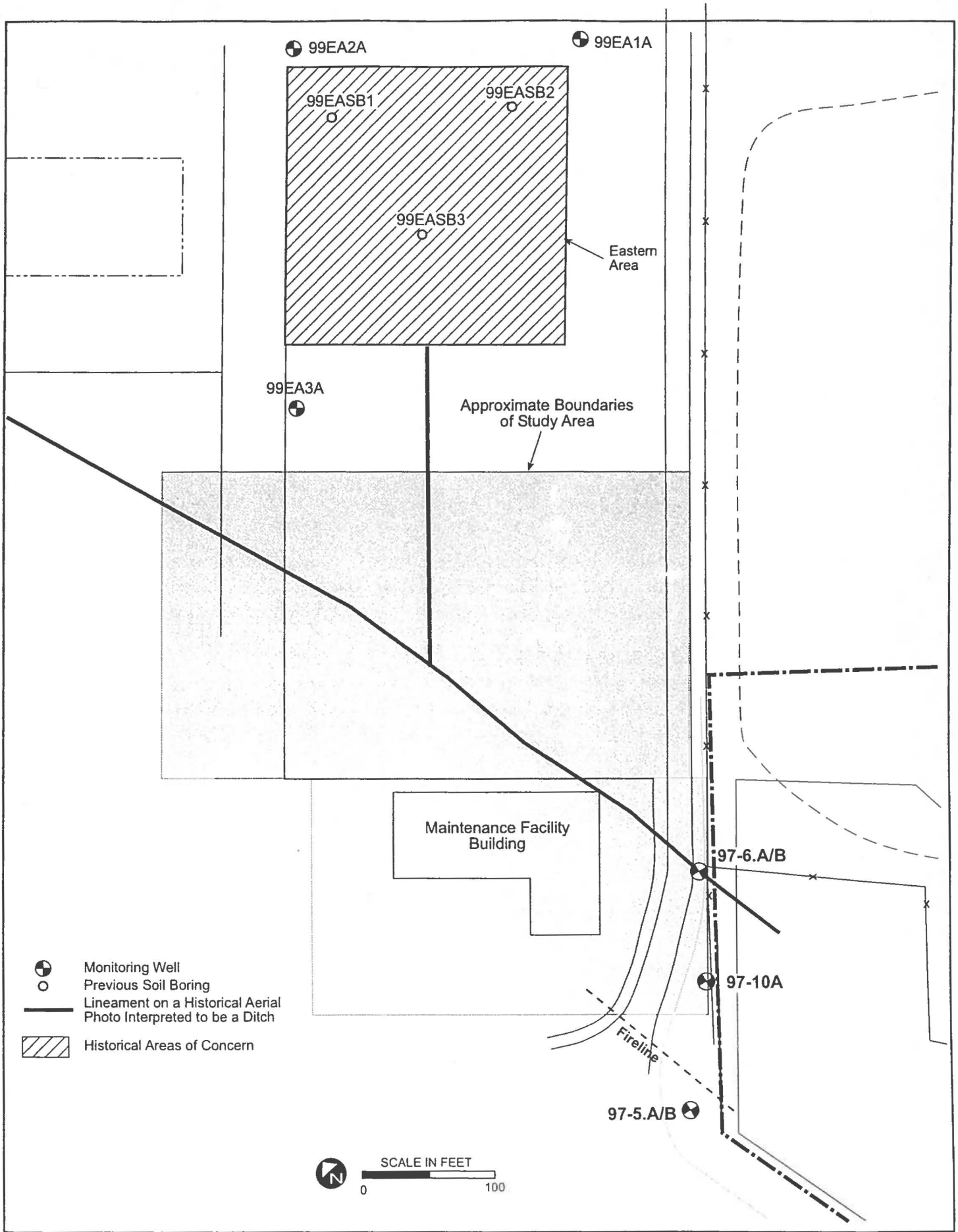

International Paper Longview, WA	Project No. 54944006NA	Maintenance Facility Area	Figure 1-2
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Applicable regulatory standards for screening analytical data for the COCs (TPH, PCP, and PAHs) from soil and groundwater samples are discussed in this section.

2.1 SOIL STANDARDS

Ecology considers the Washington State Model Toxics Control Act (MTCA) Method B criteria appropriate for soil outside the deed-restricted portion of the TWP area, including the area of the Port's Maintenance Facility. It should be noted that, as outlined in the *Cleanup Action Plan*, the MTCA Method C industrial soil cleanup levels represent the cleanup goals for soils within the deed-restricted portion of the TWP area. As discussed in the *Cleanup Action Plan*, the TWP constituents present in soil within and outside the deed-restricted portion of the TWP area do not pose a current or long-term risk to human health or the environment, for the following reasons:

- The COCs are relatively insoluble and highly sorptive, and, therefore, they are largely immobile in subsurface soils and groundwater.
- The hydraulic gradient beneath the former TWP area and the Maintenance Facility area is nearly flat, further minimizing the potential for migration of COCs in groundwater.
- Potential exposure pathways in both areas are incomplete, because the impacted soils in the Maintenance Facility area are overlain by about 3 feet of clean fill and 6 inches of pavement, isolating impacted soils from potential receptors at the surface.
- Both areas will remain industrial in the long-term.
- Practicable removal or treatment options for the COCs present in subsurface soils in the Maintenance Facility area, including soils below the water table, are unlikely to be effective in achieving MTCA Method B criteria.

Based on the considerations above, MTCA Method C criteria are also the most appropriate criteria for evaluating impacts and remedial alternatives for soils in the Maintenance Facility area. However, to be conservative, both sets of criteria are presented in the following sections.

There are neither MTCA Method B nor Method C criteria for TPH in soil. Therefore, to be conservative, comparisons were made with the MTCA Method A criteria for TPH in soils.

2.2 GROUNDWATER STANDARDS

As outlined in the *Cleanup Action Plan*, MTCA Method C groundwater cleanup levels represent the trigger levels, or short-term cleanup goals, for the deed-restricted portion of the former TWP area. Ecology considers MTCA Method B groundwater cleanup levels to be applicable outside the deed-restricted portion of the TWP area (including the Maintenance Facility area). Based on the considerations discussed above, MTCA Method C criteria are also the most appropriate criteria for evaluating impacts and remedial alternatives for groundwater in the Maintenance Facility area. However, to be conservative, both sets of criteria are presented in the following sections.

As is the case for soils, there are neither MTCA Method B nor C criteria for TPH in groundwater. Therefore, to be conservative, comparisons were made with the MTCA Method A criterion for TPH in groundwater.

Potential impacts to soil and groundwater in the study area were investigated in three phases. Results from each phase are described below. Analytical results from the first 2 years (eight quarters) of PCMP groundwater monitoring are also discussed. In addition, other historic data that are relevant to environmental conditions in this area are discussed.

3.1 PREVIOUS MAINTENANCE FACILITY INVESTIGATIONS

An initial investigation was performed near the former TWP area in July 1998 to assess soil conditions in the three areas identified in Ecology's November 7, 1997 letter. The investigation was performed in accordance with *Work Plan for Investigation of Areas of Soil Impact Outside the Containment Area* (URS 1998). A total of 14 soil borings (PB-01 through PB-14) were drilled and sampled using hollow-stem auger drilling techniques. Soil samples were collected from each boring and screened in the field for petroleum hydrocarbons. Worst-case soil samples or those samples judged most likely to have been impacted, were submitted for laboratory analysis of TPH, PAHs, and PCP.

The results of that investigation indicated that some soils between the TWP area and the Port Maintenance Facility area had been impacted by TPH and PAHs. Results from this investigation are discussed in work plan for *Work Plan for Investigation of Areas of Soil Impact Outside the Containment Area* (URS 1998).

An investigation of the area to the north and west of the TWP area, representing a logical continuation of the July 1998 investigation, was conducted in July 1999. A total of 29 Geoprobe borings were advanced and sampled (PB-15 through PB-43) using the Geoprobe technique. Soil samples were collected from each boring and screened in the field for volatiles and petroleum hydrocarbons. A total of 31 worst-case soil samples were submitted for laboratory analysis of TPH, PCP, and PAHs. A total of nine groundwater samples, collected from selected Geoprobe borings, were also submitted for laboratory analysis.

The results of this investigation are summarized in *Additional Perimeter Boring Investigation Report and Maintenance Facility Work Plan* (URS 1999a). These results indicated that some soils and groundwater in this area had been impacted by TPH and PAHs and appeared to be oriented along the historical lineament discussed in Section 1.0. Also included in the report/work plan was a recommendation for performing a third phase of work to delineate the boundaries of impacted soil and groundwater in this area.

The third phase of investigation was performed in February 2000 and intended to complete the delineation of impacted soil and groundwater in Maintenance Facility area. A total of 15 Geoprobe borings were advanced (PB-44 through PB-58) and 17 soil samples were submitted for laboratory analysis of TPH, PCP, and PAHs. A total of 10 groundwater samples, collected from selected Geoprobe borings, were also submitted for laboratory analysis. A sample location map and data tables containing analytical results from these samples was provided to Ecology and the Port on April 19, 2000. These results, along with the results from the previous phases of field work, are discussed in this report.

3.2 RESULTS FROM PCMP GROUNDWATER MONITORING

A network of 17 monitoring wells was installed around the boundaries of the former TWP area and has been sampled quarterly since 1998. These wells are intended to confirm the effectiveness of the subsurface barrier wall and to indicate whether COCs are migrating from inside the contained area. The 17 PCMP monitoring wells include:

- Two previously existing wells (LL01.15 and LL18.22)
- Eight wells installed as PCMP wells in October 1997 (97-1.A, 97-1.B, 97-2.A, 97-2.B, 97-3.A, 97-7.B, 97-8.A, and 97-9.A)
- Seven wells installed as PMCP wells in July 1998 (97-4.A, 97-4.B, 97-5.A, 97-5.B, 97-6.A, 97-6.B, and 97-10.A)

The COCs for the former TWP area were identified in the *Focused Feasibility Study* for the site (Woodward-Clyde 1997d). The identified COCs include TPH, PCP, and PAHs. Groundwater samples are collected from the PCMP wells each quarter and analyzed for indicator parameters, which represent a subset of the COCs. The indicator parameters include TPH, PCP, and the PAHs naphthalene, benzo(a)anthracene, and chrysene. In addition, a groundwater sample collected from well 97-6.A is analyzed for U.S. Environmental Protection Agency (EPA) priority pollutants at least once each year.

Results from the first and second years of PCMP groundwater monitoring are described in the respective PCMP annual groundwater monitoring reports (URS 1999b; 2000a). Concentrations of TPH as diesel, chrysene, benzo(a)anthracene, and naphthalene have exceeded short-term cleanup levels (i.e., trigger levels) in Well 97-6.A. Concentrations of naphthalene and other PAHs have irregularly exceeded short-term cleanup levels in Wells 97-5.A and 97-5.B at least once. However, concentrations of these constituents have been consistently decreasing during the PCMP monitoring. Concentrations of indicator parameters have not exceeded trigger levels in the other PCMP wells after 2 full years of monitoring.

3.3 RESULTS FROM EASTERN AREA INVESTIGATION

A review of historical documents and aerial photographs taken between 1957 and 1965 of an area located north of the present Maintenance Facility area indicated that an impoundment may have been previously present in this area. The impoundment, referred to as the eastern area, was apparently infilled in 1968. The southern boundary of this area is about 325 feet north of the Maintenance Facility building.

Soil samples were collected and analyzed from three soil borings drilled within the estimated boundaries of the former impoundment in January 1999. TPH and non-carcinogenic PAHs (ncPAHs) were detected in several soil samples at concentrations below Interim TPH Policy cleanup criteria. Carcinogenic PAHs (cPAHs) were detected in one soil sample above MTCA Method B criteria. PCP was not detected in any of the soil samples. Based on the low levels of detections within the Eastern Area, impacts to soil in this area appear to be minor and localized in extent. The detected constituents were not found in multiple borings or at multiple vertical intervals within a single boring.

Three monitoring wells were also installed outside the estimated boundaries of the former impoundment as part of the same investigation. Groundwater samples were collected and

analyzed for a comprehensive suite of constituents, including PAHs, TPH, PCP, volatile and semi-volatile organic compounds, pesticides, metals, and other inorganic water quality parameters.

No TWP constituents were detected at concentrations exceeding MTCA Method B in groundwater samples from these wells. PCP was not detected in any of the samples.

The herbicide heptachlor was detected in the primary groundwater sample from one of the wells (99-EA3D) at a concentration exceeding MTCA Method B, but was non-detect in the duplicate sample. Chloroform, a by-product of routine water chlorination, was also detected in the sample from this well at a concentration exceeding MTCA Method B. However, the detected concentration was below the applicable U.S. Primary Drinking Water Standard. Total arsenic was detected at concentrations exceeding MTCA Method B, but dissolved arsenic (i.e., measured in filtered sample aliquots) was not detected in any of the groundwater samples. The detection of total arsenic is most likely attributable to naturally occurring arsenic sorbed to colloids or particulates, and is therefore not representative of formation groundwater quality. The analytical results for a comprehensive suite of constituents indicated that groundwater had not been significantly impacted by the former impoundment.

3.4 RESULTS FROM TWP MONITORING WELLS

Six wells were previously installed and sampled in the northern portion of the former TWP area as part of a site groundwater monitoring program. These wells, discussed in Section 6.0 and shown on Figure 6-4, include LL-11.93, LL-16.20, LL-17.115, LL-18.23, 93-1.102, and 93-1.103. In general, groundwater samples were collected quarterly between 1994 and 1996 and analyzed for 10 groundwater protection standard (GWPS) constituents, including PCP, selected PAHs and TPH. No constituents were detected at concentrations exceeding MTCA Method B criteria in any of the wells. Based on analytical results from these wells, TWP constituents are not present in groundwater in the area to the north of the barrier wall at concentrations exceeding MTCA Method B criteria. Most of the wells were abandoned in 1997.

Methods used in the field and laboratory to collect and analyze samples are described below. All work was performed according to the standard operating procedures (SOP) included in the project SOP binder (PTI 1996).

4.1 SAMPLING RATIONALE

The February 2000 sampling program was designed to address data gaps from the earlier investigation activities. Each sample location and sample interval was discussed by personnel from Ecology, Landau Associates (representing the Port) and URS prior to drilling at each location. Sample locations are shown in Figure 4-1.

In particular, PCP and several PAH constituents had previously been detected at concentrations exceeding MTCA Method B criteria at one location (PB-34) and at one specific depth interval (7 to 9 feet below ground surface [bgs]) along the eastern side of the Port Maintenance Facility area. To evaluate the potential distribution of these constituents, four Geoprobe locations (PB-52, PB-53, PB-54 and PB-57) were sampled at locations about 10 feet outward from PB-34. Three additional Geoprobe locations (PB-49, PB-55, and PB-56) were sampled at locations surrounding the Maintenance Facility to evaluate whether COCs were present beneath the building, further to the west.

Geoprobe locations PB-44 and PB-45 were intended to evaluate the northern extent of COCs in soil and groundwater, Geoprobe locations PB-48, PB-50, and PB-51 were intended to delineate the southern extent, and Geoprobe locations PB-46, PB-47, and PB-58 were intended to delineate the western extent.

Groundwater samples were collected from at least one Geoprobe location in each area to evaluate whether COCs were present in these areas. Locations included PB-45, PB-47, PB-49, PB-50, PB-51, PB-53, PB-55, PB-56, and PB-58 (Figure 4-1). Locations PB-44 and PB-45 provided data for delineating water quality in the northern portion of the Maintenance Facility area; locations PB-50 and PB-51 provided data for evaluating water quality in the southern portion of the Maintenance Facility area; and locations PB-47 and PB-58 provided data for evaluating water quality in the western portion of the Maintenance Facility area. Locations PB-49, PB-55, and PB-56 provided data for evaluating water quality beneath the Maintenance Facility building. Location PB-53 provided data for evaluating whether PCP or other COCs were present in the vicinity of previous Geoprobe sample PB-34.

It was anticipated that any soil with elevated constituent concentrations would occur primarily above the Upper Silt layer. Therefore, at a minimum, the Geoprobes were advanced to the top of the Upper Silt layer at each location. When field measurements or observations indicated the presence of obvious chemical impact in any interval above the Upper Silt, the drilling was discontinued to avoid carry-down beneath the Upper Silt. If groundwater samples were desired from an impacted area, the sampling was performed at an adjacent location.

Soil samples were collected for field screening and laboratory analysis at each location. The soil samples were collected from depth intervals judged most likely to have elevated constituent concentrations, including the vadose zone-water table interface and the Upper Sand-Upper Silt interface. Field measurements included visual observation, screening for volatiles with a flame ionization detector (FID), and TPH analysis using a Hanby test kit. Worst-case soil samples (i.e., samples characterized by the presence of a sheen or free product, or yielding the highest FID or

Hanby test kit readings) were selected for laboratory analysis. Collecting soil samples from intervals where constituents were likely to have accumulated, in presumed worst-case locations, maximized the chances that potentially impacted areas would be detected in the field.

Selection of samples for laboratory analysis was discussed in the field by personnel from Ecology, Landau Associates, and URS. Several soil samples were provided to Landau Associates for independent laboratory analysis, at their request.

4.2 GEOPROBE SOIL SAMPLING

Prior to the advancement of the probes, an underground utility contractor located and marked subsurface utilities. The 15 Geoprobes (PB-44 through PB-58) were advanced and sampled using a modified Geoprobe rig by Cascade Drilling Inc. of Woodinville, Washington.

Soil samples were collected from each Geoprobe boring to obtain detailed information on the soil stratigraphy and constituent concentrations in soil. Soil samples were obtained using standard penetration test procedures. Samples were collected continuously (i.e., at 2-foot intervals) from each of the Geoprobes. The Geoprobes were logged by a URS hydrogeologist assisted by a technician. Soil descriptions, soil conditions, the presence or absence of odors, and any other evidence of contamination were recorded in a field log, according to SOPs 48 and 49. Boring logs for each Geoprobe are provided in Appendix A.

Soil samples were collected for headspace analysis, field screening, and off-site laboratory analysis. Four to five soil samples were usually collected from each of the borings. Each sample was screened for headspace analysis. A small amount of soil was placed into a plastic ziplock bag and allowed to volatilize in a warm area for approximately 15 minutes. The headspace in the bag was screened with a portable FID to measure the concentration of total organic vapors. Headspace readings were recorded in the field logbook. Soil used for headspace analysis was subsequently used for testing with the Hanby TPH test kit but not included with any laboratory samples.

A total of 67 soil samples were retained for field TPH analyses using a portable Hanby TPH test kit. One or two samples from each boring (based on visual observation, FID headspace analysis, and field screening data) were submitted to the laboratory for analysis. A total of 17 soil samples were submitted for analysis of COCs from the former TWP area, including TPH, PCP, and PAHs.

The soil samples collected for laboratory analysis were homogenized in the field by mixing in a stainless-steel spatula and bowl. Any sample intervals characterized by screening evidence of field contamination, or containing changes in lithology, were homogenized separately for laboratory analysis; otherwise, the full soil interval was used for homogenizing.

Table 4-1 lists the sample containers, preservation methods, and holding times. All sampling, field testing, and laboratory testing were performed in accordance with the applicable SOPs indicated in Table 4-2.

The location and ground surface elevation of each boring was surveyed by Osborne and Gray, registered land surveyors, following completion of the field program. The vertical datum for the survey was National Geodetic Vertical Datum (NGVD). The datum for the planar coordinates was the State Planar Coordinate System. The surveyed coordinates are included in Appendix A.

Cuttings generated during the drilling investigation were contained in drums. The drummed soil cuttings was transported to the former TWP area, stored under cover, labeled, and designated for proper off-site disposal. All probe locations were backfilled according to the requirements of WAC 173-160-560 for abandonment of resource protection wells, and the sites restored as closely as practicable to their previous condition.

4.3 GEOPROBE GROUNDWATER SAMPLING

A total of 10 groundwater samples were collected from the saturated zone beneath the Upper Silt (Aquifer A). Locations for groundwater sampling were discussed with Ecology and Landau Associates in the field.

The groundwater samples were collected using a peristaltic pump. After reaching the target depth, a dedicated length of Tygon tubing was lowered into the borehole. Sample water was pumped directly into sample containers at the surface, but was directed along the sides of the containers to minimize volatilization.

Table 4-1 lists the sample containers, preservation methods, and holding times. All sampling, field testing, and laboratory testing were performed in accordance with the applicable SOPs indicated in Table 4-2.

4.4 LABORATORY ANALYSES

The soil and groundwater samples were analyzed by Oregon Analytical Laboratories of Beaverton, Washington. Each soil and groundwater sample was analyzed for TPH, PCP, and PAHs. Laboratory data sheets are provided in Appendix B. A QA/QC review of the data is provided in Appendix C.

Table 4-1 lists the laboratory methods used. All sampling, field testing, and laboratory testing was performed in accordance with the applicable SOPs indicated in Table 4-2. All sample handling, transport, and storage were performed using chain-of-custody procedures.

Table 4-1
SAMPLE CONTAINERS, PRESERVATION METHODS, AND HOLDING TIMES

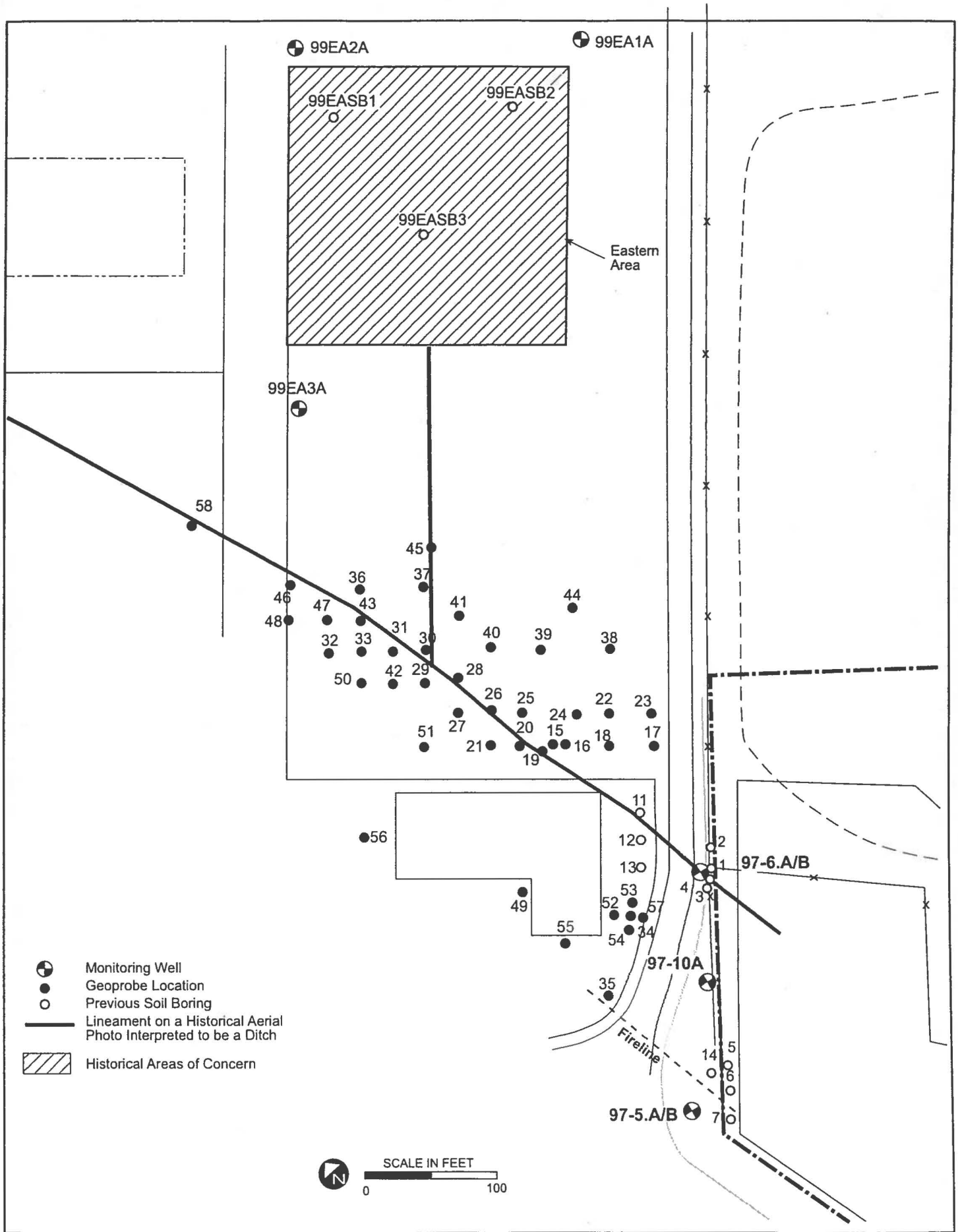
PARAMETER	METHOD NUMBER	CONTAINER	PRESERVATION METHODS	HOLDING TIME
SOIL				
PAHs (low level)	EPA 8270 SIM[1]	8-oz. WM jar	cool to 4°C	14 days (extraction)
Pentachlorophenol	EPA 8270 SIM[1]	Use PAH jar	cool to 4°C	14 days (extraction)
Diesel Range Hydrocarbons	NWTPH-Dx	Use PAH jar	cool to 4°C	14 days (extraction)
WATER				
PAHs (low level)	EPA 8270 SIM[1]	1 – 1 L amber glass	cool to 4°C	7 days (extraction)
Pentachlorophenol	EPA 8270 SIM[1]	Use PAH jar	cool to 4°C	14 days (extraction)
Diesel Range Hydrocarbons	NWTPH-Dx	1 – 1 L amber glass	cool to 4°C	7 days (extraction)

Notes:
EPA: Environmental Protection Agency
PAH: polynuclear aromatic hydrocarbon
WM: wide mouth
1: If detention limits less than or equal to MTCA Method B are not achieved using this method, an alternate analytical method may be used (e.g., EPA Method 8151 for PAHs).

Table 4-2
PROJECT STANDARD OPERATING PROCEDURES

SOP	TITLE
2	Sample Packaging and Shipping
3	Equipment Decontamination for Soil and Water Sampling
4	Field Documentation
5	Sample Custody
6A	Preparation of Field Quality Control Samples – Water
6B	Preparation of Field Quality Control Samples – Sediment
44	Installation and Sampling of Probe Holes with Geoprobe System
48	Logging of Soil Boreholes
49	Field Classification of Soil

Source: PTI (1996)



International Paper Longview, WA	Project No. 54944006NA	Maintenance Facility Area Sampling Locations	Figure 4-1
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Based on investigations conducted to date, four general stratigraphic units are located in the shallow (up to 125 feet bgs) alluvial deposits beneath the former TWP area: the Upper Sand, the Upper Silt, the Lower Sand and the Lower Silt.

- **Upper Sand.** The Upper Sand is interpreted to be primarily a fill unit and is continuous across the former TWP area. The thickness of the Upper S nd ranges from 3 to 7 feet in the former TWP area and Maintenance Facility area.
- **Upper Silt.** The Upper Silt is the shallowest zone of fine-grained relatively low-permeability material and may influence shallow groundwater movement. The Upper Silt is generally continuous in the former TWP area. However, it is absent in a linear zone across the central portion of the former Pond 2, which is likely due to construction and remediation activities. The thickness of the Upper Silt varies from 2 to 6 feet in the former TWP area and Maintenance Facility area.
- **Lower Sand.** The Lower Sand is a locally extensive water-bearing unit in the former TWP area and directly underlies the Upper Silt. Groundwater movement in the Lower Sand is influenced by the Columbia River. The Lower Sand is a gray medium-dense to dense, medium-grained to coarse-grained sand, with red, white and gray grains of volcanic material.

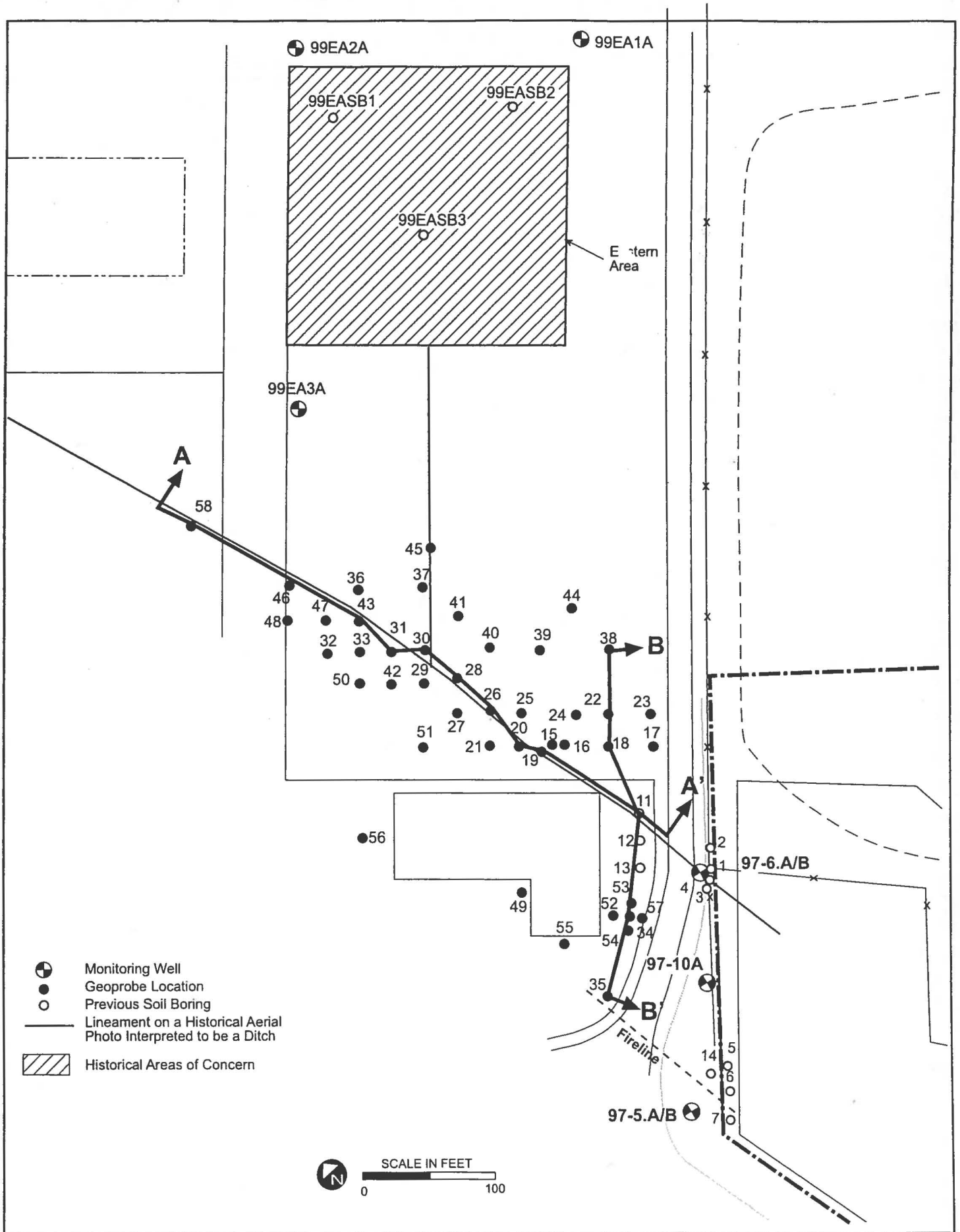
  The Lower Sand is divided into two aquifers: the upper aquifer (Aquifer A) is approximately 25 to 35 feet thick and the lower aquifer (Aquifer B) is approximately 35 to 65 feet thick. Aquifers A and B are separate by distinct silt or silty sand referred to as the Intermediate Silt. Within the northern and central former TWP area, the Intermediate Silt was encountered at an elevation of 20 to 30 feet below Mean Sea Level (msl) and ranged from 2 to more than 5 feet in thickness. In the southern portion of the former TWP area, the Intermediate Silt is less distinct and may only be distinguishable from the overlying sand by a subtle increase in silt content.
- **Lower Silt.** The Lower Silt is the deepest unit encountered in borings completed at the former TWP area. The Lower Silt is at least 32.5 feet thick in one onsite boring, and serves as a locally extensive aquitard. The depth to this unit ranges from 77 to 103 feet bgs.

Drilling performed in the Maintenance Facility area advanced to a maximum depth of about 17 feet bgs, penetrating fill, the Upper Sand, Upper Silt, and the upper portion of Aquifer A of the Lower Sand. Cross-sections A-A' and B-B' showing the subsurface geology and soil results, along with a transect location map, are provided as Figures 5-1 through 5-3. In general, the subsurface consists of about 6 inches of asphalt pavement, 3 feet of gravel fill, 3 feet of sand (Upper Sand), and 3 to 4 feet of silt (Upper Silt). Aquifer A was usually encountered at a depth of about 9 to 10 feet bgs. The Upper Silt appears to dip towards the south and east in the study area, as the depth to the top of the Upper Silt was greatest closest to the building.

Sediments above Aquifer A in the Maintenance Facility area, including the fill, Upper Sand, and Upper Silt, were moist to dry at the time of drilling. Shallow groundwater was first encountered in Aquifer A, as a confined to semi-confined zone underlying the Upper Silt. Groundwater rose up to 1 foot after waiting 30 minutes at some of the Geoprobe locations. The potentiometric surface was constant at other locations. Lenses of fine to medium sand often interfinger with the Upper Silt, forming a thin transition zone from the Upper Sand into the Upper Silt and from the Upper Silt into the Lower Sand.

Groundwater elevations are measured in the 17 PCMP wells quarterly as part of PCMP monitoring. The direction of groundwater flow has consistently been north to northeast, with a relatively flat gradient of about 0.001 feet per foot. As indicated in an extended tidal study performed at the site in 1996 (Woodward-Clyde 1996), tidal influences from the Columbia River cause transient fluctuations in groundwater levels and the hydraulic gradient, but the general hydraulic gradient across the study area does not appear to vary significantly.

Groundwater elevations were also measured in the three wells installed as part of the eastern area investigation in January 1999. The direction of groundwater flow was towards the north-northeast in that area, similar to the hydraulic gradient near the former TWP area.



International Paper Longview, WA	Project No. 54944006NA	Cross Sections in the Maintenance Facility Area	Figure 5 -1
URS			

99/IP Long 6/00

Looking East

A (North)

A' (South)

Approx. 150'

Approximate Location of Utility Corridor

RETAINING WALL

ASPHALT

Elevation (MSL)

15

10

5

0

PB–58 PB–43 PB–31 PB–30 PB–28 PB–26 PB–20 PB–19 PB–11

(SAND GRAVEL)

(Upper Sand)

(Upper Silt)

(Lower Sand)

Coarse Sand

Analyte	
Diesel	1.4 mg/L
cPAHs	0.3 ug/L

Analyte	
Diesel	2.0 mg/L

Analyte	3.5 – 5.5'
Diesel	3,200 mg/kg

Analyte	
Diesel	39 mg/L
Naphthalene	12,900 ug/L

Analyte	3.5 – 5.5'
B(b)F	226 ug/kg

Analyte	5.5 – 7.5'
Diesel	26,000 mg/kg
B(b)F	No Exceedance

Analyte	3.5 – 5.5'
Diesel	3,100 mg/kg
B(a)A	14,600 ug/kg
chrysene	12,800 ug/kg
B(b)F	11,200 ug/kg
B(a)P	12,600 ug/kg

Analyte	3.5 – 5.5'
Diesel	4,600 mg/kg

Analyte	6–7.5'
Diesel	13,000 mg/kg
Naphthalene	4,060,000 ug/kg

Legend

Soil Sample Interval

Groundwater sample

Abbreviations

B(a)P	benzo(a)pyrene
B(a)A	benzo(a)anthracene
B(b)F	benzo(b)fluoranthene
B(k)F	benzo(k)fluoranthene
I(1,2,3–cd)P	indeno(1,2,3–cd)pyrene
D(a,h)A	dibenz(a,h)anthracene
PCP	pentachlorophenol

Units are µg/kg unless otherwise stated.

Exceedances of MTCA B criteria (or MTCA A for TPH) for offsite soils are shown

SCALE 0 5 FEET Vertical Scale

SCALE 0 25 FEET Horizontal Scale

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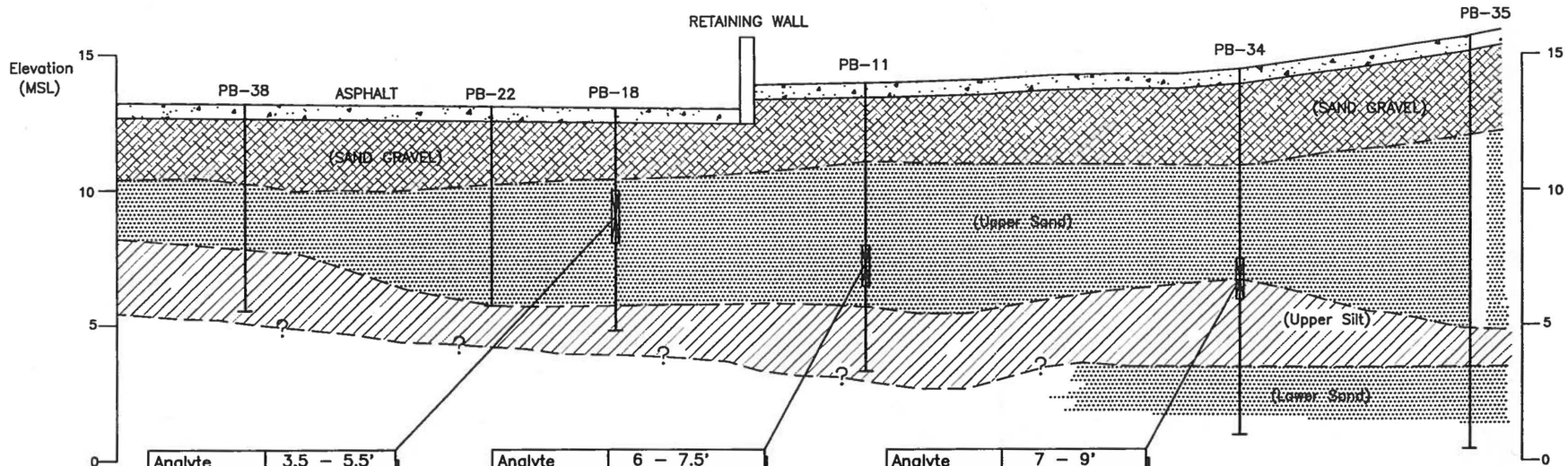
EDIT DATE: 09/12/00 AT: 14:05

International Paper Longview, WA	Project No. 5409900003.10	Additional Perimeter Boring Investigation Cross Section A-A'	Figure 5-2
URS			

B
(Northeast)

Looking Southeast

B'
(Southwest)



Analyte	3.5 – 5.5'
diesel	5,000 mg/kg
B(a)A	20,200 ug/kg
chrysene	17,100 ug/kg
B(b)F	11,900 ug/kg

Analyte	6 – 7.5'
Diesel	13,000 mg/kg
naphthalene	4,060,000 ug/kg

Analyte	7 – 9'
B(a)A	3,360 ug/kg
chrysene	3,950 ug/kg
B(b)F	3,440 ug/kg
B(k)F	3,670 ug/kg
B(a)P	3,120 ug/kg
I(1,2,3–cd)P	3,580 ug/kg
D(a,h)A	3,660 ug/kg
PCP	17,300 ug/kg

Legend

Soil Sample Interval

Abbreviations

B(a)P	benzo(a)pyrene
B(a)A	benzo(a)anthracene
B(b)F	benzo(b)fluoranthene
B(k)F	benzo(k)fluoranthene
I(1,2,3–cd)P	indeno(1,2,3–cd)pyrene
D(a,h)A	dibenz(a,h)anthracene
PCP	pentachlorophenol

Exceedances of MTCA B criteria
(or MTCA A for TPH) for offsite soils are shown

SCALE 0 5 FEET
Vertical Scale

SCALE 0 25 FEET
Horizontal Scale

FILENAME: Q:\IP\2000\IP-224.dwg
EDIT DATE: 09/12/00 AT: 14:05

International Paper Longview, WA	Project No. 5409900003.10	Additional Perimeter Boring Investigation Cross Section B-B' Showing Soil Sample Results	Figure 5-3
URS			

The analytical results for all soil and groundwater samples, including those collected as part of the most recent field effort (February 2000), are discussed below.

6.1 SOIL RESULTS

A total of 17 soil samples were collected from 15 Geoprobe locations in February 2000. Field measurements for the soil samples screened in the field in February 2000 are provided in Table 6-1.

A total of 63 soil samples have been collected from 58 soil boring and Geoprobe locations (including the samples collected from PB-1 through PB-14, which were drilled using hollow-stem augers) as part of the overall Maintenance Facility area investigation. Laboratory analytical data for all soil samples collected in the Maintenance Facility area, including those collected in February 2000, are provided in Table 6-2. MTCA Method B and C criteria (MTCA Method A for TPH) are included in Table 6-2. Exceedances of MTCA Method B are plotted on Figure 6-1.

TPH or PAH exceedances of MTCA Method B (or MTCA Method A for TPH) were detected in at least one sample from 18 of the 58 sample locations. TPH as oil or diesel exceeded MTCA Method A in 13 samples. TPH detections ranged from 35 milligrams per kilogram (mg/kg) to 26,000 mg/kg.

Naphthalene, a noncarcinogenic (ncPAH), was the most frequently detected PAH, and exceeded MTCA Method B in two soil samples. Total cPAHs exceeded MTCA Method B in 12 soil samples.

PCP exceeded MTCA Method B in only one sample (PB-34) and was not detected in the four samples located within 10 feet of this boring. PCP was also not detected in any of the groundwater samples. The single detection of PCP in one soil sample may be attributable to laboratory error, or represent a minor, localized occurrence of PCP.

Based on observations during sample logging, the most visibly impacted soils were present in samples collected from a 6-inch-thick interval usually occurring between 4.5 and 5.5 feet bgs. This horizon occurs within the Upper Sand rather than the contact of the Upper Sand and Upper Silt.

Figure 6-2 shows an expanded plan view of the study area. All of the former TWP area and the Eastern Area are included, along with results from borings in these areas. The highest detected concentrations of TPH and PAHs occurred in samples collected from along the approximate transect of a lineament that was observed on aerial photographs (Figure 6-1). As described in the *Soil and Groundwater Investigation of the Eastern Area Report* (URS 2000b), this lineament has been interpreted to be a ditch leading from the former TWP area.

As shown on Figure 6-1, the results from a number of Geoprobes located north of the lineament, including PB-23, PB-38, PB-39, PB-40, PB-41, PB-44, PB-45 and others, constrain the extent of impacted soil in this direction. Similarly, the results from the borings located around the Maintenance Facility building, including PB-49, PB-55, PB-56 and others, constrain the extent of impacted soil to the south. The results from PB-58 indicate that impacted soils do not extend this far to the west. The western extent of impacts is constrained by a number of historic borings within the former TWP area.

The approximate length of the impacted zone, measured from PB-4 to PB-46, is about 400 feet; however, the impacted soils become spotty towards the western end of this length. The maximum width of the impacted zone, measured from PB-51 to PB-26, is about 60 feet but more typically appears to be 40 to 50 feet.

6.2 GROUNDWATER RESULTS

A total of 10 groundwater samples were collected in February 2000. A total of 19 groundwater samples were collected as part of the overall Maintenance Facility investigation. It should be noted that no groundwater samples were collected from the initial borings PB-1 through PB-14, which were drilled using hollow-stem augers.

Laboratory analytical data for all groundwater samples collected in the Maintenance Facility area, including those collected in February 2000, are provided in Table 6-3. MTCA Method B (and MTCA Method A for TPH) criteria are included in Table 6-3. Exceedances of MTCA Method B are plotted on Figure 6-3.

TPH or PAH exceedances of MTCA Method B (or MTCA Method A for TPH) were detected in 8 of the sample locations. TPH as diesel exceeded MTCA Method A in 10 samples. TPH detections ranged from 1.1 milligrams per liter (mg/L) to 7,500 mg/L. TPH as diesel was the only compound detected at exceedant concentrations in 6 of the 10 samples, reflecting the relative immobility of PAHs in groundwater.

PCP was not detected in any of the groundwater samples. Naphthalene, an ncPAH, exceeded MTCA Method B in two groundwater samples. Total cPAHs also exceeded MTCA Method B in 2 groundwater samples. No sheen or other evidence of contamination was observed in any of the groundwater samples.

Figure 6-4 shows an expanded plan view of the study area. All of the former TWP area and the Eastern Area are included, along with results from PCMP wells, the three wells installed as part of the Eastern Area investigation, and the former wells associated with GWPS monitoring (described in Section 3.4). The highest detected concentrations of TPH and PAHs again appear to be present in samples collected from along the approximate transect of the lineament described above.

The results from the borings located around the Maintenance Facility building, including PB-34, PB-49, PB-53, PB-55, and PB-56 bracket the extent of impacted groundwater to the south. The results from the three Eastern Area wells and several of the former TWP area wells, including LL-11.93 and 99EA-1A, indicate that impacted groundwater does not extend this far to the north (in the regional downgradient direction).

Of the PAH compounds, naphthalene is the most soluble and mobile, and has consistently been the key indicator parameter of PAH impacts to groundwater. The cPAH compounds have low solubilities and readily adsorb to soil, resulting in low mobilities. Groundwater sampling techniques using a Geoprobe result in a more turbid water sample than routinely found with properly installed wells. The result is a potential that cPAH detections are a result of cPAH sorbed to soil particles in the turbid groundwater sample and not representative of actual groundwater results. The absence of naphthalene in the groundwater from sample location PB-44, which contained an exceedant concentration of cPAH, may be attributable to this. In

addition, the groundwater sample from PB-58 had only a slight detection of naphthalene, suggesting that the cPAHs detected in this sample were also attributable to desorption from soil.

The detection of diesel and PAHs in the westernmost sample (PB-58) indicates that impacted groundwater extends further to the west. However, the Western Area is located about 500 feet west of PB-58, and the oil storage area, a known source of significant concentrations of TPH in soil and groundwater, is located several hundred feet further to the west. Therefore, further investigation in this direction is unlikely to yield additional useful data.

The approximate length of the impacted zone, measured from 97-6.A to PB-58, is about 450 feet. The apparent minimum width of the impacted zone, measured from PB-51 to the lineament, is about 60 feet.

