

Report  
Confirmation Ground Water Sampling  
Fourth Quarter 1999  
Grady Way Complex Property  
Renton, Washington

November 24, 1999

PSE Grady Way Renton  
Complex - VCP

aka - LUST # 511315  
For Renton Sheffield  
Puget Sound Energy

DEPARTMENT OF ECOLOGY NWRO/TCP TANKS UNIT	
INTERIM CLEANUP REPORT	<input checked="" type="checkbox"/>
SITE CHARACTERIZATION	<input type="checkbox"/>
FINAL CLEANUP REPORT	<input type="checkbox"/>
OTHER _____	<input type="checkbox"/>
AFFECTED MEDIA	SOIL <input checked="" type="checkbox"/>
OTHER _____	GW <input checked="" type="checkbox"/>
INSPECTOR (INIT.) <i>ST</i>	DATE <i>6/30/00</i>

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November 24, 1999

**Consulting Engineers  
and Geoscientists**  
Offices in Washington,  
Oregon, and Alaska

Puget Western, Inc.  
19515 North Creek Parkway  
Suite 310  
Bothell, Washington 98011

Attention: Bob Boyd

We are pleased to submit five copies of our report entitled "Confirmation Ground Water Sampling, Fourth Quarter 1999" for Puget Sound Energy's (PSE) Grady Way Complex property located in Renton, Washington. Our study was completed in general accordance with the scope of services described in our fee estimate dated February 4, 1999 and the conditions of our general agreement with PSE (Contract No. 9600000888). Changes in the scope of services were verbally authorized by Bob Boyd of Puget Western and Barry Lombard of PSE.

We appreciate the opportunity to assist PSE and Puget Western on this project. Please contact us if you have questions regarding this report.

Yours very truly,

GeoEngineers, Inc.



Kurt R. Fraese  
Principal

SCW:KRF:pb

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**CONFIRMATION GROUND WATER SAMPLING  
FOURTH QUARTER 1999  
GRADY WAY COMPLEX PROPERTY  
RENTON, WASHINGTON  
FOR  
PUGET SOUND ENERGY**

**1.0 INTRODUCTION**

This report presents the results of our quarterly ground water monitoring activities at Puget Sound Energy's (PSE) Grady Way Complex property located at 915 Grady Way South in Renton, Washington. The activities described in this report were completed during November 1999. The location of the site relative to surrounding physical features is shown in Figure 1. The layout of the site is shown in Figure 2.

Two buildings currently are located on site at the locations shown in Figure 2. The Division Office has been removed from the site. PSE vacated the facility in 1998 in preparation for the sale of the site.

**2.0 PROJECT BACKGROUND**

PSE has conducted business activities at the subject site since about 1903. Historical on-site business activities included the following: (1) the storage and/or repair of transformers and other electrical equipment, (2) the storage of power poles treated with chemical preservative, and (3) the fueling and maintenance of vehicles. A total of 11 underground storage tanks (USTs) and several hydraulic hoists historically were located on site.

GeoEngineers assessed environmental conditions beneath the site and monitored remedial activities during several phases of work between 1987 and 1999. Our report entitled "1998 Site Cleanup Activities, Grady Way Complex Property, Renton, Washington," dated December 23, 1998 provides a summary of the assessment and remedial activities completed at the site during, and prior to, 1998. More recent remedial activities were completed in the northeastern portion of the site during October and November 1999. A summary of these activities is presented in our report entitled "Supplemental Site Characterization and Remedial Activities, Grady Way Complex Property, Renton, Washington," dated November 17, 1999.

The previous remedial activities consisted primarily of the excavation and off-site disposal of soil containing petroleum hydrocarbons, carcinogenic polycyclic aromatic hydrocarbons (cPAHs) and polychlorinated biphenyls (PCBs) at concentrations exceeding applicable cleanup levels. Selected subsurface facilities also were removed from the site during this time. Facilities removed from the site include (1) USTs and hydraulic hoists, (2) the storm water system in the southern portion of the site, and (3) selected subsurface vaults associated with the storm and sanitary sewer systems.

The remedial excavation activities successfully removed known soil with contaminant (petroleum hydrocarbons, cPAHs and PCBs) concentrations exceeding applicable Model Toxics Control Act (MTCA) Method A or Method B residential cleanup levels in the developed portion

of the site. Our previous studies indicate that soil contamination remaining in the developed portion of the site is protective of human health based on direct contact scenarios. The ground water monitoring activities described in this report are being completed to evaluate whether residual on-site soil contamination is protective of ground water. Ground water monitoring is being completed at the site in accordance with our discussions with the Washington State Department of Ecology (Ecology).

Three new ground water monitoring wells (GMW-15 through GMW-17) were installed in the northeastern portion of the site during the recent (October and November 1999) remedial activities. Details concerning the drilling and installation of these wells, including boring logs, are presented in our November 17, 1999 report. Ground water samples were obtained from these wells during this (4th quarter 1999) monitoring event.

### **3.0 SCOPE OF SERVICES**

Ground water samples were obtained from monitoring wells located on, or adjacent to, the subject site in accordance with our recommendations presented in the previous (3rd quarter 1999) ground water monitoring report. We also obtained ground water samples from the three new ground water monitoring wells (GMW-15 through GMW-17) recently installed at the site. Our specific scope of services for this ground water monitoring event is as follows:

1. Measure the depth to ground water in 19 on-site monitoring wells.
2. Calculate the ground water elevation in each monitoring well and evaluate the direction of shallow ground water flow beneath the site.
3. Measure the airspace in the monitoring well casings for combustible vapors using a Bacharach TLV Sniffer calibrated to hexane.
4. Purge at least three well volumes of water from each well prior to sampling and place the purged water in a labeled and secured 55-gallon drum.
5. Obtain ground water samples from four monitoring wells (GMW-4a, GMW-5, GMW-7 and GMW-12a) in accordance with the sampling and analysis plan presented in our last (3rd quarter 1999) ground water monitoring report. Ground water samples also were obtained from the three new (GMW-15 through GMW-17) monitoring wells. The ground water samples were submitted for chemical analysis of one or more of the following: (1) diesel- and lube oil-range hydrocarbons using Ecology Method NWTPH-D extended, (2) PCBs using EPA Method 8082, and (3) cPAHs and other semivolatile organic compounds (SVOCs) using EPA Method 8270.
6. Evaluate the chemical analytical results relative to current environmental regulations.

## **4.0 GROUND WATER MONITORING RESULTS**

### **4.1 GENERAL**

Ground water samples were obtained from four existing (GMW-4a, GMW-5, GMW-7 and GMW-12a) and three new (GMW-15 through GMW-17) monitoring wells during this sampling event. The locations of the monitoring wells are shown in Figure 2. The ground water samples were obtained on November 9, 1999.

The ground water samples were submitted for chemical analysis of diesel- and lube oil-range hydrocarbons using Ecology Method NWTPH-D extended, PCBs using EPA Method 8082, and/or cPAHs and other SVOCs using EPA Method 8270. A summary of our ground water monitoring field procedures is presented in Appendix A.

## **4.2 GROUND WATER ELEVATIONS**

We measured ground water levels in 19 monitoring wells located on, or adjacent to, the site on November 9, 1999. Ground water monitoring data was not obtained from GMW-6 because we were not able to locate this well during our site visit. Based on our observations, it appeared that GMW-6 was likely covered by a thin veneer of soil transported to this area during a recent rain event. Ground water depth information in the vicinity of GMW-6 was obtained from nearby wells. GMW-6 was not scheduled for sampling during this monitoring event.

The depth to ground water ranged from about 2.14 to 9.60 feet below ground surface (bgs) in the wells we measured. The maximum depth to ground water (9.60 feet bgs) was measured in monitoring well GMW-12a, which is located on an elevated loading dock. The depth to ground water and ground water elevations for this and previous monitoring events are presented in Table 1.

Ground water elevations were calculated relative to an assumed site datum of 100.00 feet based on the November 1999 water level measurements. The ground water elevations in each monitoring well and interpolated elevation contours are shown in Figure 2. Shallow ground water beneath the site generally appeared to flow in a westerly to northwesterly direction based on our November 1999 measurements. The interpolated shallow ground water flow direction based on our November 1999 measurements is similar to previous monitoring events.

A localized easterly ground water flow direction was observed beneath the western-most corner of the site (near GMW-8, GMW-13 and GMW-14) during this and previous monitoring events. This localized reversal of ground water flow direction may be related to ground water "mounding" associated with underground utility trenches beneath the adjacent roads (Grady Way South and Talbot Road), as summarized in our previous reports.

