FINAL REPORT

INVESTIGATION OF AREAS OF SOIL IMPACT OUTSIDE THE CONTAINMENT AREA

Prepared for

INTERNATIONAL PAPER

Longview, Washington

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This report, prepared for International Paper Company by URS Greiner Woodward Clyde, presents the results of the perimeter soil boring program at the International Paper Longview site. The program was designed to investigate several areas of potential impact that were identified during construction activities at the site. This investigation focused on three areas:

- Area 1: The west side of the barrier wall
- Area 2: The southwest corner of the barrier wall near where the 24-inch diameter fire control line was encountered
- Area 3: The south side of the barrier wall near the former location of well PW-3

A series of shallow borings were drilled and sampled to evaluate impacts, if any, on the soils in each of these three areas. Impacts to soils were evaluated using field measurements (photoionization/flame ionization detector, headspace readings), immunoassay field test kits for polynuclear aromatic hydrocarbons (PAHs), and laboratory confirmation analyses. Soil samples were also collected and analyzed from the Performance and Compliance Monitoring Plan (PCMP) well installation program, which was conducted concurrently with the perimeter boring investigation.

The results of the perimeter boring investigation indicate that the area along the west side of the barrier wall has been impacted with total petroleum hydrocarbons (TPH). The impacts may extend across the roadway to the Port of Longview maintenance facility.

In Area 1, benzo(a)anthracene and chrysene were detected above the Model Toxics Control Act (MTCA) Method C criteria in one boring located adjacent to the culvert along the west side of the barrier wall. Near this same area a TPH concentration greater than the MTCA regulatory criterion was detected in a soil sample collected from beneath the Upper Silt in boring 97-6.B.

In Area 2, the 24-inch diameter fire control line, formerly thought to have run parallel with the perimeter ditch on International Paper property, was located using an underground utility contractor. The line was found to continue across the roadway to the west and under the Port of Longview maintenance facility and then turn to the north and continue up to Panel Way.

No evidence of impact to the area surrounding the 24-inch diameter fire control line was found. Therefore, removal of the fire control line is not considered to be necessary.

In Area 3, no evidence of impact to the south side of the barrier wall, near the former well PW-3, was found.

This report presents the results from the perimeter boring investigation area at the International Paper facility in Longview, Washington. The investigation was intended to provide data for evaluating potential soil impacts to areas outside of the containment area at the former treated wood products (TWP) area.

1.1 PROJECT BACKGROUND

A vertical subsurface barrier wall was constructed in 1998 in the northern portion of the former TWP area to isolate the impacted soil and groundwater by providing a low permeability barrier encircling the impacted soil. A low permeability engineered cover was constructed over the area bounded by the soil-bentonite barrier wall to minimize infiltration within the barrier wall. In addition, a bioventing/biosparging system, consisting of bioventing wells screened in the upper sand and biosparging/venting wells screened in the upper portion of Aquifer A, was constructed within the area bounded by the barrier wall. Operation of these systems are intended to mitigate chemicals of concern (COCs) in groundwater.

Visually impacted soils were encountered outside the barrier wall alignment during construction activities in the fall of 1997. The Washington State Department of Ecology (Ecology) identified four areas of concern in a November 7, 1997 letter to International Paper. International Paper responded in a letter to Ecology dated November 13, 1997 that, based on conditions observed in the field by both the construction team and Ecology personnel, the areas of potential concern should be considered to be three areas. The fourth area was likely related to carry-over during wall construction.

The objective of this investigation was to evaluate the areas of potential impact identified during construction using the procedures identified in the Cleanup Action Plan (CAP) (Woodward-Clyde 1997a) and the Performance and Compliance Monitoring Plan (PCMP) (Woodward-Clyde 1997b), and to address Ecology concerns for the following three areas:

- Area 1: the west side of the barrier wall
- Area 2: the southwest corner of the barrier wall, near the location that the 24-inch diameter fire control line was encountered
- Area 3: the south side of the barrier wall, near the former location of well PW-3

The location of each of these areas of potential impact was documented during construction activities and the locations were surveyed for future investigation.

1.2 PROJECT APPROACH

To meet the project objective, the approach for evaluation of the three areas included drilling shallow exploratory soil borings, collecting and logging continuous soil samples, and performing field sample analysis and laboratory confirmation analysis.

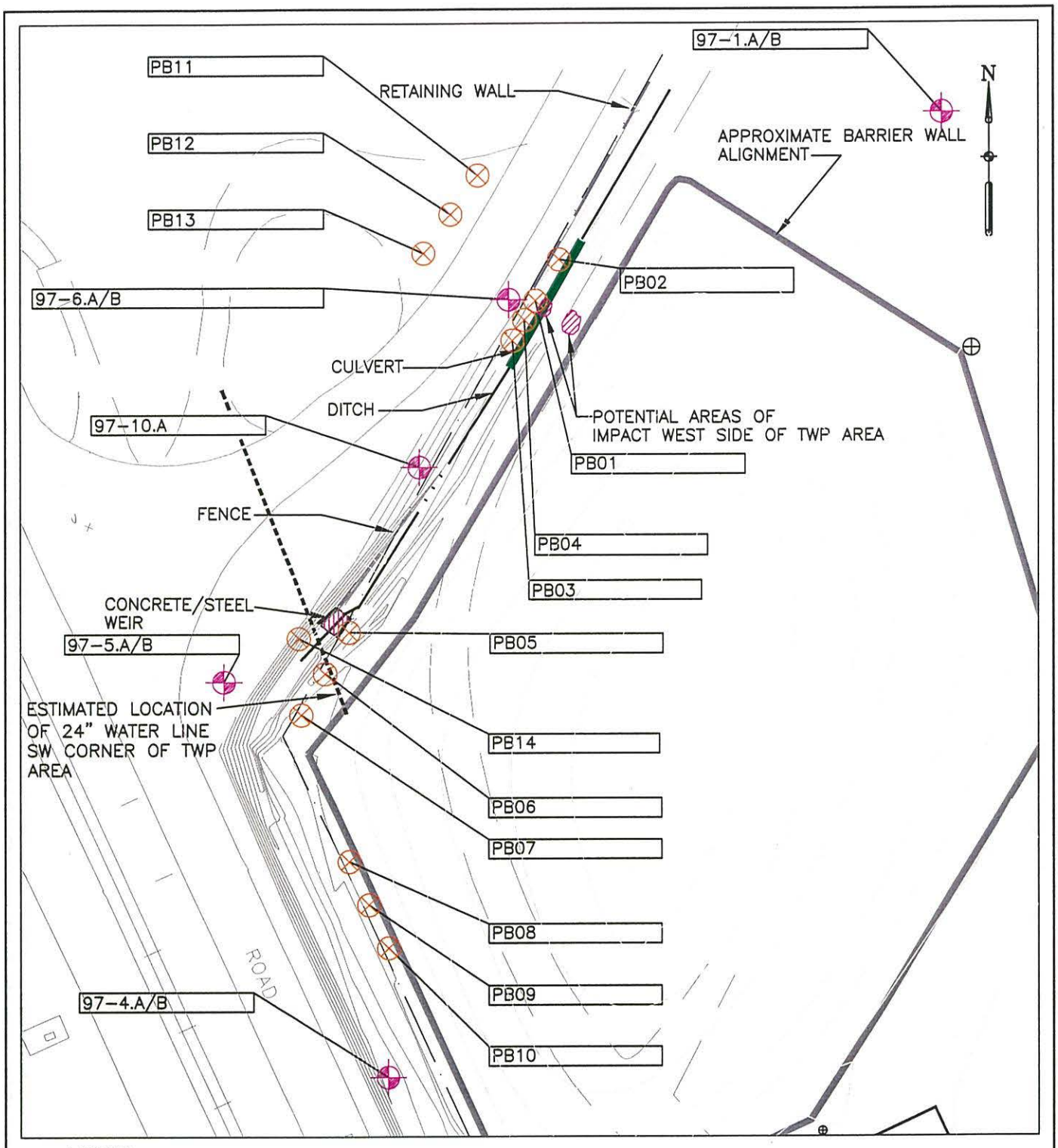
As specified in the CAP, the cleanup goals for soils outside the point of compliance (which is defined as the property boundary along the west and south portions of the barrier wall) are the Model Toxics Control Act (MTCA) Method C industrial soil cleanup levels (Ecology 1996). Therefore, the MTCA Method C industrial soil cleanup values were used as screening values to

evaluate the nature and extent of soil impacts based on the results of this investigation. In accordance with Washington Administrative Code (WAC) 173-340-745(4)(a)(ii), potential impacts to groundwater will be evaluated using data obtained from the PCMP monitoring wells.

1.3 SITE DESCRIPTION

The 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. The facility is located less than two 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 facility area is relatively level and ranges in elevation from 10 to 15 feet above mean sea level (msl) (USGS 1953).

The former TWP area consists of approximately 4 acres and is located in the southwestern portion of the facility. Due to recent property transactions, it is bordered on all sides by Port of Longview property. The Columbia River is located approximately 300 feet southwest of the southwest corner of the former TWP area. The site history and a summary of past activities of environmental concern are provided in the CAP (Woodward-Clyde 1997a).



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International Paper Longview, Washington	Project No. 91C0796B	Perimeter Boring Site Plan	Figure 1-1
Woodward-Clyde			

The perimeter boring investigation was conducted concurrently with the installation of the bioventing/air sparging system and the remaining PCMP wells. The drilling activities occurred between July 14 and 21, 1998.

2.1 SOIL BORINGS

URS Greiner Woodward Clyde personnel supervised the drilling of 14 shallow soil borings, including nine initial borings and five contingency borings. The contingency borings were drilled based on the findings of the field testing results and on discussions in the field with Ecology. All work was conducted according to the Work Plan for Investigation of Areas of Soil Impact Outside the Containment Area (Woodward-Clyde 1998).

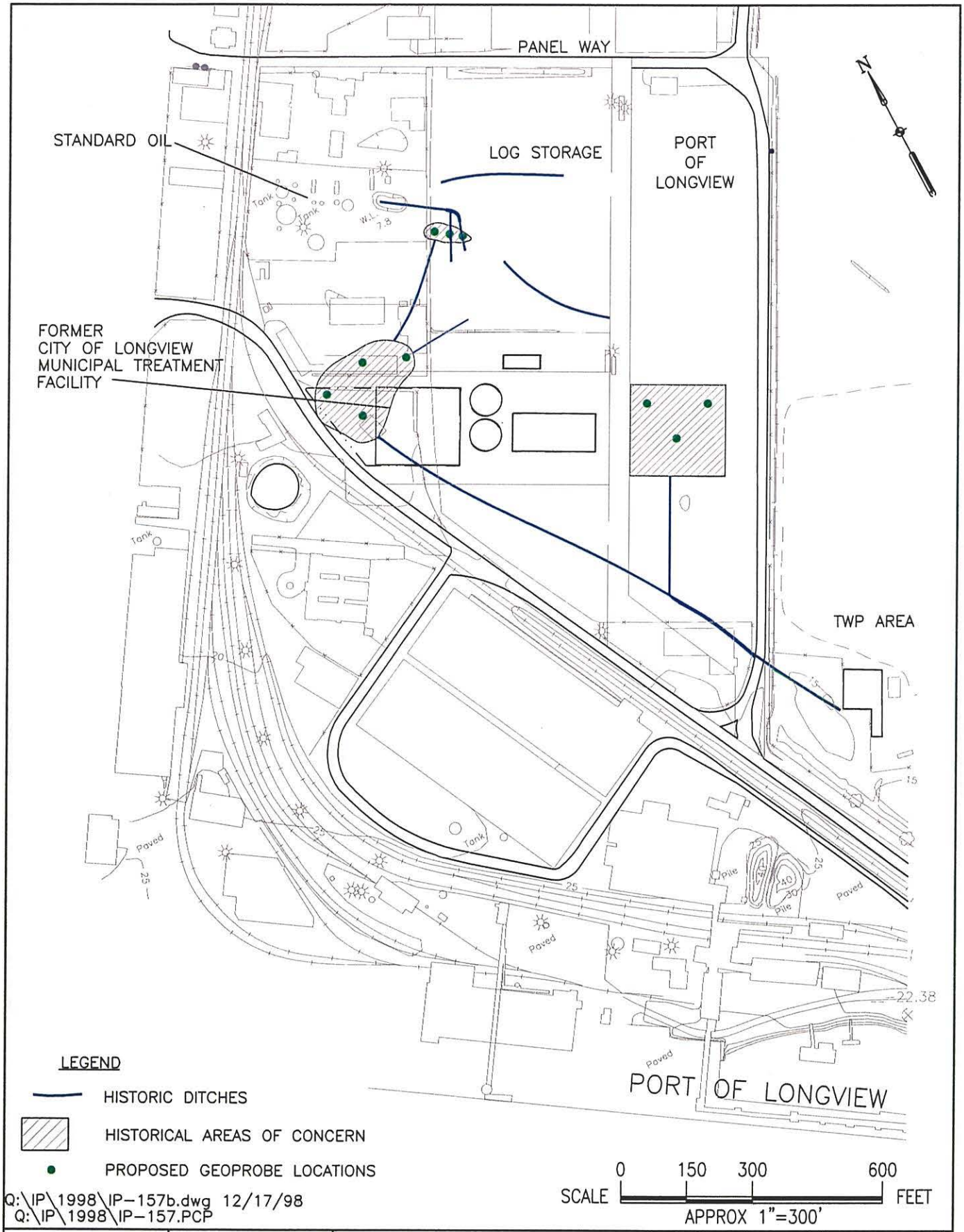
The 14 borings were concentrated in the three areas previously described. Cascade Drilling Inc. of Woodinville Washington supplied a track-mounted CME 75 drill rig equipped with 4.25-inch inner diameter hollow stem augers. Soil samples were collected continuously with an 18-inch standard split-spoon sampler. The borings were advanced to either the shallow water table or to the top of the Upper Silt. The total depths drilled ranged from 6 feet below ground surface (bgs) to 10.5 feet bgs.

All soils generated during the drilling activities were contained and placed within the containment area. The boreholes were grouted to surface with a cement-bentonite mixture in accordance with the requirements of WAC 173-160-560.

2.2 SOIL SAMPLING

Soil samples were logged by a qualified staff geologist. Soil descriptions, conditions, presence or absence of odors, and evidence of contamination were collected in a field log and summarized in boring logs. The boring logs are included in Appendix A. All samples were also screened for headspace in the field with a portable Foxboro TVA 1000 flame ionization/photoionization detector (FID/PID). These values were recorded in the field notebook and are presented in Appendix B.

Three to four samples from each location were field tested for polynuclear aromatic hydrocarbons (PAHs) using immunoassay techniques. Based on the results of this field screening, the most impacted soil sample from each boring was selected for laboratory confirmation analysis.



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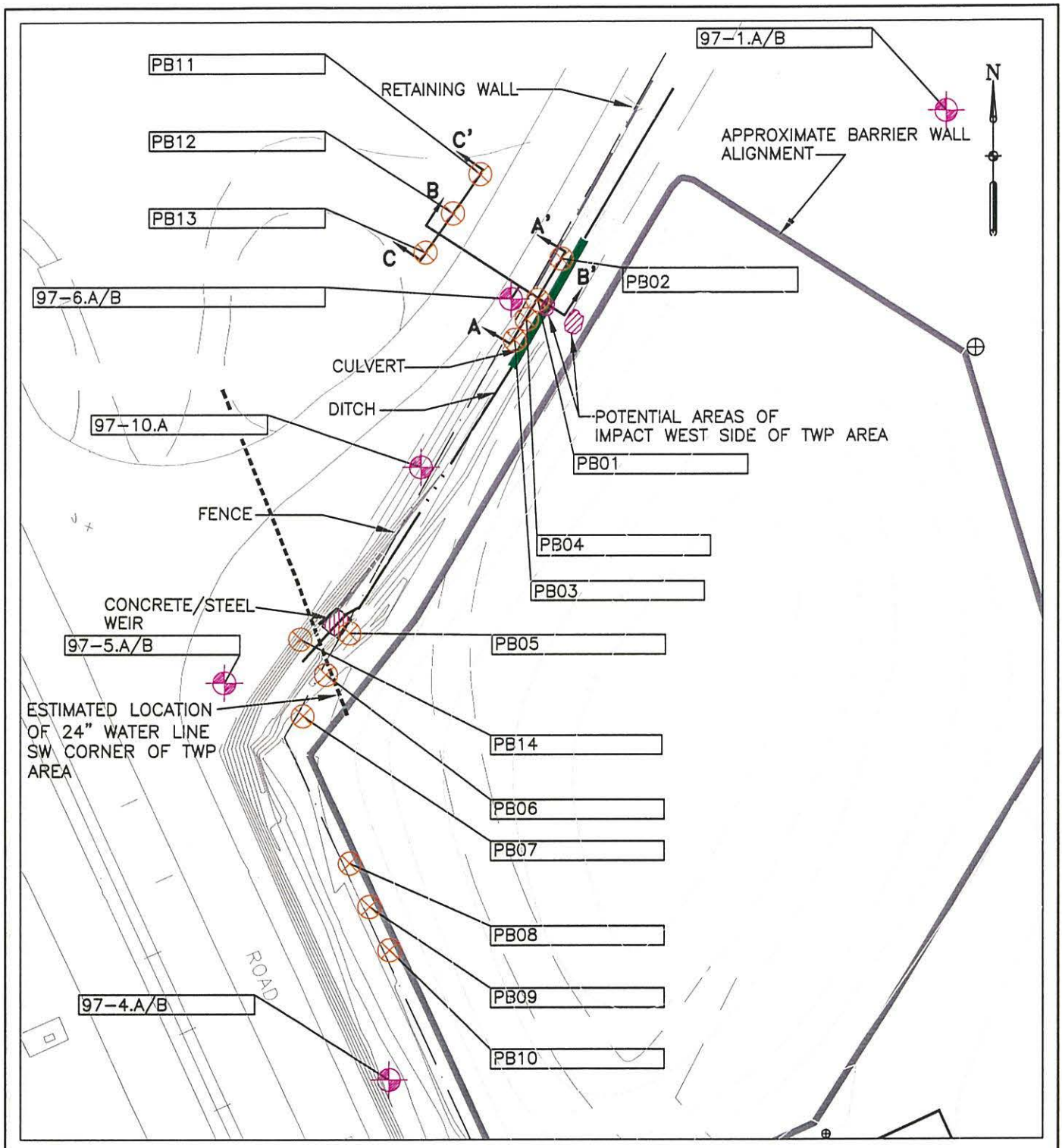
International Paper Longview, Washington	Project No. 91C0796B	Proposed Geoprobe Locations Off Site Investigation	Figure 2-1
Woodward-Clyde			

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 Sand ranges from 3 to 7 feet in the former TWP 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.
- **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 separated 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 elevations of 20 to 30 feet below msl, and ranges 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 on-site boring, and serves as a locally extensive aquitard. The depth to this unit ranges from 77 to 103 feet bgs.

The borings drilled during this investigation, which were advanced to a maximum depth of 10.5 feet bgs, encountered the Upper Sand and the top of the Upper Silt. A thin zone of perched groundwater was encountered coincident with the top of the Upper Silt. The geology observed in the field is described in the boring logs (Appendix A). Geologic cross sections for the areas in the vicinity of the west side of the barrier wall and the former TWP area are shown in Figures 3-1 through 3-4.



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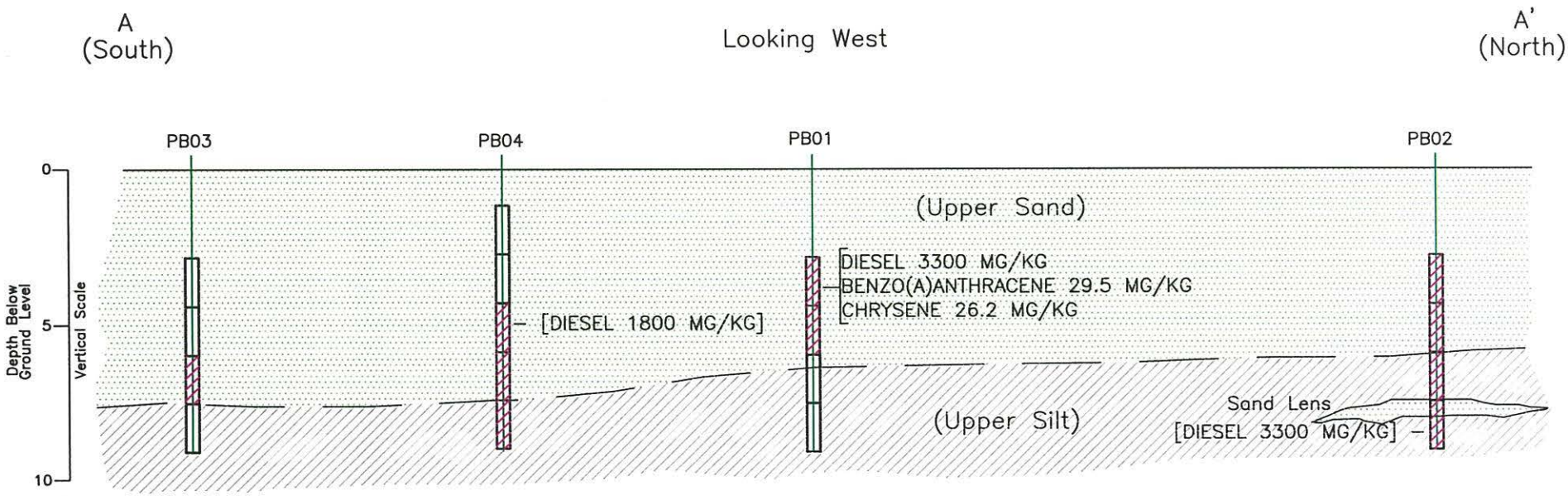
International Paper Longview, Washington	Project No. 91C0796B	Perimeter Boring Cross Section Locations	Figure 3-1
Woodward-Clyde			



LEGEND

▭	IMMUNO–ASSAY FIELD TEST KIT INDICATES NO EXCEEDANCE OF MTCA–LEVEL C PAH CRITERIA
▨	IMMUNO–ASSAY FIELD TEST KIT INDICATES EXCEEDANCE OF MTCA–LEVEL C PAH CRITERIA
[DIESEL 3300 MG/KG]	LABORATORY CONFIRMATION DATA IN BRACKETS
[<MTCA–C]	LABORATORY CONFIRMATION DATA LESS THAN MTCA–LEVEL C TPH AND PAH CRITERIA

SCALE 0 5 FEET
Horizontal Scale

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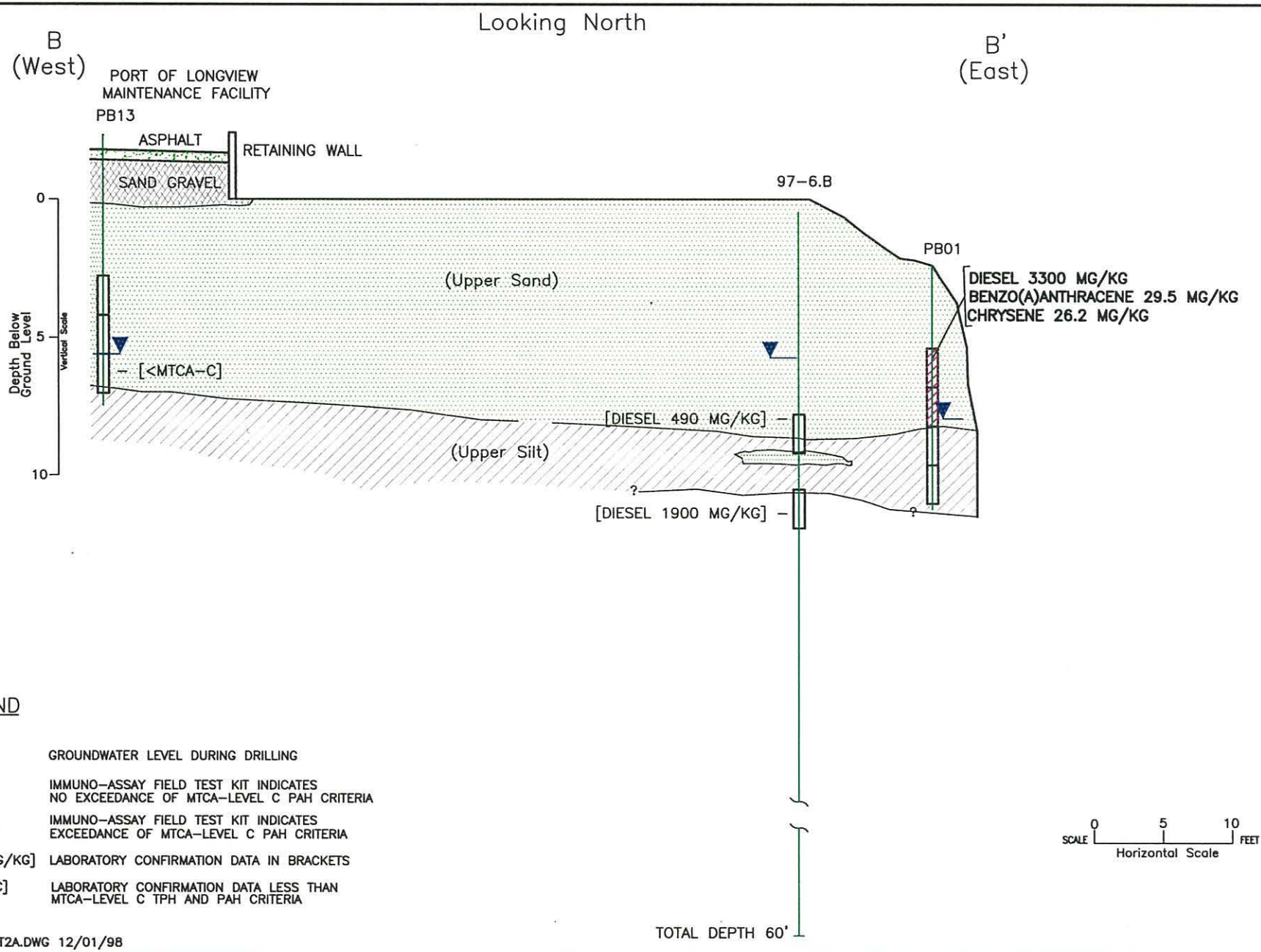
International Paper Longview, WA	Project No. 91C0796B	Perimeter Borings in Area of Historic Ditch	Figure 3–2
Woodward-Clyde			



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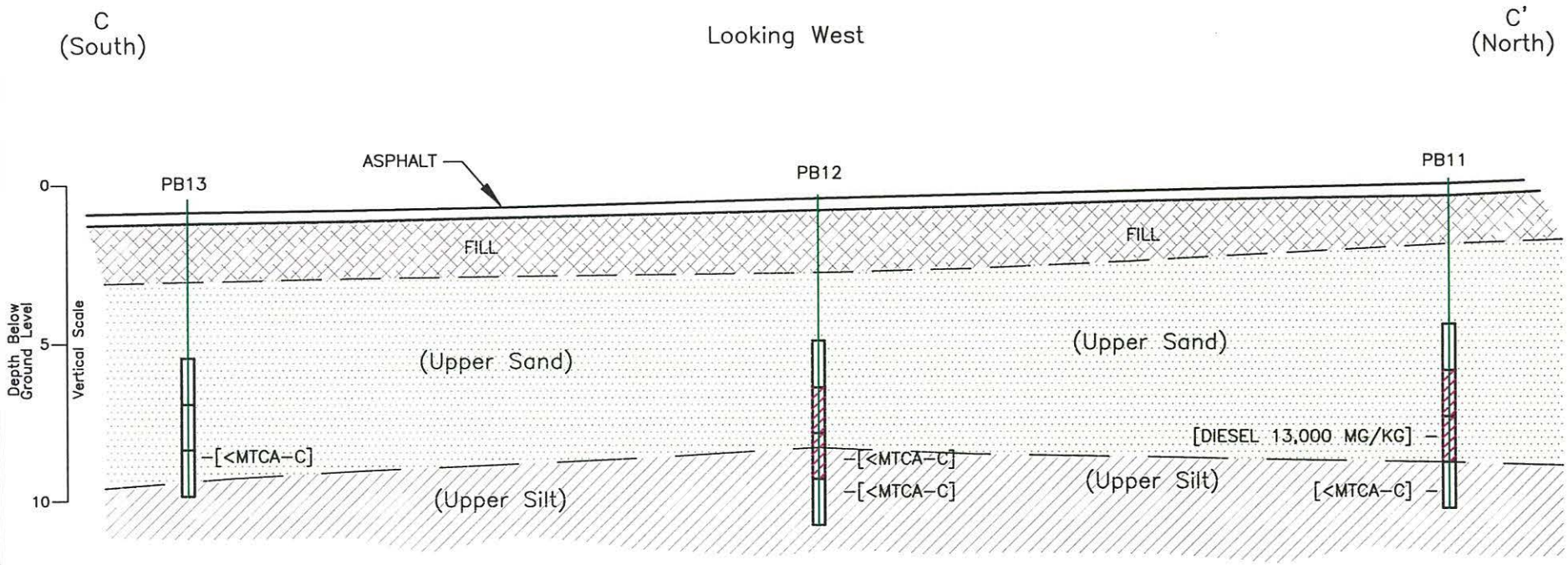
International Paper Longview, WA	Project No. 91C0796B
Woodward-Clyde	

Perimeter Borings Along Historic Ditch Lineation

Figure 3-3



LEGEND

▭	IMMUNO-ASSAY FIELD TEST KIT INDICATES NO EXCEEDANCE OF MTCA-LEVEL C PAH CRITERIA
▨	IMMUNO-ASSAY FIELD TEST KIT INDICATES EXCEEDANCE OF MTCA-LEVEL C PAH CRITERIA
[DIESEL 3300 MG/KG]	LABORATORY CONFIRMATION DATA IN BRACKETS
[<MTCA-C]	LABORATORY CONFIRMATION DATA LESS THAN MTCA-LEVEL C TPH AND PAH CRITERIA

SCALE 0 5 FEET
Horizontal Scale

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International Paper Longview, WA	Project No. 91C0796B	Perimeter Borings in Area of Historic Ditch
Woodward-Clyde		Figure 3-4

The installation of the remaining PCMP monitoring wells was conducted concurrently with the perimeter boring investigation. Seven borings were drilled and converted to groundwater monitoring wells for inclusion in the PCMP monitoring network. Soil samples were collected from each of the borings and submitted for laboratory analysis. The results of the analytical testing conducted on the PCMP well soil samples are included in Table 4-1. Analytical results on groundwater samples collected from the wells will be reported in the quarterly PCMP groundwater monitoring reports.

4.1 FIELD MEASUREMENTS

All soil samples collected during the investigation were screened for headspace levels using a Foxboro FID/PID. The measurement results are included in Appendix B. All of the soil samples collected, with the exception of the samples from PB-14, were tested for PAHs in the field using immunoassay field test kits. The kits were designed to report concentrations below 1 part per million (ppm), between 1 ppm and 10 ppm, and greater than 10 ppm. The results from these test kits were used to select samples for confirmation laboratory analysis. The results are provided in Table 4-2.

Samples exhibiting concentrations greater than 10 ppm PAHs, indicative of concentrations exceeding MTCA Method C industrial soil cleanup levels for PAHs, were noted in 8 of the 14 borings (PB-01, PB-02, PB-03, PB-04, PB-05, PB-07, PB-11, and PB-12). These exceedances are shown on Figure 4-1.

Based on these results, several contingency borings were advanced, including one additional boring near the culvert along the west side of the barrier wall (PB-04), three additional borings on the Port of Longview maintenance facility further to the west (PB-11, PB-12, and PB-13), and one on the Port of Longview property along the inferred lineation of a former 24-inch fire control line (PB-14). This line, formerly thought to run parallel with the perimeter ditch, was located using a utility locating contractor. The line was found to cross over to the Port of Longview maintenance facility and then turn towards the north and continue to Panel Way, as shown on Figure 4-1. A second contingency boring was attempted further to north of PB-01; however, access was limited and this boring was not completed.

4.2 LABORATORY ANALYTICAL RESULTS

The sample from each boring exhibiting the highest reading from the field testing were submitted to Oregon Analytical Laboratories Inc. (OAL) of Beaverton, Oregon for confirmation analysis of TPH, PAHs, and pentachlorophenol. Table 4-3 lists the analytical methods, sample containers, preservation requirements, and holding times. The results of the analyses are summarized on Table 4-4, and the exceedances of the MTCA level C criteria are shown on Figure 4-2.

Exceedances of the MTCA criterion for TPH as diesel (TPH-D) were noted in samples collected from PB-01, PB-02, PB-04, PB-11, and two depths from 97-6.B. Benzo(a)anthracene and chrysene were also detected at levels above the MTCA Level C criterion from PB-01.

The quality assurance/quality control (QA/QC) review and laboratory data sheets are provided in Appendix C.

Table 4-1

SOIL ANALYTICAL RESULTS
PCMP WELL INSTALLATION

Sample ID		IP-97-1.A		IP-97-2.A		IP-97-3.A		97-4.B	
Depth (ft)		5	9	4.5	9	5	11	6-7.5	9-10.5
Sample Date	MTCA C[a]	11/7/97	11/7/97	11/10/97	11/10/97	11/11/97	11/11/97	7/20/98	7/20/98
TPH (mg/kg)									
diesel range	200	--	--	--	--	--	--	25 U	25 U
oil range	200	--	--	--	--	--	--	50 U	50 U
Semivolatiles (mg/kg)									
naphthalene	140000	0.007	0.005 U	0.006	0.005 U	0.005	0.005 U	0.900	0.010 U
acenaphthylene	--	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.100 U	0.010 U
acenapthene	210000	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.100 U	0.010 U
fluorene	140000	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.100 U	0.010 U
phenanthrene	--	0.005 U	0.005 U	0.014	0.005 U	0.056	0.010 U	0.100 U	0.010 U
anthracene	1,050,000	0.250 U	0.250 U	0.005 U	0.005 U	0.005 U	0.005 U	0.100 U	0.010 U
fluoranthene	140000	0.050 U	0.050 U	0.014	0.010 U	0.076	0.010 U	0.100 U	0.010 U
pyrene	105000	0.010 U	0.010 U	0.014	0.010 U	0.058	0.010 U	0.100 U	0.010 U
benzo(a)anthracene	18	0.005 U	0.005 U	0.010 U	0.010 U	0.018	0.010 U	0.100 U	0.010 U
chrysene	18	0.050 U	0.050 U	0.010 U	0.010 U	0.029	0.010 U	0.100 U	0.010 U
benzo(b)fluoranthene	18	0.200 U	0.200 U	0.010 U	0.010 U	0.024	0.010 U	0.100 U	0.010 U
benzo(k)fluoranthene	18	0.030 U	0.030 U	0.010 U	0.010 U	0.010 U	0.010 U	0.100 U	0.010 U
benzo(a)pyrene	18	0.040 U	0.040 U	0.010 U	0.010 U	0.014	0.010 U	0.100 U	0.010 U
indeno(1,2,3-cd)pyrene	18	0.005 U	0.005 U	0.005 U	0.005 U	0.008	0.005 U	0.100 U	0.010 U
dibenz(a,h)anthracene	18	0.010 U	0.010 U	0.005 U	0.005 U	0.005 U	0.005 U	0.100 U	0.010 U
benzo(g,h,i)perylene	--	0.010 U	0.010 U	0.005 U	0.005 U	0.012	0.005 U	0.100 U	0.010 U
pentachlorophenol	1090	0.010 U	0.010 U	0.300 U	0.010 U	0.300 U	0.300 U	1.00 U	0.100 U

Notes:

Bold and underlined results are greater than MTCA C industrial.

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.

a. Cleanup goals and trigger levels are calculated based on provisional oral RfDs cited in EPA Region III RBC table, and MTCA C formulas (WAC-173-340-720); except for TPH, which uses the MTCA Method A values.

b. Practical Quantitation Limit for carcinogenic PAHs is 0.005

c. 100 X Federal MCL

Table 4-1

SOIL ANALYTICAL RESULTS
PCMP WELL INSTALLATION

Sample ID		97-5.A		97-6.B		IP-97-8.A		IP-97-9.A		97-10.A	
Depth (ft)		9.5-11	12.5-14	7.5-9	10.5-12	4.5	9	4.5	11	9.5-11	11-12.5
Sample Date	MTCA C[a]	7/21/98	7/21/98	7/23/98	7/23/98	11/10/97	11/10/97	11/11/97	11/11/97	7/22/98	7/22/98
TPH (mg/kg)											
diesel range	200	25 U	25 U	**490**	**1900**	--	--	--	--	25 U	25 U
oil range	200	50 U	50 U	50 U	500 U	--	--	--	--	50 U	50 U
Semivolatiles (mg/kg)											
naphthalene	140000	0.010 U	0.010 U	187	245	0.005 U	0.005 U	0.199	3.30	0.010 U	0.010 U
acenaphthylene	--	0.010 U	0.010 U	1.00 U	1.00 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
acenapthene	210000	0.010 U	0.010 U	4.29	55.5	0.010 U	0.010 U	0.053	0.213	0.010 U	0.010 U
fluorene	140000	0.010 U	0.010 U	3.84	53.8	0.010 U	0.010 U	0.039	0.101	0.010 U	0.010 U
phenanthrene	--	0.010 U	0.010 U	12.7	141	0.010 U	0.010 U	0.048	0.054	0.010 U	0.010 U
anthracene	1,050,000	0.010 U	0.010 U	1.42	53.6	0.005 U	0.005 U	0.061	0.011	0.010 U	0.010 U
fluoranthene	140000	0.010 U	0.014	4.74	47.5	0.010 U	0.010 U	0.047	0.016	0.010 U	0.010 U
pyrene	105000	0.010 U	0.015	3.27	31.8	0.010	0.010 U	0.045	0.011	0.010 U	0.010 U
benzo(a)anthracene	18	0.010 U	0.011	1.00 U	7.90	0.010 U	0.010 U	0.044	0.010 U	0.010 U	0.010 U
chrysene	18	0.010 U	0.013	1.00 U	7.32	0.010 U	0.010 U	0.074	0.010 U	0.010 U	0.010 U
benzo(b)fluoranthene	18	0.010 U	0.021	1.00 U	3.95	0.010 U	0.010 U	0.086	0.010 U	0.010 U	0.010 U
benzo(k)fluoranthene	18	0.010 U	0.010 U	1.00 U	1.32	0.010 U	0.010 U	0.022	0.010 U	0.010 U	0.010 U
benzo(a)pyrene	18	0.010 U	0.015	1.00 U	2.21	0.010 U	0.010 U	0.027	0.010 U	0.010 U	0.010 U
indeno(1,2,3-cd)pyrene	18	0.010 U	0.010 U	1.00 U	1.00 U	0.011	0.005 U	0.021	0.005 U	0.010 U	0.010 U
dibenz(a,h)anthracene	18	0.010 U	0.010 U	1.00 U	1.00 U	0.005 U	0.005 U	0.007	0.005 U	0.010 U	0.010 U
benzo(g,h,i)perylene	--	0.010 U	0.013	1.00 U	1.00 U	0.015	0.005 U	0.015	0.005 U	0.010 U	0.010 U
pentachlorophenol	1090	0.100 U	0.100 U	10.0 U	10.0 U	0.300 U	0.300 U	0.300 U	0.300 U	0.100 U	0.100 U

Notes:

Bold and underlined results are greater than MTCA C industrial.