TABLE 6-1
PERIMETER AND OFFSITE INVESTIGATIONS
FIELD PID/FID AND TEST KIT RESULTS

Sample ID	Date Collected	PID ppm	FID ppm	Handby mg/kg
PB01 - 3-4.5	7/14/98	--	--	> 10
PB01 - 4.5-6	7/14/98	--	--	> 10
PB01 - 6-7.5	7/14/98	--	--	< 10
PB01 - 7.5-9	7/14/98	--	--	< 10
PB02 - 3-4.5	7/15/98	--	--	> 10
PB02 - 4.5-6	7/15/98	--	--	> 10
PB02 - 6-7.5	7/15/98	--	--	> 10
PB02 - 7.5-9	7/15/98	--	--	> 10
PB03 - 3-4.5	7/15/98	--	--	< 10
PB03 - 4.5-6	7/15/98	--	--	< 10
PB03 - 6-7.5	7/15/98	--	--	> 10
PB03 - 7.5-9	7/15/98	--	--	< 10
PB04 - 1.5-3	7/15/98	--	--	< 10
PB04 - 4.5-6	7/15/98	--	--	> 10
PB04 - 6-7.5	7/15/98	--	--	> 10
PB04 - 7.5-9	7/15/98	--	--	> 10
PB05 - 1.5-3	7/16/98	--	--	< 1
PB05 - 3-4.5	7/16/98	--	--	> 10
PB05 - 4.5-6	7/16/98	--	--	< 1
PB06 - 1.5-3	7/16/98	--	--	< 10
PB06 - 3-4.5	7/16/98	--	--	< 1
PB06 - 4.5-6	7/16/98	--	--	< 1
PB06 - 6-7.5	7/16/98	--	--	< 1
PB07 - 1.5-3	7/16/98	--	--	> 10
PB07 - 3-4.5	7/16/98	--	--	> 10
PB07 - 4.5-6	7/16/98	--	--	< 1
PB08 - 1.5-3	7/16/98	--	--	< 1
PB08 - 3-4.5	7/16/98	--	--	< 10
PB08 - 4.5-6	7/16/98	--	--	< 1
PB09 - 1.5-3	7/16/98	--	--	< 1
PB09 - 3-4.5	7/16/98	--	--	< 10
PB09 - 4.5-6	7/16/98	--	--	< 1
PB10 - 1.5-3	7/16/98	--	--	< 1
PB10 - 3-4.5	7/16/98	--	--	< 10
PB10 - 4.5-6	7/16/98	--	--	< 1
PB11 - 4.5-6	7/17/98	--	--	< 10
PB11 - 6-7.5	7/17/98	--	--	> 10
PB11 - 7.5-9	7/17/98	--	--	> 10
PB11 - 9-10.5	7/17/98	--	--	< 10
PB12 - 4.5-6	7/17/98	--	--	< 10
PB12 - 6-7.5	7/17/98	--	--	> 10
PB12 - 7.5-9	7/17/98	--	--	> 10
PB12 - 9-10.5	7/17/98	--	--	< 1
PB13 - 4.5-6	7/17/98	--	--	< 1
PB13 - 6-7.5	7/17/98	--	--	< 10
PB13 - 7.5-9	7/17/98	--	--	< 10

TABLE 6-1
PERIMETER AND OFFSITE INVESTIGATIONS
FIELD PID/FID AND TEST KIT RESULTS

Sample ID	Date Collected	PID ppm	FID ppm	Handby mg/kg
PB-15 3-5'	7/19/99	101	103	> 1000
PB-15 5-7'	7/19/99	102	37	100
PB-15 7-8'	7/19/99	102	64	50
PB-15 8-9'	7/19/99	102	105	50
PB-16A 3-5'	7/19/99	40	80	> 1000
PB-16A 5-7'	7/19/99	15	101	50
PB-16A 7-9'	7/19/99	12	4	50
PB-17 3-5'	7/19/99	8	2	10
PB-17 5-7'	7/19/99	7	7	10
PB-17 7-9'	7/19/99	14	33	10
PB-17 9-11'	7/19/99	--	31	10
PB-17 11-13'	7/19/99	--	102	10
PB-18 3-5'	7/19/99	33	44	> 1000
PB-18 5-7'	7/19/99	9	36	200
PB-18 7-9'	7/19/99	8	33	200
PB-19 3-5'	7/19/99	69	96	> 1000
PB-19 5-7'	7/19/99	9	144	100
PB-19 7-9'	7/19/99	7	35	100
PB-20 3.5-5.5'	7/19/99	65	400	> 1000
PB-20 5.5-7.5'	7/19/99	14	900	50
PB-20 7.5-9.5'	7/19/99	10	800	10
PB-21 3.5-5.5'	7/20/99	3	500	1
PB-21 5.5-7.5'	7/20/99	6	600	10
PB-21 7.5-9.5'	7/20/99	8	400	1
PB-21 9.5-11.5'	7/20/99	7	760	1
PB-22 3.5-5.5'	7/20/99	72	550	> 1000
PB-22 5.5-7.5'	7/20/99	17	720	10
PB-23 3.5-5.5'	7/20/99	8	70	1
PB-23 5.5-7.5'	7/20/99	10	240	1
PB-23 7.5-9.5'	7/20/99	18	700	1
PB-23 9.5-11.5'	7/20/99	15	140	1
PB-24 3.5-5.5'	7/20/99	174	312	> 1000
PB-24 5.5-7.5'	7/20/99	10	440	10
PB-25 3.5-5.5'	7/20/99	116	470	> 1000
PB-25 5.5-7.5'	7/20/99	121	423	> 1000
PB-26 3.5-5.5'	7/20/99	63	101	> 1000
PB-26 5.5-6.5'	7/20/99	6	70	10
PB-26 6.5-7.5'	7/20/99	8	80	10

TABLE 6-1
PERIMETER AND OFFSITE INVESTIGATIONS
FIELD PID/FID AND TEST KIT RESULTS

Sample ID	Date Collected	PID ppm	FID ppm	Handby mg/kg
PB-27 3.5-5.5'	7/20/99	6.3	74	1
PB-27 5.5-7.5'	7/20/99	14	320	1
PB-28 3.5-5.5'	7/21/99	5	647	10
PB-28 5.5-7.5'	7/21/99	120	800	> 1000
PB-28 7.5-8.5'	7/21/99	130	360	> 1000
PB-29 3.5-5.5'	7/21/99	4.4	212	1
PB-29 5.5-7.5	7/21/99	4	470	10
PB-30 3.5-5.5'	7/21/99	4.6	67	10
PB-30 5.5-6.5'	7/21/99	17	204	> 1000
PB-31 3.5-5.5'	7/21/99	45	260	> 1000
PB-31 5.5-7.5'	7/21/99	120	413	> 1000
PB-31 7.5-9.5'	7/21/99	75	260	> 1000
PB-32 3.5-5.5'	7/21/99	2.5	120	1
PB-32 5.5-7.5'	7/21/99	2.2	300	1
PB-33 3.5-5.5'	7/21/99	2.6	90	1
PB-33 5.5-7.5'	7/21/99	4.2	43	50
PB-33 7.5-9.5'	7/21/99	2.9	120	1
PB-34 5-7'	7/21/99	2.1	260	1
PB-34 7-9'	7/21/99	4.3	500	10
PB-34 9-11'	7/21/99	3.3	1000	1
PB-34 11-13'	7/21/99	2.2	120	1
PB44 3-5	2/23/00	-4.2	55	10-50
PB44 5-6	2/23/00	-4.6	36	<1
PB44 6-7	2/23/00	-4.4	52	<1
PB44 7-9	2/23/00	-3.79	83	1-10
PB45 3-5	2/23/00	2.38	289-A	1-10
PB45 5-7	2/23/00	-3.24	2.98	1-10
PB45 8-9	2/23/00	2.21	271.1-A	1-10
PB45 9-11	2/23/00	2.76	270.1-A	<1
PB45 11-13	2/23/00	-1.09	76.5	1-10
PB46 3-5	2/23/00	-2.54	90.7	<1
PB46 5-7	2/23/00	75.4	38.7	200
PB47 3-5	2/23/00	-0.03	4.6	1-10
PB47 5-6	2/23/00	-0.27	30.4	1-10
PB47 6-7	2/23/00	-2.24	78.2	1-10
PB47 7-9	2/23/00	3.87	337-A	10-50
PB47 9-11	2/23/00	-4.41	54.2	1-10
PB48 3-5	2/23/00	2.25	1.2	1-10
PB48 6.5-7	2/23/00	2.57	1.4	1-10
PB48 7-9	2/23/00	4.42	3.2	1-10

TABLE 6-1
PERIMETER AND OFFSITE INVESTIGATIONS
FIELD PID/FID AND TEST KIT RESULTS

Sample ID	Date Collected	PID ppm	FID ppm	Handby mg/kg
PB49 3-5	2/23/00	5.29	17.8	<1
PB49 5-7	2/23/00	5.61	1.53	<1
PB49 7-9	2/23/00	4.82	2.1	<1
PB49 9-11	2/23/00	3.82	1.4	1-10
PB49 11-13	2/23/00	3.09	17.3	1-10
PB50 3-4.5	2/24/00	10.12	26.9	1-10
PB50 4.5-5	2/24/00	9.37	6.6	1-10
PB50 5-6	2/24/00	9.32	9.4	10-50
PB50 6-7	2/24/00	11.71	10.3	1-10
PB50 7-9	2/24/00	17.14	29.7	10
PB51 3-5	2/24/00	12.74	103.2	1-10
PB51 5-7	2/24/00	25.19	388-A	1-10
PB51 7-9	2/24/00	27.42	275-A	1-10
PB51 9-11	2/24/00	8.21	45.4	1-10
PB52 5-7	2/24/00	7.24	32.8	1-10
PB52 7.5-9	2/24/00	11.89	275-A	1-10
PB52 9-11	2/24/00	14.36	411-A	1-10
PB52 11-13	2/24/00	18.89	267-A	1-10
PB52 13-15	2/24/00	15.69	169	1-10
PB53 5-7	2/24/00	10.77	29.7	1-10
PB53 7-8.5	2/24/00	36.7	109	1-10
PB53 8.5-9	2/24/00	36.57	257-A	1-10
PB53 9-11	2/24/00	24.89	346-A	1-10
PB53 11-13	2/24/00	50.33	429-A	1-10
PB53 13-15	2/24/00	7.89	139	1-10
PB54 5-7	2/24/00	--	--	<1
PB54 7-8.5	2/24/00	--	--	<1
PB54 8.5-9	2/24/00	--	--	<1
PB55 3-5	2/24/00	--	--	<1
PB55 5-7	2/24/00	--	--	1-10
PB55 7.5-9	2/24/00	--	--	1-10
PB55 9-11	2/24/00	--	--	<1
PB55 11-13	2/24/00	--	--	<1
PB55 13-15	2/24/00	--	--	<1
PB55 15-17	2/24/00	--	--	<1
PB56 3-5	2/25/00	--	--	1-10
PB56 5-7	2/25/00	--	--	<1
PB56 7-9	2/25/00	--	--	<1
PB56 9-11	2/25/00	--	--	<1
PB56 11-13	2/25/00	--	--	1-10
PB57 5-7	2/25/00	--	--	<1
PB57 7-8	2/25/00	--	--	<1
PB57 8-9	2/25/00	--	--	1-10
PB58 3-5	2/25/00	--	--	<1
PB58 5.5-7	2/25/00	--	--	<1
PB58 7-9	2/25/00	--	--	<1
PB58 9-11	2/25/00	--	--	<1
PB58 12.5-13	2/25/00	--	--	<1

Notes:
Shaded samples were analyzed for TPH-Diesel and PAHs
--' Not analyzed

TABLE 6-2
PERIMETER AND OFFSITE INVESTIGATIONS
SOIL ANALYTICAL RESULTS

Location			98-PB01	98-PB02	98-PB03	98-PB04	98-PB05	98-PB06	98-PB07	98-PB08	98-PB09
Depth (ft bgs)		MTCA C[a]	3-4.5	7.5-9	6-7.5	4.5-6	3-4.5	1.5-3	3-4.5	3-4.5	3-4.5
Date Sampled	MTCA B[a]	Industrial	14-Jul-98	15-Jul-98	15-Jul-98	15-Jul-98	16-Jul-98	16-Jul-98	16-Jul-98	16-Jul-98	16-Jul-98
TPH (mg/kg)											
diesel range	--	200	**3,300**	**3,300**	42	**1,800**	25 U	54	74	25 U	25 U
oil range	--	200	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Semivolatiles (µg/kg)											
naphthalene	3,200,000	140,000,000	**532,000**	**137,000**	**1,160**	**245**	42	46	**12,300**	24	41
acenaphthylene	--	--	**3,250**	1,000 U	100 U	1,000 U	10 U	21	22	10 U	10 U
acenaphthene	4,800,000	210,000,000	**225,000**	**47,500**	**620**	**44,400**	95	308	103	65	50
fluorene	3,200,000	140,000,000	**177,000**	**37,000**	482	**39,800**	42	108	473	56	47
phenanthrene	--	--	**465,000**	**94,100**	**1,150**	**133,000**	16	60	219	10 U	10 U
anthracene	24,000,000	1,050,000,000	**132,000**	**17,500**	494	**33,200**	67	33	20	10 U	10 U
fluoranthene	3,200,000	140,000,000	**234,000**	**52,300**	811	**40,700**	10 U	60	143	10 U	10 U
pyrene	2,400,000	105,000,000	**139,000**	**30,600**	444	**24,600**	10 U	48	106	10 U	10 U
benz(a)anthracene	137	18,000	**29,500**	**8,050**	121	**6,240**	10 U	25	33	10 U	10 U
chrysene	137	18,000	**26,200**	**7,120**	144	**5,470**	10 U	33	49	10 U	10 U
benzo(b)fluoranthene	137	18,000	**11,900**	**3,510**	100 U	**2,890**	10 U	41	29	10 U	10 U
benzo(k)fluoranthene	137	18,000	**3,740**	**1,170**	100 U	1,000 U	10 U	14	11	10 U	10 U
benzo(a)pyrene	137	18,000	**6,820**	**1,930**	100 U	**1,670**	10 U	24	15	10 U	10 U
indeno(1,2,3-cd)pyrene	137	18,000	**1,530**	1,000 U	100 U	1,000 U	10 U	16	10 U	10 U	10 U
dibenz(a,h)anthracene	137	18,000	1,000 U	1,000 U	100 U	1,000 U	10 U	10 U	10 U	10 U	10 U
benzo(g,h,i)perylene	--	--	**1,540**	1,000 U	100 U	1,000 U	10 U	19	10 U	10 U	10 U
pentachlorophenol	8,330	1,090,000	10,000 U	10,000 U	1,000 U	10,000 U	100 U	100 U	100 U	100 U	100 U
Total PAHs	--	--	**1,988,480**	**437,780**	**5,426**	**332,215**	**262**	**856**	**13,523**	**145**	**138**
Total carcinogenic PAHs	137	18,000	**79,690**	**21,780**	**265**	**16,270**	10 U	**153**	**137**	10 U	10 U

Notes
bold and **underlined** results are greater than MTCA B (or MTCA A for TPH).
U = below the stated laboratory reporting limit
Samples were analyzed using the following methods: WTPH-D ext.; EPA Method 8270 SIM.
Pentachlorophenol is not a PAH. All carcinogenic PAHs have a MTCA Method C value of 18,000.
a: Cleanup goals and trigger levels are calculated based on provisional oral RfDs cited in EPA Region III RBC table, and MTCA B and C formulas (WAC-173-340-720); except for TPH, which uses the MTCA Method A values.

TABLE 6-2
PERIMETER AND OFFSITE INVESTIGATIONS
SOIL ANALYTICAL RESULTS

Location			98-PB10	98-PB11		98-PB12		98-PB13	98-PB14	PB15	
Depth (ft bgs)		MTCA C[a]	3-4.5	6-7.5	9-10.5	7.5-9	9-10.5	7.5-9	7.5-9	3-5	5-7
Date Sampled	MTCA B[a]	Industrial	16-Jul-98	17-Jul-98	17-Jul-98	17-Jul-98	17-Jul-98	17-Jul-98	21-Jul-98	19-Jul-99	19-Jul-99
TPH (mg/kg)											
diesel range	--	200	25 U	**13,000**	**54**	**100**	25 U	25 U	25 U	**9,600**	**430**
oil range	--	200	50 U	50 U	50 U	50 U	50 U	50 U	50 U	500 U	500 U
Semivolatiles (µg/kg)											
naphthalene	3,200,000	140,000,000	**171**	**4,060,000**	**810**	**8,130**	**6,700**	**11 800**	**25**	**4,580,000**	**67,500**
acenaphthylene	--	--	10 U	100,000 U	1,000 U	1,000 U	100 U	1,000 U	10 U	200,000 U	1,000 U
acenaphthene	4,800,000	210,000,000	**340**	**691,000**	1,000 U	1,000 U	100 U	1,000 U	10 U	**260 000**	**4,430**
fluorene	3,200,000	140,000,000	**128**	**537,000**	1,000 U	1,000 U	100 U	1,000 U	10 U	200,000 U	**2,370**
phenanthrene	--	--	10 U	**1,360,000**	1,000 U	1,000 U	100 U	1,000 U	10 U	**351,000**	**4,270**
anthracene	24,000,000	1,050,000,000	10 U	**161,000**	1,000 U	1,000 U	100 U	1,000 U	10 U	200,000 U	1,000 U
fluoranthene	3,200,000	140,000,000	10 U	**474,000**	1,000 U	1,000 U	100 U	1,000 U	10 U	200,000 U	**1,230**
pyrene	2,400,000	105,000,000	10 U	**340,000**	1,000 U	1,000 U	100 U	1,000 U	10 U	200,000 U	1,000 U
benz(a)anthracene	137	18,000	10 U	100,000 U	1,000 U	1,000 U	100 U	1,000 U	10 U	200,000 U	1,000 U
chrysene	137	18,000	10 U	100,000 U	1,000 U	1,000 U	100 U	1,000 U	10 U	200,000 U	1,000 U
benzo(b)fluoranthene	137	18,000	10 U	100,000 U	1,000 U	1,000 U	100 U	1,000 U	10 U	200,000 U	1,000 U
benzo(k)fluoranthene	137	18,000	10 U	100,000 U	1,000 U	1,000 U	100 U	1,000 U	10 U	200,000 U	1,000 U
benzo(a)pyrene	137	18,000	10 U	100,000 U	1,000 U	1,000 U	100 U	1,000 U	10 U	200,000 U	1,000 U
indeno(1,2,3-cd)pyrene	137	18 000	10 U	100,000 U	1,000 U	1,000 U	100 U	1,000 U	10 U	200,000 U	1,000 U
dibenz(a,h)anthracene	137	18,000	10 U	100,000 U	1,000 U	1,000 U	100 U	1,000 U	10 U	200,000 U	1,000 U
benzo(g,h,i)perylene	--	--	10 U	100,000 U	1,000 U	1,000 U	100 U	1,000 U	10 U	200,000 U	1,000 U
pentachlorophenol	8,330	1,090,000	10 U	1,000,000 U	10,000 U	10,000 U	1,000 U	10,000 U	00 U	2,000,000 U	10,000 U
Total PAHs	--	--	**639**	**7,623,000**	**8**	**8,130**	**6,700**	**11,800**	**25**	**5,191,000**	**79,800**
Total carcinogenic PAHs	137	18,000	10 U	100,000 U	1,000 U	1,000 U	100 U	1,000 U	10 U	200,000 U	1,000 U

Notes:
bold and **underlined** results are greater than MTCA B (or MTCA A for TPH).
U = below the stated laboratory reporting limit
Samples were analyzed using the following methods: WTPH-D ext.; EPA Method 8270 SIM.
Pentachlorophenol is not a PAH. All carcinogenic PAHs have a MTCA Method C value of 18,000.
a: Cleanup goals and trigger levels are calculated based on provisional oral RfDs cited in EPA Region III RBC table, and MTCA B and C formulas (WAC-173-340-720); except for TPH, which uses the MTCA Method A values.

TABLE 6-2
PERIMETER AND OFFSITE INVESTIGATIONS
SOIL ANALYTICAL RESULTS

Location			PB17		PB18	PB20		PB21		PB23	PB24
Depth (ft bgs)		MTCA C[a]	3-5	5-7	3-5	3.5-5.5	5.5-7.5	3.5-5.5	5.5-7.5	5.5-7.5	3.5-5.5
Date Sampled	MTCA B[a]	Industrial	19-Jul-99	19-Jul-99	19-Jul-99	19-Jul-99	19-Jul-99	20-Jul-99	20-Jul-99	20-Jul-99	20-Jul-99
TPH (mg/kg)											
diesel range	--	200	25 U	**75**	**5,000**	**4,600**	**110**	25 U	**38**	25 U	**7,100**
oil range	--	200	50 U	50 U	500 U	500 U	**51**	50 U	50 U	50 U	500 U
Semivolatiles (µg/kg)											
naphthalene	3,200,000	140,000,000	**115**	**969**	**845,000**	**426,000**	**76,900**	**1,750**	**10,700**	100 U	**697,000**
acenaphthylene	--	--	10 U	100 U	10,000 U	10,000 U	1,000 U	100 U	1,000 U	100 U	200,000 U
acenaphthene	4,800,000	210,000,000	**416**	**2,500**	**143,000**	**103,000**	**3,110**	**128**	1,000 U	**563**	**236,000**
fluorene	3,200,000	140,000,000	**341**	**2,150**	**113,000**	**60,500**	1,000 U	100 U	1,000 U	**218**	200,000 U
phenanthrene	--	--	**51**	**3,840**	**288,000**	**140,000**	1,000 U	100 U	1,000 U	100 U	**482,000**
anthracene	24,000,000	1,050,000,000	**80**	**298**	**46,700**	**19,100**	1,000 U	100 U	1,000 U	100 U	200,000 U
fluoranthene	3,200,000	140,000,000	**311**	**427**	**128,000**	**55,400**	1,000 U	100 U	1,000 U	100 U	**220,000**
pyrene	2,400,000	105,000,000	**179**	**192**	**76,400**	**35,100**	1,000 U	100 U	1,000 U	100 U	200,000 U
benz(a)anthracene	137	18,000	**47**	100 U	**20,200**	10,000 U	1,000 U	100 U	1,000 U	100 U	200 000 U
chrysene	137	18,000	**57**	100 U	**17,100**	10,000 U	1,000 U	100 U	1,000 U	100 U	200,000 U
benzo(b)fluoranthene	137	18,000	**92**	100 U	**11,900**	10,000 U	1,000 U	100 U	1,000 U	100 U	200,000 U
benzo(k)fluoranthene	137	18,000	**32**	100 U	10,000 U	10,000 U	1,000 U	100 U	1,000 U	100 U	200,000 U
benzo(a)pyrene	137	18,000	**71**	100 U	10,000 U	10,000 U	1,000 U	100 U	1,000 U	100 U	200,000 U
indeno(1,2,3-cd)pyrene	137	18,000	**32**	100 U	10,000 U	10,000 U	1,000 U	100 U	1,000 U	100 U	200,000 U
dibenz(a,h)anthracene	137	18,000	**11**	100 U	10,000 U	10,000 U	1,000 U	100 U	1,000 U	100 U	200,000 U
benzo(g,h,i)perylene	--	--	**39**	100 U	10,000 U	10,000 U	1,000 U	100 U	1,000 U	100 U	200,000 U
pentachlorophenol	8,330	1,090,000	100 U	1,000 U	100,000 U	100,000 U	10,000 U	1,000 U	10,000 U	1,000 U	2,000,000 U
Total PAHs	--	--	**1874**	**10376**	**1,689,300**	**839,100**	**80,010**	**1,878**	**10,700**	**781**	**1,635,000**
Total carcinogenic PAHs	137	18,000	**342**	100 U	10,000 U	10,000 U	1,000 U	100 U	1,000 U	100 U	200,000 U

Notes:
bold and **underlined** results are greater than MTCA B (or MTCA A for TPH).
U = below the stated laboratory reporting limit
Samples were analyzed using the following methods: WTPH-D ext.; EPA Method 8270 SIM.
Pentachlorophenol is not a PAH. All carcinogenic PAHs have a MTCA Method C value of 18,000.
a: Cleanup goals and trigger levels are calculated based on provisional oral RfDs cited in EPA Region III RBC table, and MTCA B and C formulas (WAC-173-340-720); except for TPH, which uses the MTCA Method A values.

TABLE 6-2
PERIMETER AND OFFSITE INVESTIGATIONS
SOIL ANALYTICAL RESULTS

Location			PB26	PB27		PB28		PB29	PB31	PB33
Depth (ft bgs)		MTCA C[a]	3.5-5.5	3.5-5.5	5.5-7.5	3.5-5.5	5.5-7.5	5.5-7.5	3.5-5.5	3.5-5.5
Date Sampled	MTCA B[a]	Industrial	20-Jul-99	20-Jul-99	20-Jul-99	21-Jul-99	21-Jul-99	21-Jul-99	21-Jul-99	21-Jul-99
TPH (mg/kg)										
diesel range	--	200	**3,100**	25 U	**39**	25 U	**26,000**	25 U	**3,200**	25 U
oil range	--	200	500 U	50 U	**52**	50 U	2,500 U	50 U	500 U	50 U
Semivolatiles (µg/kg)										
naphthalene	3,200,000	140,000,000	**73,300**	**220**	**4,460**	**2,650**	**3,080,000**	**220**	**242,000**	**30**
acenaphthylene	--	--	10,000 U	10 U	100 U	**212**	200,000 U	10 U	20,000 U	10 U
acenaphthene	4,800,000	210,000,000	**103,000**	**312**	**339**	**499**	**576,000**	**412**	**93,900**	**76**
fluorene	3,200,000	140,000,000	**56,000**	**254**	100 U	**109**	**323,000**	**283**	**42,800**	**13**
phenanthrene	--	--	**144,000**	**361**	100 U	**215**	**801,000**	**202**	**68,200**	**19**
anthracene	24,000,000	1,050,000,000	**26,600**	**37**	100 U	**127**	200,000 U	**23**	20,000 U	10 U
fluoranthene	3,200,000	140,000,000	**73,700**	**56**	100 U	**444**	**308,000**	**30**	**119,000**	**18**
pyrene	2,400,000	105,000,000	**48,700**	**35**	100 U	**293**	200,000 U	**16**	**80,300**	10 U
benz(a)anthracene	137	18,000	**14,600**	10 U	100 U	**107**	200,000 U	10 U	20,000 U	10 U
chrysene	137	18,000	**12,800**	**10**	100 U	**136**	200,000 U	10 U	20,000 U	10 U
benzo(b)fluoranthene	137	18,000	**11,200**	**25**	100 U	**226**	200,000 U	10 U	20,000 U	10 U
benzo(k)fluoranthene	137	18,000	10,000 U	10 U	100 U	100 U	200,000 U	10 U	20,000 U	10 U
benzo(a)pyrene	137	18,000	**12,600**	**20**	100 U	100 U	200,000 U	10 U	20,000 U	10 U
indeno(1,2,3-cd)pyrene	137	18,000	10,000 U	**22**	100 U	100 U	200,000 U	10 U	20,000 U	10 U
dibenz(a,h)anthracene	137	18,000	10,000 U	10 U	100 U	100 U	200,000 U	10 U	20,000 U	10 U
benzo(g,h,i)perylene	--	--	10,000 U	**25**	100 U	100 U	200,000 U	10 U	20,000 U	10 U
pentachlorophenol	8,330	1,090,000	100,000 U	100 U	1,000 U	1,000 U	2,000,000 U	100 U	200,000 U	100 U
Total PAHs	--	--	**576,500**	**1377**	4,799	**5,018**	**5,088,000**	**1186**	**646,200**	**156**
Total carcinogenic PAHs	137	18,000	**51,200**	**102**	100 U	**469**	200,000 U	10 U	20,000 U	10 U

Notes:
bold and **underlined** results are greater than MTCA B (or MTCA A for TPH).
U = below the stated laboratory reporting limit
Samples were analyzed using the following methods: WTPH-D ext.; EPA Method 8270 SIM.
Pentachlorophenol is not a PAH. All carcinogenic PAHs have a MTCA Method C value of 18,000.
a: Cleanup goals and trigger levels are calculated based on provisional oral RfDs cited in EPA Region III RBC table, and MTCA B and C formulas (WAC-173-340-720); except for TPH, which uses the MTCA Method A values.

TABLE 6-2
PERIMETER AND OFFSITE INVESTIGATIONS
SOIL ANALYTICAL RESULTS

Location			PB34				PB35		PB37	PB39	PB40
Depth (ft bgs)		MTCA C[a]	5-7	7-9	9-11	11-13	7-9	9-11	5.5-7.5	3.5-5.5	5.5-7.5
Date Sampled	MTCA B[a]	Industrial	21-Jul-99	21-Jul-99	21-Jul-99	21-Jul-99	2-Aug-99	2-Aug-99	2-Aug-99	2-Aug-99	3-Aug-99
TPH (mg/kg)											
diesel range	--	200	25 U	**44**	25 UJ	25 UJ	**44**	**39**	25 U	25 U	**40**
oil range	--	200	50 U	50 U	50 UJ	50 UJ	50 U	50 U	50 U	50 U	**93**
Semivolatiles (µg/kg)											
naphthalene	3,200,000	140,000,000	10 U	**10,500**	**770 J**	10 UJ	10 U	10 U	**40**	**15**	**9690**
acenaphthylene	--	--	10 U	1,000 U	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U
acenaphthene	4,800,000	210,000,000	10 U	**1,080**	**12 J**	10 UJ	10 U	10 U	**11**	**24**	**525**
fluorene	3,200,000	140,000,000	**38**	**1,810**	10 UJ	10 UJ	10 U	10 U	10 U	10 U	**74**
phenanthrene	--	--	**24**	**3,410**	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U
anthracene	24,000,000	1,050,000,000	10 U	**3,120**	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U
fluoranthene	3,200,000	140,000,000	**16**	**3,650**	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U
pyrene	2,400,000	105,000,000	10 U	**3,470**	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U
benz(a)anthracene	137	18,000	10 U	**3,360**	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U
chrysene	137	18,000	10 U	**3,950**	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U
benzo(b)fluoranthene	137	18,000	10 U	**3,440**	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U
benzo(k)fluoranthene	137	18,000	10 U	**3,670**	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U
benzo(a)pyrene	137	18,000	10 U	**3,120**	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U
indeno(1,2,3-cd)pyrene	137	18,000	10 U	**3,580**	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U
dibenz(a,h)anthracene	137	18,000	10 U	**3,660**	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U
benzo(g,h,i)perylene	--	--	10 U	**3,670**	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U
pentachlorophenol	8,330	1,090,000	100 U	**17,300**	100 UJ	100 UJ	100 U	100 U	100 U	100 U	100 U
Total PAHs	--	--	**78**	**72,790**	**782 J**	10 UJ	10 U	10 U	**51**	**39**	**10289**
Total carcinogenic PAHs	137	18,000	10 U	**24,780**	10 UJ	10 UJ	10 U	10 U	10 U	10 U	10 U

Notes:
bold and **underlined** results are greater than MTCA B (or MTCA A for TPH).
U = below the stated laboratory reporting limit
Samples were analyzed using the following methods: WTPH-D ext.; EPA Method 8270 SIM.
Pentachlorophenol is not a PAH. All carcinogenic PAHs have a MTCA Method C value of 18,000.
a: Cleanup goals and trigger levels are calculated based on provisional oral RfDs cited in EPA Region III RBC table, and MTCA B and C formulas (WAC-173-340-720); except for TPH, which uses the MTCA Method A values.

TABLE 6-2
PERIMETER AND OFFSITE INVESTIGATIONS
SOIL ANALYTICAL RESULTS

Location			PB41	PB42	PB43	PB44	PB45	PB46	PB47	PB48	PB49	PB50
Depth (ft bgs)		MTCA C[a]	5.5-7.5	3.5-5.5	3.5-5.5	5-6	5-7	5-7	5-6	6.5-7	7-9	3-4.5
Date Sampled	MTCA B[a]	Industrial	3-Aug-99	3-Aug-99	3-Aug-99	23-Feb-00	23-Feb-00	23-Feb-00	23-Feb-00	23-Feb-00	23-Feb-00	24-Feb-00
TPH (mg/kg)												
diesel range	--	200	25 U	39	43	25 U	25 U	3,000	35	25 U	25 U	25 U
oil range	--	200	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	88
Semivolatiles (µg/kg)												
naphthalene	3,200,000	140,000,000	41	10 U	10 U	10 U	10 U	18,900	286	481	81	16
acenaphthylene	--	--	10 U	10 U	10 U	10 U	10 U	1,970	15	10 U	10 U	12
acenaphthene	4,800,000	210,000,000	10 U	10 U	13	10 U	10 U	73,000	915	89	204	10 U
fluorene	3,200,000	140,000,000	10 U	10 U	10 U	10 U	10 U	57,100	1,340	33	44	10 U
phenanthrene	--	--	10 U	10 U	10 U	10 U	10 U	194,000	999	13	10 U	20
anthracene	24,000,000	1,050,000,000	10 U	10 U	10 U	10 U	10 U	57,200	99	10 U	10 U	36
fluoranthene	3,200,000	140,000,000	10 U	10 U	10 U	10 U	10 U	184,000	68	10 U	10 U	58
pyrene	2,400,000	105,000,000	10 U	10 U	10 U	10 U	10 U	147,000	74	10 U	10 U	47
benz(a)anthracene	137	18,000	10 U	10 U	10 U	10 U	10 U	41,700	10 U	10 U	10 U	25
chrysene	137	18,000	10 U	10 U	10 U	10 U	10 U	45,300	26	10 U	10 U	29
benzo(b)fluoranthene	137	18,000	10 U	10 U	10 U	10 U	10 U	37,200	37	10 U	10 U	68
benzo(k)fluoranthene	137	18,000	10 U	10 U	10 U	10 U	10 U	12,300	10 U	10 U	10 U	15
benzo(a)pyrene	137	18,000	10 U	10 U	10 U	10 U	10 U	26,800	32	10 U	10 U	20
indeno(1,2,3-cd)pyrene	137	18,000	10 U	10 U	10 U	10 U	10 U	9,960	22	10 U	10 U	19
dibenz(a,h)anthracene	137	18,000	10 U	10 U	10 U	10 U	10 U	3,200	10 U	10 U	10 U	10 U
benzo(g,h,i)perylene	--	--	10 U	10 U	10 U	10 U	10 U	11,600	25	10 U	10 U	21
pentachlorophenol	8,330	1,090,000	100 U	100 U	100 U	100 U	50 U	240 U	50 U	50 U	50 U	50 U
Total PAHs	--	--	41	10 U	13	10 U	10 U	921,230	3,938	616	329	386
Total carcinogenic PAHs	137	18,000	10 U	10 U	10 U	10 U	10 U	176,460	117	10 U	10 U	176

Notes:
bold and **underlined** results are greater than MTCA B (or MTCA A for TPH).
U = below the stated laboratory reporting limit
Samples were analyzed using the following methods: WTPH-D ext.; EPA Method 8270 SIM.
Pentachlorophenol is not a PAH. All carcinogenic PAHs have a MTCA Method C value of 18,000.
a: Cleanup goals and trigger levels are calculated based on provisional oral RfDs cited in EPA Region III RBC table, and MTCA B and C formulas (WAC-173-340-720); except for TPH, which uses the MTCA Method A values.

TABLE 6-2
PERIMETER AND OFFSITE INVESTIGATIONS
SOIL ANALYTICAL RESULTS

Location			PB51	PB52	PB53		PB54	PB55	PB56	PB57	PB58
Depth (ft bgs)		MTCA C[a]	3-5	7.5-9	7-8.5	8.5-9	8.5-9	5-7	7-9	7-8	5.5-7
Date Sampled	MTCA B[a]	Industrial	24-Feb-00	24-Feb-00	24-Feb-00	24-Feb-00	24-Feb-00	24-Feb-00	25-Feb-00	25-Feb-00	25-Feb-00
TPH (mg/kg)											
diesel range	--	200	25 U	**41**	**38**	**52**	**67**	25 U	25 U	**36**	25 U
oil range	--	200	**350**	50 U	50 U	50 U	**180**	50 U	50 U	50 U	50 U
Semivolatiles (µg/kg)											
naphthalene	3,200,000	140,000,000	**62**	**1,010**	**348**	**9,050**	**13,600**	10 U	10 U	**2,020**	10 U
acenaphthylene	--	--	**54**	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
acenaphthene	4,800,000	210,000,000	**20**	**1,090**	**1,560**	**2,170**	**1,390**	10 U	10 U	**1,130**	10 U
fluorene	3,200,000	140,000,000	**24**	**400**	**1,620**	**608**	**108**	10 U	10 U	**411**	10 U
phenanthrene	--	--	**76**	**32**	**1,730**	**98**	**14**	10 U	10 U	**29**	10 U
anthracene	24,000,000	1,050,000,000	**153**	10 U	**24**	10 U	10 U	10 U	10 U	10 U	10 U
fluoranthene	3,200,000	140,000,000	**266**	10 U	**22**	**10**	**13**	10 U	10 U	**13**	10 U
pyrene	2,400,000	105,000,000	**236**	10 U	10 U	10 U	**11**	10 U	10 U	10 U	10 U
benz(a)anthracene	137	18,000	**134**	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
chrysene	137	18,000	**154**	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
benzo(b)fluoranthene	137	18,000	**386**	10 U	10 U	10 U	**11**	10 U	10 U	**11**	10 U
benzo(k)fluoranthene	137	18,000	**79**	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
benzo(a)pyrene	137	18,000	**104**	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
indeno(1,2,3-cd)pyrene	137	18,000	**113**	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
dibenz(a,h)anthracene	137	18,000	**36**	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
benzo(g,h,i)perylene	--	--	**120**	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
pentachlorophenol	8,330	1,090,000	50 U	50 U	50 U	50 U	5 U	50 U	50 U	50 U	50 U
Total PAHs	--	--	**2,017**	**2,532**	**5,304**	**11,936**	**15,147**	10 U	10 U	**3,614**	10 U
Total carcinogenic PAHs	137	18,000	**1006**	10 U	10 U	10 U	10 U	10 U	10 U	**11**	10 U

Notes:
bold and **underlined** results are greater than MTCA B (or MTCA A for TPH).
U = below the stated laboratory reporting limit
Samples were analyzed using the following methods: WTPH-D ext.; EPA Method 8270 SIM.
Pentachlorophenol is not a PAH. All carcinogenic PAHs have a MTCA Method C value of 18,000.
a: Cleanup goals and trigger levels are calculated based on provisional oral RfDs cited in EPA Region III RBC table, and MTCA B and C formulas (WAC-173-340-720); except for TPH, which uses the MTCA Method A values.

TABLE 6-3
OFFSITE INVESTIGATIONS
GROUNDWATER ANALYTICAL RESULTS

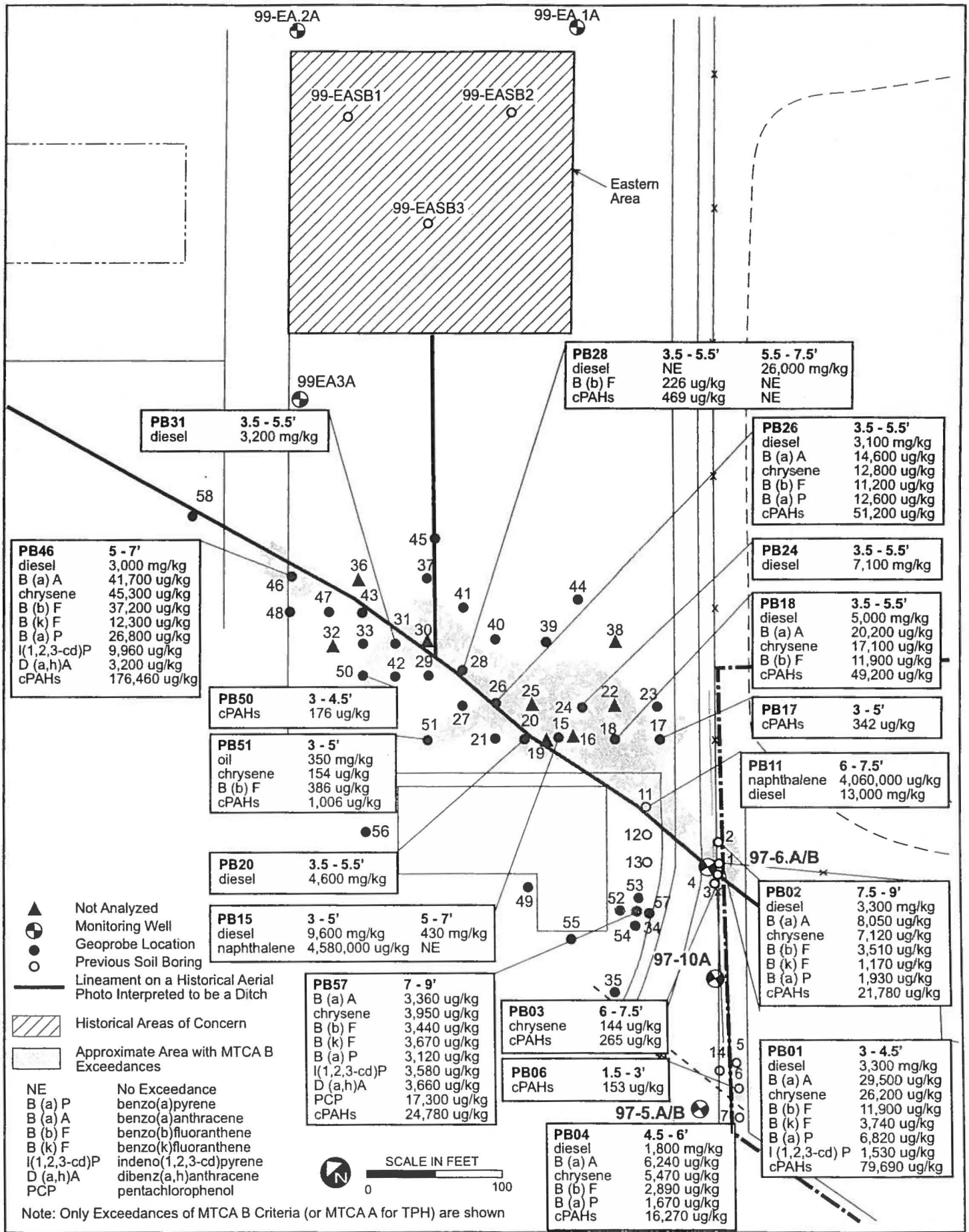
Location ID: / Date Sampled:	MTCA A or B[a]	PB17-GW 19-Jul-99	PB21-GW 20-Jul-99	PB23-GW 20-Jul-99	PB31-GW 21-Jul-99	PB34-GW 21-Jul-99	PB35-GW 2-Aug-99	PB40-GW 3-Aug-99	PB42-GW 3-Aug-99	PB43-GW 3-Aug-99
TPH (mg/L)										
diesel range	1	**0.28**	**1.9**	0.25 U	**39**	**0.69**	0.25 U	**0.98**	**1.4**	**2.0**
oil range	1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Semivolatiles (µg/L)										
naphthalene	320	**1.0**	**117**	--	**12,900**	**2.1**	0.1 U	**1.1**	**2.5**	**615**
acenaphthylene	--	0.1 U	1.0 U	--	100 U	0.1 U	0.1 U	0.1 U	**0.5**	0.1 U
acenaphthene	960	**4.3**	**22**	--	**687**	**0.4**	0.1 U	**13.6**	**62.1**	**73.6**
fluorene	640	**0.8**	**5.9**	--	**337**	**0.3**	0.1 U	**7.0**	**1.4**	**16.2**
phenanthrene	--	**1.1**	**1.8**	--	**543**	**0.3**	0.1 U	**4.6**	**0.3**	0.1 U
anthracene	4,800	**0.1**	1.0 U	--	100 U	0.1 U	0.1 U	**0.3**	**0.2**	0.1 U
fluoranthene	640	**0.3**	1.0 U	--	**206**	**0.1**	0.1 U	0.1 U	0.1 U	0.1 U
pyrene	480	**0.2**	1.0 U	--	**110**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
benz(a)anthracene	0.012	0.1 U	1.0 U	--	100 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
chrysene	0.012	0.1 U	1.0 U	--	100 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
benzo(b)fluoranthene	0.012	0.1 U	1.0 U	--	100 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
benzo(k)fluoranthene	0.012	0.1 U	1.0 U	--	100 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
benzo(a)pyrene	0.012	0.1 U	1.0 U	--	100 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
indeno(1,2,3-cd)pyrene	0.012	0.1 U	1.0 U	--	100 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
dibenz(a,h)anthracene	0.012	0.1 U	1.0 U	--	100 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
benzo(g,h,i)perylene	--	0.1 U	1.0 U	--	100 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
pentachlorophenol	0.729	0.5 U	5.0 U	--	500 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Total PAHs	--	**7.8**	**146.7**	--	**14,783**	**3.2**	0.1 U	**26.6**	**67.0**	**704.8**
Total carcinogenic PAHs	0.012	0.1 U	1.0 U	--	100 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U

Notes:
bold and **underlined** results are greater than MTCA B.
U = below the stated laboratory reporting limit
Samples were analyzed using the following methods: WTPH-D ext.; EPA Method 8270 SIM.
Pentachlorophenol is not a PAH. All carcinogenic PAHs have a MTCA Method B value of 0.012.
a: Cleanup goals and trigger levels are calculated based on provisional oral RfDs cited in EPA Region III RBC table, and MTCA B and C formulas (WAC-173-340-720); except for TPH, which uses the MTCA Method A values.

TABLE 6-3
OFFSITE INVESTIGATIONS
GROUNDWATER ANALYTICAL RESULTS

Location ID: / Date Sampled:	MTCA A or B[a]	PB44 23-Feb-00	PB45 23-Feb-00	PB47 23-Feb-00	PB50 24-Feb-00	PB51 24-Feb-00	PB53 24-Feb-00	PB49 23-Feb-00	PB55 24-Feb-00	PB56 25-Feb-00	PB58 25-Feb-00
TPH (mg/L)											
diesel range	1	0.25 U	**1.2**	**0.60**	**0.28**	**1.1**	**0.73**	0.25 U	0.25 U	0.25 U	**1.4**
oil range	1	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Semivolatiles (µg/L)											
naphthalene	320	0.1 U	**6**	**0.5**	**0.1**	**0.7**	**31.4**	**0.2**	**0.1**	0.1 U	**0.9**
acenaphthylene	--	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**1.7**
acenaphthene	960	0.1 U	**1.4**	**1.5**	**0.4**	**11.1**	**1.1**	**0.1**	**0.1**	0.1 U	**194**
fluorene	640	0.1 U	**0.1**	0.1 U	0.1 U	**2.5**	0.1 U	0.1 U	0.1 U	0.1 U	**108**
phenanthrene	--	**0.7**	0.1 U	0.1 U	0.1 U	**1.8**	0.1 U	0.1 U	0.1 U	0.1 U	**113**
anthracene	4,800	0.1 U	0.1 U	0.1 U	0.1 U	**0.1**	0.1 U	0.1 U	0.1 U	0.1 U	**10.8**
fluoranthene	640	**1.1**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**10.8**
pyrene	480	**1.1**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**7.6**
benz(a)anthracene	0.012	**0.4**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.3**
chrysene	0.012	**0.6**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
benzo(b)fluoranthene	0.012	**0.6**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
benzo(k)fluoranthene	0.012	**0.2**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
benzo(a)pyrene	0.012	**0.5**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
indeno(1,2,3-cd)pyrene	0.012	**0.3**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
dibenz(a,h)anthracene	0.012	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
benzo(g,h,i)perylene	--	**0.3**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
pentachlorophenol	0.729	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Total PAHs	--	**5.8**	**7.5**	**2**	**0.5**	**16.2**	**32.5**	**0.3**	**0.2**	0.1 U	**447.1**
Total carcinogenic PAHs	0.012	**2.6**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.3**

Notes:
bold and **underlined** results are greater
U = below the stated laboratory reporting
Samples were analyzed using the followi
Pentachlorophenol is not a PAH. All carc
a: Cleanup goals and trigger levels are c
and MTCA B and C formulas (WAC-173-



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URS

Maintenance Facility Area Soil Analytical Results

Figure 6-1

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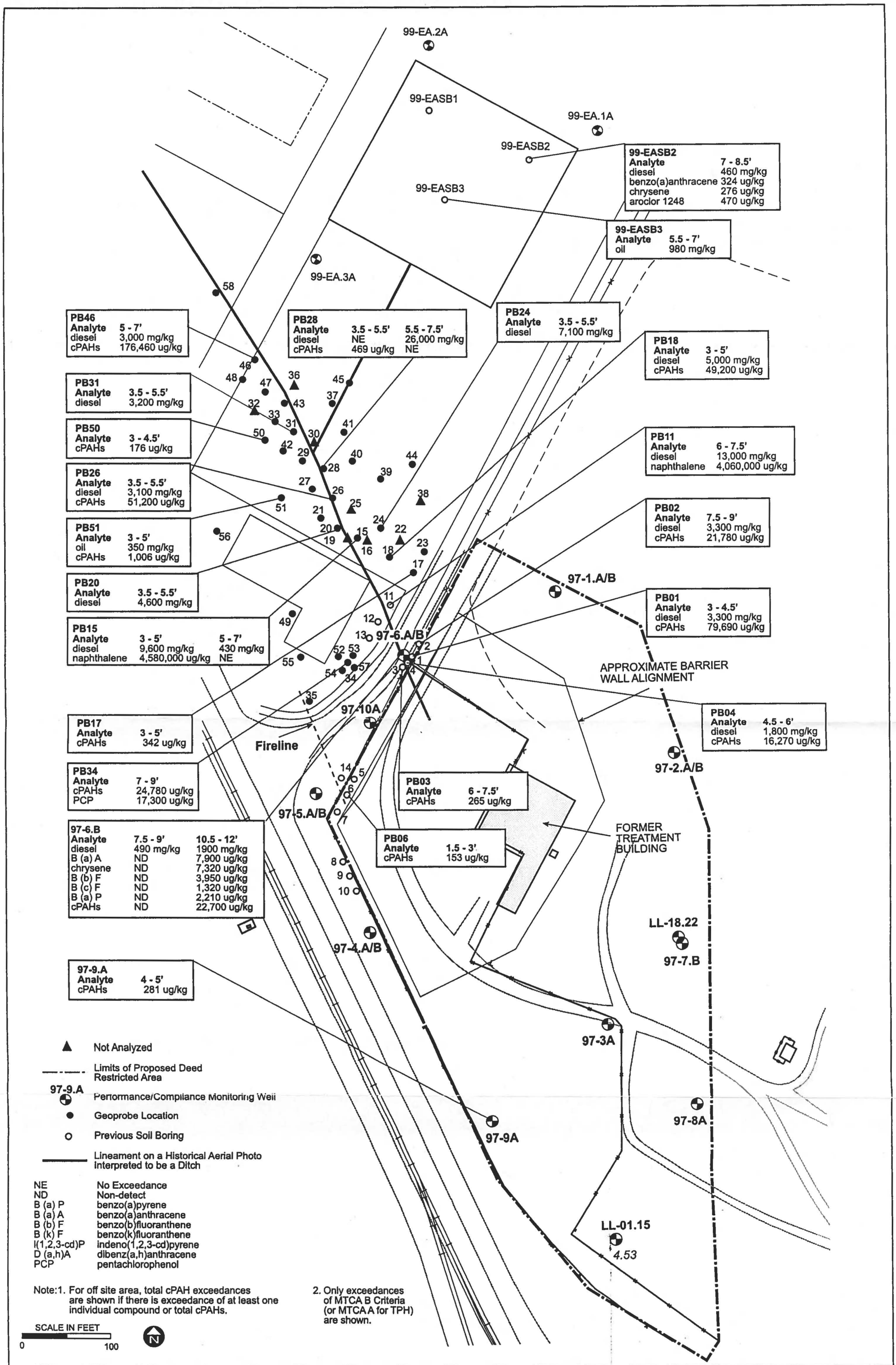

International Paper Longview, WA	Project No. 54944006NA	Study Area Soil Analytical Results
URS		Figure 6-2

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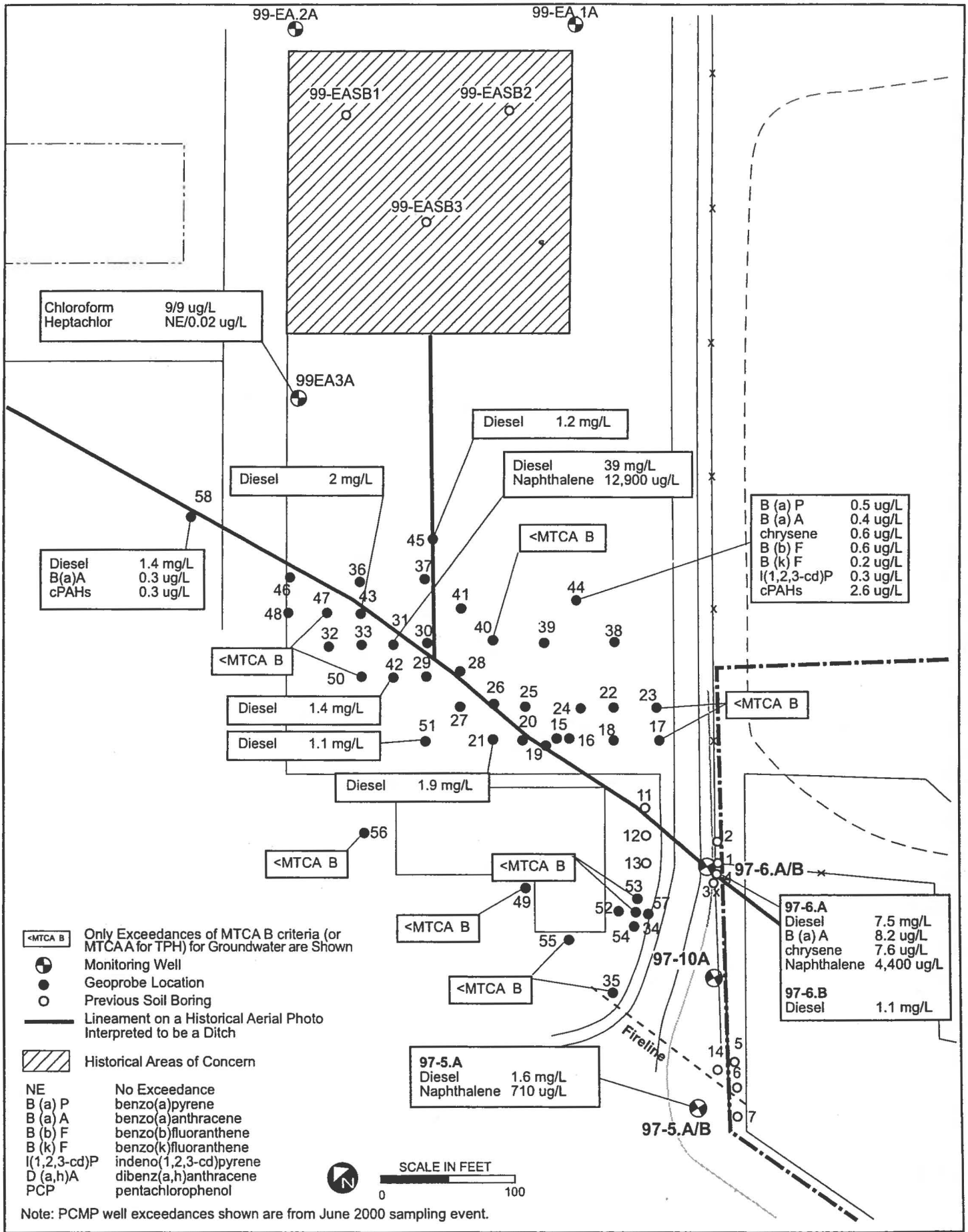

Note: PCMP well exceedances shown are from June 2000 sampling event.