## **4.3 COMBUSTIBLE VAPOR CONCENTRATIONS**

Combustible vapors were detected at concentrations greater than 10,000 parts per million (ppm) in the casings of monitoring wells GMW-1, GMW-4a, GMW-5, GMW-7, GMW-9, GMW-10, GMW-11, GMW-17 and MW-4. Combustible vapor concentrations ranged between 2,000 and 5,000 ppm in monitoring wells GMW-3a, GMW-16 and MW-20. Combustible vapors either were not detected or were detected at concentrations less than 800 ppm in the other monitoring wells.

Based on the analytical results for ground water samples obtained during this and previous monitoring events, it is our opinion that elevated combustible vapor concentrations in monitoring wells at the site do not indicate the presence of soil or ground water contamination. The elevated

vapors measured in the casings likely are primarily related to methane associated with the presence of coal debris in fill soil at the site.

#### **4.4 CHEMICAL ANALYTICAL RESULTS**

Ground water samples obtained during the November 1999 sampling event were submitted for analysis of one or more of the following, as previously described: (1) diesel- and lube oil-range hydrocarbons, (2) PCBs, and (3) cPAHs and other SVOCs. Chemical analytical results for the ground water samples are presented in Table 2. Please note that the analytical results for cPAHs/SVOCs are presented as footnotes in Table 2. Laboratory reports for the chemical analyses are presented in Appendix B. A summary of the analytical results is presented below.

##### **4.4.1 Diesel- and Lube Oil-range Hydrocarbons**

Diesel- and lube oil-range hydrocarbons were detected at a combined concentration [1.379 milligrams per liter (mg/l)] that slightly exceeds the MTCA Method A cleanup level (1.0 mg/l) in the ground water sample obtained from GMW-17. GMW-17 is located downgradient of the remedial excavation recently completed in the northeastern portion of the site. Diesel-range and lube oil-range hydrocarbons either were not detected or were detected at concentrations less than the MTCA Method A cleanup level in the other ground water samples obtained during this monitoring event.

##### **4.4.2 PCBs**

PCBs were detected at a concentration [0.812 micrograms per liter ( $\mu\text{g/l}$ )] exceeding the MTCA Method A cleanup level (0.1  $\mu\text{g/l}$ ) in the ground water sample obtained from GMW-4a. PCBs were not detected in the ground water sample obtained from GMW-5. GMW-5 is located downgradient from GMW-4a, near the western property boundary.

##### **4.4.3 SVOCs Including cPAHs**

Two cPAHs [benzo(a)anthracene and chrysene] were detected at a combined concentration (0.561  $\mu\text{g/l}$ ) that exceeds the MTCA Method A cleanup level (0.1  $\mu\text{g/l}$ ) in the ground water sample obtained from GMW-7. GMW-7 is located in Talbot Road, west of the site. Other PAHs (acenaphthene, fluoranthene, fluorene, naphthalene, phenanthrene and pyrene) were detected at concentrations less than the respective MTCA Method B cleanup levels for these compounds in the ground water sample obtained from GMW-7. SVOCs, including cPAHs, were not detected in the ground water sample obtained from GMW-17.

#### **5.0 CONCLUSIONS AND RECOMMENDATIONS**

GeoEngineers completed ground water monitoring activities in accordance with the recommendations presented in our previous (3rd quarter 1999) quarterly monitoring report. Additionally, we evaluated ground water conditions in the northeastern portion of the site, near the recent remedial excavation.

Petroleum hydrocarbons were detected at a concentration slightly exceeding the MTCA Method A cleanup level in only one (GMW-17) of the ground water samples obtained during this monitoring event. GMW-17 is located immediately downgradient of the remedial excavation recently completed in the northeastern portion of the site. In our opinion, the concentration of residual petroleum-related ground water contamination detected in GMW-17 will decrease with time because the source of the contamination (petroleum-contaminated soil) recently was removed from the site. Remedial excavation activities in this area were completed to achieve compliance with MTCA Method A cleanup levels. Additionally, based on our experience, it is our opinion that dissolved petroleum hydrocarbons in ground water originating from this portion of the site do not migrate off-site because: (1) the property line is located over 100 feet downgradient from GMW-17, (2) the concentration of petroleum hydrocarbons in GMW-17 is relatively low, and (3) the petroleum hydrocarbon concentrations downgradient of GMW-17 likely decline rapidly through natural attenuation and dilution processes.

The PCB concentration detected in the ground water sample obtained from GMW-4a is generally consistent with past monitoring events. The PCB-related ground water contamination detected in GMW-4a does not appear to be migrating off-site based on ground water analytical data obtained from GMW-5, which is located downgradient from GMW-4a. Extensive soil analytical data obtained in the vicinity of GMW-4a during past site characterization and remediation studies did not identify a source for the PCB-related ground water contamination detected in GMW-4a. Petroleum hydrocarbon concentrations in GMW-4a have been less than the MTCA Method A cleanup level during the past four consecutive quarterly monitoring events.

Carcinogenic PAHs were detected at a concentration exceeding the MTCA Method A cleanup level in the ground water sample obtained from GMW-7. In our opinion, this analytical result does not have significant regulatory implications for the subject site because the source for the ground water contamination in GMW-7 does not appear to be located on the subject site. PAHs were not detected during four consecutive quarterly monitoring events in ground water samples obtained from monitoring wells (GMW-6, GMW-10 and GMW-11) located on the subject site, immediately upgradient of GMW-7.

During the next (February 2000) monitoring event, we recommend sampling and testing for the following analytes:

- Diesel- and lube oil-range hydrocarbons in ground water samples obtained from GMW-12a, GMW-16 and GMW-17.
- PCBs in a ground water sample obtained from GMW-4a.

We do not recommend obtaining a ground water sample from GMW-7 for analysis of cPAHs because the source of this contamination does not appear to be related to the subject site.

## 6.0 LIMITATIONS

We have prepared this report for use by Puget Sound Energy, their authorized agents and regulatory agencies. This report is not intended for use by others, and the information contained herein is not applicable to other sites. If a lending agency or other parties intend to place reliance

on the product of our services, we require that those parties indicate in writing their acknowledgment that the scope of services provided, and the general conditions under which the services were rendered are understood and accepted by them. This is to provide our firm with reasonable protection against open-end litigation by third parties with whom there otherwise would be no contractual limits to their actions.

No ESA or remedial action can wholly eliminate the potential for contamination to remain at the property at concentrations exceeding applicable cleanup levels. Performance of this practice is intended to reduce, but not eliminate, uncertainty regarding the potential for remaining contamination in connection with a property. Our conclusions are based on chemical analytical results from soil and ground water samples obtained during our site studies. There always is a potential that areas of contamination may exist in portions of the site that were not sampled or tested during this or prior studies. Further evaluation of such potential would require additional research, subsurface exploration, sampling and testing.

Some substances may be present in the site vicinity in quantities or under conditions that may have led, or may lead, to contamination of the subject site, but are not included in current local, state, or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards of all appropriate inquiry or regulatory definitions of hazardous substances change, or if you are required to meet more stringent standards in the future.

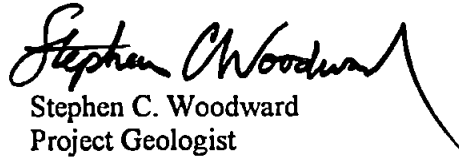
GeoEngineers has performed site characterization, facilities removal and remedial action monitoring at the Puget Sound Energy property at 915 Grady Way South in Renton, Washington within the limitations of scope, schedule and budget. Our services have been executed in accordance with our general agreement with Puget Sound Energy (Contract No. 9600000888) and generally accepted environmental science practices in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.



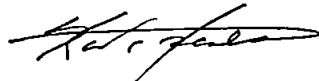
We appreciate the opportunity to assist Puget Sound Energy on this project. Please call if you have questions.

Yours very truly,

GeoEngineers, Inc.