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.

a. Cleanup goals and trigger levels are calculated based on provisional oral RfDs cited in EPA Region III RBC table, and MTCA C formulas (WAC-173-340-720); except for TPH, which uses the MTCA Method A values.

b. Practical Quantitation Limit for carcinogenic PAHs is 0.005

c. 100 X Federal MCL

Table 4-2

PAH FIELD SCREENING RESULTS FOR PERIMETER BORINGS

SAMPLE ID	1 ppm	10 ppm
PB01 - 3-4.5	**> 1**	**> 10**
PB01 - 4.5-6	**> 1**	**> 10**
PB01 - 6-7.5	**> 1**	< 10
PB01 - 7.5-9	**> 1**	< 10
PB02 - 3-4.5	**> 1**	**> 10**
PB02 - 4.5-6	**> 1**	**> 10**
PB02 - 6-7.5	**> 1**	**> 10**
PB02 - 7.5-9	**> 1**	**> 10**
PB03 - 3-4.5	**> 1**	< 10
PB03 - 4.5-6	**> 1**	< 10
PB03 - 6-7.5	**> 1**	**> 10**
PB03 - 7.5-9	**> 1**	< 10
PB04 - 1.5-3	**> 1**	< 10
PB04 - 4.5-6	**> 1**	**> 10**
PB04 - 6-7.5	**> 1**	**> 10**
PB04 - 7.5-9	**> 1**	**> 10**
PB05 - 1.5-3	< 1	< 10
PB05 - 3-4.5	**> 1**	**> 10**
PB05 - 4.5-6	< 1	< 10
PB06 - 1.5-3	**> 1**	< 10
PB06 - 3-4.5	< 1	< 10
PB06 - 4.5-6	< 1	< 10
PB06 - 6-7.5	< 1	< 10
PB07 - 1.5-3	**> 1**	**> 10**
PB07 - 3-4.5	**> 1**	**> 10**
PB07 - 4.5-6	< 1	< 10
PB08 - 1.5-3	< 1	< 10
PB08 - 3-4.5	**> 1**	< 10
PB08 - 4.5-6	< 1	< 10
PB09 - 1.5-3	< 1	< 10
PB09 - 3-4.5	**> 1**	< 10
PB09 - 4.5-6	< 1	< 10
PB10 - 1.5-3	< 1	< 10
PB10 - 3-4.5	**> 1**	< 10
PB10 - 4.5-6	< 1	< 10
PB11 - 4.5-6	**> 1**	< 10
PB11 - 6-7.5	**> 1**	**> 10**
PB11 - 7.5-9	**> 1**	**> 10**
PB11 - 9-10.5	**> 1**	< 10
PB12 - 4.5-6	< 1	< 10
PB12 - 6-7.5	**> 1**	**> 10**
PB12 - 7.5-9	**> 1**	**> 10**
PB12 - 9-10.5	< 1	< 10
PB13 - 4.5-6	< 1	< 10
PB13 - 6-7.5	**> 1**	< 10
PB13 - 7.5-9	**> 1**	< 10

Table 4-3

SAMPLE CONTAINERS, PRESERVATION, AND HOLDING TIMES

PARAMETER	EPA METHOD NUMBER	METHOD REPORTING LIMIT	CONTAINER[a]	PRESERVATION	HOLDING TIME
Total petroleum hydrocarbons	418.1	25 mg/kg	1-8 oz CWM jar	cool to 4° C	14 days (analysis)
Polynuclear aromatic hydrocarbons and pentachlorophenol	8270 modified SIM	3 µg/kg[b]	1-8 oz CWM jar	cool to 4° C	14 days (extraction)

Notes:

a. Sample jars will be supplied by the analytical laboratory, which will maintain documentation regarding the manufacturer, grade, and lot number.
b. The Method Reporting Limit for pentachlorophenol is 10 µg/kg
CWM: clear wide mouth
EPA: Environmental Protection Agency
SIM: selected ion monitoring

Table 4-4

SOIL SAMPLE ANALYTICAL RESULTS
PERIMETER BORING INVESTIGATION

Location Depth (ft bgs) Date Sampled	MTCA C[a] Industiral	98-PB01 3-4.5 14-Jul-98	98-PB02 7.5-9 15-Jul-98	98-PB03 6-7.5 15-Jul-98	98-PB04 4.5-6 15-Jul-98	98-PB05 3-4.5 16-Jul-98	98-PB06 1.5-3 16-Jul-98	98-PB07 3-4.5 16-Jul-98	98-PB08 3-4.5 16-Jul-98
TPH (mg/kg)									
diesel range	200	**3300**	**3300**	42	**1800**	25 U	54	74	25 U
oil range	200	50 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U
Semivolatiles (mg/kg)									
naphthalene	140000	532	137	1.16	245	0.042	0.046	12.3	0.024
acenaphthylene	--	3.25	1.00 U	0.100 U	1.00 U	0.010 U	0.021	0.022	0.010 U
acenaphthene	210000	225	47.5	0.620	44.4	0.095	0.308	1.03	0.065
fluorene	140000	177	37.0	0.482	39.8	0.042	0.108	0.473	0.056
phenanthrene	--	465	94.1	1.15	133	0.016	0.060	0.219	0.010 U
anthracene	1,050,000	132	17.5	0.494	33.2	0.067	0.033	0.020	0.010 U
fluoranthene	140000	234	52.3	0.811	40.7	0.010 U	0.060	0.143	0.010 U
pyrene	105000	139	30.6	0.444	24.6	0.010 U	0.048	0.106	0.010 U
benzo(a)anthracene	18	**29.5**	8.05	0.121	6.24	0.010 U	0.025	0.033	0.010 U
chrysene	18	**26.2**	7.12	0.144	5.47	0.010 U	0.033	0.049	0.010 U
benzo(b)fluoranthene	18	11.9	3.51	0.100 U	2.89	0.010 U	0.041	0.029	0.010 U
benzo(k)fluoranthene	18	3.74	1.17	0.100 U	1.00 U	0.010 U	0.014	0.011	0.010 U
benzo(a)pyrene	18	6.82	1.93	0.100 U	1.67	0.010 U	0.024	0.015	0.010 U
indeno(1,2,3-cd)pyrene	18	1.53	1.00 U	0.100 U	1.00 U	0.010 U	0.016	0.010 U	0.010 U
dibenz(a,h)anthracene	18	1.00 U	1.00 U	0.100 U	1.00 U	0.010 U	0.010 U	0.010 U	0.010 U
benzo(g,h,i)perylene	--	1.54	1.00 U	0.100 U	1.00 U	0.010 U	0.019	0.010 U	0.010 U
pentachlorophenol	1090	10.0 U	10.0 U	1.00 U	10.0 U	0.100 U	0.100 U	0.100 U	0.100 U

Notes:

Bold and underlined results are greater than MTCA C industrial.

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.

a. Cleanup goals and trigger levels are calculated based on provisional oral RfDs cited in EPA Region III RBC table, and MTCA C formulas (WAC-173-340-720); except for TPH, which uses the MTCA Method A values.

b. Practical Quantitation Limit for carcinogenic PAHs is 0.005

c. 100 X Federal MCL

The total PAH numbers do not include non-detects.

Table 4-4

SOIL SAMPLE ANALYTICAL RESULTS
PERIMETER BORING INVESTIGATION

Location Depth (ft bgs) Date Sampled	MTCA C[a]	98-PB09 3-4.5 16-Jul-98	98-PB10 3-4.5 16-Jul-98	98-PB11 6-7.5 17-Jul-98	98-PB11 9-10.5 17-Jul-98	98-PB12 7.5-9 17-Jul-98	98-PB12 9-10.5 17-Jul-98	98-PB13 7.5-9 17-Jul-98	98-PB14 7.5-9 21-Jul-98
TPH (mg/kg)									
Diesel Range	200	25 U	25 U	**13000**	54	100	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
Semivolatiles (mg/kg)									
naphthalene	140000	0.041	0.171	4060	8.10	8.13	6.70	11.8	0.025
acenaphthylene	--	0.010 U	0.010 U	100 U	1.00 U	1.00 U	0.100 U	1.00 U	0.010 U
acenaphthene	210000	0.050	0.340	691	1.00 U	1.00 U	0.100 U	1.00 U	0.010 U
fluorene	140000	0.047	0.128	537	1.00 U	1.00 U	0.100 U	1.00 U	0.010 U
phenanthrene[d]	--	0.010 U	0.010 U	1360	1.00 U	1.00 U	0.100 U	1.00 U	0.010 U
anthracene	1,050,000	0.010 U	0.010 U	161	1.00 U	1.00 U	0.100 U	1.00 U	0.010 U
fluoranthene	140000	0.010 U	0.010 U	474	1.00 U	1.00 U	0.100 U	1.00 U	0.010 U
pyrene	105000	0.010 U	0.010 U	340	1.00 U	1.00 U	0.100 U	1.00 U	0.010 U
benzo(a)anthracene	18	0.010 U	0.010 U	100 U	1.00 U	1.00 U	0.100 U	1.00 U	0.010 U
chrysene	18	0.010 U	0.010 U	100 U	1.00 U	1.00 U	0.100 U	1.00 U	0.010 U
benzo(b)fluoranthene	18	0.010 U	0.010 U	100 U	1.00 U	1.00 U	0.100 U	1.00 U	0.010 U
benzo(k)fluoranthene	18	0.010 U	0.010 U	100 U	1.00 U	1.00 U	0.100 U	1.00 U	0.010 U
benzo(a)pyrene	18	0.010 U	0.010 U	100 U	1.00 U	1.00 U	0.100 U	1.00 U	0.010 U
indeno(1,2,3-cd)pyrene	18	0.010 U	0.010 U	100 U	1.00 U	1.00 U	0.100 U	1.00 U	0.010 U
dibenz(a,h)anthracene	18	0.010 U	0.010 U	100 U	1.00 U	1.00 U	0.100 U	1.00 U	0.010 U
benzo(g,h,i)perylene[d]	--	0.010 U	0.010 U	100 U	1.00 U	1.00 U	0.100 U	1.00 U	0.010 U
pentachlorophenol	1090	0.100 U	0.100 U	1000 U	10 U	10 U	1.00 U	10 U	0.100 U

Notes:

Bold and underlined results are greater than MTCA C industrial.

U: below the stated laboratory reporting limit

Samples were analyzed using the following methods: WTPH-D ext.; EPA Method 8270 SIM.

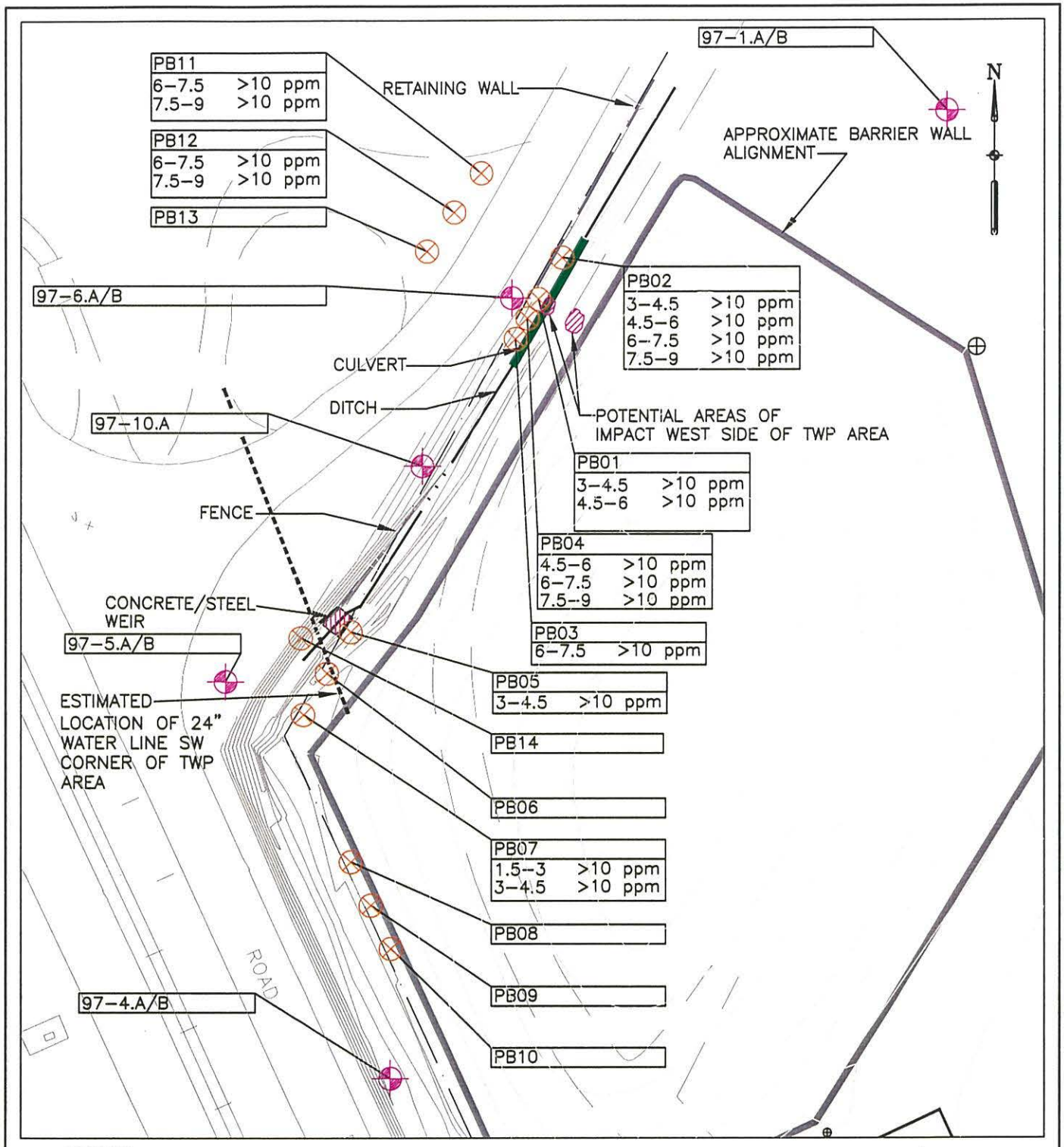
Pentachlorophenol is not a PAH. All carcinogenic PAHs have a MTCA Method C value of 18.

a. Cleanup goals and trigger levels are calculated based on provisional oral RfDs cited in EPA Region III RBC table, and MTCA C formulas (WAC-173-340-720); except for TPH, which uses the MTCA Method A values.

b. Practical Quantitation Limit for carcinogenic PAHs is 0.005

c. 100 X Federal MCL

The total PAH numbers do not include non-detects.



LEGEND

- PCMP WELLS
- BOREHOLE LOCATION

Note:

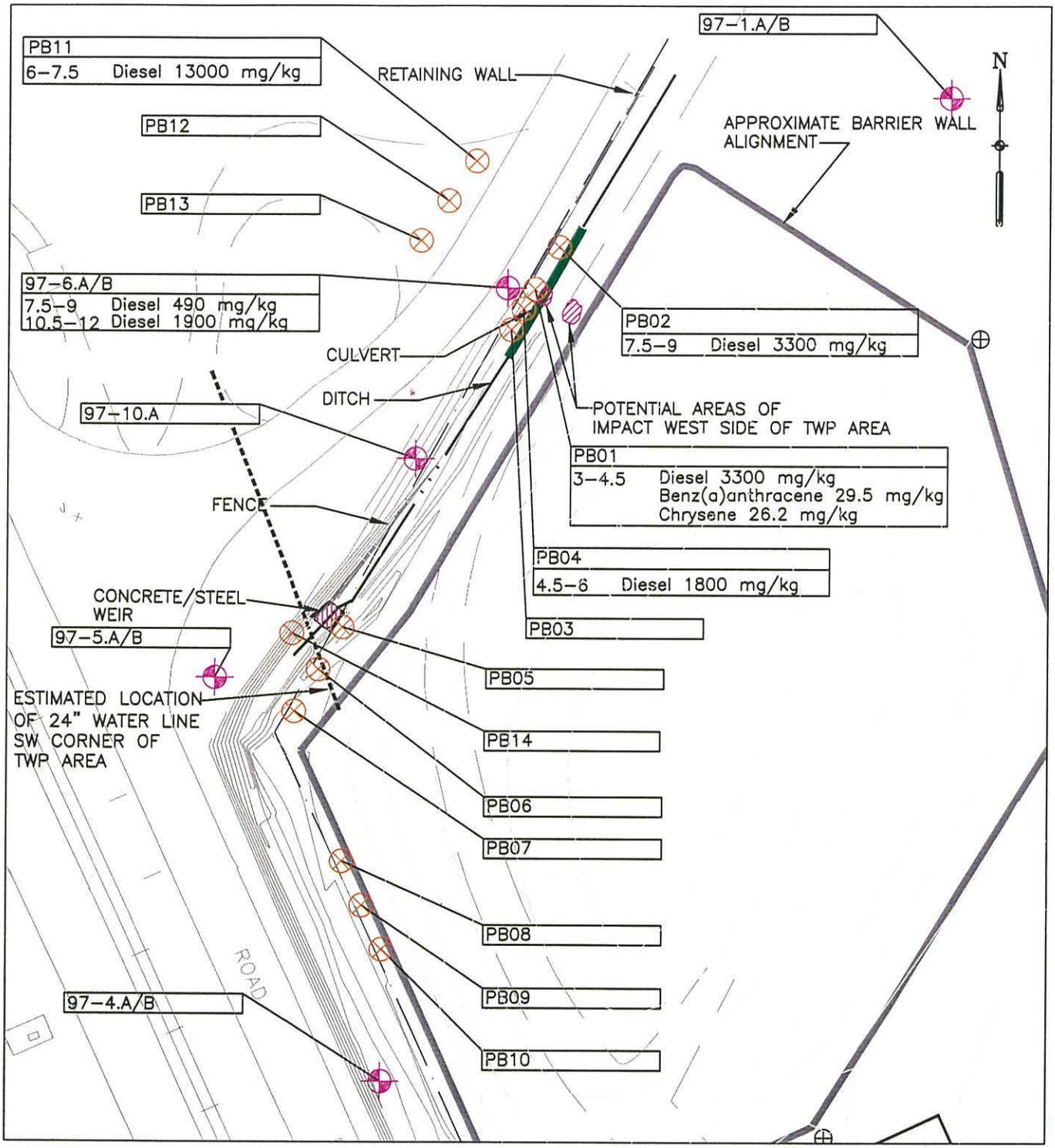
1) Soil sample depth and field test kit data mg/kg.
2) Field test kit concentrations of >10 ppm PAHS are inferred to exceed the MTCA Level C criterion.

SCALE 0 30 60 120 FEET

APPROX 1"=60'

Q:\IP\1998\IP-154a.DWG
FROM: IP\1997\BUILD-SE\AS-BUILT\IP97-AB6 12/17/98

International Paper Longview, Washington	Project No. 91C0796B	Perimeter Boring Field Screening Results	Figure 4-1
Woodward-Clyde			



LEGEND

PCMP WELLS

BOREHOLE LOCATION

Note:

1) Soil sample depth and laboratory data in mg/Kg
2) Only MTCA level C exceedances are shown

SCALE 0 30 60 120 FEET

APPROX 1"=60'

Q:\IP\1998\IP-155b.DWG
FROM: IP\1997\BUILD-SE\AS-BUILT\IP97-AB6 12/17/98

International Paper Longview, Washington	Project No. 91C0796B	Perimeter Boring Laboratory Data	Figure 4–2
Woodward-Clyde			

The results of the laboratory confirmation samples indicate that some soils on the west side of the barrier wall exceed applicable criteria. No exceedances of the MTCA regulatory criterion for TPH or MTCA level C criteria for PAHs or pentachlorophenol were noted along the south side of the barrier wall near the former location of PW-3, or in the vicinity of the 24-inch diameter fire control line.

In Area 1, benzo(a)anthracene and chrysene were detected above the Model Toxics Control Act (MTCA) Method C criteria in one boring located adjacent to the culvert along the west side of the barrier wall. Near this same area, a TPH concentration greater than the MTCA regulatory criterion was detected in a soil sample collected from beneath the Upper Silt in boring 97-6.B.

In Area 2, the 24-inch diameter fire control line, formerly thought to have run parallel with the perimeter ditch on International Paper property, was located using an underground utility contractor. The line was found to continue across the roadway to the west and under the Port of Longview maintenance facility and then turn to the north and continue up to Panel Way.

No evidence of impact to the area surrounding the 24-inch diameter fire control line was found. Therefore, removal of the fire control line is not considered to be necessary.

In Area 3, no evidence of impact to the south side of the barrier wall, near the former well PW-3, was found.

International Paper. 1997a. "Ecology Letter dated November 7, 1997 Regarding Emergency Stored Wastewater Removal and SWMUs and AOCs Requiring Further Action." Letter to Ecology. November 13.

———. 1997b. "Response to International Paper Letter dated November 13." Letter to International Paper. December 3.

United States Geological Survey (USGS). 1953. Rainier Quadrangle, Oregon-Washington. photo revised 1970.

Washington State Department of Ecology (Ecology). 1996. Model Toxics Control Act Cleanup Levels and Risk Calculations (CLARCII). Update.

Woodward-Clyde. 1997a. Cleanup Action Plan, Former Treated Wood Products Area, International Paper Facility. July.

———. 1997b. Performance and Compliance Monitoring Plan, Former Treated Wood Products Area, International Paper Facility. July.

———. 1998. Work Plan for Investigation of Areas of Soil Impact Outside the Containment Area, International Paper Facility. March.

Appendix A
Boring Logs

Project: International Paper
Project Location: Longview WA
Project Number: 91C0796B

Log of Boring PB-01

Sheet 1 of 1

Date(s) Drilled	7/14/1998 - 7/15/1998	Logged By	TMM	Checked By	RS
Drilling Method	Hollow Stem Auger	Drilling Contractor	Cascade Drilling, Inc	Total Depth Drilled (feet bgs)	9.0
Drill Rig Type	Trackmount CME75	Sampler Type	18" Split Spoon	Approximate Surface Elevation (feet msl)	
Groundwater Level		Hammer Weight and Drop	NA	Top of PVC Elevation	NA
Diameter of Hole (inches)	6	Diameter of Well (inches)	NA	Type of Well Casing	NA	Screen Perforation	NA
Type of Sand Pack	NA	Type and Depth of Seal(s)	Bentonite cement grout to surface		
Comments					

Elevation, feet	Depth, feet	SAMPLES Type	Number	Blows per 6-inch Interval	Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	FID Headspace (ppm)	FID Background (ppm)	Drilling Rate (Time, 24-hour clock)	REMARKS
	0				75		Reddish brown, moist, coarse sand and gravel (FILL)		18.43	1.75	1405	
					75				12.2	1.75	1410	
					75		Dark brown, moist, fine to medium SAND (SP-SM) with trace silt and gravel		1025	1.81	1415	
	5				75		Finer with depth		135	1.75	1420	
					90		Saturated		68.5	1.81	1425	Sheen
					90		Gray brown, uniform SILT (ML) with trace of wood and plastic				0815	7/15/98
	10						End of hole at 9'					
	15											
	20											
	25											
	30											

Project: International Paper
Project Location: Longview WA
Project Number: 91C0796B

Log of Boring PB-02

Sheet 1 of 1

Date(s) Drilled	7/15/1998	Logged By	TMM	Checked By	RS
Drilling Method	Hollow Stem Auger	Drilling Contractor	Cascade Drilling, Inc	Total Depth Drilled (feet bgs)	9.0
Drill Rig Type	Trackmount CME75	Sampler Type	18" Split Spoon	Approximate Surface Elevation (feet msl)	
Groundwater Level		Hammer Weight and Drop	NA	Top of PVC Elevation	NA
Diameter of Hole (inches)	6	Diameter of Well (inches)	NA	Type of Well Casing	NA	Screen Perforation	NA
Type of Sand Pack	NA	Type and Depth of Seal(s)	Bentonite cement grout to surface		
Comments					

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows per 6-inch Interval	Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	FID Headspace (ppm)	FID Background (ppm)	Drilling Rate (Time, 24-hour clock)	REMARKS
	0						Reddish brown, moist, coarse sand and gravel (FILL)				0830	
					75		Dark brown, medium SAND (SP-SM) grades to uniform fine and medium sand		5	0	0835	
					75				101	0	0840	
	5				75				96.8	0	0845	
					75		Saturated Uniform fine SILT (ML) with trace of wood		928	0	0850	Sheen
					90		Loose sand (1")		1568	0	0900	
	10						End of hole at 9'					
	15											
	20											
	25											
	30											

Project: International Paper
Project Location: Longview WA
Project Number: 91C0796B

Log of Boring PB-03

Sheet 1 of 1

Date(s) Drilled	7/15/1998	Logged By	TMM	Checked By	RS
Drilling Method	Hollow Stem Auger	Drilling Contractor	Cascade Drilling, Inc	Total Depth Drilled (feet bgs)	9.0
Drill Rig Type	Trackmount CME75	Sampler Type	18" Split Spoon	Approximate Surface Elevation (feet msl)	
Groundwater Level		Hammer Weight and Drop	NA	Top of PVC Elevation	NA
Diameter of Hole (inches)	6 / Diameter of Well (inches) NA	Type of Well Casing	NA	Screen Perforation	NA
Type of Sand Pack	NA	Type and Depth of Seal(s)	Bentonite cement grout to surface		
Comments					

Elevation, feet / Depth, feet	SAMPLES: Type / Number	Blows per 6-inch Interval	Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	FID Headspace (ppm)	FID Background (ppm)	Drilling Rate (Time, 24-hour clock)	REMARKS
0					Reddish brown, moist, coarse sand and gravel (FILL)				0920	
			75				6.26	.69	0930	
			75		Medium brown, moist to wet SAND (SP-SM)		106	.69	0935	
5			75		Becoming finer grained		178	.69	0940	
			75		Saturated		71.96	.69	0942	
			90		Fine, pinkish color, uniform, moist to wet SILT (ML)		523	.69	0945	
10					End of hole at 9'					
15										
20										
25										
30										

Project: International Paper
Project Location: Longview WA
Project Number: 91C0796B

Log of Boring PB-04

Sheet 1 of 1

Date(s) Drilled	7/15/1998	Logged By	TMM	Checked By	RS
Drilling Method	Hollow Stem Auger	Drilling Contractor	Cascade Drilling, Inc	Total Depth Drilled (feet bgs)	9.0
Drill Rig Type	Trackmount CME75	Sampler Type	18" Split Spoon	Approximate Surface Elevation (feet msl)	
Groundwater Level		Hammer Weight and Drop	NA	Top of PVC Elevation	NA
Diameter of Hole (inches)	6	Diameter of Well (inches) NA	Type of Well Casing	NA	Screen Perforation NA
Type of Sand Pack	NA	Type and Depth of Seal(s)	Bentonite cement grout to surface		
Comments					

Elevation, feet / Depth, feet	SAMPLES: Type	Number	Blows per 6-inch Interval	Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	FID Headspace (ppm)	FID Background (ppm)	Drilling Rate (Time, 24-hour clock)	REMARKS
0						Reddish brown, moist, coarse sand and gravel (FILL)				1000	
				75				3.69	.51	1010	
						Gray, fine to medium SAND (SP-SM) with trace of gravel and roots				1015	
5				75				864	.51	1020	
				90		Grades to fine sand with trace of silt and trace of wood		132	.51	1025	Sheen
				90		Gray, moist, uniform, plastic SILT (ML) with trace of fine sand and wood		843	.51	1030	
10						End of hole at 9'					
15											
20											
25											
30											

Project: International Paper
Project Location: Longview WA
Project Number: 91C0796B

Log of Boring PB-05

Sheet 1 of 1

Date(s) Drilled	7/16/98	Logged By	TMM	Checked By	RS
Drilling Method	Hollow Stem Auger	Drilling Contractor	Cascade Drilling, Inc	Total Depth Drilled (feet bgs)	6.0
Drill Rig Type	Trackmount CME75	Sampler Type	18" Split Spoon	Approximate Surface Elevation (feet msl)	
Groundwater Level		Hammer Weight and Drop	NA	Top of PVC Elevation	NA
Diameter of Hole (inches)	6	Diameter of Well (inches) NA	Type of Well Casing	NA	Screen Perforation NA
Type of Sand Pack	NA	Type and Depth of Seal(s)	Bentonite cement grout to surface		
Comments					

Elevation, feet / Depth, feet	SAMPLES: Type	Number	Blows per 6-inch Interval	Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	FID Headspace (ppm)	FID Background (ppm)	Drilling Rate (Time, 24-hour clock)	REMARKS
0						Reddish brown, moist, medium to coarse sand with trace of fine sand and roots (FILL)				0810	
				75				264	0	0820	
						Grades to gray brown, moist to wet, fine SILT (ML)					
				75				466	0	0822	
5				90		Gray brown, saturated, plastic SILT (ML) with uniform trace of wood		821	0	0825	
						End of hole at 6'					
10											
15											
20											
25											
30											

Report: ENV_23A; Project File: C:\PROGRA~1\GINTW\PROJECTS\LONGVIEW.GPJ; Data Template:WC_CORP1.GDT Printed: 12/9/98

Project: International Paper
Project Location: Longview WA
Project Number: 91C0796B

Log of Boring PB-06

Sheet 1 of 1

Date(s) Drilled	7/16/98	Logged By	TMM	Checked By	RS
Drilling Method	Hollow Stem Auger	Drilling Contractor	Cascade Drilling, Inc	Total Depth Drilled (feet bgs)	7.5
Drill Rig Type	Trackmount CME75	Sampler Type	18" Split Spoon	Approximate Surface Elevation (feet msl)	
Groundwater Level		Hammer Weight and Drop	NA	Top of PVC Elevation	NA
Diameter of Hole (inches)	6	Diameter of Well (inches)	NA	Type of Well Casing	NA	Screen Perforation	NA
Type of Sand Pack	NA	Type and Depth of Seal(s)	Bentonite cement grout to surface		
Comments					

Elevation, feet / Depth, feet	SAMPLES: Type	Number	Blows per 6-inch Interval	Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	FID Headspace (ppm)	FID Background (ppm)	Drilling Rate (Time, 24-hour clock)	REMARKS
0						Gray, moist, coarse sand and gravel (FILL)				0845	
				75				20.57	0	0850	
						Dark gray, moist, fine to medium SAND (SP-SM)					
				75				29.32	0	0855	
						Saturated, trace of wood					
5				75				194	0	0905	
				90		Moist to wet, uniform, fine SILT (ML) with trace of sand and wood		954	0	0910	
						End of hole at 7.5'					
10											
15											
20											
25											
30											

Project: International Paper
Project Location: Longview WA
Project Number: 91C0796B

Log of Boring PB-07

Sheet 1 of 1

Date(s) Drilled	7/16/98	Logged By	TMM	Checked By	RS
Drilling Method	Hollow Stem Auger	Drilling Contractor	Cascade Drilling, Inc	Total Depth Drilled (feet bgs)	6.0
Drill Rig Type	Trackmount CME75	Sampler Type	18" Split Spoon	Approximate Surface Elevation (feet msl)	
Groundwater Level		Hammer Weight and Drop	NA	Top of PVC Elevation	NA
Diameter of Hole (inches)	6	Diameter of Well (inches) NA	Type of Well Casing	NA	Screen Perforation NA
Type of Sand Pack	NA	Type and Depth of Seal(s)	Bentonite cement grout to surface		
Comments					

Elevation, feet / Depth, feet	SAMPLES: Type	Number	Blows per 6-inch Interval	Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	FID Headspace (ppm)	FID Background (ppm)	Drilling Rate (Time, 24-hour clock)	REMARKS
0						Dark gray, moist, coarse SAND (SP-SM) with trace of gravel				0925	
				75		Grades to fine SAND with trace of silt		38.8	0	0930	
				75				448	0	0932	
						Saturated at 4.5'					
5				90		Wet, fine SILT (ML) with trace of fine sand and wood		1149	0	0935	
						End of hole at 6'					
10											
15											
20											
25											
30											

Report: ENV_23A; Project File: C:\PROGRA~1\GINTW\PROJECTS\LONGVIEW.GPJ; Data Template:WC_CORP1.GDT Printed: 12/9/98

Project: International Paper
Project Location: Longview WA
Project Number: 91C0796B

Log of Boring PB-08

Sheet 1 of 1

Date(s) Drilled	7/16/98	Logged By	TMM	Checked By	RS
Drilling Method	Hollow Stem Auger	Drilling Contractor	Cascade Drilling, Inc	Total Depth Drilled (feet bgs)	6.0
Drill Rig Type	Trackmount CME75	Sampler Type	18" Split Spoon	Approximate Surface Elevation (feet msl)	
Groundwater Level		Hammer Weight and Drop	NA	Top of PVC Elevation	NA
Diameter of Hole (inches)	6	Diameter of Well (inches)	NA	Type of Well Casing	NA	Screen Perforation	NA
Type of Sand Pack	NA	Type and Depth of Seal(s)	Bentonite cement grout to surface		
Comments					

Elevation, feet / Depth, feet	SAMPLES: Type	Number	Blows per 6-inch Interval	Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	FID Headspace (ppm)	FID Background (ppm)	Drilling Rate (Time, 24-hour clock)	REMARKS
0						Dark gray, medium to coarse SAND (SP-SM) with trace of gravel				0950	
				75				67.73	0	0955	
				75				186	0	1000	
						Grades to fine to medium sand with trace of silt					
5				90		Saturated at 4.5'		1058	0	1005	
						Moist to wet, fine SILT (ML) with trace of fine sand and wood					
						End of hole at 6'					
10											
15											
20											
25											
30											

Project: International Paper
Project Location: Longview WA
Project Number: 91C0796B

Log of Boring PB-09

Sheet 1 of 1

Date(s) Drilled	7/16/98	Logged By	TMM	Checked By	RS
Drilling Method	Hollow Stem Auger	Drilling Contractor	Cascade Drilling, Inc	Total Depth Drilled (feet bgs)	6.0
Drill Rig Type	Trackmount CME75	Sampler Type	18" Split Spoon	Approximate Surface Elevation (feet msl)	
Groundwater Level		Hammer Weight and Drop	NA	Top of PVC Elevation	NA
Diameter of Hole (inches)	6 / Diameter of Well (inches) NA	Type of Well Casing	NA	Screen Perforation	NA
Type of Sand Pack	NA	Type and Depth of Seal(s)	Bentonite cement grout to surface		
Comments					

Elevation, feet / Depth, feet	SAMPLES: Type	Number	Blows per 6-inch Interval	Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	FID Headspace (ppm)	FID Background (ppm)	Drilling Rate (Time, 24-hour clock)	REMARKS
0						Dark gray, moist, coarse to medium SAND (SP-SM)				1030	
				75				12.86	0	1035	
				75		Grades to fine sand with trace of silt		21.73	0	1040	
						Saturated at 4.5'					
5				90		Dark brown, moist, plastic SILT (ML) with trace of fine sand and wood		1746	0	1045	
						End of hole at 6'					
10											
15											
20											
25											
30											

Project: International Paper
Project Location: Longview WA
Project Number: 91C0796B

Log of Boring PB-10

Sheet 1 of 1

Date(s) Drilled	7/16/98	Logged By	TMM	Checked By	RS
Drilling Method	Hollow Stem Auger	Drilling Contractor	Cascade Drilling, Inc	Total Depth Drilled (feet bgs)	6.0
Drill Rig Type	Trackmount CME75	Sampler Type	18" Split Spoon	Approximate Surface Elevation (feet msl)	
Groundwater Level		Hammer Weight and Drop	NA	Top of PVC Elevation	NA
Diameter of Hole (inches)	6 / Diameter of Well (inches) NA	Type of Well Casing	NA	Screen Perforation	NA
Type of Sand Pack	NA	Type and Depth of Seal(s)	Bentonite cement grout to surface		
Comments					

Elevation, feet / Depth, feet	SAMPLES: Type	SAMPLES: Number	SAMPLES: Blows per 6-inch Interval	SAMPLES: Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	FID Headspace (ppm)	FID Background (ppm)	Drilling Rate (Time; 24-hour clock)	REMARKS
0						Gray, moist, fine to medium SAND (SP-SM)				1225	
				75				24.51	0	1230	
				75				159	0	1235	
5				90		Gray, moist SILT (ML) with trace of fine sand		1002	0	1240	
						End of hole at 6'					
10											
15											
20											
25											
30											

Project: International Paper
Project Location: Longview WA
Project Number: 91C0796B

Log of Boring PB-11

Sheet 1 of 1

Date(s) Drilled	7/17/98	Logged By	TMM	Checked By	RS
Drilling Method	Hollow Stem Auger	Drilling Contractor	Cascade Drilling, Inc	Total Depth Drilled (feet bgs)	10.5
Drill Rig Type	Trackmount CME75	Sampler Type	18" Split Spoon	Approximate Surface Elevation (feet msl)	
Groundwater Level		Hammer Weight and Drop	NA	Top of PVC Elevation	NA
Diameter of Hole (inches)	6	Diameter of Well (inches)	NA	Type of Well Casing	NA	Screen Perforation	NA
Type of Sand Pack	NA	Type and Depth of Seal(s)	Bentonite cement grout to surface		
Comments					

Elevation, feet / Depth, feet	SAMPLES: Type	SAMPLES: Number	SAMPLES: Blows per 6-inch Interval	SAMPLES: Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	FID Headspace (ppm)	FID Background (ppm)	Drilling Rate (Time, 24-hour clock)	REMARKS
0						Asphalt				0930	
						Gravel, boulders and coarse sand (FILL)					
						Brown, fine to medium SAND (SP-SM)					
5				75				6.7	.2	0945	
						Coarse SAND (SP) from 5.5' to 6'					
				75				374	.2	0950	Sheen on cuttings
						2" layer of silt and fine sand					
				75		Saturated		193	.2	0955	Sheen
10				90		Moist, plastic, fine SILT (ML) with trace of fine sand and wood		44.39	.2	1000	Sheen
						End of hole at 10.5'					
15											
20											
25											
30											

Project: International Paper
Project Location: Longview WA
Project Number: 91C0796B

Log of Boring PB-12

Sheet 1 of 1

Date(s) Drilled	7/17/98	Logged By	TMM	Checked By	RS
Drilling Method	Hollow Stem Auger	Drilling Contractor	Cascade Drilling, Inc	Total Depth Drilled (feet bgs)	10.5
Drill Rig Type	Trackmount CME75	Sampler Type	18" Split Spoon	Approximate Surface Elevation (feet msl)	
Groundwater Level		Hammer Weight and Drop	NA	Top of PVC Elevation	NA
Diameter of Hole (inches)	6	Diameter of Well (inches)	NA	Type of Well Casing	NA	Screen Perforation	NA
Type of Sand Pack	NA	Type and Depth of Seal(s)	Bentonite cement grout to surface		
Comments					

Depth, feet	Elevation, feet	SAMPLES: Type	SAMPLES: Number	SAMPLES: Blows per 6-inch Interval	SAMPLES: Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	FID Headspace (ppm)	FID Background (ppm)	Drilling Rate (Time, 24-hour clock)	REMARKS
0							Asphalt				1025	
							Coarse sand, gravel and boulders (FILL)					
							Moist, medium to coarse SAND (SP-SM)					
5					75				1209	.99	1030	Slight odor, sheen during drilling
					75				488	.99	1035	
					75		Grades to fine sand Saturated		601	.99	1040	
10					90		Gray brown, wet, plastic, fine SILT (ML) with trace of fine sand and wood		1735	.99	1045	
							End of hole at 10.5'					
15												
20												
25												
30												

Project: International Paper
Project Location: Longview WA
Project Number: 91C0796B

Log of Boring PB-13

Sheet 1 of 1

Date(s) Drilled	7/17/98	Logged By	TMM	Checked By	RS
Drilling Method	Hollow Stem Auger	Drilling Contractor	Cascade Drilling, Inc	Total Depth Drilled (feet bgs)	9.0
Drill Rig Type	Trackmount CME75	Sampler Type	18" Split Spoon	Approximate Surface Elevation (feet msl)	
Groundwater Level		Hammer Weight and Drop	NA	Top of PVC Elevation	NA
Diameter of Hole (inches)	6	Diameter of Well (inches) NA	Type of Well Casing	NA	Screen Perforation NA
Type of Sand Pack	NA	Type and Depth of Seal(s)	Bentonite cement grout to surface		
Comments					

Elevation, feet / Depth, feet	SAMPLES: Type	Number	Blows per 6-inch Interval	Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	FID Headspace (ppm)	FID Background (ppm)	Drilling Rate (Time, 24-hour clock)	REMARKS
0						Coarse sand, gravel and boulders (FILL)				1100	
						Medium to coarse SAND (SP-SM) with trace of gravel					
5				75		Becomes finer with depth		1906	1.01	1110	
				75				790	1.01	1122	No sheen, slight odor
				90		Saturated		1275	1.01	1135	
						Brown, fine, plastic SILT (ML) with trace of fine sand and wood					
10						End of hole at 9'					
15											
20											
25											
30											

Project: International Paper
Project Location: Longview WA
Project Number: 91C0796B

Log of Boring PB-14

Sheet 1 of 1

Date(s) Drilled	7/21/98	Logged By	TMM	Checked By	RS
Drilling Method	Hollow Stem Auger	Drilling Contractor	Cascade Drilling, Inc	Total Depth Drilled (feet bgs)	9.0
Drill Rig Type	Trackmount CME75	Sampler Type	18" Split Spoon	Approximate Surface Elevation (feet msl)	
Groundwater Level		Hammer Weight and Drop	NA	Top of PVC Elevation	NA
Diameter of Hole (inches)	6	Diameter of Well (inches)	NA	Type of Well Casing	NA	Screen Perforation	NA
Type of Sand Pack	NA	Type and Depth of Seal(s)	Bentonite cement grout to surface		
Comments					

Elevation, feet / Depth, feet	SAMPLES: Type	Number	Blows per 6-inch Interval	Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	Well Completion Log	FID Headspace (ppm)	FID Background (ppm)	Drilling Rate (Time, 24-hour clock)	REMARKS
0						Dark gray, moist, medium to coarse SAND (SP-SM)				1500	
						Grades to fine sand at depth					
5				75				8.0	0	1515	
				75				24.7	0	1520	
				75				23	0	1525	
10				90		Gray brown, wet, plastic, fine SILT (ML) with trace fo fine sand and wood		139	0	1530	
						End of hole at 10.5'					
15											
20											
25											
30											

Appendix B
FID/PID Values

Site Name: IP-LONGVIEW
Personnel: Tom Middleton - Drill, Michelle McClelland - Samples, Jenny Crook - Misc
Weather: @ Cloudy, gusty, 70°

Sample Name	Date	Time	FID (ppm)	Ambient Air	Comments
98PB-01-0'-1.5'	7/14	1516	18.43	1.75	
98PB-01-1.5'-3'		~~1455~~ 1516	12.20	1.75	
98PB-01-3'-4.5'		1455	1025	1.81	
98PB-01-4.5'-6'		1516	135	1.75	
98PB-01-6'-7.5'		1455	68.52	1.81	
98PB-02-1.5'-3'	7/15	1116	5.10	0.00	
98PB-02-3'-4.5'		1117	101	0.00	
98PB-02-4.5'-6'		1118	96.88	0.00	
98PB-02-6'-7.5'		1119	928	0.00	
98PB-02-7.5'-9'		1120	1568	0.00	
98PB-03-1.5'-3'		1121	6.26	0.69	
98PB-03-3'-4.5'		1122	106	0.69	
98PB-03-4.5'-6'		1122	178	0.69	
98PB-03-6'-7.5'		1123	71.96	0.69	
98PB-03-7.5'-9'		1124	523	0.69	
98PB-04-1.5'-3'		1126	8.69	0.51	
98PB-04-4.5'-6'		1127	864	0.51	
98PB-04-6'-7.5'		1128	132	0.51	
98PB-04-7.5'-9'		1128	843	0.51	
98PB-05-1.5-3	7/16	1324	264	~~0.28~~ 0.00	
98PB-05-3-4.5		1325	466	~~0.28~~ 0.00	
98PB-05-4.5-6		1325	821	~~0.28~~ 0.00	
98PB-06-1.5-3		1327	20.57	0.00	
98PB-06-3-4.5		1328	29.32	0.00	
98PB-06-4.5-6		1328	194	0.00	
98PB-06-6-7.5		1328	954	0.00	
98PB-07-1.5-3		1330	38.81	0.00	
98PB-07-3-4.5		1330	448	0.00	
98PB-07-4.5-6		1331	1149	0.00	
98PB-08-1.5-3		1332	67.73	0.00	
98PB-08-3-4.5		1332	186	0.00	
98PB-08-4.5-6		1333	1058	0.00	
98PB-09-1.5-3		1334	12.86	0.00	
98PB-09-3-4.5		1334	21.73	0.00	
98PB-09-4.5-6		1335	746	0.00	
98PB-10-1.5-3		1336	24.51	0.00	
10-3-4.5		1336	159	0.00	
10-4.5-6		1336	1002	0.00	

Site Name: IP - Longview
Personnel: Jenny Crook, Michelle McClelland, Tom Middleton
Weather: Sunny 80°

Sample Name	Date	Time	FID (ppm)	Ambient Air	Comments
98PB-11 - 4.5-6	7/17	1224	6.65	0.20	
98PB-11 - 6-7.5		1224	374	0.20	
98PB-11 - 7.5-9		1225	193	0.20	
98PB-11 - 9-10.5		1226	44.39	0.20	
98PB-12 - 4.5-6		1228	1209	0.99	
98PB-12 - 6-7.5		1228	488	0.99	
98PB-12 - 7.9-9		1229	601	0.99	
98PB-12 - 9-10.5		1229	1735	0.99	
98PB-13 - 4.5-6		1230	1906	1.01	
98PB-13 - 6-7.5		1231	790	1.01	
98PB-13 - 7.5-9		1231	1275	1.01	
974B - 6-7.5	7/20	1016	~~6942~~	0.00	886
974B - 7.5-9		1016	69.42	0.00	
974B - 9-10.5		1017	60.08	0.00	
98PB-14-4.5-6	7/22	1215	8.03	0.00	
98PB-14-6-7.5		1215	24.67	0.00	
98PB-14-7.5-9		1216	23.00	0.00	
98PB-14-9-10.5		1216	139	0.00	
97-5A-9.5-11		1217	85.88	0.00	
97-5A-11-12.5		~~0432~~	588	0.00	
97-5A-12.5-14		1218	52.89	0.00	
97-5A-14-15 5		1218	893	0.00	
97-10A-9.5-11	7/22	1340	1335	0.00	
97-10A-11-12.5		1341	936	0.00	
97-6B 4.5-6	7/23	2114	5.62	0.00	
97-6B ~~6-7.5~~	6-7.5	2117	133	0.62	
97-6B ~~6-7.5~~	7.5-9	2126	173		
97-6B-9-10.5		2128	240		
97-6B-10.5-12		2132	132		
97-6B-12-13.5		2137	138		

Appendix C

QA/QC Review and Laboratory Data Sheets

The analytical results for soil samples collected in July 1998 were subject to a QA/QC review including the following:

- Chain of Custody and Holding Times
- Review of Blanks
- Surrogate Recovery Review
- Matrix Spike (Blank Spike) Review
- Duplicate Review
- Reporting Limits

Samples were collected by Woodward-Clyde and analyzed by Oregon Analytical Laboratories of Beaverton, Oregon. Sample identifications are as follows:

URSGWC SAMPLE ID	LABORATORY SAMPLE ID	QUALIFIED RESULTS
98-PB01-3-4.5	L7105-1	none
98-PB02-7.5-9	L7105-11	none
98-PB03-6-7.5	L7105-15	none
98-PB04-4.5-6	L7105-18	none
98-PB05-3-4.5	L7157-2	none
98-PB06-1.5-3	L7157-4	none
98-PB07-3-4.5	L7157-9	none
98-PB08-3-4.5	L7157-12	none
98-PB09-3-4.5	L7157-15	none
98-PB10-3-4.5	L7157-18	none
98-PB11-6-7.5	L7158-2	none
98-PB11-9-10.5	L7158-4	none
98-PB12-7.5-9	L7158-7	none
98-PB12-9-10.5	L7158-8	none
98-PB13-7.5-9	L7158-11	none
97-4B-6-7.5	L7229-1	none
97-4B-9-10.5	L7229-3	none
97-5A-9.5-11	L7229-4	none
97-5A-12.5-14	L7229-6	none
98-PB14-7.5-9	L7229-10	none
97-10A-9.5-11	L7229-12	none
97-10A-11-12.5	L7229-13	none
97-6B-7.5-9	L7229-16	none
97-6B-10.5-12	L7229-18	none

Summary

All analytical data is acceptable for project uses. Samples were analyzed within the holding times. The method blanks were free of contaminants. No data were qualified due to surrogate or spike percent recoveries. The laboratory duplicate relative percent difference (RPD) was within established limits. 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 soil holding time for semivolatiles and diesel analysis is 14 days from collection until extraction and 40 days from extraction until analysis. Samples were analyzed within the holding time.