International Paper Longview, WA	Project No. 54944006NA	Maintenance Facility Area Groundwater Analytical Results	Figure 6-3
URS			

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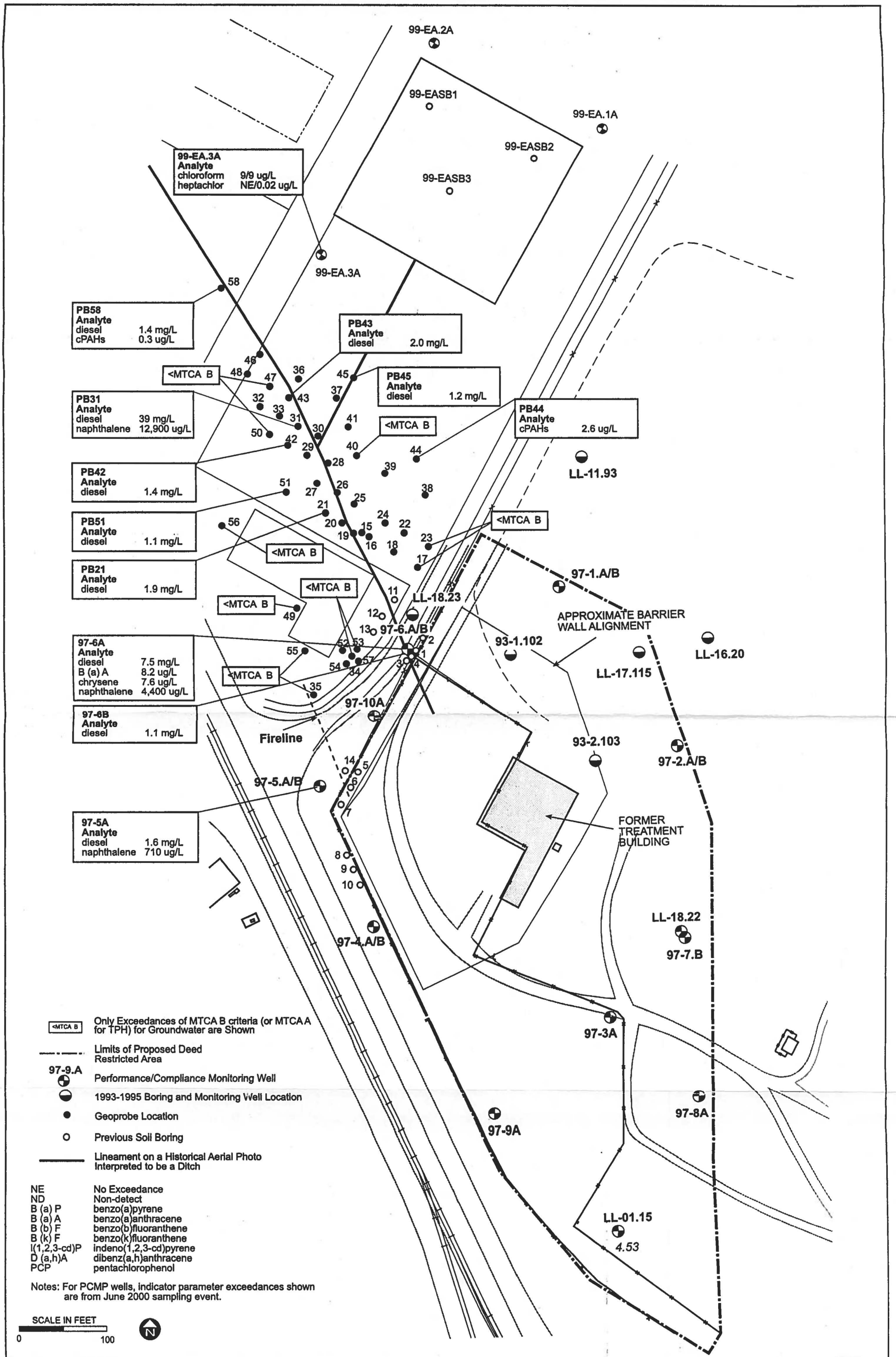

International Paper
Longview, WA

Project No.
54944006NA

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Study Area
Groundwater Analytical Results

Figure 6-4

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7.1 ADDITIONAL ACTION FEASIBILITY STUDY

In accordance with the PCMP, an AAFS was performed to evaluate the necessity of performing remedial action in the study area. The PCMP stipulates requirements for performing an AAFS and established the process by which the need for further cleanup actions associated with the former TWP area are evaluated. This process, termed the AAFS process, provides a methodology to evaluate, as appropriate:

- The need for additional cleanup measures/actions at the former TWP area
- Specific remedial technologies available
- The most technically effective, practicable, and economically feasible remediation alternative

The PCMP outlines a step-by-step process for performing these evaluations, which consists of:

- Identification and assessment of potential impacts and receptors
- Evaluation of potential cleanup action alternatives, if appropriate
- Selection and justification of a preferred cleanup action alternative, if appropriate
- Reporting

This process is shown in Figure 7-1, which was originally contained in the PCMP. The organization of this AAFS follows the organization shown in the PCMP.

The objective of this AAFS is to evaluate the necessity of remediation in the Maintenance Facility area, and select an effective, practicable, and cost-effective remedial method if warranted.

7.2 DESCRIPTION OF POTENTIAL IMPACT

Detailed results from the investigations in the Maintenance Facility area, for soil and groundwater, were discussed in Section 6.0 and are summarized below.

7.2.1 Soil Quality

The impacted soil is primarily situated above the Upper Silt. The primary area containing soil with TPH and PAHs exceeding MTCA B (or MTCA A for TPH) is about 400 feet long by 50 feet wide. Several fingers or lesser areas located to the northwest and west result in a total of about area of about 23,000 square feet.

The upper 3 to 4 feet of material is reinforced pavement and fill; the impacted interval is typically an 18-inch to 24-inch-thick interval occurring at a depth between 4 and 6 feet bgs, depending on location. To be conservative, a 2-foot thickness for the impacted zone was assumed. This yields a total soil volume likely to require treatment of about 40,000 cubic feet (1,500 cubic yards).

7.2.2 Groundwater Quality

Groundwater in Aquifer A, underlying the Upper Silt, contains TPH and PAHs at concentrations exceeding regulatory criteria. The extent of impacted groundwater is delineated to the east, south, and north, as shown on Figure 6-3, but is not fully delineated towards the west. TPH as diesel and PAHs were detected in the westernmost Geoprobe location (PB-58), located west of the utility corridor. These data were discussed in detail in Section 6.2.

The presence of these constituents in groundwater appears to be attributable to penetration of the Upper Silt by these constituents in the central portion of the impacted area (near borings PB-21 and PB-42). Although the hydraulic gradient is generally towards the north-northeast, the constituents appear to have migrated primarily along the transect of the lineament, towards the west-northwest.

7.3 POTENTIAL PATHWAYS AND RECEPTORS

Exposure pathways involve four necessary elements. There are: (1) a source and mechanism of chemical release to the environment, (2) an environmental transport medium, (3) a point of potential receptor contact with the medium containing the site-related chemical, and (4) a receptor intake route at the contact point. Whenever one or more of the exposure pathway elements are missing, the exposure pathway is incomplete and there is no exposure and, therefore, no health risk.

The *Focused Feasibility Study* for the former TWP area analyzed potential pathways and receptors for the COCs (PCP, TPH, and PAHs) present in that area, and concluded that potential receptors for site-related chemicals included the following:

- Future construction and remediation workers, from potential exposure to dust emissions and affected subsurface soils during construction or remediation,
- future construction and remediation workers, from potential exposure to affected groundwater in Aquifer A during construction or remediation,
- future industrial workers, from potential exposure to groundwater in Aquifer A in the event that affected groundwater is used in the future for water supply.

Because subsurface conditions in the former TWP area are similar to subsurface conditions in the Maintenance Facility Area, potential pathways and receptors are considered to be similar.

7.4 CLEANUP ACTION OBJECTIVES

Model Toxics Control Act regulations Part VII, Cleanup Standards (WAC 173-340-700) through 760 provides an overview and specifics of the methods to be used in establishing cleanup standards, and distinguishes between cleanup standards and cleanup actions.

The cleanup action objectives for the Maintenance Facility area should be identical to or less than the Remedial Action Objectives discussed in the *Focused Feasibility Study* and established as cleanup levels in the PCMP for the former TWP area. These are summarized in Section 2.0. Based on the long-term industrial use of the site, and the other risk-related factors discussed in Section 2.0, MTCA Method C industrial criteria (MTCA Method A for TPH) are regarded as

appropriate standards for evaluating soil and groundwater remedial actions. These cleanup action objectives are applicable to the same suite of COCs, including TPH, PCP, and PAHs.

To be conservative (i.e., tending to be overly-protective of the environment), MTCA Method B criteria (and MTCA Method A for TPH) for the COCs may serve as cleanup action objectives for soil and groundwater remedial actions. It should be noted that the cleanup action objectives represent goals for attaining long-term cleanup; achieving the cleanup action objectives may not be practicable, depending on conditions encountered during implementation of remedial actions.

7.5 EVALUATION OF EXISTING DATA

The delineation of impacted soil and groundwater in the Maintenance Facility Area is described in Section 6.0 and considered to be adequate. As noted in Section 6.2, the extent of TPH and PAHs in groundwater west of Geoprobe location PB-58 has not been fully delineated. However, the Western Area is located about 500 feet west of Geoprobe location PB-58, and the oil storage area, a known source of significant concentrations of TPH in soil and groundwater, are located several hundred feet further to the west. Therefore, it was concluded that further investigation to the west of PB-58 is unlikely to yield additional useful information.

7.6 ADDITIONAL DATA COLLECTION

No additional data regarding soil and groundwater quality in the study area are considered necessary.

7.7 IDENTIFICATION AND SELECTION OF CLEANUP ACTION ALTERNATIVES

Several remedial alternatives were identified based upon site characteristics, waste type, and media type for evaluation in relation to possible future cleanup actions in the Maintenance Facility Area. The following alternatives were included in the initial screening of technologies:

Impacted Soil in Upper Sand Unit

1. Excavation and on-site disposal (under the existing engineered cover),
2. Excavation and off-site disposal (incineration),
3. Excavation and off-site disposal (hazardous waste landfill, and incineration),
4. In-situ solidification,
5. In-situ thermal treatment (using six-phase heating),
6. Passive venting,
7. Active venting, and
8. Existing engineered cover, institutional controls, no further action.

Impacted Groundwater in Lower Sand Unit

9. In-situ thermal treatment (using six-phase heating),

10. Passive venting and ORC injection,
11. Passive venting and air sparging,
12. Active venting and air sparging,
13. Institutional controls, no further action.

7.8 INITIAL EVALUATION OF CLEANUP ACTION ALTERNATIVES

Following the identification of the alternatives listed in Section 7.6, each was evaluated according to technical, environmental, human health, and institutional concerns, as discussed below. Cost estimates for each alternative are also presented below. An overview of the evaluation of each cleanup action alternative is presented in Table 7-1.

7.9 EVALUATION CRITERIA

In accordance with the PCMP, each alternative identified in Section 7.6 was evaluated based on:

- Technical performance, reliability, implementability, and safety,
- Environmental concerns, including site conditions, migration pathways addressed, short- and long-term effectiveness, adverse impacts and the need for mitigation of any impacts due to the alternative,
- Human health effects, including mitigation of short- or long-term exposure and protectiveness during and following implementation, and
- Institutional needs, including required compliance with local, state, or federal jurisdictions for design, installation of the alternatives, and operation of the alternatives.

As the Maintenance Facility Area is an active site area, critical to site operations, and heavily trafficked, the excavation alternatives (Alternatives 1 through 3) identified above were eliminated based upon implementability, installation, operation, and institutional needs.

In-situ solidification, Alternative 4, also requires excavation, then mixing, and replacement of excavated soils. This alternative was also dismissed due to the impact on site operations at this active facility.

Alternative 5, in-situ thermal treatment, is regarded as unlikely to be effective, due to the limited moisture available in sediments above the Upper Silt. This technique relies on steam created from groundwater and soil-pore water, which are largely absent above the Upper Silt. In addition, application of this method may result in the mobilization of contaminants which would not be captured.

Alternatives 6 and 7, passive and active venting, were both retained for further analysis as an appropriate alternative for the Upper Sand. However, both will require the installation of 10 to 12 wells in the Maintenance Facility Area, which will likely disrupt site activities. In addition, these technologies will at best only reduce COC levels but will not meet state cleanup criteria.

Alternative 8, existing engineered cover, institutional controls, no further action, was retained for further analysis as an appropriate alternative for site COCs in soils in the Upper Sand Unit. These soils are effectively capped by asphalt at the surface and by the Upper Silt below the

Upper Sand Unit. In addition, the COCs detected in these soils have limited mobility in this unsaturated zone, as discussed in the *Focused Feasibility Study*. The existing pavement, fill, and filter fabric effectively serve as an engineered cover for the impacted area. Institutional controls (i.e., deed restrictions) will mitigate risks to future construction and remediation workers, described in Section 7.2.

Groundwater impacts in the Maintenance Facility area need to b. addressed with respect to COCs that are more mobile in groundwater.

In-situ thermal treatment (six-phase heating), Alternative 9, was eliminated due to anticipated poor technical performance for high boiling point COCs. Six-phase heating relies on steam created from groundwater and soil-pore water, and is most effective with COCs that have boiling points that are closer to that of water.

Alternatives 10, 11, 12, and 13 were retained for more detailed analysis following the initial evaluation of the identified above alternatives. These alternatives all have less impact on the site surface and would not create an extended period of facility disruptions. In-situ treatment has previously been utilized successfully to mitigate COCs at wood preserving sites, including the former TWP site adjacent to the Maintenance Facility area.

7.10 COST ESTIMATES

Costs for each alternative were estimated based upon:

- Capital costs, including direct construction and indirect construction and overhead costs, and
- Operation and maintenance costs, including all post-construction costs needed for effective operation and maintenance of the system for the cleanup action period.

A comparison of costs is summarized in Table 7-1; detailed costs are included in Attachment 1. Actual costs, including costs of interrupting facility operations, could be significantly higher for alternatives that involve disturbances of the site surface.

The COCs detected in samples from the Maintenance Facility area vary in their physical and chemical properties. In-situ enhanced biodegradation using bioventing/biosparging can enhance natural biodegradation and reduce the toxicity of the COCs that are most mobile. These include the single- and double-ring PAHs and the single-ring aromatic hydrocarbons. Low rates of biodegradation of single- and double-ring PAHs have been observed during in-situ bioventing at wood preserving sites. Alternatives 10, 11, and 12 would potentially reduce the toxicity, mobility, and mass of contaminants in the Maintenance Facility area.

Alternative 10, passive venting (bioventing) and ORC injection, would utilize an injection of a time-released chemical oxidizer to supply the electron acceptor for subsurface bioremediation processes. Gaseous bioremediation by-products would be released to the atmosphere via bioventing wells. Passive oxygen transfer into the subsurface could also take place in the vicinity of the bioventing well screens. An effective transfer of electron acceptors into site groundwater using this method, requires a high groundwater velocity in order to create an adequate radius of influence, or numerous injection points. An ORC groundwater pilot study has already been conducted near well 97-6.A, and this technology was determined to be ineffective at degrading site constituents.

Alternative 11, passive venting (bioventing) and air sparging, would utilize a forced air system to supply the electron acceptor (oxygen) for subsurface bioremediation processes. Gaseous bioremediation by-products would also, as in Alternative 10, be released to the atmosphere via bioventing wells. Passive oxygen transfer into the subsurface could also take place in the vicinity of the bioventing well screens. Gas transfer can be accomplished by either vertical or horizontal wells. Horizontal wells would be an advantage at t. is site due to current site uses and the need for reducing impediments to log storage and heavy vehicular traffic.

Alternative 12, active venting and air sparging, would also utilize, as in Alternative 11, a forced air system to supply the electron acceptor (oxygen) for subsurface bioremediation processes. Gaseous bioremediation by-products would be actively removed from the surface via extraction wells and a vacuum blower system. Passive venting technology has been effectively utilized at the former TWP area, and an active venting system may not be required in the Maintenance Facility area. An active venting system can be added to bioventing wells if a need is determined in the future.

Alternative 13, institutional controls, no further action, may not address risks to future construction and remediation workers if affected groundwater migrates beyond the deed-restricted boundaries.

Preferred Soil Remediation Alternative

Based on the evaluations above, Alternative 8 (engineered cover with institutional controls) is selected as the preferred cleanup action alternative for soils in the Upper Sand Unit. This alternative will adequately protect human health and the environment due to the low mobility of site COCs in dry soils and the presence of an engineered filter fabric at a depth of about 3 feet and 6 inches of asphalt at the surface, which both effectively function as a cap.

Preferred Groundwater Remediation Alternative

Alternative 11, passive venting (bioventing) and air sparging, is selected as the preferred cleanup action alternative for groundwater in the Lower Sand Unit. Horizontal wells will be utilized due to current site uses and the need for reducing impediments to log storage and heavy vehicular traffic. It is recommended that this alternative be initially implemented as a pilot test to ensure that it is effective in this area. The results will be evaluated annually by collecting and analyzing groundwater samples from the biovent wells, similar to the treatment evaluation process used in the former TWP area.

The proposed configuration of the air sparging/bioventing pilot test system is illustrated in Figure 7-2. The system would utilize two horizontal air sparging wells installed at a depth of approximately 25 feet below bgs, and four vertical bioventing wells completed approximately 10 feet above the air sparging wells (or approximately 15 feet bgs). Figure 7-3 illustrates the conceptual configuration in cross section. The locations of the two horizontal wells are configured to both cut off COC migration along the lineament, and to remediate the inferred central "source" area in the vicinity of the former lineament.

An access trench would be excavated along the southern edge of the utility corridor at the northern perimeter of the impacted area. The horizontal borings would be drilled from this trench at a 4:1 slope until the desired depth is achieved. At the appropriate depth, the boring would continue parallel to grade until it reached the far end of the screened interval. At this point, the boring would again return to grade at a 4:1 slope. The horizontal wells would be

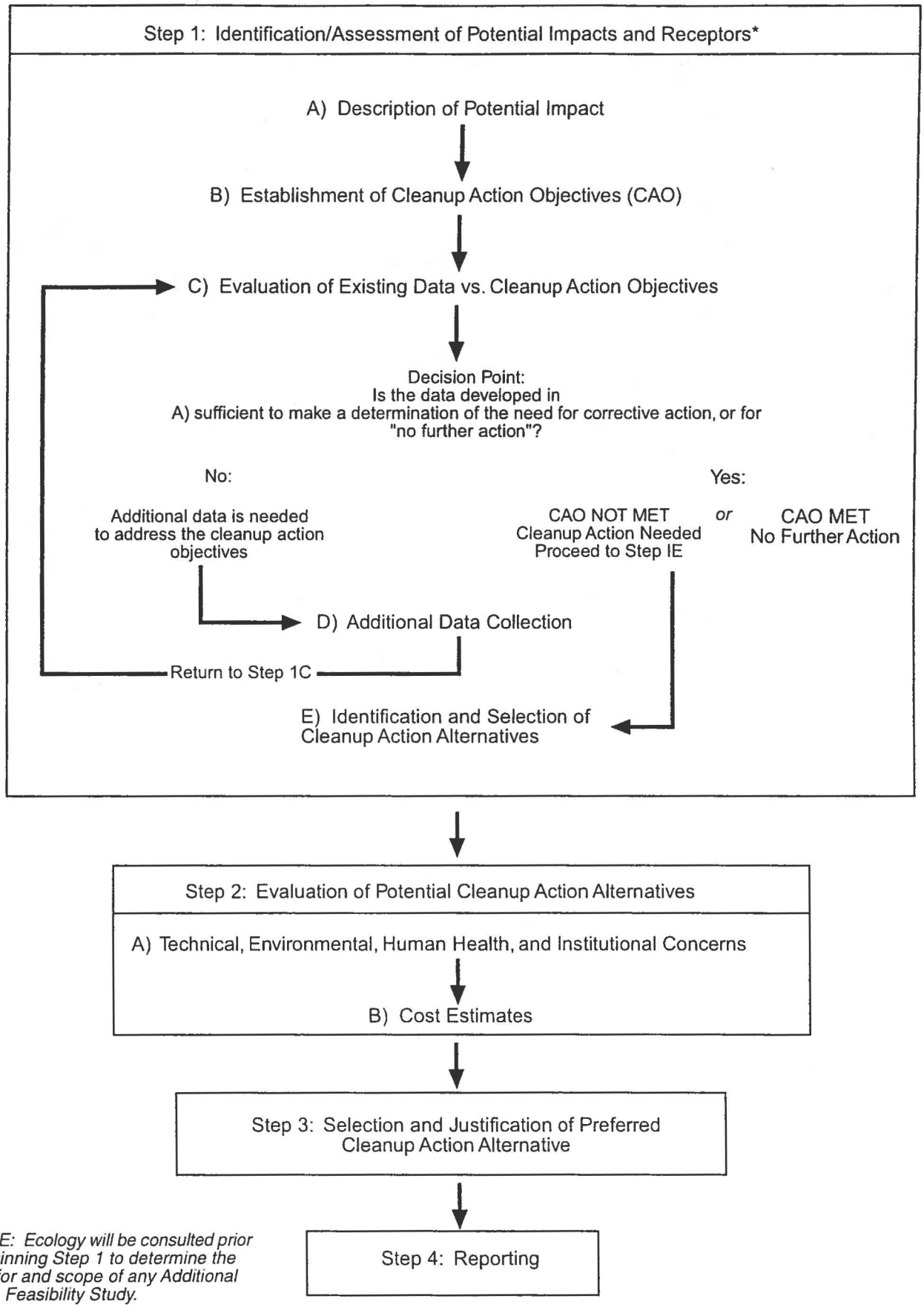
installed by pulling the casing back through the boring. Vaults will be installed at the far end of the borings. These vaults will allow access to the horizontal wells for connection of process instrumentation, equipment, and system monitoring. The entrance points of the wells will be connected via horizontal piping in the access trench to the location of the equipment shed shown on Figure 7-2. This shed will house the air sparging equipment. The vertical wells will be installed with appropriate traffic rated vault boxes and be completed above gradient, subject to approval from the Port.

The estimated cost for the proposed air sparging and bioventing system pilot test is $490,000. This estimate includes capital costs, and 3 years of PCMP monitoring and operations and maintenance of the treatment systems inside the former TWP area and in the Maintenance Facility area. Costs are also included for modifying the PCMP monitoring well network. A detailed breakdown of costs is provided in Attachment A.

TABLE 7-1
EVALUATION OF CLEANUP ACTION ALTERNATIVES

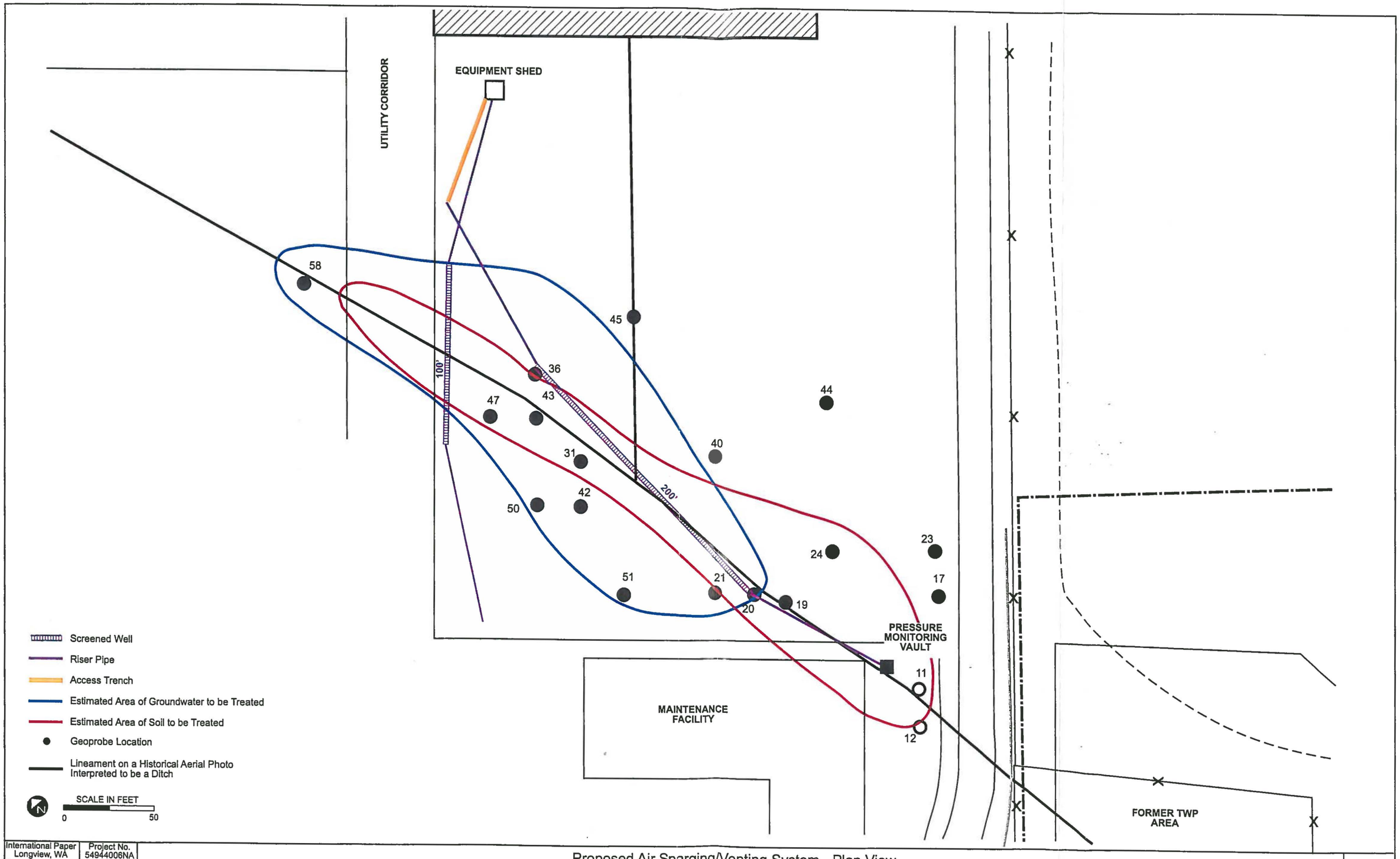
Cleanup Action Alternative	Technical	Environmental	Human Health	Institutional	Costs	Overall	Direct Costs	Total Costs
Impacted Soil in Upper Sand Unit								
1. Excavation and engineered cover	4	5	4	5	6	24	$1,264,000	$1,643,200
2. Excavation and off-site incineration	2	10	2	10	9	33	$3,287,000	$4,273,100
3. Excavation and off-site landfill/incin	3	10	3	10	8	34	$2,595,000	$3,373,500
4. In-situ solidification	4	5	4	5	4	22	$682,000	$886,600
5. In-situ thermal treatment (6-ph)	4	6	5	6	7	28	$1,473,000	$1,914,900
6. Passive venting	5	2	6	2	3	18	$358,000	$465,400
7. Active venting	5	1	6	1	4	17	$386,000	$501,800
8. Engineered cover, institutional controls	2	3	6	3	1	**15**	$320,000	$416,000
Impacted Groundwater in Lower Sand Unit								
9. In-situ thermal treatment (6-phase)	4	6	5	6	7	28	$1,118,000	$1,453,400
10. Passive venting and ORC injection	5	3	6	3	2	19	$447,000	$581,100
11. Passive venting and air sparging	5	2	6	2	3	**18**	$492,000	$639,600
12. Active Venting and air sparging	5	1	6	1	5	18	$560,000	$728,000
13. Engineered cover, institutional controls	2	10	6	10	1	29	$320,000	$416,000

Note: Alternatives were evaluated in each of these five criteria, and then ranked in numerical order. An alternative that scores a 1 would be estimated to be a better alternative than an alternative that scored a 2 for that particular criterion.
All alternatives for groundwater in Lower Sand Unit include 3 years of O&M and PCMP monitoring
Total costs include a 30 % contingency added to direct costs.



** NOTE: Ecology will be consulted prior to beginning Step 1 to determine the need for and scope of any Additional Action Feasibility Study.*

International Paper Longview, WA	Project No. 5409900118	Additional Action Feasibility Study Process	Figure 7-1
URS			



International Paper Longview, WA	Project No. 54944006NA
URS	

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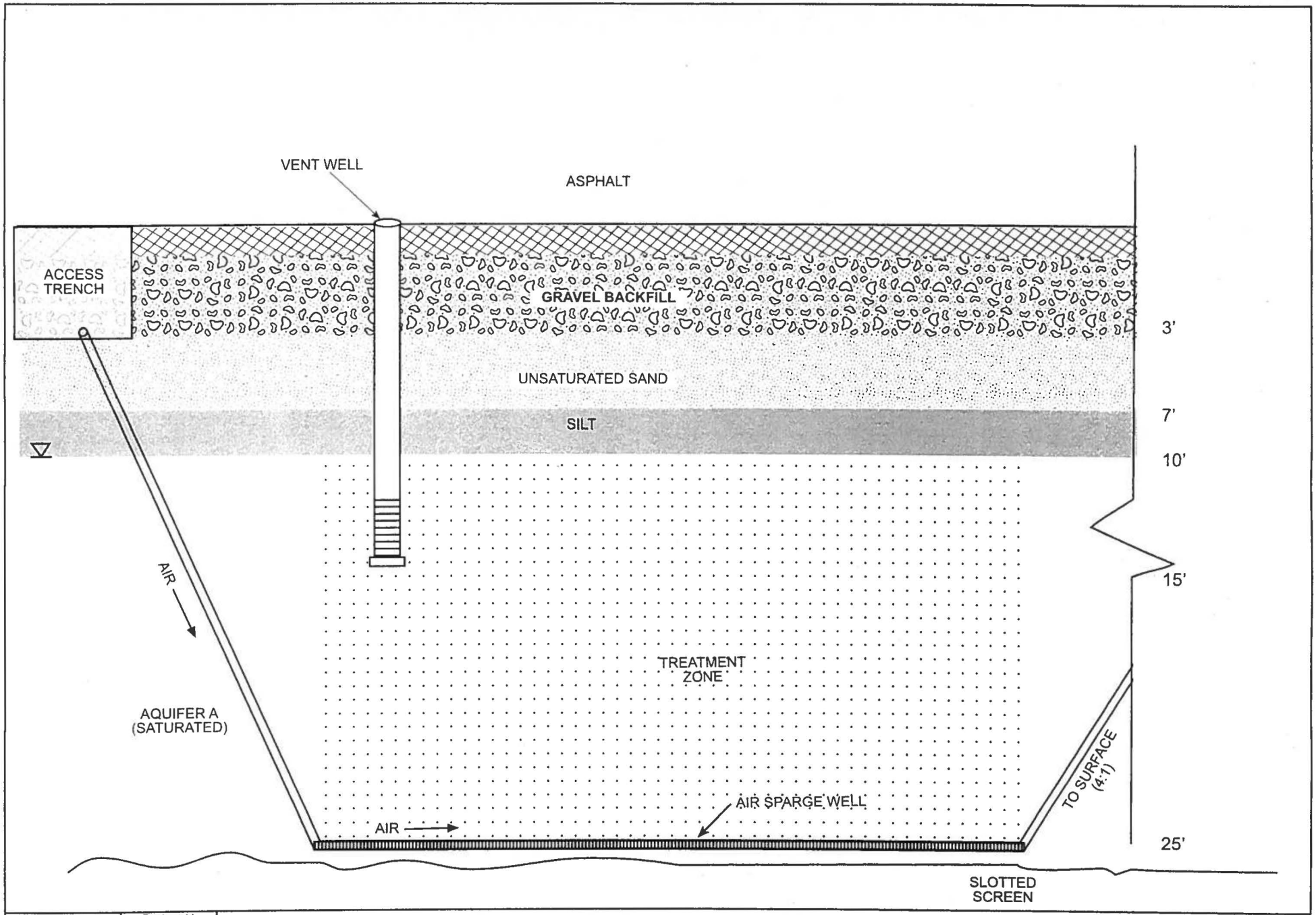
Proposed Air Sparging/Venting System - Plan View
International Paper
Longview, Washington

Figure 7-2



International Paper	Project No. 5409900118
URS	

Proposed Air Sparging/Venting System - Cross Section
International Paper, Longview, Washington

Figure 7-3

99/IP Long 9/00

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Appendix A
Boring Logs

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-44

Sheet 1 of 1

Date(s) Drilled	2/23/00	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	10.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	–	Hammer Data	Pneumatic	Approximate Surface Elevation	13.9 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	Number	Percent Recovery	Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt Gravel fill			
10			S-1	75%			SAND (SW); medium and fine; dark gray/brown; trace of gravel and woodchips; moist	10-50	-4.2/55	
5	5		S-2	83%				<1	-4.6/36	
			S-3	83%			SILT (ML) with sand; uniform; gray/brown; moist	<1	-4.4/52	
			S-4	75%			Grades to fine and medium SAND (SW); moist	1-10	-3.79/ 83	
							Back to SILT (ML) with fine sand; saturated; no odor			
5							Medium SAND (SP) at base			Water sample collected; screen from 9' to 10'
	10						BORING TERMINATED AT 10 FEET BELOW GROUND SURFACE			
0										
	15									
-5										
	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-45

Sheet 1 of 1

Date(s) Drilled	2/23/00	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	13.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	--	Hammer Data	Pneumatic	Approximate Surface Elevation	15.1 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	Number	Percent Recovery	Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
15	0						Asphalt Gravel fill			
			S-1	75%			SAND (SW); medium and fine; dark gray/brown; trace of gravel and woodchips; moist	1-10	2.38/ 289	Alarm
10	5		S-2	75%			slight odor	1-10	-3.24/ 2.98	
			S-3	75%						
							Grades to dense SILT (ML); gray; with wood roots mottled at tip; slight odor	1-10	2.21/ 271.1	Alarm
			S-4	75%			Grades to fine SAND (SP); gray; trace of silt; moist to wet; slight odor	<1	2.76/ 270.1	Alarm
5	10		S-5	75%			SAND (SW); fine and medium; gray; becoming coarser with depth; saturated; no odor	1-10	-1.09/ 76.5	Water sample collected; screen from 11' to 13'
							BORING TERMINATED AT 13 FEET BELOW GROUND SURFACE			
0	15									
	20									

Project: IP Longview Project Location: Longview, WA Project Number: 54-09900003	**Log of Boring PB-46** Sheet 1 of 1

Date(s) Drilled	2/23/00	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	7.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	–	Hammer Data	Pneumatic	Approximate Surface Elevation	14.1 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	Number	Percent Recovery	Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt Gravel fill			
10			S-1	75%			SAND (SW); medium and fine; dark gray/brown; trace of gravel; moist; slight odor	<1	-2.54/ 90.7	
5	5		S-2	75%			staining (2") at 6.5 ft bgs; moist; with odor	200	75.4/ 38.70	
							Grades to SILT (ML) with fine sand			
							BORING TERMINATED AT 7 FEET BELOW GROUND SURFACE			
5	10									
0	15									
-5	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-47

Sheet 1 of 1

Date(s) Drilled	2/23/00	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	12.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	–	Hammer Data	Pneumatic	Approximate Surface Elevation	14.1 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	Number	Percent Recovery	Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt Gravel fill			
10			S-1	75%			SAND (SW); medium and fine; dark gray/brown; trace of gravel; moist; slight odor	1-10	-0.03/ 4.6	
	5		S-2	75%				1-10	-0.27/ 30.4	Sample split into 5'-6' and 6'-7'
							Grades to SILT (ML) with fine sand; gray; trace of wood; moist	1-10	-2.24/ 78.2	
			S-3	75%			wet; slight odor	10-50	3.87/ 337	Alarm
5			S-4	75%				1-10	-4.41/ 54.2	
	10						Grades to fine SAND (SP); trace of silt; coarse sand lense (2" thick); wet			Water sample collected; screen from 11' to 12'
							BORING TERMINATED AT 12 FEET BELOW GROUND SURFACE			
0										
	15									
-5										
	20									

Template: GEO_10D Proj ID: LONGVIEW.GPJ

URS Greiner Woodward Clyde

Printed: 8/30/00

Project: IP Longview Project Location: Longview, WA Project Number: 54-09900003	**Log of Boring PB-48** Sheet 1 of 1

Date(s) Drilled	2/23/00	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	9.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	–	Hammer Data	Pneumatic	Approximate Surface Elevation	14.0 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	Number	Percent Recovery	Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt Gravel fill			
10			S-1	75%			SAND (SW); medium and fine; dark gray/brown; trace of gravel	1-10	2.25/1.2	
5	5		S-2	75%						Sample collected from 6.5'-7'
			S-3	75%			Grades to SILT (ML) with fine sand; trace of wood; laminated; moist	1-10 1-10	2.57/1.4 4.42/3.2	
-5	10						BORING TERMINATED AT 9 FEET BELOW GROUND SURFACE			
0	15									
-5	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-49

Sheet 1 of 1

Date(s) Drilled	2/23/00	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	14.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	--	Hammer Data	Pneumatic	Approximate Surface Elevation	15.6 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	Number	Percent Recovery	Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
15	0						Asphalt Gravel fill			
			S-1	75%			SAND (SW); medium and fine; dark gray/brown; trace of wood; FILL?	<1	5.29/ 17.8	
10	5		S-2	75%			plywood in tip	<1	5.61/ 1.53	
			S-3	75%			slightly finer grained at tip	<1	4.82/2.1	
5	10		S-4	75%			Grades to SILT (ML); saturated; trace of fine sand	1-10	3.82/1.4	
			S-5	75%				1-10	3.09/ 17.3	
							Grades to SAND (SW); fine and medium; saturated; no odor			Water sample collected; screen from 12.5' to 14'
0	15						BORING TERMINATED AT 14 FEET BELOW GROUND SURFACE			
	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-50

Sheet 1 of 1

Date(s) Drilled	2/24/00	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	10.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	–	Hammer Data	Pneumatic	Approximate Surface Elevation	13.8 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	Number	Percent Recovery	Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt			
							Gravel fill			
			S-1	75%			SAND (SW); medium and fine; dark gray/brown	1-10	10.12/ 26.9	Sample collected from 3'-4.5'
10										
	5						Grades to SILT (ML); gray/brown; moist; no odor	1-10	9.37/6.6	
			S-2	75%				10-50	9.32/9.4	
							becomes coarser grained at base; more sand at base	1-10	11.71/ 10.3	
			S-3	75%			SAND (SW); fine and medium; dark gray; saturated; no odor	10	17.14/ 29.7	Water sample collected; screen from 7' to 10'
5										
	10						BORING TERMINATED AT 10 FEET BELOW GROUND SURFACE			
0										
	15									
-5										
	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-51

Sheet 1 of 1

Date(s) Drilled	2/24/00	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	11.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	–	Hammer Data	Pneumatic	Approximate Surface Elevation	13.3 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	Number	Percent Recovery	Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt Gravel fill			
10			S-1	75%			SAND (SW); medium and fine; dark gray/brown; trace of gravel; becomes gray colored with depth	1-10	12.74/ 103.2	
	5		S-2	75%				1-10	25.19/ 388	Alarm
							Grades to SILT (ML) with laminations			
			S-3	75%			saturated	1-10	27.42/ 275	Alarm
5							Grades to fine SAND (SW) interbedded with silt			
			S-4	75%			interbeds of silt saturated	1-10	8.21/ 45.4	Water sample collected; screen from 9' to 11'
	10						BORING TERMINATED AT 11 FEET BELOW GROUND SURFACE			
0										
	15									
-5										
	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-52

Sheet 1 of 1

Date(s) Drilled	2/24/00	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	15.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	–	Hammer Data	Pneumatic	Approximate Surface Elevation	15.3 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	Number	Percent Recovery	Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
15	0						Asphalt Gravel fill			
10	5		S-1	75%			SAND (SW); medium and fine; gray/brown; moist	1-10	7.24/ 32.8	
			S-2	75%			saturated			Sample collected at 7.5'-9' Alarm
							Grades to SILT (ML) and fine sand; gray	1-10	11.89/ 275	
5	10		S-3	75%			2" fine/medium sand at tip; wet	1-10	14.36/ 411	Alarm
			S-4	75%			saturated; no odor	1-10	18.89/ 267	Alarm Water sample collected; screen from 11' to 15'
			S-5	75%				1-10	15.69/ 169	
0	15						BORING TERMINATED AT 15 FEET BELOW GROUND SURFACE			
	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-53

Sheet 1 of 1

Date(s) Drilled	2/24/00	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	15.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	–	Hammer Data	Pneumatic	Approximate Surface Elevation	14.8 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	Number	Percent Recovery	Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt Gravel fill			
10	5		S-1	75%			SAND (SW); medium and fine; gray/brown; moist	1-10	10.77/ 29.7	
			S-2	75%				1-10	36.7/ 109	Sample collected at 8.5'-9'
							Grades to SILT (ML) and fine sand; gray	1-10	36.57/ 257	Alarm
			S-3	75%				1-10	24.89/ 346	Alarm
5	10		S-4	75%			dryer at base dry to moist	1-10	50.33/ 429	Alarm
			S-5	75%			Grades to SAND (SW); medium and fine; gray/brown; with silty interbeds	1-10	7.89/ 139	Water sample collected; screen from 13' to 15'
0	15						medium sand in tip; saturated BORING TERMINATED AT 15 FEET BELOW GROUND SURFACE			
-5	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-54

Sheet 1 of 1

Date(s) Drilled	2/24/00	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	9.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	–	Hammer Data	Pneumatic	Approximate Surface Elevation	15.3 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Percent Recovery	SAMPLES Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
15	0						Asphalt Gravel fill			
10	5		S-1	75%			SAND (SW); medium and fine; gray/brown; trace of wood; moist	<1	4.6	
			S-2	75%			wet with piece of wood	<1	0.4	Sample collected at 8.5'-9'
							Grades to SILT (ML) and fine sand; gray/brown; wet; no odor	<1	2.0	
5	10						BORING TERMINATED AT 9 FEET BELOW GROUND SURFACE			
0	15									
	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-55

Sheet 1 of 1

Date(s) Drilled	2/24/00	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	17.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	–	Hammer Data	Pneumatic	Approximate Surface Elevation	15.5 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	Number	Percent Recovery	Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
15	0						Asphalt Gravel fill			
							SAND (SW); medium and fine; trace of wood and gravel; moist	<1	1.3	
10	5		S-1	75%			with piece of wood	1-10	2.3	
			S-2	75%			Grades to SILT (ML) and fine sand; gray	1-10	9.5	
			S-3	75%			with sandy interbeds; wet	<1	0.6	
5	10		S-4	75%				<1	4.7	
			S-5	75%			dryer; with interbeds of sand	<1	1.8	
0	15		S-6	75%			Grades to medium SAND (SP) with silty interbeds saturated	<1	3.5	Water sample collected; screen from 14.5' to 17'
	20						BORING TERMINATED AT 17 FEET BELOW GROUND SURFACE			

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-56

Sheet 1 of 1

Date(s) Drilled	2/25/00	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	15.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	--	Hammer Data	Pneumatic	Approximate Surface Elevation	15.5 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	Number	Percent Recovery	Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt			
-15							Gravel fill			
			S-1	75%			SAND (SW); medium and fine; gray/brown; trace of wood; moist	1-10	0.6	
	5		S-2	75%				<1	0.6	
-10							finer grained at tip			
			S-3	75%				<1	0.4	
							saturated at base			
			S-4	75%			Grades to SILT (ML) with fine sand; gray/brown	<1	1.9	
	10									
-5			S-5	75%			dryer at tip	1-10	0.6	
							Grades to SAND (SW); medium and fine; saturated			Water sample collected; screen from 12.5' to 15'
	15									
-0							BORING TERMINATED AT 15 FEET BELOW GROUND SURFACE			
	20									

Project: IP Longview Project Location: Longview, WA Project Number: 54-09900003	**Log of Boring PB-57** Sheet 1 of 1

Date(s) Drilled	2/25/00	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	9.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	--	Hammer Data	Pneumatic	Approximate Surface Elevation	14.8 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	Number	Percent Recovery	Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt Gravel fill			
10	5		S-1	75%			SAND (SW); medium and fine; gray/brown; moist; no odor	<1	1.1	
			S-2	75%			saturated at base	<1	0.1	Sample collected at 8'-9'
							Grades to SILT (ML) with fine sand; gray; wood chip in tip of spoon	1-10	0.1	
5	10						BORING TERMINATED AT 9 FEET BELOW GROUND SURFACE			
0	15									
-5	20									

Project: IP Longview
Project Location: Longview, WA
Project Number: 54-09900003

Log of Boring PB-58

Sheet 1 of 1

Date(s) Drilled	2/25/00	Logged By	T. Middleton	Checked By	R. Siegel
Drilling Method	Geoprobe	Drill Bit Size/Type	1" ID	Total Depth Drilled (feet)	14.0
Drill Rig Type	Truck Mounted	Drilling Contractor	Cascade Drilling	Sampler Type(s)	Geoprobe
Groundwater Level and Date Measured	--	Hammer Data	Pneumatic	Approximate Surface Elevation	13.7 MSL
Comments	Backfilled with bentonite chips, grouted to surface			Borehole Backfill	Bentonite

Elevation feet	Depth, feet	SAMPLES Type	Number	Percent Recovery	Blows per 6 inches/ft	Graphic Log	MATERIAL DESCRIPTION	Handby (mg/kg)	PID/FID (ppm)	REMARKS/ OTHER TESTS
	0						Asphalt Gravel fill			
10			S-1	75%			SAND (SW); medium and fine; gray/brown; moist; silty interbeds	<1	8.2	
5	5		S-2	75%			Grades to SILT (ML) with fine sand; gray; no odor	<1	3.0	Sample collected at 5.5'-7'
			S-3	75%			saturated	<1	1.0	
5			S-4	75%			with sandy interbeds; wet; saturated	<1	1.4	
	10		S-5	75%						
0							Grades to medium SAND (SP); saturated; no odor	<1	1.1	Water sample collected; screen from 12.5' to 14'
	15						BORING TERMINATED AT 14 FEET BELOW GROUND SURFACE			
-5										
	20									

Appendix B
Laboratory Data Sheets

OAL

L15229

March 10, 2000

Crys'al Neirby
URS Greiner Woodward Clyde
1501 Fourth Avenue
Suite 1500
Seattle, WA 98101

Phone: (206) 343-7933 ext: 269
FAX: (206) 343-0513

Re: Laboratory Sample Analysis

Project: IP Longview, WA

Project Manager: Crystal Neirby

Dear Crystal Neirby:

On February 24 through 25, 2000, OAL received seventy-eight (78) samples for analysis: sixty-seven soil samples; and eleven water samples. The samples were analyzed utilizing EPA, ASTM, or equivalent methodology.

Should you have any questions concerning the results in this report, please contact me. My direct line is (503)590-2152. Please refer to OAL login number L15229.

Sincerely,

Becky Sims
Client Manager
(503)590-2152

OAL

L15229

Sample Summary

Sample ID	Lab #	Description	Sampled	Received
PB44 3'-5'	L15229-1	soil	02/23/2000 09:55	02/24/2000 17:05
PB44 5'-6'	L15229-2	soil	02/23/2000 10:07	02/24/2000 17:05
PB44 6'-7'	L15229-3	soil	02/23/2000 10:07	02/24/2000 17:05
PB44 7'-9'	L15229-4	soil	02/23/2000 10:21	02/24/2000 17:05
PB44 GW	L15229-5	water	02/23/2000 10:37	02/24/2000 17:05
PB45 3'-5'	L15229-6	soil	02/23/2000 11:21	02/24/2000 17:05
PB45 5'-7'	L15229-7	soil	02/23/2000 11:29	02/24/2000 17:05
PB45 8'-9'	L15229-8	soil	02/23/2000 11:38	02/24/2000 17:05
PB45 9'-11'	L15229-9	soil	02/23/2000 11:46	02/24/2000 17:05
PB45 11'-13'	L15229-10	soil	02/23/2000 11:53	02/24/2000 17:05
PB45 GW	L15229-11	water	02/23/2000 12:00	02/24/2000 17:05
PB46 3'-5'	L15229-12	soil	02/23/2000 13:35	02/24/2000 17:05
PB46 5'-7'	L15229-13	soil	02/23/2000 13:45	02/24/2000 17:05
PB47 3'-5'	L15229-14	soil	02/23/2000 14:12	02/24/2000 17:05
PB47 5'-6'	L15229-15	soil	02/23/2000 14:25	02/24/2000 17:05
PB47 6'-7'	L15229-16	soil	02/23/2000 14:25	02/24/2000 17:05
PB47 7'-9'	L15229-17	soil	02/23/2000 14:39	02/24/2000 17:05
PB47 9'-11'	L15229-18	soil	02/23/2000 14:46	02/24/2000 17:05
PB47 GW	L15229-19	water	02/23/2000 15:00	02/24/2000 17:05
PB48 3'-5'	L15229-20	soil	02/23/2000 15:42	02/24/2000 17:05
PB48 6.5'-7'	L15229-21	soil	02/23/2000 15:50	02/24/2000 17:05
PB48 7'-9'	L15229-22	soil	02/23/2000 15:57	02/24/2000 17:05
PB49 3'-5'	L15229-23	soil	02/23/2000 16:26	02/24/2000 17:05
PB49 5'-7'	L15229-24	soil	02/23/2000 16:35	02/24/2000 17:05
PB49 7'-9'	L15229-25	soil	02/23/2000 16:44	02/24/2000 17:05
PB49 9'-11'	L15229-26	soil	02/23/2000 16:50	02/24/2000 17:05
PB49 11'-13'	L15229-27	soil	02/23/2000 16:57	02/24/2000 17:05
PB50 3'-4.5'	L15229-28	soil	02/24/2000 08:25	02/24/2000 17:05
PB50 4.5'-5'	L15229-29	soil	02/24/2000 08:25	02/24/2000 17:05
PB50 5'-6'	L15229-30	soil	02/24/2000 08:30	02/24/2000 17:05
		soil		

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L15229

Sample Summary

Sample ID	Lab #	Description	Sampled	Received
PB50 6'-7'	L15229-31		02/24/2000 08:30	02/24/2000 17:05
PB50 7'-9'	L15229-32	soil	02/24/2000 08:35	02/24/2000 17:05
PB50 GW	L15229-33	water	02/24/2000 09:00	02/24/2000 17:05
PB51 3'-5'	L15229-34	soil	02/24/2000 09:35	02/24/2000 17:05
PB51 5'-7'	L15229-35	soil	02/24/2000 09:42	02/24/2000 17:05
PB51 7'-9'	L15229-36	soil	02/24/2000 09:52	02/24/2000 17:05
PB51 9'-11'	L15229-37	soil	02/24/2000 10:01	02/24/2000 17:05
PB51 GW	L15229-38	water	02/24/2000 10:20	02/24/2000 17:05
PB52 5'-7'	L15229-39	soil	02/24/2000 10:44	02/24/2000 17:05
PB52 7.5'-9'	L15229-40	soil	02/24/2000 10:52	02/24/2000 17:05
PB52 9'-11'	L15229-41	soil	02/24/2000 10:55	02/24/2000 17:05
PB52 11'-13'	L15229-42	soil	02/24/2000 11:03	02/24/2000 17:05
PB52 13'-15'	L15229-43	soil	02/24/2000 11:16	02/24/2000 17:05
PB52 GW	L15229-44	water	02/24/2000 11:30	02/24/2000 17:05
PB53 5'-7'	L15229-45	soil	02/24/2000 13:21	02/24/2000 17:05
PB53 7'-8.5'	L15229-46	soil	02/24/2000 13:30	02/24/2000 17:05
PB53 8.5'-9'	L15229-47	soil	02/24/2000 13:30	02/24/2000 17:05
PB53 9'-11'	L15229-48	soil	02/24/2000 13:38	02/24/2000 17:05
PB53 11'-13'	L15229-49	soil	02/24/2000 13:43	02/24/2000 17:05
PB53 13'-15'	L15229-50	soil	02/24/2000 13:50	02/24/2000 17:05
PB53 GW	L15229-51	water	02/24/2000 14:16	02/24/2000 17:05
PB49 GW	L15229-52	water	02/23/2000 05:00	02/24/2000 17:05
PB54 5'-7'	L15229-53	soil	02/24/2000 14:42	02/24/2000 17:05
PB54 7'-8.5'	L15229-54	soil	02/24/2000 14:46	02/24/2000 17:05
PB54 8.5'-9'	L15229-55	soil	02/24/2000 14:46	02/24/2000 17:05
PB55 3'-5'	L15229-56	soil	02/24/2000 15:15	02/25/2000 16:55
PB55 5'-7'	L15229-57	soil	02/24/2000 15:22	02/25/2000 16:55
PB55 7.5'-9'	L15229-58	soil	02/24/2000 15:30	02/25/2000 16:55
PB55 9'-11'	L15229-59	soil	02/24/2000 15:34	02/25/2000 16:55
PB55 11'-13'	L15229-60	soil	02/24/2000 15:44	02/25/2000 16:55
		soil		

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Sample Summary

Sample ID	Lab #	Description	Sampled	Received
PB55 13'-15'	L15229-61		02/24/2000 15:50	02/25/2000 16:55
PB55 15'-17'	L15229-62	soil	02/24/2000 15:54	02/25/2000 16:55
PB55 GW	L15229-63	water	02/24/2000 16:00	02/25/2000 16:55
PB56 3'-5'	L15229-64	soil	02/25/2000 08:15	02/25/2000 16:55
PB56 5'-7'	L15229-65	soil	02/25/2000 08:26	02/25/2000 16:55
PB56 7'-9'	L15229-66	soil	02/25/2000 08:32	02/25/2000 16:55
PB56 9'-11'	L15229-67	soil	02/25/2000 08:40	02/25/2000 16:55
PB56 11'-13'	L15229-68	soil	02/25/2000 08:49	02/25/2000 16:55
PB56 GW	L15229-69	water	02/25/2000 09:12	02/25/2000 16:55
PB57 5'-7'	L15229-70	soil	02/25/2000 09:47	02/25/2000 16:55
PB57 7'-8'	L15229-71	soil	02/25/2000 09:50	02/25/2000 16:55
PB57 8'-9'	L15229-72	soil	02/25/2000 09:50	02/25/2000 16:55
PB58 3'-5'	L15229-73	soil	02/25/2000 10:25	02/25/2000 16:55
PB58 5.5'-7'	L15229-74	soil	02/25/2000 10:28	02/25/2000 16:55
PB58 7'-9'	L15229-75	soil	02/25/2000 10:37	02/25/2000 16:55
PB58 9'-11'	L15229-76	soil	02/25/2000 10:42	02/25/2000 16:55
PB58 12.5'-13'	L15229-77	soil	02/25/2000 10:50	02/25/2000 16:55
PB58 GW	L15229-78	water	02/25/2000 10:55	02/25/2000 16:55

Definition of Terms

D Reported value is based on a dilution.