Stephen C. Woodward  
Project Geologist



Kurt R. Fraese  
Principal

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**Attachments**

**Five copies submitted**

**TABLE 1 (Page 1 of 3)**  
**SUMMARY OF GROUND WATER ELEVATIONS**

Puget Sound Energy Grady Way Site  
 Renton, Washington

Monitoring Well <sup>1</sup>	Date Measured	Depth to Ground Water <sup>2</sup> (feet)	Ground Water Elevation <sup>3</sup> (feet)
GMW-1	11/30/98	3.74	95.92
	02/24/99	3.21	96.45
	05/20/99	4.16	95.50
	08/10/99	4.80	94.86
	11/09/99	5.28	94.38
GMW-2/2a <sup>4</sup>	11/30/98	2.46	96.18
	02/24/99	1.17	97.47
	05/20/99	3.10	95.54
	08/10/99	3.81	94.83
	11/09/99	2.91	95.73
GMW-3/3a <sup>4</sup>	11/30/98	1.42	95.70
	02/24/99	0.83	96.29
	05/20/99	1.64	95.48
	08/10/99	1.99	95.13
	11/09/99	2.19	94.93
GMW-4/4a <sup>4</sup>	11/30/98	1.45	95.13
	02/24/99	0.58	96.00
	05/20/99	2.04	94.54
	08/10/99	2.49	94.09
	11/09/99	2.14	94.44
GMW-5	11/30/98	2.93	94.24
	02/24/99	2.80	94.37
	05/20/99	3.80	93.37
	08/10/99	4.72	92.45
	11/09/99	4.55	92.62
GMW-6	11/30/98	1.60	94.58
	02/24/99	1.24	94.94
	05/20/99	2.09	94.09
	08/10/99	2.38	93.80
	11/09/99 <sup>5</sup>	-	-
GMW-7	11/30/98	4.29	93.22
	02/24/99	4.06	93.45
	05/20/99	5.09	92.42
	08/10/99	5.20	92.31
	11/09/99	5.36	92.15
GMW-8	11/30/98	4.60	93.51
	02/24/99	4.40	93.71
	05/20/99	5.41	92.70
	08/10/99	5.89	92.22
	11/09/99	5.98	92.13

Notes appear on Page 3 of 3.

TABLE 1 (Page 2 of 3)

Monitoring Well <sup>1</sup>	Date Measured	Depth to Ground Water <sup>2</sup> (feet)	Ground Water Elevation <sup>3</sup> (feet)
GMW-9	11/30/98	5.85	92.86
	02/24/99	5.74	92.97
	05/20/99	6.39	92.32
	08/10/99	6.67	92.04
	11/09/99	7.02	91.69
GMW-10	11/30/98	2.60	93.24
	02/24/99	2.40	93.44
	05/20/99	3.35	92.49
	08/10/99	3.42	92.42
	11/09/99	3.77	92.07
GMW-11	11/30/98	4.42	94.33
	02/24/99	4.09	94.66
	05/20/99	5.10	93.65
	08/10/99	4.91	93.84
	11/09/99	4.76	93.99
GMW-12/12a <sup>4,8</sup>	11/30/98	8.02	94.56
	02/24/99	7.18	95.40
	05/20/99	8.00	94.58
	08/10/99	9.00	93.58
	11/09/99	9.60	92.98
GMW-13	11/30/98	5.86	93.00
	02/24/99	5.67	93.19
	05/20/99	6.22	92.64
	08/10/99	6.64	92.22
	11/09/99	6.82	92.04
GMW-14	11/30/98	5.66	93.40
	02/24/99	5.50	93.56
	05/20/99	6.35	92.71
	08/10/99	6.80	92.26
	11/09/99	7.02	92.04
GMW-15	11/09/99	4.05	95.56
GMW-16	11/09/99	4.91	90.46
GMW-17	11/09/99	5.00	90.43
MW-4	11/30/98	4.65	90.28
	02/24/99	4.45	90.48
	05/20/99	5.21	89.72
	08/10/99	5.52	89.41
	11/09/99	5.74	89.19
MW-10	11/30/98	7.17	93.07
	02/24/99	6.94	93.30
	05/20/99	7.56	92.68
	08/10/99	7.95	92.29
	11/09/99	8.13	92.11

Notes appear on Page 3 of 3.

TABLE 1 (Page 3 of 3)

Monitoring Well <sup>1</sup>	Date Measured	Depth to Ground Water <sup>2</sup> (feet)	Ground Water Elevation <sup>3</sup> (feet)
MW-20	11/30/98	6.92	92.62
	02/24/99	6.75	92.79
	05/20/99	7.31	92.23
	08/10/99	7.71	91.83
	11/09/99	7.88	91.66

Notes:

<sup>1</sup> Approximate locations of the monitoring wells are shown in Figure 2.

<sup>2</sup> The depths to ground water were measured relative to the tops of the monitoring well casings.

<sup>3</sup> Casing elevations were surveyed relative to a temporary benchmark. The benchmark was assigned an arbitrary elevation of 100.00 feet.

<sup>4</sup> Monitoring well was abandoned during remedial activities and subsequently replaced.

<sup>5</sup> We were unable to identify the location of this monitoring well during this site visit.

<sup>6</sup> This monitoring well is located on a storage dock that is elevated several feet above surrounding site grades.

"--" = not measured

TABLE 2 (Page 1 of 4)  
 SUMMARY OF GROUND WATER CHEMICAL ANALYTICAL DATA<sup>1</sup>

Puget Sound Energy Grady Way Site  
 Renton, Washington

Sample Number <sup>2</sup>	Date Sampled	Petroleum Hydrocarbons <sup>3</sup> (mg/l)		PCBs <sup>4</sup> (µg/l)	Dissolved Arsenic <sup>5</sup> (µg/l)	pH <sup>6</sup> (pH units)
		Diesel-Range	Lube Oil-Range			
GMW-1	02/20/98	0.320	<0.500	-	-	-
	08/29/98	<0.250	<0.500	<0.100	-	7.08
	11/03/98	<0.250	<0.500	<0.100	-	6.46
	02/24/99	<0.250	<0.500	<0.100	-	6.37
	05/20/99	-	-	<0.100	-	-
GMW-2 GMW-2a <sup>7</sup>	02/20/98	0.396	0.970	-	-	-
	08/29/98	<0.250	<0.500	<0.100	-	7.12
	11/03/98	<0.250	<0.500	<0.100	-	6.98
	02/24/99	<0.250	<0.500	<0.100	-	6.91
	05/20/99	<0.250	<0.500	<0.100	-	-
GMW-3 GMW-3a <sup>7</sup>	02/20/98	<0.250	<0.500	<0.100	-	-
	08/29/98 <sup>8</sup>	<0.250	<0.500	<0.100	-	7.20
	09/17/98	-	-	-	2.56	-
	11/03/98	<0.250	<0.500	<0.100	15.2	6.40
	02/24/99	<0.250	<0.500	<0.100	<1.00	6.47
GMW-4 GMW-4a <sup>7</sup>	02/20/98 <sup>9</sup>	0.404	<0.500	1.17 <sup>10</sup>	-	-
	08/29/98 <sup>9</sup>	<0.250	<0.500	<0.100	-	6.93
	11/03/98 <sup>9</sup>	0.402	1.52	0.505 <sup>10</sup>	-	6.30
	03/02/99 <sup>11</sup>	0.361	<0.500	<0.100	-	6.35
	05/20/99 <sup>12</sup>	0.488	<0.500	1.16 <sup>10</sup>	-	-
	08/10/99	0.436	<0.500	1.17	-	-
	11/09/99	0.275	<0.500	0.812 <sup>10</sup>	-	-
GMW-5	02/20/98	<0.250	<0.500	<0.100	-	-
	08/29/98 <sup>9</sup>	<0.250	<0.500	<0.100	-	6.81
	11/03/98 <sup>9</sup>	<0.250	<0.500	<0.100	-	6.30
	02/24/99 <sup>9</sup>	0.267	<0.500	<0.100	-	6.26
	05/20/99 <sup>11</sup>	-	-	-	-	-
	11/09/99	-	-	<0.100	-	-
MTCA Method A Cleanup Level		1.0 <sup>13</sup>		0.1	5.0	NA

Notes appear on Page 4 of 4

TABLE 2 (Page 2 of 4)