Review of Blanks

The laboratory analyzed one method blank for each method. The method blanks did not have detectable levels of any analyte of concern. 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 surrogate percent recovery for nine samples were not reported due to matrix interference from high analyte concentrations. The remaining surrogate and QC results were acceptable; therefore, no data were qualified due to these results.

Matrix Spike (Blank Spike) Review

The matrix spike percent recoveries were within the control limits with the following exceptions. The diesel matrix spike percent recoveries for batches L7157 and L7158 were not reported due to matrix interference; the blank spike percent recoveries were acceptable and no data were qualified. The blank spike percent recoveries were within the control limits. No data were qualified.

Duplicate Review

No field duplicates were collected. The laboratory duplicate results were acceptable; no data were qualified.

Reporting Limits

The reporting limits are summarized in the table below. Many of the samples were diluted due to high analyte concentration; however, the reporting limits met the project needs.

METHOD	MATRIX	REPORTING LIMIT
diesel	soil	25 mg/kg
oil	soil	50 mg/kg
PAHs	soil	0.010 to 100 mg/kg
pentachlorophenol	soil	0.10 to 1000 mg/kg

WOODWARD-CLYDE
CHAIN OF CUSTODY RECORD

Fourth Avenue Suite 1500
Seattle, Washington 98101
(206) 343-7933 fax (206) 343-0513

Project Name: IP
Project Number: 9100796B Project Manager: TS
Sampler (signature): TM
Shipping Form Tracking Number:
Page 1 of 1 Number of Coolers: 1

Date	Time	Sample Identification	Matrix	Lab ID	Analyses: TPH - Dext.	Analyses: PAH + PCP (8270SIM)										Preservative y/n	Number of Containers
7/20	0930	97-4B-6-7.5	Soil		X	X				~~H~~	~~O~~	~~L~~	~~D~~			N	1
7/20	0936	97-4B-7.5-9	Soil							H	O	L	D			N	1
7/20	0940	97-4B-9-10.5	Soil		X	X										N	
7/21	1310	97-5A-9.5-11	Soil		X	X										N	1
	1315	97-5A-11-12.5	Soil							H	O	L	D			N	1
	1320	97-5A-12.5-14	Soil		X	X										N	1
	1325	97-5A-14-15.5	Soil							H	O	L	D			N	1
	1515	98PB-14-4.5-6	Soil							H	O	L	D			N	1
	1520	~~98PB-6-7~~ 98PB-14-6-7.5	Soil							H	O	L	D			N	1
	1525	98PB-14-7.5-9	Soil		X	X										N	1
	1530	98PB-14-9-10.5	Soil							H	O	L	D			N	1
7/22	1305	97-10A-9.5-11	Soil		X	X										N	1
7/22	1310	97-10A-11-12.5	Soil		X	X										N	1
7/23	1745	97-6B-4.5-6	Soil							H	O	L	D			N	1
	1750	97-6B-6-7.5	Soil							H	O	L	D			N	1
	1755	97-6B-7.5-9	Soil		X	X										N	1
	1800	97-6B-9-10.5	Soil							H	O	L	D			N	1
	1805	97-6B-10.5-12	Soil		X	X										N	1
	1806	97-6B-12-13.5	Soil							H	O	L	D				

Comments:
* Please send chromatograms (TPH-D)

Total Number of Containers

Relinquished By (signature):	Date/Time	Relinquished By (signature):	Date/Time
[signature]	7/24/98 10:50am		
Received By (Signature):	**Date/Time**	**Received for Lab By (signature):**	**Date/Time**
[signature]	7-24/10:30		

(COCSEA.xls)

WOODWARD-CLYDE
CHAIN OF CUSTODY RECORD

Fourth Avenue Suite 1500
Seattle, Washington 98101
(206) 343-7933 fax (206) 343-0513

Project Name: IP
Project Number: 91C0796C Project Manager: TS
Sampler (signature): TM
Shipping Form Tracking Number:
Page 1 of Number of Coolers:

Date 1998	Time	Sample Identification	Matrix	Lab ID	Analyses: TPH-D (EXT)	Analyses: PAH + PCP - SIM	Preservative y/n	Number of Containers
16Jul	820	98-PB05-1.5-3	Soil				N	1
	822	98-PB05-3-4.5			X	X	N	1
	825	98-PB05-4.5-6					N	1
	850	98-PB06-1.5-3			X	X	N	1
	855	98-PB06-3-4.5					N	1
	905	98-PB06-4.5-6					N	1
	910	98-PB06-6-7.5					N	1
	930	98-PB07-1.5-3					N	1
	932	98-PB07-3-4.5			X	X	N	1
	935	98-PB07-4.5-6					N	1
	955	98-PB08-1.5-3					N	1
	1000	98-PB08-3-4.5			X	X	N	1
	1005	98-PB08-4.5-6					N	1
	1035	98-PB09-1.5-3					N	1
	1040	98-PB09-3-4.5			X	X	N	1
	1045	98-PB09-4.5-6					N	1
	1230	98-PB10-1.5-3					N	1
	1235	98-PB10-3-4.5			X	X	N	1
	1240	98-PB10-4.5-6					N	1

Analyses: H O L D

Comments: * Please sent Chromatograms (TPH-D)

Total Number of Containers

Relinquished By (signature)	Date/Time	Relinquished By (signature)	Date/Time
Kelly Clark	7/17 12:45		
Received By (Signature)	**Date/Time**	**Received for Lab By (signature)**	**Date/Time**
ERA QC	7-17-12:45		

(COCSEA.xls)

WOODWARD-CLYDE
CHAIN OF CUSTODY RECORD

1501 Fourth Avenue Suite 1500
Seattle, Washington 98101
(206) 343-7933 fax (206) 343-0513

Project Name: IP
Project Number: 91C0796B Project Manager: TS
Sampler (signature): TM
Shipping Form Tracking Number:
Page 1 of Number of Coolers: 1

Date 1998	Time	Sample Identification	Matrix	Lab ID	Analyses: TPH-D ext.	Analyses: PAH + PCP (8270 SIM)	Analyses	Preservative y/n	Number of Containers
17 Jul	945	98-PB11-4.5-6	Soil				HOLD	N	1
	950	98-PB11-6-7.5			X	X		N	1
	955	98-PB11-7.5-9					HOLD	N	1
	957	98-PB11-9-10.5			X	X	~~HOLD~~ 2	N	1
	1030	98-PB12-4.5-6					HOLD	N	1
	1035	98-PB12-6-7.5					HOLD	N	1
	1040	98-PB12-7.5-9			X	X		N	1
	1045	98-PB12-9-10.5			X	X	~~HOLD~~ 2	N	1
		98-PB13-4.5-6					HOLD	N	1
		98-PB13-6-7.5					HOLD	N	1
↓		98-PB13-7.5-9	↓		X	X		N	1

Comments: * Please sent chromatograms for all Project samples. (TPH-D)

Total Number of Containers

Relinquished By (signature):	Date/Time	Relinquished By (signature):	Date/Time
Jimmy Clock	7/17 12:45		
Received By (Signature):	**Date/Time**	**Received for Lab By (signature):**	**Date/Time**
[signature]	7-17-1245		

(COCSEA.xls)

OAL

L7105

July 29, 1998

Michelle McClelland
Woodward Clyde Consultants
1501 Fourth Avenue
Suite 1500
Seattle, WA 98101

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

Re: Laboratory Sample Analysis

Project: 91C0796B
IP

Project Manager: Michelle McClelland

Dear Michelle McClelland:

On Wednesday, July 15, 1998, OAL received twenty (20) soil samples for analysis. The samples were analyzed utilizing EPA, ASTM, or equivalent methodology.

Should you have any questions concerning the results in this report, please contact us at (503) 590-5300. Refer to OAL login number L7105.

Sincerely,

Patty Boyden
Project Manager

Suzanne LeMay
QA/QC Officer

OREGON ANALYTICAL LABORATORY
A Division of Portland General Electric
14855 S.W. Old Scholls Ferry Road, Beaverton, OR 97007
Phone 503-590-5300 • Fax 503-590-1404
www.oalab.com/oal • Toll-Free 1-800-644-0967

OAL

L7105

Sample Summary

Sample ID	Lab #	Description	Sampled	Received
98-PB01-3-4.5	L7105-1	soil	07/14/98 14:00	07/15/98
98-PB01-0-1.5	L7105-2	soil	07/14/98 14:02	07/15/98
98-PB01-1.5-3	L7105-3	soil	07/14/98 14:10	07/15/98
98-PB01-4.5-6	L7105-4	soil	07/14/98 14:20	07/15/98
98-PB01-7.5-9	L7105-5	soil	07/14/98 14:28	07/15/98
98-PB01-6-7.5	L7105-6	soil	07/14/98 14:10	07/15/98
98-PB02-1.5-3	L7105-7	soil	07/15/98 11:00	07/15/98
98-PB02-3-4.5	L7105-8	soil	07/15/98	07/15/98
98-PB02-4.5-6	L7105-9	soil	07/15/98 08:45	07/15/98
98-PB02-6-7.5	L7105-10	soil	07/15/98 08:00	07/15/98
98-PB02-7.5-9	L7105-11	soil	07/15/98 09:00	07/15/98
98-PB03-1.5-3	L7105-12	soil	07/15/98 09:30	07/15/98
98-PB03-3-4.5	L7105-13	soil	07/15/98 09:35	07/15/98
98-PB03-4.5-6	L7105-14	soil	07/15/98 09:38	07/15/98
98-PB03-6-7.5	L7105-15	soil	07/15/98 09:41	07/15/98
98-PB03-7.5-9	L7105-16	soil	07/15/98 09:45	07/15/98
98-PB04-1.5-3	L7105-17	soil	07/15/98 10:10	07/15/98
98-PB04-4.5-6	L7105-18	soil	07/15/98 10:20	07/15/98
98-PB04-6-7.5	L7105-19	soil	07/15/98 10:25	07/15/98
98-PB04-7.5-9	L7105-20	soil	07/15/98 10:30	07/15/98

Definition of Terms

MI Matrix interference.

ND Analytical result was below the reporting limit.

Analysts

Initials	Analyst	Title
JJR	Joseph Race	Analyst
PB	Pat Buddrus	Organics Chemist

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Method Summary

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

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Client: *Woodward Clyde Consultants*
Contact: *Michelle McClelland*

Project: *91C0796B*
IP

Polynuclear Aromatic Hydrocarbons (PNA) and PCP
by EPA 8270 SIM

Sample ID	*Matrix*					*Lab Number*
Analyte		Result	Reporting Limit	Units	Comment	
98-PB01-3-4.5	*Soil*				Sampled: *07/14/98* Extracted: *07/17/98* Analyzed: *07/21/98 by PB*	*L7105-1*
See Attached Data Sheet						
98-PB02-7.5-9	*Soil*				Sampled: *07/15/98* Extracted: *07/17/98* Analyzed: *07/21/98 by PB*	*L7105-11*
See Attached Data Sheet						
98-PB03-6-7.5	*Soil*				Sampled: *07/15/98* Extracted: *07/17/98* Analyzed: *07/21/98 by PB*	*L7105-15*
See Attached Data Sheet						
98-PB04-4.5-6	*Soil*				Sampled: *07/15/98* Extracted: *07/17/98* Analyzed: *07/21/98 by PB*	*L7105-18*
See Attached Data Sheet						

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Client: Woodward Clyde Consultants
Contact: Michelle McClelland

Project: 91C0796B

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

Sample ID	Analyte	Results	Blank Result	Reporting Limit *	Units	COMMENT	*Lab Number*
98-PB01-3-4.5	*SOIL*		*MB0717S*			Sampled: *07/14/98* Analyzed: *07/21/98*	*L7105-1*
CAS#							
91-20-3	Naphthalene	532,000	nd	1,000	ug/Kg		
208-96-8	Acenaphthylene	3,250	nd	1,000	ug/Kg		
83-32-9	Acenaphthene	225,000	nd	1,000	ug/Kg		
86-73-7	Fluorene	177,000	nd	1,000	ug/Kg		
87-86-5	Pentachlorophenol	nd	nd	10,000	ug/Kg		
85-01-8	Phenanthrene	465,000	nd	1,000	ug/Kg		
120-12-7	Anthracene	132,000	nd	1,000	ug/Kg		
206-44-0	Fluoranthene	234,000	nd	1,000	ug/Kg		
129-00-0	Pyrene	139,000	nd	1,000	ug/Kg		
56-55-3	Benzo[a]anthracene	29,500	nd	1,000	ug/Kg		
218-01-9	Chrysene	26,200	nd	1,000	ug/Kg		
205-99-2	Benzo[b]fluoranthene	11,900	nd	1,000	ug/Kg		
207-08-9	Benzo[k]fluoranthene	3,740	nd	1,000	ug/Kg		
50-32-8	Benzo[a]pyrene	6,820	nd	1,000	ug/Kg		
193-39-5	Indeno[1,2,3-cd]pyrene	1,530	nd	1,000	ug/Kg		
53-70-3	Dibenz[a,h]anthracene	nd	nd	1,000	ug/Kg		
191-24-2	Benzo[g,h,i]perylene	1,540	nd	1,000	ug/Kg		

Acid Surrogates:	Recovery *L7105-1*	Recovery *MB0717S*
2-Fluorophenol	MI	85%
Phenol-d4	MI	91%
2,4,6-Tribromophenol	MI	32%

Base / Neutral Surrogates:	*L7105-1*	*MB0717S*
1,2-Dichlorobenzene-d4	MI	94%
Nitrobenzene-d5	MI	74%
2-Fluorobiphenyl	MI	95%

none detected = nd
Elevated Reporting Limits due to sample matrix = *
Matrix Interference = MI

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L7105

Client: Woodward Clyde Consultants
Contact: Michelle McClelland

Project: 91C0796B

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

Sample ID	Analyte	Results	Blank Result	Reporting Limit *	Units	COMMENT	*Lab Number*
98-PB02-7.5-9	*SOIL*		*MB0717S*			Sampled: *07/15/98* Analyzed: *07/21/98*	*L7105-11*
CAS#							
91-20-3	**Naphthalene**	**137,000**	**nd**	**1,000**	**ug/Kg**		
208-96-8	Acenaphthylene	nd	nd	1,000	ug/Kg		
83-32-9	**Acenaphthene**	**47,500**	**nd**	**1,000**	**ug/Kg**		
86-73-7	**Fluorene**	**37,000**	**nd**	**1,000**	**ug/Kg**		
87-86-5	Pentachlorophenol	nd	nd	10,000	ug/Kg		
85-01-8	**Phenanthrene**	**94,100**	**nd**	**1,000**	**ug/Kg**		
120-12-7	**Anthracene**	**17,500**	**nd**	**1,000**	**ug/Kg**		
206-44-0	**Fluoranthene**	**52,300**	**nd**	**1,000**	**ug/Kg**		
129-00-0	**Pyrene**	**30,600**	**nd**	**1,000**	**ug/Kg**		
56-55-3	**Benzo[a]anthracene**	**8,050**	**nd**	**1,000**	**ug/Kg**		
218-01-9	**Chrysene**	**7,120**	**nd**	**1,000**	**ug/Kg**		
205-99-2	**Benzo[b]fluoranthene**	**3,510**	**nd**	**1,000**	**ug/Kg**		
207-08-9	**Benzo[k]fluoranthene**	**1,170**	**nd**	**1,000**	**ug/Kg**		
50-32-8	**Benzo[a]pyrene**	**1,930**	**nd**	**1,000**	**ug/Kg**		
193-39-5	Indeno[1,2,3-cd]pyrene	nd	nd	1,000	ug/Kg		
53-70-3	Dibenz[a,h]anthracene	nd	nd	1,000	ug/Kg		
191-24-2	Benzo[g,h,i]perylene	nd	nd	1,000	ug/Kg		

Acid Surrogates:	Recovery *L7105-11*	Recovery *MB0717S*
2-Fluorophenol	MI	85%
Phenol-d4	MI	91%
2,4,6-Tribromophenol	MI	32%

Base / Neutral Surrogates:	*L7105-11*	*MB0717S*
1,2-Dichlorobenzene-d4	MI	94%
Nitrobenzene-d5	MI	74%
2-Fluorobiphenyl	MI	95%

none detected = nd
Elevated Reporting Limits due to sample matrix = *
Matrix Interference = MI

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Client: Woodward Clyde Consultants
Contact: Michelle McClelland

Project: 91C0796B

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

Sample ID	Analyte	Results	Blank Result	Reporting Limit *	Units	COMMENT	*Lab Number*
98-PB03-6-7.5	*SOIL*		*MB0717S*			Sampled: *07/15/98* Analyzed: *07/21/98*	*L7105-15*
CAS#							
91-20-3	**Naphthalene**	**1,160**	**nd**	**100**	**ug/Kg**		
208-96-8	Acenaphthylene	nd	nd	100	ug/Kg		
83-32-9	**Acenaphthene**	**620**	**nd**	**100**	**ug/Kg**		
86-73-7	**Fluorene**	**482**	**nd**	**100**	**ug/Kg**		
87-86-5	Pentachlorophenol	nd	nd	1000	ug/Kg		
85-01-8	**Phenanthrene**	**1,150**	**nd**	**100**	**ug/Kg**		
120-12-7	**Anthracene**	**494**	**nd**	**100**	**ug/Kg**		
206-44-0	**Fluoranthene**	**811**	**nd**	**100**	**ug/Kg**		
129-00-0	**Pyrene**	**444**	**nd**	**100**	**ug/Kg**		
56-55-3	**Benzo[a]anthracene**	**121**	**nd**	**100**	**ug/Kg**		
218-01-9	**Chrysene**	**144**	**nd**	**100**	**ug/Kg**		
205-99-2	Benzo[b]fluoranthene	nd	nd	100	ug/Kg		
207-08-9	Benzo[k]fluoranthene	nd	nd	100	ug/Kg		
50-32-8	Benzo[a]pyrene	nd	nd	100	ug/Kg		
193-39-5	Indeno[1,2,3-cd]pyrene	nd	nd	100	ug/Kg		
53-70-3	Dibenz[a,h]anthracene	nd	nd	100	ug/Kg		
191-24-2	Benzo[g,h,i]perylene	nd	nd	100	ug/Kg		

Acid Surrogates:	Recovery *L7105-15*	Recovery *MB0717S*
2-Fluorophenol	96%	85%
Phenol-d4	97%	91%
2,4,6-Tribromophenol	90%	32%

Base / Neutral Surrogates:	*L7105-15*	*MB0717S*
1,2-Dichlorobenzene-d4	95%	94%
Nitrobenzene-d5	90%	74%
2-Fluorobiphenyl	119%	95%

none detected = nd
Elevated Reporting Limits due to sample matrix = *

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Client: Woodward Clyde Consultants
Contact: Michelle McClelland

Project: 91C0796B

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

Sample ID	Analyte	Results	Blank Result	Reporting Limit *	Units	COMMENT	*Lab Number*
98-PB04-4.5-6	*SOIL*		*MB0717S*			Sampled: *07/15/98* Analyzed: *07/21/98*	*L7105-18*
CAS#							
91-20-3	**Naphthalene**	**245,000**	**nd**	**1,000**	**ug/Kg**		
208-96-8	Acenaphthylene	nd	nd	1,000	ug/Kg		
83-32-9	**Acenaphthene**	**44,400**	**nd**	**1,000**	**ug/Kg**		
86-73-7	**Fluorene**	**39,800**	**nd**	**1,000**	**ug/Kg**		
87-86-5	Pentachlorophenol	nd	nd	10,000	ug/Kg		
85-01-8	**Phenanthrene**	**133,000**	**nd**	**1,000**	**ug/Kg**		
120-12-7	**Anthracene**	**33,200**	**nd**	**1,000**	**ug/Kg**		
206-44-0	**Fluoranthene**	**40,700**	**nd**	**1,000**	**ug/Kg**		
129-00-0	**Pyrene**	**24,600**	**nd**	**1,000**	**ug/Kg**		
56-55-3	**Benzo[a]anthracene**	**6,240**	**nd**	**1,000**	**ug/Kg**		
218-01-9	**Chrysene**	**5,470**	**nd**	**1,000**	**ug/Kg**		
205-99-2	**Benzo[b]fluoranthene**	**2,890**	**nd**	**1,000**	**ug/Kg**		
207-08-9	Benzo[k]fluoranthene	nd	nd	1,000	ug/Kg		
50-32-8	**Benzo[a]pyrene**	**1,670**	**nd**	**1,000**	**ug/Kg**		
193-39-5	Indeno[1,2,3-cd]pyrene	nd	nd	1,000	ug/Kg		
53-70-3	Dibenz[a,h]anthracene	nd	nd	1,000	ug/Kg		
191-24-2	Benzo[g,h,i]perylene	nd	nd	1,000	ug/Kg		

Acid Surrogates:	Recovery *L7105-18*	Recovery *MB0717S*
2-Fluorophenol	MI	85%
Phenol-d4	MI	91%
2,4,6-Tribromophenol	MI	32%

Base / Neutral Surrogates:	*L7105-18*	*MB0717S*
1,2-Dichlorobenzene-d4	MI	94%
Nitrobenzene-d5	MI	74%
2-Fluorobiphenyl	MI	95%

none detected = nd
Elevated Reporting Limits due to sample matrix = *
Matrix Interference = MI

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Client: ***Woodward Clyde Consultants***
Contact: ***Michelle McClelland***

Project: ***91C0796B***
IP

Semi-Volatile Petroleum Products
by NWTPH-DX

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

98-PB01-3-4.5 ***Soil*** — Sampled: *07/14/98* | Extracted: *07/17/98* | Analyzed: *07/21/98 by JJR* — *L7105-1*

Diesel Region	**3,300**	**25.**	**mg/kg**	1
Oil Region	ND	50.	mg/kg	

Surrogate	Recovery	Limit
2-Fluorobiphenyl	MI	50. - 150.
O-terphenyl	MI	50. - 150.

[1] Diesel range product does not resemble a typical fuel pattern.

98-PB02-7.5-9 ***Soil*** — Sampled: *07/15/98* | Extracted: *07/17/98* | Analyzed: *07/21/98 by JJR* — *L7105-11*

Diesel Region	**3,300**	**25.**	**mg/kg**	1
Oil Region	ND	50.	mg/kg	

Surrogate	Recovery	Limit
2-Fluorobiphenyl	104.%	50. - 150.
O-terphenyl	81.%	50. - 150.

[1] Diesel range product does not resemble a typical fuel pattern.

98-PB03-6-7.5 ***Soil*** — Sampled: *07/15/98* | Extracted: *07/17/98* | Analyzed: *07/21/98 by JJR* — *L7105-15*

Diesel Region	**42.**	**25.**	**mg/kg**	1
Oil Region	ND	50.	mg/kg	

Surrogate	Recovery	Limit
2-Fluorobiphenyl	93.%	50. - 150.
O-terphenyl	101.%	50. - 150.

[1] Diesel range product does not resemble a typical fuel pattern.

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Client: ***Woodward Clyde Consultants***
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Project: ***91C0796B***
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Semi-Volatile Petroleum Products
by NWTPH-DX

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

Sampled: *07/15/98*
Extracted: *07/17/98*

98-PB04-4.5-6	*Soil*	Analyzed: *07/21/98 by JJR*				*L7105-18*
Diesel Region		**1,800**	**25.**	**mg/kg**	[1]	
Oil Region		ND	50.	mg/kg		

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

[1] Diesel range product does not resemble a typical fuel product.

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Client: **Woodward Clyde Consultants**
Contact: **Michelle McClelland**

Project: **91C0796B**

PNA LCS

by modified EPA method 8270 (SIM)

Sample ID	Lab Number	
Analyte	**Recovery**	**COMMENT**

Sampled: *NA*
Analyzed: *07/20/98*

CAS#		*LCS0717S*
91-20-3	Naphthalene	96%
208-96-8	Acenaphthylene	80%
83-32-9	Acenaphthene	99%
86-73-7	Fluorene	93%
87-86-5	Pentachlorophenol	28%
85-01-8	Phenanthrene	104%
120-12-7	Anthracene	84%
206-44-0	Fluoranthene	97%
129-00-0	Pyrene	98%
56-55-3	Benzo[a]anthracene	93%
218-01-9	Chrysene	106%
205-99-2	Benzo[b]fluoranthene	90%
207-08-9	Benzo[k]fluoranthene	97%
50-32-8	Benzo[a]pyrene	87%
193-39-5	Indeno[1,2,3-cd]pyrene	92%
53-70-3	Dibenz[a,h]anthracene	93%
191-24-2	Benzo[g,h,i]perylene	95%

Acid Surrogates:	Recovery *LCS0717S*
2-Fluorophenol	92%
Phenol-d4	96%
2,4,6-Tribromophenol	76%

Base / Neutral Surrogates:	*LCS0717S*
1,2-Dichlorobenzene-d4	97%
Nitrobenzene-d5	80%
2-Fluorobiphenyl	97%

none detected = nd

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Client: **Woodward Clyde Consultants**
Contact: **Michelle McClelland**

Project: **91C0796B**

PNA Matrix Spikes

by modified EPA method 8270 (SIM)

Sample ID		Lab Number	Lab Number		
	Analyte	**Recovery**	**Recovery**	**RPD**	**COMMENT**
98-5896-42	*SOIL*	*L7122-3 MS*	*L7122-3 MSD*		**Sampled:** *07/22/97* **Analyzed:** *07/20/98*
CAS#					
91-20-3	Naphthalene	-336%	-586%	54%	
208-96-8	Acenaphthylene	80%	76%	4%	
83-32-9	Acenaphthene	68%	50%	31%	
86-73-7	Fluorene	49%	19%	89%	
87-86-5	Pentachlorophenol	73%	67%	8%	
85-01-8	Phenanthrene	-2%	-65%	190%	
120-12-7	Anthracene	97%	89%	9%	
206-44-0	Fluoranthene	94%	87%	8%	
129-00-0	Pyrene	93%	80%	14%	
56-55-3	Benzo[a]anthracene	99%	91%	8%	
218-01-9	Chrysene	99%	89%	10%	
205-99-2	Benzo[b]fluoranthene	91%	86%	6%	
207-08-9	Benzo[k]fluoranthene	99%	90%	10%	
50-32-8	Benzo[a]pyrene	92%	86%	6%	
193-39-5	Indeno[1,2,3-cd]pyrene	96%	89%	8%	
53-70-3	Dibenz[a,h]anthracene	95%	88%	8%	
191-24-2	Benzo[g,h,i]perylene	97%	89%	9%	

Acid Surrogates:	Recovery *L7122-3 MS*	Recovery *L7122-3 MSD*
2-Fluorophenol	93%	91%
Phenol-d4	99%	93%
2,4,6-Tribromophenol	95%	92%

Base / Neutral Surrogates:	*L7122-3 MS*	*L7122-3 MSD*
1,2-Dichlorobenzene-d4	99%	93%
Nitrobenzene-d5	91%	86%
2-Fluorobiphenyl	94%	91%

none detected = nd

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Client: ***Woodward Clyde Consultants***
Contact: ***Michelle McClelland***

Project: ***91C0796B***
IP

Batch Q.C.

Method Blank

NWTPH-Dx/Soil (mg/kg)

Analyte	Result	Reporting Limit	Q	Date Analyzed
NWTPH-Dx				
Diesel range	ND	25		07/17/98
Oil range	ND	50		

Surrogates	% Recovery
Fluorobiphenyl	80
O-terphenyl	89

Comments:

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Client: *Woodward Clyde Consultants*
Contact: *Michelle McClelland*

Project: *91C0796B*
IP

Batch Q.C.

LCS

NWTPH-Dx/Soil (mg/kg)

Analyte	Result	True Value	% Recovery	Q	Date Analyzed
NWTPH-Dx	138	134	103		07/20/98

Surrogates	% Recovery
Fluorobiphenyl	103
O-terphenyl	107

Comments:

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Client: *Woodward Clyde Consultants*
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Project: *91C0796B*
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Batch Q.C.

MS

NWTPH-Dx/Soil (mg/kg)

Analyte	Sample Result	MS Result	True Value	% Recovery	Q	Date Analyzed
NWTPH-Dx	71	261	180	106		07/20/98

Surrogates	% Recovery Sample	% Recovery MS
Fluorobiphenyl	97	104
O-terphenyl	104	108

Comments:

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OAL

L7105

Client: *Woodward Clyde Consultants*
Contact: *Michelle McClelland*

Project: *91C0796B*
IP

Batch Q.C.

Duplicate

NWTPH-Dx/Soil (mg/kg)

Analyte	Result	Duplicate Result	RPD	Reporting Limit	Q	Date Analyzed
NWTPH-Dx						
Diesel range	71	40	56	25	*1	07/20/98
Oil range	ND	ND	NA	50		

Surrogates	% Recovery Sample	% Recovery Duplicate
Fluorobiphenyl	90	97
O-terphenyl	96	104

Comments: *1 = Duplicate analysis exceeds laboratroy control limits due to sample inhomogeniety.