MI Matrix interference.

ND Analytical result was below the reporting limit.

Laboratory Certifications*

Agency	Number
Florida Department of Health	ID #E87569
Oregon Health Division	State Lab #OR020
Washington Department of Ecology	Lab Accreditation #C136
Washington Department of Health	Washington Code #136

* Current Scopes of Accreditation are available upon request.

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L15229

Analysts

Initials	Analyst	Title
PB	Pat Buddrus	Chemist
RJ	Rick Jordan	Chemist

Method Summary

Analysis	Method
Polynuclear Aromatic Hydrocarbons (PNA)	EPA 8270 SIM
Semi-Volatile Petroleum Products	NWTPH-DX

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L15229

Client: *URS Greiner Woodward Clyde*

Project: *IP Longview, WA*

Contact: *Crystal Neirby*

Polynuclear Aromatic Hydrocarbons (PNA)

by EPA 8270 SIM

Sample ID	*Matrix*					*Lab Number*
CAS	Analyte	Result	Reporting Limit	Units (ppb)	Dilution	Comment
				Solids:	*83.4 % w/w*	
				Sampled:	*2/23/2000*	
				Extracted:	*3/1/2000*	
PB44 5'-6'	*soil*			Analyzed:	*3/2/2000 by PB*	*L15229-2*
91-20-3	Naphthalene	ND	10.	µg/kg		
208-96-8	Acenaphthylene	ND	10.	µg/kg		
83-32-9	Acenaphthene	ND	10.	µg/kg		
86-73-7	Fluorene	ND	10.	µg/kg		
87-86-5	Pentachlorophenol	ND	100	µg/kg		
85-01-8	Phenanthrene	ND	10.	µg/kg		
120-12-7	Anthracene	ND	10.	µg/kg		
206-44-0	Fluoranthene	ND	10.	µg/kg		
129-00-0	Pyrene	ND	10.	µg/kg		
56-55-3	Benzo[a]anthracene	ND	10.	µg/kg		
218-01-9	Chrysene	ND	10.	µg/kg		
205-99-2	Benzo[b]fluoranthene	ND	10.	µg/kg		
207-08-9	Benzo[k]fluoranthene	ND	10.	µg/kg		
50-32-8	Benzo[a]pyrene	ND	10.	µg/kg		
193-39-5	Indeno[1,2,3-cd]pyrene	ND	10.	µg/kg		
53-70-3	Dibenz[a,h]anthracene	ND	10.	µg/kg		
191-24-2	Benzo[g,h,i]perylene	ND	10.	µg/kg		

Surrogate	Recovery	Limit
2-Fluorophenol	103.%	64. - 124.
Phenol-d6	104.%	30 - 159.
2,4,6-Tribromophenol	116.%	0 - 224.
1,2-Dichlorobenzene-d4	98.%	59. - 134.
Nitrobenzene-d5	113.%	42. - 142.
2-Fluorobiphenyl	99.%	57. - 135.

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L15229

Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Polynuclear Aromatic Hydrocarbons (PNA)
by EPA 8270 SIM

Sample ID	*Matrix*					*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppb)**	**Dilution**	**Comment**

Solids: *95.9 % w/w*
Sampled: *2/23/2000*
Extracted: *3/1/2000*
Analyzed: *3/2/2000 by PB*

PB45 5'-7'	*soil*					*L15229-7*
91-20-3	Naphthalene	ND	10.	µg/kg		
208-96-8	Acenaphthylene	ND	10.	µg/kg		
83-32-9	Acenaphthene	ND	10.	µg/kg		
86-73-7	Fluorene	ND	10.	µg/kg		
87-86-5	Pentachlorophenol	ND	50.	µg/kg		
85-01-8	Phenanthrene	ND	10.	µg/kg		
120-12-7	Anthracene	ND	10.	µg/kg		
206-44-0	Fluoranthene	ND	10.	µg/kg		
129-00-0	Pyrene	ND	10.	µg/kg		
56-55-3	Benzo[a]anthracene	ND	10.	µg/kg		
218-01-9	Chrysene	ND	10.	µg/kg		
205-99-2	Benzo[b]fluoranthene	ND	10.	µg/kg		
207-08-9	Benzo[k]fluoranthene	ND	10.	µg/kg		
50-32-8	Benzo[a]pyrene	ND	10.	µg/kg		
193-39-5	Indeno[1,2,3-cd]pyrene	ND	10.	µg/kg		
53-70-3	Dibenz[a,h]anthracene	ND	10.	µg/kg		
191-24-2	Benzo[g,h,i]perylene	ND	10.	µg/kg		

Surrogate	Recovery	Limit
2-Fluorophenol	89.%	64. - 124.
Phenol-d6	90.%	30 - 159.
2,4,6-Tribromophenol	129.%	0 - 224.
1,2-Dichlorobenzene-d4	86.%	59. - 134.
Nitrobenzene-d5	104.%	42. - 142.
2-Fluorobiphenyl	86.%	57. - 135.

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L15229

Client: ***URS Greiner Woodward Clyde***

Project: ***IP Longview, WA***

Contact: ***Crystal Neirby***

Polynuclear Aromatic Hydrocarbons (PNA)

by EPA 8270 SIM

Sample ID	*Matrix*						*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppb)**	**Dilution**	**Comment**	
				Solids:	*83.1 % w/w*		
				Sampled:	*2/23/2000*		
				Extracted:	*3/1/2000*		
PB46 5'-7'	*soil*			**Analyzed:**	*3/2/2000 by PB*		*L15229-13*
91-20-3	**Naphthalene**	**18,900**	**1,000**	**µg/kg**	100.	**D**	
208-96-8	**Acenaphthylene**	**1,970**	**100**	**µg/kg**	10.	**D**	
83-32-9	**Acenaphthene**	**73,000**	**1,000**	**µg/kg**	100.	**D**	
86-73-7	**Fluorene**	**57,100**	**1,000**	**µg/kg**	100.	**D**	
87-86-5	Pentachlorophenol	ND	240	µg/kg	10.	D	
85-01-8	**Phenanthrene**	**194,000**	**10,000**	**µg/kg**	1,000.	**D**	
120-12-7	**Anthracene**	**57,200**	**1,000**	**µg/kg**	100.	**D**	
206-44-0	**Fluoranthene**	**184,000**	**10,000**	**µg/kg**	1,000.	**D**	
129-00-0	**Pyrene**	**147,000**	**10,000**	**µg/kg**	1,000.	**D**	
56-55-3	**Benzo[a]anthracene**	**41,700**	**1,000**	**µg/kg**	100.	**D**	
218-01-9	**Chrysene**	**45,300**	**1,000**	**µg/kg**	100.	**D**	
205-99-2	**Benzo[b]fluoranthene**	**37,200**	**1,000**	**µg/kg**	100.	**D**	
207-08-9	**Benzo[k]fluoranthene**	**12,300**	**1,000**	**µg/kg**	100.	**D**	
50-32-8	**Benzo[a]pyrene**	**26,800**	**1,000**	**µg/kg**	100.	**D**	
193-39-5	**Indeno[1,2,3-cd]pyrene**	**9,960**	**100**	**µg/kg**	10.	**D**	
53-70-3	**Dibenz[a,h]anthracene**	**3,200**	**100**	**µg/kg**	10.	**D**	
191-24-2	**Benzo[g,h,i]perylene**	**11,600**	**100**	**µg/kg**	10.	**D**	

Surrogate	Recovery	Limit
2-Fluorophenol	97.%	64. - 124.
Phenol-d6	96.%	30 - 159.
2,4,6-Tribromophenol	118.%	0 - 224.
1,2-Dichlorobenzene-d4	98.%	59. - 134.
Nitrobenzene-d5	MI	42. - 142.
2-Fluorobiphenyl	102.%	57. - 135.

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L15229

Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Polynuclear Aromatic Hydrocarbons (PNA)
by EPA 8270 SIM

Sample ID	*Matrix*					*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppb)**	**Dilution**	**Comment**

				Solids:	*86.2 % w/w*	
				Sampled:	*2/23/2000*	
				Extracted:	*3/1/2000*	
PB47 5'-6'	*soil*			**Analyzed:**	*3/2/2000 by PB*	*L15229-15*
91-20-3	**Naphthalene**	**286.**	**10.**	**µg/kg**		
208-96-8	**Acenaphthylene**	**15.**	**10.**	**µg/kg**		
83-32-9	**Acenaphthene**	**915.**	**100**	**µg/kg**	10.	**D**
86-73-7	**Fluorene**	**1,340**	**100**	**µg/kg**	10.	**D**
87-86-5	Pentachlorophenol	ND	50.	µg/kg		
85-01-8	**Phenanthrene**	**999.**	**100**	**µg/kg**	10.	**D**
120-12-7	**Anthracene**	**99.**	**10.**	**µg/kg**		
206-44-0	**Fluoranthene**	**68.**	**10.**	**µg/kg**		
129-00-0	**Pyrene**	**74.**	**10.**	**µg/kg**		
56-55-3	Benzo[a]anthracene	ND	10.	µg/kg		
218-01-9	**Chrysene**	**26.**	**10.**	**µg/kg**		
205-99-2	**Benzo[b]fluoranthene**	**37.**	**10.**	**µg/kg**		
207-08-9	Benzo[k]fluoranthene	ND	10.	µg/kg		
50-32-8	**Benzo[a]pyrene**	**32.**	**10.**	**µg/kg**		
193-39-5	**Indeno[1,2,3-cd]pyrene**	**22.**	**10.**	**µg/kg**		
53-70-3	Dibenz[a,h]anthracene	ND	10.	µg/kg		
191-24-2	**Benzo[g,h,i]perylene**	**25.**	**10.**	**µg/kg**		

Surrogate	Recovery	Limit
2-Fluorophenol	80.%	64. - 124.
Phenol-d6	83.%	30 - 159.
2,4,6-Tribromophenol	131.%	0 - 224.
1,2-Dichlorobenzene-d4	76.%	59. - 134.
Nitrobenzene-d5	96.%	42. - 142.
2-Fluorobiphenyl	76.%	57. - 135.

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L15229

Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Polynuclear Aromatic Hydrocarbons (PNA)
by EPA 8270 SIM

Sample ID	*Matrix*					*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppb)**	**Dilution**	**Comment**
					Solids:	*74.0 % w/w*
					Sampled:	*2/23/2000*
					Extracted:	*3/1/2000*
PB48 6.5'-7'	*soil*				Analyzed:	*3/2/2000 by PB*	*L15229-21*
91-20-3	**Naphthalene**	**481.**	**10.**	**µg/kg**		
208-96-8	Acenaphthylene	ND	10.	µg/kg		
83-32-9	**Acenaphthene**	**89.**	**10.**	**µg/kg**		
86-73-7	**Fluorene**	**33.**	**10.**	**µg/kg**		
87-86-5	Pentachlorophenol	ND	50.	µg/kg		
85-01-8	**Phenanthrene**	**13.**	**10.**	**µg/kg**		
120-12-7	Anthracene	ND	10.	µg/kg		
206-44-0	Fluoranthene	ND	10.	µg/kg		
129-00-0	Pyrene	ND	10.	µg/kg		
56-55-3	Benzo[a]anthracene	ND	10.	µg/kg		
218-01-9	Chrysene	ND	10.	µg/kg		
205-99-2	Benzo[b]fluoranthene	ND	10.	µg/kg		
207-08-9	Benzo[k]fluoranthene	ND	10.	µg/kg		
50-32-8	Benzo[a]pyrene	ND	10.	µg/kg		
193-39-5	Indeno[1,2,3-cd]pyrene	ND	10.	µg/kg		
53-70-3	Dibenz[a,h]anthracene	ND	10.	µg/kg		
191-24-2	Benzo[g,h,i]perylene	ND	10.	µg/kg		

Surrogate	Recovery	Limit
2-Fluorophenol	91.%	64. - 124.
Phenol-d6	93.%	30 - 159.
2,4,6-Tribromophenol	151.%	0 - 224.
1,2-Dichlorobenzene-d4	85.%	59. - 134.
Nitrobenzene-d5	112.%	42. - 142.
2-Fluorobiphenyl	86.%	57. - 135.

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L15229

Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Polynuclear Aromatic Hydrocarbons (PNA)
by EPA 8270 SIM

Sample ID	*Matrix*					*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppb)**	**Dilution**	**Comment**

Solids: *74.0 % w/w*
Sampled: *2/23/2000*
Extracted: *3/1/2000*
Analyzed: *3/2/2000 by PB*

PB49 7'-9'	*soil*					*L15229-25*
91-20-3	**Naphthalene**	**81.**	**10.**	**µg/kg**		
208-96-8	Acenaphthylene	ND	10.	µg/kg		
83-32-9	**Acenaphthene**	**204.**	**10.**	**µg/kg**		
86-73-7	**Fluorene**	**44.**	**10.**	**µg/kg**		
87-86-5	Pentachlorophenol	ND	50.	µg/kg		
85-01-8	Phenanthrene	ND	10.	µg/kg		
120-12-7	Anthracene	ND	10.	µg/kg		
206-44-0	Fluoranthene	ND	10.	µg/kg		
129-00-0	Pyrene	ND	10.	µg/kg		
56-55-3	Benzo[a]anthracene	ND	10.	µg/kg		
218-01-9	Chrysene	ND	10.	µg/kg		
205-99-2	Benzo[b]fluoranthene	ND	10.	µg/kg		
207-08-9	Benzo[k]fluoranthene	ND	10.	µg/kg		
50-32-8	Benzo[a]pyrene	ND	10.	µg/kg		
193-39-5	Indeno[1,2,3-cd]pyrene	ND	10.	µg/kg		
53-70-3	Dibenz[a,h]anthracene	ND	10.	µg/kg		
191-24-2	Benzo[g,h,i]perylene	ND	10.	µg/kg		

Surrogate	Recovery	Limit
2-Fluorophenol	81.%	64. - 124.
Phenol-d6	85.%	30 - 159.
2,4,6-Tribromophenol	143.%	0 - 224.
1,2-Dichlorobenzene-d4	77.%	59. - 134.
Nitrobenzene-d5	105.%	42. - 142.
2-Fluorobiphenyl	79.%	57. - 135.

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L15229

Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Polynuclear Aromatic Hydrocarbons (PNA)
by EPA 8270 SIM

Sample ID	*Matrix*					*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppb)**	**Dilution**	**Comment**
				Solids:	*84.5 % w/w*	
				Sampled:	*2/24/2000*	
				Extracted:	*3/1/2000*	
PB50 3'-4.5'	*soil*			**Analyzed:**	*3/2/2000 by PB*	*L15229-28*
91-20-3	**Naphthalene**	**16.**	**10.**	**µg/kg**		
208-96-8	**Acenaphthylene**	**12.**	**10.**	**µg/kg**		
83-32-9	Acenaphthene	ND	10.	µg/kg		
86-73-7	Fluorene	ND	10.	µg/kg		
87-86-5	Pentachlorophenol	ND	50.	µg/kg		
85-01-8	**Phenanthrene**	**20.**	**10.**	**µg/kg**		
120-12-7	**Anthracene**	**36.**	**10.**	**µg/kg**		
206-44-0	**Fluoranthene**	**58.**	**10.**	**µg/kg**		
129-00-0	**Pyrene**	**47.**	**10.**	**µg/kg**		
56-55-3	**Benzo[a]anthracene**	**25.**	**10.**	**µg/kg**		
218-01-9	**Chrysene**	**29.**	**10.**	**µg/kg**		
205-99-2	**Benzo[b]fluoranthene**	**68.**	**10.**	**µg/kg**		
207-08-9	**Benzo[k]fluoranthene**	**15.**	**10.**	**µg/kg**		
50-32-8	**Benzo[a]pyrene**	**20.**	**10.**	**µg/kg**		
193-39-5	**Indeno[1,2,3-cd]pyrene**	**19.**	**10.**	**µg/kg**		
53-70-3	Dibenz[a,h]anthracene	ND	10.	µg/kg		
191-24-2	**Benzo[g,h,i]perylene**	**21.**	**10.**	**µg/kg**		

Surrogate	Recovery	Limit
2-Fluorophenol	77.%	64. - 124.
Phenol-d6	83.%	30 - 159.
2,4,6-Tribromophenol	137.%	0 - 224.
1,2-Dichlorobenzene-d4	74.%	59. - 134.
Nitrobenzene-d5	103.%	42. - 142.
2-Fluorobiphenyl	79.%	57. - 135.

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L15229

Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Polynuclear Aromatic Hydrocarbons (PNA)
by EPA 8270 SIM

Sample ID	*Matrix*					*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppb)**	**Dilution**	**Comment**

					Solids:	*80.5 % w/w*
					Sampled:	*2/24/2000*
					Extracted:	*3/1/2000*
PB51 3'-5'	*soil*				Analyzed:	*3/2/2000 by PB*
						L15229-34
91-20-3	**Naphthalene**	**62.**	**10.**	**µg/kg**		
208-96-8	**Acenaphthylene**	**54.**	**10.**	**µg/kg**		
83-32-9	**Acenaphthene**	**20.**	**10.**	**µg/kg**		
86-73-7	**Fluorene**	**24.**	**10.**	**µg/kg**		
87-86-5	Pentachlorophenol	ND	50.	µg/kg		
85-01-8	**Phenanthrene**	**76.**	**10.**	**µg/kg**		
120-12-7	**Anthracene**	**153.**	**10.**	**µg/kg**		
206-44-0	**Fluoranthene**	**266.**	**10.**	**µg/kg**		
129-00-0	**Pyrene**	**236.**	**10.**	**µg/kg**		
56-55-3	**Benzo[a]anthracene**	**134.**	**10.**	**µg/kg**		
218-01-9	**Chrysene**	**154.**	**10.**	**µg/kg**		
205-99-2	**Benzo[b]fluoranthene**	**386.**	**10.**	**µg/kg**		
207-08-9	**Benzo[k]fluoranthene**	**79.**	**10.**	**µg/kg**		
50-32-8	**Benzo[a]pyrene**	**104.**	**10.**	**µg/kg**		
193-39-5	**Indeno[1,2,3-cd]pyrene**	**113.**	**10.**	**µg/kg**		
53-70-3	**Dibenz[a,h]anthracene**	**36.**	**10.**	**µg/kg**		
191-24-2	**Benzo[g,h,i]perylene**	**120.**	**10.**	**µg/kg**		

Surrogate	Recovery	Limit
2-Fluorophenol	98.%	64. - 124.
Phenol-d6	98.%	30 - 159.
2,4,6-Tribromophenol	155.%	0 - 224.
1,2-Dichlorobenzene-d4	89.%	59. - 134.
Nitrobenzene-d5	133.%	42. - 142.
2-Fluorobiphenyl	92.%	57. - 135.

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L15229

Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Polynuclear Aromatic Hydrocarbons (PNA)
by EPA 8270 SIM

Sample ID	*Matrix*					*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppb)**	**Dilution**	**Comment**
				Solids:	*67.1 % w/w*	
				Sampled:	*2/24/2000*	
				Extracted:	*3/1/2000*	
PB52 7.5'-9'	*soil*			**Analyzed:**	*3/2/2000 by PB*	*L15229-40*
91-20-3	**Naphthalene**	**1,010**	**100**	**µg/kg**	10.	D
208-96-8	Acenaphthylene	ND	10.	µg/kg		
83-32-9	**Acenaphthene**	**1,090**	**100**	**µg/kg**	10.	D
86-73-7	**Fluorene**	**400.**	**10.**	**µg/kg**		
87-86-5	Pentachlorophenol	ND	50.	µg/kg		
85-01-8	**Phenanthrene**	**32.**	**10.**	**µg/kg**		
120-12-7	Anthracene	ND	10.	µg/kg		
206-44-0	Fluoranthene	ND	10.	µg/kg		
129-00-0	Pyrene	ND	10.	µg/kg		
56-55-3	Benzo[a]anthracene	ND	10.	µg/kg		
218-01-9	Chrysene	ND	10.	µg/kg		
205-99-2	Benzo[b]fluoranthene	ND	10.	µg/kg		
207-08-9	Benzo[k]fluoranthene	ND	10.	µg/kg		
50-32-8	Benzo[a]pyrene	ND	10.	µg/kg		
193-39-5	Indeno[1,2,3-cd]pyrene	ND	10.	µg/kg		
53-70-3	Dibenz[a,h]anthracene	ND	10.	µg/kg		
191-24-2	Benzo[g,h,i]perylene	ND	10.	µg/kg		

Surrogate	Recovery	Limit
2-Fluorophenol	97.%	64. - 124.
Phenol-d6	101.%	30 - 159.
2,4,6-Tribromophenol	168.%	0 - 224.
1,2-Dichlorobenzene-d4	91.%	59. - 134.
Nitrobenzene-d5	135.%	42. - 142.
2-Fluorobiphenyl	92.%	57. - 135.

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L15229

Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Polynuclear Aromatic Hydrocarbons (PNA)
by EPA 8270 SIM

Sample ID	*Matrix*					*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppb)**	**Dilution**	**Comment**

				Solids:	*71.5 % w/w*	
				Sampled:	*2/24/2000*	
				Extracted:	*3/1/2000*	
PB53 7'-8.5'	*soil*			**Analyzed:**	*3/2/2000 by PB*	*L15229-46*
91-20-3	**Naphthalene**	**348.**	**10.**	**µg/kg**		
208-96-8	Acenaphthylene	ND	10.	µg/kg		
83-32-9	**Acenaphthene**	**1,560**	**100**	**µg/kg**	10.	**D**
86-73-7	**Fluorene**	**1,620**	**100**	**µg/kg**	10.	**D**
87-86-5	Pentachlorophenol	ND	50.	µg/kg		
85-01-8	**Phenanthrene**	**1,730**	**100**	**µg/kg**	10.	**D**
120-12-7	**Anthracene**	**24.**	**10.**	**µg/kg**		
206-44-0	**Fluoranthene**	**22.**	**10.**	**µg/kg**		
129-00-0	Pyrene	ND	10.	µg/kg		
56-55-3	Benzo[a]anthracene	ND	10.	µg/kg		
218-01-9	Chrysene	ND	10.	µg/kg		
205-99-2	Benzo[b]fluoranthene	ND	10.	µg/kg		
207-08-9	Benzo[k]fluoranthene	ND	10.	µg/kg		
50-32-8	Benzo[a]pyrene	ND	10.	µg/kg		
193-39-5	Indeno[1,2,3-cd]pyrene	ND	10.	µg/kg		
53-70-3	Dibenz[a,h]anthracene	ND	10.	µg/kg		
191-24-2	Benzo[g,h,i]perylene	ND	10.	µg/kg		

Surrogate	Recovery	Limit
2-Fluorophenol	86.%	64. - 124.
Phenol-d6	90.%	30 - 159.
2,4,6-Tribromophenol	156.%	0 - 224.
1,2-Dichlorobenzene-d4	79.%	59. - 134.
Nitrobenzene-d5	118.%	42. - 142.
2-Fluorobiphenyl	79.%	57. - 135.

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L15229

Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Polynuclear Aromatic Hydrocarbons (PNA)
by EPA 8270 SIM

Sample ID	*Matrix*						*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppb)**	**Dilution**	**Comment**	
				Solids:	*64.7 % w/w*		
				Sampled:	*2/24/2000*		
				Extracted:	*3/1/2000*		
PB53 8.5'-9'	*soil*			**Analyzed:**	*3/2/2000 by PB*		*L15229-47*
91-20-3	**Naphthalene**	**9,050**	**1,000**	**µg/kg**	100.	**D**	
208-96-8	Acenaphthylene	ND	10.	µg/kg			
83-32-9	**Acenaphthene**	**2,170**	**1,000**	**µg/kg**	100.	**D**	
86-73-7	**Fluorene**	**608.**	**10.**	**µg/kg**			
87-86-5	Pentachlorophenol	ND	50.	µg/kg			
85-01-8	**Phenanthrene**	**98.**	**10.**	**µg/kg**			
120-12-7	Anthracene	ND	10.	µg/kg			
206-44-0	**Fluoranthene**	**10.**	**10.**	**µg/kg**			
129-00-0	Pyrene	ND	10.	µg/kg			
56-55-3	Benzo[a]anthracene	ND	10.	µg/kg			
218-01-9	Chrysene	ND	10.	µg/kg			
205-99-2	Benzo[b]fluoranthene	ND	10.	µg/kg			
207-08-9	Benzo[k]fluoranthene	ND	10.	µg/kg			
50-32-8	Benzo[a]pyrene	ND	10.	µg/kg			
193-39-5	Indeno[1,2,3-cd]pyrene	ND	10.	µg/kg			
53-70-3	Dibenz[a,h]anthracene	ND	10.	µg/kg			
191-24-2	Benzo[g,h,i]perylene	ND	10.	µg/kg			

Surrogate	Recovery	Limit
2-Fluorophenol	93.%	64. - 124.
Phenol-d6	98.%	30 - 159.
2,4,6-Tribromophenol	162.%	0 - 224.
1,2-Dichlorobenzene-d4	87.%	59. - 134.
Nitrobenzene-d5	131.%	42. - 142.
2-Fluorobiphenyl	89.%	57. - 135.

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Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Polynuclear Aromatic Hydrocarbons (PNA)
by EPA 8270 SIM

Sample ID	*Matrix*						*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppb)**	**Dilution**	**Comment**	
				Solids:	*62.4 % w/w*		
				Sampled:	*2/24/2000*		
				Extracted:	*3/1/2000*		
PB54 8.5'-9'	*soil*			**Analyzed:**	*3/2/2000 by PB*		*L15229-55*
91-20-3	**Naphthalene**	**13,600**	**1,000**	**µg/kg**	100.	**D**	
208-96-8	Acenaphthylene	ND	10.	µg/kg			
83-32-9	**Acenaphthene**	**1,390**	**1,000**	**µg/kg**	100.	**D**	
86-73-7	**Fluorene**	**108.**	**10.**	**µg/kg**			
87-86-5	Pentachlorophenol	ND	50.	µg/kg			
85-01-8	**Phenanthrene**	**14.**	**10.**	**µg/kg**			
120-12-7	Anthracene	ND	10.	µg/kg			
206-44-0	**Fluoranthene**	**13.**	**10.**	**µg/kg**			
129-00-0	**Pyrene**	**11.**	**10.**	**µg/kg**			
56-55-3	Benzo[a]anthracene	ND	10.	µg/kg			
218-01-9	Chrysene	ND	10.	µg/kg			
205-99-2	**Benzo[b]fluoranthene**	**11.**	**10.**	**µg/kg**			
207-08-9	Benzo[k]fluoranthene	ND	10.	µg/kg			
50-32-8	Benzo[a]pyrene	ND	10.	µg/kg			
193-39-5	Indeno[1,2,3-cd]pyrene	ND	10.	µg/kg			
53-70-3	Dibenz[a,h]anthracene	ND	10.	µg/kg			
191-24-2	Benzo[g,h,i]perylene	ND	10.	µg/kg			

Surrogate	Recovery	Limit
2-Fluorophenol	85.%	64. - 124.
Phenol-d6	91.%	30 - 159.
2,4,6-Tribromophenol	162.%	0 - 224.
1,2-Dichlorobenzene-d4	82.%	59. - 134.
Nitrobenzene-d5	122.%	42. - 142.
2-Fluorobiphenyl	86.%	57. - 135.

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L15229

Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Polynuclear Aromatic Hydrocarbons (PNA)
by EPA 8270 SIM

Sample ID	*Matrix*					*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppb)**	**Dilution**	**Comment**

Solids: *83.0 % w/w*
Sampled: *2/24/2000*
Extracted: *3/2/2000*
Analyzed: *3/3/2000*

PB55 5'-7'	*soil*					*L15229-57*
91-20-3	Naphthalene	ND	10.	µg/kg		
208-96-8	Acenaphthylene	ND	10.	µg/kg		
83-32-9	Acenaphthene	ND	10.	µg/kg		
86-73-7	Fluorene	ND	10.	µg/kg		
87-86-5	Pentachlorophenol	ND	50.	µg/kg		
85-01-8	Phenanthrene	ND	10.	µg/kg		
120-12-7	Anthracene	ND	10.	µg/kg		
206-44-0	Fluoranthene	ND	10.	µg/kg		
129-00-0	Pyrene	ND	10.	µg/kg		
56-55-3	Benzo[a]anthracene	ND	10.	µg/kg		
218-01-9	Chrysene	ND	10.	µg/kg		
205-99-2	Benzo[b]fluoranthene	ND	10.	µg/kg		
207-08-9	Benzo[k]fluoranthene	ND	10.	µg/kg		
50-32-8	Benzo[a]pyrene	ND	10.	µg/kg		
193-39-5	Indeno[1,2,3-cd]pyrene	ND	10.	µg/kg		
53-70-3	Dibenz[a,h]anthracene	ND	10.	µg/kg		
191-24-2	Benzo[g,h,i]perylene	ND	10.	µg/kg		

Surrogate	Recovery	Limit
2-Fluorophenol	93.%	64. - 124.
Phenol-d6	97.%	30 - 159.
2,4,6-Tribromophenol	163.%	0 - 224.
1,2-Dichlorobenzene-d4	89.%	59. - 134.
Nitrobenzene-d5	121.%	42. - 142.
2-Fluorobiphenyl	98.%	57. - 135.

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Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Polynuclear Aromatic Hydrocarbons (PNA)
by EPA 8270 SIM

Sample ID	*Matrix*					*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppb)**	**Dilution**	**Comment**

				Solids:	*76.8 % w/w*	
				Sampled:	*2/25/2000*	
				Extracted:	*3/2/2000*	
PB56 7'-9'	*soil*			**Analyzed:**	*3/3/2000*	*L15229-66*
91-20-3	Naphthalene	ND	10.	µg/kg		
208-96-8	Acenaphthylene	ND	10.	µg/kg		
83-32-9	Acenaphthene	ND	10.	µg/kg		
86-73-7	Fluorene	ND	10.	µg/kg		
87-86-5	Pentachlorophenol	ND	50.	µg/kg		
85-01-8	Phenanthrene	ND	10.	µg/kg		
120-12-7	Anthracene	ND	10.	µg/kg		
206-44-0	Fluoranthene	ND	10.	µg/kg		
129-00-0	Pyrene	ND	10.	µg/kg		
56-55-3	Benzo[a]anthracene	ND	10.	µg/kg		
218-01-9	Chrysene	ND	10.	µg/kg		
205-99-2	Benzo[b]fluoranthene	ND	10.	µg/kg		
207-08-9	Benzo[k]fluoranthene	ND	10.	µg/kg		
50-32-8	Benzo[a]pyrene	ND	10.	µg/kg		
193-39-5	Indeno[1,2,3-cd]pyrene	ND	10.	µg/kg		
53-70-3	Dibenz[a,h]anthracene	ND	10.	µg/kg		
191-24-2	Benzo[g,h,i]perylene	ND	10.	µg/kg		

Surrogate	Recovery	Limit
2-Fluorophenol	86.%	64. - 124.
Phenol-d6	90.%	30 - 159.
2,4,6-Tribromophenol	153.%	0 - 224.
1,2-Dichlorobenzene-d4	79.%	59. - 134.
Nitrobenzene-d5	112.%	42. - 142.
2-Fluorobiphenyl	89.%	57. - 135.

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Client: ***URS Greiner Woodward Clyde***
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Project: ***IP Longview, WA***

Polynuclear Aromatic Hydrocarbons (PNA)
by EPA 8270 SIM

Sample ID	*Matrix*					*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppb)**	**Dilution**	**Comment**
				Solids:	*69.4 % w/w*	
				Sampled:	*2/25/2000*	
				Extracted:	*3/2/2000*	
PB57 7'-8'	*soil*			**Analyzed:**	*3/3/2000*	*L15229-71*
91-20-3	**Naphthalene**	**2,020**	**100**	**µg/kg**	10.	D
208-96-8	Acenaphthylene	ND	10.	µg/kg		
83-32-9	**Acenaphthene**	**1,130**	**100**	**µg/kg**	10.	D
86-73-7	**Fluorene**	**411.**	**10.**	**µg/kg**		
87-86-5	Pentachlorophenol	ND	50.	µg/kg		
85-01-8	**Phenanthrene**	**29.**	**10.**	**µg/kg**		
120-12-7	Anthracene	ND	10.	µg/kg		
206-44-0	**Fluoranthene**	**13.**	**10.**	**µg/kg**		
129-00-0	Pyrene	ND	10.	µg/kg		
56-55-3	Benzo[a]anthracene	ND	10.	µg/kg		
218-01-9	Chrysene	ND	10.	µg/kg		
205-99-2	**Benzo[b]fluoranthene**	**11.**	**10.**	**µg/kg**		
207-08-9	Benzo[k]fluoranthene	ND	10.	µg/kg		
50-32-8	Benzo[a]pyrene	ND	10.	µg/kg		
193-39-5	Indeno[1,2,3-cd]pyrene	ND	10.	µg/kg		
53-70-3	Dibenz[a,h]anthracene	ND	10.	µg/kg		
191-24-2	Benzo[g,h,i]perylene	ND	10.	µg/kg		

Surrogate	Recovery	Limit
2-Fluorophenol	92.%	64. - 124.
Phenol-d6	95.%	30 - 159.
2,4,6-Tribromophenol	151.%	0 - 224.
1,2-Dichlorobenzene-d4	84.%	59. - 134.
Nitrobenzene-d5	119.%	42. - 142.
2-Fluorobiphenyl	85.%	57. - 135.

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Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Polynuclear Aromatic Hydrocarbons (PNA)
by EPA 8270 SIM

Sample ID	*Matrix*					*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppb)**	**Dilution**	**Comment**

				Solids:	*64.0 % w/w*	
				Sampled:	*2/25/2000*	
				Extracted:	*3/2/2000*	
PB57 8'-9'	*soil*			**Analyzed:**	*3/4/2000*	*L15229-72*
91-20-3	**Naphthalene**	**11,300**	**1,000**	**µg/kg**	100.	**D**
208-96-8	Acenaphthylene	ND	10.	µg/kg		
83-32-9	**Acenaphthene**	**189.**	**10.**	**µg/kg**		
86-73-7	Fluorene	ND	10.	µg/kg		
87-86-5	Pentachlorophenol	ND	50.	µg/kg		
85-01-8	Phenanthrene	ND	10.	µg/kg		
120-12-7	Anthracene	ND	10.	µg/kg		
206-44-0	Fluoranthene	ND	10.	µg/kg		
129-00-0	Pyrene	ND	10.	µg/kg		
56-55-3	Benzo[a]anthracene	ND	10.	µg/kg		
218-01-9	Chrysene	ND	10.	µg/kg		
205-99-2	Benzo[b]fluoranthene	ND	10.	µg/kg		
207-08-9	Benzo[k]fluoranthene	ND	10.	µg/kg		
50-32-8	Benzo[a]pyrene	ND	10.	µg/kg		
193-39-5	Indeno[1,2,3-cd]pyrene	ND	10.	µg/kg		
53-70-3	Dibenz[a,h]anthracene	ND	10.	µg/kg		
191-24-2	Benzo[g,h,i]perylene	ND	10.	µg/kg		

Surrogate	Recovery	Limit
2-Fluorophenol	86.%	64. - 124.
Phenol-d6	90.%	30 - 159.
2,4,6-Tribromophenol	149.%	0 - 224.
1,2-Dichlorobenzene-d4	80.%	59. - 134.
Nitrobenzene-d5	MI	42. - 142.
2-Fluorobiphenyl	84.%	57. - 135.

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L15229

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Project: ***IP Longview, WA***

Polynuclear Aromatic Hydrocarbons (PNA)
by EPA 8270 SIM

Sample ID	*Matrix*					*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppb)**	**Dilution**	**Comment**

Solids: *71.4 % w/w*
Sampled: *2/25/2000*
Extracted: *3/2/2000*
Analyzed: *3/6/2000*

PB58 5.5'-7'	*soil*					*L15229-74*
91-20-3	Naphthalene	ND	10.	µg/kg		
208-96-8	Acenaphthylene	ND	10.	µg/kg		
83-32-9	Acenaphthene	ND	10.	µg/kg		
86-73-7	Fluorene	ND	10.	µg/kg		
87-86-5	Pentachlorophenol	ND	50.	µg/kg		
85-01-8	Phenanthrene	ND	10.	µg/kg		
120-12-7	Anthracene	ND	10.	µg/kg		
206-44-0	Fluoranthene	ND	10.	µg/kg		
129-00-0	Pyrene	ND	10.	µg/kg		
56-55-3	Benzo[a]anthracene	ND	10.	µg/kg		
218-01-9	Chrysene	ND	10.	µg/kg		
205-99-2	Benzo[b]fluoranthene	ND	10.	µg/kg		
207-08-9	Benzo[k]fluoranthene	ND	10.	µg/kg		
50-32-8	Benzo[a]pyrene	ND	10.	µg/kg		
193-39-5	Indeno[1,2,3-cd]pyrene	ND	10.	µg/kg		
53-70-3	Dibenz[a,h]anthracene	ND	10.	µg/kg		
191-24-2	Benzo[g,h,i]perylene	ND	10.	µg/kg		

Surrogate	Recovery	Limit
2-Fluorophenol	84.%	64. - 124.
Phenol-d6	87.%	30 - 159.
2,4,6-Tribromophenol	109.%	0 - 224.
1,2-Dichlorobenzene-d4	80.%	59. - 134.
Nitrobenzene-d5	104.%	42. - 142.
2-Fluorobiphenyl	89.%	57. - 135.

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Project: ***IP Longview, WA***

Polynuclear Aromatic Hydrocarbons (PNA)
by EPA 8270 SIM

Sample ID	*Matrix*					*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppb)**	**Dilution**	**Comment**

					Sampled: *2/23/2000*	
					Extracted: *2/29/2000*	
PB44 GW	*water*				Analyzed: *3/1/2000 by PB*	*L15229-5*
91-20-3	Naphthalene	ND	0.1	µg/L		
208-96-8	Acenaphthylene	ND	0.1	µg/L		
83-32-9	Acenaphthene	ND	0.1	µg/L		
86-73-7	Fluorene	ND	0.1	µg/L		
87-86-5	Pentachlorophenol	ND	0.5	µg/L		
85-01-8	**Phenanthrene**	**0.7**	**0.1**	**µg/L**		
120-12-7	Anthracene	ND	0.1	µg/L		
206-44-0	**Fluoranthene**	**1.1**	**0.1**	**µg/L**		
129-00-0	**Pyrene**	**1.1**	**0.1**	**µg/L**		
56-55-3	**Benzo[a]anthracene**	**0.4**	**0.1**	**µg/L**		
218-01-9	**Chrysene**	**0.6**	**0.1**	**µg/L**		
205-99-2	**Benzo[b]fluoranthene**	**0.6**	**0.1**	**µg/L**		
207-08-9	**Benzo[k]fluoranthene**	**0.2**	**0.1**	**µg/L**		
50-32-8	**Benzo[a]pyrene**	**0.5**	**0.1**	**µg/L**		
193-39-5	**Indeno[1,2,3-cd]pyrene**	**0.3**	**0.1**	**µg/L**		
53-70-3	Dibenz[a,h]anthracene	ND	0.1	µg/L		
191-24-2	**Benzo[g,h,i]perylene**	**0.3**	**0.1**	**µg/L**		

Surrogate	Recovery	Limit
2-Fluorophenol	62.%	0 - 141.
Phenol-d6	40.%	0 - 120
2,4,6-Tribromophenol	113.%	0 - 279.
1,2-Dichlorobenzene-d4	91.%	49. - 127.
Nitrobenzene-d5	93.%	0 - 183.
2-Fluorobiphenyl	90.%	57. - 131.

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Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Polynuclear Aromatic Hydrocarbons (PNA)
by EPA 8270 SIM

Sample ID	*Matrix*					*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppb)**	**Dilution**	**Comment**
				Sampled: *2/23/2000*		
				Extracted: *2/29/2000*		
PB45 GW	*water*			Analyzed: *3/1/2000 by PB*		*L15229-11*
91-20-3	**Naphthalene**	**6.0**	**0.1**	**µg/L**		
208-96-8	Acenaphthylene	ND	0.1	µg/L		
83-32-9	**Acenaphthene**	**1.4**	**0.1**	**µg/L**		
86-73-7	**Fluorene**	**0.1**	**0.1**	**µg/L**		
87-86-5	Pentachlorophenol	ND	0.5	µg/L		
85-01-8	Phenanthrene	ND	0.1	µg/L		
120-12-7	Anthracene	ND	0.1	µg/L		
206-44-0	Fluoranthene	ND	0.1	µg/L		
129-00-0	Pyrene	ND	0.1	µg/L		
56-55-3	Benzo[a]anthracene	ND	0.1	µg/L		
218-01-9	Chrysene	ND	0.1	µg/L		
205-99-2	Benzo[b]fluoranthene	ND	0.1	µg/L		
207-08-9	Benzo[k]fluoranthene	ND	0.1	µg/L		
50-32-8	Benzo[a]pyrene	ND	0.1	µg/L		
193-39-5	Indeno[1,2,3-cd]pyrene	ND	0.1	µg/L		
53-70-3	Dibenz[a,h]anthracene	ND	0.1	µg/L		
191-24-2	Benzo[g,h,i]perylene	ND	0.1	µg/L		

Surrogate	Recovery	Limit
2-Fluorophenol	65.%	0 - 141.
Phenol-d6	39.%	0 - 120
2,4,6-Tribromophenol	138.%	0 - 279.
1,2-Dichlorobenzene-d4	98.%	49. - 127.
Nitrobenzene-d5	112.%	0 - 183.
2-Fluorobiphenyl	98.%	57. - 131.

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Project: ***IP Longview, WA***

Polynuclear Aromatic Hydrocarbons (PNA)
by EPA 8270 SIM

Sample ID	*Matrix*					*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppb)**	**Dilution**	**Comment**
				Sampled: *2/23/2000*		
				Extracted: *2/29/2000*		
PB47 GW	*water*			**Analyzed:** *3/1/2000 by PB*		*L15229-19*
91-20-3	**Naphthalene**	**0.5**	**0.1**	**µg/L**		
208-96-8	Acenaphthylene	ND	0.1	µg/L		
83-32-9	**Acenaphthene**	**1.5**	**0.1**	**µg/L**		
86-73-7	Fluorene	ND	0.1	µg/L		
87-86-5	Pentachlorophenol	ND	0.5	µg/L		
85-01-8	Phenanthrene	ND	0.1	µg/L		
120-12-7	Anthracene	ND	0.1	µg/L		
206-44-0	Fluoranthene	ND	0.1	µg/L		
129-00-0	Pyrene	ND	0.1	µg/L		
56-55-3	Benzo[a]anthracene	ND	0.1	µg/L		
218-01-9	Chrysene	ND	0.1	µg/L		
205-99-2	Benzo[b]fluoranthene	ND	0.1	µg/L		
207-08-9	Benzo[k]fluoranthene	ND	0.1	µg/L		
50-32-8	Benzo[a]pyrene	ND	0.1	µg/L		
193-39-5	Indeno[1,2,3-cd]pyrene	ND	0.1	µg/L		
53-70-3	Dibenz[a,h]anthracene	ND	0.1	µg/L		
191-24-2	Benzo[g,h,i]perylene	ND	0.1	µg/L		

Surrogate	Recovery	Limit
2-Fluorophenol	64.%	0 - 141.
Phenol-d6	39.%	0 - 120
2,4,6-Tribromophenol	146.%	0 - 279.
1,2-Dichlorobenzene-d4	98.%	49. - 127.
Nitrobenzene-d5	120.%	0 - 183.
2-Fluorobiphenyl	97.%	57. - 131.

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Project: ***IP Longview, WA***

Polynuclear Aromatic Hydrocarbons (PNA)
by EPA 8270 SIM

Sample ID	*Matrix*					*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppb)**	**Dilution**	**Comment**
				Sampled: *2/24/2000*		
				Extracted: *2/29/2000*		
PB50 GW	*water*			**Analyzed:** *3/1/2000 by PB*		*L15229-33*
91-20-3	**Naphthalene**	**0.1**	**0.1**	**µg/L**		
208-96-8	Acenaphthylene	ND	0.1	µg/L		
83-32-9	**Acenaphthene**	**0.4**	**0.1**	**µg/L**		
86-73-7	Fluorene	ND	0.1	µg/L		
87-86-5	Pentachlorophenol	ND	0.5	µg/L		
85-01-8	Phenanthrene	ND	0.1	µg/L		
120-12-7	Anthracene	ND	0.1	µg/L		
206-44-0	Fluoranthene	ND	0.1	µg/L		
129-00-0	Pyrene	ND	0.1	µg/L		
56-55-3	Benzo[a]anthracene	ND	0.1	µg/L		
218-01-9	Chrysene	ND	0.1	µg/L		
205-99-2	Benzo[b]fluoranthene	ND	0.1	µg/L		
207-08-9	Benzo[k]fluoranthene	ND	0.1	µg/L		
50-32-8	Benzo[a]pyrene	ND	0.1	µg/L		
193-39-5	Indeno[1,2,3-cd]pyrene	ND	0.1	µg/L		
53-70-3	Dibenz[a,h]anthracene	ND	0.1	µg/L		
191-24-2	Benzo[g,h,i]perylene	ND	0.1	µg/L		

Surrogate	Recovery	Limit
2-Fluorophenol	65.%	0 - 141.
Phenol-d6	39.%	0 - 120
2,4,6-Tribromophenol	149.%	0 - 279.
1,2-Dichlorobenzene-d4	98.%	49. - 127.
Nitrobenzene-d5	123.%	0 - 183.
2-Fluorobiphenyl	97.%	57. - 131.

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Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Polynuclear Aromatic Hydrocarbons (PNA)
by EPA 8270 SIM

Sample ID	*Matrix*					*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppb)**	**Dilution**	**Comment**

				Sampled: *2/24/2000*		
				Extracted: *2/29/2000*		
PB51 GW	*water*			**Analyzed:** *3/1/2000 by PB*		*L15229-38*
91-20-3	**Naphthalene**	**0.7**	**0.1**	**µg/L**		
208-96-8	Acenaphthylene	ND	0.1	µg/L		
83-32-9	**Acenaphthene**	**11.1**	**0.1**	**µg/L**		
86-73-7	**Fluorene**	**2.5**	**0.1**	**µg/L**		
87-86-5	Pentachlorophenol	ND	0.5	µg/L		
85-01-8	**Phenanthrene**	**1.8**	**0.1**	**µg/L**		
120-12-7	**Anthracene**	**0.1**	**0.1**	**µg/L**		
206-44-0	Fluoranthene	ND	0.1	µg/L		
129-00-0	Pyrene	ND	0.1	µg/L		
56-55-3	Benzo[a]anthracene	ND	0.1	µg/L		
218-01-9	Chrysene	ND	0.1	µg/L		
205-99-2	Benzo[b]fluoranthene	ND	0.1	µg/L		
207-08-9	Benzo[k]fluoranthene	ND	0.1	µg/L		
50-32-8	Benzo[a]pyrene	ND	0.1	µg/L		
193-39-5	Indeno[1,2,3-cd]pyrene	ND	0.1	µg/L		
53-70-3	Dibenz[a,h]anthracene	ND	0.1	µg/L		
191-24-2	Benzo[g,h,i]perylene	ND	0.1	µg/L		

Surrogate	Recovery	Limit
2-Fluorophenol	65.%	0 - 141.
Phenol-d6	40.%	0 - 120
2,4,6-Tribromophenol	153.%	0 - 279.
1,2-Dichlorobenzene-d4	95.%	49. - 127.
Nitrobenzene-d5	120.%	0 - 183.
2-Fluorobiphenyl	94.%	57. - 131.

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L15229

Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Polynuclear Aromatic Hydrocarbons (PNA)
by EPA 8270 SIM

Sample ID	*Matrix*					*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppb)**	**Dilution**	**Comment**
				Sampled: *2/24/2000*		
				Extracted: *2/29/2000*		
PB53 GW	*water*			**Analyzed:** *3/1/2000 by PB*		*L15229-51*
91-20-3	**Naphthalene**	**31.4**	**1.0**	**µg/L**	10.	**D**
208-96-8	Acenaphthylene	ND	0.1	µg/L		
83-32-9	**Acenaphthene**	**1.1**	**0.1**	**µg/L**		
86-73-7	Fluorene	ND	0.1	µg/L		
87-86-5	Pentachlorophenol	ND	0.5	µg/L		
85-01-8	Phenanthrene	ND	0.1	µg/L		
120-12-7	Anthracene	ND	0.1	µg/L		
206-44-0	Fluoranthene	ND	0.1	µg/L		
129-00-0	Pyrene	ND	0.1	µg/L		
56-55-3	Benzo[a]anthracene	ND	0.1	µg/L		
218-01-9	Chrysene	ND	0.1	µg/L		
205-99-2	Benzo[b]fluoranthene	ND	0.1	µg/L		
207-08-9	Benzo[k]fluoranthene	ND	0.1	µg/L		
50-32-8	Benzo[a]pyrene	ND	0.1	µg/L		
193-39-5	Indeno[1,2,3-cd]pyrene	ND	0.1	µg/L		
53-70-3	Dibenz[a,h]anthracene	ND	0.1	µg/L		
191-24-2	Benzo[g,h,i]perylene	ND	0.1	µg/L		

Surrogate	Recovery	Limit
2-Fluorophenol	58.%	0 - 141.
Phenol-d6	38.%	0 - 120
2,4,6-Tribromophenol	152.%	0 - 279.
1,2-Dichlorobenzene-d4	93.%	49. - 127.
Nitrobenzene-d5	118.%	0 - 183.
2-Fluorobiphenyl	94.%	57. - 131.