Sample Number <sup>2</sup>	Date Sampled	Petroleum Hydrocarbons <sup>3</sup> (mg/l)		PCBs <sup>4</sup> (µg/l)	Dissolved Arsenic <sup>5</sup> (µg/l)	pH <sup>6</sup> (pH units)
		Diesel-Range	Lube Oil-Range			
GMW-6	02/20/98	<0.250	<0.500	<0.100	--	--
	08/29/98	<0.250	<0.500	<0.100	--	6.91
	11/03/98 <sup>9</sup>	<0.250	<0.500	<0.100	--	6.47
	02/24/99 <sup>9</sup>	<0.250	<0.500	<0.100	--	6.40
	05/20/99 <sup>9</sup>	--	--	--	--	--
	08/10/99 <sup>9</sup>	--	--	--	--	--
GMW-7	02/20/98	4.55	7.72	<0.100	--	--
	08/29/98	1.25	1.96	<0.100	--	6.74
	11/03/98	9.43	15.6	<0.100	--	6.52
	02/24/99 <sup>11</sup>	3.44	3.45	<0.100	--	6.38
	05/20/99 <sup>11</sup>	--	--	--	--	--
	08/10/99 <sup>11</sup>	--	--	--	--	--
	11/09/99 <sup>11</sup>	--	--	--	--	--
GMW-8	08/29/98	<0.250	<0.500	<0.100	5.95	7.31
	11/03/98	0.385	0.942	<0.100	2.28	6.44
	11/24/98	1.54	5.13	--	--	--
	02/24/99	0.372	<0.500	<0.100	3.19	6.24
	05/20/99	0.886	2.42	<0.100	--	--
GMW-9	08/29/98	<0.250	<0.500	<0.100	3.67	7.09
	11/03/98	<0.250	<0.500	<0.100	2.87	6.75
	02/24/99	<0.250	<0.500	<0.100	1.38	6.53
	05/20/99	<0.250	<0.500	<0.100	--	--
GMW-10	08/29/98 <sup>9</sup>	<0.250	<0.500	<0.100	16.0	6.88
	11/03/98 <sup>9</sup>	<0.250	<0.500	<0.100	5.15	6.41
	02/24/99 <sup>9</sup>	<0.250	<0.500	<0.100	2.30	6.30
	05/20/99 <sup>9</sup>	<0.250	<0.500	<0.100	--	--
GMW-11	08/29/98 <sup>9</sup>	<0.250	<0.500	<0.100	7.36	6.88
	11/03/98 <sup>9</sup>	<0.250	<0.500	<0.100	1.22	6.42
	02/24/99 <sup>9</sup>	<0.250	<0.500	<0.100	<1.00	6.33
	05/20/99 <sup>9</sup>	0.280	<0.500	<0.100	--	--
MTCA Method A Cleanup Level		1.0 <sup>13</sup>		0.1	5.0	NA

Notes appear on Page 4 of 4

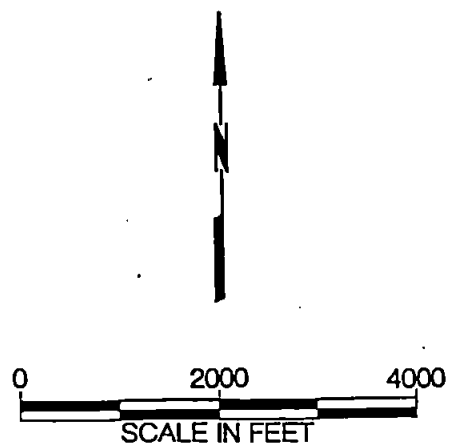
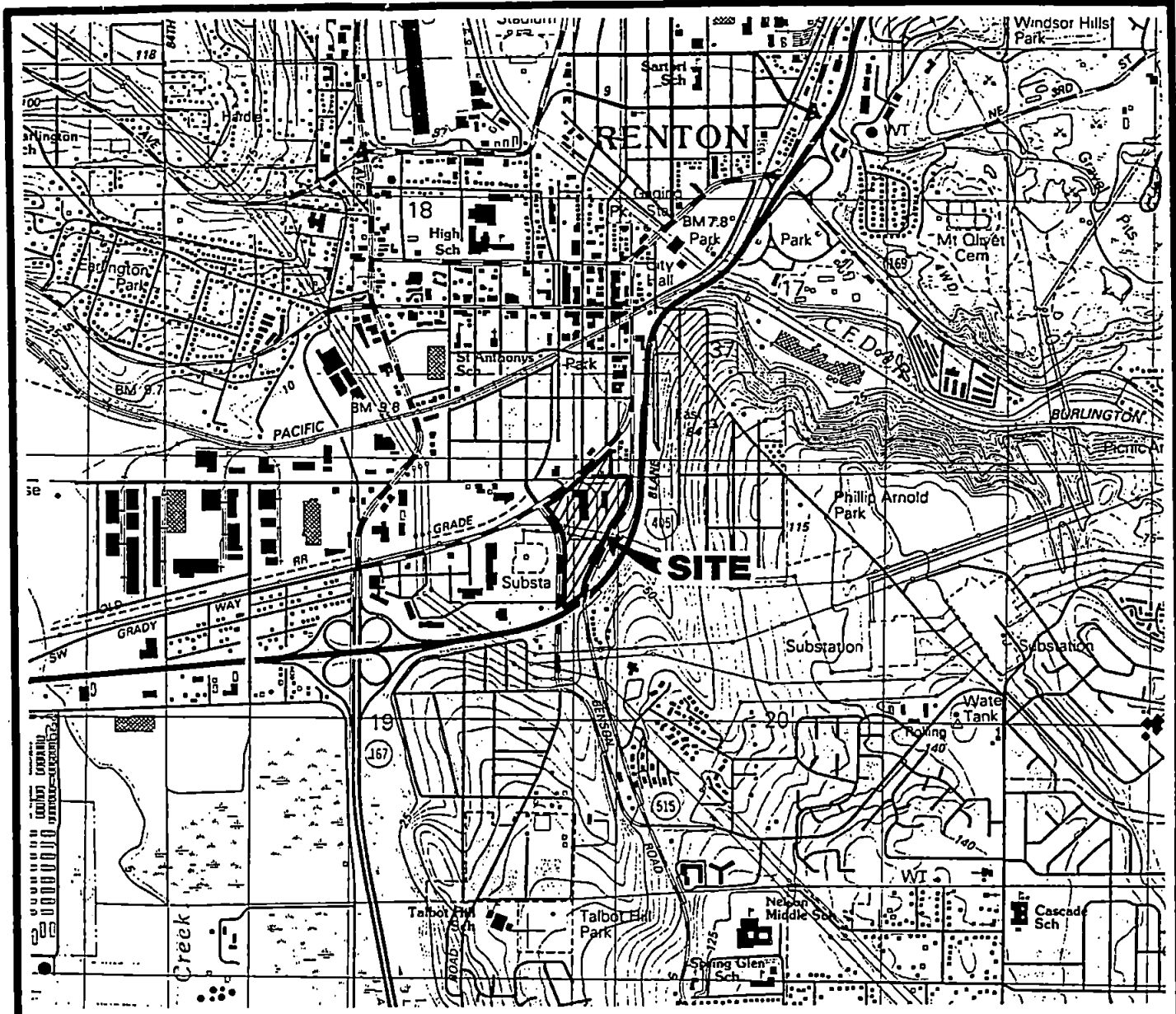
TABLE 2 (Page 3 of 4)

Sample Number <sup>2</sup>	Date Sampled	Petroleum Hydrocarbons <sup>3</sup> (mg/l)		PCBs <sup>4</sup> (µg/l)	Dissolved Arsenic <sup>5</sup> (µg/l)	pH <sup>6</sup> (pH units)
		Diesel-Range	Lube Oil-Range			
GMW-12 GMW-12a <sup>7</sup>	09/08/98	<0.250	<0.500	<0.100	<1.00	6.61
	11/03/98	<0.250	<0.500	<0.100	6.46	6.56
	02/24/99	0.325	<0.500	<0.100	1.74	6.44
	05/20/99	0.349	0.786	<0.100	-	-
	08/10/99	0.390	<0.500	-	-	-
	11/09/99	<0.250	<0.500	-	-	-
GMW-13	11/24/98	0.472	1.21	-	-	-
	02/24/99	<0.250	<0.500	-	-	6.30
	05/20/99	<0.250	<0.500	-	-	-
GMW-14	11/24/98	1.06	2.98	-	-	-
	02/24/99	0.556	0.969	-	-	6.31
	05/20/99	<0.250	<0.500	-	-	-
GMW-15	11/09/99	<0.250	<0.500	-	-	-
GMW-16	11/09/99	0.501	<0.500	-	-	-
GMW-17	11/09/99 <sup>9</sup>	0.460	0.919	-	-	-
MW-4	08/29/98 <sup>14</sup>	<0.250	<0.500	-	55.5	6.99
	09/17/98	-	-	-	19.9	-
	11/03/98 <sup>14</sup>	<0.250	<0.500	-	12.1	6.56
	02/24/99	-	-	-	2.15	6.55
	05/20/99	<0.250	<0.500	-	-	-
	08/10/99	0.279	<0.500	-	-	-
MW-10	12/22/97	<0.250	<0.500	<0.100	-	-
	08/29/98 <sup>14</sup>	<0.250	<0.500	-	1.06	7.16
	11/03/98 <sup>14</sup>	<0.250	<0.500	<0.100	<1.00	6.54
	02/24/99	<0.250	<0.500	-	<1.00	6.57
MW-20 <sup>14</sup>	08/29/98 <sup>14</sup>	<0.250	<0.500	-	4.26	8.08
	11/03/98 <sup>14</sup>	<0.250	<0.500	-	1.70	6.63
	02/24/99	<0.250	<0.500	-	<1.00	6.53
	05/20/99	<0.250	<0.500	-	-	-
MTCA Method A Cleanup Level		1.0 <sup>13</sup>		0.1	5.0	NA