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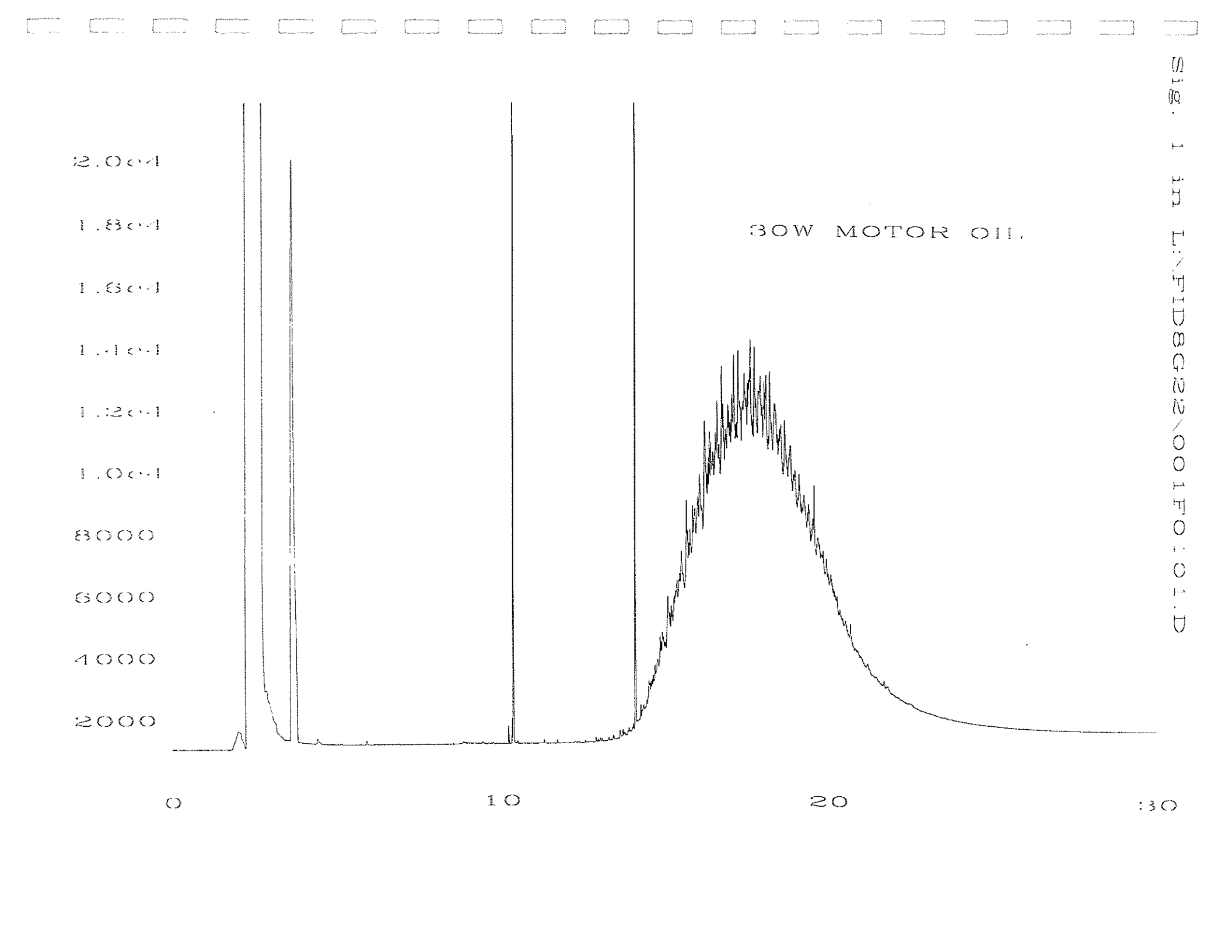
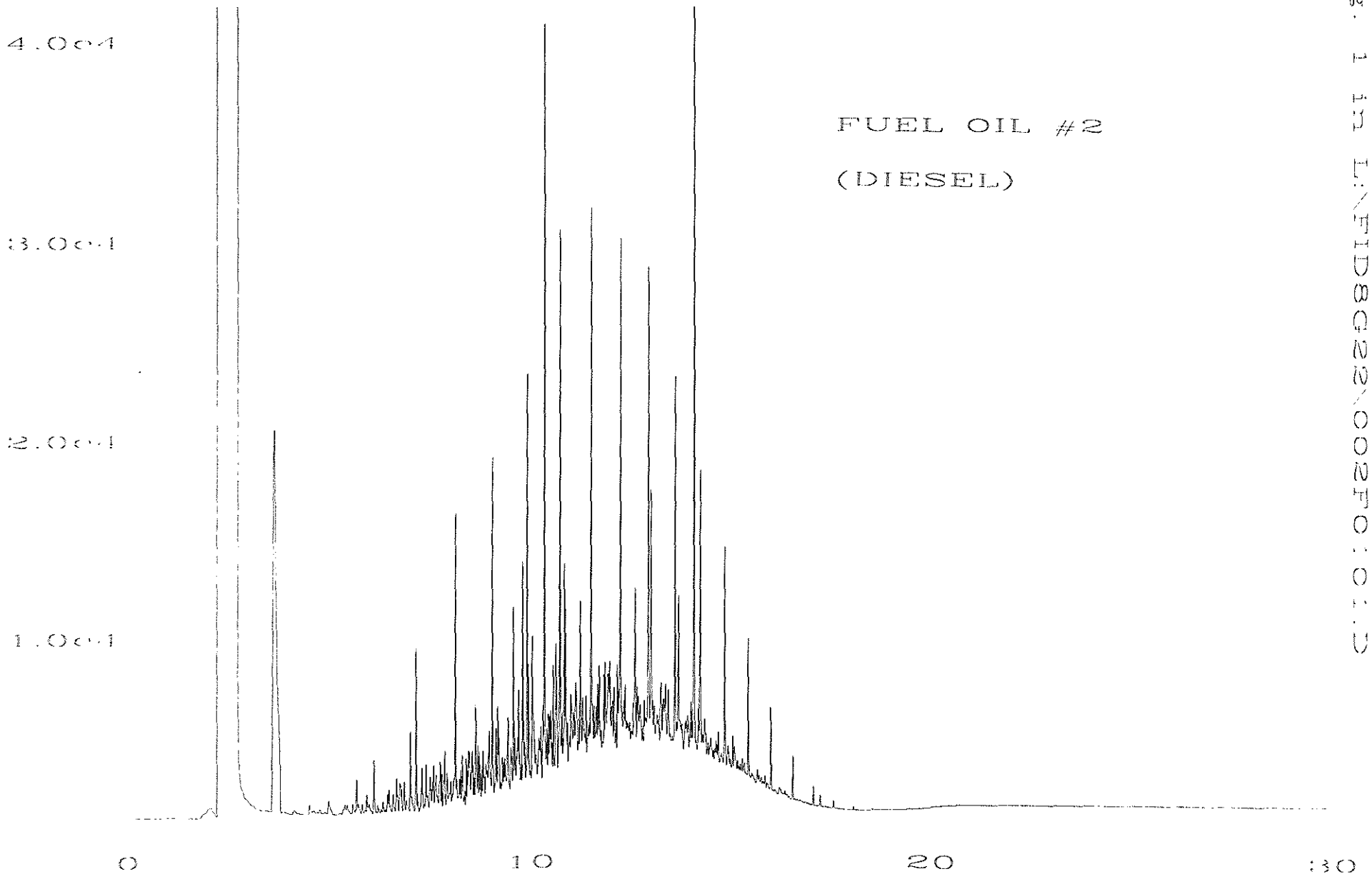
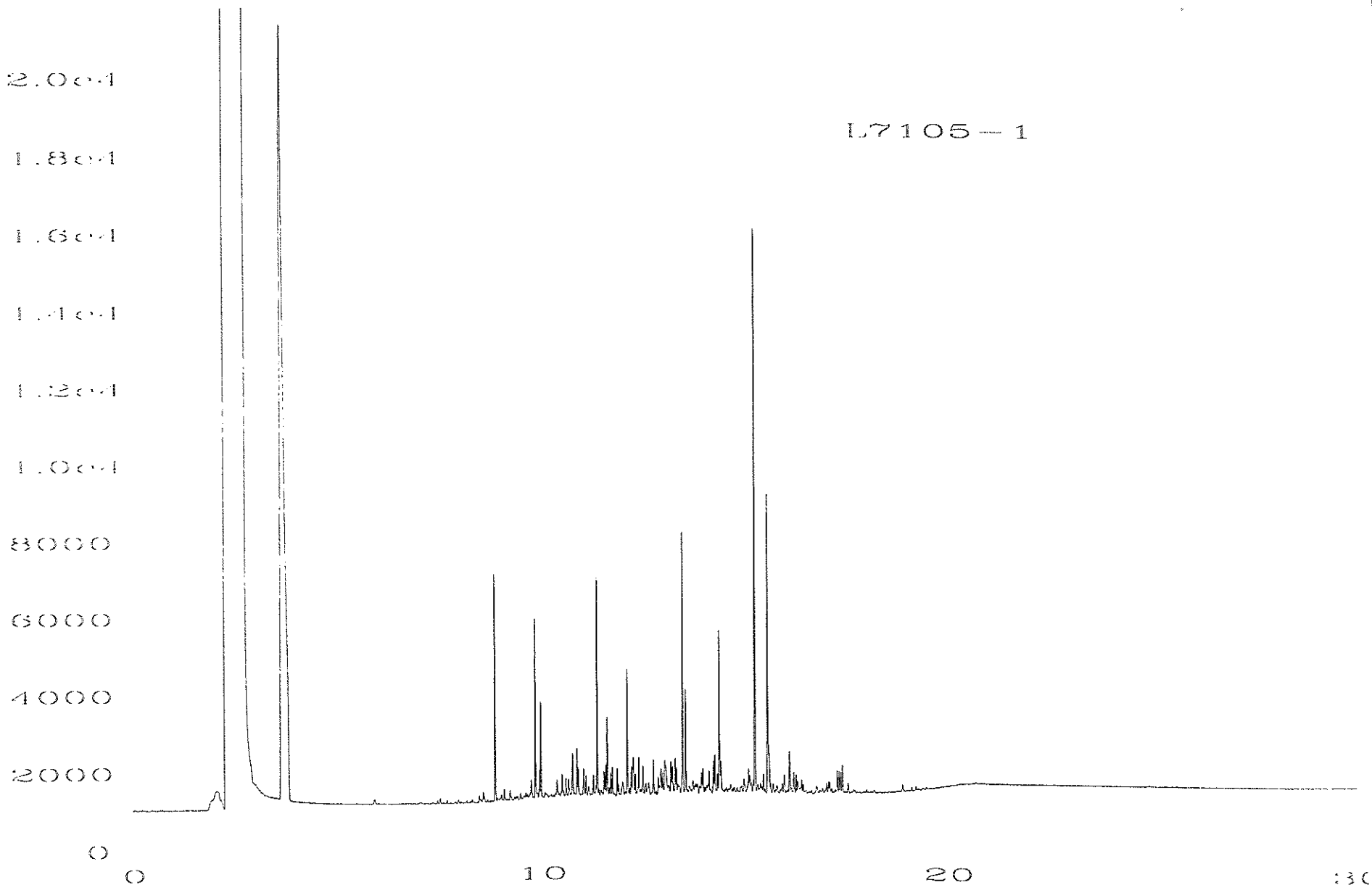
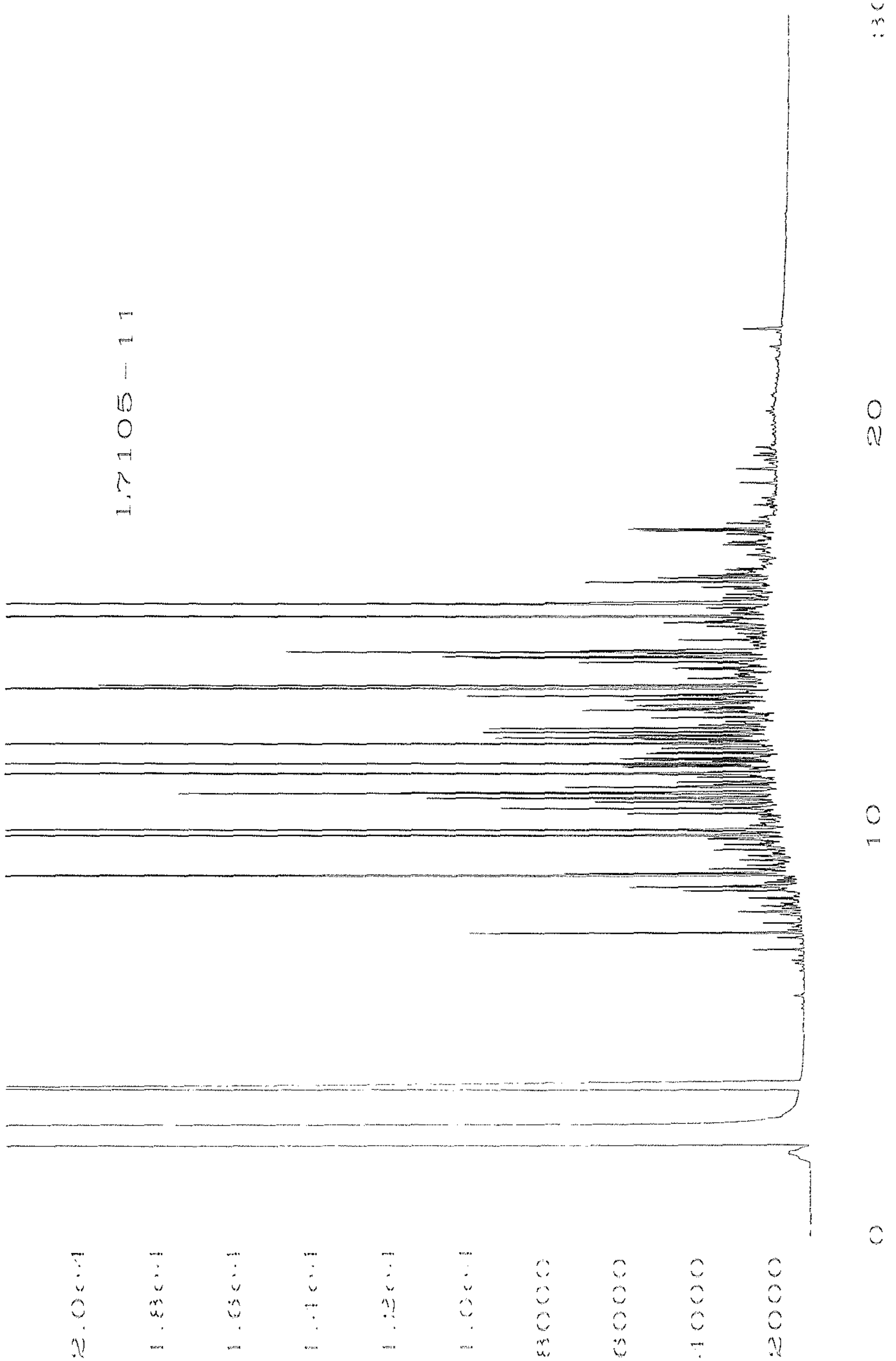
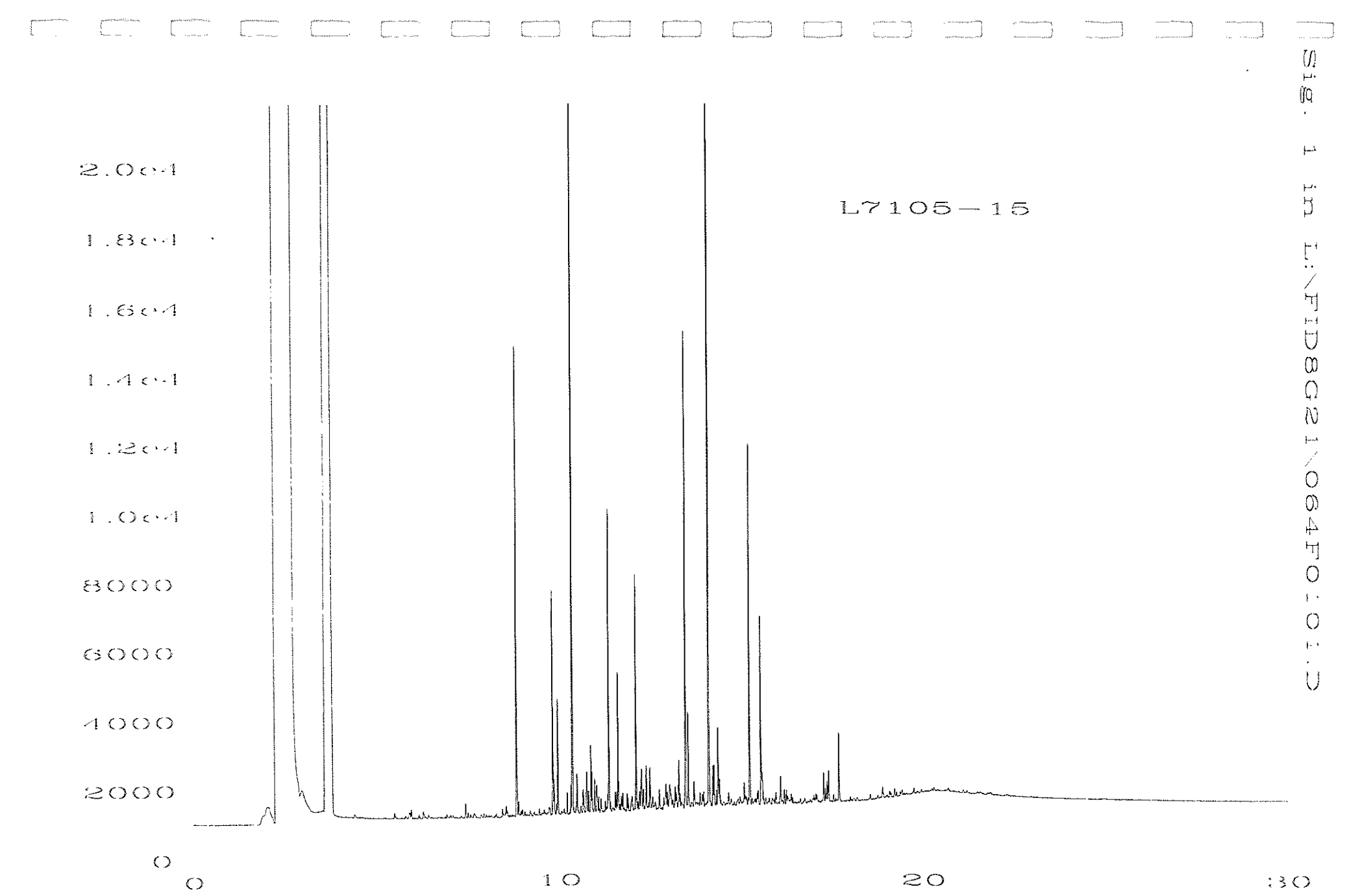

30W MOTOR OIL
2.0e+1
1.8e+1
1.6e+1
1.4e+1
1.2e+1
1.0e+1
8000
6000
4000
2000
0
10
20
30
Sig. 1 in L:\FID8G22\001F01.01.D


FUEL OIL #2
(DIESEL)
4.0e-1
3.0e-1
2.0e-1
1.0e-1
0
10
20
30


L7105-1
2.0e+1
1.8e+1
1.6e+1
1.4e+1
1.2e+1
1.0e+1
80000
60000
40000
20000
0
0
10
20
30
SEQ. 1 BY L:\FID8G22\006F0101.D

Sig. 1 in L:\FID8G22\008F0101.D




L7105-15
2.0e+1
1.8e+1
1.6e+1
1.4e+1
1.2e+1
1.0e+1
8000
6000
4000
2000
0
0
10
20
30
Sig. 1 in L:\FID8G21\064F01.D

Sig. 1 in L:\FID8G21\065F0101.D
17105-18
2.0e-1
1.8e-1
1.6e-1
1.4e-1
1.2e-1
1.0e-1
80000
60000
40000
20000
0
0
10
20
30

WOODWARD-CLYDE
CHAIN OF CUSTODY RECORD

1501 Fourth Avenue Suite 1500
Seattle, Washington 98101
(206) 343-7933 fax (206) 343-0513

Project Name: IP
Project Number: 91C0796B Project Manager: TS
Sampler (signature): TM
Shipping Form Tracking Number:
Page 1 of 1 Number of Coolers:

Date 1998	Time	Sample Identification	Matrix	Lab ID	Analyses: TPH-D ext.	Analyses: PAH + PCP	Preservative y/n	Number of Containers
14Jul	1400	98-PB01-3-4.5	Soil	L7105-1	X	X	N	1
14Jul	1502	98-PB01-0-1.5	Soil	-2			N	1
14Jul	1510	98-PB01-1.5-3	Soil	-3			N	1
14Jul	1520	98-PB01-4.5-6	Soil	-4			N	1
14Jul	1526	98-PB01-7.5-9	Soil	-5			N	1
14Jul	1510	98-PB01-6-7.5	Soil	-6			N	1
15Jul	11	98-PB02-1.5-3		-7			N	1
		98-PB02-3-4.5		-8			N	1
	845	98-PB02-4.5-6		-9			N	1
	8	98-PB02-6-7.5		-10			N	1
	900	98-PB02-7.5-9		-11	X	X	N	1
	930	98-PB03-1.5-3		-12			N	1
	935	98-PB03-3-4.5		-13			N	1
	938	98-PB03-4.5-6		-14			N	1
	941	98-PB03-6-7.5		-15	X	X	N	1
	945	98-PB03-7.5-9		-16			N	1
	1010	98-PB04-1.5-3		-17			N	1
	1020	98-PB04-4.5-6		-18	X	X	N	1
	1025	98-PB04-6-7.5		-19			N	1
↓	1030	98-PB04-7.5-9	↓	-20			N	1

Analyses: HOLD

Comments:
x PAH & Pentachlorophenol by 8270 SIM

Total Number of Containers 20

Relinquished By (signature):	Date/Time	Relinquished By (signature):	Date/Time
[illegible] M Caillard	15 Jul 98 1710		
Received By (Signature):	**Date/Time**	**Received for Lab By (signature):**	**Date Time**
TEVENT GOSSA	7/15/98 17:15		

(COCSEA.xls)

OAL

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L7157

August 7, 1998

Michelle McClelland
Woodward Clyde Consultants
1501 Fourth Avenue
Suite 1500
Seattle, WA 98101

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

Re: Laboratory Sample Analysis

Project: 91C0796B
IP

Project Manager: Michelle McClelland

Dear Michelle McClelland:

On Friday, July 17, 1998, OAL received nineteen (19) soil samples for analysis. The samples were analyzed utilizing EPA, ASTM, or equivalent methodology.

Should you have any questions concerning the results in this report, please contact us at (503) 590-5300. Refer to OAL login number L7157.

Sincerely,

Patty Boyden
Project Manager

Suzanne LeMay
QA/QC Officer

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Sample Summary

Sample ID	Lab #	Description	Sampled	Received
98-PB05-1.5-3	L7157-1	soil	07/16/98 08:20	07/17/98
98-PB05-3-4.5	L7157-2	soil	07/16/98 08:22	07/17/98
98-PB05-4.5-6	L7157-3	soil	07/16/98 08:25	07/17/98
98-PB06-1.5-3	L7157-4	soil	07/16/98 08:50	07/17/98
98-PB06-3-4.5	L7157-5	soil	07/16/98 08:55	07/17/98
98-PB06-4.5-6	L7157-6	soil	07/16/98 09:05	07/17/98
98-PB06-6-7.5	L7157-7	soil	07/16/98 09:10	07/17/98
98-PB07-1.5-3	L7157-8	soil	07/16/98 09:30	07/17/98
98-PB07-3-4.5	L7157-9	soil	07/16/98 09:32	07/17/98
98-PB07-4.5-6	L7157-10	soil	07/16/98 09:35	07/17/98
98-PB08-1.5-3	L7157-11	soil	07/16/98 09:55	07/17/98
98-PB08-3-4.5	L7157-12	soil	07/16/98 10:00	07/17/98
98-PB08-4.5-6	L7157-13	soil	07/16/98 10:05	07/17/98
98-PB09-1.5-3	L7157-14	soil	07/16/98 10:35	07/17/98
98-PB09-3-4.5	L7157-15	soil	07/16/98 10:40	07/17/98
98-PB09-4.5-6	L7157-16	soil	07/16/98 10:45	07/17/98
98-PB10-1.5-3	L7157-17	soil	07/16/98 12:30	07/17/98
98-PB10-3-4.5	L7157-18	soil	07/16/98 12:35	07/17/98
98-PB10-4.5-6	L7157-19	soil	07/16/98 12:40	07/17/98

Definition of Terms

ND Analytical result was below the reporting limit.

Analysts

Initials	Analyst	Title
PB	Pat Buddrus	Organics Chemist
RJ	Rick Jordan	Chemist

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Method Summary

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

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L7157

Client: *Woodward Clyde Consultants*
Contact: *Michelle McClelland*

Project: *91C0796B*
IP

Polynuclear Aromatic Hydrocarbons (PNA) and PCP
by EPA 8270 SIM

Sample ID	*Matrix*					*Lab Number*
Analyte		Result	Reporting Limit	Units	Comment	
98-PB05-3-4.5	*Soil*				Sampled: *07/16/98* Extracted: *07/23/98* Analyzed: *07/23/98 by PB*	*L7157-2*
See Attached Data Sheet						
98-PB06-1.5-3	*Soil*				Sampled: *07/16/98* Extracted: *07/23/98* Analyzed: *07/23/98 by PB*	*L7157-4*
See Attached Data Sheet						
98-PB07-3-4.5	*Soil*				Sampled: *07/16/98* Extracted: *07/23/98* Analyzed: *07/23/98 by PB*	*L7157-9*
See Attached Data Sheet						
98-PB08-3-4.5	*Soil*				Sampled: *07/16/98* Extracted: *07/23/98* Analyzed: *07/31/98 by PB*	*L7157-12*
See Attached Data Sheet						
98-PB09-3-4.5	*Soil*				Sampled: *07/16/98* Extracted: *07/23/98* Analyzed: *07/23/98 by PB*	*L7157-15*
See Attached Data Sheet						
98-PB10-3-4.5	*Soil*				Sampled: *07/16/98* Extracted: *07/23/98* Analyzed: *07/23/98 by PB*	*L7157-18*
See Attached Data Sheet						

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L7157

Client: **Woodward Clyde Consultants**
Contact: **Michelle McClelland**

Project: **91C0796E**

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

Sample ID	Analyte	Results	Blank Result	Reporting Limit	Units	COMMENT	*Lab Number*
98-PB05-3-4.5	*SOIL*		*MB0723M*			Sampled: *07/16/98* Analyzed: *07/23/98*	*L7157-2*
CAS#							
91-20-3	**Naphthalene**	**42**	**nd**	**10**	**ug/Kg**		
208-96-8	Acenaphthylene	nd	nd	10	ug/Kg		
83-32-9	**Acenaphthene**	**95**	**nd**	**10**	**ug/Kg**		
86-73-7	**Fluorene**	**42**	**nd**	**10**	**ug/Kg**		
87-86-5	Pentachlorophenol	nd	nd	100	ug/Kg		
85-01-8	**Phenanthrene**	**16**	**nd**	**10**	**ug/Kg**		
120-12-7	**Anthracene**	**67**	**nd**	**10**	**ug/Kg**		
206-44-0	Fluoranthene	nd	nd	10	ug/Kg		
129-00-0	Pyrene	nd	nd	10	ug/Kg		
56-55-3	Benzo[a]anthracene	nd	nd	10	ug/Kg		
218-01-9	Chrysene	nd	nd	10	ug/Kg		
205-99-2	Benzo[b]fluoranthene	nd	nd	10	ug/Kg		
207-08-9	Benzo[k]fluoranthene	nd	nd	10	ug/Kg		
50-32-8	Benzo[a]pyrene	nd	nd	10	ug/Kg		
193-39-5	Indeno[1,2,3-cd]pyrene	nd	nd	10	ug/Kg		
53-70-3	Dibenz[a,h]anthracene	nd	nd	10	ug/Kg		
191-24-2	Benzo[g,h,i]perylene	nd	nd	10	ug/Kg		

Acid Surrogates:	Recovery *L7157-2*	Recovery *MB0723M*
2-Fluorophenol	92%	102%
Phenol-d4	94%	107%
2,4,6-Tribromophenol	82%	48%

Base / Neutral Surrogates:	*L7157-2*	*MB0723M*
1,2-Dichlorobenzene-d4	82%	95%
Nitrobenzene-d5	82%	90%
2-Fluorobiphenyl	82%	99%

none detected = nd

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L7157

Client: Woodward Clyde Consultants
Contact: Michelle McClelland

Project: 91C0796B

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

Sample ID	Analyte	Results	Blank Result	Reporting Limit	Units	COMMENT	Lab Number
98-PB06-1.5-3	SOIL		MB0723M			Sampled: 07/16/98 Analyzed: 07/23/98	L7157-4
CAS#							
91-20-3	Naphthalene	46	nd	10	ug/Kg		
208-96-8	Acenaphthylene	21	nd	10	ug/Kg		
83-32-9	Acenaphthene	308	nd	10	ug/Kg		
86-73-7	Fluorene	108	nd	10	ug/Kg		
87-86-5	Pentachlorophenol	nd	nd	100	ug/Kg		
85-01-8	Phenanthrene	60	nd	10	ug/Kg		
120-12-7	Anthracene	33	nd	10	ug/Kg		
206-44-0	Fluoranthene	60	nd	10	ug/Kg		
129-00-0	Pyrene	48	nd	10	ug/Kg		
56-55-3	Benzo[a]anthracene	25	nd	10	ug/Kg		
218-01-9	Chrysene	33	nd	10	ug/Kg		
205-99-2	Benzo[b]fluoranthene	41	nd	10	ug/Kg		
207-08-9	Benzo[k]fluoranthene	14	nd	10	ug/Kg		
50-32-8	Benzo[a]pyrene	24	nd	10	ug/Kg		
193-39-5	Indeno[1,2,3-cd]pyrene	16	nd	10	ug/Kg		
53-70-3	Dibenz[a,h]anthracene	nd	nd	10	ug/Kg		
191-24-2	Benzo[g,h,i]perylene	19	nd	10	ug/Kg		

Acid Surrogates:	Recovery L7157-4	Recovery MB0723M
2-Fluorophenol	85%	102%
Phenol-d4	88%	107%
2,4,6-Tribromophenol	90%	48%

Base / Neutral Surrogates:	L7157-4	MB0723M
1,2-Dichlorobenzene-d4	79%	95%
Nitrobenzene-d5	77%	90%
2-Fluorobiphenyl	83%	99%

none detected = nd

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L715

Client: Woodward Clyde Consultants
Contact: Michelle McClelland

Project: 91C079(

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

Sample ID	Analyte	Results	Blank Result	Reporting Limit	Units	COMMENT	*Lab Numb*
98-PB07-3-4.5	*SOIL*		*MB0723M*			Sampled: *07/16/98* Analyzed: *07/23/98*	*L7157-5*
CAS#							
91-20-3	**Naphthalene**	12,300	nd	10	ug/Kg		
208-96-8	**Acenaphthylene**	22	nd	10	ug/Kg		
83-32-9	**Acenaphthene**	1,030	nd	10	ug/Kg		
86-73-7	**Fluorene**	473	nd	10	ug/Kg		
87-86-5	Pentachlorophenol	nd	nd	100	ug/Kg		
85-01-8	**Phenanthrene**	219	nd	10	ug/Kg		
120-12-7	**Anthracene**	20	nd	10	ug/Kg		
206-44-0	**Fluoranthene**	143	nd	10	ug/Kg		
129-00-0	**Pyrene**	106	nd	10	ug/Kg		
56-55-3	**Benzo[a]anthracene**	33	nd	10	ug/Kg		
218-01-9	**Chrysene**	49	nd	10	ug/Kg		
205-99-2	**Benzo[b]fluoranthene**	29	nd	10	ug/Kg		
207-08-9	**Benzo[k]fluoranthene**	11	nd	10	ug/Kg		
50-32-8	**Benzo[a]pyrene**	15	nd	10	ug/Kg		
193-39-5	Indeno[1,2,3-cd]pyrene	nd	nd	10	ug/Kg		
53-70-3	Dibenz[a,h]anthracene	nd	nd	10	ug/Kg		
191-24-2	Benzo[g,h,i]perylene	nd	nd	10	ug/Kg		

Acid Surrogates:	Recovery *L7157-9*	Recovery *MB0723M*
2-Fluorophenol	96%	102%
Phenol-d4	100%	107%
2,4,6-Tribromophenol	102%	48%

Base / Neutral Surrogates:	*L7157-9*	*MB0723M*
1,2-Dichlorobenzene-d4	88%	95%
Nitrobenzene-d5	90%	90%
2-Fluorobiphenyl	94%	99%

none detected = nd

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Client: Woodward Clyde Consultants
Contact: Michelle McClelland

Project: 91C0796B

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

Sample ID	Analyte	Results	Blank Result	Reporting Limit	Units	COMMENT	*Lab Number*
98-PB08-3-4.5	*SOIL*		*MB0723M*			Sampled: *07/16/98* Analyzed: *07/31/98*	*L7157-12*
CAS#							
91-20-3	**Naphthalene . . . . . .**	**24**	**nd**	**10**	**ug/Kg**		
208-96-8	Acenaphthylene	nd	nd	10	ug/Kg		
83-32-9	**Acenaphthene . . . . . .**	**65**	**nd**	**10**	**ug/Kg**		
86-73-7	**Fluorene . . . . . .**	**56**	**nd**	**10**	**ug/Kg**		
87-86-5	Pentachlorophenol	nd	nd	100	ug/Kg		
85-01-8	Phenanthrene	nd	nd	10	ug/Kg		
120-12-7	Anthracene	nd	nd	10	ug/Kg		
206-44-0	Fluoranthene	nd	nd	10	ug/Kg		
129-00-0	Pyrene	nd	nd	10	ug/Kg		
56-55-3	Benzo[a]anthracene	nd	nd	10	ug/Kg		
218-01-9	Chrysene	nd	nd	10	ug/Kg		
205-99-2	Benzo[b]fluoranthene	nd	nd	10	ug/Kg		
207-08-9	Benzo[k]fluoranthene	nd	nd	10	ug/Kg		
50-32-8	Benzo[a]pyrene	nd	nd	10	ug/Kg		
193-39-5	Indeno[1,2,3-cd]pyrene	nd	nd	10	ug/Kg		
53-70-3	Dibenz[a,h]anthracene	nd	nd	10	ug/Kg		
191-24-2	Benzo[g,h,i]perylene	nd	nd	10	ug/Kg		

Acid Surrogates:	Recovery *L7157-12*	Recovery *MB0723M*
2-Fluorophenol	112%	102%
Phenol-d4	129%	107%
2,4,6-Tribromophenol	114%	48%

Base / Neutral Surrogates:	*L7157-12*	*MB0723M*
1,2-Dichlorobenzene-d4	105%	95%
Nitrobenzene-d5	91%	90%
2-Fluorobiphenyl	111%	99%

none detected = nd

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OAL

L7157

Client: Woodward Clyde Consultants
Contact: Michelle McClelland

Project: 91C0796B

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

Sample ID	Analyte	Results	Blank Result	Reporting Limit	Units	COMMENT	*Lab Number*
98-PB09-3-4.5	*SOIL*		*MB0723M*			Sampled: *07/16/98* Analyzed: *07/23/98*	*L7157-15*
CAS#							
91-20-3	**Naphthalene . . . . . .**	**41**	**nd**	**10**	**ug/Kg**		
208-96-8	Acenaphthylene	nd	nd	10	ug/Kg		
83-32-9	**Acenaphthene . . . . . .**	**50**	**nd**	**10**	**ug/Kg**		
86-73-7	**Fluorene . . . . . .**	**47**	**nd**	**10**	**ug/Kg**		
87-86-5	Pentachlorophenol	nd	nd	100	ug/Kg		
85-01-8	Phenanthrene	nd	nd	10	ug/Kg		
120-12-7	Anthracene	nd	nd	10	ug/Kg		
206-44-0	Fluoranthene	nd	nd	10	ug/Kg		
129-00-0	Pyrene	nd	nd	10	ug/Kg		
56-55-3	Benzo[a]anthracene	nd	nd	10	ug/Kg		
218-01-9	Chrysene	nd	nd	10	ug/Kg		
205-99-2	Benzo[b]fluoranthene	nd	nd	10	ug/Kg		
207-08-9	Benzo[k]fluoranthene	nd	nd	10	ug/Kg		
50-32-8	Benzo[a]pyrene	nd	nd	10	ug/Kg		
193-39-5	Indeno[1,2,3-cd]pyrene	nd	nd	10	ug/Kg		
53-70-3	Dibenz[a,h]anthracene	nd	nd	10	ug/Kg		
191-24-2	Benzo[g,h,i]perylene	nd	nd	10	ug/Kg		

Acid Surrogates:	Recovery *L7157-15*	Recovery *MB0723M*
2-Fluorophenol	106%	102%
Phenol-d4	109%	107%
2,4,6-Tribromophenol	84%	48%

Base / Neutral Surrogates:	*L7157-15*	*MB0723M*
1,2-Dichlorobenzene-d4	97%	95%
Nitrobenzene-d5	97%	90%
2-Fluorobiphenyl	101%	99%

none detected = nd

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A Division of Portland General Electric
14855 S.W. Old Scholls Ferry Road, Beaverton, OR 97007
Phone 503-590-5300 • Fax 503-590-1404

OAL

L7157

Client: Woodward Clyde Consultants
Contact: Michelle McClelland

Project: 91C0796B

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

Sample ID	Analyte	Results	Blank Result	Reporting Limit	Units	COMMENT	*Lab Number*
98-PB10-3-4.5 *SOIL*			*MB0723M*			Sampled: *07/16/98* Analyzed: *07/23/98*	*L7157-18*
CAS#							
91-20-3	**Naphthalene . . . . . .**	**171**	**nd**	**10**	**ug/Kg**		
208-96-8	Acenaphthylene	nd	nd	10	ug/Kg		
83-32-9	**Acenaphthene . . . . . .**	**340**	**nd**	**10**	**ug/Kg**		
86-73-7	**Fluorene . . . . . .**	**128**	**nd**	**10**	**ug/Kg**		
87-86-5	Pentachlorophenol	nd	nd	100	ug/Kg		
85-01-8	Phenanthrene	nd	nd	10	ug/Kg		
120-12-7	Anthracene	nd	nd	10	ug/Kg		
206-44-0	Fluoranthene	nd	nd	10	ug/Kg		
129-00-0	Pyrene	nd	nd	10	ug/Kg		
56-55-3	Benzo[a]anthracene	nd	nd	10	ug/Kg		
218-01-9	Chrysene	nd	nd	10	ug/Kg		
205-99-2	Benzo[b]fluoranthene	nd	nd	10	ug/Kg		
207-08-9	Benzo[k]fluoranthene	nd	nd	10	ug/Kg		
50-32-8	Benzo[a]pyrene	nd	nd	10	ug/Kg		
193-39-5	Indeno[1,2,3-cd]pyrene	nd	nd	10	ug/Kg		
53-70-3	Dibenz[a,h]anthracene	nd	nd	10	ug/Kg		
191-24-2	Benzo[g,h,i]perylene	nd	nd	10	ug/Kg		

Acid Surrogates:	Recovery *L7157-18*	Recovery *MB0723M*
2-Fluorophenol	106%	102%
Phenol-d4	112%	107%
2,4,6-Tribromophenol	85%	48%

Base / Neutral Surrogates:	*L7157-18*	*MB0723M*
1,2-Dichlorobenzene-d4	99%	95%
Nitrobenzene-d5	99%	90%
2-Fluorobiphenyl	98%	99%

none detected = nd

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A Division of Portland General Electric
14855 S.W. Old Scholls Ferry Road, Beaverton, OR 97007
Phone 503-590-5300 • Fax 503-590-1404

Client: ***Woodward Clyde Consultants***
Contact: ***Michelle McClelland***

Project: ***91C0796B***
IP

Semi-Volatile Petroleum Products
by NWTPH-DX

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

					Sampled: *07/16/98*	
					Extracted: *07/23/98*	
98-PB05-3-4.5	*Soil*				**Analyzed:** *07/24/98 by RJ*	*L7157-*
Diesel Region		ND	25.	mg/kg		
Oil Region		ND	50.	mg/kg		

Surrogate	Recovery	Limit
2-Fluorobiphenyl	99.%	50. - 150.
O-terphenyl	114.%	50. - 150.

					Sampled: *07/16/98*	
					Extracted: *07/23/98*	
98-PB06-1.5-3	*Soil*				**Analyzed:** *07/24/98 by RJ*	*L7157-4*
Diesel Region		**54.**	**25.**	**mg/kg**	1	
Oil Region		ND	50.	mg/kg		

Surrogate	Recovery	Limit
2-Fluorobiphenyl	117.%	50. - 150.
O-terphenyl	129.%	50. - 150.

[1] Pattern does not suggest a typical product.

					Sampled: *07/16/98*	
					Extracted: *07/23/98*	
98-PB07-3-4.5	*Soil*				**Analyzed:** *07/24/98 by RJ*	*L7157-9*
Diesel Region		**74.**	**25.**	**mg/kg**	1	
Oil Region		ND	50.	mg/kg		

Surrogate	Recovery	Limit
2-Fluorobiphenyl	98.%	50. - 150.
O-terphenyl	106.%	50. - 150.

[1] Pattern does not suggest a typical product.

Client: ***Woodward Clyde Consultants***
Contact: ***Michelle McClelland***

Project: ***91C0796B***
IP

Semi-Volatile Petroleum Products
by NWTPH-DX

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

					Sampled: *07/16/98*	
					Extracted: *07/23/98*	
98-PB08-3-4.5	*Soil*				**Analyzed:** *07/24/98 by RJ*	*L7157-12*
Diesel Region		ND	25.	mg/kg		
Oil Region		ND	50.	mg/kg		

Surrogate	Recovery	Limit
2-Fluorobiphenyl	73.%	50. - 150.
O-terphenyl	88.%	50. - 150.

					Sampled: *07/16/98*	
					Extracted: *07/23/98*	
98-PB09-3-4.5	*Soil*				**Analyzed:** *07/24/98 by RJ*	*L7157-15*
Diesel Region		ND	25.	mg/kg		
Oil Region		ND	50.	mg/kg		

Surrogate	Recovery	Limit
2-Fluorobiphenyl	79.%	50. - 150.
O-terphenyl	92.%	50. - 150.

					Sampled: *07/16/98*	
					Extracted: *07/23/98*	
98-PB10-3-4.5	*Soil*				**Analyzed:** *07/24/98 by RJ*	*L7157-18*
Diesel Region		ND	25.	mg/kg		
Oil Region		ND	50.	mg/kg		

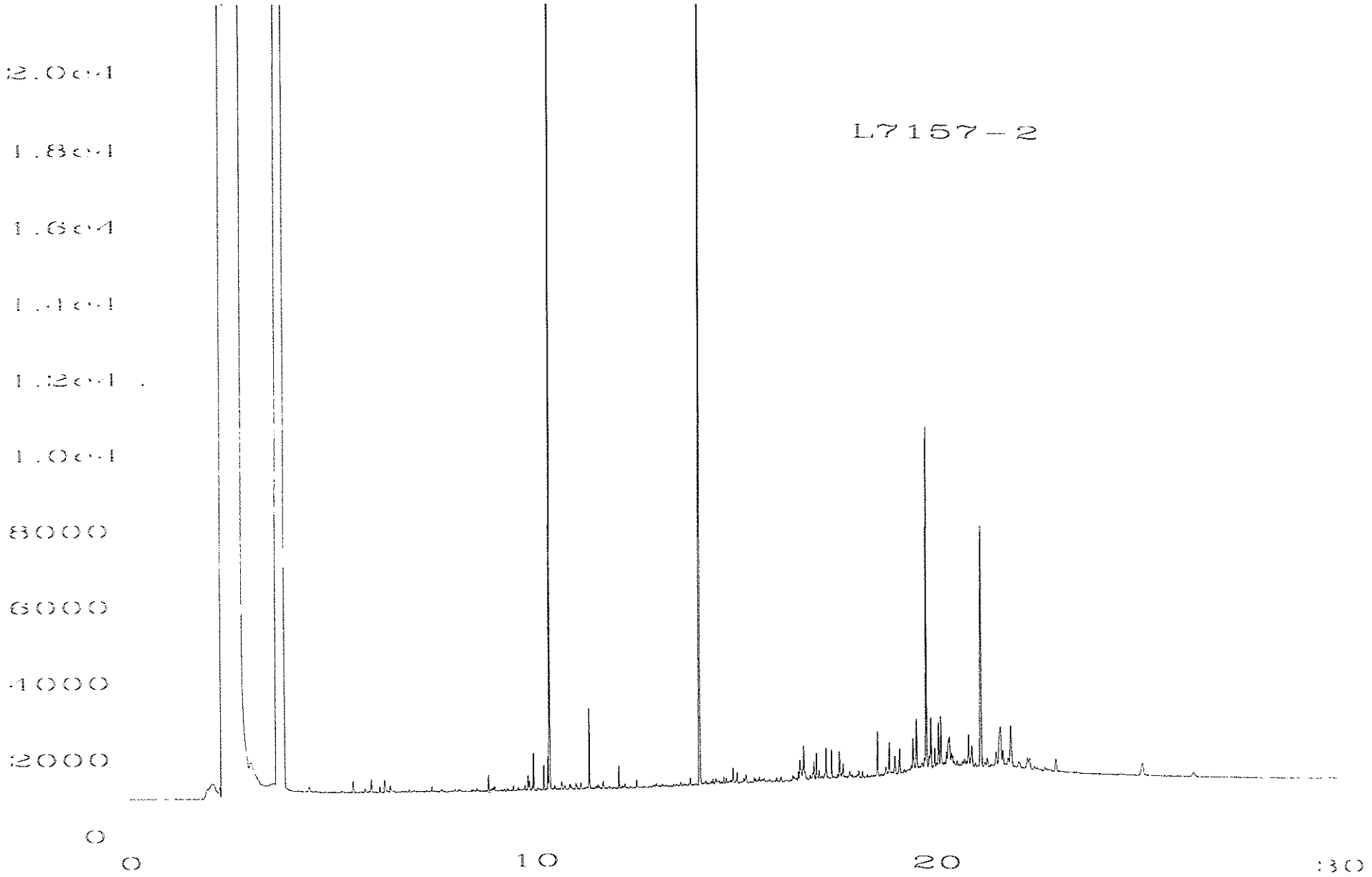
Surrogate	Recovery	Limit
2-Fluorobiphenyl	75.%	50. - 150.
O-terphenyl	85.%	50. - 150.