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by EPA 8270 SIM

Sample ID	*Matrix*					*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppb)**	**Dilution**	**Comment**

				Sampled: *2/23/2000*		
				Extracted: *2/29/2000*		
PB49 GW	*water*			Analyzed: *3/1/2000 by PB*		*L15229-52*
91-20-3	**Naphthalene**	**0.2**	**0.1**	**µg/L**		
208-96-8	Acenaphthylene	ND	0.1	µg/L		
83-32-9	**Acenaphthene**	**0.1**	**0.1**	**µg/L**		
86-73-7	Fluorene	ND	0.1	µg/L		
87-86-5	Pentachlorophenol	ND	0.5	µg/L		
85-01-8	Phenanthrene	ND	0.1	µg/L		
120-12-7	Anthracene	ND	0.1	µg/L		
206-44-0	Fluoranthene	ND	0.1	µg/L		
129-00-0	Pyrene	ND	0.1	µg/L		
56-55-3	Benzo[a]anthracene	ND	0.1	µg/L		
218-01-9	Chrysene	ND	0.1	µg/L		
205-99-2	Benzo[b]fluoranthene	ND	0.1	µg/L		
207-08-9	Benzo[k]fluoranthene	ND	0.1	µg/L		
50-32-8	Benzo[a]pyrene	ND	0.1	µg/L		
193-39-5	Indeno[1,2,3-cd]pyrene	ND	0.1	µg/L		
53-70-3	Dibenz[a,h]anthracene	ND	0.1	µg/L		
191-24-2	Benzo[g,h,i]perylene	ND	0.1	µg/L		

Surrogate	Recovery	Limit
2-Fluorophenol	62.%	0 - 141.
Phenol-d6	40.%	0 - 120
2,4,6-Tribromophenol	151.%	0 - 279.
1,2-Dichlorobenzene-d4	94.%	49. - 127.
Nitrobenzene-d5	120.%	0 - 183.
2-Fluorobiphenyl	96.%	57. - 131.

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Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Polynuclear Aromatic Hydrocarbons (PNA)
by EPA 8270 SIM

Sample ID	*Matrix*					*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppb)**	**Dilution**	**Comment**
				Sampled: *2/24/2000*		
				Extracted: *3/2/2000*		
PB55 GW	*water*			Analyzed: *3/4/2000*		*L15229-63*
91-20-3	**Naphthalene**	**0.1**	**0.1**	**µg/L**		
208-96-8	Acenaphthylene	ND	0.1	µg/L		
83-32-9	**Acenaphthene**	**0.1**	**0.1**	**µg/L**		
86-73-7	Fluorene	ND	0.1	µg/L		
87-86-5	Pentachlorophenol	ND	0.5	µg/L		
85-01-8	Phenanthrene	ND	0.1	µg/L		
120-12-7	Anthracene	ND	0.1	µg/L		
206-44-0	Fluoranthene	ND	0.1	µg/L		
129-00-0	Pyrene	ND	0.1	µg/L		
56-55-3	Benzo[a]anthracene	ND	0.1	µg/L		
218-01-9	Chrysene	ND	0.1	µg/L		
205-99-2	Benzo[b]fluoranthene	ND	0.1	µg/L		
207-08-9	Benzo[k]fluoranthene	ND	0.1	µg/L		
50-32-8	Benzo[a]pyrene	ND	0.1	µg/L		
193-39-5	Indeno[1,2,3-cd]pyrene	ND	0.1	µg/L		
53-70-3	Dibenz[a,h]anthracene	ND	0.1	µg/L		
191-24-2	Benzo[g,h,i]perylene	ND	0.1	µg/L		

Surrogate	Recovery	Limit
2-Fluorophenol	50.%	0 - 141.
Phenol-d6	33.%	0 - 120
2,4,6-Tribromophenol	144.%	0 - 279.
1,2-Dichlorobenzene-d4	70.%	49. - 127.
Nitrobenzene-d5	104.%	0 - 183.
2-Fluorobiphenyl	78.%	57. - 131.

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Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Polynuclear Aromatic Hydrocarbons (PNA)
by EPA 8270 SIM

Sample ID	*Matrix*					*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppb)**	**Dilution**	**Comment**

				Sampled: *2/25/2000*		
				Extracted: *3/2/2000*		
PB56 GW	*water*			**Analyzed:** *3/4/2000*		*L15229-69*
91-20-3	Naphthalene	ND	0.1	µg/L		
208-96-8	Acenaphthylene	ND	0.1	µg/L		
83-32-9	Acenaphthene	ND	0.1	µg/L		
86-73-7	Fluorene	ND	0.1	µg/L		
87-86-5	Pentachlorophenol	ND	0.5	µg/L		
85-01-8	Phenanthrene	ND	0.1	µg/L		
120-12-7	Anthracene	ND	0.1	µg/L		
206-44-0	Fluoranthene	ND	0.1	µg/L		
129-00-0	Pyrene	ND	0.1	µg/L		
56-55-3	Benzo[a]anthracene	ND	0.1	µg/L		
218-01-9	Chrysene	ND	0.1	µg/L		
205-99-2	Benzo[b]fluoranthene	ND	0.1	µg/L		
207-08-9	Benzo[k]fluoranthene	ND	0.1	µg/L		
50-32-8	Benzo[a]pyrene	ND	0.1	µg/L		
193-39-5	Indeno[1,2,3-cd]pyrene	ND	0.1	µg/L		
53-70-3	Dibenz[a,h]anthracene	ND	0.1	µg/L		
191-24-2	Benzo[g,h,i]perylene	ND	0.1	µg/L		

Surrogate	Recovery	Limit
2-Fluorophenol	56.%	0 - 141.
Phenol-d6	37.%	0 - 120
2,4,6-Tribromophenol	164.%	0 - 279.
1,2-Dichlorobenzene-d4	84.%	49. - 127.
Nitrobenzene-d5	123.%	0 - 183.
2-Fluorobiphenyl	95.%	57. - 131.

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L15229

Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Polynuclear Aromatic Hydrocarbons (PNA)
by EPA 8270 SIM

Sample ID	*Matrix*						*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppb)**	**Dilution**	**Comment**	
				Sampled: *2/25/2000*			
				Extracted: *3/2/2000*			
PB58 GW	*water*			Analyzed: *3/4/2000*			*L15229-78*
91-20-3	**Naphthalene**	**0.9**	**0.1**	**µg/L**			
208-96-8	**Acenaphthylene**	**1.7**	**0.1**	**µg/L**			
83-32-9	**Acenaphthene**	**194.**	**1.0**	**µg/L**	10.	**D**	
86-73-7	**Fluorene**	**108.**	**1.0**	**µg/L**	10.	**D**	
87-86-5	Pentachlorophenol	ND	0.5	µg/L			
85-01-8	**Phenanthrene**	**113.**	**1.0**	**µg/L**	10.	**D**	
120-12-7	**Anthracene**	**10.8**	**0.1**	**µg/L**			
206-44-0	**Fluoranthene**	**10.8**	**0.1**	**µg/L**			
129-00-0	**Pyrene**	**7.6**	**0.1**	**µg/L**			
56-55-3	**Benzo[a]anthracene**	**0.3**	**0.1**	**µg/L**			
218-01-9	Chrysene	ND	0.1	µg/L			
205-99-2	Benzo[b]fluoranthene	ND	0.1	µg/L			
207-08-9	Benzo[k]fluoranthene	ND	0.1	µg/L			
50-32-8	Benzo[a]pyrene	ND	0.1	µg/L			
193-39-5	Indeno[1,2,3-cd]pyrene	ND	0.1	µg/L			
53-70-3	Dibenz[a,h]anthracene	ND	0.1	µg/L			
191-24-2	Benzo[g,h,i]perylene	ND	0.1	µg/L			

Surrogate	Recovery	Limit
2-Fluorophenol	64.%	0 - 141.
Phenol-d6	41.%	0 - 120
2,4,6-Tribromophenol	180.%	0 - 279.
1,2-Dichlorobenzene-d4	93.%	49. - 127.
Nitrobenzene-d5	132.%	0 - 183.
2-Fluorobiphenyl	99.%	57. - 131.

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L15229

Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Semi-Volatile Petroleum Products
by NWTPH-DX

Sample ID	*Matrix*						*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppm)**	**Dilution**	**Comment**	

				Solids:	*83.4 % w/w*		
				Sampled:	*2/23/2000*		
				Extracted:	*2/28/2000*		
PB44 5'-6'	*soil*			**Analyzed:**	*2/28/2000 by RJ*		*L15229-2*
	Diesel Region	ND	25.	mg/kg			
	Oil Region	ND	50.	mg/kg			

Surrogate	Recovery	Limit
2-Fluorobiphenyl	108.%	50 - 150
O-terphenyl	110.%	50 - 150

				Solids:	*95.9 % w/w*		
				Sampled:	*2/23/2000*		
				Extracted:	*2/28/2000*		
PB45 5'-7'	*soil*			**Analyzed:**	*2/28/2000 by RJ*		*L15229-7*
	Diesel Region	ND	25.	mg/kg			
	Oil Region	ND	50.	mg/kg			

Surrogate	Recovery	Limit
2-Fluorobiphenyl	98.%	50 - 150
O-terphenyl	108.%	50 - 150

				Solids:	*83.1 % w/w*		
				Sampled:	*2/23/2000*		
				Extracted:	*2/28/2000*		
PB46 5'-7'	*soil*			**Analyzed:**	*3/2/2000 by RJ*		*L15229-13*
	Diesel Region	**3,000**	**250**	**mg/kg**	10.	1,D	
	Oil Region	ND	50.	mg/kg			

Surrogate	Recovery	Limit
2-Fluorobiphenyl	112.%	50 - 150
O-terphenyl	111.%	50 - 150

[1] Product appears to be diesel.

OAL

L15229

Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Semi-Volatile Petroleum Products
by NWTPH-DX

Sample ID	*Matrix*						*Lab Number*
CAS	Analyte	Result	Reporting Limit	Units (ppm)	Dilution	Comment	
				Solids:	*86.2 % w/w*		
				Sampled:	*2/23/2000*		
				Extracted:	*2/28/2000*		
PB47 5'-6'	*soil*			Analyzed:	*2/28/2000 by RJ*		*L15229-15*
	Diesel Region	**35.**	**25.**	**mg/kg**		**1**	
	Oil Region	ND	50.	mg/kg			

Surrogate	Recovery	Limit
2-Fluorobiphenyl	100.%	50 - 150
O-terphenyl	108.%	50 - 150

[1] Non-typical diesel range product.

				Solids:	*74.0 % w/w*		
				Sampled:	*2/23/2000*		
				Extracted:	*2/28/2000*		
PB48 6.5'-7'	*soil*			Analyzed:	*2/28/2000 by RJ*		*L15229-21*
	Diesel Region	ND	25.	mg/kg			
	Oil Region	ND	50.	mg/kg			

Surrogate	Recovery	Limit
2-Fluorobiphenyl	97.%	50 - 150
O-terphenyl	107.%	50 - 150

				Solids:	*74.0 % w/w*		
				Sampled:	*2/23/2000*		
				Extracted:	*2/28/2000*		
'B49 7'-9'	*soil*			Analyzed:	*2/28/2000 by RJ*		*L15229-25*
	Diesel Region	ND	25.	mg/kg			
	Oil Region	ND	50.	mg/kg			

Surrogate	Recovery	Limit
2-Fluorobiphenyl	104.%	50 - 150
O-terphenyl	113.%	50 - 150

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Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Semi-Volatile Petroleum Products
by NWTPH-DX

Sample ID	*Matrix*						*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppm)**	**Dilution**	**Comment**	

				Solids:	*84.5 % w/w*	
				Sampled:	*2/24/2000*	
				Extracted:	*2/28/2000*	
PB50 3'-4.5'	*soil*			**Analyzed:**	*2/28/2000 by RJ*	*L15229-28*
	Diesel Region	ND	25.	mg/kg		
	Oil Region	**88.**	**50.**	**mg/kg**	1	

Surrogate	Recovery	Limit
2-Fluorobiphenyl	105.%	50 - 150
O-terphenyl	113.%	50 - 150

[1] Non-typical oil range product.

				Solids:	*80.5 % w/w*	
				Sampled:	*2/24/2000*	
				Extracted:	*2/28/2000*	
PB51 3'-5'	*soil*			**Analyzed:**	*2/28/2000 by RJ*	*L15229-34*
	Diesel Region	ND	25.	mg/kg		
	Oil Region	**350**	**50.**	**mg/kg**	1	

Surrogate	Recovery	Limit
2-Fluorobiphenyl	106.%	50 - 150
O-terphenyl	115.%	50 - 150

[1] Product appears to be oil.

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Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Semi-Volatile Petroleum Products
by NWTPH-DX

Sample ID	*Matrix*					*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppm)**	**Dilution**	**Comment**

Solids: *67.1 % w/w*
Sampled: *2/24/2000*
Extracted: *2/28/2000*

PB52 7.5'-9' *soil* **Analyzed:** *2/28/2000 by RJ* *L15229-40*

Diesel Region	41.	25.	mg/kg	1	
Oil Region	ND	50.	mg/kg		

Surrogate	Recovery	Limit
2-Fluorobiphenyl	104.%	50 - 150
O-terphenyl	114.%	50 - 150

[1] Non-typical diesel range product.

Solids: *71.5 % w/w*
Sampled: *2/24/2000*
Extracted: *2/28/2000*

PB53 7'-8.5' *soil* **Analyzed:** *2/29/2000 by RJ* *L15229-46*

Diesel Region	38.	25.	mg/kg	1	
Oil Region	ND	50.	mg/kg		

Surrogate	Recovery	Limit
2-Fluorobiphenyl	101.%	50 - 150
O-terphenyl	109.%	50 - 150

[1] Non-typical diesel range product.

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Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Semi-Volatile Petroleum Products
by NWTPH-DX

Sample ID	*Matrix*					*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppm)**	**Dilution**	**Comment**

				Solids:	*64.7 % w/w*	
				Sampled:	*2/24/2000*	
				Extracted:	*2/28/2000*	
PB53 8.5'-9'	*soil*			**Analyzed:**	*2/29/2000 by RJ*	*L15229-47*
	Diesel Region	**52.**	**25.**	**mg/kg**	**1**	
	Oil Region	ND	50.	mg/kg		

Surrogate	Recovery	Limit
2-Fluorobiphenyl	101.%	50 - 150
O-terphenyl	109.%	50 - 150

[1] Non-typical diesel range product.

				Solids:	*62.4 % w/w*	
				Sampled:	*2/24/2000*	
				Extracted:	*2/28/2000*	
PB54 8.5'-9'	*soil*			**Analyzed:**	*2/29/2000 by RJ*	*L15229-55*
	Diesel Region	**67.**	**25.**	**mg/kg**	**1**	
	Oil Region	**180**	**50.**	**mg/kg**	**2**	

Surrogate	Recovery	Limit
2-Fluorobiphenyl	104.%	50 - 150
O-terphenyl	113.%	50 - 150

[1] Non-typical diesel range product.
[2] Non-typical oil range product.

				Solids:	*83.0 % w/w*	
				Sampled:	*2/24/2000*	
				Extracted:	*2/29/2000*	
PB55 5'-7'	*soil*			**Analyzed:**	*2/29/2000 by RJ*	*L15229-57*
	Diesel Region	ND	25.	mg/kg		
	Oil Region	ND	50.	mg/kg		

Surrogate	Recovery	Limit
2-Fluorobiphenyl	100.%	50 - 150
O-terphenyl	110.%	50 - 150

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L15229

Client: ***URS Greiner Woodward Clyde***

Project: ***IP Longview, WA***

Contact: ***Crystal Neirby***

Semi-Volatile Petroleum Products

by NWTPH-DX

Sample ID	*Matrix*					*Lab Number*
CAS	Analyte	Result	Reporting Limit	Units (ppm)	Dilution	Comment
				Solids: *76.8 % w/w*		
				Sampled: *2/25/2000*		
				Extracted: *2/29/2000*		
B56 7'-9'	*soil*			**Analyzed:** *2/29/2000 by RJ*		*L15229-66*
	Diesel Region	ND	25.	mg/kg		
	Oil Region	ND	50.	mg/kg		

Surrogate	Recovery	Limit
2-Fluorobiphenyl	99.%	50 - 150
O-terphenyl	110.%	50 - 150

				Solids: *69.4 % w/w*		
				Sampled: *2/25/2000*		
				Extracted: *2/29/2000*		
B57 7'-8'	*soil*			**Analyzed:** *2/29/2000 by RJ*		*L15229-71*
	Diesel Region	**36.**	**25.**	**mg/kg**	**1**	
	Oil Region	ND	50.	mg/kg		

Surrogate	Recovery	Limit
2-Fluorobiphenyl	100.%	50 - 150
O-terphenyl	108.%	50 - 150

[1] Non-typical diesel range product.

				Solids: *64.0 % w/w*		
				Sampled: *2/25/2000*		
				Extracted: *2/29/2000*		
B57 8'-9'	*soil*			**Analyzed:** *2/29/2000 by RJ*		*L15229-72*
	Diesel Region	**71.**	**25.**	**mg/kg**	**1**	
	Oil Region	ND	50.	mg/kg		

Surrogate	Recovery	Limit
2-Fluorobiphenyl	97.%	50 - 150
O-terphenyl	105.%	50 - 150

[1] Non-typical diesel range product.

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Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Semi-Volatile Petroleum Products
by NWTPH-DX

Sample ID	*Matrix*					*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppm)**	**Dilution**	**Comment**

				Solids:	*71.4 % w/w*	
				Sampled:	*2/25/2000*	
				Extracted:	*2/29/2000*	
PB58 5.5'-7'	*soil*			**Analyzed:**	*2/29/2000 by RJ*	*L15229-74*
	Diesel Region	ND	25.	mg/kg		
	Oil Region	ND	50.	mg/kg		

Surrogate	Recovery	Limit
2-Fluorobiphenyl	96.%	50 - 150
O-terphenyl	105.%	50 - 150

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L15229

Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Semi-Volatile Petroleum Products
by NWTPH-DX

Sample ID	*Matrix*					*Lab Number*
CAS	Analyte	Result	Reporting Limit	Units (ppm)	Dilution	Comment

				Sampled:	*2/23/2000*	
				Extracted:	*2/25/2000*	
PB44 GW	*water*			Analyzed:	*2/28/2000 by RJ*	*L15229-5*
	Diesel Region	ND	0.25	mg/L		
	Oil Region	ND	0.50	mg/L		

Surrogate	Recovery	Limit
2-Fluorobiphenyl	91.%	50 - 150
O-terphenyl	101.%	50 - 150

				Sampled:	*2/23/2000*	
				Extracted:	*2/25/2000*	
PB45 GW	*water*			Analyzed:	*2/28/2000 by RJ*	*L15229-11*
	Diesel Region	**1.2**	**0.25**	**mg/L**	**1**	
	Oil Region	ND	0.50	mg/L		

Surrogate	Recovery	Limit
2-Fluorobiphenyl	93.%	50 - 150
O-terphenyl	102.%	50 - 150

[1] Non-typical diesel range product.

				Sampled:	*2/23/2000*	
				Extracted:	*2/25/2000*	
PB47 GW	*water*			Analyzed:	*2/28/2000 by RJ*	*L15229-19*
	Diesel Region	**0.60**	**0.25**	**mg/L**	**1**	
	Oil Region	ND	0.50	mg/L		

Surrogate	Recovery	Limit
2-Fluorobiphenyl	91.%	50 - 150
O-terphenyl	100.%	50 - 150

[1] Non-typical diesel range product.

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Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Semi-Volatile Petroleum Products
by NWTPH-DX

Sample ID	*Matrix*					*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppm)**	**Dilution**	**Comment**

PB50 GW — *water* — **Sampled:** *2/24/2000* **Extracted:** *2/25/2000* **Analyzed:** *2/28/2000 by RJ* — *L15229-33*

Diesel Region	**0.28**	**0.25**	**mg/L**	**1**
Oil Region	ND	0.50	mg/L	

Surrogate	Recovery	Limit
2-Fluorobiphenyl	87.%	50 - 150
O-terphenyl	102.%	50 - 150

[1] Non-typical diesel range product.

PB51 GW — *water* — **Sampled:** *2/24/2000* **Extracted:** *2/25/2000* **Analyzed:** *2/28/2000 by RJ* — *L15229-38*

Diesel Region	**1.1**	**0.25**	**mg/L**	**1**
Oil Region	ND	0.50	mg/L	

Surrogate	Recovery	Limit
2-Fluorobiphenyl	93.%	50 - 150
O-terphenyl	103.%	50 - 150

[1] Non-typical diesel range product.

PB53 GW — *water* — **Sampled:** *2/24/2000* **Extracted:** *2/25/2000* **Analyzed:** *2/28/2000 by RJ* — *L15229-51*

Diesel Region	**0.73**	**0.25**	**mg/L**	**1**
Oil Region	ND	0.50	mg/L	

Surrogate	Recovery	Limit
2-Fluorobiphenyl	85.%	50 - 150
O-terphenyl	99.%	50 - 150

[1] Non-typical diesel range product.

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L15229

Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Semi-Volatile Petroleum Products
by NWTPH-DX

Sample ID	*Matrix*						*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppm)**	**Dilution**	**Comment**	
				Sampled: *2/23/2000*			
				Extracted: *2/25/2000*			
PB49 GW	*water*			**Analyzed:** *2/28/2000 by RJ*			*L15229-52*
	Diesel Region	ND	0.25	mg/L			
	Oil Region	ND	0.50	mg/L			
	Surrogate			Recovery		Limit	
	2-Fluorobiphenyl			95.%		50 - 150	
	O-terphenyl			107.%		50 - 150	
				Sampled: *2/24/2000*			
				Extracted: *3/1/2000*			
PB55 GW	*water*			**Analyzed:** *3/1/2000 by RJ*			*L15229-63*
	Diesel Region	ND	0.25	mg/L			
	Oil Region	ND	0.50	mg/L			
	Surrogate			Recovery		Limit	
	2-Fluorobiphenyl			102.%		50 - 150	
	O-terphenyl			114.%		50 - 150	
				Sampled: *2/25/2000*			
				Extracted: *3/1/2000*			
PB56 GW	*water*			**Analyzed:** *3/1/2000 by RJ*			*L15229-69*
	Diesel Region	ND	0.25	mg/L			
	Oil Region	ND	0.50	mg/L			
	Surrogate			Recovery		Limit	
	2-Fluorobiphenyl			100.%		50 - 150	
	O-terphenyl			116.%		50 - 150	

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L15229

Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Semi-Volatile Petroleum Products
by NWTPH-DX

Sample ID	*Matrix*					*Lab Number*
CAS	**Analyte**	**Result**	**Reporting Limit**	**Units (ppm)**	**Dilution**	**Comment**

				Sampled: *2/25/2000*		
				Extracted: *3/1/2000*		
PB58 GW	*water*			**Analyzed:** *3/1/2000 by RJ*		*L15229-78*
	Diesel Region [1]	**1.4**	**0.25**	**mg/L**	**1**	
	Oil Region	ND	0.50	mg/L		

Surrogate	Recovery	Limit
2-Fluorobiphenyl	106.%	50 - 150
O-terphenyl	113.%	50 - 150

[1] Non-typical diesel range product.

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L15229

Client: **URS Greiner Woodward Clyde**
Contact: **Crystal Neirby**

Project: **IP Longview, WA**

Batch Q.C.

EPA Method 8310 Polynuclear Aromatic Hydrocarbons by modified EPA method 8270 (SIM)

Sample ID	Analyte	Blank Result	Reporting Limit	Units	Q	*Lab Number*
		MB0301B			Sampled: *NA* Analyzed: *03/02/00*	*MB0301B*
CAS#						
91-20-3	Naphthalene	nd	10	ug/Kg		
208-96-8	Acenaphthylene	nd	10	ug/Kg		
83-32-9	Acenaphthene	nd	10	ug/Kg		
86-73-7	Fluorene	nd	10	ug/Kg		
87-86-5	Pentachlorophenol	nd	50	ug/Kg		
85-01-8	Phenanthrene	nd	10	ug/Kg		
120-12-7	Anthracene	nd	10	ug/Kg		
206-44-0	Fluoranthene	nd	10	ug/Kg		
129-00-0	Pyrene	nd	10	ug/Kg		
56-55-3	Benzo[a]anthracene	nd	10	ug/Kg		
218-01-9	Chrysene	nd	10	ug/Kg		
205-99-2	Benzo[b]fluoranthene	nd	10	ug/Kg		
207-08-9	Benzo[k]fluoranthene	nd	10	ug/Kg		
50-32-8	Benzo[a]pyrene	nd	10	ug/Kg		
193-39-5	Indeno[1,2,3-cd]pyrene	nd	10	ug/Kg		
53-70-3	Dibenz[a,h]anthracene	nd	10	ug/Kg		
191-24-2	Benzo[g,h,i]perylene	nd	10	ug/Kg		

Acid Surrogates:	Recovery *MB0310B*	Control Limits
2-Fluorophenol	89%	**64% - 124%**
Phenol-d4	90%	**30% - 159%**
2,4,6-Tribromophenol	97%	**0% - 224%**

Base / Neutral Surrogates:	*MB0310B*	Limits
1,2-Dichlorobenzene-d4	88%	**59% - 134%**
Nitrobenzene-d5	95%	**42% - 142%**
2-Fluorobiphenyl	90%	**57% - 135%**

QC for samples L15229 - 2,7,13,15,21,25,28,34,40,46,47,55

none detected = nd

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L15229

Client: **URS Greiner Woodward Clyde**
Contact: **Crystal Neirby**

Project: **IP Longview, WA**

Batch Q.C.

EPA Method 8310 Polynuclear Aromatic Hydrocarbons by modified EPA method 8270 (SIM)

Sample ID	Analyte	Blank Result	Reporting Limit	Units	Q	*Lab Number*
	SOIL	*MB0302U*			Sampled: *NA* Analyzed: *03/02/00*	*MB0302U*
CAS#						
91-20-3	Naphthalene	nd	10	ug/Kg		
208-96-8	Acenaphthylene	nd	10	ug/Kg		
83-32-9	Acenaphthene	nd	10	ug/Kg		
86-73-7	Fluorene	nd	10	ug/Kg		
87-86-5	Pentachlorophenol	nd	50	ug/Kg		
85-01-8	Phenanthrene	nd	10	ug/Kg		
120-12-7	Anthracene	nd	10	ug/Kg		
206-44-0	Fluoranthene	nd	10	ug/Kg		
129-00-0	Pyrene	nd	10	ug/Kg		
56-55-3	Benzo[a]anthracene	nd	10	ug/Kg		
218-01-9	Chrysene	nd	10	ug/Kg		
205-99-2	Benzo[b]fluoranthene	nd	10	ug/Kg		
207-08-9	Benzo[k]fluoranthene	nd	10	ug/Kg		
50-32-8	Benzo[a]pyrene	nd	10	ug/Kg		
193-39-5	Indeno[1,2,3-cd]pyrene	nd	10	ug/Kg		
53-70-3	Dibenz[a,h]anthracene	nd	10	ug/Kg		
191-24-2	Benzo[g,h,i]perylene	nd	10	ug/Kg		

Acid Surrogates:	Recovery *MB0302U*	Control Limits
2-Fluorophenol	97%	64% - 124%
Phenol-d4	98%	30% - 159%
2,4,6-Tribromophenol	132%	0% - 224%

Base / Neutral Surrogates:	*MB0302U*	Limits
1,2-Dichlorobenzene-d4	92%	59% - 134%
Nitrobenzene-d5	123%	42% - 142%
2-Fluorobiphenyl	91%	57% - 135%

QC for samples L15229 - 57,66,71,72,74

none detected = nd

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L15229

Client: URS Greiner Woodward Clyde
Contact: Crystal Neirby

Project: IP Longview, WA

Batch Q.C.
PNA LCS
Soils (ug/Kg)
by modified EPA method 8270 (SIM)

Sample ID

CAS#	Analyte	Spiked (ug/Kg)	Found (ug/Kg)	Recovery (%)	Control Limits (%)	Q
						Sampled: *NA* Analyzed: *02/21/00* *LCS0218B*
91-20-3	Naphthalene	19.9	18.1	91	78 - 120	
208-96-8	Acenaphthylene	19.9	17.4	87	59 - 120	
83-32-9	Acenaphthene	19.9	18.0	90	77 - 120	
86-73-7	Fluorene	19.9	18.1	91	71 - 120	
87-86-5	Pentachlorophenol	199	157	79	0 - 122	
85-01-8	Phenanthrene	19.9	18.9	95	75 - 126	
120-12-7	Anthracene	19.9	18.1	91	63 - 120	
206-44-0	Fluoranthene	19.9	18.8	94	61 - 126	
129-00-0	Pyrene	19.9	19.0	95	67 - 125	
56-55-3	Benzo[a]anthracene	19.9	19.0	95	62 - 124	
218-01-9	Chrysene	19.9	18.7	94	76 - 128	
205-99-2	Benzo[b]fluoranthene	19.9	18.8	94	64 - 124	
207-08-9	Benzo[k]fluoranthene	19.9	18.3	92	64 - 129	
50-32-8	Benzo[a]pyrene	19.9	18.7	94	58 - 120	
193-39-5	Indeno[1,2,3-cd]pyrene	19.9	17.9	90	59 - 124	
53-70-3	Dibenz[a,h]anthracene	19.9	17.7	89	59 - 124	
191-24-2	Benzo[g,h,i]perylene	19.9	17.6	88	61 - 126	

Acid Surrogates:	Recovery (%)	Control Limits (%)	Q
2-Fluorophenol	89	66 - 126	
Phenol-d4	90	65 - 131	
2,4,6-Tribromophenol	99	25 - 142	

Base / Neutral Surrogates:	(%)	(%)	
1,2-Dichlorobenzene-d4	89	79 - 120	
Nitrobenzene-d5	97	49 - 124	
2-Fluorobiphenyl	90	76 - 121	

QC for samples L15229 - 2,7,13,15,21,25,28,34,40,46,47,55,57,66,71,72,74

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L15229

Client: URS Greiner Woodward Clyde
Contact: Crystal Neirby

Project: IP Longview, WA

Batch Q.C.
PNA MS & MSD
Soils (ug/Kg)
by modified EPA method 8270 (SIM)

Analyzed: *02/21/10* L15032-3

CAS#		Sample Result (ug/Kg)	MS Result (ug/Kg)	Spike Added (ug/Kg)	Recovery (%)	MSD Result (ug/Kg)	Spike Added (ug/Kg)	Recovery (%)	Control Limits (%)	Q
91-20-3	Naphthalene	5380	5394	25	56	5107	25	MI	10 - 200	
208-96-8	Acenaphthylene	540.0	700	25	MI	563	25	94	10 - 200	
83-32-9	Acenaphthene	1640	1885	25	MI	1547	25	MI	10 - 200	
86-73-7	Fluorene	4316	3955	25	MI	3735	25	MI	10 - 200	
87-86-5	Pentachlorophenol	546.9	262	250	MI	557	250	MI	10 - 200	
85-01-8	Phenanthrene	11660	9350	25	MI	8906	25	MI	10 - 200	
120-12-7	Anthracene	2431	2113	25	MI	2143	25	MI	10 - 200	
206-44-0	Fluoranthene	66	97	25	124	107	25	163	10 - 200	
129-00-0	Pyrene	355	339	25	MI	348	25	MI	10 - 200	
56-55-3	Benzo[a]anthracene	19	40	25	84	46	25	108	10 - 200	
218-01-9	Chrysene	58	72	25	55	78	25	78	10 - 200	
205-99-2	Benzo[b]fluoranthene	12	31	25	76	34	25	88	10 - 200	
207-08-9	Benzo[k]fluoranthene	0	25	25	101	27	25	108	10 - 200	
50-32-8	Benzo[a]pyrene	0	25	25	100	26	25	106	10 - 200	
193-39-5	Indeno[1,2,3-cd]pyrene	0	23	25	90	25	25	99	10 - 200	
53-70-3	Dibenz[a,h]anthracene	0	22	25	89	24	25	98	10 - 200	
191-24-2	Benzo[g,h,i]perylene	0	21	25	84	25	25	101	10 - 200	

CAS#		RPD (%)	Control Limits (%)	Q
91-20-3	Naphthalene	MI	40	
208-96-8	Acenaphthylene	MI	40	
83-32-9	Acenaphthene	MI	40	
86-73-7	Fluorene	MI	40	
87-86-5	Pentachlorophenol	MI	40	
85-01-8	Phenanthrene	MI	40	
120-12-7	Anthracene	MI	40	
206-44-0	Fluoranthene	27	40	
129-00-0	Pyrene	MI	40	
56-55-3	Benzo[a]anthracene	25	40	
218-01-9	Chrysene	35	40	
205-99-2	Benzo[b]fluoranthene	14	40	
207-08-9	Benzo[k]fluoranthene	6	40	
50-32-8	Benzo[a]pyrene	6	40	
193-39-5	Indeno[1,2,3-cd]pyrene	9	40	
53-70-3	Dibenz[a,h]anthracene	10	40	
191-24-2	Benzo[g,h,i]perylene	19	40	

Acid Surrogates:	MS Recovery (%)	MSD Recovery (%)	Control Limits (%)	Q
2-Fluorophenol	103	119	64 - 124	
Phenol-d4	97	110	30 - 159	
2,4,6-Tribromophenol	82	95	0 - 224	
Base / Neutral Surrogates:				
1,2-Dichlorobenzene-d4	MI	MI	59 - 134	
Nitrobenzene-d5	MI	MI	41 - 141	
2-Fluorobiphenyl	MI	MI	57 - 135	

QC for samples 2,7,13,15,21,25,28,34,40,46,47,55,57,66,71,72,74

Matrix Interference = MI

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L15229

Client: **URS Greiner Woodward Clyde**
Contact: **Crystal Neirby**

Project: **IP Longview, WA**

Batch Q.C.

EPA Method 8310 Polynuclear Aromatic Hydrocarbons by modified EPA method 8270 (SIM)

Sample ID	Analyte	Blank Result	Reporting Limit	Units	Q	*Lab Number*
		MB0229F			Sampled: *NA* Analyzed: *03/01/00*	*MB0229F*
CAS#						
91-20-3	Naphthalene	nd	0.1	ug/L		
208-96-8	Acenaphthylene	nd	0.1	ug/L		
83-32-9	Acenaphthene	nd	0.1	ug/L		
86-73-7	Fluorene	nd	0.1	ug/L		
87-86-5	Pentachlorophenol	nd	0.5	ug/L		
85-01-8	Phenanthrene	nd	0.1	ug/L		
120-12-7	Anthracene	nd	0.1	ug/L		
206-44-0	Fluoranthene	nd	0.1	ug/L		
129-00-0	Pyrene	nd	0.1	ug/L		
56-55-3	Benzo[a]anthracene	nd	0.1	ug/L		
218-01-9	Chrysene	nd	0.1	ug/L		
205-99-2	Benzo[b]fluoranthene	nd	0.1	ug/L		
207-08-9	Benzo[k]fluoranthene	nd	0.1	ug/L		
50-32-8	Benzo[a]pyrene	nd	0.1	ug/L		
193-39-5	Indeno[1,2,3-cd]pyrene	nd	0.1	ug/L		
53-70-3	Dibenz[a,h]anthracene	nd	0.1	ug/L		
191-24-2	Benzo[g,h,i]perylene	nd	0.1	ug/L		

Acid Surrogates:	Recovery(%) *MB0229F*	Control Limits (%)
2-Fluorophenol	66	**0 - 141**
Phenol-d4	42	**0 - 120**
2,4,6-Tribromophenol	62	**0 - 279**

Base / Neutral Surrogates:	*MB0229F*	Limits (%)
1,2-Dichlorobenzene-d4	98	**49 - 127**
Nitrobenzene-d5	91	**0 - 183**
2-Fluorobiphenyl	97	**57 - 131**

QC for samples L15229 - 5,11,19,33,38,51,52

none detected = nd

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L15229

Client: **URS Greiner Woodward Clyde**
Contact: **Crystal Neirby**

Project: **IP Longview, WA**

Batch Q.C.

EPA Method 8310 Polynuclear Aromatic Hydrocarbons by modified EPA method 8270 (SIM)

Sample ID	Analyte	Blank Result	Reporting Limit	Units	Q	*Lab Number*
	WATER	*MB0302T*			Sampled: *NA* Analyzed: *03/03/00*	*MB0302T*
CAS#						
91-20-3	Naphthalene	nd	0.1	ug/L		
208-96-8	Acenaphthylene	nd	0.1	ug/L		
83-32-9	Acenaphthene	nd	0.1	ug/L		
86-73-7	Fluorene	nd	0.1	ug/L		
87-86-5	Pentachlorophenol	nd	0.5	ug/L		
85-01-8	Phenanthrene	nd	0.1	ug/L		
120-12-7	Anthracene	nd	0.1	ug/L		
206-44-0	Fluoranthene	nd	0.1	ug/L		
129-00-0	Pyrene	nd	0.1	ug/L		
56-55-3	Benzo[a]anthracene	nd	0.1	ug/L		
218-01-9	Chrysene	nd	0.1	ug/L		
205-99-2	Benzo[b]fluoranthene	nd	0.1	ug/L		
207-08-9	Benzo[k]fluoranthene	nd	0.1	ug/L		
50-32-8	Benzo[a]pyrene	nd	0.1	ug/L		
193-39-5	Indeno[1,2,3-cd]pyrene	nd	0.1	ug/L		
53-70-3	Dibenz[a,h]anthracene	nd	0.1	ug/L		
191-24-2	Benzo[g,h,i]perylene	nd	0.1	ug/L		

Acid Surrogates:	Recovery(%) *MB0302T*	Control Limits (%)
2-Fluorophenol	65	**0 - 141**
Phenol-d4	42	**0 - 120**
2,4,6-Tribromophenol	164	**0 - 279**

Base / Neutral Surrogates:	*MB0302T*	Limits (%)
1,2-Dichlorobenzene-d4	91	**49 - 127**
Nitrobenzene-d5	132	**0 - 183**
2-Fluorobiphenyl	99	**57 - 131**

QC for samples L15229 - 63,69,78

none detected = nd

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L15229

Client: URS Greiner Woodward Clyde
Contact: Crystal Neirby

Project: IP Longview, WA

Batch Q.C.
PNA LCS & LCSD
Waters (ug/L)
by modified EPA method 8270 (SIM)

Analyzed:	03/01/00	LCS0229F	LCS0229F	LCSD0229F	LCSD0229F

CAS#		Result (ug/L)	Reference Value (ug/L)	Recovery (%)	Result (ug/L)	Reference Value (ug/L)	Recovery (%)	Control Limits (%)	Q
91-20-3	Naphthalene	1.050	1.031	102	1.060	1.042	102	55 - 136	
208-96-8	Acenaphthylene	0.945	1.031	92	0.977	1.042	94	42 - 124	
83-32-9	Acenaphthene	1.020	1.031	99	1.050	1.042	101	57 - 138	
86-73-7	Fluorene	0.994	1.031	96	1.020	1.042	98	51 - 139	
87-86-5	Pentachlorophenol	7.630	10.309	74	8.260	10.417	79	0 - 142	
85-01-8	Phenanthrene	1.000	1.031	97	1.040	1.042	100	61 - 145	
120-12-7	Anthracene	0.931	1.031	90	0.947	1.042	91	34 - 132	
206-44-0	Fluoranthene	0.998	1.031	97	0.997	1.042	96	51 - 139	
129-00-0	Pyrene	1.050	1.031	102	1.060	1.042	102	54 - 142	
56-55-3	Benzo[a]anthracene	0.991	1.031	96	1.020	1.042	98	46 - 141	
218-01-9	Chrysene	0.969	1.031	94	1.010	1.042	97	62 - 147	
205-99-2	Benzo[b]fluoranthene	0.944	1.031	92	0.982	1.042	94	54 - 139	
207-08-9	Benzo[k]fluoranthene	0.942	1.031	91	0.965	1.042	93	48 - 143	
50-32-8	Benzo[a]pyrene	0.923	1.031	90	0.930	1.042	89	42 - 132	
193-39-5	Indeno[1,2,3-cd]pyrene	0.898	1.031	87	0.916	1.042	88	36 - 142	
53-70-3	Dibenz[a,h]anthracene	0.890	1.031	86	0.914	1.042	88	14 - 158	
191-24-2	Benzo[g,h,i]perylene	0.881	1.031	85	0.900	1.042	86	26 - 154	

		RPD (%)	Control Limits (%)	Q
91-20-3	Naphthalene	0	27	
91-57-6	2-Methylnaphthalene	0	32	
90-12-0	1-Methylnaphthalene	0	31	
208-96-8	Acenaphthylene	2	31	
83-32-9	Acenaphthene	2	29	
86-73-7	Fluorene	2	30	
87-86-5	Pentachlorophenol	7	135	
85-01-8	Phenanthrene	3	27	
120-12-7	Anthracene	1	31	
206-44-0	Fluoranthene	1	26	
129-00-0	Pyrene	0	26	
56-55-3	Benzo[a]anthracene	2	25	
218-01-9	Chrysene	3	26	
205-99-2	Benzo[b]fluoranthene	3	25	
207-08-9	Benzo[k]fluoranthene	1	30	
50-32-8	Benzo[a]pyrene	0	31	
193-39-5	Indeno[1,2,3-cd]pyrene	1	34	
53-70-3	Dibenz[a,h]anthracene	2	45	
191-24-2	Benzo[g,h,i]perylene	1	47	

Acid Surrogates:	LCS0229F Recovery (%)	LCSD0229F Recovery (%)	Control Limits (%)	Q
2-Fluorophenol	67	67	30 - 120	
Phenol-d4	42	42	0 - 120	
2,4,6-Tribromophenol	85	96	0 - 244	
Base / Neutral Surrogates:				
1,2-Dichlorobenzene-d4	99	97	61 - 121	
Nitrobenzene-d5	94	96	49 - 122	
2-Fluorobiphenyl	100	99	69 - 129	

QC for samples L15229-5,11,19,33,38,51,52,63,69,78

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OAL

L15229

Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Batch Q.C.

Method Blank

NWTPH-Dx/Soil (mg/kg)

Analyte	Result	Reporting Limit	Q	Date Analyzed
NWTPH-Dx				
Diesel range	ND	25		02/28/00
Oil range	ND	50		

Surrogates	% Recovery
Fluorobiphenyl	96
O-terphenyl	106

Comments: Batch QC for soil samples L15229-2 through -55.

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L15229

Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Batch Q.C.

Method Blank

NWTPH-Dx/Soil (mg/kg)

Analyte	Result	Reporting Limit	Q	Date Analyzed
NWTPH-Dx				
Diesel range	ND	25		02/29/00
Oil range	ND	50		

Surrogates	% Recovery
Fluorobiphenyl	86
O-terphenyl	96

Comments: Batch QC for soil samples L15229-57 through -74.

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L15229

Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Batch Q.C.

LCS

NWTPH-Dx/Soil (mg/kg)

Analyte	Result	True Value	% Recovery	Control Limits %	Q	Date Analyzed
NWTPH-Dx	123	127	97	72-124		02/25/00

Surrogates	% Recovery
Fluorobiphenyl	97
O-terphenyl	101

Comments: Batch QC for soil samples L15229-2 through -55.

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L15229

Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Batch Q.C.

LCS

NWTPH-Dx/Soil (mg/kg)

Analyte	Result	True Value	% Recovery	Control Limits %	Q	Date Analyzed
NWTPH-Dx	133	127	105	72-124		02/29/00

Surrogates	% Recovery
Fluorobiphenyl	118
O-terphenyl	120

Comments: Batch QC for soil samples L15229-57 through -74.

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Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Batch Q.C.

MS

NWTPH-Dx/Soil (mg/kg)

Analyte	Sample Result	MS Result	True Value	% Recovery	Control Limits %	Q	Date Analyzed
NWTPH-Dx	ND	150	152	99	58-152		02/28/00

Surrogates	% Recovery Sample	% Recovery MS
Fluorobiphenyl	108	103
O-terphenyl	110	117

Comments: Batch QC for soil samples L15229-2 through -55.

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L15229

Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Batch Q.C.

MS

NWTPH-Dx/Soil (mg/kg)

Analyte	Sample Result	MS Result	True Value	% Recovery	Control Limits %	Q	Date Analyzed
NWTPH-Dx	36	194	167	95	58-152		02/29/00

Surrogates	% Recovery Sample	% Recovery MS
Fluorobiphenyl	100	104
O-terphenyl	108	109

Comments: Batch QC for soil samples L15229-57 through -74.

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Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Batch Q.C.

Duplicate

NWTPH-Dx/Soil (mg/kg)

Analyte	Result	Duplicate Result	RPD	Reporting Limit	Q	Date Analyzed
NWTPH-Dx						
Diesel range	ND	ND	NA	25		02/28/00
Oil range	ND	ND	NA	50		

Surrogates	% Recovery Sample	% Recovery Duplicate
Fluorobiphenyl	108	103
O-terphenyl	110	111

Comments: Batch QC for soil samples L15229-2 through -46.

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Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Batch Q.C.

Duplicate

NWTPH-Dx/Soil (mg/kg)

Analyte	Result	Duplicate Result	RPD	Reporting Limit	Q	Date Analyzed
NWTPH-Dx						
Diesel range	52	56	7	25		02/29/00
Oil range	ND	ND	NA	50		

Surrogates	% Recovery Sample	% Recovery Duplicate
Fluorobiphenyl	101	102
O-terphenyl	109	110

Comments: Batch QC for soil samples L15229-47 through -66.

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Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Batch Q.C.

Duplicate
NWTPH-Dx/Soil (mg/kg)

Analyte	Result	Duplicate Result	RPD	Reporting Limit	Q	Date Analyzed
NWTPH-Dx						
Diesel range	36	36	<1	25		02/29/00
Oil range	ND	ND	NA	50		

Surrogates	% Recovery Sample	% Recovery Duplicate
Fluorobiphenyl	100	101
O-terphenyl	108	109

Comments: Batch QC for soil samples L15229-71 through -74.

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L15229

Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Batch Q.C.

Method Blank

NWTPH-Dx/Water (mg/L)

Analyte	Result	Reporting Limit	Q	Date Analyzed
NWTPH-Dx				
Diesel range	ND	0.25		02/25/00
Oil range	ND	0.50		

Surrogates	% Recovery
Fluorobiphenyl	100
O-terphenyl	109

Comments: Batch QC for samples L15229-5,-11,-19,-33,-38,-51,-52.

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Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Batch Q.C.

Method Blank

NWTPH-Dx/Water (mg/L)

Analyte	Result	Reporting Limit	Q	Date Analyzed
NWTPH-Dx				
Diesel range	ND	0.25		03/01/00
Oil range	ND	0.50		

Surrogates	% Recovery
Fluorobiphenyl	94
O-terphenyl	111

Comments: Batch QC for samples L15229-63,-69,-78.

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L15229

Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Batch Q.C.

LCS

NWTPH-Dx/Water (mg/L)

Analyte	Result	True Value	% Recovery	Control Limits %	Q	Date Analyzed
NWTPH-Dx	1.11	1.27	87	52-128		02/25/00

Surrogates	% Recovery
Fluorobiphenyl	107
O-terphenyl	122

Comments: Batch QC for samples L15229-5,-11,-19,-33,-38,-51,-52.

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L15229

Client: ***URS Greiner Woodward Clyde***
Contact: ***Crystal Neirby***

Project: ***IP Longview, WA***

Batch Q.C.

LCS

NWTPH-Dx/Water (mg/L)

Analyte	Result	True Value	% Recovery	Control Limits %	Q	Date Analyzed
NWTPH-Dx	1.11	1.27	87	52-128		02/25/00

Surrogates	% Recovery
Fluorobiphenyl	107
O-terphenyl	122

Comments: Batch QC for samples L15229-63,-69,-78.