Notes appear on Page 4 of 4

TABLE 2 (Page 4 of 4)

Notes	
1	Chemical analyses were performed by North Creek Analytical Laboratory of Bothell, Washington.
2	Ground water sampling locations are shown in Figure 2. Ground water sampling procedures are described in Appendix A.
3	Diesel- and lube oil-range hydrocarbons analyzed using Ecology Method NWTPH-D extended.
4	Polychlorinated biphenyls (PCBs) analyzed using EPA Method 8082.
5	Dissolved arsenic analyzed using EPA Method 6020.
6	pH analyzed using EPA Method 150.1.
7	Monitoring well was abandoned during remedial activities and subsequently replaced.
8	The ground water sample submitted for analysis of petroleum hydrocarbons was obtained on September 8, 1998.
9	This sample also was submitted for analysis of carcinogenic polycyclic aromatic hydrocarbons (cPAHs) and other semivolatile organic compounds (SVOCs) using EPA Method 8270. cPAHs and other SVOCs were not detected in the sample.
10	PCBs detected in this sample consisted of Aroclor 1242.
11	These samples also were submitted for analysis of cPAHs and other SVOCs using EPA Method 8270. One or more PAHs (acenaphthene, fluoranthene, fluorene, naphthalene, phenanthrene and pyrene) were detected in the samples at concentrations ranging from 0.113 to 7.14 $\mu\text{g/l}$ , which are less than the respective MTCA Method B cleanup levels for these compounds. Carcinogenic PAHs were detected only in the ground water sample obtained from GMW-7 on 11/09/99; the sum of the cPAH concentrations in this sample was 0.561 $\mu\text{g/l}$ , which exceeds the MTCA Method A cleanup level (0.1 $\mu\text{g/l}$ ).
12	The ground water sample submitted for analysis of PCBs was obtained from GMW-4a on 05/27/99.
13	The MTCA Method A cleanup level applies to the sum of all ranges of petroleum hydrocarbons.
14	This sample also was submitted for analysis of gasoline-range hydrocarbons using NWTPH-G, and benzene, ethylbenzene, toluene and xylenes (BETX) using EPA Method 8021B. Gasoline-range hydrocarbons and BETX were not detected in the sample.
15	A ground water sample also was obtained from MW-20 on 09/17/98 and 11/03/98 and submitted for analysis of halogenated volatile organic compounds (HVOCs) using EPA Method 8021B. HVOCs were not detected in these samples.
	"-" = not tested
	NA = not applicable
	mg/l = milligrams per liter
	$\mu\text{g/l}$ = micrograms per liter
	MTCA = Model Toxics Control Act
	Shaded values exceed MTCA Method A cleanup levels.
	Entries in bold text indicate samples were obtained during the most recent monitoring event.



Reference: USGS 7.5' X 15' topographic-bathymetric quadrangle map "Renton, Wash.," dated 1983.



VICINITY MAP

FIGURE 1

0186-346-R85 LCM:BDH 9/1/95

TNO:HLA 0186-407-85 10/29/97

16.0195

**APPENDIX A**  
**FIELD PROCEDURES**

## **APPENDIX A**

### **FIELD PROCEDURES**

#### **GROUND WATER MONITORING**

Prior to obtaining ground water samples, we measured combustible vapors and the depth to ground water in each monitoring well. Combustible vapors were measured using a Bacharach TLV Sniffer calibrated to hexane. The depths to ground water were measured using an electronic water level indicator. The water level indicator was cleaned with a Liquinox wash and distilled water rinse prior to use in each well.

Ground water samples were obtained from the monitoring wells after purging a minimum of three well volumes of water from the well casings. The ground water samples were obtained using disposable polyethylene bailers. The samples were transferred to laboratory-prepared bottles in the field and kept cool during transport to the testing laboratory. Chain-of-custody procedures were observed during transport of the samples to the laboratory.

#### **PURGE WATER STORAGE/DISPOSAL**

Purge and decontamination water generated during this monitoring event was placed in a labeled, sealed 55-gallon drum that is stored on-site. A sample of the purge/decontamination water stored on-site was obtained during this monitoring event and submitted for analysis of benzene, ethylbenzene, toluene and xylenes (BETX) using EPA Method 8021B, PCBs using EPA Method 8082, and fats, oil and grease (FOG) using EPA Methods 418.1/413.2. These analyses were performed to evaluate whether purge water generated at the subject site is suitable for disposal at GeoEngineers' Redmond, Washington office in accordance with a Metro permit.

Purge water from the site is acceptable for disposal at GeoEngineers' Redmond office based on the analytical results of the purge water sample. The analytical results are on file at GeoEngineers, and will be provided for review upon request. Purge water from the site will be transported to GeoEngineers' Redmond office for permitted disposal into the sanitary sewer during the next monitoring event.

MAIN AVENUE S.

I-405

EXPLANATION:

GMW-1 ● MONITORING WELL  
94.38 GROUND WATER ELEVATION BASED ON 11/09/99 MEASUREMENTS

➤ INFERRED DIRECTION OF SHALLOW GROUND WATER FLOW BASED ON 11/09/99 MEASUREMENTS

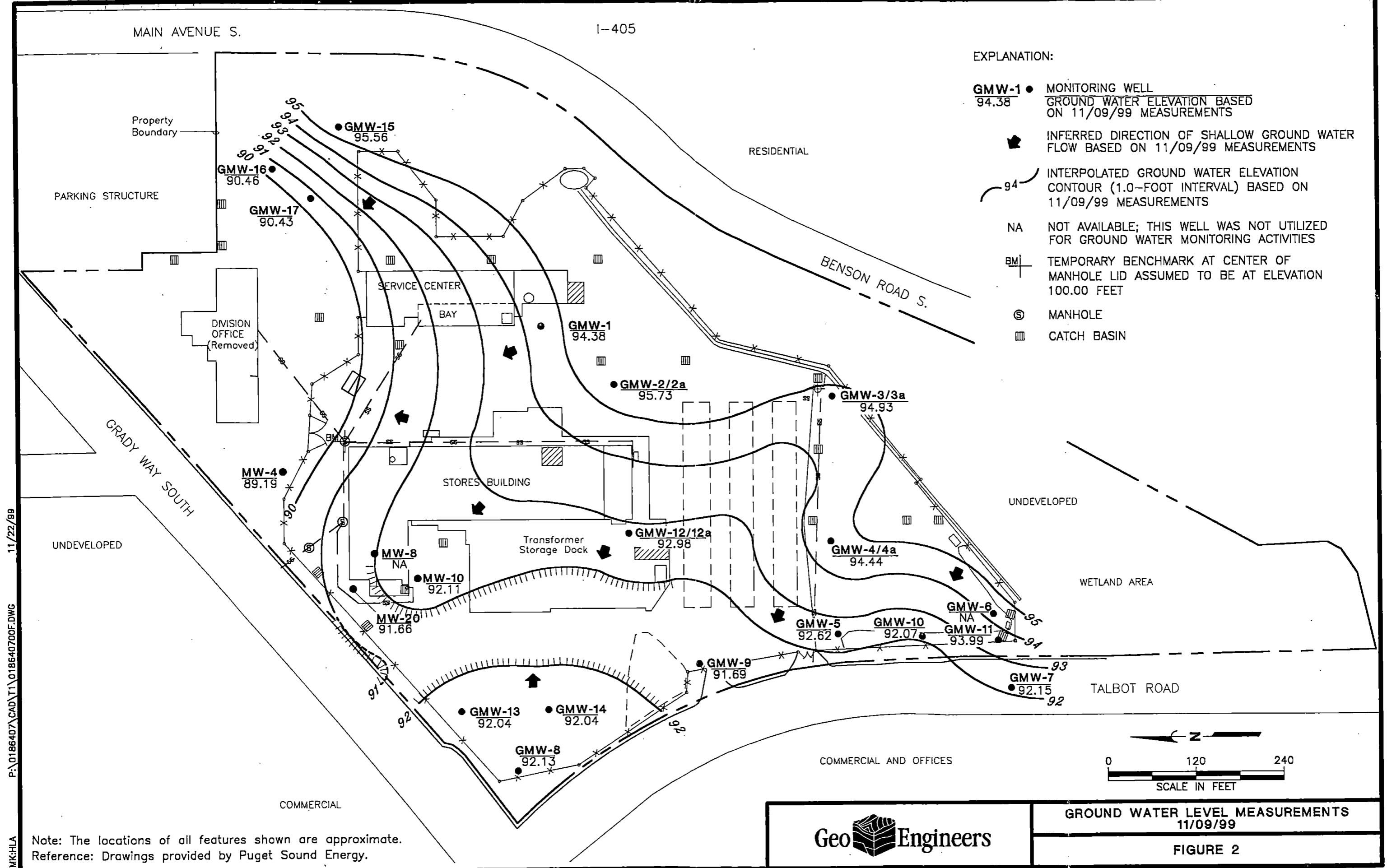
94 ⤴ INTERPOLATED GROUND WATER ELEVATION CONTOUR (1.0-FOOT INTERVAL) BASED ON 11/09/99 MEASUREMENTS

NA NOT AVAILABLE; THIS WELL WAS NOT UTILIZED FOR GROUND WATER MONITORING ACTIVITIES

BM ⊕ TEMPORARY BENCHMARK AT CENTER OF MANHOLE LID ASSUMED TO BE AT ELEVATION 100.00 FEET

⊕ MANHOLE

▣ CATCH BASIN



11/22/99

P:\0186407\CAD\T1\018640700F.DWG

TMK:HLA

Note: The locations of all features shown are approximate.  
Reference: Drawings provided by Puget Sound Energy.