Client: ***Woodward Clyde Consultants***
Contact: ***Michelle McClelland***

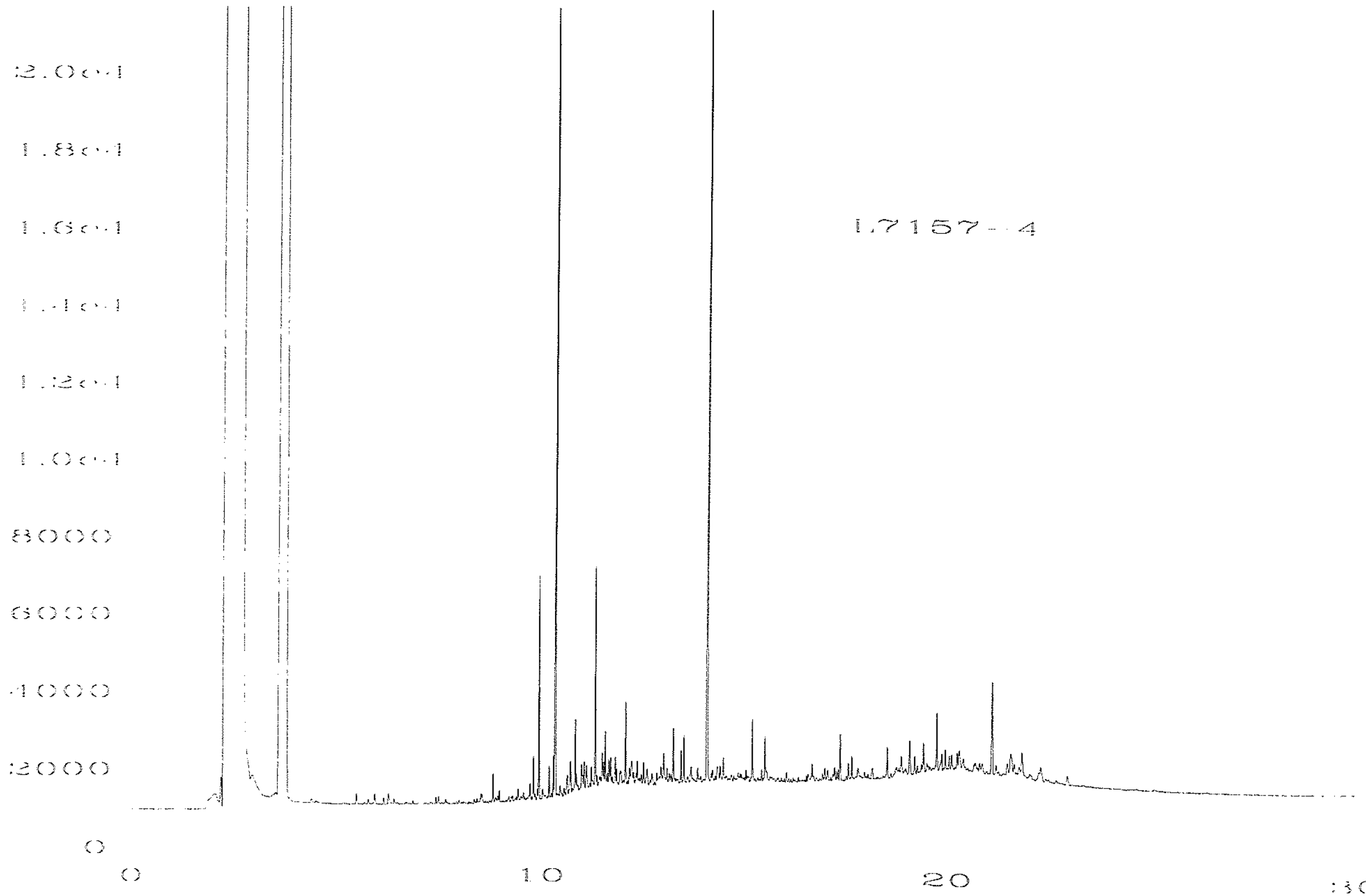
Project: ***91C0796B***
IP

Custom GC Fuels Analysis

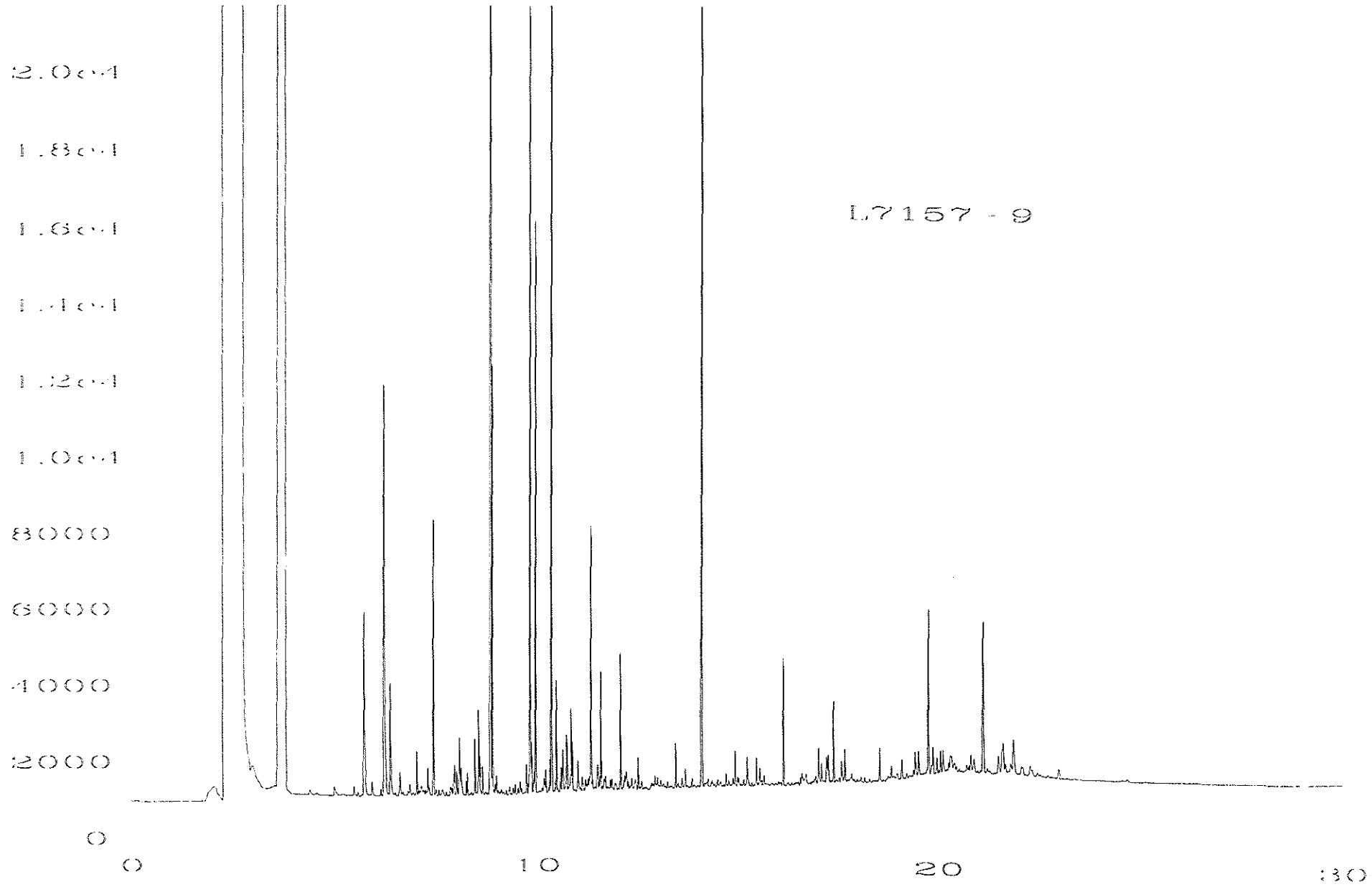
Sample ID	*Matrix*					*Lab Number*
Analyte		**Result**	**Reporting Limit**	**Units**	**Comment**	
					Sampled: *07/16/98*	
					Custom GC Fuels Analysis: *08/06/98*	
98-PB05-1.5-3	*Soil*				**Analyzed:** *08/06/98 by RJ*	*L7157-1*
See Attached Data Sheet						



Sig. 1 in L:\FID8G24\0271F0101.D



Sig. 1 in L:\FID8G24\032F0101.D



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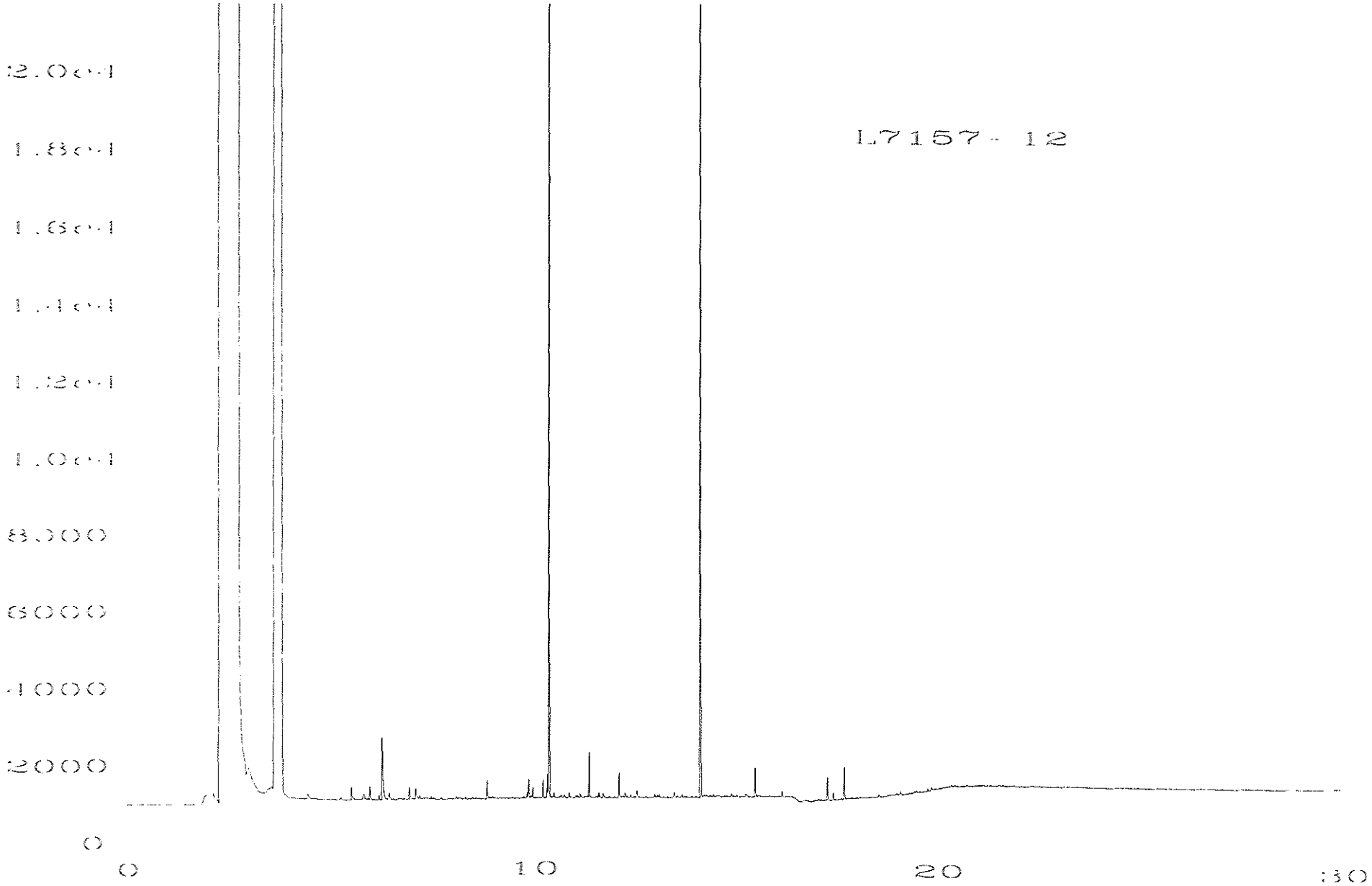

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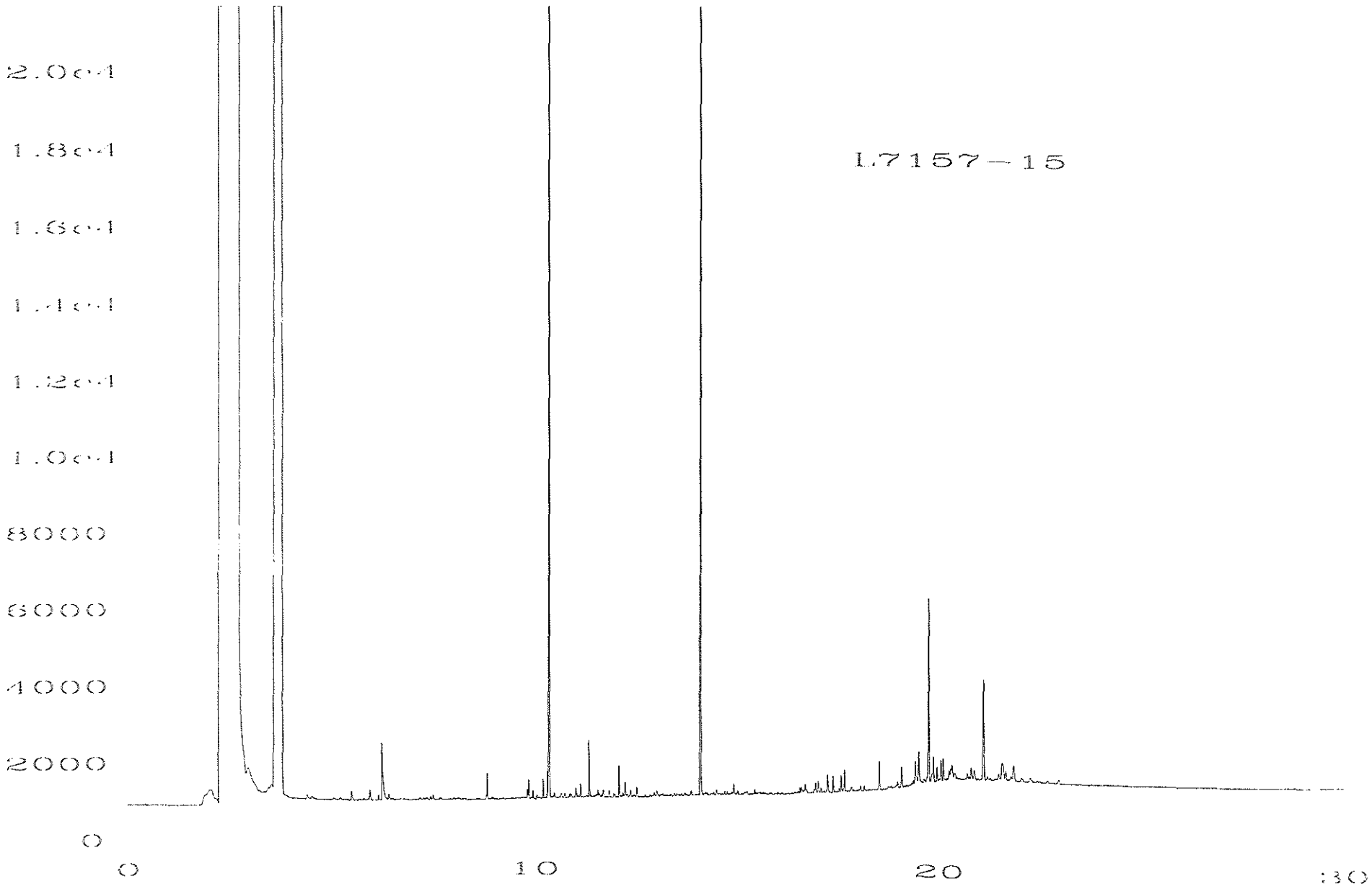

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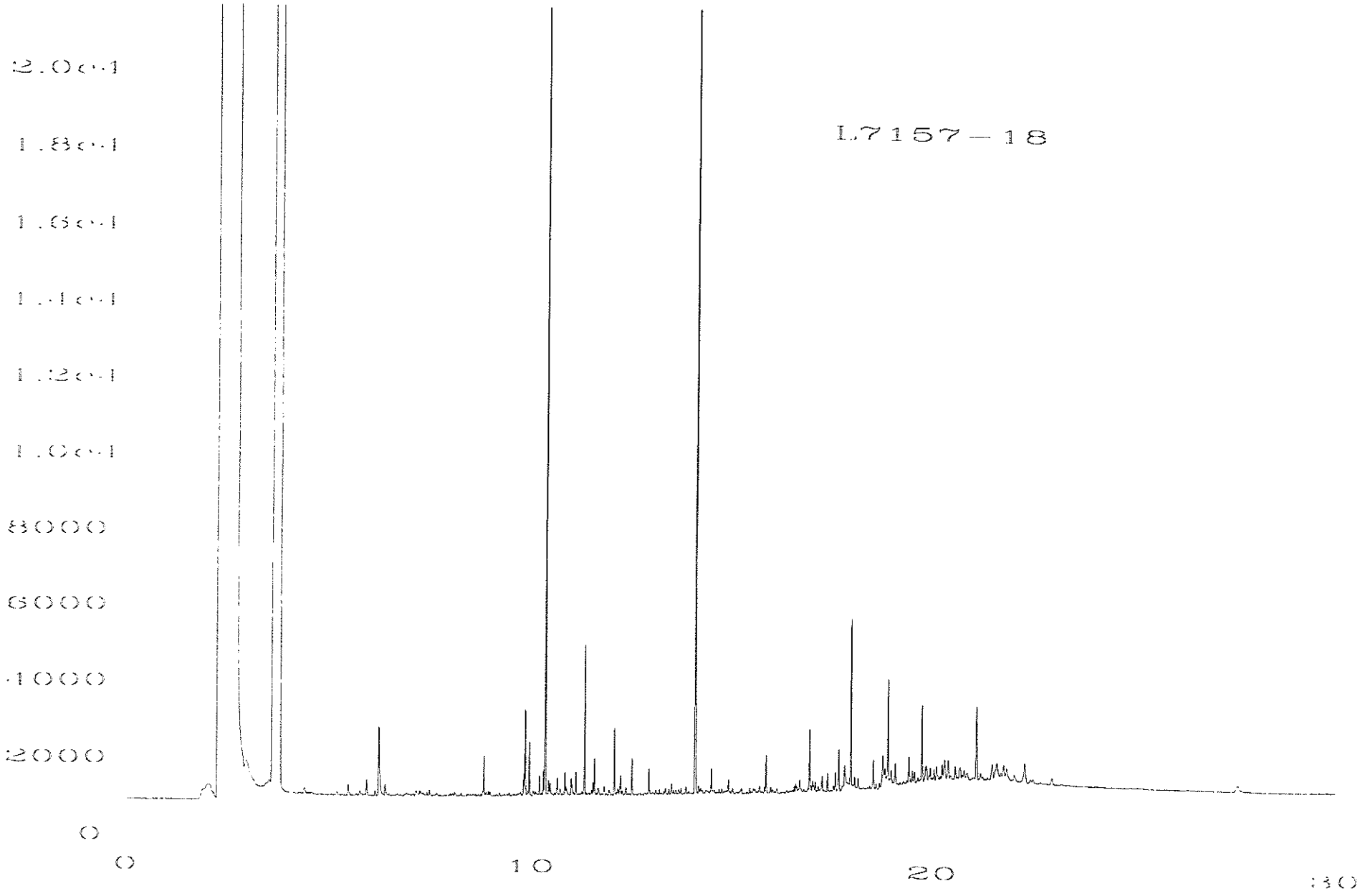

Fig. 1 in L:\FID8G24\008F0101.D

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L7157

Client: **Woodward Clyde Consultants**
Contact: **Michelle McClelland**

Project: **91C0796B**

PNA & PCP LCS

by modified EPA method 8270 (SIM)

Sample ID	Lab Number	
Analyte	Recovery	COMMENT

Sampled: *NA*
Analyzed: *07/23/98*

CAS#		*LCS0723M*
91-20-3	Naphthalene	89%
208-96-8	Acenaphthylene	92%
83-32-9	Acenaphthene	105%
86-73-7	Fluorene	96%
87-86-5	Pentachlorophenol	58%
85-01-8	Phenanthrene	106%
120-12-7	Anthracene	93%
206-44-0	Fluoranthene	94%
129-00-0	Pyrene	97%
56-55-3	Benzo[a]anthracene	99%
218-01-9	Chrysene	101%
205-99-2	Benzo[b]fluoranthene	93%
207-08-9	Benzo[k]fluoranthene	97%
50-32-8	Benzo[a]pyrene	92%
193-39-5	Indeno[1,2,3-cd]pyrene	80%
53-70-3	Dibenz[a,h]anthracene	76%
191-24-2	Benzo[g,h,i]perylene	82%

Acid Surrogates:	Recovery *LCS0723M*
2-Fluorophenol	95%
Phenol-d4	100%
2,4,6-Tribromophenol	68%

Base / Neutral Surrogates:	*LCS0723M*
1,2-Dichlorobenzene-d4	88%
Nitrobenzene-d5	87%
2-Fluorobiphenyl	96%

none detected = nd

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Phone 503-590-5300 • Fax 503-590-1404
www.oalab.com/oal • Toll-Free 1-800-644-0967

Client: **Woodward Clyde Consultants**
Contact: **Michelle McClelland**

Project: **91C07**

PNA & PCP Matrix Spikes

by modified EPA method 8270 (SIM)

Sample ID		Lab Number	Lab Number		
	Analyte	Recovery	Recovery	RPD	COMMENT
98-5896-60	*SOIL*	*L7184-3MS*	*L7184-3MSD*		**Sampled:** *07/21/98* **Analyzed:** *07/23/98*
CAS#					
91-20-3	Naphthalene	82%	97%	**16%**	
208-96-8	Acenaphthylene	61%	73%	**18%**	
83-32-9	Acenaphthene	90%	64%	**33%**	
86-73-7	Fluorene	81%	4%	**179%**	
87-86-5	Pentachlorophenol	45%	47%	**3%**	
85-01-8	Phenanthrene	-2%	-6%	**99%**	
120-12-7	Anthracene	72%	87%	**18%**	
206-44-0	Fluoranthene	70%	86%	**21%**	
129-00-0	Pyrene	56%	72%	**25%**	
56-55-3	Benzo[a]anthracene	70%	93%	**28%**	
218-01-9	Chrysene	73%	104%	**35%**	
205-99-2	Benzo[b]fluoranthene	89%	112%	**22%**	
207-08-9	Benzo[k]fluoranthene	87%	100%	**14%**	
50-32-8	Benzo[a]pyrene	73%	93%	**23%**	
193-39-5	Indeno[1,2,3-cd]pyrene	67%	87%	**26%**	
53-70-3	Dibenz[a,h]anthracene	56%	68%	**20%**	
191-24-2	Benzo[g,h,i]perylene	78%	95%	**19%**	

Acid Surrogates:	Recovery *L7184-3MS*	Recovery *L7184-3MSD*
2-Fluorophenol	92%	83%
Phenol-d4	94%	86%
2,4,6-Tribromophenol	0%	0%

Base / Neutral Surrogates:	*L7184-3MS*	*L7184-3MSD*
1,2-Dichlorobenzene-d4	101%	87%
Nitrobenzene-d5	145%	103%
2-Fluorobiphenyl	98%	82%

none detected = nd

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L7157

Client: *Woodward Clyde Consultants*
Contact: *Michelle McClelland*

Project: *91C0796B*
IP

Batch Q.C.

Method Blank

NWTPH-Dx/Soil (mg/kg)

Analyte	Result	Reporting Limit	Q	Date Analyzed
NWTPH-Dx				
Diesel range	ND	25		07/23/98
Oil range	ND	50		

Surrogates	% Recovery
Fluorobiphenyl	82
O-terphenyl	98

Comments:

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OAL

L715

Client: *Woodward Clyde Consultants*
Contact: *Michelle McClelland*

Project: *91C0796*
I

Batch Q.C.

LCS

NWTPH-Dx/Soil (mg/kg)

Analyte	Result	True Value	% Recovery	Q	Date Analyzed
NWTPH-Dx	142	134	106		07/23/98

Surrogates	% Recovery
Fluorobiphenyl	96
O-terphenyl	108

Comments:

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L7157

Client: ***Woodward Clyde Consultants***
Contact: ***Michelle McClelland***

Project: ***91C0796B***
IP

Batch Q.C.

Duplicate

NWTPH-Dx/Soil (mg/kg)

Analyte	Result	Duplicate Result	RPD	Reporting Limit	Q	Date Analyzed
NWTPH-Dx						
Diesel range	9890	10600	7	1250		07/23/98
Oil range	ND	ND	NA	2500		

Surrogates	% Recovery Sample	% Recovery Duplicate
Fluorobiphenyl	MI	MI
O-terphenyl	MI	MI

Comments:

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Client: *Woodward Clyde Consultants*
Contact: *Michelle McClelland*

Project: *91C0796B*
IP

Batch Q.C.

MS

NWTPH-Dx/Soil (mg/kg)

Analyte	Sample Result	MS Result	True Value	% Recovery	Q	Date Analyzed
NWTPH-Dx	9890	MI	159	NA		07/23/98

Surrogates	% Recovery Sample	% Recovery MS
Fluorobiphenyl	MI	MI
O-terphenyl	MI	MI

Comments:

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WOODWARD-CLYDE
CHAIN OF CUSTODY RECORD

1501 Fourth Avenue Suite 1500
Seattle, Washington 98101
(206) 343-7933 fax (206) 343-0513

Project Name: I P
Project Number: 91C0196B Project Manager: TS
Sampler (signature): T M
Shipping Form Tracking Number:
Page 1 of Number of Coolers: UNCUT-G 7/17

Date 1998	Time	Sample Identification	Matrix	Lab ID	Analyses: TPH-Dext	Analyses: PAH + PCP - 8270 SIM	Analyses: H O L D	Preservative y/n	Number of Containers
16Jul	820	98-PB05-1.5-3	Soil	17157-1			H O L D	N	1
	822	98-PB05-3-4.5		-2	X	X		N	1
	825	98-PB05-4.5-6		-3			H O L D	N	1
	850	98-PB06-1.5-3		-4	X	X		N	1
	855	98-PB06-3-4.5		-5			H O L D	N	1
	905	98-PB06-4.5-6		-6			H O L D	N	1
	910	98-PB06-6-7.5		-7			H O L D	N	1
	930	98-PB07-1.5-3		-8			H O L D	N	1
	932	98-PB07-3-4.5		-9	X	X		N	1
	935	98-PB07-4.5-6		-10			H O L D	N	1
	955	98-PB08-1.5-3		-11			H O L D	N	1
	1000	98-PB08-3-4.5		-12	X	X		N	1
	1005	98-PB08-4.5-6		-13			H O L D	N	1
	1035	98-PB09-1.5-3		-14			H O L D	N	1
	1040	98-PB09-3-4.5		-15	X	X		N	1
	1045	98-PB09-4.5-6		-16			H O L D	N	1
	1230	98-PB10-1.5-3		-17			H O L D	N	1
	1235	98-PB10-3-4.5		-18	X	X		N	1
↓	1240	98-PB10-4.5-6	↓	-19			H O L D	N	1

Comments: * Please sent Chromatograms (TPH-D)

Total Number of Containers: 19

Relinquished By (signature): Jenny Crook Date/Time: 7/17 12:45

Received By (Signature): Date/Time: 7-17-12:45

Relinquished By (signature): Date/Time:

Received for Lab By (signature): Date/Time: 7/18/98 (TG) 17:05

TEYENT GOSSA

(COCSEA xls)

OAL

L7158

August 7, 1998

Michelle McClelland
Woodward Clyde Consultants
1501 Fourth Avenue
Suite 1500
Seattle, WA 98101

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

Re: Laboratory Sample Analysis

Project: 91C0796B
IP

Project Manager: Michelle McClelland

Dear Michelle McClelland:

On Friday, July 17, 1998, OAL received eleven (11) soil samples for analysis. The samples were analyzed utilizing EPA, ASTM, or equivalent methodology.

Should you have any questions concerning the results in this report, please contact us at (503) 590-5300. Refer to OAL login number L7158.

Sincerely,

Patty Boyden
Project Manager

Suzanne LeMay
QA/QC Officer

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OAL

L7158

Sample Summary

Sample ID	Lab #	Description	Sampled	Received
98-PB11-4.5-6	L7158-1	soil	07/17/98 09:45	07/17/98
98-PB11-6-7.5	L7158-2	soil	07/17/98 09:50	07/17/98
98-PB11-7.5-9	L7158-3	soil	07/17/98 09:55	07/17/98
98-PB11-9-10.5	L7158-4	soil	07/17/98 09:57	07/17/98
98-PB12-4.5-6	L7158-5	soil	07/17/98 10:30	07/17/98
98-PB12-6-7.5	L7158-6	soil	07/17/98 10:35	07/17/98
98-PB12-7.5-9	L7158-7	soil	07/17/98 10:40	07/17/98
98-PB12-9-10.5	L7158-8	soil	07/17/98 10:45	07/17/98
98-PB13-4.5-6	L7158-9	soil	07/17/98	07/17/98
98-PB13-6-7.5	L7158-10	soil	07/17/98	07/17/98
98-PB13-7.5-9	L7158-11	soil	07/17/98	07/17/98

Definition of Terms

MI Matrix interference.

ND Analytical result was below the reporting limit.

Analysts

Initials	Analyst	Title
PB	Pat Buddrus	Organics Chemist
RJ	Rick Jordan	Chemist

Method Summary

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

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L7158

Client: ***Woodward Clyde Consultants***
Contact: ***Michelle McClelland***

Project: ***91C0796B***
IP

Polynuclear Aromatic Hydrocarbons (PNA) and PCP

by EPA 8270 SIM

Sample ID	*Matrix*					*Lab Number*
Analyte		Result	Reporting Limit	Units	Comment	
					Sampled: *07/17/98*	
					Extracted: *07/24/98*	
98-PB11-6-7.5	*Soil*				Analyzed: *07/31/98 by PB*	*L7158-2*
See Attached Data Sheet						
					Sampled: *07/17/98*	
					Extracted: *07/24/98*	
98-PB11-9-10.5	*Soil*				Analyzed: *07/31/98 by PB*	*L7158-4*
See Attached Data Sheet						
					Sampled: *07/17/98*	
					Extracted: *07/24/98*	
98-PB12-7.5-9	*Soil*				Analyzed: *07/31/98 by PB*	*L7158-7*
See Attached Data Sheet						
					Sampled: *07/17/98*	
					Extracted: *07/24/98*	
98-PB12-9-10.5	*Soil*				Analyzed: *07/31/98 by PB*	*L7158-8*
See Attached Data Sheet						
					Sampled: *07/17/98*	
					Extracted: *07/24/98*	
98-PB13-7.5-9	*Soil*				Analyzed: *07/31/98 by PB*	*L7158-11*
See Attached Data Sheet						

OREGON ANALYTICAL LABORATORY
A Division of Portland General Electric
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OAL

L7158

Client: **Woodward Clyde Consultants**
Contact: **Michelle McClelland**

Project: **91C0796B**

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

Sample ID	Analyte	Results	Blank Result	Reporting Limit *	Units	COMMENT	*Lab Number*
98-PB11-6-7.5	*SOIL*		*MB0724M*			Sampled: *07/17/98* Analyzed: *07/31/98*	*L7158-2*
CAS#							
91-20-3	**Naphthalene**	**4,060,000**	**nd**	**100,000**	**ug/Kg**		
208-96-8	Acenaphthylene	nd	nd	100,000	ug/Kg		
83-32-9	**Acenaphthene**	**691,000**	**nd**	**100,000**	**ug/Kg**		
86-73-7	**Fluorene**	**537,000**	**nd**	**100,000**	**ug/Kg**		
87-86-5	Pentachlorophenol	nd	nd	1,000,000	ug/Kg		
85-01-8	**Phenanthrene**	**1,360,000**	**nd**	**100,000**	**ug/Kg**		
120-12-7	**Anthracene**	**161,000**	**nd**	**100,000**	**ug/Kg**		
206-44-0	**Fluoranthene**	**474,000**	**nd**	**100,000**	**ug/Kg**		
129-00-0	**Pyrene**	**340,000**	**nd**	**100,000**	**ug/Kg**		
56-55-3	Benzo[a]anthracene	nd	nd	100,000	ug/Kg		
218-01-9	Chrysene	nd	nd	100,000	ug/Kg		
205-99-2	Benzo[b]fluoranthene	nd	nd	100,000	ug/Kg		
207-08-9	Benzo[k]fluoranthene	nd	nd	100,000	ug/Kg		
50-32-8	Benzo[a]pyrene	nd	nd	100,000	ug/Kg		
193-39-5	Indeno[1,2,3-cd]pyrene	nd	nd	100,000	ug/Kg		
53-70-3	Dibenz[a,h]anthracene	nd	nd	100,000	ug/Kg		
191-24-2	Benzo[g,h,i]perylene	nd	nd	100,000	ug/Kg		

Acid Surrogates:	Recovery *L7158-2*	Recovery *MB0724M*
2-Fluorophenol	MI	103%
Phenol-d4	MI	138%
2,4,6-Tribromophenol	MI	57%

Base / Neutral Surrogates:	*L7158-2*	*MB0724M*
1,2-Dichlorobenzene-d4	MI	101%
Nitrobenzene-d5	MI	91%
2-Fluorobiphenyl	MI	103%

none detected = nd
Elevated Reporting Limit due to sample matrix = *
Matrix Interference = MI

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L7158

Client: **Woodward Clyde Consultants**
Contact: **Michelle McClelland**

Project: **91C0796B**

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

Sample ID	Analyte	Results	Blank Result	Reporting Limit *	Units	COMMENT	*Lab Number*
						Sampled: *07/17/98*	
98-PB11-9-10.5	*SOIL*		*MB0724M*			Analyzed: *07/31/98*	*L7158-4*
CAS#							
91-20-3	**Naphthalene . . . . . .**	**8,100**	**nd**	**1,000**	**ug/Kg**		
208-96-8	Acenaphthylene	nd	nd	1,000	ug/Kg		
83-32-9	Acenaphthene	nd	nd	1,000	ug/Kg		
86-73-7	Fluorene	nd	nd	1,000	ug/Kg		
87-86-5	Pentachlorophenol	nd	nd	10,000	ug/Kg		
85-01-8	Phenanthrene	nd	nd	1,000	ug/Kg		
120-12-7	Anthracene	nd	nd	1,000	ug/Kg		
206-44-0	Fluoranthene	nd	nd	1,000	ug/Kg		
129-00-0	Pyrene	nd	nd	1,000	ug/Kg		
56-55-3	Benzo[a]anthracene	nd	nd	1,000	ug/Kg		
218-01-9	Chrysene	nd	nd	1,000	ug/Kg		
205-99-2	Benzo[b]fluoranthene	nd	nd	1,000	ug/Kg		
207-08-9	Benzo[k]fluoranthene	nd	nd	1,000	ug/Kg		
50-32-8	Benzo[a]pyrene	nd	nd	1,000	ug/Kg		
193-39-5	Indeno[1,2,3-cd]pyrene	nd	nd	1,000	ug/Kg		
53-70-3	Dibenz[a,h]anthracene	nd	nd	1,000	ug/Kg		
191-24-2	Benzo[g,h,i]perylene	nd	nd	1,000	ug/Kg		

Acid Surrogates:	Recovery *L7158-4*	Recovery *MB0724M*
2-Fluorophenol	MI	103%
Phenol-d4	MI	138%
2,4,6-Tribromophenol	MI	57%

Base / Neutral Surrogates:	*L7158-4*	*MB0724M*
1,2-Dichlorobenzene-d4	MI	101%
Nitrobenzene-d5	MI	91%
2-Fluorobiphenyl	MI	103%

none detected = nd
Elevated Reporting Limit due to sample matrix = *
Matrix Interference = MI

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L7158

Client: **Woodward Clyde Consultants**
Contact: **Michelle McClelland**

Project: **91C0796B**

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

Sample ID	Analyte	Results	Blank Result	Reporting Limit *	Units	COMMENT	*Lab Number*
98-PB12-7.5-9	*SOIL*		*MB0724M*			**Sampled:** *07/17/98* **Analyzed:** *07/31/98*	*L7158-7*
CAS#							
91-20-3	**Naphthalene . . . . . .**	**8,130**	**nd**	**1,000**	**ug/Kg**		
208-96-8	Acenaphthylene	nd	nd	1,000	ug/Kg		
83-32-9	Acenaphthene	nd	nd	1,000	ug/Kg		
86-73-7	Fluorene	nd	nd	1,000	ug/Kg		
87-86-5	Pentachlorophenol	nd	nd	10,000	ug/Kg		
85-01-8	Phenanthrene	nd	nd	1,000	ug/Kg		
120-12-7	Anthracene	nd	nd	1,000	ug/Kg		
206-44-0	Fluoranthene	nd	nd	1,000	ug/Kg		
129-00-0	Pyrene	nd	nd	1,000	ug/Kg		
56-55-3	Benzo[a]anthracene	nd	nd	1,000	ug/Kg		
218-01-9	Chrysene	nd	nd	1,000	ug/Kg		
205-99-2	Benzo[b]fluoranthene	nd	nd	1,000	ug/Kg		
207-08-9	Benzo[k]fluoranthene	nd	nd	1,000	ug/Kg		
50-32-8	Benzo[a]pyrene	nd	nd	1,000	ug/Kg		
193-39-5	Indeno[1,2,3-cd]pyrene	nd	nd	1,000	ug/Kg		
53-70-3	Dibenz[a,h]anthracene	nd	nd	1,000	ug/Kg		
191-24-2	Benzo[g,h,i]perylene	nd	nd	1,000	ug/Kg		

Acid Surrogates:	Recovery *L7158-7*	Recovery *MB0724M*
2-Fluorophenol	MI	103%
Phenol-d4	MI	138%
2,4,6-Tribromophenol	MI	57%

Base / Neutral Surrogates:	*L7158-7*	*MB0724M*
1,2-Dichlorobenzene-d4	MI	101%
Nitrobenzene-d5	MI	91%
2-Fluorobiphenyl	MI	103%

none detected = nd
Elevated Reporting Limit due to sample matrix = *
Matrix Interference = MI

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L7158

Client: **Woodward Clyde Consultants**
Contact: **Michelle McClelland**

Project: **91C0796**

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

Sample ID	Analyte	Results	Blank Result	Reporting Limit *	Units	COMMENT	*Lab Number*
98-PB12-9-10.5	*SOIL*		*MB0724M*			**Sampled:** *07/17/98* **Analyzed:** *07/31/98*	*L7158-8*
CAS#							
91-20-3	**Naphthalene**	**6,700**	**nd**	**100**	**ug/Kg**		
208-96-8	Acenaphthylene	nd	nd	100	ug/Kg		
83-32-9	Acenaphthene	nd	nd	100	ug/Kg		
86-73-7	Fluorene	nd	nd	100	ug/Kg		
87-86-5	Pentachlorophenol	nd	nd	1,000	ug/Kg		
85-01-8	Phenanthrene	nd	nd	100	ug/Kg		
120-12-7	Anthracene	nd	nd	100	ug/Kg		
206-44-0	Fluoranthene	nd	nd	100	ug/Kg		
129-00-0	Pyrene	nd	nd	100	ug/Kg		
56-55-3	Benzo[a]anthracene	nd	nd	100	ug/Kg		
218-01-9	Chrysene	nd	nd	100	ug/Kg		
205-99-2	Benzo[b]fluoranthene	nd	nd	100	ug/Kg		
207-08-9	Benzo[k]fluoranthene	nd	nd	100	ug/Kg		
50-32-8	Benzo[a]pyrene	nd	nd	100	ug/Kg		
193-39-5	Indeno[1,2,3-cd]pyrene	nd	nd	100	ug/Kg		
53-70-3	Dibenz[a,h]anthracene	nd	nd	100	ug/Kg		
191-24-2	Benzo[g,h,i]perylene	nd	nd	100	ug/Kg		

Acid Surrogates:	Recovery *L7158-8*	Recovery *MB0724M*
2-Fluorophenol	92%	103%
Phenol-d4	117%	138%
2,4,6-Tribromophenol	78%	57%

Base / Neutral Surrogates:	*L7158-8*	*MB0724M*
1,2-Dichlorobenzene-d4	87%	101%
Nitrobenzene-d5	66%	91%
2-Fluorobiphenyl	96%	103%

none detected = nd
Elevated Reporting Limit due to sample matrix = *
Matrix Interference = MI

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Client: **Woodward Clyde Consultants**
Contact: **Michelle McClelland**

Project: **91C0796B**

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

Sample ID	Analyte	Results	Blank Result	Reporting Limit *	Units	COMMENT	*Lab Number*
98-PB13-7.5-9	*SOIL*		*MB0724M*			Sampled: *07/17/98* Analyzed: *07/31/98*	*L7158-11*
CAS#							
91-20-3	**Naphthalene**	**11,800**	**nd**	**1,000**	**ug/Kg**		
208-96-8	Acenaphthylene	nd	nd	1,000	ug/Kg		
83-32-9	Acenaphthene	nd	nd	1,000	ug/Kg		
86-73-7	Fluorene	nd	nd	1,000	ug/Kg		
87-86-5	Pentachlorophenol	nd	nd	10,000	ug/Kg		
85-01-8	Phenanthrene	nd	nd	1,000	ug/Kg		
120-12-7	Anthracene	nd	nd	1,000	ug/Kg		
206-44-0	Fluoranthene	nd	nd	1,000	ug/Kg		
129-00-0	Pyrene	nd	nd	1,000	ug/Kg		
56-55-3	Benzo[a]anthracene	nd	nd	1,000	ug/Kg		
218-01-9	Chrysene	nd	nd	1,000	ug/Kg		
205-99-2	Benzo[b]fluoranthene	nd	nd	1,000	ug/Kg		
207-08-9	Benzo[k]fluoranthene	nd	nd	1,000	ug/Kg		
50-32-8	Benzo[a]pyrene	nd	nd	1,000	ug/Kg		
193-39-5	Indeno[1,2,3-cd]pyrene	nd	nd	1,000	ug/Kg		
53-70-3	Dibenz[a,h]anthracene	nd	nd	1,000	ug/Kg		
191-24-2	Benzo[g,h,i]perylene	nd	nd	1,000	ug/Kg		

Acid Surrogates:	Recovery *L7158-11*	Recovery *MB0724M*
2-Fluorophenol	MI	103%
Phenol-d4	MI	138%
2,4,6-Tribromophenol	MI	57%

Base / Neutral Surrogates:	*L7158-11*	*MB0724M*
1,2-Dichlorobenzene-d4	MI	101%
Nitrobenzene-d5	MI	91%
2-Fluorobiphenyl	MI	103%

none detected = nd
Elevated Reporting Limit due to sample matrix = *
Matrix Interference = MI

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L7158

Client: ***Woodward Clyde Consultants***
Contact: ***Michelle McClelland***

Project: ***91C0796B***
IP

Semi-Volatile Petroleum Products
by NWTPH-DX

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

Sampled: *07/17/98*
Extracted: *07/23/98*
98-PB11-6-7.5 *Soil* **Analyzed:** *07/27/98 by KJ* *L7158-*

Diesel Region	**13,000**	**25.**	**mg/kg**	1
Oil Region	ND	50.	mg/kg	

Surrogate	Recovery	Limit
2-Fluorobiphenyl	MI	50. - 150.
O-terphenyl	MI	50. - 150.

[1] Pattern does not resemble a typical product.

Sampled: *07/17/98*
Extracted: *07/23/98*
98-PB11-9-10.5 *Soil* **Analyzed:** *07/24/98 by RJ* *L7158-*

Diesel Region	**54.**	**25.**	**mg/kg**	1
Oil Region	ND	50.	mg/kg	

Surrogate	Recovery	Limit
2-Fluorobiphenyl	89.%	50. - 150.
O-terphenyl	96.%	50. - 150.

[1] Pattern does not suggest a typical product.

Sampled: *07/17/98*
Extracted: *07/23/98*
98-PB12-7.5-9 *Soil* **Analyzed:** *07/24/98 by RJ* *L7158-*

Diesel Region	**100**	**25.**	**mg/kg**	1
Oil Region	ND	50.	mg/kg	

Surrogate	Recovery	Limit
2-Fluorobiphenyl	84.%	50. - 150.
O-terphenyl	89.%	50. - 150.

[1] Pattern does not suggest a typical product.

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Client: ***Woodward Clyde Consultants***
Contact: ***Michelle McClelland***

Project: ***91C0796B***
IP

Semi-Volatile Petroleum Products
by NWTPH-DX

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

Sampled: *07/17/98*
Extracted: *07/23/98*
98-PB12-9-10.5 ***Soil*** **Analyzed:** *07/24/98 by RJ* ***L7158-8***

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

Surrogate	Recovery	Limit
2-Fluorobiphenyl	86.%	50. - 150.
O-terphenyl	95.%	50. - 150.

Sampled: *07/17/98*
Extracted: *07/23/98*
98-PB13-7.5-9 ***Soil*** **Analyzed:** *07/24/98 by RJ* ***L7158-11***

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

Surrogate	Recovery	Limit
2-Fluorobiphenyl	93.%	50. - 150.
O-terphenyl	100.%	50. - 150.