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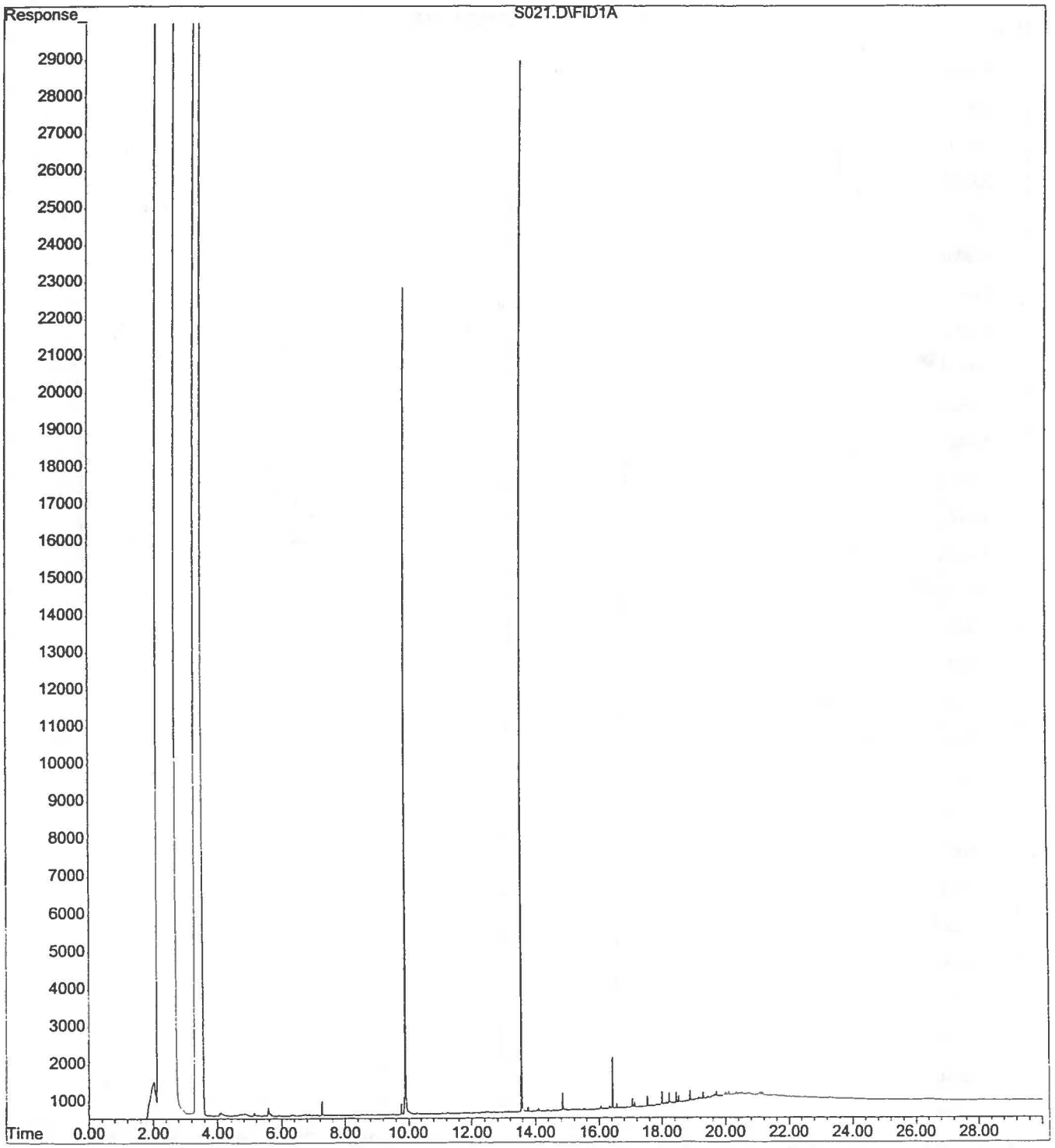
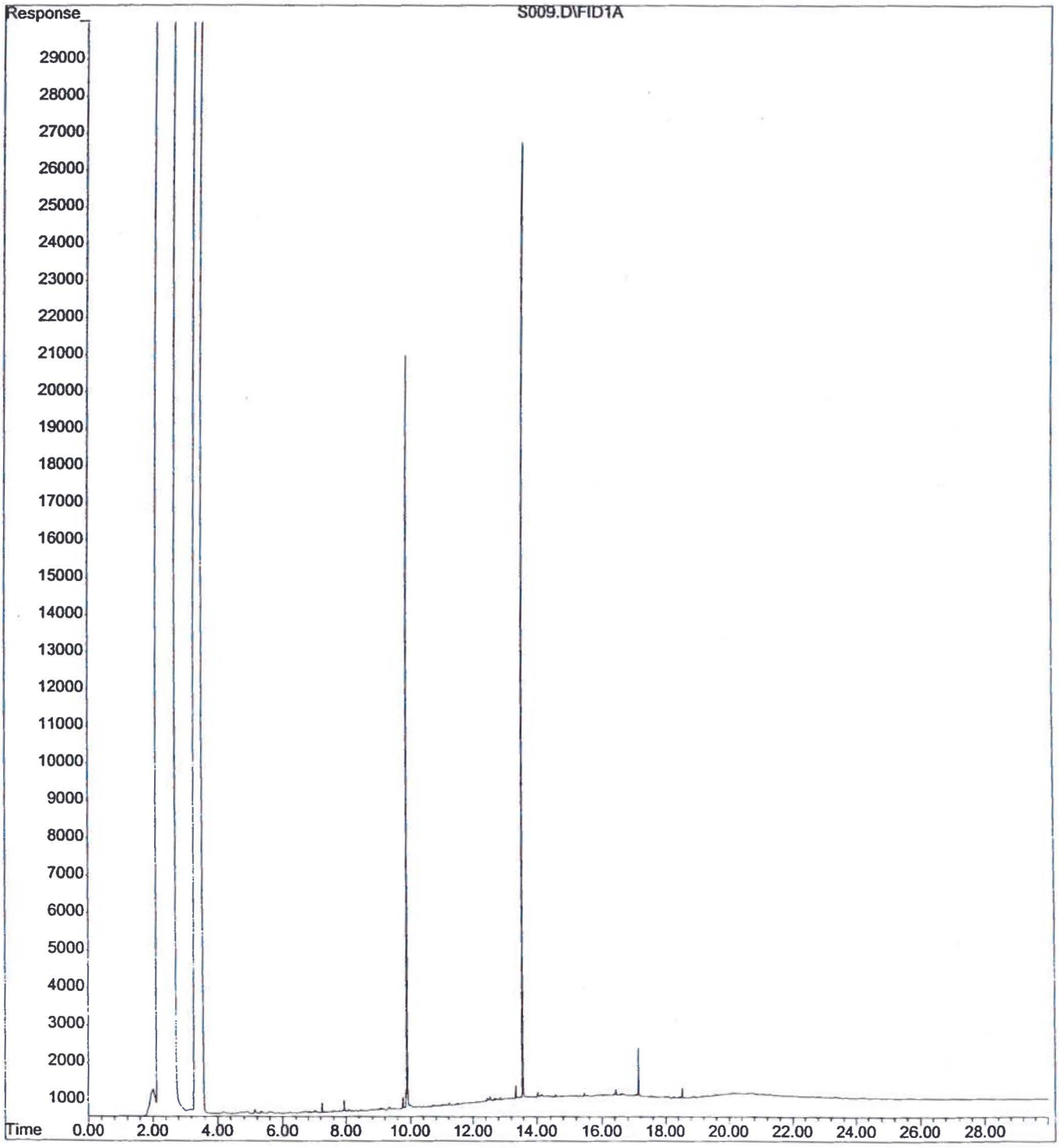
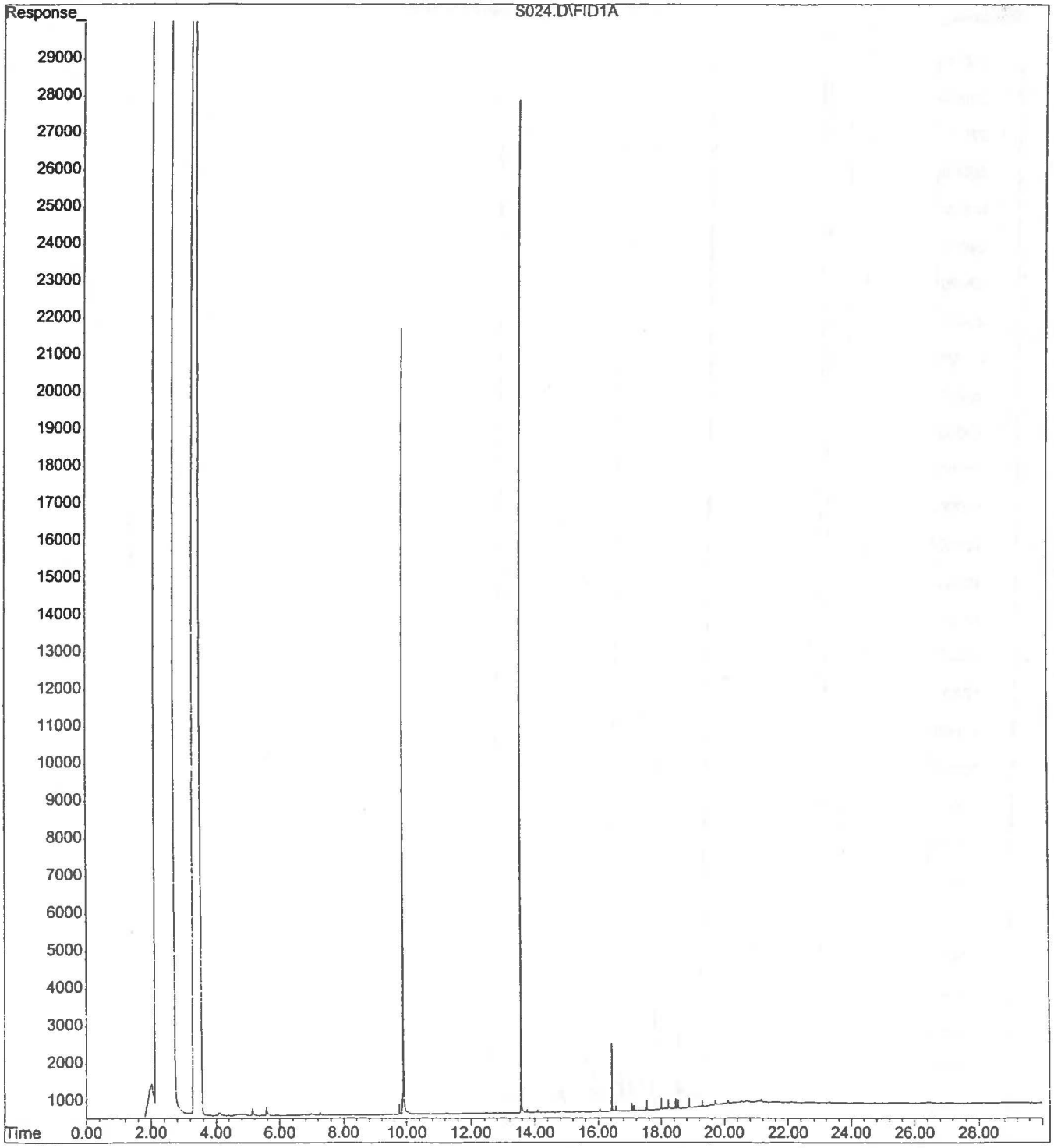
File : N:\HPCHEM\1\DATA\FID0B28\S021.D
Operator : HP Demo
Acquired : 28 Feb 2000 11:45 pm using AcqMethod DX-FRONT.M
Instrument : Rusty
Sample Name: 15229-2
Misc Info :
Vial Number: 21



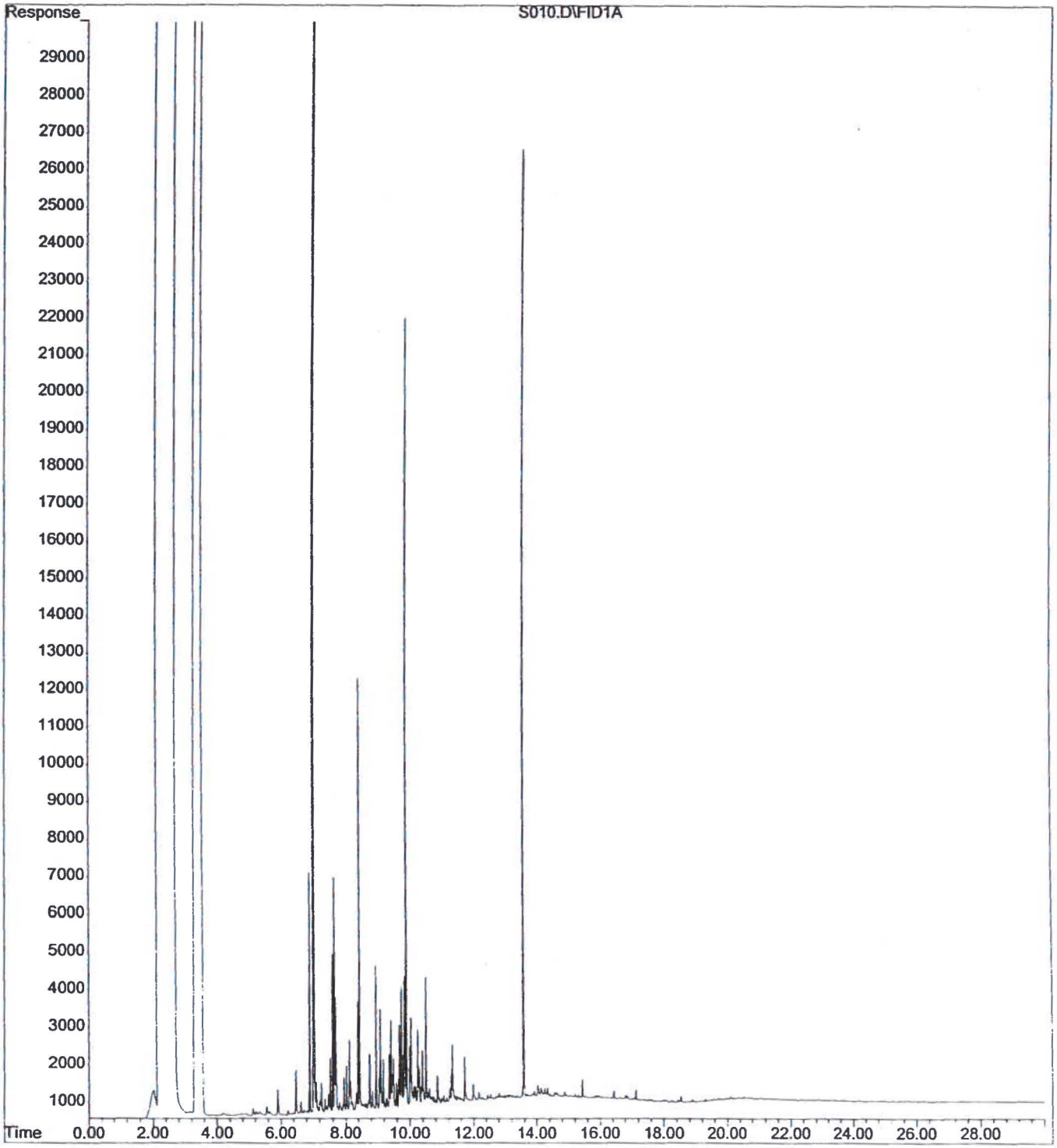
File : N:\HPCHEM\1\DATA\FID0B28\S009.D
Operator : HP Demo
Acquired : 28 Feb 2000 3:54 pm using AcqMethod DX-FRONT.M
Instrument : Rusty
Sample Name: 15229-5
Misc Info :
Vial Number: 9



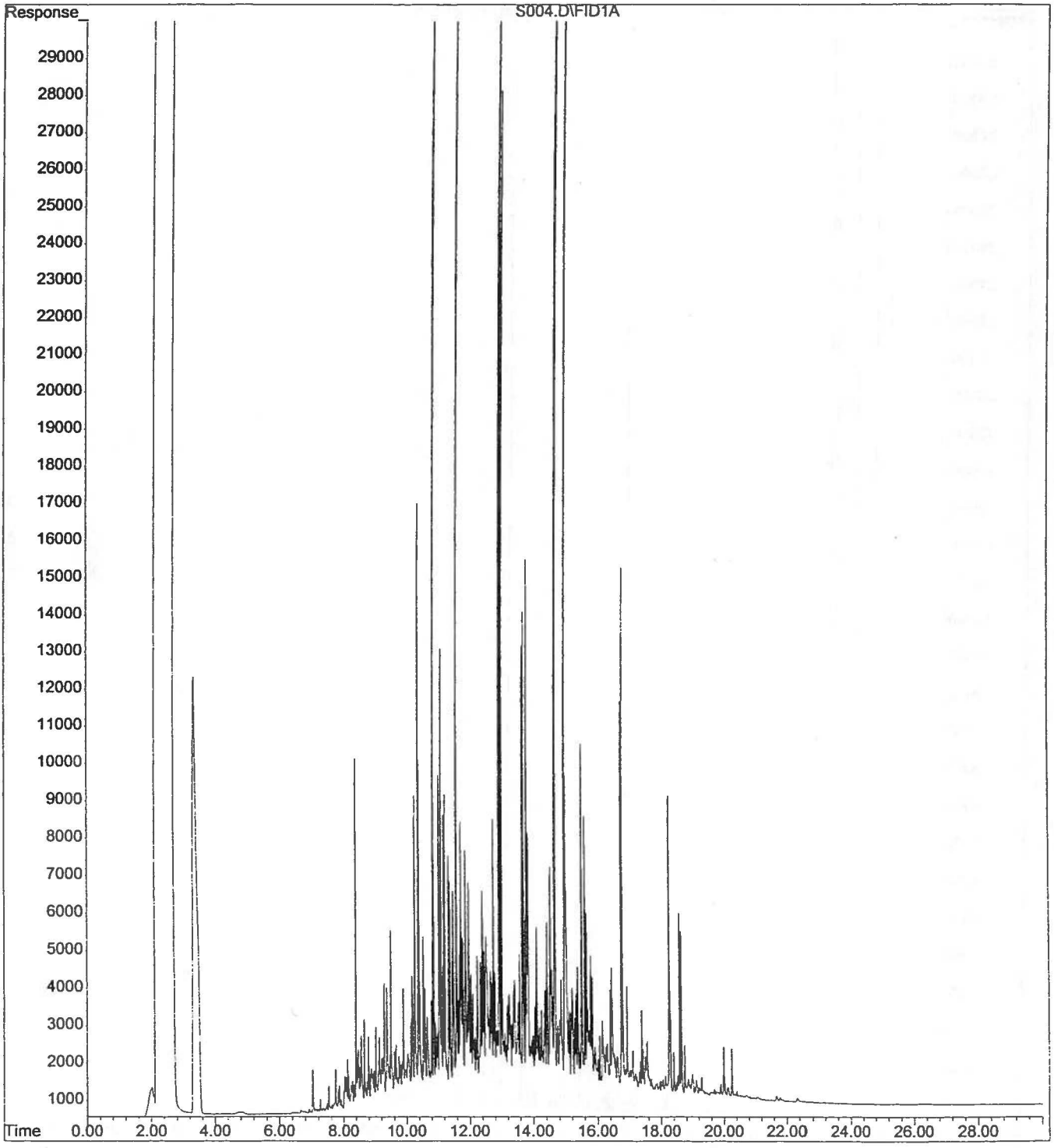
File : N:\HPCHEM\1\DATA\FID0B28\S024.D
Operator : HP Demo
Acquired : 29 Feb 2000 1:44 am using AcqMethod DX-FRONT.M
Instrument : Rusty
Sample Name: 15229-7
Misc Info :
Vial Number: 24



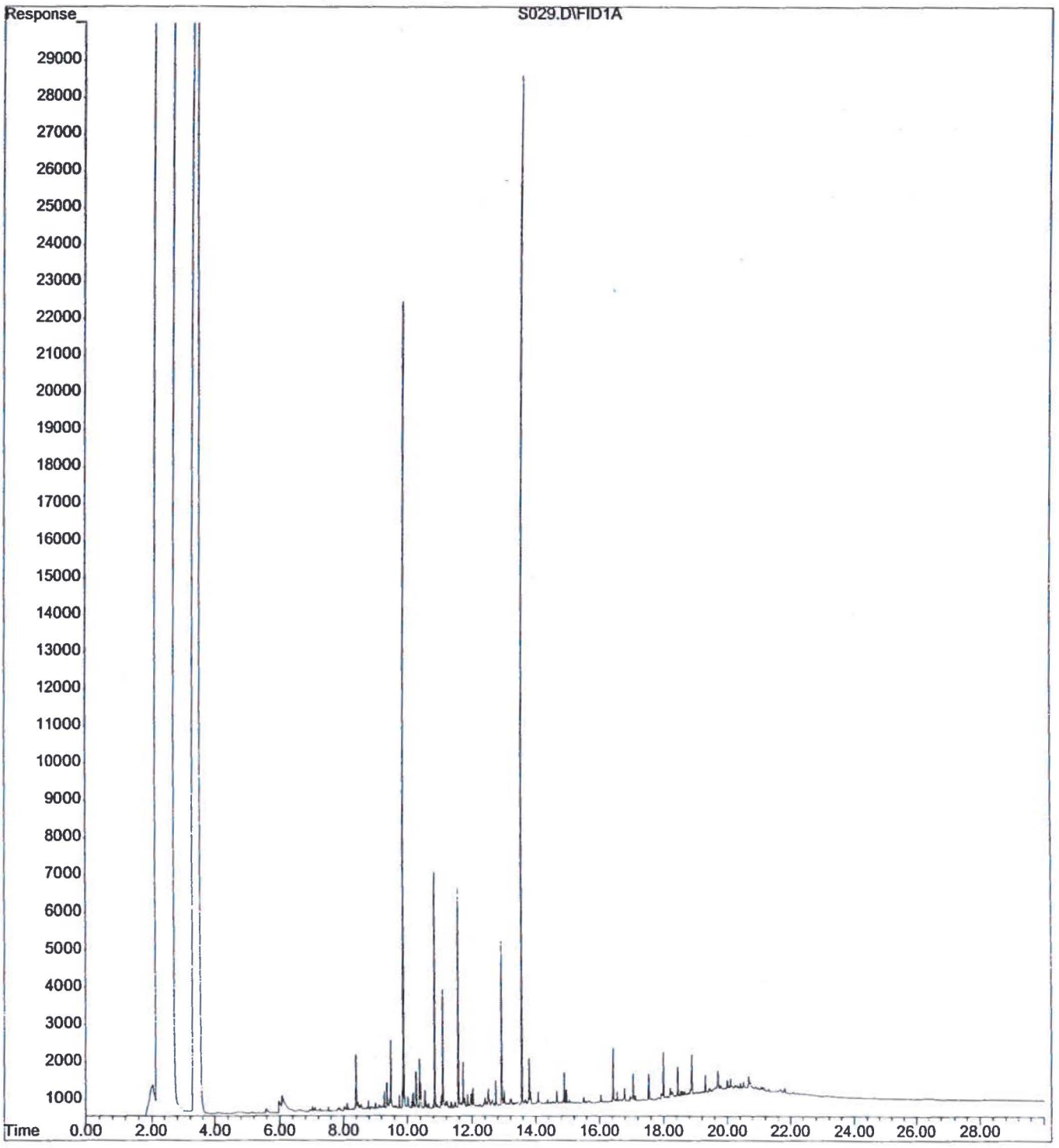
File : N:\HPCHEM\1\DATA\FID0B28\S010.D
Operator : HP Demo
Acquired : 28 Feb 2000 4:33 pm using AcqMethod DX-FRONT.M
Instrument : Rusty
Sample Name: 15229-11
Misc Info :
Vial Number: 10



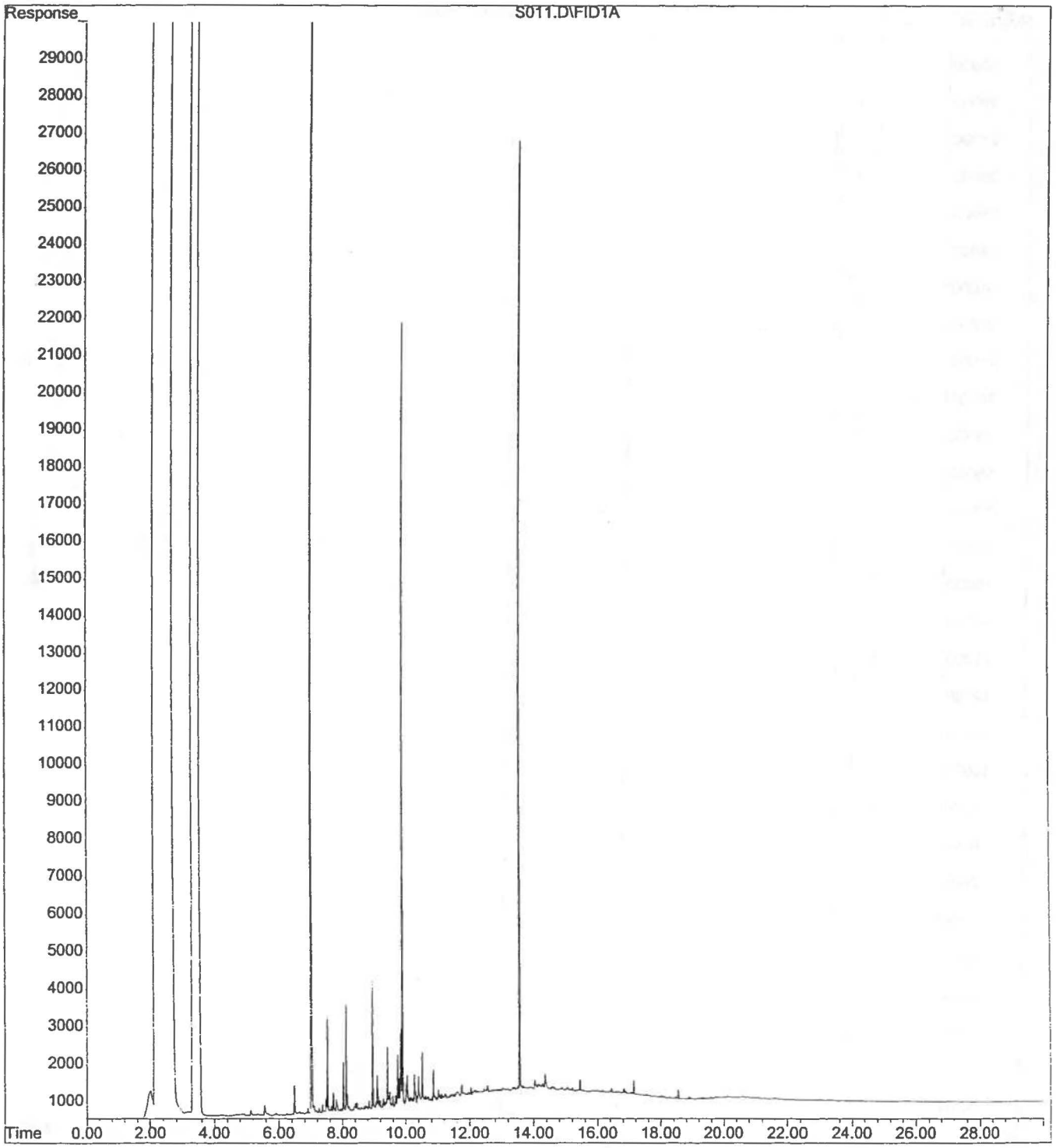
File : N:\HPCHEM\1\DATA\FID0C02\S004.D
Operator : HP Demo
Acquired : 2 Mar 2000 6:58 pm using AcqMethod DX-FRONT.M
Instrument : Rusty
Sample Name: 15229-13 1:10
Misc Info :
Vial Number: 4



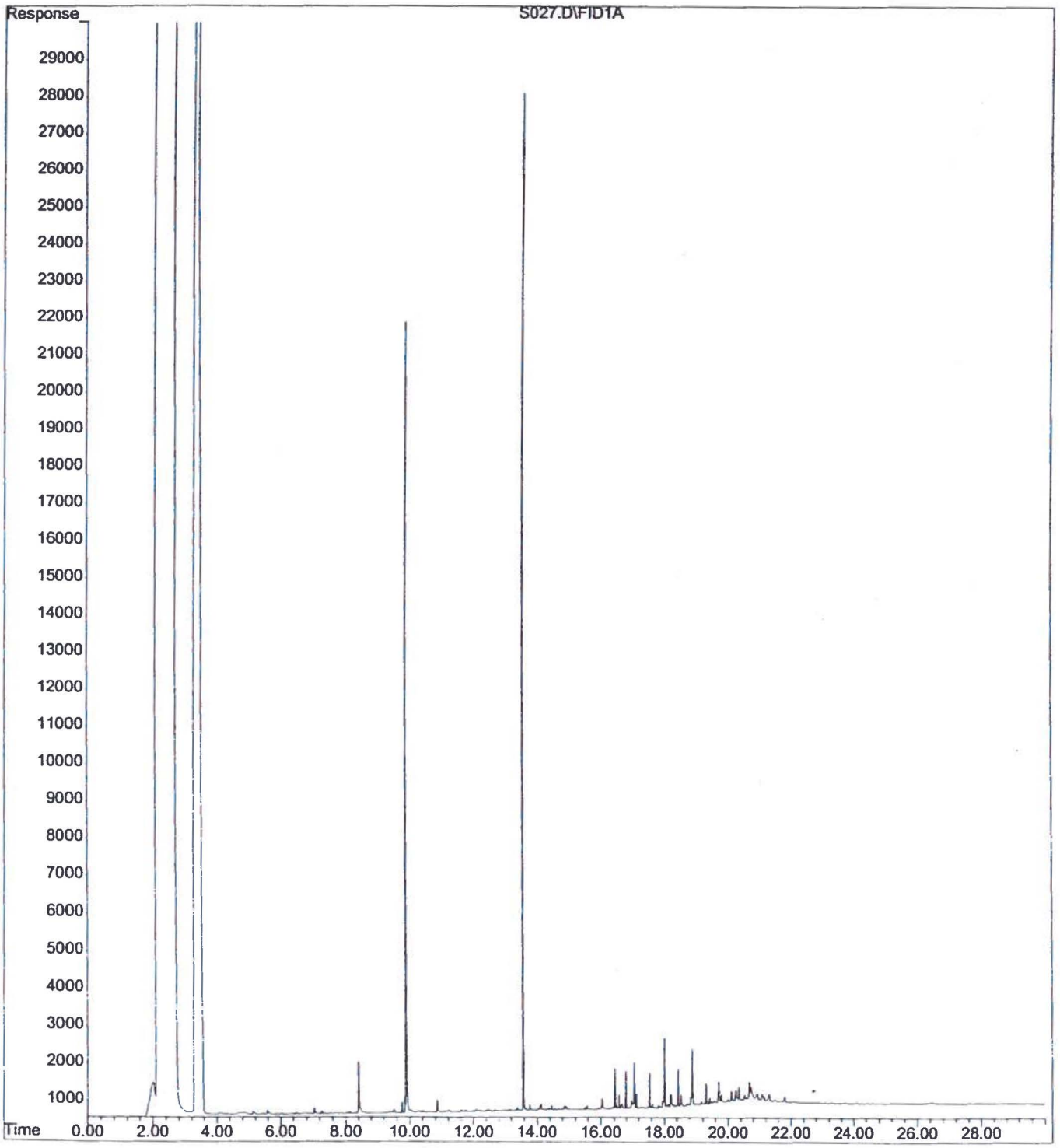
File : N:\HPCHEM\1\DATA\FID0B28\S029.D
Operator : HP Demo
Acquired : 29 Feb 2000 5:02 am using AcqMethod DX-FRONT.M
Instrument : Rusty
Sample Name: 15229-15
Misc Info :
Vial Number: 29



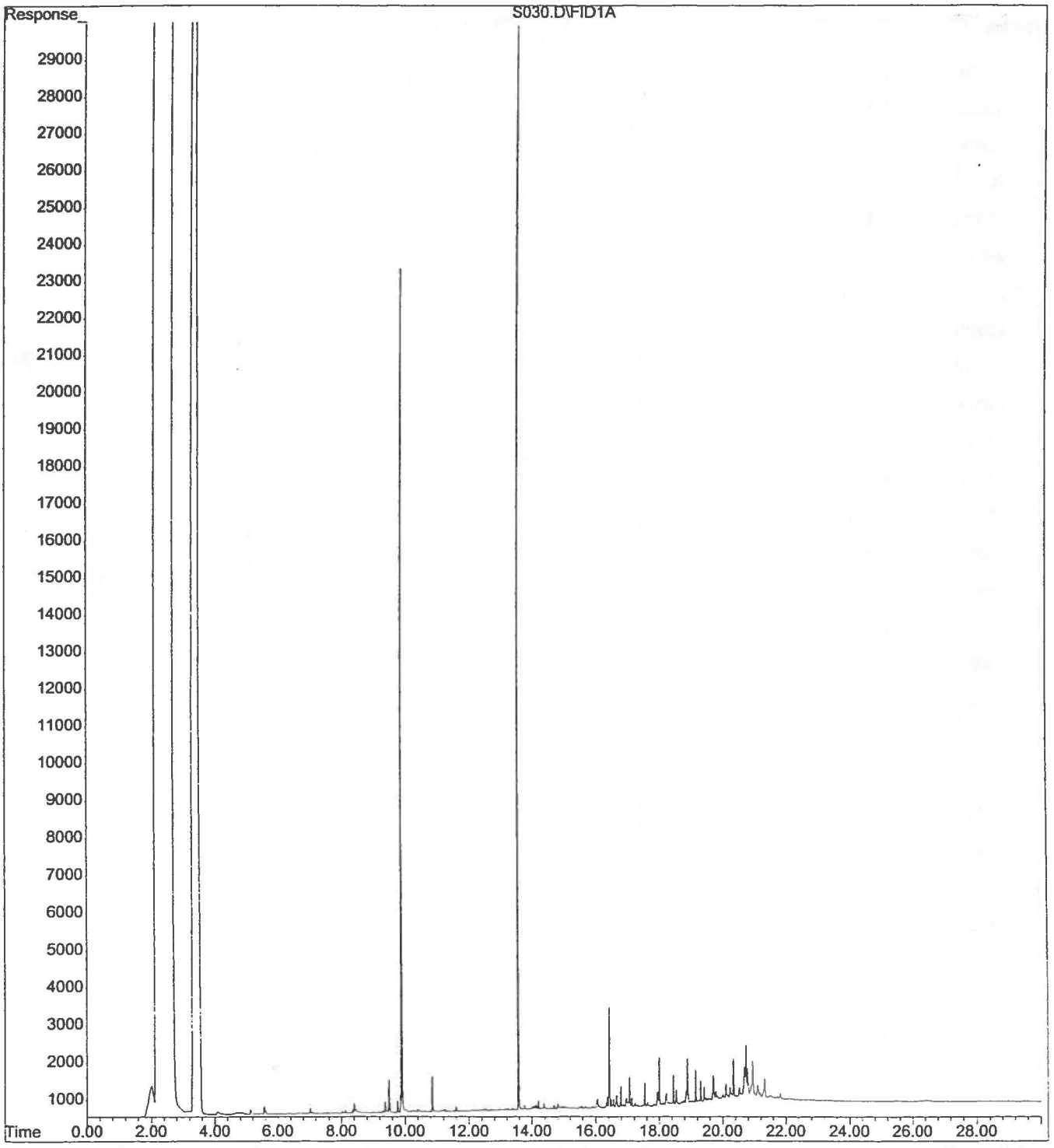
File : N:\HPCHEM\1\DATA\FID0B28\S011.D
Operator : HP Demo
Acquired : 28 Feb 2000 5:12 pm using AcqMethod DX-FRONT.M
Instrument : Rusty
Sample Name: 15229-19
Misc Info :
Vial Number: 11



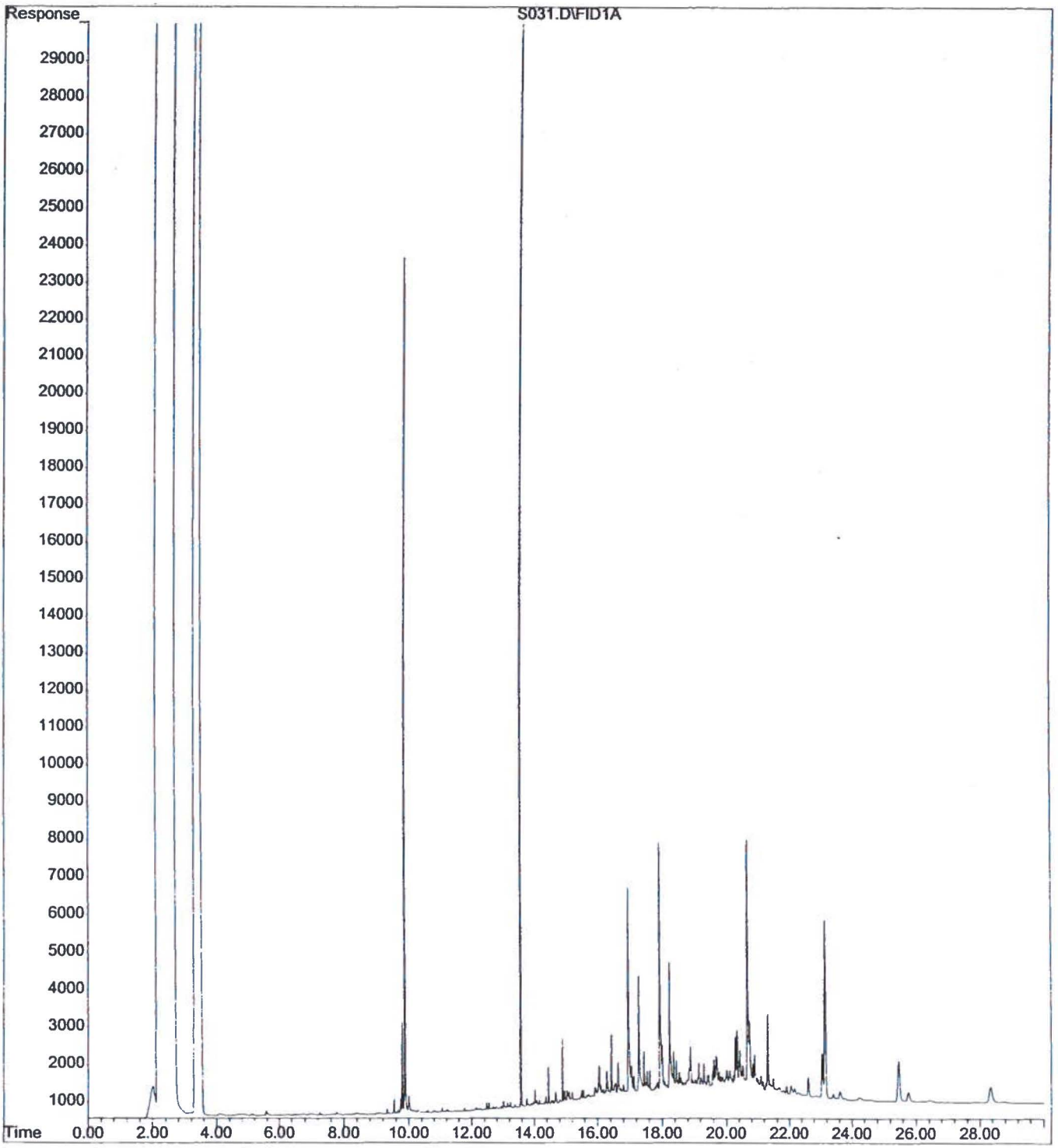
File : N:\HPCHEM\1\DATA\FID0B28\S027.D
Operator : HP Demo
Acquired : 29 Feb 2000 3:43 am using AcqMethod DX-FRONT.M
Instrument : Rusty
Sample Name: 15229-21
Misc Info :
Vial Number: 27



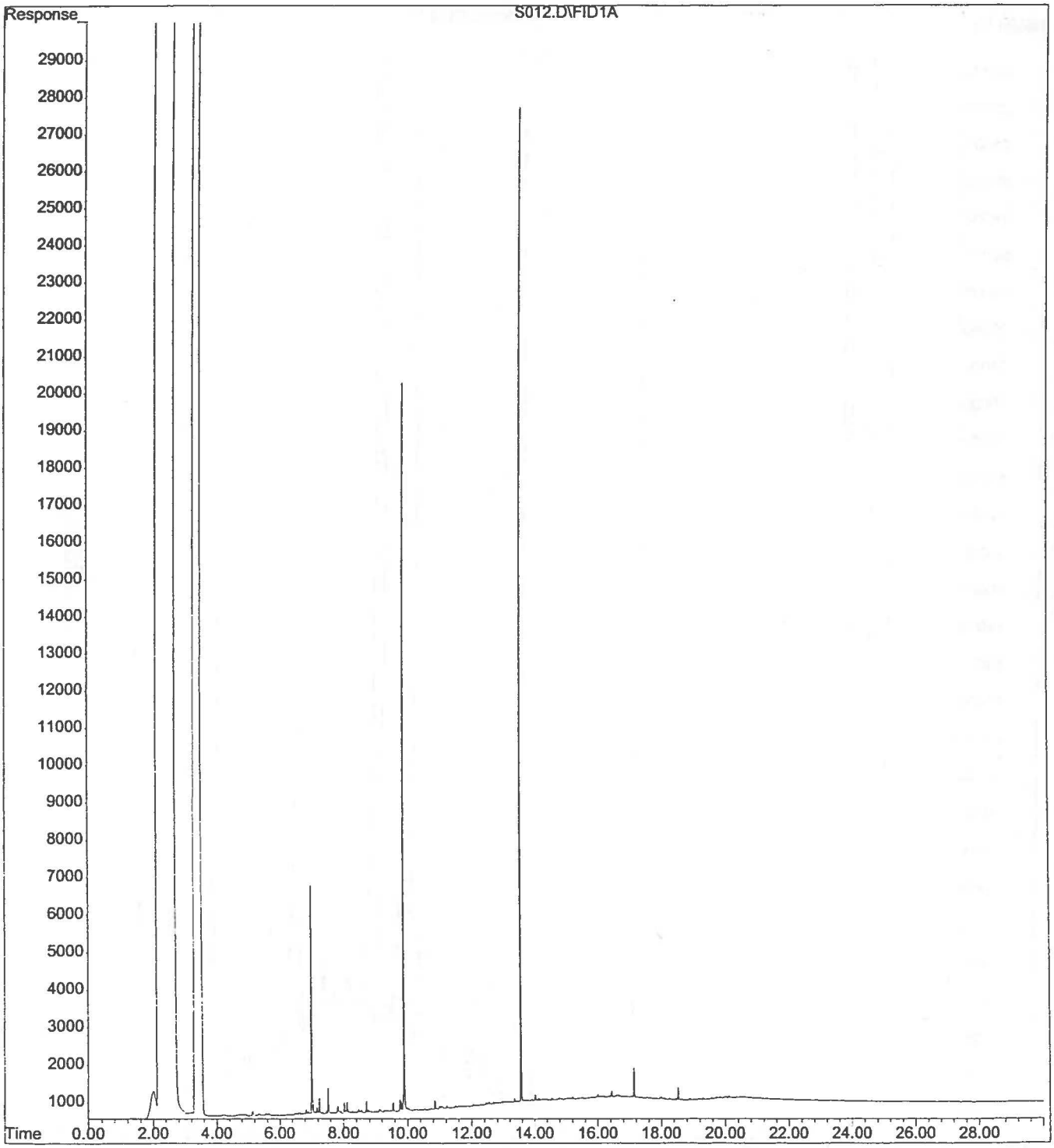
File : N:\HPCHEM\1\DATA\FID0B28\S030.D
Operator : HP Demo
Acquired : 29 Feb 2000 5:42 am using AcqMethod DX-FRONT.M
Instrument : Rusty
Sample Name: 15229-25
Misc Info :
Vial Number: 30



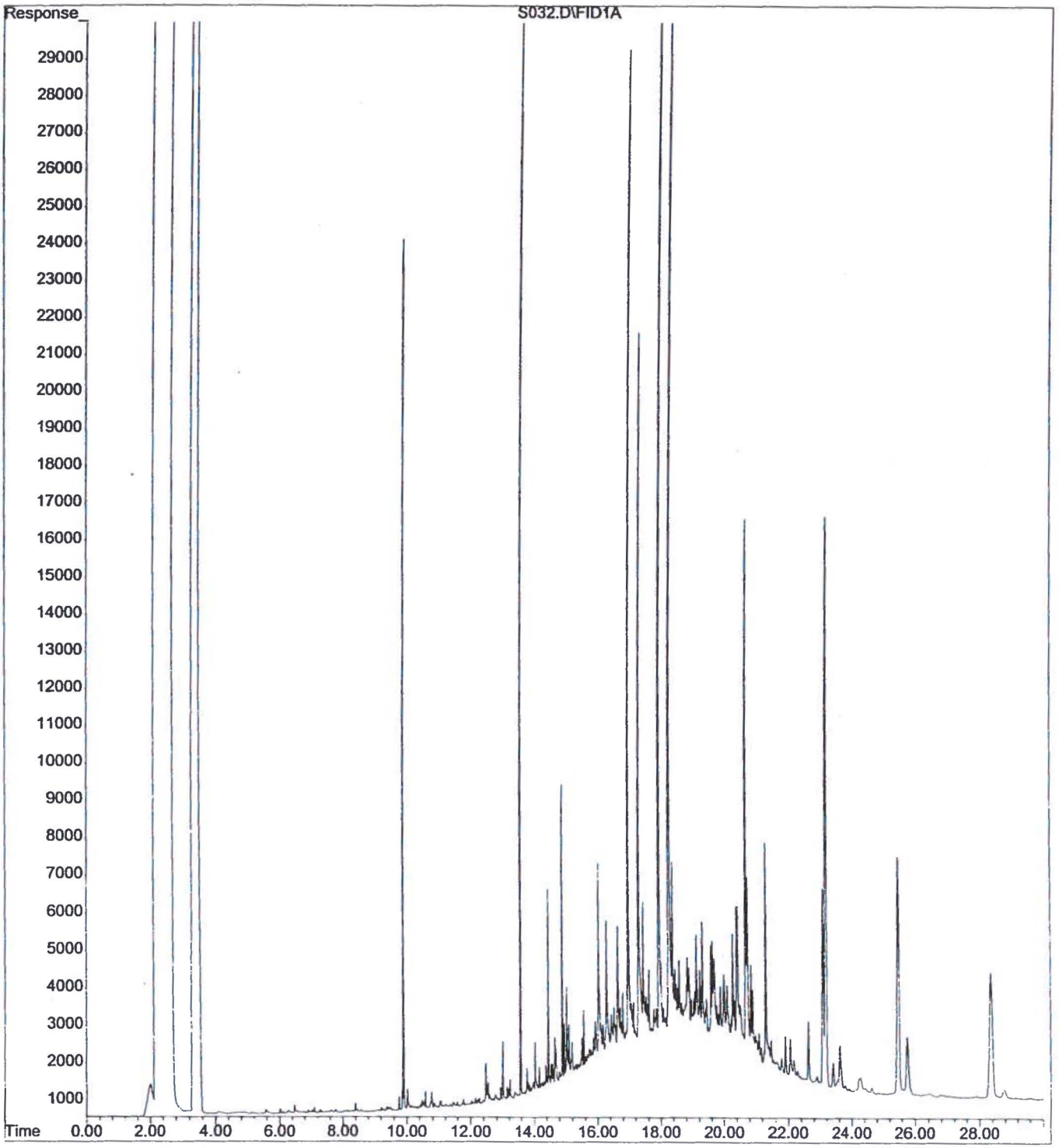
File : N:\HPCHEM\1\DATA\FID0B28\S031.D
Operator : HP Demo
Acquired : 29 Feb 2000 6:22 am using AcqMethod DX-FRONT.M
Instrument : Rusty
Sample Name: 15229-28
Misc Info :
Vial Number: 31



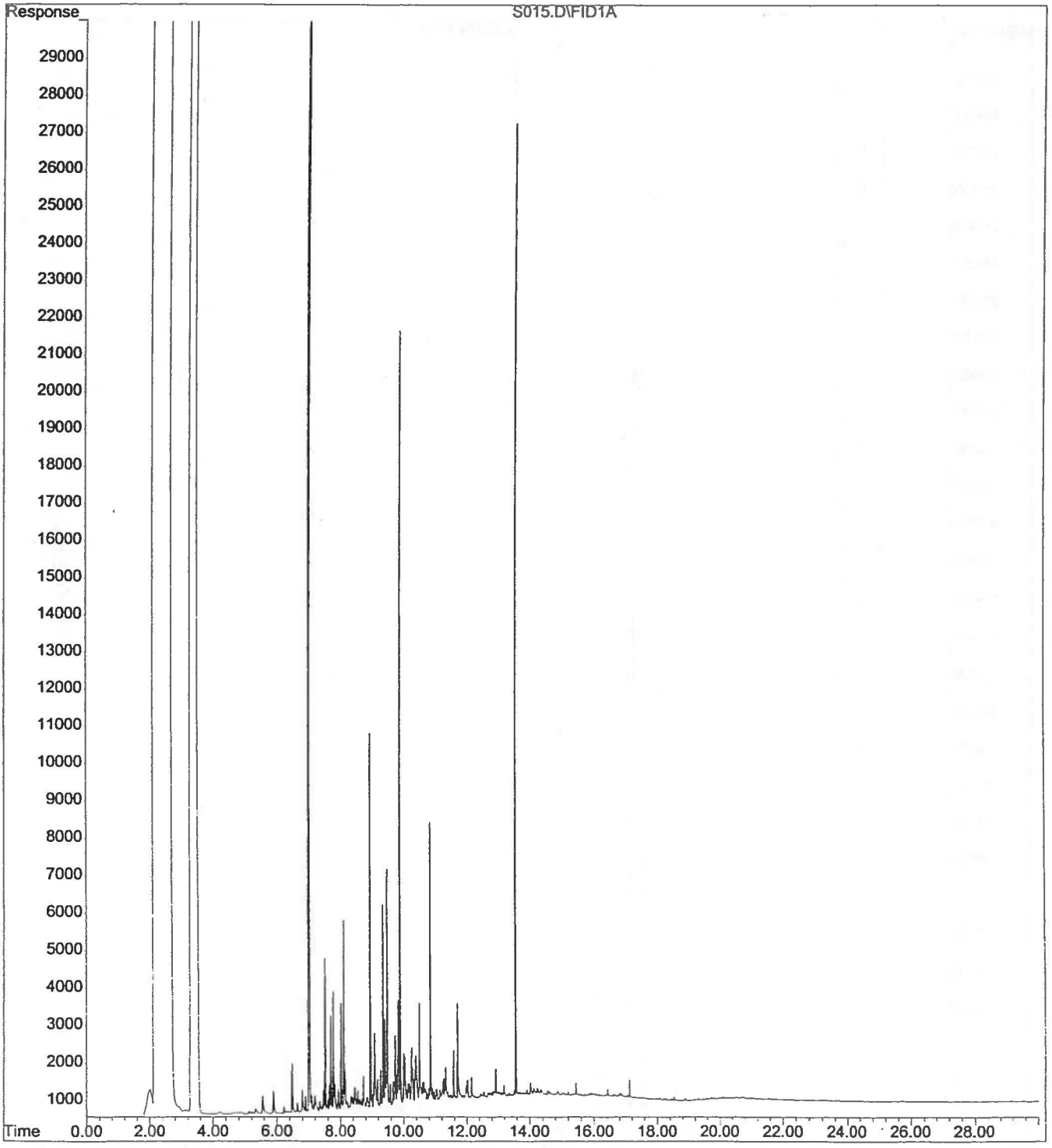
File : N:\HPCHEM\1\DATA\FID0B28\S012.D
Operator : HP Demo
Acquired : 28 Feb 2000 5:51 pm using AcqMethod DX-FRONT.M
Instrument : Rusty
Sample Name: 15229-33
Misc Info :
Vial Number: 12



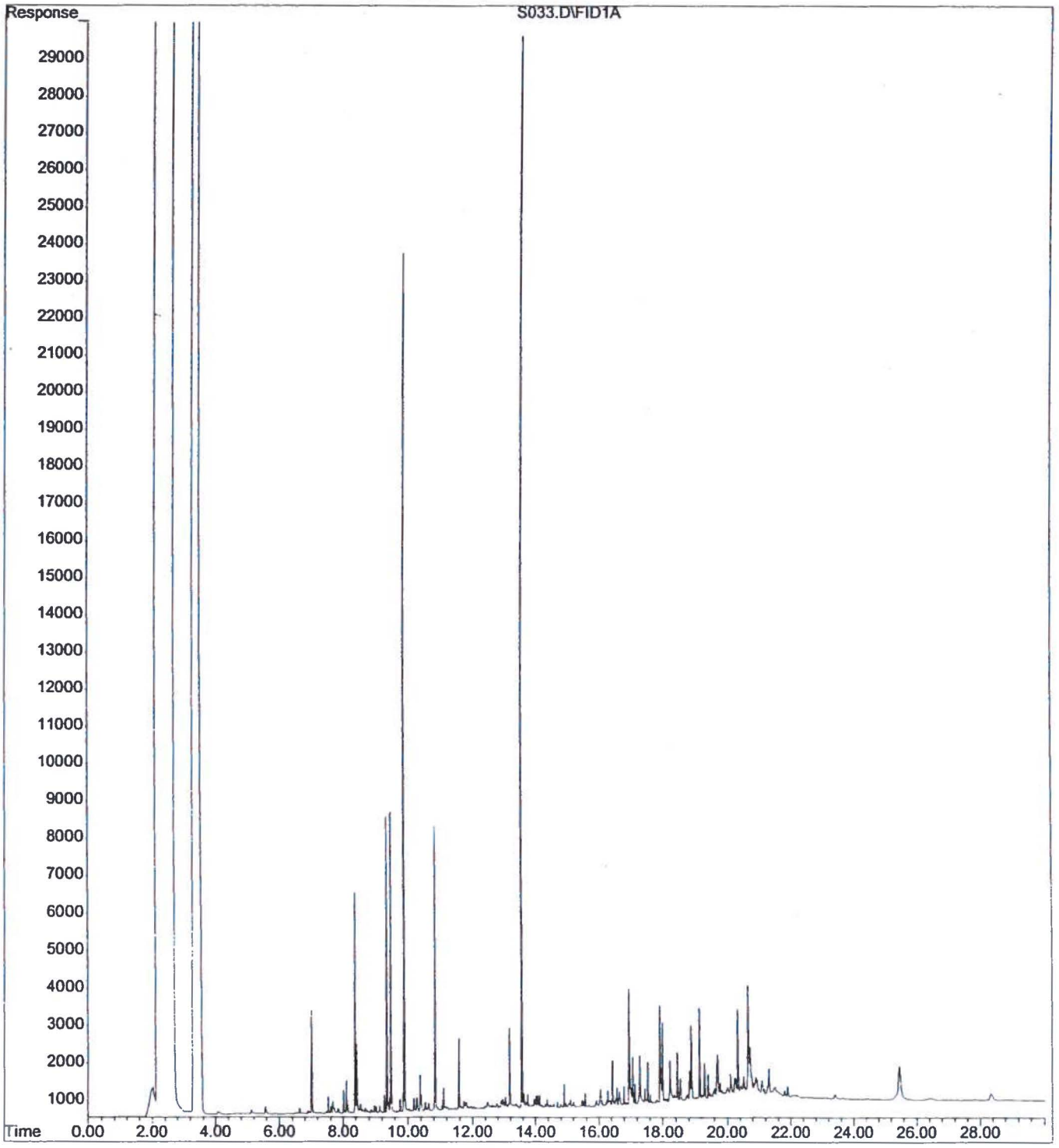
File : N:\HPCHEM\1\DATA\FID0B28\S032.D
Operator : HP Demo
Acquired : 29 Feb 2000 7:02 am using AcqMethod DX-FRONT.M
Instrument : Rusty
Sample Name: 15229-34
Misc Info :
Vial Number: 32