GROUND WATER LEVEL MEASUREMENTS  
11/09/99

FIGURE 2

**APPENDIX B**  
**CHEMICAL ANALYTICAL PROGRAM**

## **APPENDIX B**

### **CHEMICAL ANALYTICAL PROGRAM**

#### **ANALYTICAL METHODS**

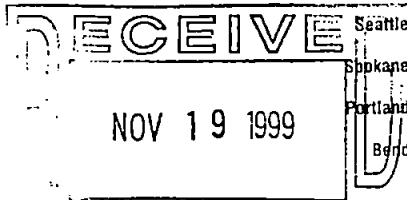
Chain-of-custody procedures were followed during the transport of the water and soil samples to North Creek Analytical in Bothell, Washington. The samples were held in cold storage pending extraction and/or analysis. The analytical results, analytical methods reference and laboratory quality assurance/quality control (QA/QC) records are included in this appendix. The analytical results are also summarized in the text and tables of this report.

#### **ANALYTICAL DATA REVIEW**

The laboratory maintains an internal quality assurance program as documented in its laboratory quality assurance manual. The laboratory uses a combination of blanks, surrogate recoveries, duplicates, matrix spike recoveries, matrix spike duplicate recoveries, blank spike recoveries and blank spike duplicate recoveries to evaluate the validity of the analytical results. The laboratory also uses data quality goals for individual chemicals or groups of chemicals based on the long-term performance of the test methods. The data quality goals are included in the laboratory reports. The laboratory compared each group of samples with the existing data quality goals and noted any exceptions in the laboratory report. Data quality exceptions documented by the laboratory in the laboratory reports are reviewed by GeoEngineers using the applicable data validation guidelines from the following documents: "National Functional Guidelines For Organic Data Review" draft dated 1991 and "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses" dated 1988.

#### **ANALYTICAL DATA REVIEW SUMMARY**

Based on our data quality review, it is our opinion that the analytical data are of acceptable quality for their intended use in this report.



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Geo Engineers - Seattle  
 600 Stewart Street, Suite 1215  
 Seattle WA, 98101

Project: PSE-Grady Way  
 Project Number: 0186-407-00  
 Project Manager: Steve Woodward

Reported:  
 11/17/99 17:22

**ANALYTICAL REPORT FOR SAMPLES**

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
GMW-4/4a	B9K0175-01	Water	11/09/99 00:00	11/09/99 16:14
GMW-5	B9K0175-02	Water	11/09/99 00:00	11/09/99 16:14
GMW-7	B9K0175-03	Water	11/09/99 00:00	11/09/99 16:14
GMW-12/12a	B9K0175-04	Water	11/09/99 00:00	11/09/99 16:14
GMW-15	B9K0175-05	Water	11/09/99 00:00	11/09/99 16:14
GMW-16	B9K0175-06	Water	11/09/99 00:00	11/09/99 16:14
GMW-17	B9K0175-07	Water	11/09/99 00:00	11/09/99 16:14
PURGE 11-9-99	B9K0175-08	Water	11/09/99 00:00	11/09/99 16:14

North Creek Analytical - Bothell

*Steve Davis*  
 Steve Davis, Project Manager

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Geo Engineers - Seattle  
 600 Stewart Street, Suite 1215  
 Seattle WA, 98101

Project: PSE-Grady Way  
 Project Number: 0186-407-00  
 Project Manager: Steve Woodward

Reported:  
 11/17/99 17:22

**Semivolatile Petroleum Products by NWTPH-Dx (w/o Acid/Silica Gel Clean-up)**  
**North Creek Analytical - Bothell**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>GMW-4/4a (B9K0175-01) Water</b> Sampled: 11/09/99 00:00 Received: 11/09/99 16:14									
Diesel Range Hydrocarbons	0.275	0.250	mg/l	1	9K10007	11/10/99	11/11/99	NWTPH-Dx	
Lube Oil Range Hydrocarbons	ND	0.500	"	"	"	"	"	"	
Surrogate: 2-FBP		71.7 %	50-150		"	"	"	"	
<b>GMW-12/12a (B9K0175-04) Water</b> Sampled: 11/09/99 00:00 Received: 11/09/99 16:14									
Diesel Range Hydrocarbons	ND	0.250	mg/l	1	9K10007	11/10/99	11/11/99	NWTPH-Dx	
Lube Oil Range Hydrocarbons	ND	0.500	"	"	"	"	"	"	
Surrogate: 2-FBP		58.1 %	50-150		"	"	"	"	
<b>GMW-15 (B9K0175-05) Water</b> Sampled: 11/09/99 00:00 Received: 11/09/99 16:14									
Diesel Range Hydrocarbons	ND	0.250	mg/l	1	9K09027	11/09/99	11/10/99	NWTPH-Dx	
Lube Oil Range Hydrocarbons	ND	0.500	"	"	"	"	"	"	
Surrogate: 2-FBP		64.0 %	50-150		"	"	"	"	
<b>GMW-16 (B9K0175-06) Water</b> Sampled: 11/09/99 00:00 Received: 11/09/99 16:14									
Diesel Range Hydrocarbons	0.501	0.250	mg/l	1	9K09027	11/09/99	11/10/99	NWTPH-Dx	
Lube Oil Range Hydrocarbons	ND	0.500	"	"	"	"	"	"	
Surrogate: 2-FBP		66.5 %	50-150		"	"	"	"	
<b>GMW-17 (B9K0175-07) Water</b> Sampled: 11/09/99 00:00 Received: 11/09/99 16:14									
Diesel Range Hydrocarbons	0.460	0.250	mg/l	1	9K09027	11/09/99	11/10/99	NWTPH-Dx	
Lube Oil Range Hydrocarbons	0.919	0.500	"	"	"	"	"	"	
Surrogate: 2-FBP		50.8 %	50-150		"	"	"	"	

North Creek Analytical - Bothell

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Steve Davis, Project Manager

North Creek Analytical, Inc.  
 Environmental Laboratory Network

Page 2 of 15



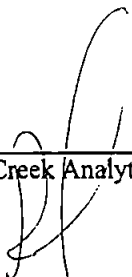
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**BTEX by EPA Method 8021B**  
**North Creek Analytical - Bothell**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>PURGE 11-9-99 (B9K0175-08) Water</b> <b>Sampled: 11/09/99 00:00</b> <b>Received: 11/09/99 16:14</b>									
Benzene	ND	0.500	ug/l	1	9K09001	11/10/99	11/10/99	EPA 8021B	
Toluene	ND	0.500	"	"	"	"	"	"	
Ethylbenzene	ND	0.500	"	"	"	"	"	"	
Xylenes (total)	ND	1.00	"	"	"	"	"	"	
<i>Surrogate: 4-BFB (PID)</i>		<i>94.2 %</i>	<i>50-150</i>		"	"	"	"	

North Creek Analytical - Bothell



Steve Davis, Project Manager

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 600 Stewart Street, Suite 1215  
 Seattle WA, 98101

Project: PSE-Grady Way  
 Project Number: 0186-407-00  
 Project Manager: Steve Woodward