Client: ***Woodward Clyde Consultants***
Contact: ***Michelle McClelland***

Project: ***91C0796B***
IP

Custom GC Fuels Analysis

Sample ID	*Matrix*					*Lab Numb.*
Analyte		**Result**	**Reporting Limit**	**Units**	**Comment**	
					Sampled: *07/17/98*	
					Custom GC Fuels Analysis: *08/06/98*	
98-PB11-4.5-6	*Soil*				**Analyzed:** *08/06/98 by RJ*	*L7158-*
See Attached Data Sheet						

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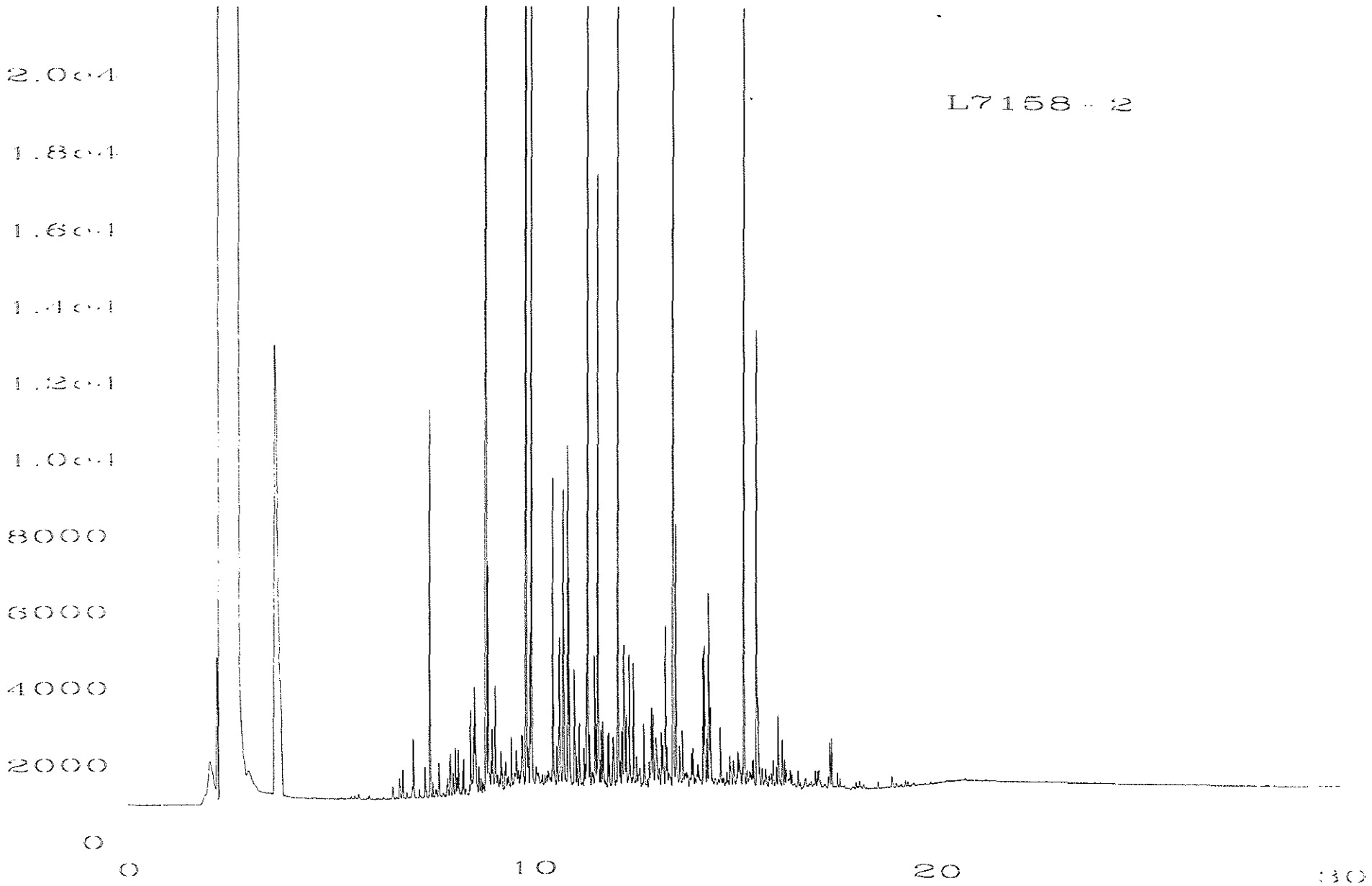

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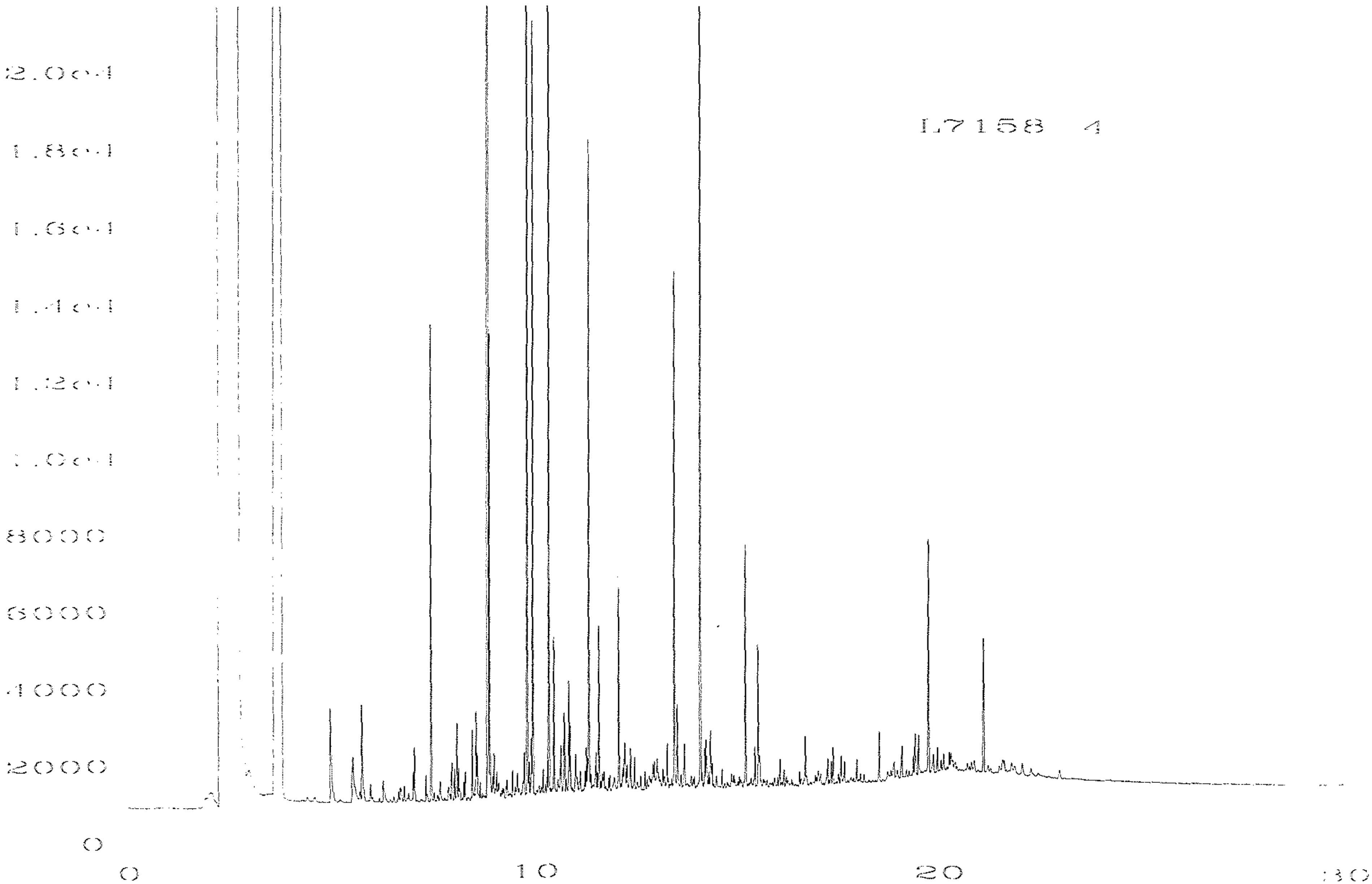

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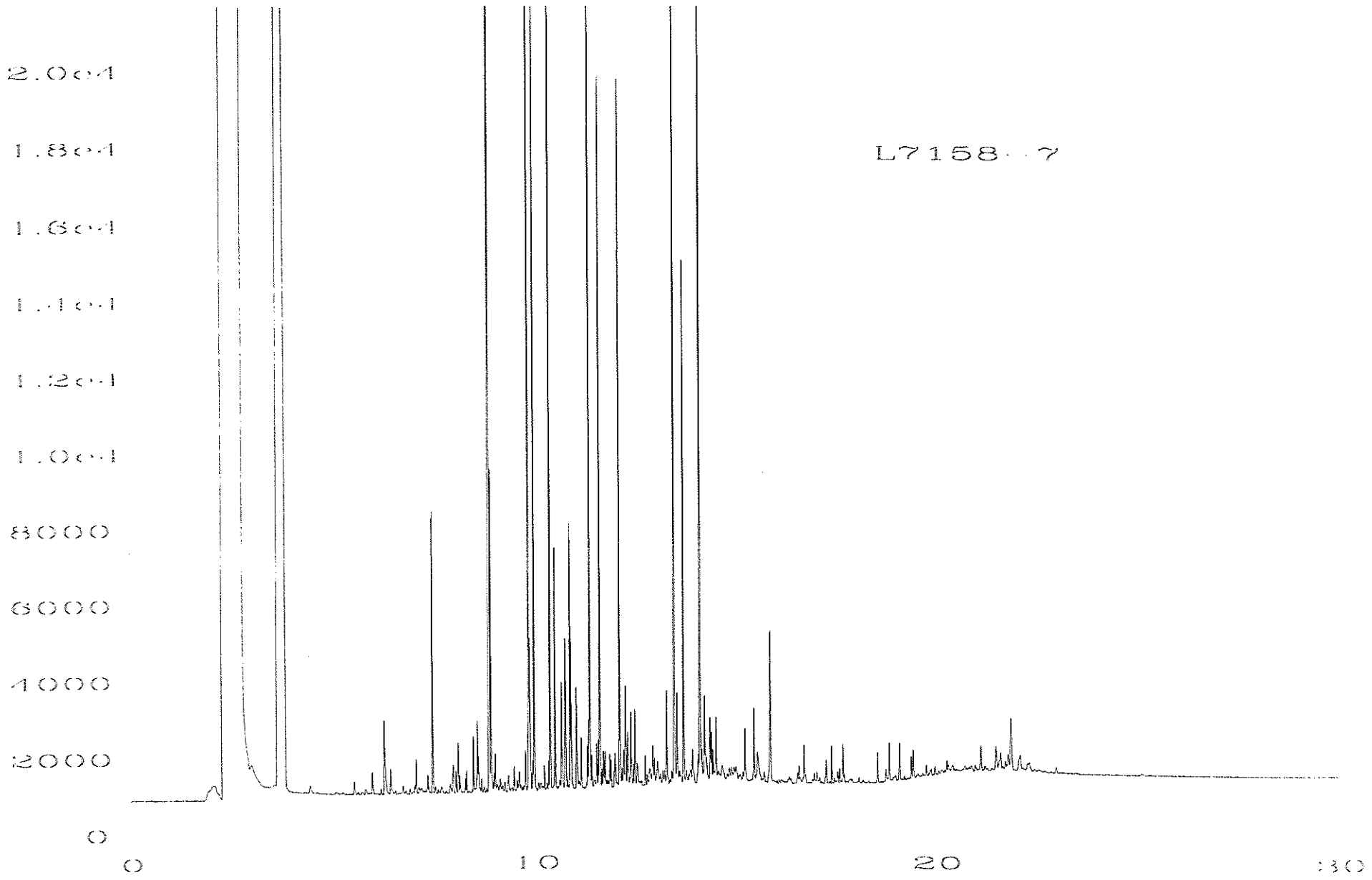

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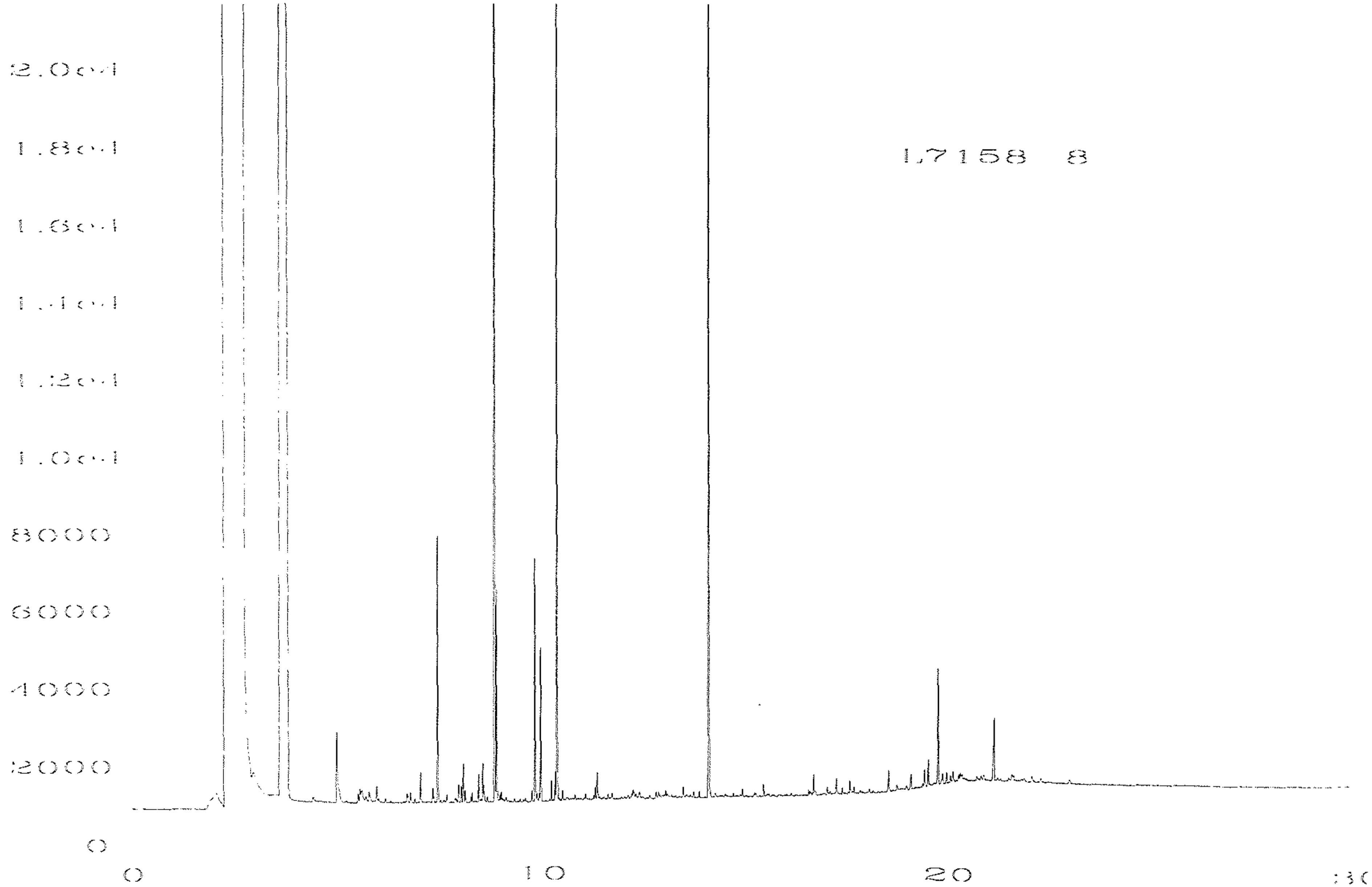

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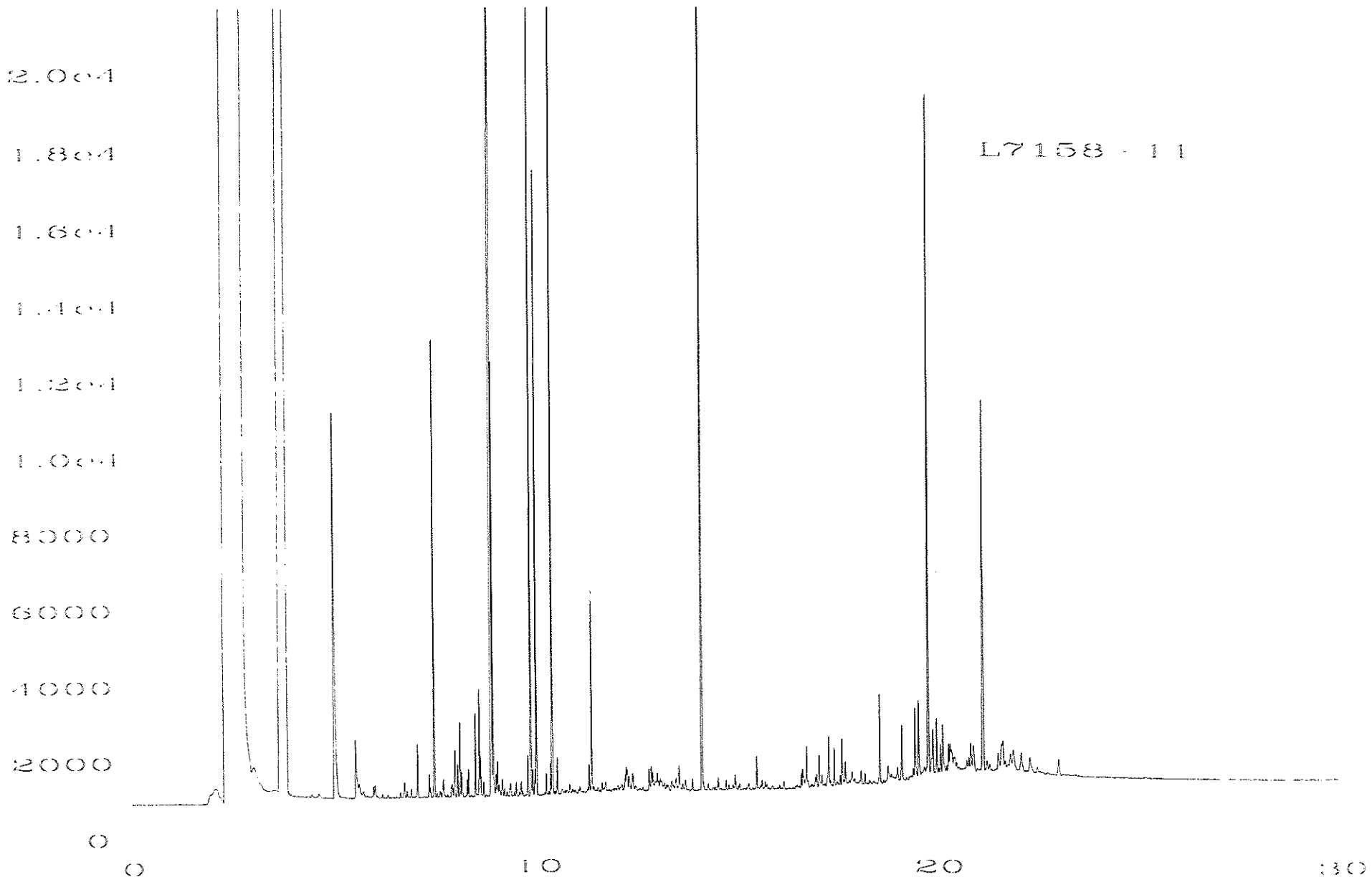

Fig. 1 in L:\FID8G24\014F0101.D

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L7158

Client: **Woodward Clyde Consultants**
Contact: **Michelle McClelland**

Project: 91C0796B

PNA & PCP LCS

by modified EPA method 8270 (SIM)

Sample ID	Lab Number	
Analyte	**Recovery**	**COMMENT**

Sampled: *NA*
Analyzed: *07/23/98*

CAS#		*LCS0723M*
91-20-3	Naphthalene	89%
208-96-8	Acenaphthylene	92%
83-32-9	Acenaphthene	105%
86-73-7	Fluorene	96%
87-86-5	Pentachlorophenol	58%
85-01-8	Phenanthrene	106%
120-12-7	Anthracene	93%
206-44-0	Fluoranthene	94%
129-00-0	Pyrene	97%
56-55-3	Benzo[a]anthracene	99%
218-01-9	Chrysene	101%
205-99-2	Benzo[b]fluoranthene	93%
207-08-9	Benzo[k]fluoranthene	97%
50-32-8	Benzo[a]pyrene	92%
193-39-5	Indeno[1,2,3-cd]pyrene	80%
53-70-3	Dibenz[a,h]anthracene	76%
191-24-2	Benzo[g,h,i]perylene	82%

	Recovery
Acid Surrogates:	*LCS0723M*
2-Fluorophenol	95%
Phenol-d4	100%
2,4,6-Tribromophenol	68%

Base / Neutral Surrogates:	*LCS0723M*
1,2-Dichlorobenzene-d4	88%
Nitrobenzene-d5	87%
2-Fluorobiphenyl	96%

none detected = nd

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L7158

Client: **Woodward Clyde Consultants**
Contact: **Michelle McClelland**

Project: **91C0796B**

PNA & PCP Matrix Spikes

by modified EPA method 8270 (SIM)

Sample ID		Lab Number	Lab Number		
	Analyte	**Recovery**	**Recovery**	**RPD**	**COMMENT**
98-5896-60	*SOIL*	*L7184-3MS*	*L7184-3MSD*		**Sampled:** *07/21/98* **Analyzed:** *07/23/98*
CAS#					
91-20-3	Naphthalene	82%	97%	**16%**	
208-96-8	Acenaphthylene	61%	73%	**18%**	
83-32-9	Acenaphthene	90%	64%	**33%**	
86-73-7	Fluorene	81%	4%	**179%**	
87-86-5	Pentachlorophenol	45%	47%	**3%**	
85-01-8	Phenanthrene	-2%	-6%	**99%**	
120-12-7	Anthracene	72%	87%	**18%**	
206-44-0	Fluoranthene	70%	86%	**21%**	
129-00-0	Pyrene	56%	72%	**25%**	
56-55-3	Benzo[a]anthracene	70%	93%	**28%**	
218-01-9	Chrysene	73%	104%	**35%**	
205-99-2	Benzo[b]fluoranthene	89%	112%	**22%**	
207-08-9	Benzo[k]fluoranthene	87%	100%	**14%**	
50-32-8	Benzo[a]pyrene	73%	93%	**23%**	
193-39-5	Indeno[1,2,3-cd]pyrene	67%	87%	**26%**	
53-70-3	Dibenz[a,h]anthracene	56%	68%	**20%**	
191-24-2	Benzo[g,h,i]perylene	78%	95%	**19%**	

Acid Surrogates:	Recovery *L7184-3MS*	Recovery *L7184-3MSD*
2-Fluorophenol	92%	83%
Phenol-d4	94%	86%
2,4,6-Tribromophenol	0%	0%

Base / Neutral Surrogates:	*L7184-3MS*	*L7184-3MSD*
1,2-Dichlorobenzene-d4	101%	87%
Nitrobenzene-d5	145%	103%
2-Fluorobiphenyl	98%	82%

none detected = nd

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Client: *Woodward Clyde Consultants*
Contact: *Michelle McClelland*

Project: *91C0796B*
IP

Batch Q.C.

Method Blank

NWTPH-Dx/Soil (mg/kg)

Analyte	Result	Reporting Limit	Q	Date Analyzed
NWTPH-Dx				
Diesel range	ND	25		07/23/98
Oil range	ND	50		

Surrogates	% Recovery
Fluorobiphenyl	82
O-terphenyl	98

Comments:

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Client: *Woodward Clyde Consultants*
Contact: *Michelle McClelland*

Project: *91C0796B*
IP

Batch Q.C.

LCS

NWTPH-Dx/Soil (mg/kg)

Analyte	Result	True Value	% Recovery	Q	Date Analyzed
NWTPH-Dx	142	134	106		07/23/98

Surrogates	% Recovery
Fluorobiphenyl	96
O-terphenyl	108

Comments:

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OAL

L7158

Client: *Woodward Clyde Consultants*
Contact: *Michelle McClelland*

Project: *91C0796B*
IP

Batch Q.C.

Duplicate
NWTPH-Dx/Soil (mg/kg)

Analyte	Result	Duplicate Result	RPD	Reporting Limit	Q	Date Analyzed
NWTPH-Dx						
Diesel range	12700	12400	2	25		07/27/98
Oil range	ND	ND	NA	50		

Surrogates	% Recovery Sample	% Recovery Duplicate
Fluorobiphenyl	MI	MI
O-terphenyl	MI	MI

Comments:

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L7158

Client: *Woodward Clyde Consultants*
Contact: *Michelle McClelland*

Project: *91C0796B*
IP

Batch Q.C.

MS

NWTPH-Dx/Soil (mg/kg)

Analyte	Sample Result	MS Result	True Value	% Recovery	Q	Date Analyzed
NWTPH-Dx	9890	MI	159	NA		07/23/98

Surrogates	% Recovery Sample	% Recovery MS
Fluorobiphenyl	MI	MI
O-terphenyl	MI	MI

Comments:

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WOODWARD-CLYDE
CHAIN OF CUSTODY RECORD

1501 Fourth Avenue Suite 1500
Seattle, Washington 98101
(206) 343-7933 fax (206) 343-0513

Project Name: IP
Project Number: 91C0796B Project Manager: TS
Sampler (signature): TM
Shipping Form Tracking Number:
Page 1 of Number of Coolers: 1

Date 1998	Time	Sample Identification	Matrix	Lab ID	Analyses: TPH-Pcrt.	Analyses: PAH+PCP (8270 SIM)	Analyses: HOLD	Preservative y/n	Number of Containers
17Jul	945	98-PB11-4.5-6	Soil	L7158-1			HOLD	N	1
	950	98-PB11-6-7.5		-2	X	X		N	1
	955	98-PB11-7.5-9		-3			HOLD	N	1
	957	98-PB11-9-10.5		-4	X	X	~~HOLD~~ e	N	1
	1030	98-PB12-4.5-6		-5			HOLD	N	1
	1035	98-PB12-6-7.5		-6			HOLD	N	1
	1040	98-PB12-7.5-9		-7	X	X		N	1
	1045	98-PB12-9-10.5		-8	X	X	~~HOLD~~ e	N	1
		98-PB13-4.5-6		-9			HOLD	N	1
		98-PB13-6-7.5		-10			HOLD	N	1
↓		98-PB13-7.5-9	↓	-11	X	X		N	1

Comments: * Please sent Chromatograms for all Project samples. (TPH-D)

Total Number of Containers: 11

Relinquished By (signature): Jenny Crook Date/Time: 7/17 12:45

Received By (Signature): Eric Gobler Date/Time: 7-17-1245

Relinquished By (signature): Date/Time:

Received for Lab By (signature): Teyent Gossa Date/Time: 7/17/98 17:05

(COCSEA.xls)

OAL

L7229

August 28, 1998

Michelle McClelland
Woodward Clyde Consultants
1501 Fourth Avenue
Suite 1500
Seattle, WA 98101

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

Re: Laboratory Sample Analysis

Project: 91C0796B
IP

Project Manager: Michelle McClelland

Dear Michelle McClelland:

On Friday, July 24, 1998, OAL received nineteen (19) soil samples for analysis. The samples were analyzed utilizing EPA, ASTM, or equivalent methodology.

Should you have any questions concerning the results in this report, please contact us at (503) 590-5300. Refer to OAL login number L7229.

Sincerely,

Patty Boyden
Project Manager

Suzanne LeMay
for QA/QC Officer

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OAL

L7229

Sample Summary

Sample ID	Lab #	Description	Sampled	Received
97-4B-6-7.5	L7229-1	soil	07/20/98 09:30	07/24/98
97-4B-7.5-9	L7229-2	soil	07/20/98 09:36	07/24/98
97-4B-9-10.5	L7229-3	soil	07/20/98 09:40	07/24/98
97-5A-9.5-11	L7229-4	soil	07/21/98 13:10	07/24/98
97-5A-11-12.5	L7229-5	soil	07/21/98 13:15	07/24/98
97-5A-12.5-14	L7229-6	soil	07/21/98 13:20	07/24/98
97-5A-14-15.5	L7229-7	soil	07/21/98 13:25	07/24/98
98PB-14-4.5-6	L7229-8	soil	07/21/98 15:15	07/24/98
98PB-14-6-7.5	L7229-9	soil	07/21/98 15:20	07/24/98
98PB-14-7.5-9	L7229-10	soil	07/21/98 15:25	07/24/98
98PB-14-9-10.5	L7229-11	soil	07/21/98 15:30	07/24/98
97-10A-9.5-11	L7229-12	soil	07/22/98 13:05	07/24/98
97-10A-11-12.5	L7229-13	soil	07/22/98 13:10	07/24/98
97-6B-4.5-6	L7229-14	soil	07/23/98 17:45	07/24/98
97-6B-6-7.5	L7229-15	soil	07/23/98 17:50	07/24/98
97-6B-7.5-9	L7229-16	soil	07/23/98 17:55	07/24/98
97-6B-9-10.5	L7229-17	soil	07/23/98 18:00	07/24/98
97-6B-10.5-12	L7229-18	soil	07/23/98 18:05	07/24/98
97-6B-12-13.5	L7229-19	soil	07/23/98 18:06	07/24/98

Definition of Terms

D Reported value is based on a dilution.

ND Analytical result was below the reporting limit.

Analysts

Initials	Analyst	Title
PB	Pat Buddrus	Organics Chemist
RJ	Rick Jordan	Chemist

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Method Summary

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

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L7229

Client: *Woodward Clyde Consultants*
Contact: *Michelle McClelland*

Project: *91C0796B*
IP

Polynuclear Aromatic Hydrocarbons (PNA) and PCP
by EPA 8270 SIM

Sample ID	*Matrix*					*Lab Number*
Analyte		Result	Reporting Limit	Units	Comment	
97-4B-6-7.5	*Soil*				Sampled: *07/20/98* Extracted: *07/29/98* Analyzed: *08/05/98 by PB*	*L7229-1*
See Attached Data Sheet						
97-4B-9-10.5	*Soil*				Sampled: *07/20/98* Extracted: *07/29/98* Analyzed: *08/05/98 by PB*	*L7229-3*
See Attached Data Sheet						
97-5A-9.5-11	*Soil*				Sampled: *07/21/98* Extracted: *07/29/98* Analyzed: *08/08/98 by PB*	*L7229-4*
See Attached Data Sheet						
97-5A-12.5-14	*Soil*				Sampled: *07/21/98* Extracted: *07/29/98* Analyzed: *08/08/98 by PB*	*L7229-6*
See Attached Data Sheet						
98PB-14-7.5-9	*Soil*				Sampled: *07/21/98* Extracted: *07/29/98* Analyzed: *08/08/98 by PB*	*L7229-10*
See Attached Data Sheet						
97-10A-9.5-11	*Soil*				Sampled: *07/22/98* Extracted: *07/29/98* Analyzed: *08/08/98 by PB*	*L7229-12*
See Attached Data Sheet						

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Client: *Woodward Clyde Consultants*
Contact: *Michelle McClelland*

Project: *91C0796B*
IP

Polynuclear Aromatic Hydrocarbons (PNA) and PCP
by EPA 8270 SIM

Sample ID	*Matrix*					*Lab Number*
Analyte		Result	Reporting Limit	Units	Comment	
					Sampled: *07/22/98*	
					Extracted: *07/29/98*	
97-10A-11-12.5	*Soil*				Analyzed: *08/05/98 by PB*	*L7229-13*
See Attached Data Sheet						
					Sampled: *07/23/98*	
					Extracted: *07/29/98*	
97-6B-7.5-9	*Soil*				Analyzed: *08/05/98 by PB*	*L7229-16*
See Attached Data Sheet						
					Sampled: *07/23/98*	
					Extracted: *07/29/98*	
97-6B-10.5-12	*Soil*				Analyzed: *08/05/98 by PB*	*L7229-18*
See Attached Data Sheet						

OAL

L7229

Client: **Woodward Clyde Consultants**
Contact: **Michelle McClelland**

Project: **91C0796B**

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

Sample ID	Analyte	Results	Blank Result	Reporting Limit *	Units	COMMENT	*Lab Number*
97-4B-6-7.5	*SOIL*		*MB0729M*			**Sampled:** *07/20/98* **Analyzed:** *08/05/98*	*L7229-1*
CAS#							
91-20-3	**Naphthalene . . . . . .**	**900**	**nd**	**100**	**ug/Kg**		
208-96-8	Acenaphthylene	nd	nd	100	ug/Kg		
83-32-9	Acenaphthene	nd	nd	100	ug/Kg		
86-73-7	Fluorene	nd	nd	100	ug/Kg		
87-86-5	Pentachlorophenol	nd	nd	1,000	ug/Kg		
85-01-8	Phenanthrene	nd	nd	100	ug/Kg		
120-12-7	Anthracene	nd	nd	100	ug/Kg		
206-44-0	Fluoranthene	nd	nd	100	ug/Kg		
129-00-0	Pyrene	nd	nd	100	ug/Kg		
56-55-3	Benzo[a]anthracene	nd	nd	100	ug/Kg		
218-01-9	Chrysene	nd	nd	100	ug/Kg		
205-99-2	Benzo[b]fluoranthene	nd	nd	100	ug/Kg		
207-08-9	Benzo[k]fluoranthene	nd	nd	100	ug/Kg		
50-32-8	Benzo[a]pyrene	nd	nd	100	ug/Kg		
193-39-5	Indeno[1,2,3-cd]pyrene	nd	nd	100	ug/Kg		
53-70-3	Dibenz[a,h]anthracene	nd	nd	100	ug/Kg		
191-24-2	Benzo[g,h,i]perylene	nd	nd	100	ug/Kg		

Acid Surrogates:	Recovery *L7229-1*	Recovery *MB0729M*
2-Fluorophenol	109%	111%
Phenol-d4	148%	147%
2,4,6-Tribromophenol	120%	124%

Base / Neutral Surrogates:	*L7229-1*	*MB0729M*
1,2-Dichlorobenzene-d4	104%	106%
Nitrobenzene-d5	85%	83%
2-Fluorobiphenyl	103%	111%

none detected = nd
Elevated Reporting Limit due to sample matrix = *
Matrix Interference = MI

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L7229

Client: **Woodward Clyde Consultants**
Contact: **Michelle McClelland**

Project: **91C0796E**

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

Sample ID	Analyte	Results	Blank Result	Reporting Limit	Units	COMMENT	*Lab Number*
97-4B-9-10.5	*SOIL*		*MB0729M*			**Sampled:** *07/20/98* **Analyzed:** *08/05/98*	*L7229-3*
CAS#							
91-20-3	Naphthalene	nd	nd	10	ug/Kg		
208-96-8	Acenaphthylene	nd	nd	10	ug/Kg		
83-32-9	Acenaphthene	nd	nd	10	ug/Kg		
86-73-7	Fluorene	nd	nd	10	ug/Kg		
87-86-5	Pentachlorophenol	nd	nd	100	ug/Kg		
85-01-8	Phenanthrene	nd	nd	10	ug/Kg		
120-12-7	Anthracene	nd	nd	10	ug/Kg		
206-44-0	Fluoranthene	nd	nd	10	ug/Kg		
129-00-0	Pyrene	nd	nd	10	ug/Kg		
56-55-3	Benzo[a]anthracene	nd	nd	10	ug/Kg		
218-01-9	Chrysene	nd	nd	10	ug/Kg		
205-99-2	Benzo[b]fluoranthene	nd	nd	10	ug/Kg		
207-08-9	Benzo[k]fluoranthene	nd	nd	10	ug/Kg		
50-32-8	Benzo[a]pyrene	nd	nd	10	ug/Kg		
193-39-5	Indeno[1,2,3-cd]pyrene	nd	nd	10	ug/Kg		
53-70-3	Dibenz[a,h]anthracene	nd	nd	10	ug/Kg		
191-24-2	Benzo[g,h,i]perylene	nd	nd	10	ug/Kg		

Acid Surrogates:	Recovery *L7229-3*	Recovery *MB0729M*
2-Fluorophenol	110%	111%
Phenol-d4	154%	147%
2,4,6-Tribromophenol	137%	124%

Base / Neutral Surrogates:	*L7229-3*	*MB0729M*
1,2-Dichlorobenzene-d4	98%	106%
Nitrobenzene-d5	91%	83%
2-Fluorobiphenyl	102%	111%

none detected = nd

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L7229

Client: **Woodward Clyde Consultants**
Contact: **Michelle McClelland**

Project: **91C0796B**

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

Sample ID	Analyte	Results	Blank Result	Reporting Limit	Units	COMMENT	*Lab Number*
						Sampled: *07/21/98*	
97-5A-9.5-11	*SOIL*		*MB0729M*			**Analyzed:** *08/08/98*	*L7229-4*
CAS#							
91-20-3	Naphthalene	nd	nd	10	ug/Kg		
208-96-8	Acenaphthylene	nd	nd	10	ug/Kg		
83-32-9	Acenaphthene	nd	nd	10	ug/Kg		
86-73-7	Fluorene	nd	nd	10	ug/Kg		
87-86-5	Pentachlorophenol	nd	nd	100	ug/Kg		
85-01-8	Phenanthrene	nd	nd	10	ug/Kg		
120-12-7	Anthracene	nd	nd	10	ug/Kg		
206-44-0	Fluoranthene	nd	nd	10	ug/Kg		
129-00-0	Pyrene	nd	nd	10	ug/Kg		
56-55-3	Benzo[a]anthracene	nd	nd	10	ug/Kg		
218-01-9	Chrysene	nd	nd	10	ug/Kg		
205-99-2	Benzo[b]fluoranthene	nd	nd	10	ug/Kg		
207-08-9	Benzo[k]fluoranthene	nd	nd	10	ug/Kg		
50-32-8	Benzo[a]pyrene	nd	nd	10	ug/Kg		
193-39-5	Indeno[1,2,3-cd]pyrene	nd	nd	10	ug/Kg		
53-70-3	Dibenz[a,h]anthracene	nd	nd	10	ug/Kg		
191-24-2	Benzo[g,h,i]perylene	nd	nd	10	ug/Kg		

Acid Surrogates:	Recovery *L7229-4*	Recovery *MB0729M*
2-Fluorophenol	112%	111%
Phenol-d4	153%	147%
2,4,6-Tribromophenol	137%	124%

Base / Neutral Surrogates:	*L7229-4*	*MB0729M*
1,2-Dichlorobenzene-d4	95%	106%
Nitrobenzene-d5	87%	83%
2-Fluorobiphenyl	93%	111%

none detected = nd
Matrix Interference = MI

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L722

Client: **Woodward Clyde Consultants**
Contact: **Michelle McClelland**

Project: **91C079**

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

Sample ID							*Lab Numb*
	Analyte	**Results**	**Blank Result**	**Reporting Limit**	**Units**	**COMMENT**	
97-SA-12.5-14	*SOIL*		*MB0729M*			**Sampled:** *07/21/98* **Analyzed:** *08/08/98*	*L7229-6*
CAS#							
91-20-3	Naphthalene	nd	nd	10	ug/Kg		
208-96-8	Acenaphthylene	nd	nd	10	ug/Kg		
83-32-9	Acenaphthene	nd	nd	10	ug/Kg		
86-73-7	Fluorene	nd	nd	10	ug/Kg		
87-86-5	Pentachlorophenol	nd	nd	100	ug/Kg		
85-01-8	Phenanthrene	nd	nd	10	ug/Kg		
120-12-7	Anthracene	nd	nd	10	ug/Kg		
206-44-0	**Fluoranthene . . . . . .**	**14**	**nd**	**10**	**ug/Kg**		
129-00-0	**Pyrene . . . . . .**	**15**	**nd**	**10**	**ug/Kg**		
56-55-3	**Benzo[a]anthracene . . . . . .**	**11**	**nd**	**10**	**ug/Kg**		
218-01-9	**Chrysene . . . . . .**	**13**	**nd**	**10**	**ug/Kg**		
205-99-2	**Benzo[b]fluoranthene . . . . .**	**21**	**nd**	**10**	**ug/Kg**		
207-08-9	Benzo[k]fluoranthene	nd	nd	10	ug/Kg		
50-32-8	**Benzo[a]pyrene . . . . . .**	**15**	**nd**	**10**	**ug/Kg**		
193-39-5	Indeno[1,2,3-cd]pyrene	nd	nd	10	ug/Kg		
53-70-3	Dibenz[a,h]anthracene	nd	nd	10	ug/Kg		
191-24-2	**Benzo[g,h,i]perylene . . . . . .**	**13**	**nd**	**10**	**ug/Kg**		

Acid Surrogates:	Recovery *L7229-6*	Recovery *MB0729M*
2-Fluorophenol	115%	111%
Phenol-d4	160%	147%
2,4,6-Tribromophenol	149%	124%

Base / Neutral Surrogates:	*L7229-6*	*MB0729M*
1,2-Dichlorobenzene-d4	99%	106%
Nitrobenzene-d5	94%	83%
2-Fluorobiphenyl	98%	111%

none detected = nd
Matrix Interference = MI

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L7229

Client: Woodward Clyde Consultants
Contact: Michelle McClelland

Project: 91C0796B

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

Sample ID	Analyte	Results	Blank Result	Reporting Limit	Units	COMMENT	Lab Number
98PB-14-7.5-9	SOIL		MB0729M			Sampled: 07/21/98 Analyzed: 08/08/98	L7229-10
CAS#							
91-20-3	**Naphthalene**	**25**	**nd**	**10**	**ug/Kg**		
208-96-8	Acenaphthylene	nd	nd	10	ug/Kg		
83-32-9	Acenaphthene	nd	nd	10	ug/Kg		
86-73-7	Fluorene	nd	nd	10	ug/Kg		
87-86-5	Pentachlorophenol	nd	nd	100	ug/Kg		
85-01-8	Phenanthrene	nd	nd	10	ug/Kg		
120-12-7	Anthracene	nd	nd	10	ug/Kg		
206-44-0	Fluoranthene	nd	nd	10	ug/Kg		
129-00-0	Pyrene	nd	nd	10	ug/Kg		
56-55-3	Benzo[a]anthracene	nd	nd	10	ug/Kg		
218-01-9	Chrysene	nd	nd	10	ug/Kg		
205-99-2	Benzo[b]fluoranthene	nd	nd	10	ug/Kg		
207-08-9	Benzo[k]fluoranthene	nd	nd	10	ug/Kg		
50-32-8	Benzo[a]pyrene	nd	nd	10	ug/Kg		
193-39-5	Indeno[1,2,3-cd]pyrene	nd	nd	10	ug/Kg		
53-70-3	Dibenz[a,h]anthracene	nd	nd	10	ug/Kg		
191-24-2	Benzo[g,h,i]perylene	nd	nd	10	ug/Kg		