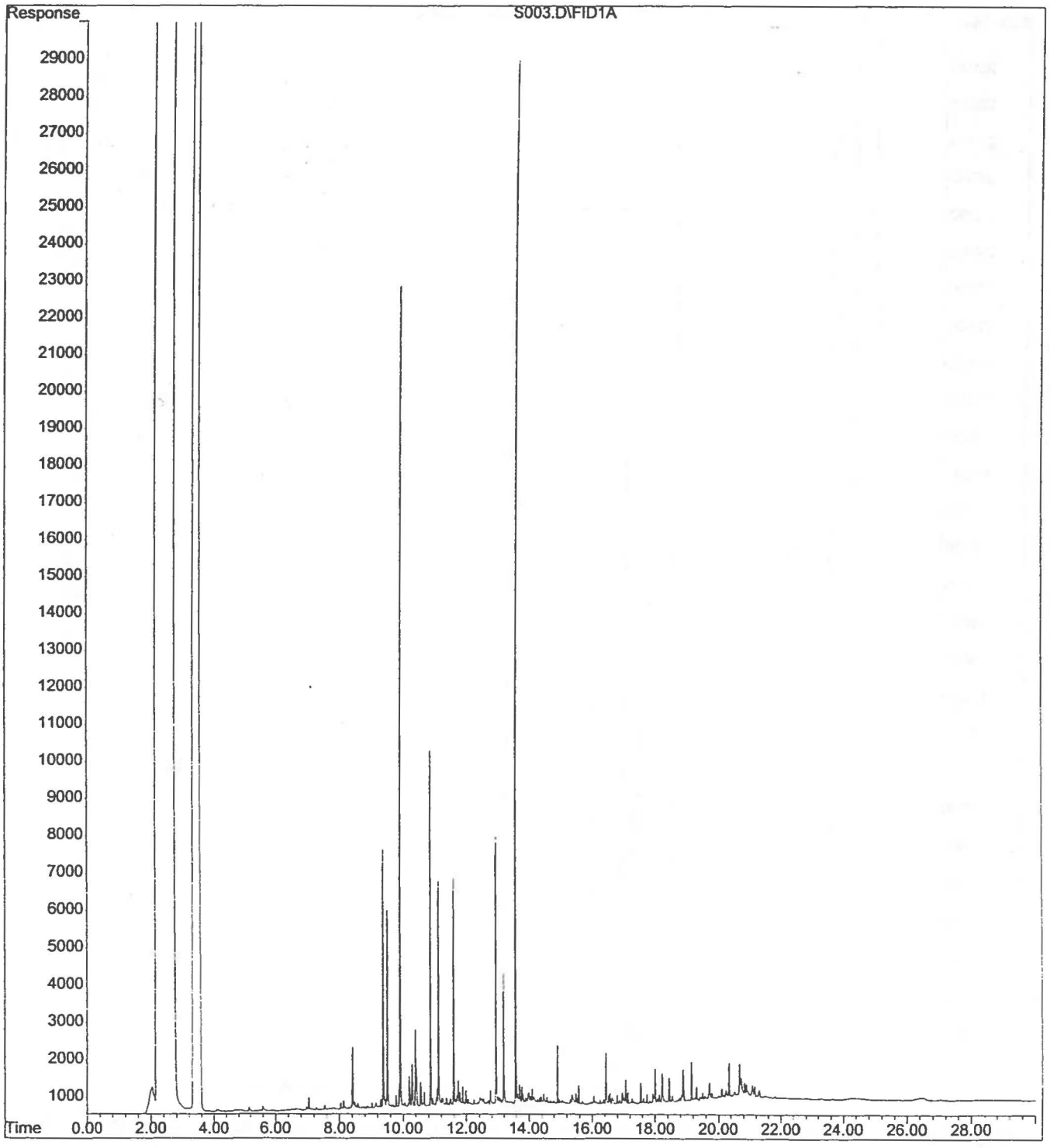
File : N:\HPCHEM\1\DATA\FID0B28\S015.D
Operator : HP Demo
Acquired : 28 Feb 2000 7:48 pm using AcqMethod DX-FRONT.M
Instrument : Rusty
Sample Name: 15229-38
Misc Info :
Vial Number: 15



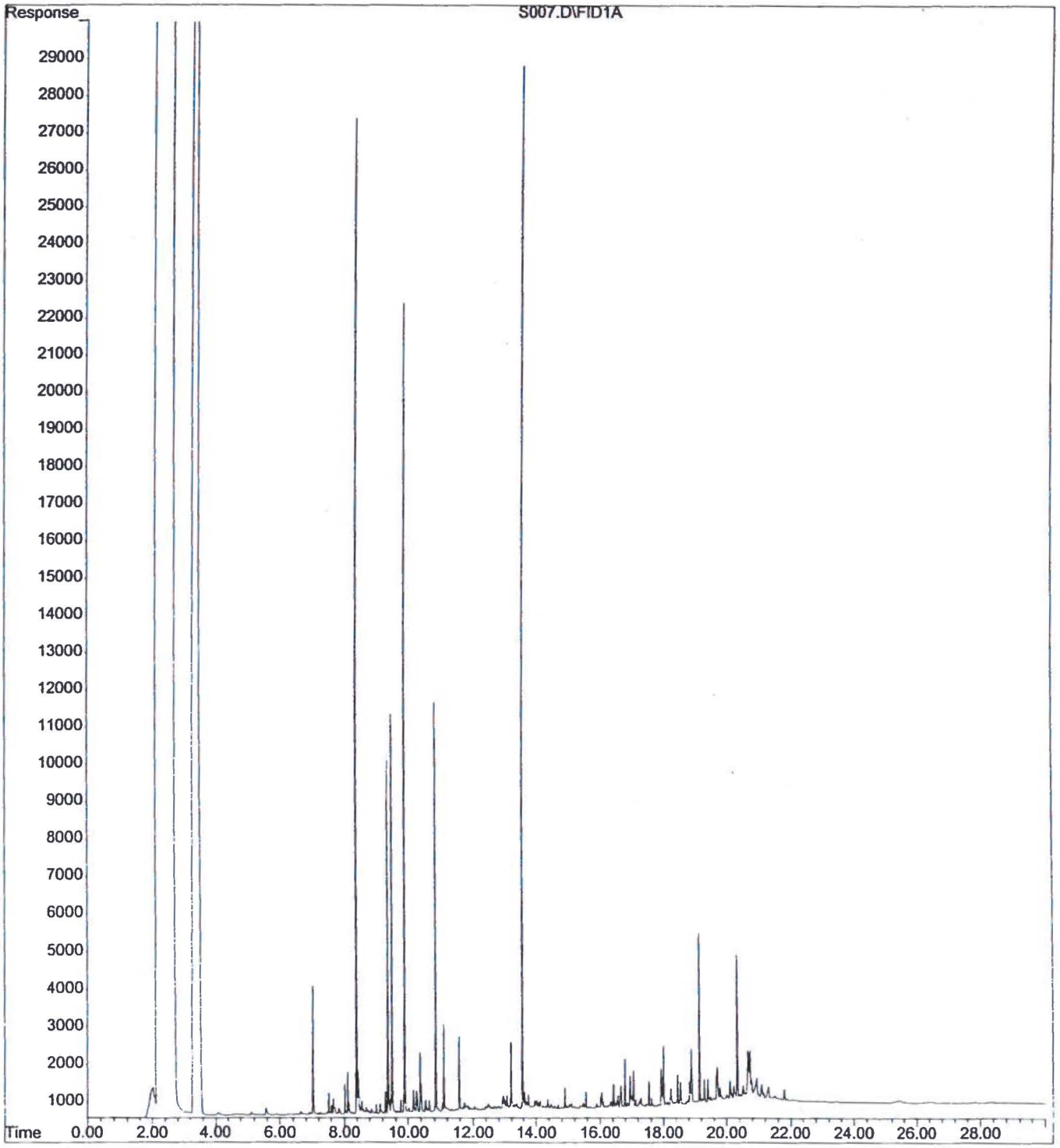
File : N:\HPCHEM\1\DATA\FID0B28\S033.D
Operator : HP Demo
Acquired : 29 Feb 2000 7:42 am using AcqMethod DX-FRONT.M
Instrument : Rusty
Sample Name: 15229-40
Misc Info :
Vial Number: 33



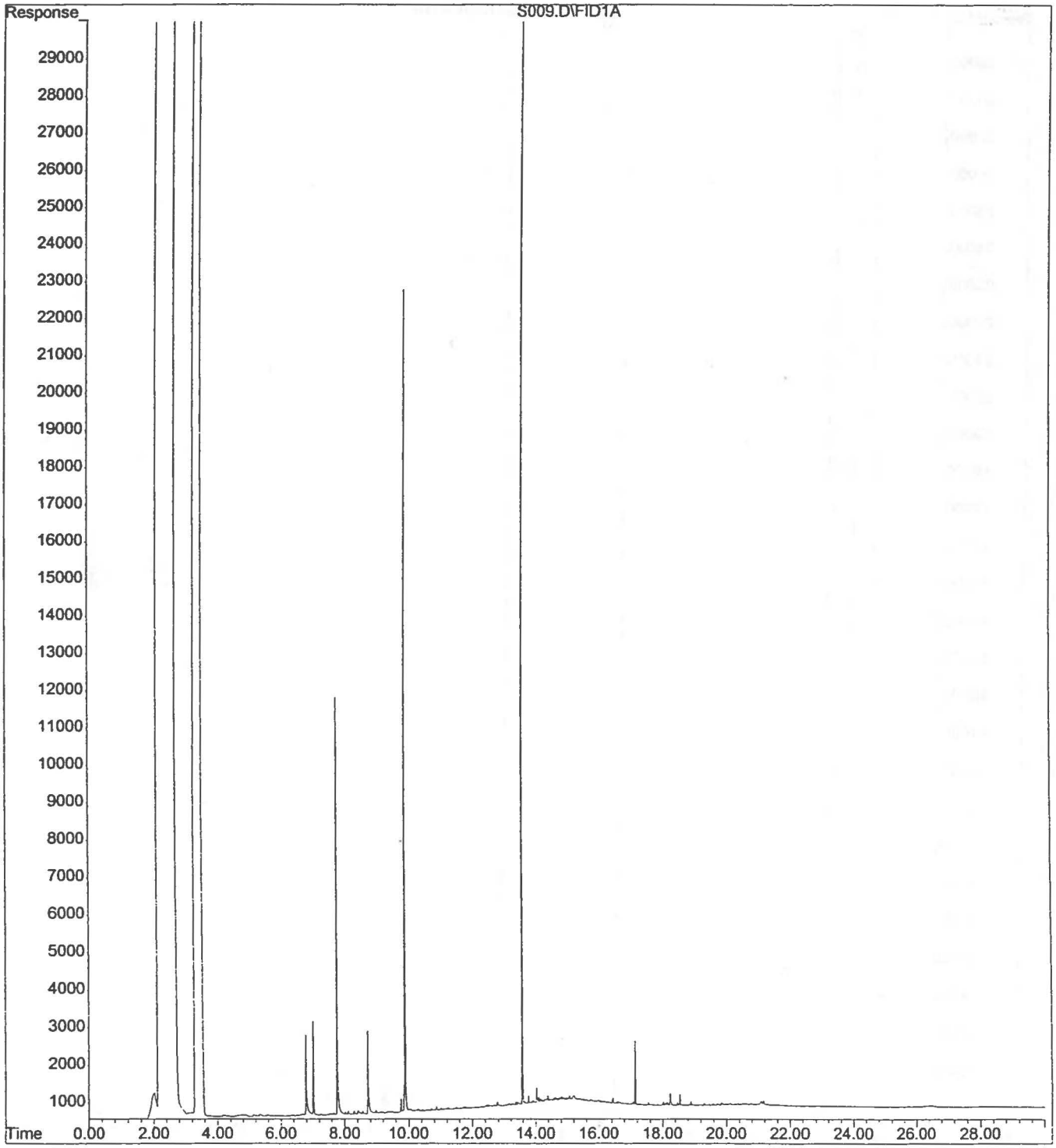
File : N:\HPCHEM\1\DATA\FID0B29\S003.D
Operator : HP Demo
Acquired : 29 Feb 2000 11:10 am using AcqMethod DX-FRONT.M
Instrument : Rusty
Sample Name: 15229-46
Misc Info :
Vial Number: 3



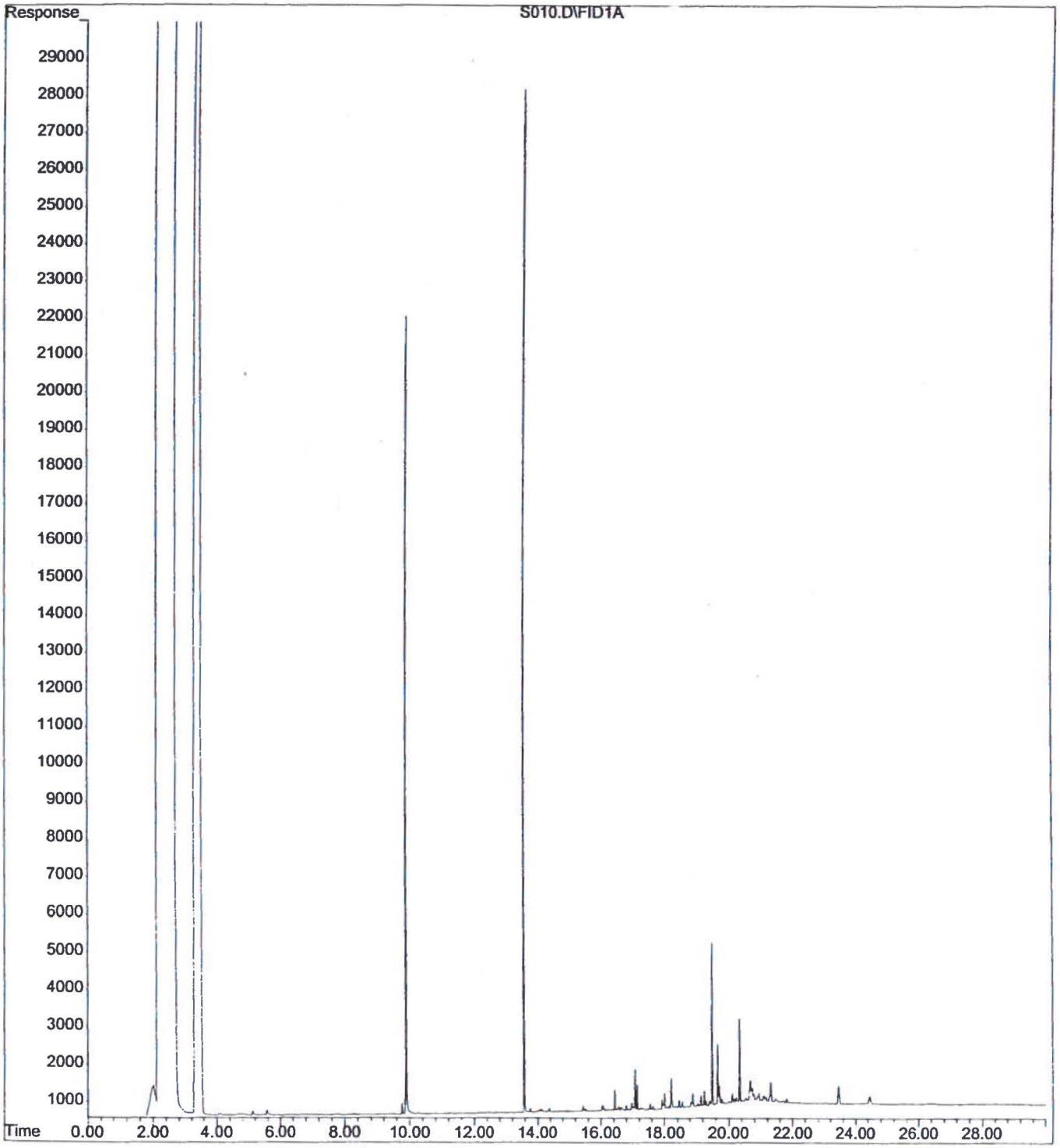
File : N:\HPCHEM\1\DATA\FID0B29\S007.D
Operator : HP Demo
Acquired : 29 Feb 2000 1:47 pm using AcqMethod DX-FRONT.M
Instrument : Rusty
Sample Name: 15229-47
Misc Info :
Vial Number: 7



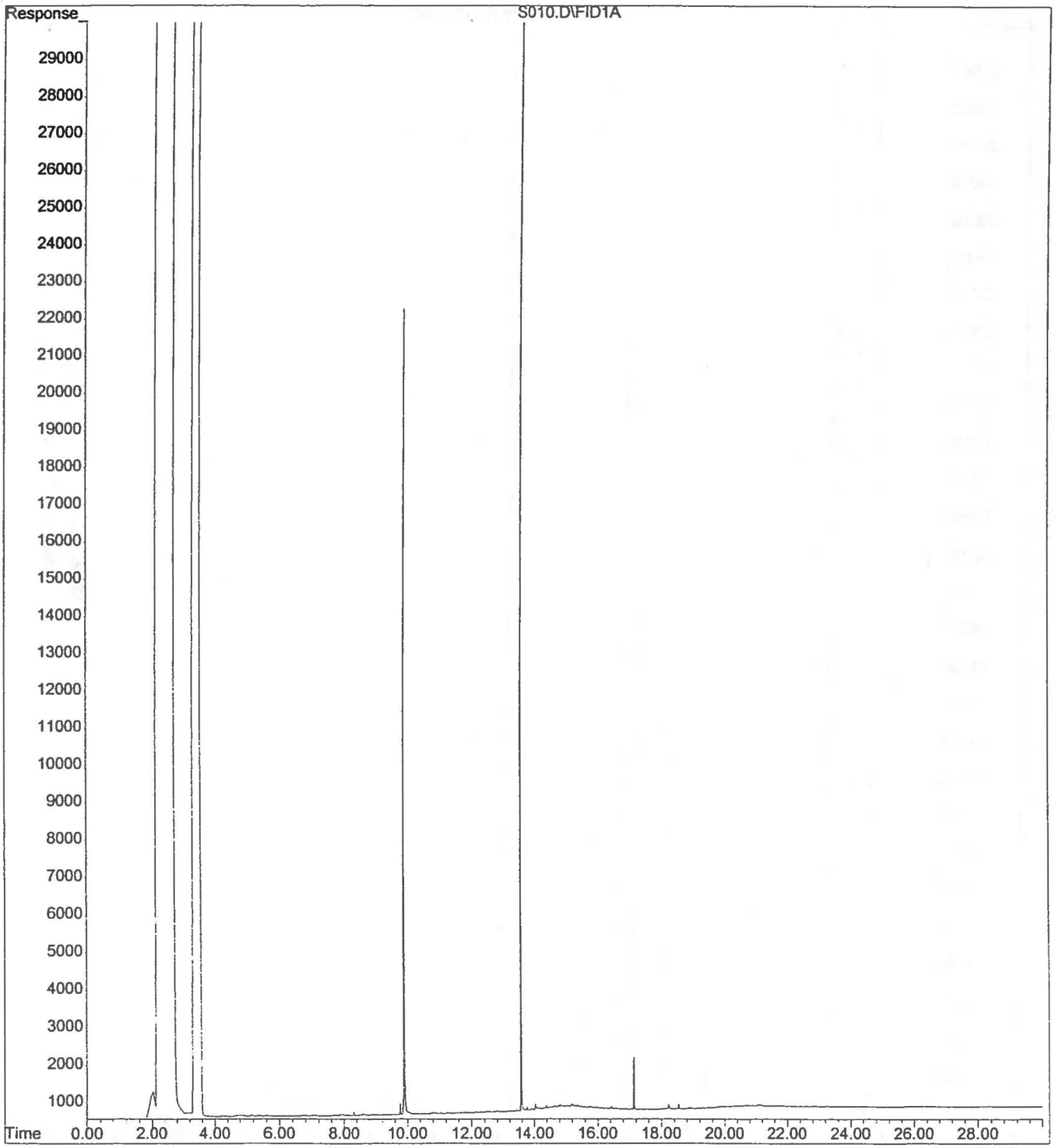
File : N:\HPCHEM\1\DATA\FID0C01\S009.D
Operator : HP Demo
Acquired : 1 Mar 2000 4:42 pm using AcqMethod DX-FRONT.M
Instrument : Rusty
Sample Name: 15229-63
Misc Info :
Vial Number: 9



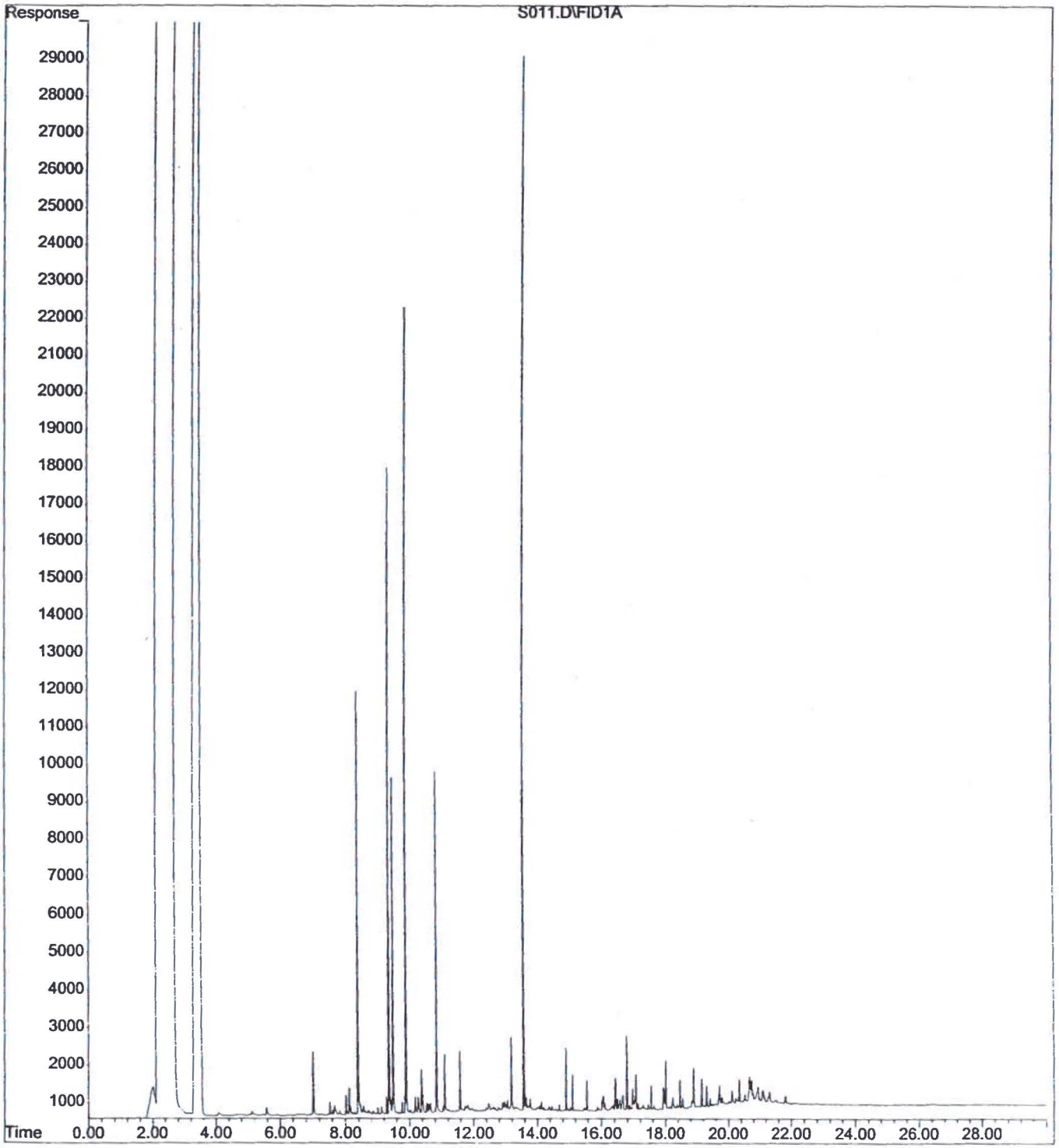
File : N:\HPCHEM\1\DATA\FID0B29\S010.D
Operator : HP Demo
Acquired : 29 Feb 2000 3:44 pm using AcqMethod DX-FRONT.M
Instrument : Rusty
Sample Name: 15229-66
Misc Info :
Vial Number: 10



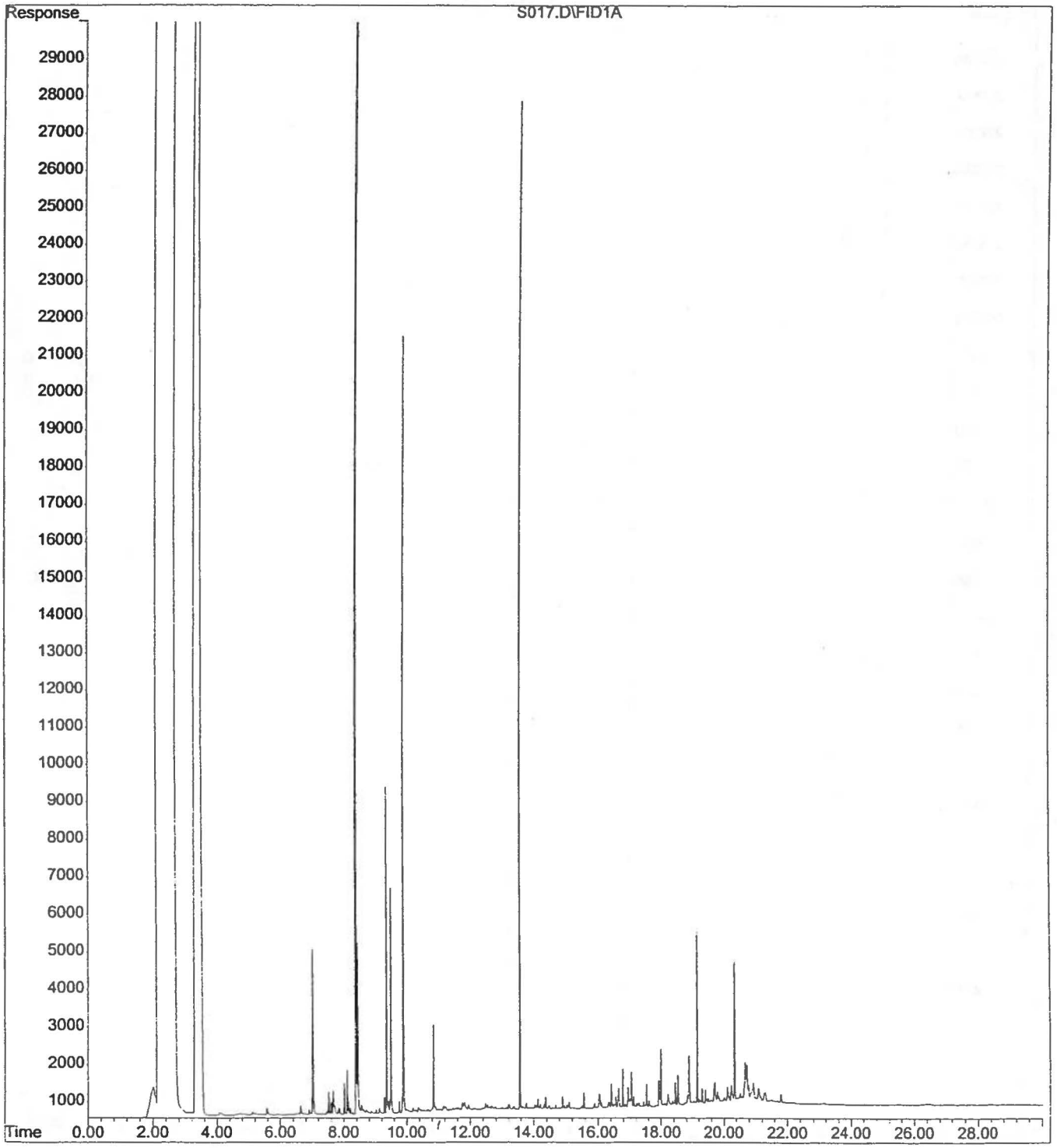
File : N:\HPCHEM\1\DATA\FID0C01\S010.D
Operator : HP Demo
Acquired : 1 Mar 2000 5:21 pm using AcqMethod DX-FRONT.M
Instrument : Rusty
Sample Name: 15229-69
Misc Info :
Vial Number: 10



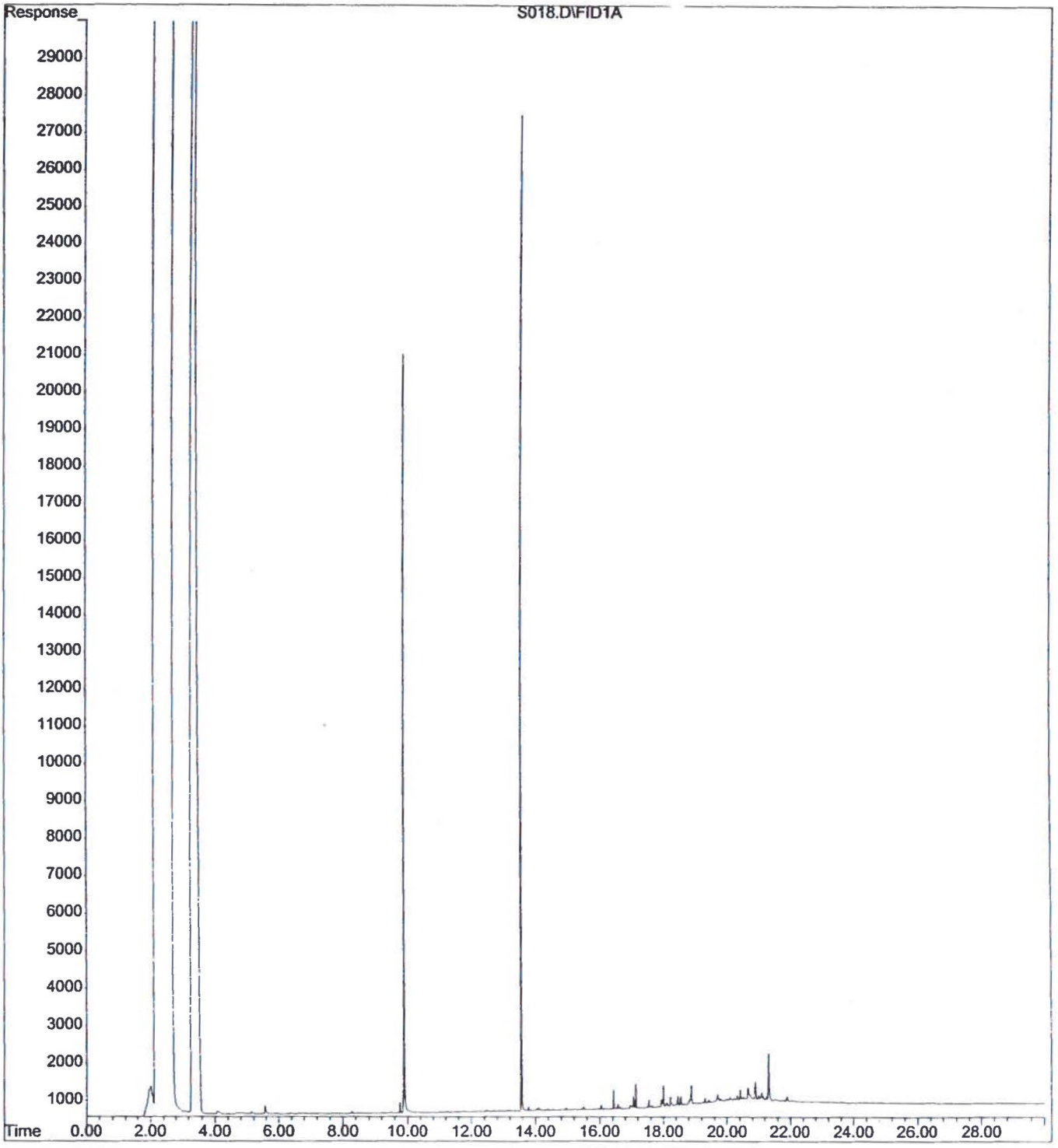
File : N:\HPCHEM\1\DATA\FID0B29\S011.D
Operator : HP Demo
Acquired : 29 Feb 2000 4:23 pm using AcqMethod DX-FRONT.M
Instrument : Rusty
Sample Name: 15229-71
Misc Info :
Vial Number: 11



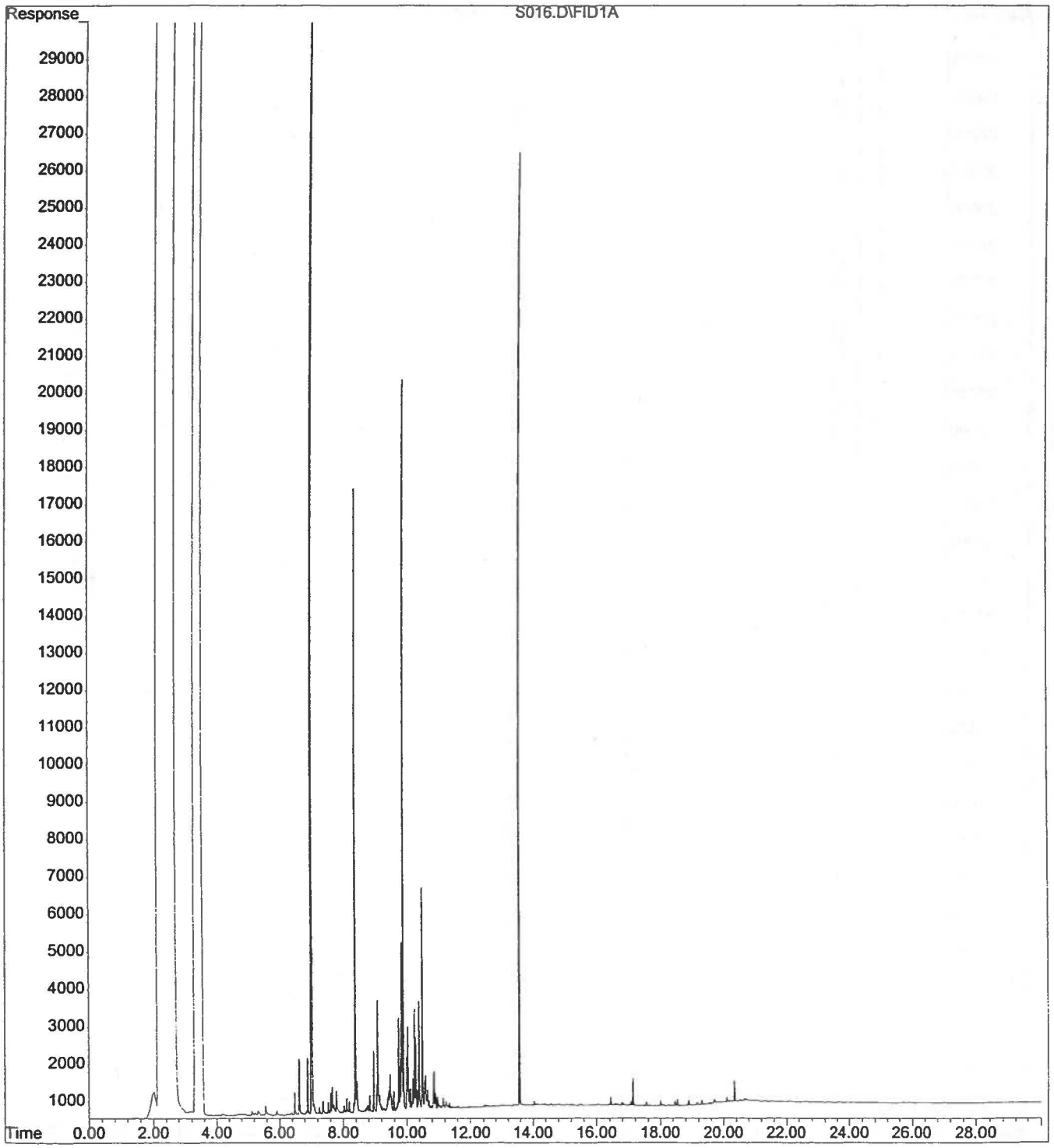
File : N:\HPCHEM\1\DATA\FID0B29\S017.D
Operator : HP Demo
Acquired : 29 Feb 2000 8:18 pm using AcqMethod DX-FRONT.M
Instrument : Rusty
Sample Name: 15229-72
Misc Info :
Vial Number: 17



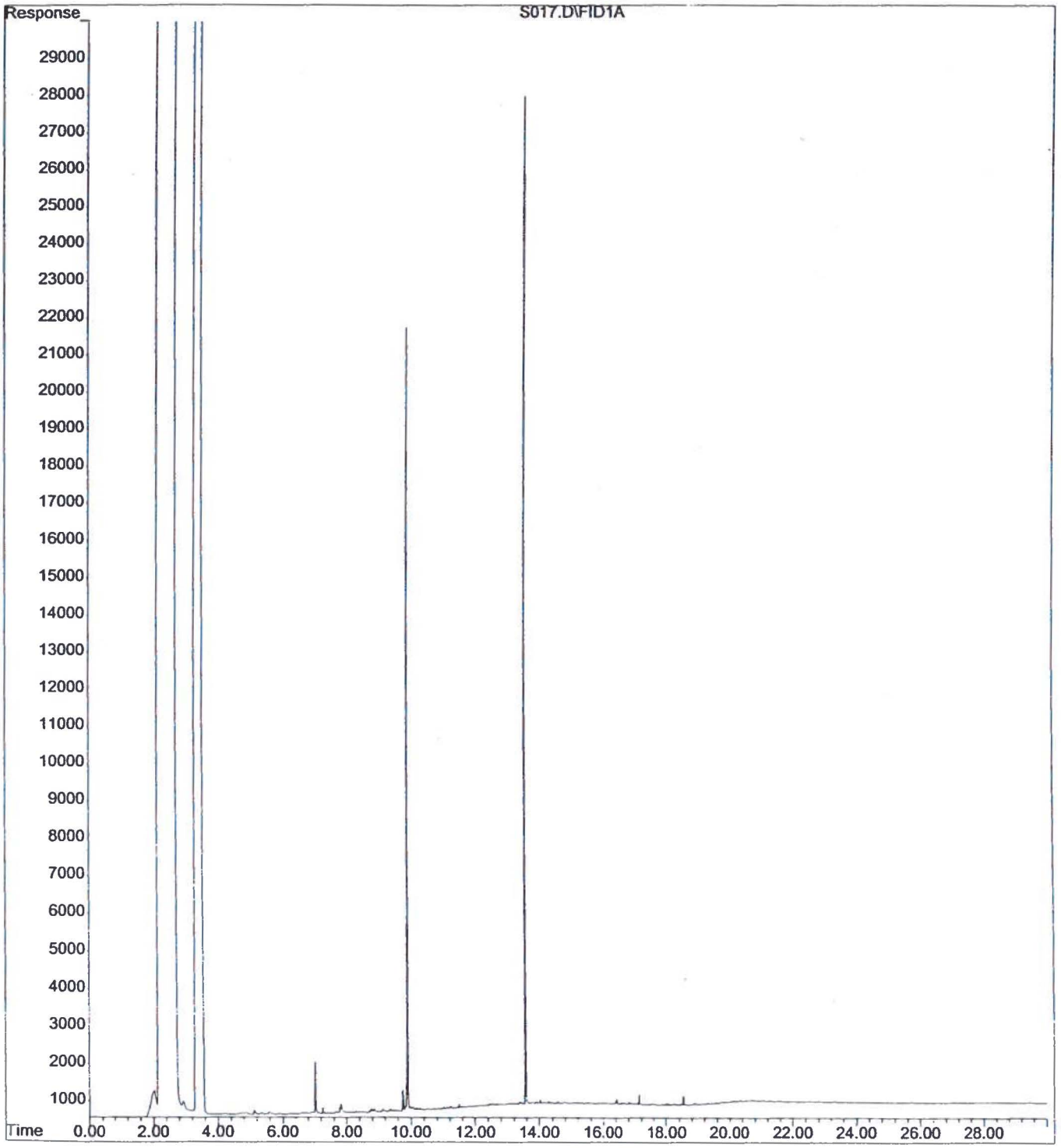
File : N:\HPCHEM\1\DATA\FID0B29\S018.D
Operator : HP Demo
Acquired : 29 Feb 2000 8:57 pm using AcqMethod DX-FRONT.M
Instrument : Rusty
Sample Name: 15229-74
Misc Info :
Vial Number: 18



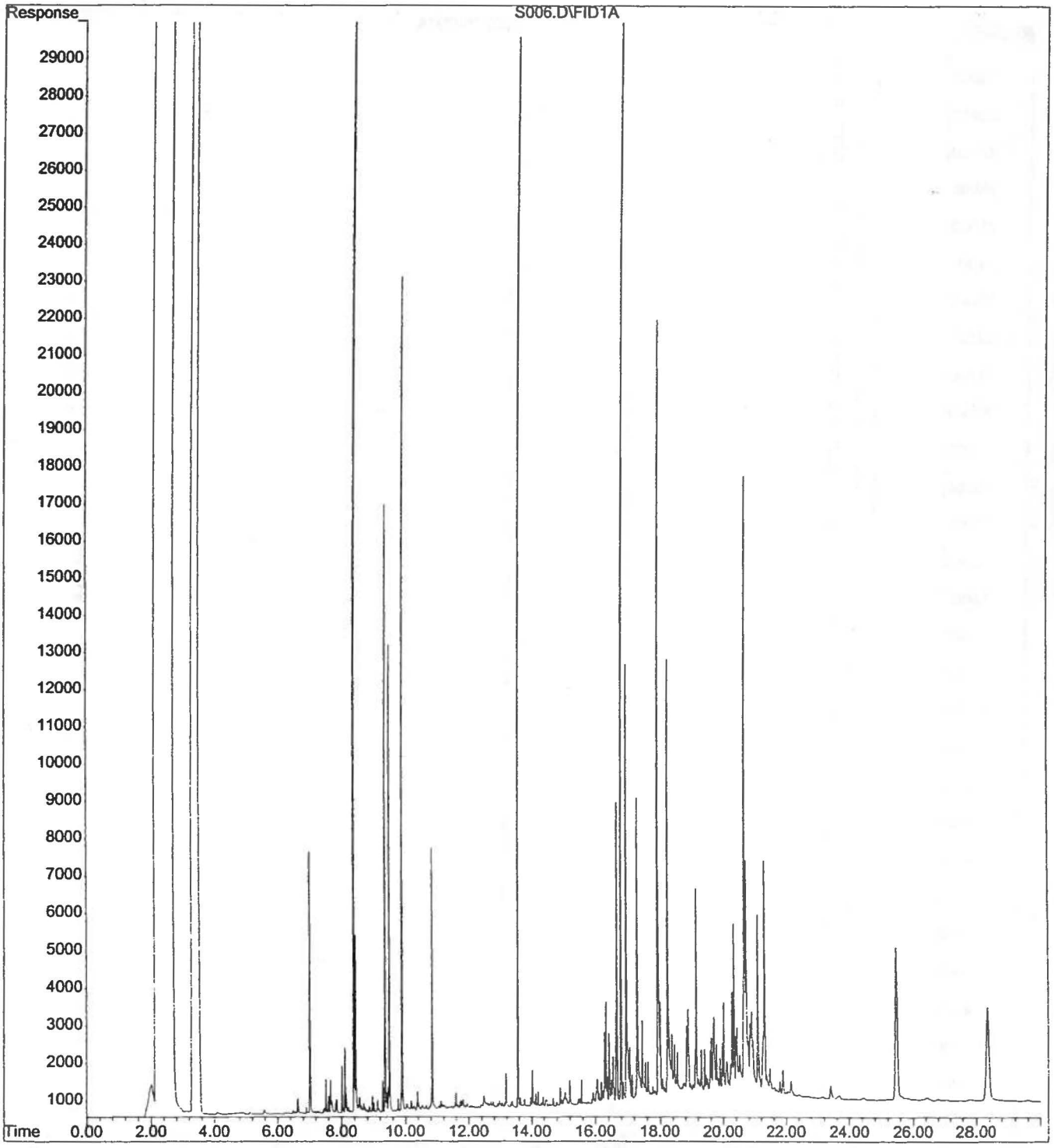
File : N:\HPCHEM\1\DATA\FID0B28\S016.D
Operator : HP Demo
Acquired : 28 Feb 2000 8:28 pm using AcqMethod DX-FRONT.M
Instrument : Rusty
Sample Name: 15229-51
Misc Info :
Vial Number: 16



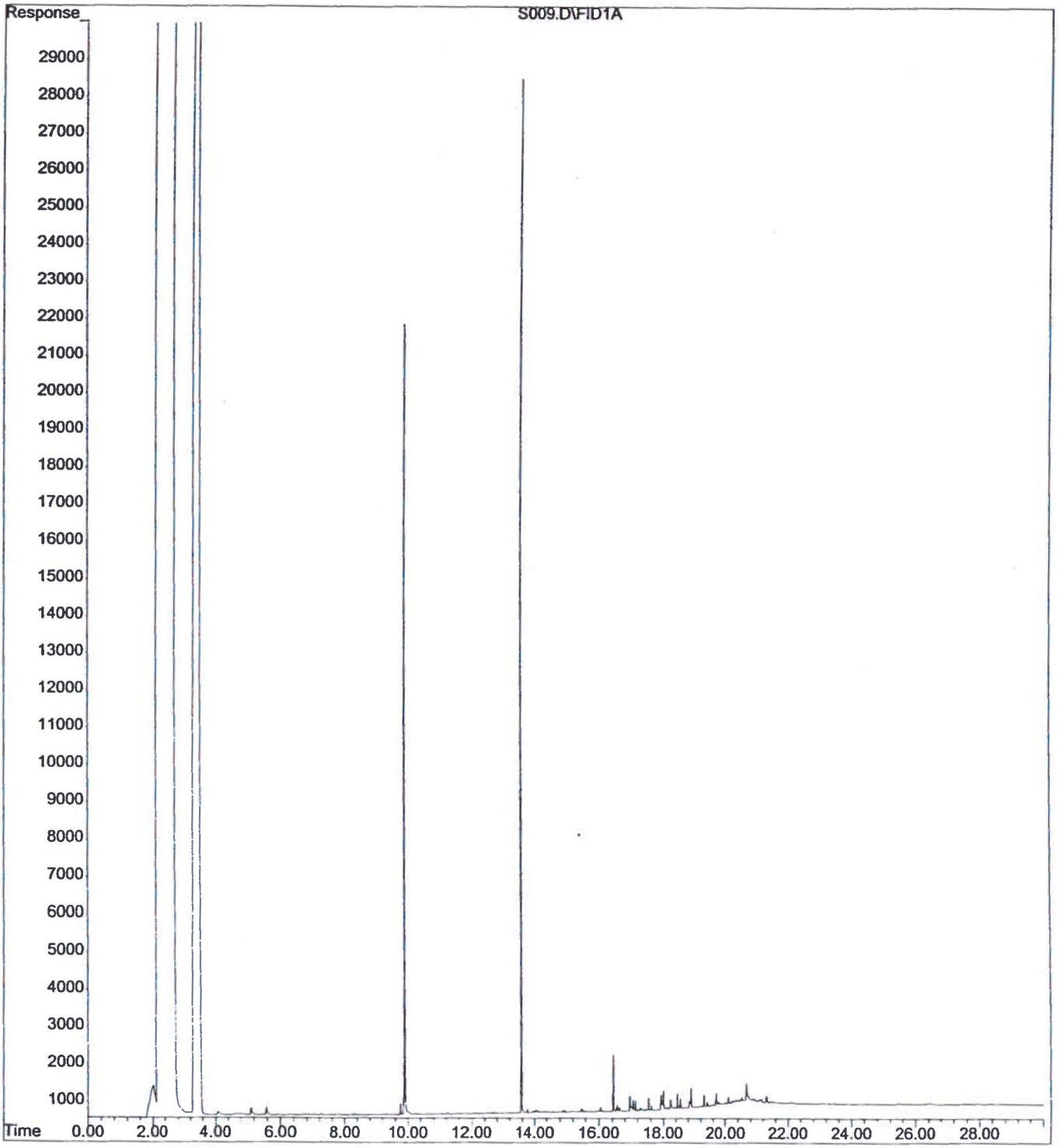
File : N:\HPCHEM\1\DATA\FID0B28\S017.D
Operator : HP Demo
Acquired : 28 Feb 2000 9:07 pm using AcqMethod DX-FRONT.M
Instrument : Rusty
Sample Name: 15229-52
Misc Info :
Vial Number: 17