Reported:  
 11/17/99 17:22

**Polychlorinated Biphenyls by EPA Method 8082**  
**North Creek Analytical - Bothell**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>GMW-4/4a (B9K0175-01) Water</b> Sampled: 11/09/99 00:00 Received: 11/09/99 16:14									
Aroclor 1016	ND	0.100	ug/l	1	9K10005	11/10/99	11/17/99	EPA 8082	
Aroclor 1221	ND	0.100	"	"	"	"	"	"	
Aroclor 1232	ND	0.100	"	"	"	"	"	"	
Aroclor 1242	0.812	0.100	"	"	"	"	"	"	
Aroclor 1248	ND	0.100	"	"	"	"	"	"	
Aroclor 1254	ND	0.100	"	"	"	"	"	"	
Aroclor 1260	ND	0.100	"	"	"	"	"	"	
Aroclor 1262	ND	0.100	"	"	"	"	"	"	
Aroclor 1268	ND	0.100	"	"	"	"	"	"	

Surrogate: TCX 63.0 % 40-130 " " " "

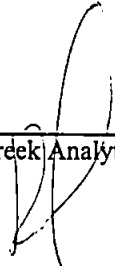
Surrogate: Decachlorobiphenyl 61.5 % 40-130 " " 11/17/99 "

<b>GMW-5 (B9K0175-02) Water</b> Sampled: 11/09/99 00:00 Received: 11/09/99 16:14									
Aroclor 1016	ND	0.100	ug/l	1	9K10005	11/10/99	11/17/99	EPA 8082	
Aroclor 1221	ND	0.100	"	"	"	"	"	"	
Aroclor 1232	ND	0.100	"	"	"	"	"	"	
Aroclor 1242	ND	0.100	"	"	"	"	"	"	
Aroclor 1248	ND	0.100	"	"	"	"	"	"	
Aroclor 1254	ND	0.100	"	"	"	"	"	"	
Aroclor 1260	ND	0.100	"	"	"	"	"	"	
Aroclor 1262	ND	0.100	"	"	"	"	"	"	
Aroclor 1268	ND	0.100	"	"	"	"	"	"	

Surrogate: TCX 74.1 % 40-130 " " " "

Surrogate: Decachlorobiphenyl 59.4 % 40-130 " " " "

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**Polychlorinated Biphenyls by EPA Method 8082**  
**North Creek Analytical - Bothell**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>PURGE 11-9-99 (B9K0175-08) Water</b> <b>Sampled: 11/09/99 00:00</b> <b>Received: 11/09/99 16:14</b>									
Aroclor 1016	ND	0.500	ug/l	5	9K10005	11/10/99	11/17/99	EPA 8082	
Aroclor 1221	ND	0.500	"	"	"	"	"	"	
Aroclor 1232	ND	0.500	"	"	"	"	"	"	
Aroclor 1242	ND	0.500	"	"	"	"	"	"	
Aroclor 1248	ND	0.500	"	"	"	"	"	"	
Aroclor 1254	ND	0.500	"	"	"	"	"	"	
Aroclor 1260	ND	0.500	"	"	"	"	"	"	
Aroclor 1262	ND	0.500	"	"	"	"	"	"	
Aroclor 1268	ND	0.500	"	"	"	"	"	"	
<i>Surrogate: TCX</i>		42.1 %	40-130		"	"	"	"	
<i>Surrogate: Decachlorobiphenyl</i>		59.4 %	40-130		"	"	"	"	

North Creek Analytical - Bothell

Steve Davis, Project Manager

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Geo Engineers - Seattle  
 600 Stewart Street, Suite 1215  
 Seattle WA, 98101

Project: PSE-Grady Way  
 Project Number: 0186-407-00  
 Project Manager: Steve Woodward

Reported:  
 11/17/99 17:22

**Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring**  
**North Creek Analytical - Bothell**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
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**GMW-7 (B9K0175-03) Water** Sampled: 11/09/99 00:00 Received: 11/09/99 16:14

Acenaphthene	0.602	0.200	ug/l	2	9K12008	11/12/99	11/14/99	GCMS-SIM	
Acenaphthylene	ND	0.200	"	"	"	"	"	"	
Anthracene	ND	0.200	"	"	"	"	"	"	
Benzo (a) anthracene	0.201	0.200	"	"	"	"	"	"	
Benzo (a) pyrene	ND	0.200	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	0.200	"	"	"	"	"	"	
Benzo (ghi) perylene	ND	0.200	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	0.200	"	"	"	"	"	"	
Chrysene	0.361	0.200	"	"	"	"	"	"	
Dibenz (a,h) anthracene	ND	0.200	"	"	"	"	"	"	
Fluoranthene	0.241	0.200	"	"	"	"	"	"	
Fluorene	0.963	0.200	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	0.200	"	"	"	"	"	"	
Naphthalene	7.14	0.200	"	"	"	"	"	"	
Phenanthrene	2.37	0.200	"	"	"	"	"	"	
Pyrene	0.883	0.200	"	"	"	"	"	"	

Surrogate: 2-FBP	86.7 %		30-150	"	"	"	"	"	
Surrogate: Nitrobenzene-d5	99.0 %		30-150	"	"	"	"	"	
Surrogate: p-Terphenyl-d14	65.1 %		30-150	"	"	"	"	"	

**GMW-17 (B9K0175-07) Water** Sampled: 11/09/99 00:00 Received: 11/09/99 16:14

Acenaphthene	ND	0.100	ug/l	1	9K12008	11/12/99	11/14/99	GCMS-SIM	
Acenaphthylene	ND	0.100	"	"	"	"	"	"	
Anthracene	ND	0.100	"	"	"	"	"	"	
Benzo (a) anthracene	ND	0.100	"	"	"	"	"	"	
Benzo (a) pyrene	ND	0.100	"	"	"	"	"	"	
Benzo (b) fluoranthene	ND	0.100	"	"	"	"	"	"	
Benzo (ghi) perylene	ND	0.100	"	"	"	"	"	"	
Benzo (k) fluoranthene	ND	0.100	"	"	"	"	"	"	
Chrysene	ND	0.100	"	"	"	"	"	"	
Dibenz (a,h) anthracene	ND	0.100	"	"	"	"	"	"	
Fluoranthene	ND	0.100	"	"	"	"	"	"	
Fluorene	ND	0.100	"	"	"	"	"	"	
Indeno (1,2,3-cd) pyrene	ND	0.100	"	"	"	"	"	"	
Naphthalene	ND	0.100	"	"	"	"	"	"	
Phenanthrene	ND	0.100	"	"	"	"	"	"	
Pyrene	ND	0.100	"	"	"	"	"	"	

Surrogate: 2-FBP	76.2 %		30-150	"	"	"	"	"	
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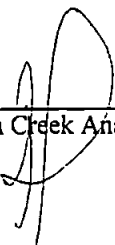
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Geo Engineers - Seattle 600 Stewart Street, Suite 1215 Seattle WA, 98101	Project: PSE-Grady Way Project Number: 0186-407-00 Project Manager: Steve Woodward	Reported: 11/17/99 17:22
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**Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring  
 North Creek Analytical - Bothell**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>GMW-17 (B9K0175-07) Water</b> <b>Sampled: 11/09/99 00:00</b> <b>Received: 11/09/99 16:14</b>									
Surrogate: Nitrobenzene-d5		90.4 %	30-150		9K12008	11/12/99	11/14/99	GCMS-SIM	
Surrogate: p-Terphenyl-d14		68.1 %	30-150		"	"	"	"	

North Creek Analytical - Bothell



Steve Davis, Project Manager

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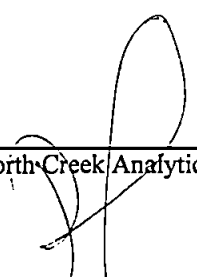
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Geo Engineers - Seattle 600 Stewart Street, Suite 1215 Seattle WA, 98101	Project: PSE-Grady Way Project Number: 0186-407-00 Project Manager: Steve Woodward	Reported: 11/17/99 17:22
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**Conventional Chemistry Parameters by APHA/EPA Methods**  
**North Creek Analytical - Bothell**

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
<b>PURGE 11-9-99 (B9K0175-08) Water</b> <b>Sampled: 11/09/99 00:00</b> <b>Received: 11/09/99 16:14</b>									
Fats, Oil & Grease (total)	1.16	1.00	mg/l	1	9K14004	11/14/99	11/15/99	EPA	
Fats, Oil & Grease (non-polar)	ND	1.00	"	"	"	"	"	418.14413.2	
Fats, Oil & Grease (polar)	ND	1.00	"	"	"	"	"	"	

North Creek Analytical - Bothell



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Project: PSE-Grady Way  
 Project Number: 0186-407-00  
 Project Manager: Steve Woodward

Reported:  
 11/17/99 17:22

**Semivolatile Petroleum Products by NWTPH-Dx (w/o Acid/Silica Gel Clean-up) - Quality Control**  
**North Creek Analytical - Bothell**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch 9K09027: Prepared 11/09/99 Using EPA 3510C/600 Series**