Acid Surrogates:	Recovery L7229-10	Recovery MB0729M
2-Fluorophenol	113%	111%
Phenol-d4	156%	147%
2,4,6-Tribromophenol	148%	124%

Base / Neutral Surrogates:	L7229-10	MB0729M
1,2-Dichlorobenzene-d4	94%	106%
Nitrobenzene-d5	92%	83%
2-Fluorobiphenyl	95%	111%

none detected = nd
Matrix Interference = MI

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A Division of Portland General Electric
14855 S.W. Old Scholls Ferry Road, Beaverton, OR 97007
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OAL

L7229

Client: **Woodward Clyde Consultants**
Contact: **Michelle McClelland**

Project: **91C0796B**

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

Sample ID	Analyte	Results	Blank Result	Reporting Limit	Units	COMMENT	*Lab Number*
97-10A-9.5-11	*SOIL*		*MB0729M*			**Sampled:** *07/22/98* **Analyzed:** *08/08/98*	*L7229-12*
CAS#							
91-20-3	Naphthalene	nd	nd	10	ug/Kg		
208-96-8	Acenaphthylene	nd	nd	10	ug/Kg		
83-32-9	Acenaphthene	nd	nd	10	ug/Kg		
86-73-7	Fluorene	nd	nd	10	ug/Kg		
87-86-5	Pentachlorophenol	nd	nd	100	ug/Kg		
85-01-8	Phenanthrene	nd	nd	10	ug/Kg		
120-12-7	Anthracene	nd	nd	10	ug/Kg		
206-44-0	Fluoranthene	nd	nd	10	ug/Kg		
129-00-0	Pyrene	nd	nd	10	ug/Kg		
56-55-3	Benzo[a]anthracene	nd	nd	10	ug/Kg		
218-01-9	Chrysene	nd	nd	10	ug/Kg		
205-99-2	Benzo[b]fluoranthene	nd	nd	10	ug/Kg		
207-08-9	Benzo[k]fluoranthene	nd	nd	10	ug/Kg		
50-32-8	Benzo[a]pyrene	nd	nd	10	ug/Kg		
193-39-5	Indeno[1,2,3-cd]pyrene	nd	nd	10	ug/Kg		
53-70-3	Dibenz[a,h]anthracene	nd	nd	10	ug/Kg		
191-24-2	Benzo[g,h,i]perylene	nd	nd	10	ug/Kg		

Acid Surrogates:	Recovery *L7229-12*	Recovery *MB0729M*
2-Fluorophenol	112%	111%
Phenol-d4	154%	147%
2,4,6-Tribromophenol	148%	124%

Base / Neutral Surrogates:	*L7229-12*	*MB0729M*
1,2-Dichlorobenzene-d4	95%	106%
Nitrobenzene-d5	92%	83%
2-Fluorobiphenyl	96%	111%

none detected = nd
Matrix Interference = MI

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L7229

Client: **Woodward Clyde Consultants**
Contact: **Michelle McClelland**

Project: **91C0796B**

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

Sample ID	Analyte	Results	Blank Result	Reporting Limit	Units	COMMENT	*Lab Number*
97-10A-11-12.5	*SOIL*		*MB0729M*			**Sampled:** *07/22/98* **Analyzed:** *08/05/98*	*L7229-13*
CAS#							
91-20-3	Naphthalene	nd	nd	10	ug/Kg		
208-96-8	Acenaphthylene	nd	nd	10	ug/Kg		
83-32-9	Acenaphthene	nd	nd	10	ug/Kg		
86-73-7	Fluorene	nd	nd	10	ug/Kg		
87-86-5	Pentachlorophenol	nd	nd	100	ug/Kg		
85-01-8	Phenanthrene	nd	nd	10	ug/Kg		
120-12-7	Anthracene	nd	nd	10	ug/Kg		
206-44-0	Fluoranthene	nd	nd	10	ug/Kg		
129-00-0	Pyrene	nd	nd	10	ug/Kg		
56-55-3	Benzo[a]anthracene	nd	nd	10	ug/Kg		
218-01-9	Chrysene	nd	nd	10	ug/Kg		
205-99-2	Benzo[b]fluoranthene	nd	nd	10	ug/Kg		
207-08-9	Benzo[k]fluoranthene	nd	nd	10	ug/Kg		
50-32-8	Benzo[a]pyrene	nd	nd	10	ug/Kg		
193-39-5	Indeno[1,2,3-cd]pyrene	nd	nd	10	ug/Kg		
53-70-3	Dibenz[a,h]anthracene	nd	nd	10	ug/Kg		
191-24-2	Benzo[g,h,i]perylene	nd	nd	10	ug/Kg		

Acid Surrogates:	Recovery *L7229-13*	Recovery *MB0729M*
2-Fluorophenol	108%	111%
Phenol-d4	148%	147%
2,4,6-Tribromophenol	145%	124%

Base / Neutral Surrogates:	*L7229-13*	*MB0729M*
1,2-Dichlorobenzene-d4	96%	106%
Nitrobenzene-d5	81%	83%
2-Fluorobiphenyl	100%	111%

none detected = nd

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Client: **Woodward Clyde Consultants**
Contact: **Michelle McClelland**

Project: **91C0796B**

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

Sample ID	Analyte	Results	Blank Result	Reporting Limit *	Units	COMMENT	*Lab Number*
						Sampled: *07/23/98*	
97-6B-7.5-9	*SOIL*		*MB0729M*			Analyzed: *08/05/98*	*L7229-16*
CAS#							
91-20-3	**Naphthalene**	**187,000**	**nd**	**1,000**	**ug/Kg**		
208-96-8	Acenaphthylene	nd	nd	1,000	ug/Kg		
83-32-9	**Acenaphthene**	**4,290**	**nd**	**1,000**	**ug/Kg**		
86-73-7	**Fluorene**	**3,840**	**nd**	**1,000**	**ug/Kg**		
87-86-5	Pentachlorophenol	nd	nd	10,000	ug/Kg		
85-01-8	**Phenanthrene**	**12,700**	**nd**	**1,000**	**ug/Kg**		
120-12-7	**Anthracene**	**1,420**	**nd**	**1,000**	**ug/Kg**		
206-44-0	**Fluoranthene**	**4,740**	**nd**	**1,000**	**ug/Kg**		
129-00-0	**Pyrene**	**3,270**	**nd**	**1,000**	**ug/Kg**		
56-55-3	Benzo[a]anthracene	nd	nd	1,000	ug/Kg		
218-01-9	Chrysene	nd	nd	1,000	ug/Kg		
205-99-2	Benzo[b]fluoranthene	nd	nd	1,000	ug/Kg		
207-08-9	Benzo[k]fluoranthene	nd	nd	1,000	ug/Kg		
50-32-8	Benzo[a]pyrene	nd	nd	1,000	ug/Kg		
193-39-5	Indeno[1,2,3-cd]pyrene	nd	nd	1,000	ug/Kg		
53-70-3	Dibenz[a,h]anthracene	nd	nd	1,000	ug/Kg		
191-24-2	Benzo[g,h,i]perylene	nd	nd	1,000	ug/Kg		

Acid Surrogates:	Recovery *L7229-16*	Recovery *MB0729M*
2-Fluorophenol	MI	111%
Phenol-d4	MI	147%
2,4,6-Tribromophenol	MI	124%

Base / Neutral Surrogates:	*L7229-16*	*MB0729M*
1,2-Dichlorobenzene-d4	MI	106%
Nitrobenzene-d5	MI	83%
2-Fluorobiphenyl	MI	111%

none detected = nd
Elevated Reporting Limit due to sample matrix = *
Matrix Interference = MI

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L7229

Client: **Woodward Clyde Consultants**
Contact: **Michelle McClelland**

Project: **91C0796B**

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

Sample ID	Analyte	Results	Blank Result	Reporting Limit *	Units	COMMENT	*Lab Number*
97-6B-10.5-12	*SOIL*		*MB0729M*			Sampled: *07/23/98* Analyzed: *08/05/98*	*L7229-18*
CAS#							
91-20-3	**Naphthalene**	**245,000**	**nd**	**1,000**	**ug/Kg**		
208-96-8	Acenaphthylene	nd	nd	1,000	ug/Kg		
83-32-9	**Acenaphthene**	**55,500**	**nd**	**1,000**	**ug/Kg**		
86-73-7	**Fluorene**	**53,800**	**nd**	**1,000**	**ug/Kg**		
87-86-5	Pentachlorophenol	nd	nd	10,000	ug/Kg		
85-01-8	**Phenanthrene**	**141,000**	**nd**	**1,000**	**ug/Kg**		
120-12-7	**Anthracene**	**53,600**	**nd**	**1,000**	**ug/Kg**		
206-44-0	**Fluoranthene**	**47,500**	**nd**	**1,000**	**ug/Kg**		
129-00-0	**Pyrene**	**31,800**	**nd**	**1,000**	**ug/Kg**		
56-55-3	**Benzo[a]anthracene**	**7,900**	**nd**	**1,000**	**ug/Kg**		
218-01-9	**Chrysene**	**7,320**	**nd**	**1,000**	**ug/Kg**		
205-99-2	**Benzo[b]fluoranthene**	**3,950**	**nd**	**1,000**	**ug/Kg**		
207-08-9	**Benzo[k]fluoranthene**	**1,320**	**nd**	**1,000**	**ug/Kg**		
50-32-8	**Benzo[a]pyrene**	**2,210**	**nd**	**1,000**	**ug/Kg**		
193-39-5	Indeno[1,2,3-cd]pyrene	nd	nd	1,000	ug/Kg		
53-70-3	Dibenz[a,h]anthracene	nd	nd	1,000	ug/Kg		
191-24-2	Benzo[g,h,i]perylene	nd	nd	1,000	ug/Kg		

Acid Surrogates:	Recovery *L7229-18*	Recovery *MB0729M*
2-Fluorophenol	MI	111%
Phenol-d4	MI	147%
2,4,6-Tribromophenol	MI	124%

Base / Neutral Surrogates:	*L7229-18*	*MB0729M*
1,2-Dichlorobenzene-d4	MI	106%
Nitrobenzene-d5	MI	83%
2-Fluorobiphenyl	MI	111%

none detected = nd
Elevated Reporting Limit due to sample matrix = *
Matrix Interference = MI

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Client: *Woodward Clyde Consultants*
Contact: *Michelle McClelland*

Project: *91C0796*
IP

Semi-Volatile Petroleum Products
by NWTPH-DX

Sample ID	*Matrix*	Analyte	Result	Reporting Limit	Units (ppm)	Comment	*Lab Numb*
						Sampled: *07/20/98*	
						Extracted: *07/27/98*	
97-4B-6-7.5	*Soil*					Analyzed: *07/30/98 by RJ*	*L7229*
		Diesel Region	ND	25.	mg/kg		
		Oil Region	ND	50.	mg/kg		
		Surrogate			Recovery	Limit	
		2-Fluorobiphenyl			80.%	50 - 150	
		O-terphenyl			95.%	50 - 150	
						Sampled: *07/20/98*	
						Extracted: *07/27/98*	
97-4B-9-10.5	*Soil*					Analyzed: *07/30/98 by RJ*	*L7229*
		Diesel Region	ND	25.	mg/kg		
		Oil Region	ND	50.	mg/kg		
		Surrogate			Recovery	Limit	
		2-Fluorobiphenyl			72.%	50 - 150	
		O-terphenyl			89.%	50 - 150	
						Sampled: *07/21/98*	
						Extracted: *07/27/98*	
97-5A-9.5-11	*Soil*					Analyzed: *07/30/98 by RJ*	*L7229*
		Diesel Region	ND	25.	mg/kg		
		Oil Region	ND	50.	mg/kg		
		Surrogate			Recovery	Limit	
		2-Fluorobiphenyl			81.%	50 - 150	
		O-terphenyl			96.%	50 - 150	

Client: ***Woodward Clyde Consultants***
Contact: ***Michelle McClelland***

Project: ***91C0796B***
IP

Semi-Volatile Petroleum Products
by NWTPH-DX

Sample ID / *Matrix* / Analyte	Result	Reporting Limit	Units (ppm)	Comment	*Lab Number*
97-5A-12.5-14 / ***Soil***				**Sampled:** *07/21/98* **Extracted:** *07/27/98* **Analyzed:** *07/30/98 by RJ*	*L7229-6*
Diesel Region	ND	25.	mg/kg		
Oil Region	ND	50.	mg/kg		
Surrogate			Recovery	Limit	
2-Fluorobiphenyl			78.%	50 - 150	
O-terphenyl			91.%	50 - 150	
98PB-14-7.5-9 / ***Soil***				**Sampled:** *07/21/98* **Extracted:** *07/27/98* **Analyzed:** *07/30/98 by RJ*	*L7229-10*
Diesel Region	ND	25.	mg/kg		
Oil Region	ND	50.	mg/kg		
Surrogate			Recovery	Limit	
2-Fluorobiphenyl			81.%	50 - 150	
O-terphenyl			96.%	50 - 150	
97-10A-9.5-11 / ***Soil***				**Sampled:** *07/22/98* **Extracted:** *07/27/98* **Analyzed:** *07/30/98 by RJ*	*L7229-12*
Diesel Region	ND	25.	mg/kg		
Oil Region	ND	50.	mg/kg		
Surrogate			Recovery	Limit	
2-Fluorobiphenyl			85.%	50 - 150	
O-terphenyl			102.%	50 - 150	

Client: ***Woodward Clyde Consultants***
Contact: ***Michelle McClelland***

Project: ***91C0796B***
IP

Semi-Volatile Petroleum Products

by NWTPH-DX

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

97-10A-11-12.5 — *Soil* — Sampled: *07/22/98* — Extracted: *07/27/98* — Analyzed: *07/29/98 by RJ* — *L7229-13*

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

Surrogate	Recovery	Limit
2-Fluorobiphenyl	84.%	50 - 150
O-terphenyl	104.%	50 - 150

97-6B-7.5-9 — *Soil* — Sampled: *07/23/98* — Extracted: *07/27/98* — Analyzed: *07/30/98 by RJ* — *L7229-16*

Diesel Region	**490**	**25.**	**mg/kg**	1
Oil Region	ND	50.	mg/kg	

Surrogate	Recovery	Limit
2-Fluorobiphenyl	80.%	50 - 150
O-terphenyl	89.%	50 - 150

[1] Pattern does not resemble a typical product.

97-6B-10.5-12 — *Soil* — Sampled: *07/23/98* — Extracted: *07/27/98* — Analyzed: *07/31/98 by RJ* — *L7229-18*

Diesel Region	**1,900**	**250**	**mg/kg**	1,D
Oil Region	ND	500	mg/kg	D

Surrogate	Recovery	Limit
2-Fluorobiphenyl	91.%	50 - 150
O-terphenyl	85.%	50 - 150

[1] Pattern does not resemble a typical product.

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L7229

Client: *Woodward Clyde Consultants*
Contact: *Michelle McClelland*

Project: *91C0796B*
IP

Batch Q.C.

Method Blank

NWTPH-Dx/Soil (mg/kg)

Analyte	Result	Reporting Limit	Q	Date Analyzed
NWTPH-Dx				
Diesel range	ND	25		07/29/98
Oil range	ND	50		

Surrogates	% Recovery
Fluorobiphenyl	102
O-terphenyl	123

Comments:

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L7229

Client: *Woodward Clyde Consultants*
Contact: *Michelle McClelland*

Project: *91C0796B*
IP

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		07/29/98
Oil range	ND	ND	NA	50		

Surrogates	% Recovery Sample	% Recovery Duplicate
Fluorobiphenyl	84	79
O-terphenyl	104	98

Comments:

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L7229

Client: *Woodward Clyde Consultants*
Contact: *Michelle McClelland*

Project: *91C0796B*
IP

Batch Q.C.

MS

NWTPH-Dx/Soil (mg/kg)

Analyte	Sample Result	MS Result	True Value	% Recovery	Q	Date Analyzed
NWTPH-Dx	ND	146	162	90		07/29/98

Surrogates	% Recovery Sample	% Recovery MS
Fluorobiphenyl	84	84
O-terphenyl	104	101

Comments:

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L7229

Client: *Woodward Clyde Consultants*
Contact: *Michelle McClelland*

Project: *91C0796B*
IP

Batch Q.C.

LCS

NWTPH-Dx/Soil (mg/kg)

Analyte	Result	True Value	% Recovery	Q	Date Analyzed
NWTPH-Dx	146	134	109		07/29/98

Surrogates	% Recovery
Fluorobiphenyl	90
O-terphenyl	106

Comments:

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L7229

Client: *Woodward Clyde Consultants*
Contact: *Michelle McClelland*

Project: *91C0796B*
IP

Batch Q.C.

Method Blank

NWTPH-Dx/Soil (mg/kg)

Analyte	Result	Reporting Limit	Q	Date Analyzed
NWTPH-Dx				
Diesel range	ND	25		07/29/98
Oil range	ND	50		

Surrogates	% Recovery
Fluorobiphenyl	102
O-terphenyl	123

Comments:

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Client: **Woodward Clyde Consultants**
Contact: **Michelle McClelland**

Project: **91C0796B**

PNA & PCP LCS

by modified EPA method 8270 (SIM)

Sample ID	Lab Number	
Analyte	**Recovery**	**COMMENT**

			Sampled: *NA*
		LCS0723M	Analyzed: *07/23/98*
CAS#			
91-20-3	Naphthalene	89%	
208-96-8	Acenaphthylene	92%	
83-32-9	Acenaphthene	105%	
86-73-7	Fluorene	96%	
87-86-5	Pentachlorophenol	58%	
85-01-8	Phenanthrene	106%	
120-12-7	Anthracene	93%	
206-44-0	Fluoranthene	94%	
129-00-0	Pyrene	97%	
56-55-3	Benzo[a]anthracene	99%	
218-01-9	Chrysene	101%	
205-99-2	Benzo[b]fluoranthene	93%	
207-08-9	Benzo[k]fluoranthene	97%	
50-32-8	Benzo[a]pyrene	92%	
193-39-5	Indeno[1,2,3-cd]pyrene	80%	
53-70-3	Dibenz[a,h]anthracene	76%	
191-24-2	Benzo[g,h,i]perylene	82%	

	Recovery
Acid Surrogates:	*LCS0723M*
2-Fluorophenol	95%
Phenol-d4	100%
2,4,6-Tribromophenol	68%

Base / Neutral Surrogates:	*LCS0723M*
1,2-Dichlorobenzene-d4	88%
Nitrobenzene-d5	87%
2-Fluorobiphenyl	96%

none detected = nd

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L7229

Client: **Woodward Clyde Consultants**
Contact: **Michelle McClelland**

Project: **91C0796B**

PNA & PCP Matrix Spikes

by modified EPA method 8270 (SIM)

Sample ID		Lab Number	Lab Number		
	Analyte	Recovery	Recovery	RPD	COMMENT
98-5896-60	*SOIL*	*L7184-3MS*	*L7184-3MSD*		**Sampled:** *07/21/98* **Analyzed:** *07/23/98*
CAS#					
91-20-3	Naphthalene	82%	97%	16%	
208-96-8	Acenaphthylene	61%	73%	18%	
83-32-9	Acenaphthene	90%	64%	33%	
86-73-7	Fluorene	81%	4%	179%	
87-86-5	Pentachlorophenol	45%	47%	3%	
85-01-8	Phenanthrene	-2%	-6%	99%	
120-12-7	Anthracene	72%	87%	18%	
206-44-0	Fluoranthene	70%	86%	21%	
129-00-0	Pyrene	56%	72%	25%	
56-55-3	Benzo[a]anthracene	70%	93%	28%	
218-01-9	Chrysene	73%	104%	35%	
205-99-2	Benzo[b]fluoranthene	89%	112%	22%	
207-08-9	Benzo[k]fluoranthene	87%	100%	14%	
50-32-8	Benzo[a]pyrene	73%	93%	23%	
193-39-5	Indeno[1,2,3-cd]pyrene	67%	87%	26%	
53-70-3	Dibenz[a,h]anthracene	56%	68%	20%	
191-24-2	Benzo[g,h,i]perylene	78%	95%	19%	

Acid Surrogates:	Recovery *L7184-3MS*	Recovery *L7184-3MSD*
2-Fluorophenol	92%	83%
Phenol-d4	94%	86%
2,4,6-Tribromophenol	0%	0%

Base / Neutral Surrogates:	*L7184-3MS*	*L7184-3MSD*
1,2-Dichlorobenzene-d4	101%	87%
Nitrobenzene-d5	145%	103%
2-Fluorobiphenyl	98%	82%

none detected = nd

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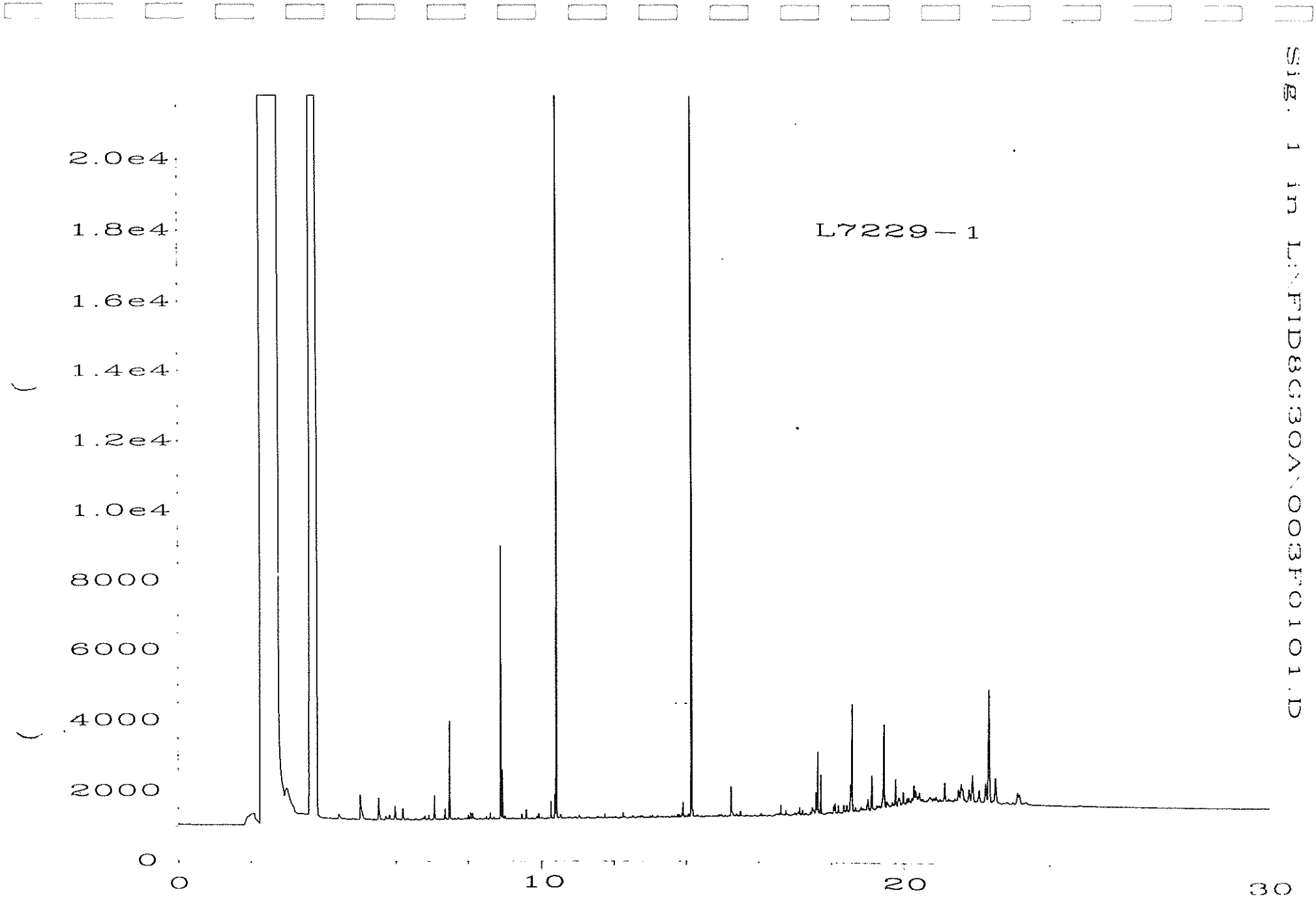
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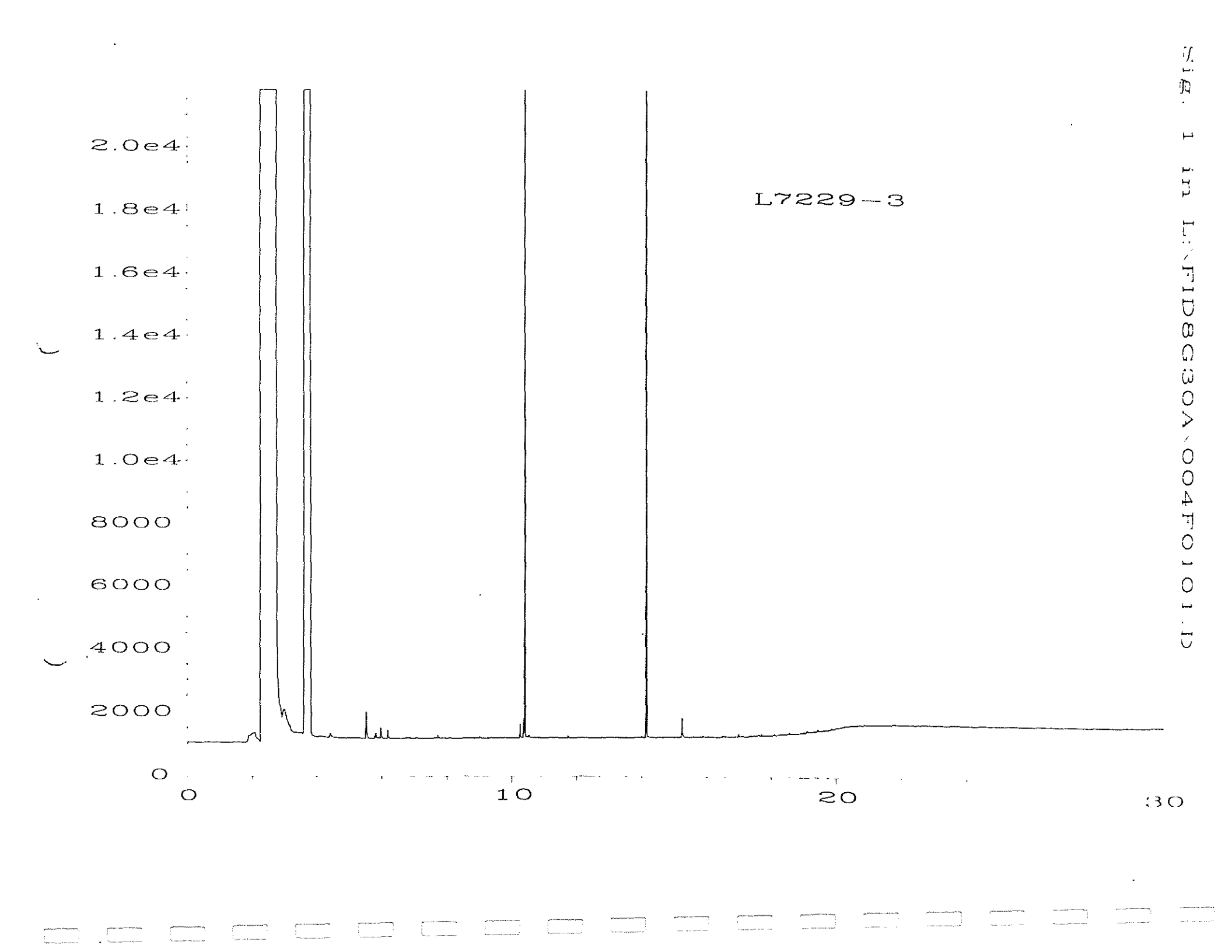
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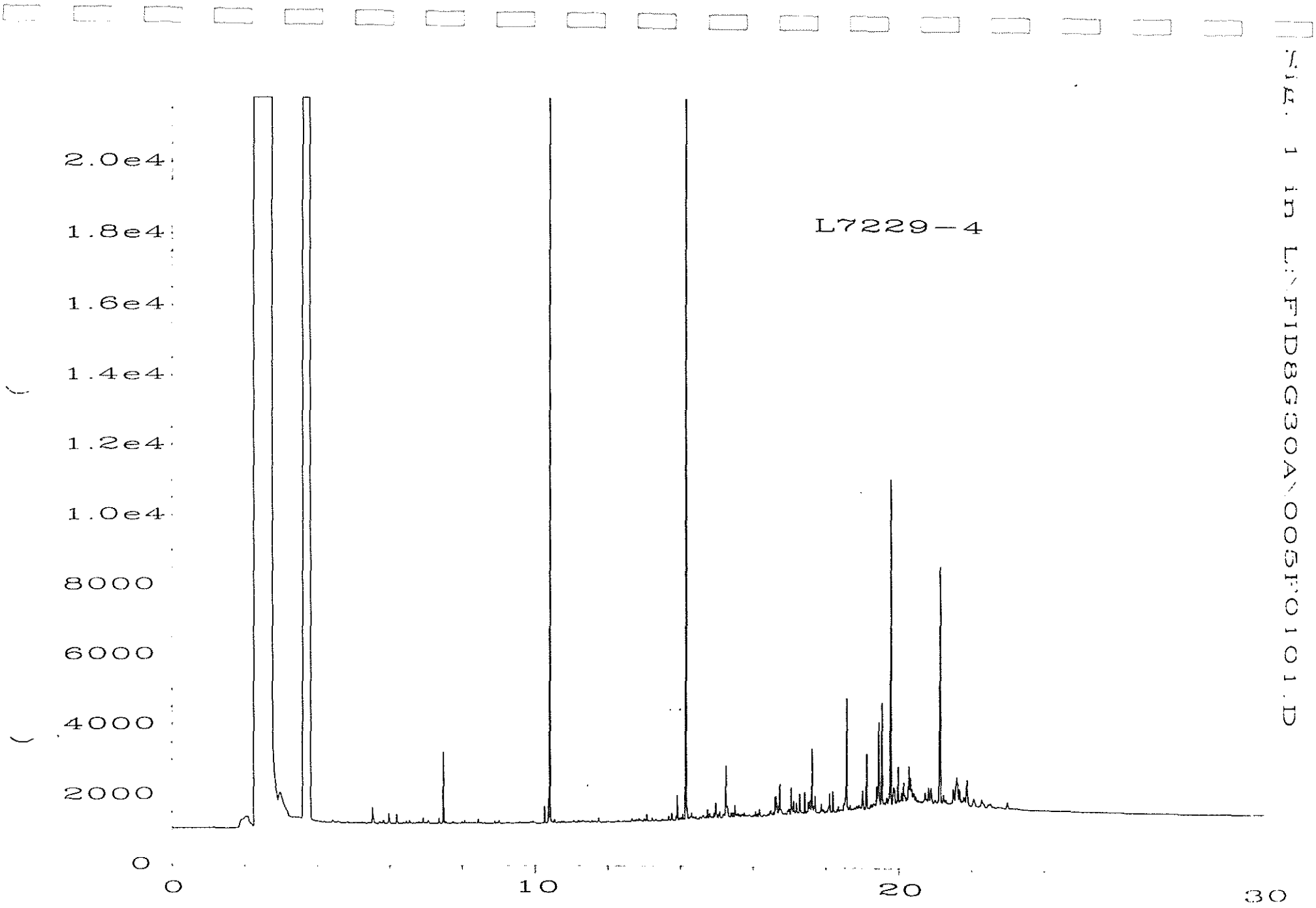

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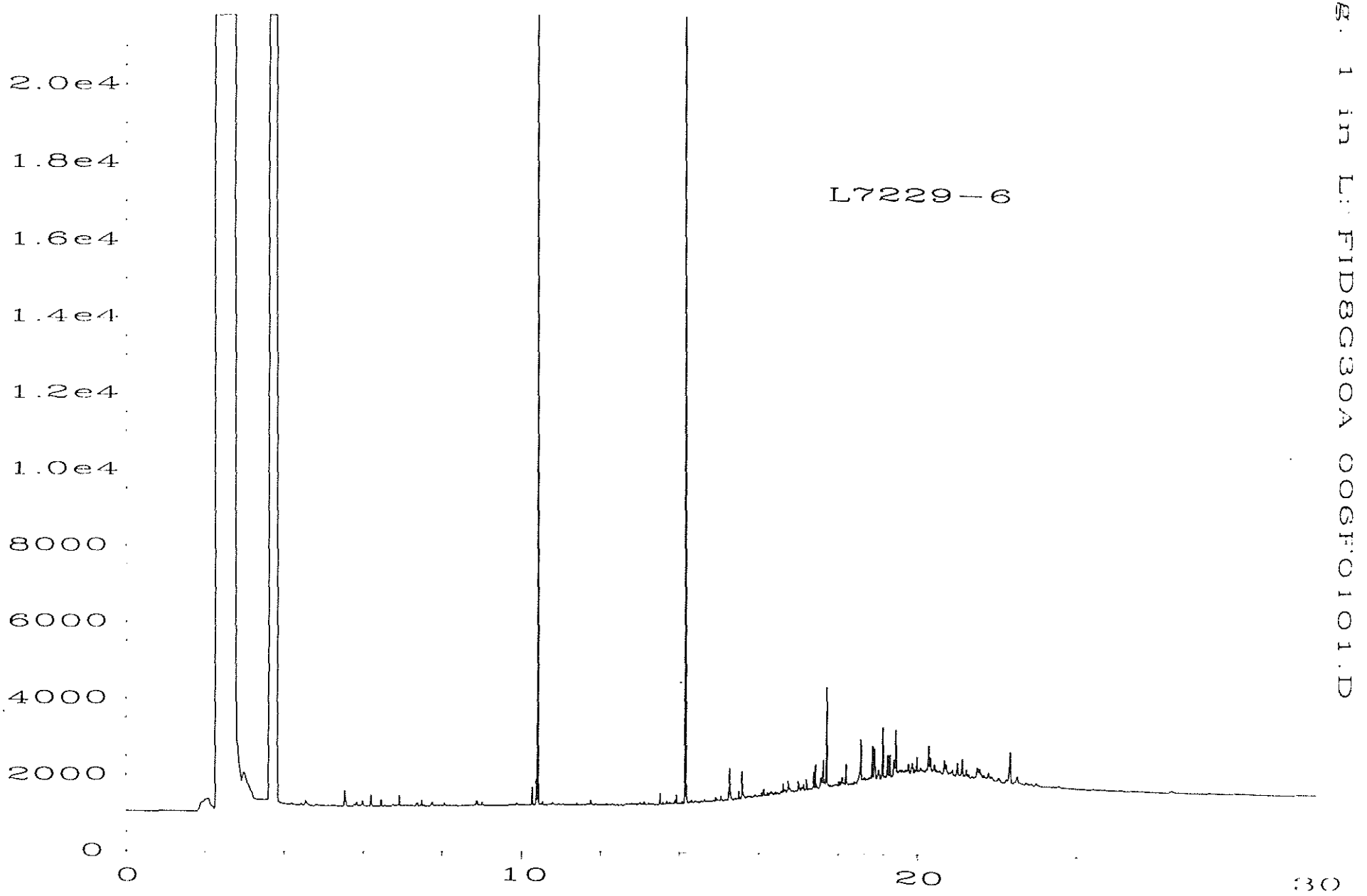