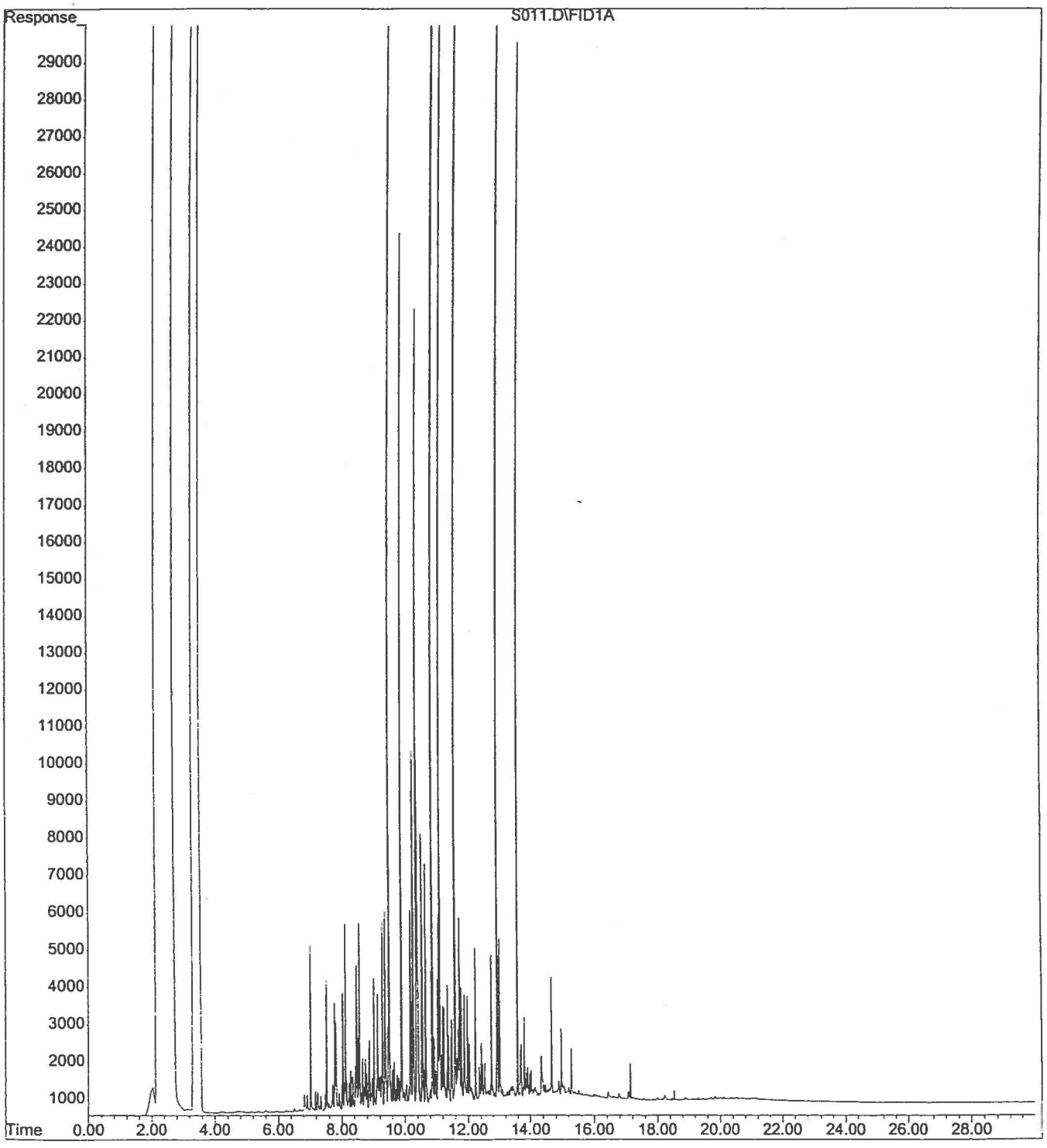
File : N:\HPCHEM\1\DATA\FID0B29\S006.D
Operator : HP Demo
Acquired : 29 Feb 2000 1:08 pm using AcqMethod DX-FRONT.M
Instrument : Rusty
Sample Name: 15229-55
Misc Info :
Vial Number: 6



File : N:\HPCHEM\1\DATA\FID0B29\S009.D
Operator : HP Demo
Acquired : 29 Feb 2000 3:05 pm using AcqMethod DX-FRONT.M
Instrument : Rusty
Sample Name: 15229-57
Misc Info :
Vial Number: 9



File : N:\HPCHEM\1\DATA\FID0C01\S011.D
Operator : HP Demo
Acquired : 1 Mar 2000 6:00 pm using AcqMethod DX-FRONT.M
Instrument : Rusty
Sample Name: 15229-78
Misc Info :
Vial Number: 11



Oregon Analytical Laboratory

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FAX (503) 590-1404
1-800-644-0967

CHAIN OF CUSTODY RECORD
LABORATORY ANALYSIS REQUEST

Sampling: ☐ Grab ☐ Comp Page 1 of ____
OAL Hours ____ Site Visit ☐
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Client Information
Company URS GREINER WOODWARD CLYDE
Contact TOM MIDDLETON
Address 1501 4TH AVE
SEATTLE, WA 98101
Phone #(206) 343-7933 Fax #(206) 343-0513

Billing Information
Company ____
Contact ____
Address ____
Phone # ____ Fax # ____

Project Information
Project Name IP LONGVIEW
Project # ____
P.O. # ____
Comments ____

Sampler's Name TOM MIDDLETON
Signature ____

Quote # ____
NOTE: If quote number is not referenced, standard pricing will be applied.
Provide Fax Results ☐ Yes ☐ No

Remarks
⊗ Analysis per fax sent 2/25/00

	Sample Identification	Date	Time	FOR LAB USE ONLY OAL Login #	# of Containers	Matrix: Soil	Matrix: Water	Matrix: Other (Note in Remarks)	Analyses: PAH/PCP 8270 SIM
1	PB44 3'-5'	2/23	0955	L15229-1	2	X			⊗
2	PB44 5'-6'	2/23	1007	-2	1	X			⊗
3	PB44 6'-7'	2/23	1007	-3	1	X			
4	PB44 7'-9'	2/23	1021	-4	2	X			
5	PB44 GW	2/23	1037	-5	2		X		⊗
6	PB45 3'-5'	2/23	1121	-6	2	X			
7	PB45 5'-7'	2/23	1129	-7	2	X			⊗
8	PB45 8'-9'	2/23	1138	-8	2	X			
9	PB45 9'-11'	2/23	1146	-9	2	X			

Analyses: Volatiles 624 / 8260 / 8240 8010 / 8020; Semivolatiles 625 / 8270 PAH(SIM)8270 PAH8310; Organochlor Pest 608 / 8081 PCB 608 / 8082; NW TPH-HCID ☐ Yes ☐ No Quantify?; NW TPH Quantification G X (DX/OIL); BTEX 602 / 8021 ☐ MTBE ☐ Naphthalene; Metals ☐ Total ☐ TCLP ☐ Dissolved As Ba Cd Cr Pb Hg Se Ag Other ____

Turnaround
[N] Normal – 10 working days
[S] Special – 5 working days
[R] Rush – 24-72 hrs
[O] Other – ____

Remarks: Hold

Relinquished
Signature ____ Date 2/24/00
Print Name Tom Middleton Time 3:15
Company URS

Received
Signature ____ Date 2/24/00
Print Name Lindsay Robles Time 3:05pm
Company OAL

Relinquished
Signature ____ Date 2/24/00
Print Name ____ Time 5:05pm
Company OAL

Received
Signature ____ Date 2/24/00
Print Name Doug McKenzie Time 1705
Company OAL

Relinquished
Signature ____ Date ____
Print Name ____ Time ____
Company ____

Received
Signature ____ Date ____
Print Name ____ Time ____
Company ____

☒ Courier ☐ UPS ☐ FedEx ☐ Other
Received @ 7 °C
Appropriate Containers ☒ Yes ☐ No
6+8 (40x/80z) Jars
____ VOA Vials
____ Plastic Bottles
2 Glass Bottles 1L
____ Other ____

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ISCO ____
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Client Information
Company URS GREINER WOODWARD CLYDE
Contact TOM MIDDLETON
Address 1501 4TH AVE
SEATTLE, WA 98101
Phone # (206) 343-7933 Fax # (206) 343-0573

Billing Information
Company ____
Contact ____
Address ____
Phone # ____ Fax # ____

Project Information
Project Name JP LONGVIEW
Project # ____
P.O. # ____
Comments ____

Sampler's Name TOM MIDDLETON
Signature ____
Quote # ____
NOTE: If quote number is not referenced, standard pricing will be applied.
Provide Fax Results ☐ Yes ☐ No

Remarks

	Sample Identification	Date	Time	FOR LAB USE ONLY OAL Login #	# of Containers	Matrix: Soil	Matrix: Water	Matrix: Other (Note in Remarks)	Analyses: NW TPH-HCID Quantify? ☐ Yes ☐ No	Analyses: NW TPH Identification G X DX/OIL	Analyses: BTEX 602 / 8021 ☐ MTBE ☐ Naphthalene	Analyses: PAH/PCP 8270SIM
1	PB45 11'-13'	2/23	1153	L15229-10	2	X						
2	PB45 GW	2/23	1200	-11	3		X			X		X
3	PB46 3'-5'	2/23	1335	-12	2	X						
4	PB46 5'-7'	2/23	1345	-13	2	X				X		X
5	PB47 3'-5'	2/23	1412	-14	2	X						
6	PB47 5'-6'	2/23	1425	-15	2	X				X		X
7	PB47 6'-7'	2/23	1425	-16	2	X						
8	PB47 7'-9'	2/23	1434	-17	2	X						
9	PB47 9'-11'	2/23	1446	-18	2	X						

Analyses: Volatiles 620 / 8260 / 8240 8010 / 8020; Semivolatiles 625 / 8270 PAH(SIM)8270 PAH8310; Organochlor Pest 608 / 8081 PCB 608 / 8082; NW TPH-HCID Quantify? ☐ Yes ☐ No; NW TPH Identification G X DX/OIL; BTEX 602 / 8021 ☐ MTBE ☐ Naphthalene; Metals ☐ Total ☐ TCLP ☐ Dissolved As Ba Cd Cr Pb Hg Se Ag; Other ____; PAH/PCP 8270SIM

Turnaround
[N] Normal – 10 working days
[S] Special – 5 working days
[R] Rush – 24-72 hrs
[O] Other – ____

Remarks
1/6/11

Relinquished		Relinquished		Relinquished	
Signature	Date 2/24/00	Signature	Date 2/24/00	Signature	Date
Print Name Tom Middleton	Time 15:05	Print Name	Time 5:05pm	Print Name	Time
Company URS		Company OAL		Company	
Received		**Received**		**Received**	
Signature	Date 2/24/00	Signature	Date 2/24/00	Signature	Date
Print Name Lisa J. Robley	Time 3:05	Print Name Doug McKenzie	Time 1705	Print Name	Time
Company OAL		Company OAL		Company	

☒ Courier ☐ UPS ☐ FedEx ☐ Other
Received @ 5 °C
Appropriate Containers ☒ Yes ☐ No
8+6 (4oz/8oz) Jars
____ VOA Vials
____ Plastic Bottles
3 Glass Bottles 1L
____ Other ____

Oregon Analytical Laboratory

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Client Information
Company URS GREINER WOODWARD CLYDE
Contact TOM MIDDLETON
Address 1501 4TH AVE
SEATTLE, WA 98101
Phone # (206) 343-7933 Fax # (206) 343-0513

Billing Information
Company ____
Contact ____
Address ____
Phone # ____ Fax # ____

Project Information
Project Name IP LONGVIEW
Project # ____
P.O. # ____
Comments ____

Sampler's Name TOM MIDDLETON
Signature ____

Quote # ____
NOTE: If quote number is not referenced, standard pricing will be applied.
Provide Fax Results ☐ Yes ☐ No

Remarks

[N] Normal – 10 working days
[S] Special – 5 working days
[R] Rush – 24-72 hrs
[O] Other – ____

	Sample Identification	Date	Time	FOR LAB USE ONLY OAL Login #	# of Containers	Matrix: Soil	Matrix: Water	Matrix: Other (Note in Remarks)	Analyses: NW TPH Quantification ☐ X ☐ DX/OIL	Analyses: PAH/PCP 8270SIM	Turnaround: Remarks
1	PB47 GW	2/23	1500	L15229-19	3		X		X	X	1-6 1/1
2	PB48 3'-5'	2/23	1542	-20	2	X					
3	PB48 6.5'-7'	2/23	1550	-21	2	X			X	X	
4	PB48 7'-9'	2/23	1557	-22	2	X					
5	PB49 3'-5'	2/23	1624	-23	2	X					
6	PB49 5'-7'	2/23	1635	-24	2	X					
7	PB49 7'-9'	2/23	1644	-25	2	X			X	X	
8	PB49 9'-11'	2/23	1650	-26	2	X					
9	PB49 11'-13'	2/23	1657	-27	2	X					

Relinquished
Signature Tom Middleton Date 2/24/00
Print Name Tom Middleton Time 3:00 pm
Company URS

Received
Signature Luis J. Kolb Date 2/24/00
Print Name Luis Kolbas Time 3:05 pm
Company OAL

Relinquished
Signature Luis J. Kolb Date 2/24/00
Print Name ____ Time 5:05 pm
Company OAL

Received
Signature [illegible] Date 2/24/00
Print Name Doug McKenzie 1705 Time ____
Company OAL

Relinquished
Signature ____ Date ____
Print Name ____ Time ____
Company ____

Received
Signature ____ Date ____
Print Name ____ Time ____
Company ____

☒ Courier ☐ UPS ☐ FedEx ☐ Other
Received @ 3 °C
Appropriate Containers ☒ Yes ☐ No
8+8 4oz./8oz. Jars
____ VOA Vials
____ Plastic Bottles
3 Glass Bottles | L
____ Other ____

PGE 10650.doc (Jun 99)

Oregon Analytical Laboratory

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CHAIN OF CUSTODY RECORD
LABORATORY ANALYSIS REQUEST

Sampling: ☐ Grab ☐ Comp Page 4 of ____
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Client Information
Company URS GREINER WOODWARD CLYDE
Contact TOM MIDDLETON
Address 1501 4TH AVE
SEATTLE, WA 98101
Phone # (206) 343-7935 Fax # (206) 343-0513

Billing Information
Company ____
Contact ____
Address ____
Phone # ____ Fax # ____

Project Information
Project Name TP LONGVIEW
Project # ____
P.O. # ____
Comments ____

Sampler's Name TOM MIDDLETON
Signature ____

Quote # ____
NOTE: If quote number is not referenced, standard pricing will be applied.
Provide Fax Results ☐ Yes ☐ No

Remarks

[N] Normal – 10 working days
[S] Special – 5 working days
[R] Rush – 24-72 hrs
[O] Other – ____

Turnaround

	Sample Identification	Date	Time	FOR LAB USE ONLY OAL Login #	# of Containers	Matrix: Soil	Water	Other (Note in Remarks)	Analyses: Volatiles 620 / 8260 / 8240 8010 / 8020	Semivolatiles 625 / 8270 PAH(SIM)8270 PAH8310	Organochlor Pest 608 / 8081 PCB 608 / 8082	NW TPH-HCID Quantify? ☐ Yes ☐ No	NW TPH Quantification G X DX/OIL	BTEX 602 / 8021 ☐ MTBE ☐ Naphthalene	Metals ☐ Total ☐ TCLP ☐ Dissolved As Ba Cd Cr Pb Hg Se Ag Other	PAH/RCP 8270 SIM	Remarks
1	PB50 3'-4.5'	2/24	0825	L15229-28	2	X							X			X	1-6 ID
2	PB50 4.5'-5'	2/24	0825	-29	2	X											
3	PB50 5'-6'	2/24	0830	-30	2	X											
4	PB50 6'-7'	2/24	0830	-31	2	X											
5	PB50 7'-9'	2/24	0835	-32	2	X											
6	PB50 GW	2/24	0900	-33	2		X						X			X	
7	PB51 3'-5'	2/24	0935	-34	2	X							X			X	
8	PB51 5'-7'	2/24	0942	-35	2	X											
9	PB51 7'-9'	2/24	0952	-36	2	X											

Relinquished
Signature [signature] Date 2/24/00
Print Name Tom Middleton Time 9:03
Company URS

Received
Signature [signature] Date 2/24/00
Print Name Leija Robles Time 3:05
Company OAL

Relinquished
Signature [signature] Date 2/24/00
Print Name ____ Time 5:05pm
Company OAL

Received
Signature [signature] Date 2/24/00
Print Name Doug McKenzie Time 1705
Company OAL

Relinquished
Signature ____ Date ____
Print Name ____ Time ____
Company ____

Received
Signature ____ Date ____
Print Name ____ Time ____
Company ____

☒ Courier ☐ UPS ☐ FedEx ☐ Other
Received @ 5 °C
Appropriate Containers ☒ Yes ☐ No
8+8 (4oz/8oz) Jars
____ VOA Vials
____ Plastic Bottles
2 Glass Bottles 1L
____ Other ____

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LABORATORY ANALYSIS REQUEST

Sampling: ☐ Grab ☐ Comp Page 5 of ____
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Client Information
Company URSGWC
Contact TOM MIDDLETON
Address 1501 4TH AVE
SEATTLE, WA 98101
Phone # (206) 343-7933 Fax # (206) 343-9513

Billing Information
Company ____
Contact ____
Address ____
Phone # ____ Fax # ____

Project Information
Project Name IP LONGVIEW
Project # ____
P.O. # ____
Comments ____

Sampler's Name TOM MIDDLETON
Signature ____

Quote # ____
NOTE: If quote number is not referenced, standard pricing will be applied.
Provide Fax Results ☐ Yes ☐ No

Remarks

	Sample Identification	Date	Time	FOR LAB USE ONLY OAL Login #	# of Containers	Matrix: Soil	Matrix: Water	Matrix: Other (Note in Remarks)	Analyses: PAH/PCP 8270 SIM
1	PB51 9'-11'	2/24	1001	L15229-37	1	X			⊗
2	PB51 GW	2/24	1020	-38	3		X		⊗
3	PB52 5'-7'	2/24	1044	-39	1	X			
4	PB52 7.5'-9'	2/24	1052	-40	1	X			⊗
5	PB52 9'-11'	2/24	1055	-41	1	X			
6	PB52 11'-13'	2/24	1103	-42	1	X			
7	PB52 13'-15'	2/24	1116	-43	1	X			
8	PB52 GW	2/24	1130	-44	3		X		
9	PB53 5'-7'	2/24	1321	-45	1	X			

Analyses: Volatiles 8260 / 8240 8010 / 8020; Semivolatiles 625 / 8270 PAH(SIM)8270 PAH8310; Organochlor Pest 608 / 8081 PCB 608 / 8082; NW TPH-HCID ☐ Quantify? ☐ Yes ☐ No; NW TPH Dx/Oil; BTEX 602 / 8021 ☐ MTBE ☐ Naphthalene; Metals ☐ Total ☐ TCLP ☐ Dissolved As Ba Cd Cr Pb Hg Se Ag Other ____

Turnaround
[N] Normal – 10 working days
[S] Special – 5 working days
[R] Rush – 24-72 hrs
[O] Other – ____

Remarks: Hold

Relinquished
Signature [signature] Date 2/24/00
Print Name Tom Middleton Time 7:00
Company URS

Received
Signature [signature] Date 2/24/00
Print Name Evelyn Robles Time 3:05 pm
Company OAL

Relinquished
Signature [signature] Date 2/24/00
Print Name [illegible] Time 5:05 pm
Company OAL

Received
Signature [signature] Date 2/24/00
Print Name Doug McKenzie Time 1705
Company OAL

Relinquished
Signature ____ Date ____
Print Name ____ Time ____
Company ____

Received
Signature ____ Date ____
Print Name ____ Time ____
Company ____

☒ Courier ☐ UPS ☐ FedEx ☐ Other
Received @ 2 °C
Appropriate Containers ☒ Yes ☐ No
7 4oz/8oz Jars
____ VOA Vials
____ Plastic Bottles
6 Glass Bottles 1L
____ Other ____

PGE 10650.doc (Jun 99)

Oregon Analytical Laboratory

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Beaverton OR 97007
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FAX (503) 590-1404
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Sampling: ☐ Grab ☐ Comp Page 6 of ____
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Client Information
Company URSGWC
Contact TOM MIDDLETON
Address 1501 4TH AVE
SEATTLE, WA 98101
Phone # (206) 342-7533 Fax # (206) 343-0573

Billing Information
Company ____
Contact ____
Address ____
Phone # ____ Fax # ____

Project Information
Project Name LANGVIEW
Project # ____
P.O. # ____
Comments ____

Sampler's Name TOM MIDDLETON
Signature ____
Quote # ____
NOTE: If quote number is not referenced, standard pricing will be applied.
Provide Fax Results ☐ Yes ☐ No

Remarks

	Sample Identification	Date	Time	FOR LAB USE ONLY OAL Login #	# of Containers	Matrix: Soil	Matrix: Water	Matrix: Other (Note in Remarks)	Analyses: NW TPH-HCID Quantify? ☐ Yes ☐ No	Analyses: NW TPH Quantification DX/OIL	Analyses: BTEX 602 / 8021 ☐ MTBE ☐ Naphthalene	Analyses: Metals ☐ Total ☐ TCLP ☐ Dissolved As Ba Cd Cr Pb Hg Se Ag	Analyses: PAH/RCP 8270 SIM
1	PB53 7'-8.5'	2/24	1330	L15229-46	1	X				X			X
2	PB53 8.5'-9'	2/24	1330	-47	1	X				X			X
3	PB53 9'-11'	2/24	1338	-48	1	X							
4	PB53 11'-13'	2/24	1343	-49	1	X							
5	PB53 13'-15'	2/24	1350	-50	1	X							
6	PB53 GW	2/24	1416	-51	3		X			X			X
7	PB49 GW	2/23	0500	-52	3		X			X			X
8	PB54 5'-7'	2/24	1442	-53	1	X							
9	PB54 7'-8.5'	2/24	1446	-54	1	X							

[N] Normal – 10 working days
[S] Special – 5 working days
[R] Rush – 24-72 hrs
[O] Other – ____

Turnaround

Remarks
1-10 WK
- Not on COC; Added DGM 2/25/00 per Michelle 2/25/00 - DGM
* Analyze

Relinquished
Signature [signature] Date 2/24/00
Print Name Tom Middleton Time 3:00
Company URS

Received
Signature [signature] Date 2/24/00
Print Name Lee Ann Robbins Time 3:05
Company OAL

Relinquished
Signature [signature] Date 2/24/00
Print Name [signature] Time 5:05 pm
Company OAL

Received
Signature [signature] Date 2/24/00
Print Name Doug McKenzie Time 1705
Company OAL

Relinquished
Signature ____ Date ____
Print Name ____ Time ____
Company ____

Received
Signature ____ Date ____
Print Name ____ Time ____
Company ____

☒ Courier ☐ UPS ☐ FedEx ☐ Other
Received @ 4 °C
Appropriate Containers ☒ Yes ☐ No
7 4oz (8oz) Jars
____ VOA Vials
____ Plastic Bottles
6 Glass Bottles 1L
____ Other ____

Oregon Analytical Laboratory

14855 SW Scholls Ferry Rd
Beaverton OR 97007
(503) 590-5300
FAX (503) 590-1404
1-800-644-0967

Chain of Custody Record
Laboratory Analysis Request

Sampling: ☐ Grab ☐ Comp Page 7 of ___
OAL Hours ___ Site Visit ☐
ISCO ___
www.oalab.com

Client Information
Company HRSGWC
Contact ___
Address ___
Phone # ___ Fax # ___

Billing Information
Company ___
Contact ___
Address ___
Phone # ___ Fax # ___

Project Information
Project Name ___
Project # ___
P.O. # ___
Comments ___

Sampler's Name ___
Signature ___
Quote # ___
NOTE: If quote number is not referenced, standard pricing will be applied.
Provide Fax Results ☐ Yes ☐ No

Remarks/Comments

Turnaround Time Options
[N] Normal – 10 working days
[S] Special – 5 working days
[R] Rush – 24-72 hrs
[O] Other – ___
TAT NOTE: If no TAT options are selected, normal TAT will be applied.

	Sample Identification	OAL # Date	Time	FOR LAB USE ONLY OAL Login #	# of Containers	Matrix: Soil	Water	Other (Note in Remarks)	Analyses: Volatiles 8260 Other ___	Semivolatiles 625 / 8270 PAH 8270 SIM	Organochlorine Pest 608 / 8081 PCB 608 / 8082	NW TPH-HCID Quantify? ☐ Yes ☐ No	NW TPH Quantification G x (DX)OIL	BTEX 602 / 8021 ☐ MTBE ☐ Naphthalene	Metals ☐ Total ☐ TCLP ☐ Dissolved As Ba Cd Cr Pb Hg Se Ag	Other ___	PAH/PCP 8270 SIM	Remarks
1	PB54 8.5'-9'	3/24	1446	L15229-55	1	X							X				X	Not listed on COC. Added 2/25/00 - DGM - Analyze per Crystal N. - DGM 3/25/00
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		

Relinquished
Signature ___ Date ___
Print Name ___ Time ___
Company ___

Received
Signature ___ Date ___
Print Name ___ Time ___
Company ___

Relinquished
Signature ___ Date ___
Print Name ___ Time ___
Company ___

Received
Signature ___ Date ___
Print Name ___ Time ___
Company ___

Relinquished
Signature ___ Date ___
Print Name ___ Time ___
Company ___

Received
Signature ___ Date ___
Print Name ___ Time ___
Company ___

☒ Courier ☐ UPS ☐ FedEx ☐ Other
Received @ 4 °C
Appropriate Containers ☒ Yes ☐ No
1 4oz./8oz. Jars
___ VOA Vials
___ Plastic Bottles
___ Glass Bottles
___ Other ___

PGE 71982 (Jan 2000)

Oregon Analytical Laboratory

14855 SW Scholls Ferry Rd
Beaverton OR 97007
(503) 590-5300
FAX (503) 590-1404
1-800-644-0967

CHAIN OF CUSTODY RECORD
LABORATORY ANALYSIS REQUEST

Sampling: ☐ Grab ☐ Comp
OAL Hours _____
ISCO _____
www.oalab.com/oal

Page 1 of 3
Site Visit ☐

Client Information
Company URS GREINER WOODWARD CLYDE
Contact TOM MIDDLETON
Address 1501 4TH AVE
SEATTLE, WA 98101
Phone # (206) 343-7433 Fax # (206) 343-0543

Billing Information
Company _____
Contact _____
Address _____
Phone # _____ Fax # _____

Project Information
Project Name JP LONGVIEW
Project # _____
P.O. # _____
Comments _____

Sampler's Name TOM MIDDLETON
Signature _____

Quote # _____
NOTE: If quote number is not referenced, standard pricing will be applied.
Provide Fax Results ☐ Yes ☐ No

Remarks
(*) Analysis per Fax Sent 2/28/00 - DGM

[N] Normal – 10 working days
[S] Special – 5 working days
[R] Rush – 24-72 hrs
[O] Other – _____

	Sample Identification	Date	Time	FOR LAB USE ONLY OAL Login #	# of Containers	Matrix: Soil	Matrix: Water	Matrix: Other (Note in Remarks)	Analyses: NW TPH-HCID Quantify? ☐ Yes ☐ No	Analyses: NW TPH Quantification G X DX/OIL	Analyses: PAH+RCP 8270 SIM	Turnaround / Remarks
1	PB55 3'-5'	2/24	1515	L15229-56	2	X						1 week
2	PB55 5'-7'	2/24	1522	-57	2	X				(*)	(*)	
3	PB55 7.5'-9'	2/24	1530	-58	2	X						
4	PB55 9'-11'	2/24	1534	-59	2	X						
5	PB55 11'-13'	2/24	1544	-60	2	X						
6	PB55 13'-15'	2/24	1550	-61	2	X						
7	PB55 15'-17'	2/24	1557	-62	2	X						
8	PB55 GW	2/24	1600	-63	3		X			(*)	(*)	
9	PB56 3'-5'	2/25	0845	-64	2	X						

Relinquished
Signature _____ Date 2/25/00
Print Name Tom Middleton Time 3:00
Company URS

Received
Signature _____ Date 2/25/00
Print Name Peggy J. Kelly Time 3:00
Company OAL

Relinquished
Signature _____ Date 2/25/00
Print Name Peggy J. Kelly Time 4:55
Company OAL

Received
Signature _____ Date 2/25/00
Print Name Doug MacKenzie Time 1655
Company OAL

Relinquished
Signature _____ Date _____
Print Name _____ Time _____
Company _____

Received
Signature _____ Date _____
Print Name _____ Time _____
Company _____

☒ Courier ☐ UPS ☐ FedEx ☐ Other
Received @ 2 °C
Appropriate Containers ☒ Yes ☐ No
8+8 4oz 8oz. Vars
_____ VOA Vials
_____ Plastic Bottles
3 Glass Bottles 1L
_____ Other _____

Oregon Analytical Laboratory

14855 SW Scholls Ferry Rd
Beaverton OR 97007
(503) 590-5300
FAX (503) 590-1404
1-800-644-0967

CHAIN OF CUSTODY RECORD
LABORATORY ANALYSIS REQUEST

Sampling: ☐ Grab ☐ Comp Page 2 of 3
OAL Hours _____ Site Visit ☐
ISCO _____
www.oalab.com/oal

Client Information
Company URSGWC
Contact TOM MIDDLETON
Address 1501 4th AVE
SEATTLE, WA 98101
Phone #(206) 343-7933 Fax #(206) 343-0513

Billing Information
Company _____
Contact _____
Address _____
Phone # _____ Fax # _____

Project Information
Project Name IP LONGVIEW
Project # _____
P.O. # _____
Comments _____

Sampler's Name T. MIDDLETON
Signature _____

Quote # _____
NOTE: If quote number is not referenced, standard pricing will be applied.
Provide Fax Results ☐ Yes ☐ No

Remarks

[N] Normal – 10 working days
[S] Special – 5 working days
[R] Rush – 24-72 hrs
[O] Other – _____

	Sample Identification	Date	Time	FOR LAB USE ONLY OAL Login #	# of Containers	Matrix: Soil	Matrix: Water	Matrix: Other (Note in Remarks)	Analyses: PAH+RCP 8270 SIM	Turnaround	Remarks
1	PB56 5'-7'	2/25	0826	L15229-65	2	X			*		1-6-11
2	PB56 7'-9'	2/25	0832	-66	2	X			*		
3	PB56 9'-11'	2/25	0840	-67	2	X					
4	PB56 11'-13'	2/25	0849	-68	2	X					
5	PB56 GW	2/25	0912	-69	3		X		*		
6	PB57 5'-7'	2/25	0947	-70	2	X					
7	PB57 7'-8'	2/25	0950	-71	2	X			*		
8	PB57 8'-9'	2/25	0958	-72	2	X			*		
9	PB58 3'-5'	2/25	1025	-73	2	X					

Relinquished
Signature [signature] Date 2/25/11
Print Name Tom Middleton Time 5:00
Company URS

Received
Signature [signature] Date 2/25/11
Print Name Evelyn Rodas Time 5:00
Company OAL

Relinquished
Signature [signature] Date 2/25/11
Print Name [signature] Time 4:55
Company OAL

Received
Signature [signature] Date 2/25/11
Print Name Doug McKenzie Time 1655
Company OAL

Relinquished
Signature _____ Date _____
Print Name _____ Time _____
Company _____

Received
Signature _____ Date _____
Print Name _____ Time _____
Company _____

☒ Courier ☐ UPS ☐ FedEx ☐ Other
Received @ 2 °C
Appropriate Containers ☒ Yes ☐ No
8 to 8 (40z 8oz) Jars
_____ VOA Vials
_____ Plastic Bottles
3 Glass Bottles 1L
_____ Other _____

PGE 10650.doc (Jun 99)

Oregon Analytical Laboratory

14855 SW Scholls Ferry Rd
Beaverton OR 97007
(503) 590-5300
FAX (503) 590-1404
1-800-644-0967

CHAIN OF CUSTODY RECORD
LABORATORY ANALYSIS REQUEST

Sampling: ☐ Grab ☐ Comp
OAL Hours _____
ISCO _____
www.oalab.com/oal

Page 3 of 3
Site Visit ☐

Client Information
Company URSGWC
Contact TOM MIDDLETON
Address 1501 4TH AVE
SEATTLE, WA 98101
Phone # (206) 343-7933 Fax # (206) 343-0513

Billing Information
Company _____
Contact _____
Address _____
Phone # _____ Fax # _____

Project Information
Project Name JP LONGVIEW
Project # _____
P.O. # _____
Comments _____

Sampler's Name TOM MIDDLETON
Signature _____

Quote # _____
NOTE: If quote number is not referenced, standard pricing will be applied.
Provide Fax Results ☐ Yes ☐ No

Remarks

	Sample Identification	Date	Time	FOR LAB USE ONLY OAL Login #	# of Containers	Matrix: Soil	Matrix: Water	Matrix: Other (Note in Remarks)	Analyses: Volatiles 620 / 8260 / 8240 8010 / 8020	Semivolatiles 625 / 8270 PAH(SIM)8270 PAH8310	Organochlor Pest 608 / 8081 PCB 608 / 8082	NW TPH-HCID Quantify? ☐ Yes ☐ No	NW TPH Quantification G X (DX/OIL)	BTEX 602 / 8021 ☐ MTBE ☐ Naphthalene	Metals ☐ Total ☐ TCLP ☐ Dissolved As Ba Cd Cr Pb Hg Se Ag Other _____	PAH + PCP 8270 SIM
1	PB5B 5.5'-7'	2/25	1028	L15229-74	2	X							(X)			(X)
2	PB5B 7'-9'	2/25	1037	-75	2	X										
3	PB5B 9'-11'	2/25	1042	-76	2	X										
4	PB5B 12.5'-13'	2/25	1050	-77	2	X										
5	PB5B GW	2/25	1055	-78	3		X						(X)			(X)
6																
7																
8																
9																

Turnaround
[N] Normal – 10 working days
[S] Special – 5 working days
[R] Rush – 24-72 hrs
[O] Other – _____

Remarks
1-6-J
Not on COC - Added 2/25/00 - DAM

Relinquished	Date	Time
Signature: Tom Middleton	2/25/00	3:01
Print Name: Tom Middleton		
Company: URS		

Received	Date	Time
Signature: Lisa J. Kelly	2/25/00	3:00
Print Name: Lisa Kelly		
Company: OAL		

Relinquished	Date	Time
Signature: Lisa J. Kelly	2/25/00	4:55
Print Name		
Company: OAL		

Received	Date	Time
Signature: [illegible]	2/25/00	1655
Print Name: Doug McKenzie		
Company: OAL		

Relinquished	Date	Time
Signature		
Print Name		
Company		

Received	Date	Time
Signature		
Print Name		
Company		

☒ Courier ☐ UPS ☐ FedEx ☐ Other
Received @ 1 °C
Appropriate Containers ☒ Yes ☐ No
4+4 (40z) (80z) Jars
_____ VOA Vials
_____ Plastic Bottles
3 Glass Bottles 1L
_____ Other _____

Appendix C

Quality Assurance/Quality Control Review

Appendix C
Quality Assurance/Quality Control Review

The analytical results for nine water and thirty-one soil samples collected in July and August, 1999 were subject to a QA/QC review including the following:

- Chain of custody and holding times
- Blank review
- Surrogate review
- Matrix/blank spike review
- Duplicate review
- Reporting limits

Samples were collected by URS Greiner Woodward Clyde and analyzed by Oregon Analytical Laboratory of Beaverton, Oregon. Samples were submitted to the laboratory between July 19 and August 3, 1999. Samples were analyzed for the following: diesel range hydrocarbons by NWTPH-Dx, and low level polynuclear aromatic hydrocarbons (PAH's) by EPA method 8270 SIM.

SUMMARY

All analytical data are acceptable for project uses. The PAH and NWTPH-Dx data for two samples were qualified as estimated (J) due to missed holding times. The method blanks were free of contaminants. No data were qualified due to surrogate or spike percent recoveries. Laboratory duplicate results were comparable. The laboratory reporting limits are acceptable.

Chain of Custody and Holding Times

The chain of custody forms indicate that samples were maintained under chain of custody, the forms were signed during release and receipt, and that the samples were chilled and appropriately preserved. The laboratory report is complete. The holding times were met with two exceptions. Samples PB34-9-11 and PB34-11-13 were extracted for PAHs and NWTPH-Dx one day past the 14 day holding time. The non-compliant results were qualified as estimated (J).

Review of Blanks

The laboratory analyzed one batch method blank for each method. The method blanks did not have detectable levels of any analyte. No data were qualified due to these results.

Surrogate Recovery Review

Each sample was spiked with a surrogate (system monitoring compound) for applicable analyses. The surrogate percent recoveries were within the control limits with the following exceptions. The PAH surrogate percent recoveries for samples PB15-3-5, PB18-3-5, PB20-3.5-5.5, PB24-3.5-5.5, PB26-3.5-5.5, PB28-5.5-7.5, PB31-3.5-5.5, and PB31-GW were not recovered due to high analyte concentration. Associated quality control data were within the control limits; therefore no data were qualified. One of the two NWTPH-Dx surrogate percent recoveries for samples PB15-3-5, PB24-3.5-5.5, PB26-3.5-5.5, PB28-5.5-7.5, PB31-3.5-5.5, and PB31-GW were not recovered due to high analyte concentration. Associated quality control data were

within the control limits; therefore no data were qualified. One of the six PAH surrogate percent recoveries for sample PB34-7-9 was not recovered due to matrix interference. Associated quality control data were within the control limits; therefore no data were qualified.

Matrix Spike/Matrix Spike Duplicate Review

The laboratory analyzed a matrix spike/matrix spike duplicate or a blank spike/blank spike duplicate for all analyses. The percent recoveries and duplicate RPD's were within the control limits with the exceptions listed below.

- Soil NWTPH-Dx matrix spike for batches L12254 and L12282: the percent recoveries were not recovered due to high analyte concentration. No data were qualified.

Duplicate Review

No field duplicates were collected during this sampling round. Laboratory duplicates were performed for the following analyses: NWTPH-Dx. Duplicate results greater than five times the reporting limit, were within the control limits with the following exceptions. The L12254 laboratory duplicate RPD (44%) was above the control limits. Associated quality control data were within the control limits; therefore no data were qualified.

Reporting Limits

The reporting limits are summarized in the table below. Many of the samples required dilution due to high analyte concentration; however, reporting limits meet the project needs.

ANALYTE	WATER REPORTING LIMIT mg/l	SOIL REPORTING LIMIT mg/kg
diesel	0.25	25
oil	0.50	50 to 2500
PAH's	0.1 to 100 µg/L	10 to 200000µg/kg
pentachlorophenol	0.5 to 500 µg/L	100 to 2000000 µg/kg

Completeness

The laboratory reported all requested analyses and the laboratory report is complete. Based on the QA/QC review, some data were qualified as estimated (J). The following table summarizes the sample IDs and qualified results for all samples covered by this review:

Sample ID	Laboratory Sample ID	Analyte	Qualifier
PB15-3-5	L12254-1	none	
PB15-5-7	L12254-2	none	
PB17-3-5	L12254-8	none	
PB17-5-7	L12254-9	none	
PB18-3-5	L12254-13	none	
PB20-3.5-5.5	L12254-19	none	
PB20-5.5-7.5	L12254-20	none	
PB21-3.5-5.5	L12254-22	none	
PB21-5.5-7.5	L12254-23	none	
PB17-GW	L12254-12	none	
PB21-GW	L12254-26	none	
PB23-5.5-7.5	L12282-4	none	
PB24-3.5-5.5	L12282-8	none	
PB26-3.5-5.5	L12282-12	none	
PB27-3.5-5.5	L12282-15	none	
PB27-5.5-7.5	L12282-16	none	
PB23-GW	L12282-7	none	
PB28-3.5-5.5	L12297-1	none	
PB28-5.5-7.5	L12297-2	none	
PB29-5.5-7.5	L12297-5	none	
PB31-3.5-5.5	L12297-8	none	
PB33-3.5-5.5	L12297-13	none	
PB34-5-7	L12297-16	none	
PB34-7-9	L12297-17	none	
PB34-9-11	L12297-18	PAHs	J or UJ
		NWTPH-Dx	J or UJ
PB34-11-13	L12297-19	PAHs	J or UJ
		NWTPH-Dx	J or UJ
PB34-GW	L12297-20	none	

Sample ID	Laboratory Sample ID	Analyte	Qualifier
PB31-GW	L12297-21	none	
PB35-7-9	L12475-2	none	
PB35-9-11	L12475-3	none	
PB37-5.5-7.5	L12475-11	none	
PB39-3.5-5.5	L12475-14	none	
PB40-5.5-7.5	L12475-17	none	
PB41-5.5-7.5	L12475-21	none	
PB42-3.5-5.5	L12475-22	none	
PB43-3.5-5.5	L12475-26	none	
PB35-GW	L12475-6	none	
PB40-GW	L12475-19	none	
PB42-GW	L12475-25	none	
PB43-GW	L12475-29	none	

Appendix D
Cost Estimates For Remedial Alternatives

Preliminary Cost Estimate - Offsite Area Remediation
International Paper - Longview, Washington
Excavation and Onsite Disposal under the Engineered Cover

Task Number	Task	Unit	Quantity	Unit Cost	Total Cost
1	Construction Management	-----	-----	9.5%	$ 120,000
2	Engineering Support	-----	-----	6.6%	$ 84,000
3	Mobilization/Demobilization	-----	-----	4.0%	$ 50,000
4	Excavation and Stockpiling of Overburden	CY	2750	$ 10.00	$ 27,500
5	Excavation and Stockpiling of Contaminated Soil	CY	2500	$ 20.00	$ 50,000
6	Confirmation Sampling	EA	50	$ 500	$ 25,000
7	Backfill and Compaction - Clean Fill	CY	2500	$ 20.00	$ 50,000
8	Backfill and Compaction - Overburden	CY	2750	$ 10.00	$ 27,500
9	Repaving (3" Lift)	SF	25000	$ 2.50	$ 62,500
10	Topsoil and Geomembrane Removal	SF	94000	$ 1.35	$ 126,700
11	Subgrade Preparation	CY	7750	$ 16.11	$ 124,900
12	Geomembrane Reinstallation	SF	94000	$ 2.00	$ 188,000
13	Raise Well/Vents	EA	14	$ 500	$ 7,000
14	Topsoil and Hydroseeding	SF	94000	$ 0.65	$ 61,100
15	Install 4 Downgradient PCMP Nested Wells	EA	4	$ 20,000	$ 80,000
16	Annual O&M & PCMP Monitoring	YR	3	$ 60,000	$ 180,000
TOTAL					**$ 1,264,000**

Note: Planning level costs. Further evaluation or design will be required to refine costs.

Preliminary Cost Estimate - Offsite Area Remediation
International Paper - Longview, Washington
Excavation and Off-site Disposal (Hazardous Waste - Incineration)

Task Number	Task	Unit	Quantity	Unit Cost	Total Cost
1	Construction Management	-----	-----	2.6%	$ 84,000
2	Engineering Support	-----	-----	1.8%	$ 58,000
3	Mobilization/Demobilization	-----	-----	1.5%	$ 50,000
4	Excavation and Stockpiling of Overburden	CY	2750	$ 10.00	$ 27,500
5	Excavation and Stockpiling of Contaminated Soil	CY	2500	$ 20.00	$ 50,000
6	Confirmation Sampling	EA	55	$ 500	$ 27,500
7	Backfill and Compaction - Clean Fill	CY	2500	$ 20.00	$ 50,000
8	Backfill and Compaction - Overburden	CY	2750	$ 10.00	$ 27,500
9	Repaving (3" Lift)	SF	25000	$ 2.50	$ 62,500
10	Soil Transportaion and Disposal (Hazardous - Incineration)	CY	2500	$ 1,036.00	$ 2,590,000
11	Install 4 Downgradient PCMP Nested Wells	EA	4	$ 20,000	$ 80,000
12	Annual O&M & PCMP Monitoring	YR	3	$ 60,000	$ 180,000
TOTAL					**$ 3,287,000**

Note: Planning level costs. Further evaluation or design will be required to refine costs.

Preliminary Cost Estimate - Offsite Area Remediation
International Paper - Longview, Washington
Excavation and Offsite Disposal
(50% Soil at Hazardous Waste Landfill / 50% Soil Incinerated)

Task Number	Task	Unit	Quantity	Unit Cost	Total Cost
1	Construction Management	-----	-----	3.7%	$ 96,000
2	Engineering Support	-----	-----	2.6%	$ 68,000
3	Mobilization/Demobilization	-----	-----	2.9%	$ 75,000
4	Excavation and Stockpiling of Overburden	CY	2750	$ 10.00	$ 27,500
5	Excavation and Stockpiling of Contaminated Soil	CY	2500	$ 20.00	$ 50,000
6	Confirmation Sampling	EA	50	$ 500	$ 25,000
7	Backfill and Compaction - Clean Fill	CY	2500	$ 20.00	$ 50,000
8	Backfill and Compaction - Overburden	CY	2750	$ 10.00	$ 27,500
9	Repaving (3" Lift)	SF	25000	$ 2.50	$ 62,500
10	Waste Characterization Sampling (one sample per 50 Cy and 10% duplicates)	EA	55	$ 500.00	$ 27,500
11	Soil Transportaion and Disposal (Hazardous - Incineration)	CY	1,250	$ 1,036.00	$ 1,295,000
12	Soil Transportaion and Disposal (Hazardous - Landfill)	CY	1,250	$ 425.00	$ 531,300
13	Install 4 Downgradient PCMP Nested Wells	EA	4	$ 20,000	$ 80,000
14	Annual O&M & PCMP Monitoring	YR	3	$ 60,000	$ 180,000
TOTAL					**$ 2,595,000**

Note: Planning level costs. Further evaluation or design will be required to refine costs.

Preliminary Cost Estimate - Offsite Area Remediation
International Paper - Longview, Washington
In-situ Solidification

Task Number	Task	Unit	Quantity	Unit Cost	Total Cost
1	Construction Management	-----	-----	10.6%	$ 72,000
2	Engineering Support	-----	-----	7.9%	$ 54,000
3	Mobilization/Demobilization	-----	-----	18.3%	$ 125,000
4	Removal, Stockpiling and Replacement of Gravel Overburden	CY	2750	$ 20.00	$ 55,000
5	In-Situ Soil Solidification with Cement or Bentonite Grout	CY	2500	$ 50.00	$ 125,000
6	Repaving (3" Lift)	SF	25000	$ 2.50	$ 62,500
7	Install 4 Downgradient PCMP Nested Wells	EA	4	$ 2,000	$ 8,000
8	Annual O&M & PCMP Monitoring	YR	3	$ 60,000	$ 180,000
TOTAL					**$ 682,000**

Note: Planning level costs. Further evaluation or design will be required to refine costs.

Preliminary Cost Estimate - Offsite Area Remediation
International Paper - Longview, Washington
In-situ Thermal Treatment

Task Number	Task	Unit	Quantity	Unit Cost	Total Cost
1	Construction Management	-----	-----	4.9%	$ 72,000
2	Engineering Support	-----	-----	3.9%	$ 58,000
3	Mobilization/Demobilization	-----	-----	6.6%	$ 96,500
4	In-Situ Thermal Treatment (six-phase heating)	CY	9650	$ 100.00	$ 965,000
5	Repaving (3" Lift)	SF	2000	$ 2.50	$ 5,000
6	Install 4 Downgradient PCMP Nested Wells	EA	4	$ 24,000	$ 96,000
7	Annual O&M & PCMP Monitoring	YR	3	$ 60,000	$ 180,000
TOTAL					**$ 1,473,000**

Note: Planning level costs. Further evaluation or design will be required to refine costs.

Preliminary Cost Estimate - Offsite Area Remediation

International Paper - Longview, Washington

Passive Venting

Task Number	Task	Unit	Quantity	Unit Cost	Total Cost
1	Construction Management	-----	-----	-----	$ 5,000
2	Engineering Support	-----	-----	-----	$ 5,000
3	Mobilization/Demobilization	-----	-----	-----	$ 5,000
4	Sparge Well Installation	EA	0	$ 2,000	$ -
5	Bioventing Well Installation	EA	12	$ 3,000	$ 36,000
6	Trenching, Pipe Installation, Backfill, and Compact	FT	0	$ 50	$ -
7	Air Sparge System Installation	EA	0	$ 1.00	$ -
8	Repaving (3" Lift)	SF	450	$ 2.50	$ 1,100
9	Install 4 Downgradient PCMP Nested Wells	YR	4	$ 24,000	$ 96,000
10	ORC Injection	EA	0	$ 16,000	$ -
11	Annual O&M & PCMP Monitoring	YR	3	$ 70,000	$ 210,000
TOTAL					**$ 358,000**

Note: Planning level costs. Further evaluation or design will be required to refine costs.

Preliminary Cost Estimate - Offsite Area Remediation
International Paper - Longview, Washington
Active Venting

Task Number	Task	Unit	Quantity	Unit Cost	Total Cost
1	Construction Management	-----	-----	-----	$ 5,000
2	Engineering Support	-----	-----	-----	$ 5,000
3	Mobilization/Demobilization	-----	-----	-----	$ 5,000
4	Sparge Well Installation	EA	0	$ 2,000	$ -
5	Bioventing Well Installation	EA	12	$ 3,000	$ 36,000
6	Trenching, Pipe Installation, Backfill, and Compact	FT	150	$ 50	$ 7,500
7	Air Sparge System Installation	EA	20,000	$ 1.00	$ 20,000
8	Repaving (3" Lift)	SF	450	$ 2.50	$ 1,100
9	Install 4 Downgradient PCMP Nested Wells	YR	4	$ 24,000	$ 96,000
10	Annual O&M & PCMP Monitoring	YR	3	$ 70,000	$ 210,000
TOTAL					**$ 386,000**

Note: Planning level costs. Further evaluation or design will be required to refine costs.

Preliminary Cost Estimate - Offsite Remediation

International Paper - Longview, Washington

Passive Venting ORC Injection

Task Number	Task	Unit	Quantity	Unit Cost	Total Cost
1	Construction Management	-----	-----	-----	$ 10,000
2	Engineering Support	-----	-----	-----	$ 10,000
3	Mobilization/Demobilization	-----	-----	-----	$ 5,000
4	Sparge Well Installation	EA	0	$ 2,000	$ -
5	Bioventing Well Installation	EA	12	$ 3,000	$ 36,000
6	Trenching, Pipe Installation, Backfill, and Compact	FT	0	$ 50	$ -
7	Air Sparge System Installation	EA	0	$ 1.00	$ -
8	Repaving (3" Lift)	SF	450	$ 2.50	$ 1,100
9	Install 4 Downgradient PCMP Nested Wells	YR	4	$ 24,000	$ 96,000
10	ORC Injection	EA	4	$ 16,000	$ 64,000
11	Annual O&M & PCMP Monitoring	YR	3	$ 75,000	$ 225,000
TOTAL					**$ 447,000**

Note: Planning level costs. Further evaluation or design will be required to refine costs.

Preliminary Cost Esimate - Offsite Area Remediation
International Paper - Longview, Washington
Biosparge - Horizontal

Task Number	Task	Unit	Quantity	Unit Cost	Total Cost
1	Construction Management	-----	-----	6%	$ 30,000
2	Engineering Support	-----	-----	7%	$ 35,000
3	Mobilization/Demobilization	-----	-----	6.1%	$ 30,000
4	Horizontal Sparge Well Installation (700')	EA	700	$ 65.00	$ 45,500
5	Bioventing Well Installation	EA	4	$ 2,000.00	$ 8,000
6	Air Sparge System Installation	EA	30000	$ 1.00	$ 30,000
7	Trenching, Pipe Installation, Backfill, and Compact	FT	150	$ 50.00	$ 7,500
8	Repaving (3" Lift)	SF	450	$ 2.50	$ 1,100
9	Install 4 Downgradient PCMP Nested Wells	EA	4	$ 20,000	$ 80,000
10	Annual O&M & PCMP Monitoring	YR	3	$ 75,000	$ 225,000
TOTAL					**$ 492,000**

Note: Planning level costs. Further evaluation or design will be required to refine costs.