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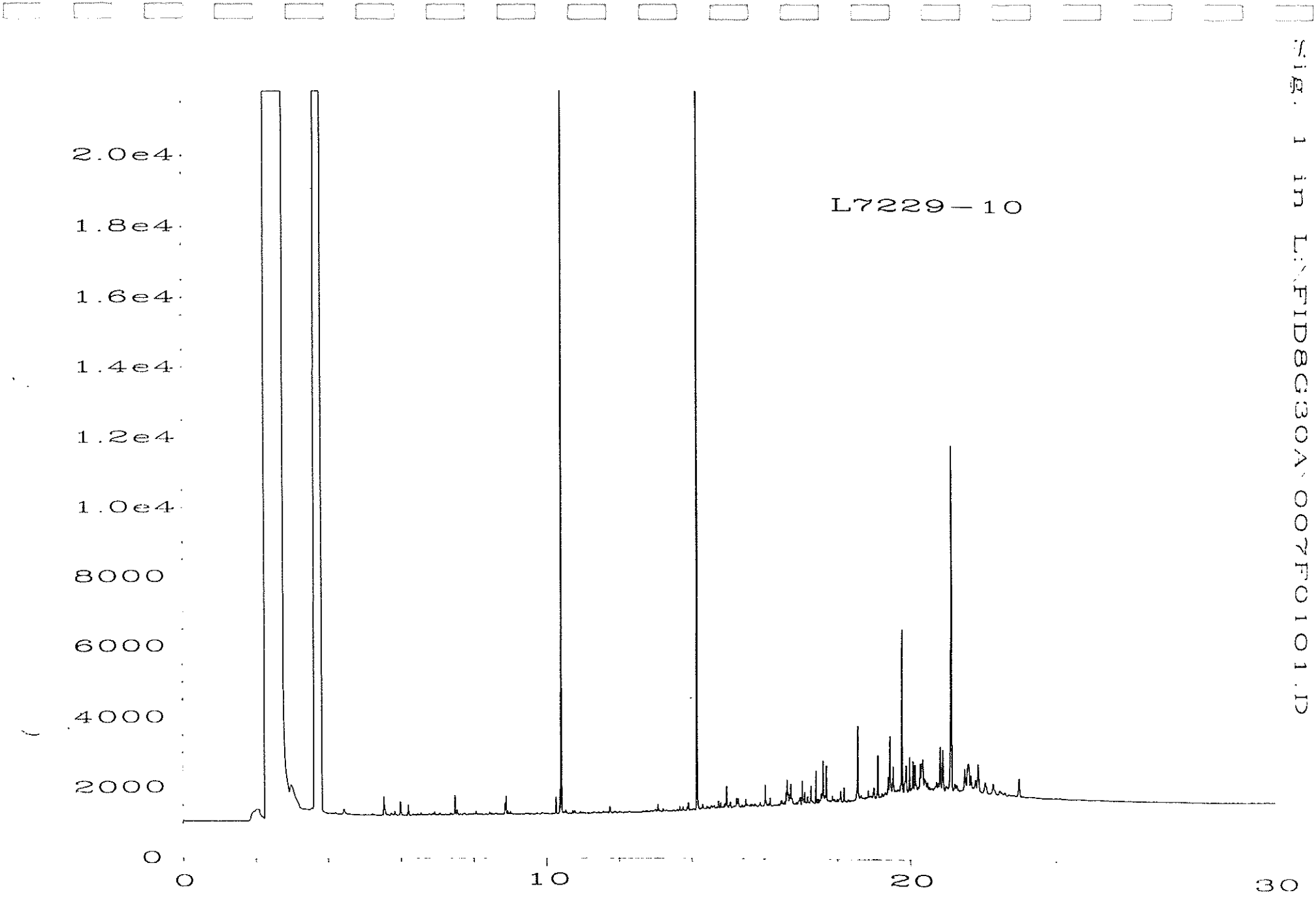
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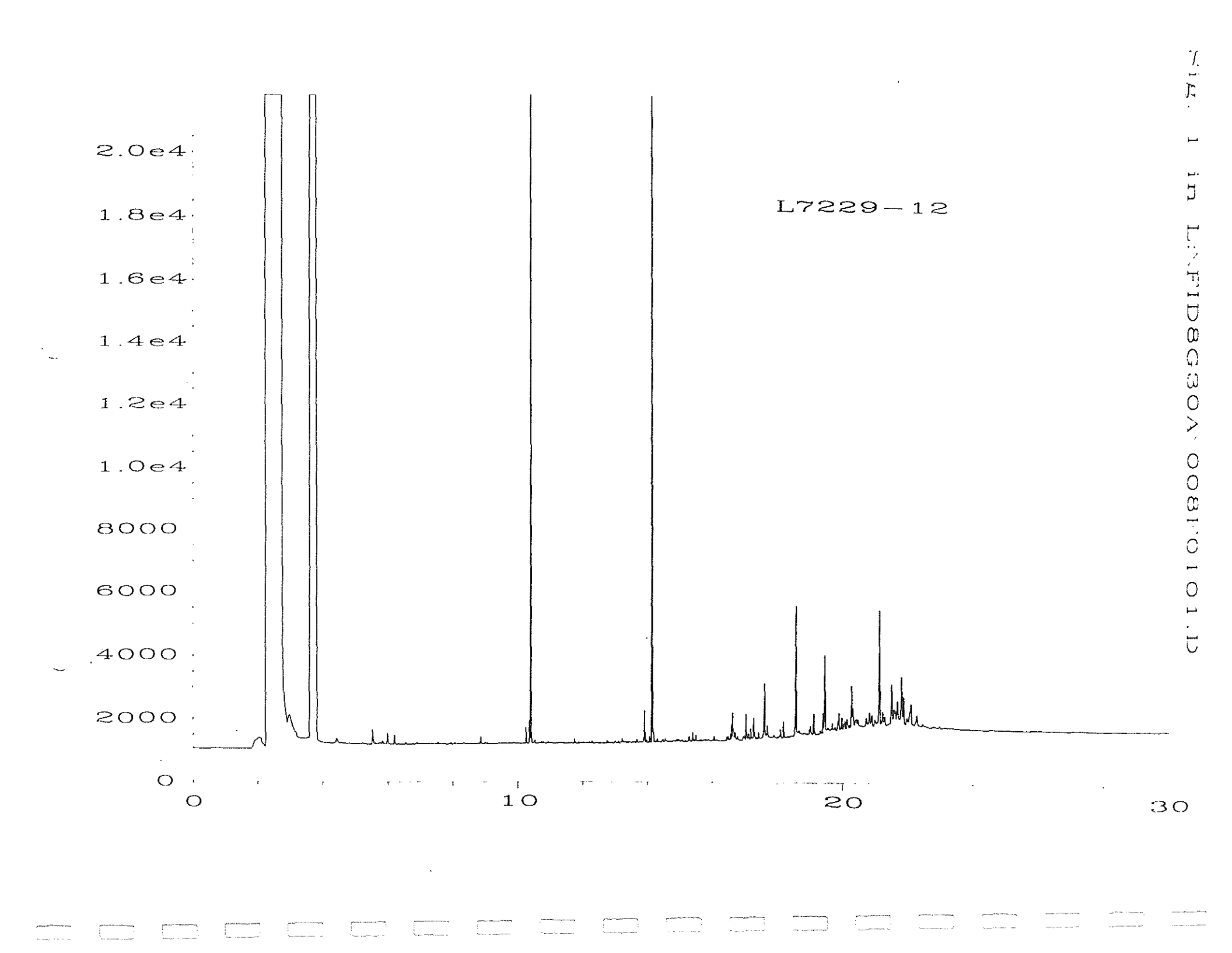
1.6e4
1.4e4
1.2e4
1.0e4
8000
6000
4000
2000
0
0
10
20
30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1.6e4
1.4e4
1.2e4
1.0e4
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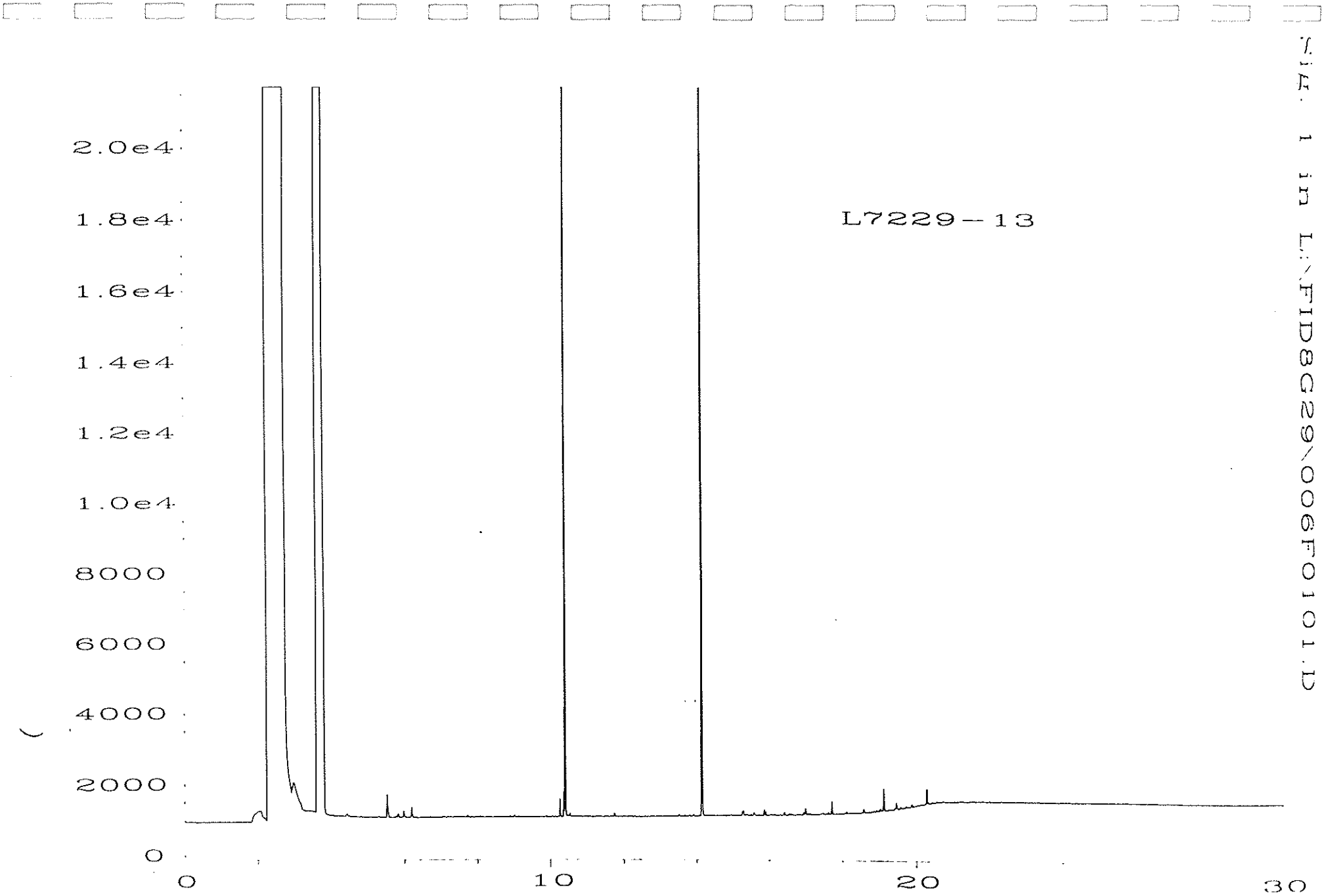
6000
4000
2000
0
0
10
20
30
FIG. 1 in L:\FID8G30A\0081\0101.D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1.8e4
1.6e4
1.4e4
1.2e4
1.0e4
8000
6000
4000
2000
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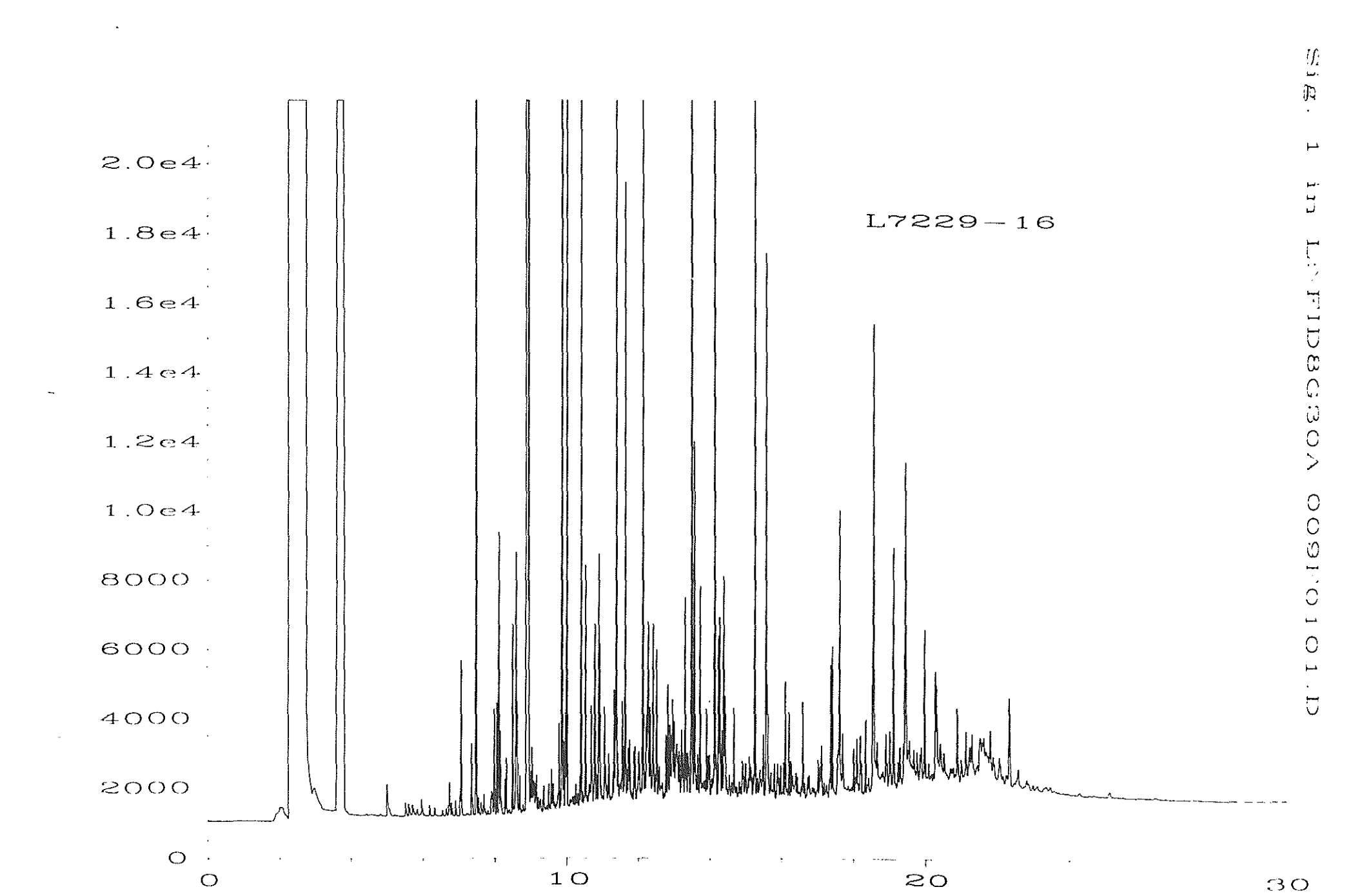
0
10
20
30
L7229-13
FID8G29\006F0101.D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1.4e4
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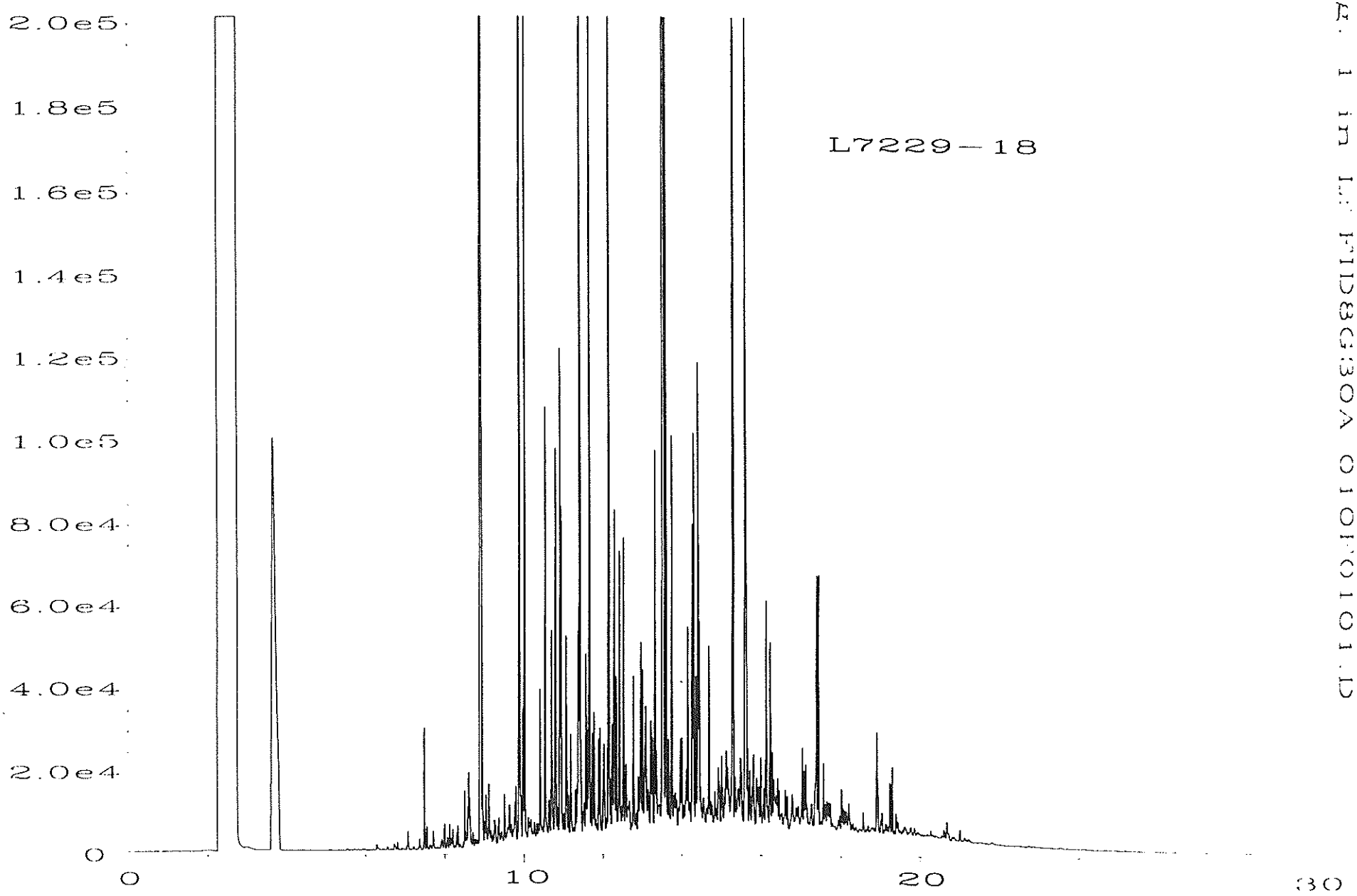
6000
4000
2000
0
0
10
20
30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1.4e5
1.2e5
1.0e5
8.0e4
6.0e4
4.0e4
2.0e4
0
0
10
20
30
L7229-18
Sig. 1 in L:\FID8G\30A 0101\0101.D

WOODWARD-CLYDE
CHAIN OF CUSTODY RECORD

1501 Fourth Avenue Suite 1500
Seattle, Washington 98101
(206) 343-7933 fax (206) 343-0513

Project Name: IP
Project Number: 91C0796B Project Manager: TS
Sampler (signature): TM
Shipping Form Tracking Number:
Page 1 of 1 Number of Coolers: 1

Date	Time	Sample Identification	Matrix	Lab ID	Analyses: TPH - Dext.	Analyses: PAH & PCP (8270SIM)	Analyses (other columns)	Preservative y/n	Number of Containers
7/20	0930	97-4B-6-7.5	Soil	L7229-1	X	X	~~HOLD~~	N	1
7/20	0936	97-4B-7.5-9	Soil	-2			HOLD	N	1
7/20	0940	97-4B-9-10.5	Soil	-3	X	X		N	
7/21	1310	97-5A-9.5-11	Soil	-4	X	X		N	1
	1315	97-5A-11-12.5	Soil	-5			HOLD	N	1
	1320	97-5A-12.5-14	Soil	-6	X	X		N	1
	1325	97-5A-14-15.5	Soil	-7			HOLD	N	1
	1515	98PB-14-4.5-6	Soil	-8			HOLD	N	1
	1520	~~98PB-6-7~~ 98PB-14-6-7.5	Soil	-9			HOLD	N	1
	1525	98PB-14-7.5-9	Soil	-10	X	X		N	1
	1530	98PB-14-9-10.5	Soil	-11			HOLD	N	1
7/22	1305	97-10A-9.5-11	Soil	-12	X	X		N	1
7/22	1310	97-10A-11-12.5	Soil	-13	X	X		N	1
7/23	[illegible]	97-6B-4.5-6	Soil	-14			HOLD	N	1
	[illegible]	97-6B-6-7.5	Soil	-15			HOLD	N	1
	[illegible]	97-6B-7.5-9	Soil	-16	X	X		N	1
	1800	97-6B-9-10.5	Soil	-17			HOLD	N	1
	1805	97-6B-10.5-12	Soil	-18	X	X		N	1
	1806	97-6B-12-13.5	Soil	-19			HOLD		

Comments:
* Please send chromatograms (TPH-D)

Total Number of Containers
RECEIVED [illegible] 8 07 JARS @ [illegible]

Relinquished By (signature):	Date/Time	Relinquished By (signature):	Date/Time
[signature]	7/24/98 10:30am		
Received By (Signature):	**Date/Time**	**Received for Lab By (signature):**	**Date/Time**
[signature]	7-24/1030	[signature]	7/24/98 14[illegible]

COCSEA 4/96

Columbia Analytical Services inc.

December 17, 1997

Service Request No: K9708358

Tim Syverson
Woodward-Clyde Consultants
1501 Fourth Avenue, Suite 1500
Seattle, WA 98101-1662

Re: IP/91C0796B

Dear Tim:

Enclosed are the results of the sample(s) submitted to our laboratory on November 11, 1997. For your reference, these analyses have been assigned our service request number K9708358.

All analyses were performed according to our laboratory's quality assurance program. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the samples analyzed.

Please call if you have any questions. My extension is 281.

Respectfully submitted,

Columbia Analytical Services, Inc.

Elizabeth Schneider
Project Chemist

ES/td

P.O. Box 479 • Kelso, Washington 98626 • Telephone 360/577-7222 • Fax 360/636-1068

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
J	Estimated concentration. The value is less than the method reporting limit, but greater than the method detection limit.
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected at or above the MRL
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Woodward-Clyde	**Service Request No.:**	K9708358
Project:	IP/91C0796B	**Date Received:**	11/11/97
Sample Matrix:	Soil		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for sample(s) designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Surrogate recoveries have been reported for all applicable organic analyses. Additional quality control analyses reported herein include: Matrix/Duplicate Matrix Spike (MS/DMS).

All EPA recommended holding times have been met for analyses in this sample delivery group.

The following difficulties were experienced during analysis of this batch:

The SIM analysis of sample IP-97-8.A-9.0 was initially performed within the recommended holding time. The 2-Fluorobiphenyl surrogate recovery was outside normal CAS control limits. The sample was reanalyzed past the recommended holding time. The QA/QC results for the reanalysis are within CAS acceptance criteria. The sample results from the reanalysis are comparable to the initial analysis, indicating that the quality of the initial sample data was not significantly affected by the reduced recovery. The values from the initial analysis are reported in the sample results section of this report.

Approved by _____ **Date** 12/2/97

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Woodward-Clyde
Project: IP/91C0796B
Sample Matrix: Soil

Service Request: K9708358
Date Collected: 11/10 - 11/11/97
Date Received: 11/11/97

Total Solids

Prep Method: NONE
Analysis Method: 160.3M
Test Notes:

Units: PERCENT
Basis: Wet

Sample Name	Lab Code	Date Analyzed	Result	Result Notes
IP-97-2.A-4.5	K9708358-001	11/12/97	64.4	
IP-97-2.A-9.0	K9708358-002	11/12/97	68.4	
IP-97-8.A-4.5	K9708358-003	11/12/97	63.7	
IP-97-8.A-9.0	K9708358-004	11/12/97	77.6	
IP-97-3.A-5	K9708358-005	11/12/97	64.5	
IP-97-3.A-11	K9708358-006	11/12/97	69.1	
IP-97-9.A-4.5	K9708358-007	11/12/97	70.8	
IP-97-9.A-11	K9708358-008	11/12/97	75.0	

Approved By: _____ Date: 11/13/97

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Woodward-Clyde
Project: IP\91C0796B
Sample Matrix: Soil

Service Request: K9708358
Date Collected: 11/10/97
Date Received: 11/11/97
Date Extracted: 11/12/97

Base Neutral/Acid Semivolatile Organic Compounds
EPA 3550A in Conjunction with GC/MS SIM Method
Units: ug/Kg (ppb)

	Sample Name:	IP-97-2.A-4.5	IP-97-2.A-9.0	IP-97-8.A-4.5
	Lab Code:	K9708358-001	K9708358-002	K9708358-003
	Date Analyzed:	11/27/97	11/27/97	11/27/97
Base Neutral Analyte	**MRL**			
Naphthalene	5	6	ND	ND
2-Methylnaphthalene	5	ND	ND	ND
Acenaphthylene	10	ND	ND	ND
Acenaphthene	10	ND	ND	ND
Dibenzofuran	5	ND	ND	ND
Fluorene	10	ND	ND	ND
Phenanthrene	10	14	ND	ND
Anthracene	5	ND	ND	ND
Fluoranthene	10	14	ND	ND
Pyrene	10	14	ND	10
Benz(a)anthracene	10	ND	ND	ND
Chrysene	10	ND	ND	ND
Benzo(b)fluoranthene	10	ND	ND	ND
Benzo(k)fluoranthene	10	ND	ND	ND
Benzo(a)pyrene	10	ND	ND	ND
Indeno(1,2,3-cd)pyrene	5	ND	ND	11
Dibenz(a,h)anthracene	5	ND	ND	ND
Benzo(g,h,i)perylene	5	ND	ND	15
Pentachlorophenol	300	ND	ND	ND

Approved By: _____ Date: 12-8-97

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Woodward-Clyde
Project: IP\91C0796B
Sample Matrix: Soil

Service Request: K9708358
Date Collected: 11/10-11/97
Date Received: 11/11/97
Date Extracted: 11/12/97

Base Neutral/Acid Semivolatile Organic Compounds
EPA 3550A in Conjunction with GC/MS SIM Method
Units: ug/Kg (ppb)

	Sample Name:	**IP-97-8.A-9.0**	**IP-97-3.A-5**	**IP-97-3.A-11**
	Lab Code:	K9708358-004	K9708358-005	K9708358-006
	Date Analyzed:	11/27/97	11/27/97	11/27/97
Base Neutral Analyte	**MRL**			
Naphthalene	5	ND	5	ND
2-Methylnaphthalene	5	ND	ND	ND
Acenaphthylene	10	ND	ND	ND
Acenaphthene	10	ND	ND	ND
Dibenzofuran	5	ND	ND	ND
Fluorene	10	ND	ND	ND
Phenanthrene	10	ND	56	ND
Anthracene	5	ND	ND	ND
Fluoranthene	10	ND	76	ND
Pyrene	10	ND	58	ND
Benz(a)anthracene	10	ND	18	ND
Chrysene	10	ND	29	ND
Benzo(b)fluoranthene	10	ND	24	ND
Benzo(k)fluoranthene	10	ND	ND	ND
Benzo(a)pyrene	10	ND	14	ND
Indeno(1,2,3-cd)pyrene	5	ND	8	ND
Dibenz(a,h)anthracene	5	ND	ND	ND
Benzo(g,h,i)perylene	5	ND	12	ND
Pentachlorophenol	300	ND	ND	ND

Approved By: _____ Date: 12-8-97

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Woodward-Clyde
Project: IP\91C0796B
Sample Matrix: Soil

Service Request: K9708358
Date Collected: 11/10/97
Date Received: 11/11/97
Date Extracted: 11/12/97
Date Analyzed: 11/27/97

Matrix Spike/Duplicate Matrix Spike Summary
Base Neutral/Acid Semivolatile Organic Compounds
EPA 3550A in Conjunction with GC/MS SIM Method
Units: ug/Kg (ppb)

Sample Name: IP-97-9.A-11
Lab Code: K9708358-008MS, K9708358-008DMS

Analyte	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Advisory Limits	Relative Percent Difference
Acenaphthene	320	330	213	534	901	100	208	43-117	70
Pentachlorophenol	320	330	ND	366	449	114	136	18-112	18
Pyrene	320	330	11	346	342	105	100	24-143	4
Benzo(a)pyrene	320	330	ND	277	302	87	92	-	6

Approved By: _____ Date: 12/17/97

DMS1S/120594
08358SVM.AY1 - DMS 12/17/97

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Woodward-Clyde
Project: IP\91C0796B
Sample Matrix: Soil

Service Request: K9708358
Date Collected: 11/10/97
Date Received: 11/11/97
Date Extracted: 11/12/97
Date Analyzed: 11/27/97

Surrogate Recovery Summary
Base Neutral/Acid Semivolatile Organic Compounds
EPA 3550A in Conjunction with GC/MS SIM Method

		Percent Recovery					
Sample Name	**Lab Code**	2FP	PHL	TBP	NBZ	FBP	TPH
IP-97-2.A-4.5	K9708358-001	64	73	58	55	75	72
IP-97-2.A-9.0	K9708358-002	69	71	74	69	81	87
IP-97-8.A-4.5	K9708358-003	73	82	73	68	89	80
IP-97-8.A-9.0	K9708358-004	7	38	31	68	2 (A)	81
IP-97-3.A-5	K9708358-005	67	75	72	69	88	93
IP-97-3.A-11	K9708358-006	69	82	76	74	60	88
IP-97-9.A-4.5	K9708358-007	70	77	70	69	86	80
IP-97-9.A-11	K9708358-008	69	77	72	74	46	83
IP-97-9.A-11	K9708358-008MS	85	85	81	77	79	92
IP-97-9.A-11	K9708358-008DMS	92	88	84	85	94	90
Lab Control Sample	KWG9703514-3	77	85	81	77	60	91
Method Blank	KWG9703514-4	54	74	77	74	16	93
	CAS Acceptance Limits:	5-106	5-96	5-110	5-134	5-120	15-145

2FP 2-Fluorophenol
PHL Phenol-d6
TBP 2,4,6-Tribromophenol
NBZ Nitrobenzene-d5
FBP 2-Fluorobiphenyl
TPH p-Terphenyl-d14

A Outside acceptance limits; see case narrative.

Approved By: [signature] Date: 12/17/97

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Woodward-Clyde	**Service Request:**	K9708358
Project:	IP\91C0796B	**Date Collected:**	NA
LCS Matrix:	Soil	**Date Received:**	NA
		Date Extracted:	11/12/97
		Date Analyzed:	11/27/97

Laboratory Control Sample Summary
Base Neutral/Acid Semivolatile Organic Compounds
EPA 3550A in Conjunction with GC/MS SIM Method
Units: ug/Kg (ppb)

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Advisory Limits
Acenaphthene	240	211	88	44-112
Pentachlorophenol	240	248	103	31-113
Pyrene	240	249	104	44-126
Benzo(a)pyrene	240	199	83	-

Approved By: _____ Date: 12/17/97

OAL Oregon Analytical Laboratory

14855 S.W. Scholls Ferry Rd. Beaverton, Oregon 97007 (503) 590-5300 FAX (503) 590-1404

CHAIN OF CUSTODY RECORD
LABORATORY ANALYSIS REQUEST

Sampling: ☐ Grab ☐ Comp
OAL hrs. ______
ISCO ______
Page 1 of 1
Site Visit ☐

Client Information
Company Woodward-Clyde
Contact Tim Syverson
Address ______
Phone# 206 343-7933 Fax# 206 343-0513

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

Project Information
Project Name ______
Project # 4100796B
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

Analyses columns: Volatiles 624 / 8260 / 8240 8010 / 8020; Semivolatiles 625 / 8270 PAH(SIM) PAH 8310; Organochlorine 608 / 8080 / 8081 PCB Pesticide; NW TPH-HCID Quantity? ☐ Yes ☐ No; NW TPH Quantification 418.1M G D; BTEX 602 / 8020 ☐ MTBE ☐ Naphthalene; TPH 418.1; Oil & Grease 413.1 / 1664 ☐ Total ☐ NP; Metals ☐ Total ☐ TCLP ☐ Dissolved As Ba Cd Cr Pb Hg Se Ag Other; PAH + Pentachlorophenol 8270SIM

	Sample Identification	1997 Date	Time	FOR LAB USE ONLY OAL Login #	# of Containers	Soil	Water	Other (Note in Remarks)	PAH + Pentachlorophenol 8270SIM	Turnaround	Remarks
1	IP-97-2.A-4.5	10 Nov	0930			X			X		
2	IP-97-2.A-9.0	10 Nov	0935			X			X		
3	IP-97-8.A-4.5	10 Nov	1610			X			X		
4	IP-97-8.A-9	10 Nov	1615			X			X		
5	IP-97-3.A-5'	11 Nov	0845			X			X		
6	IP-97-3.A-11	11 Nov	0855			X			X		
7	IP-97-9.A-4.5	11 Nov	1215			X			X		
8	IP-97-9.A-11	11 Nov	1230			X			X		
9											

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

Relinquished		Relinquished		Relinquished	
Signature M McClelland	Date 11 Nov 97	Signature	Date	Signature	Date
Print Name M McClelland	Time 1600	Print Name	Time	Print Name	Time
Company WC		Company		Company	
Received		**Received**		**Received**	
Signature [signature]	Date 11/11/97	Signature	Date	Signature	Date
Print Name [signature]	Time 1602	Print Name	Time	Print Name	Time
Company		Company		Company	

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

Columbia Analytical Services, Inc.

March 16, 1998

Service Request No: K9708358

Tim Syverson
Woodward-Clyde Consultants
1501 Fourth Avenue, Suite 1500
Seattle, WA 98101-1662

Re: IP/91C0796B

Dear Tim:

Enclosed is the additional report page for the sample(s) submitted to our laboratory on November 11, 1997. For your reference, these analyses have been assigned our service request number K9708358.

All analyses were performed according to our laboratory's quality assurance program. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the samples analyzed.

Please call if you have any questions. My extension is 281.

Respectfully submitted,

Columbia Analytical Services, Inc.

Elizabeth Schneider
Project Chemist

ES/td

1317 South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 360/577-7222 • Fax 360/636-1068

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
J	Estimated concentration. The value is less than the method reporting limit, but greater than the method detection limit.
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected at or above the MRL
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Woodward-Clyde
Project: IP\91C0796B
Sample Matrix: Soil

Service Request: K9708358
Date Collected: 11/11/97
Date Received: 11/11/97
Date Extracted: 11/12/97

Base Neutral/Acid Semivolatile Organic Compounds
EPA 3550A in Conjunction with GC/MS SIM Method
Units: ug/Kg (ppb)

	Sample Name:	IP-97-9.A-4.5	IP-97-9.A-11	Method Blank
	Lab Code:	K9708358-007	K9708358-008	KWG9703514-4
	Date Analyzed:	11/27/97	11/26/97-12/1/97	11/26/97
Base Neutral Analyte	**MRL**			
Naphthalene	5	199	3300	ND
2-Methylnaphthalene	5	ND	ND	ND
Acenaphthylene	10	ND	ND	ND
Acenaphthene	10	53	213	ND
Dibenzofuran	5	46	ND	ND
Fluorene	10	39	101	ND
Phenanthrene	10	48	54	ND
Anthracene	5	61	11	ND
Fluoranthene	10	47	16	ND
Pyrene	10	45	11	ND
Benz(a)anthracene	10	44	ND	ND
Chrysene	10	74	ND	ND
Benzo(b)fluoranthene	10	86	ND	ND
Benzo(k)fluoranthene	10	22	ND	ND
Benzo(a)pyrene	10	27	ND	ND
Indeno(1,2,3-cd)pyrene	5	21	ND	ND
Dibenz(a,h)anthracene	5	7	ND	ND
Benzo(g,h,i)perylene	5	15	ND	ND
Pentachlorophenol	300	ND	ND	ND

Approved By: _____ Date: 3/13/98

Columbia Analytical Services inc.

December 9, 1997

Service Request No: K9708307

Tim Syverson
Woodward-Clyde Consultants
1501 Fourth Avenue, Suite 1500
Seattle, WA 98101-1662

Re: IP-Longview/91C0796

DearTim:

Enclosed are the results of the sample(s) submitted to our laboratory on November 7, 1997. For your reference, these analyses have been assigned our service request number K9708307.

All analyses were performed according to our laboratory's quality assurance program. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the samples analyzed.

Please call if you have any questions. My extension is 281.

Respectfully submitted,

Columbia Analytical Services, Inc.

Elizabeth Schneider
Project Chemist

ES/td

1317 South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 360/577-7222 • Fax 360/636-1068

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
J	Estimated concentration. The value is less than the method reporting limit, but greater than the method detection limit.
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected at or above the MRL
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Woodward-Clyde	**Service Request No.:**	K9708307
Project:	IP-Longview/91C0796	**Date Received:**	11/7/97
Sample Matrix:	Soil		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for sample(s) designated for Tier II data deliverables. When appropriate to the method, method blank results have been reported with each analytical test. Surrogate recoveries have been reported for all applicable organic analyses. Additional quality control analyses reported herein include: Matrix/Duplicate Matrix Spike (MS/DMS).

All EPA recommended holding times have been met for analyses in this sample delivery group.

The following difficulties were experienced during analysis of this batch:

The SIM PAH p-Terphenyl-d14 surrogate recovery in sample IP-Soil-6 was outside normal CAS control limits because of matrix interference. The chromatogram showed components that prevented accurate quantitation of the surrogate. No further corrective action was taken.

The SIM PAH Batch QC Matrix Spike/Duplicate Matrix Spike (MS/DMS) recovery of Pentachlorophenol was outside normal CAS control limits. No target analytes were detected in the unspiked sample. The error associated with elevated recoveries equates to a high bias, thus the elevated recoveries likely have no significance to the sample results. No further corrective action was taken.

Approved by_____ **Date** 12/5/97

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Woodward-Clyde
Project: IP-Longview/91C0796
Sample Matrix: Soil

Service Request: K9708307
Date Collected: 11/7/97
Date Received: 11/7/97

Total Solids

Prep Method: NONE
Analysis Method: 160.3M
Test Notes:

Units: PERCENT
Basis: NA

Sample Name	Lab Code	Date Analyzed	Result	Result Notes
IP-97-1A-5'	K9708307-001	11/11/97	69.2	
IP-97-1A-9'	K9708307-002	11/11/97	69.7	
IP-Soil-6	K9708307-003	11/11/97	85.0	
IP-Soil-7	K9708307-004	11/11/97	68.6	

Approved By: _____ Date: 11/13/97

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Woodward-Clyde
Project: IP-Longview/91C0796
Sample Matrix: Soil

Service Request: K9708307
Date Collected: 11/7/97
Date Received: 11/7/97
Date Extracted: 11/12/97

Base Neutral/Acid Semivolatile Organic Compounds
EPA 3550A in Conjunction with GC/MS SIM Method
Units: ug/Kg (ppb)

	Sample Name:	IP-97-1A-5'	IP-97-1A-9'	IP-Soil-6
	Lab Code:	K9708307-001	K9708307-002	K9708307-003
	Date Analyzed:	11/27/97	11/27/97	11/27/97
Base Neutral Analyte	**MRL**			
Naphthalene	5	7	ND	35000
2-Methylnaphthalene	5	ND	ND	ND
Acenaphthylene	10	ND	ND	330
Acenaphthene	10	ND	ND	18000
Dibenzofuran	5	ND	ND	ND
Fluorene	10	ND	ND	23000
Phenanthrene	5	ND	ND	ND
Anthracene	250	ND	ND	20000
Fluoranthene	50	ND	ND	60000
Pyrene	10	ND	ND	37000
Benz(a)anthracene	5	ND	ND	13000
Chrysene	50	ND	ND	13000
Benzo(b)fluoranthene	200	ND	ND	8000
Benzo(k)fluoranthene	30	ND	ND	3000
Benzo(a)pyrene	40	ND	ND	4500
Indeno(1,2,3-cd)pyrene	5	ND	ND	1600
Dibenz(a,h)anthracene	10	ND	ND	255
Benzo(g,h,i)perylene	10	ND	ND	617
Pentachlorophenol	10	ND	ND	ND

Approved By: _____ Date: 12/8/97

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Woodward-Clyde
Project: IP-Longview/91C0796
Sample Matrix: Soil

Service Request: K9708307
Date Collected: 11/7/97
Date Received: 11/7/97
Date Extracted: 11/12/97

Base Neutral/Acid Semivolatile Organic Compounds
EPA 3550A in Conjunction with GC/MS SIM Method
Units: ug/Kg (ppb)

	Sample Name:	**IP-Soil-7**	**Method Blank**
	Lab Code:	K9708307-004	KWG9703514-4
	Date Analyzed:	11/27/97	11/27/97
Base Neutral Analyte	**MRL**		
Naphthalene	5	25	ND
2-Methylnaphthalene	5	ND	ND
Acenaphthylene	10	ND	ND
Acenaphthene	10	58	ND
Dibenzofuran	5	ND	ND
Fluorene	10	100	ND
Phenanthrene	5	516	ND
Anthracene	250	47	ND
Fluoranthene	50	309	ND
Pyrene	10	180	ND
Benz(a)anthracene	5	54	ND
Chrysene	50	59	ND
Benzo(b)fluoranthene	200	40	ND
Benzo(k)fluoranthene	30	20	ND
Benzo(a)pyrene	40	20	ND
Indeno(1,2,3-cd)pyrene	5	14	ND
Dibenz(a,h)anthracene	10	ND	ND
Benzo(g,h,i)perylene	10	13	ND
Pentachlorophenol	10	ND	ND

Approved By: _____ Date: 12/8/97

APPENDIX A
LABORATORY QC RESULTS

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Woodward-Clyde
Project: IP-Longview/91C0796
Sample Matrix: Soil

Service Request: K9708307
Date Collected: 11/7/97
Date Received: 11/7/97

Duplicate Summary

Total Solids

Prep Method: NONE
Analysis Method: 160.3M
Test Notes:

Units: PERCENT
Basis: NA

Sample Name	Lab Code	Date Analyzed	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference	Result Notes
IP-97-1A-5'	K9708307-001DUP	11/11/97	69.2	71.3	70.3	3	

Approved By: _____ Date: 11/13/97

TSDup 0213*Ca

0830TS.AG1 - DUP 11/12/97

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Woodward-Clyde	**Service Request:**	K9708307
Project:	IP-Longview/91C0796	**Date Collected:**	11/7/97
Sample Matrix:	Soil	**Date Received:**	11/7/97
		Date Extracted:	11/12/97
		Date Analyzed:	11/27/97

Surrogate Recovery Summary
Base Neutral/Acid Semivolatile Organic Compounds
EPA 3550A in Conjunction with GC/MS SIM Method

		Percent Recovery					
Sample Name	**Lab Code**	2FP	PHL	TBP	NBZ	FBP	TPH
IP-97-1A-5'	K9708307-001	78	87	74	70	89	54
IP-97-1A-9'	K9708307-002	75	89	82	78	52	91
IP-Soil-6	K9708307-003	67	78	68	105	84	161 (A)
IP-Soil-7	K9708307-004	12	35	11	47	72	87
Batch QC	K9708358-008	69	77	72	74	46	83
Batch QC	K9708358-008MS	85	85	81	77	79	92
Batch QC	K9708358-008DMS	92	88	84	85	94	90
Lab Control Sample	KWG9703514-3	77	85	81	77	60	91
Method Blank	KWG9703514-4	54	74	77	74	16	93
	CAS Acceptance Limits:	5-106	5-96	5-110	5-134	5-120	15-145

2FP	2-Fluorophenol
PHL	Phenol-d6
TBP	2,4,6-Tribromophenol
NBZ	Nitrobenzene-d5
FBP	2-Fluorobiphenyl
TPH	p-Terphenyl-d14
A	Outside acceptance limits; see case narrative.

Approved By: [signature] Date: 12/8/97

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: Woodward-Clyde
Project: IP-Longview/91C0796
Sample Matrix: Soil

Service Request: K9708307
Date Collected: NA
Date Received: NA
Date Extracted: 11/12/97
Date Analyzed: 11/27/97

Matrix Spike/Duplicate Matrix Spike Summary
Base Neutral/Acid Semivolatile Organic Compounds
EPA 3550A in Conjunction with GC/MS SIM Method
Units: ug/Kg (ppb)

Sample Name: Batch QC
Lab Code: K9708358-008MS, K9708358-008DMS

Analyte	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Advisory Limits	Relative Percent Difference
Acenaphthene	320	330	213	534	901	100	208	43-117	70
Pentachlorophenol	320	330	ND	366	449	114(A)	136(A)	18-112	18
Pyrene	320	330	11	346	342	105	100	24-143	4
Benzo(a)pyrene	320	330	ND	277	302	87	92	-	6

A Outside acceptance limits; see case narrative.

Approved By: _____ Date: 12/8/97

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	Woodward-Clyde	**Service Request:**	K9708307
Project:	IP-Longview/91C0796	**Date Collected:**	NA
LCS Matrix:	Soil	**Date Received:**	NA
		Date Extracted:	11/12/97
		Date Analyzed:	11/27/97

Laboratory Control Sample Summary
Base Neutral/Acid Semivolatile Organic Compounds
EPA 3550A in Conjunction with GC/MS SIM Method
Units: ug/Kg (ppb)

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Advisory Limits
Acenaphthene	240	211	88	44-112
Pentachlorophenol	240	248	103	31-113
Pyrene	240	249	104	44-126
Benzo(a)pyrene	240	199	83	-

Approved By: _____ Date: 12/8/97

APPENDIX B
CHAIN OF CUSTODY INFORMATION

Inchcape Testing Services
Anametrix Laboratories
1961 [illegible] San Jose, CA 95131
(408) 432-8192 • Fax (408) 432-8198

CHAIN-OF-CUSTODY RECORD

PROJECT NUMBER	PROJECT NAME
9IC074E	IP - Longview

Send Report Attention of:	Report Due	Verbal Due
Tim Syverson	standard / TAT	/ /

Sample Number	Date 1997	Time	Comp	Matrix	Station Location	Number of Cntnrs	Type of Containers	Type of Analysis: FAH by 8270 plus PCP	Condition of Samples	Initial
IP-97-1A-5'	7 Nov	1015		S		1	8oz Jar	X		
IP-97-1A-9'	7 Nov	1030		↓		↓	↓	X		
IP-Sed.1-6	5 Nov	1100		↓		↓	↓	X		
IP-Sed.1-7	5 Nov	1130		↓		↓	↓	X		

Sampled by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
M. McClelland	7 Nov 97	[signature]	11/7/97 1616
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time
M. McClelland	7 Nov 97 16:15		
Relinquished by: (Signature)	Date/Time	Received by Lab:	Date/Time

Remarks:
* See Elizabeth S.

COMPANY:
ADDRESS:

PHONE :
FAX :