**Blank (9K09027-BLK1)**

Diesel Range Hydrocarbons	ND	0.250	mg/l							
Lube Oil Range Hydrocarbons	ND	0.500	"							
Surrogate: 2-FBP	0.171		"	0.320		53.4	50-150			

**LCS (9K09027-BS1)**

Diesel Range Hydrocarbons	1.20	0.250	mg/l	2.00		60.0	60-140			
Surrogate: 2-FBP	0.161		"	0.320		50.3	50-150			

**LCS Dup (9K09027-BSD1)**

Diesel Range Hydrocarbons	1.33	0.250	mg/l	2.00		66.5	60-140	10.3	40	
Surrogate: 2-FBP	0.181		"	0.320		56.6	50-150			

**Batch 9K10007: Prepared 11/10/99 Using EPA 3520C/600 Series**

**Blank (9K10007-BLK1)**

Diesel Range Hydrocarbons	ND	0.250	mg/l							
Lube Oil Range Hydrocarbons	ND	0.500	"							
Surrogate: 2-FBP	0.222		"	0.320		69.4	50-150			

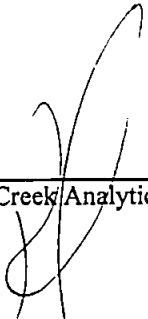
**LCS (9K10007-BS1)**

Diesel Range Hydrocarbons	1.31	0.250	mg/l	2.00		65.5	60-140			
Surrogate: 2-FBP	0.212		"	0.320		66.3	50-150			

**LCS Dup (9K10007-BSD1)**

Diesel Range Hydrocarbons	1.34	0.250	mg/l	2.00		67.0	60-140	2.26	40	
Surrogate: 2-FBP	0.229		"	0.320		71.6	50-150			

North Creek Analytical - Bothell



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 Project Number: 0186-407-00  
 Project Manager: Steve Woodward

Reported:  
 11/17/99 17:22

**BTEX by EPA Method 8021B - Quality Control**  
**North Creek Analytical - Bothell**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch 9K09001: Prepared 11/10/99 Using EPA 5030B (P/T)**

**Blank (9K09001-BLK2)**

Benzene	ND	0.500	ug/l							
Toluene	ND	0.500	"							
Ethylbenzene	ND	0.500	"							
Xylenes (total)	ND	1.00	"							
<i>Surrogate: 4-BFB (PID)</i>	<i>44.7</i>		<i>"</i>	<i>48.0</i>		<i>93.1</i>	<i>50-150</i>			

**LCS (9K09001-BS2)**

Benzene	9.58	0.500	ug/l	10.0		95.8	70-130			
Toluene	9.36	0.500	"	10.0		93.6	70-130			
Ethylbenzene	9.55	0.500	"	10.0		95.5	70-130			
Xylenes (total)	28.7	1.00	"	30.0		95.7	70-130			
<i>Surrogate: 4-BFB (PID)</i>	<i>45.0</i>		<i>"</i>	<i>48.0</i>		<i>93.8</i>	<i>50-150</i>			

**Matrix Spike (9K09001-MS1)**

Source: B9K0152-03

Benzene	9.63	0.500	ug/l	10.0	ND	96.3	70-130			
Toluene	9.40	0.500	"	10.0	ND	94.0	70-130			
Ethylbenzene	9.64	0.500	"	10.0	ND	96.4	70-130			
Xylenes (total)	28.9	1.00	"	30.0	ND	96.3	70-130			
<i>Surrogate: 4-BFB (PID)</i>	<i>46.2</i>		<i>"</i>	<i>48.0</i>		<i>96.3</i>	<i>50-150</i>			

**Matrix Spike Dup (9K09001-MSD1)**

Source: B9K0152-03

Benzene	9.77	0.500	ug/l	10.0	ND	97.7	70-130	1.44	15	
Toluene	9.47	0.500	"	10.0	ND	94.7	70-130	0.742	15	
Ethylbenzene	9.66	0.500	"	10.0	ND	96.6	70-130	0.207	15	
Xylenes (total)	29.2	1.00	"	30.0	ND	97.3	70-130	1.03	15	
<i>Surrogate: 4-BFB (PID)</i>	<i>45.3</i>		<i>"</i>	<i>48.0</i>		<i>94.4</i>	<i>50-150</i>			

North Creek Analytical - Bothell

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**Polychlorinated Biphenyls by EPA Method 8082 - Quality Control**  
**North Creek Analytical - Bothell**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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**Batch 9K10005: Prepared 11/10/99 Using EPA 3520C/600 Series**

**Blank (9K10005-BLK1)**

Aroclor 1016	ND	0.100	ug/l							
Aroclor 1221	ND	0.100	"							
Aroclor 1232	ND	0.100	"							
Aroclor 1242	ND	0.100	"							
Aroclor 1248	ND	0.100	"							
Aroclor 1254	ND	0.100	"							
Aroclor 1260	ND	0.100	"							
Aroclor 1262	ND	0.100	"							
Aroclor 1268	ND	0.100	"							

<i>Surrogate: TCX</i>	0.144		"	0.200		72.0	40-130			
<i>Surrogate: Decachlorobiphenyl</i>	0.136		"	0.200		68.0	40-130			

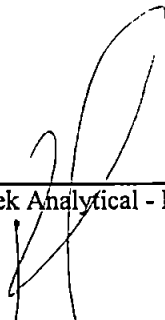
**LCS (9K10005-BS1)**

Aroclor 1260	7.42	0.100	ug/l	10.0		74.2	33-122			
<i>Surrogate: TCX</i>	0.160		"	0.200		80.0	40-130			
<i>Surrogate: Decachlorobiphenyl</i>	0.167		"	0.200		83.5	40-130			

**LCS Dup (9K10005-BSD1)**

Aroclor 1260	7.32	0.100	ug/l	10.0		73.2	33-122	1.36	21	
<i>Surrogate: TCX</i>	0.154		"	0.200		77.0	40-130			
<i>Surrogate: Decachlorobiphenyl</i>	0.151		"	0.200		75.5	40-130			

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**Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring - Quality Control**  
**North Creek Analytical - Bothell**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 9K12008: Prepared 11/12/99 Using EPA 3520C/600 Series

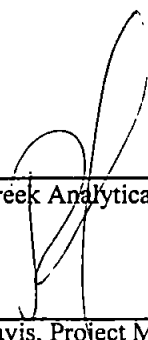
**Blank (9K12008-BLK1)**

Acenaphthene	ND	0.100	ug/l							
Acenaphthylene	ND	0.100	"							
Anthracene	ND	0.100	"							
Benzo (a) anthracene	ND	0.100	"							
Benzo (a) pyrene	ND	0.100	"							
Benzo (b) fluoranthene	ND	0.100	"							
Benzo (ghi) perylene	ND	0.100	"							
Benzo (k) fluoranthene	ND	0.100	"							
Chrysene	ND	0.100	"							
Dibenz (a,h) anthracene	ND	0.100	"							
Fluoranthene	ND	0.100	"							
Fluorene	ND	0.100	"							
Indeno (1,2,3-cd) pyrene	ND	0.100	"							
Naphthalene	ND	0.100	"							
Phenanthrene	ND	0.100	"							
Pyrene	ND	0.100	"							
Surrogate: 2-FBP	43.0		"	50.0		86.0	30-150			
Surrogate: Nitrobenzene-d5	48.4		"	50.0		96.8	30-150			
Surrogate: p-Terphenyl-d14	41.5		"	50.0		83.0	30-150			

**LCS (9K12008-BS1)**

Chrysene	9.48	0.100	ug/l	10.0		94.8	50-150			
Fluorene	8.98	0.100	"	10.0		89.8	50-150			
Indeno (1,2,3-cd) pyrene	8.50	0.100	"	10.0		85.0	50-150			
Surrogate: 2-FBP	40.3		"	50.0		80.6	30-150			
Surrogate: Nitrobenzene-d5	48.6		"	50.0		97.2	30-150			
Surrogate: p-Terphenyl-d14	37.8		"	50.0		75.6	30-150			

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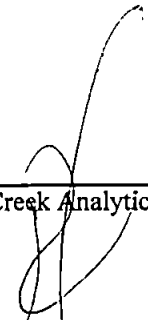
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**Polynuclear Aromatic Compounds by GC/MS with Selected Ion Monitoring - Quality Control**  
**North Creek Analytical - Bothell**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
<b>Batch 9K12008: Prepared 11/12/99 Using EPA 3520C/600 Series</b>										
<b>LCS Dup (9K12008-BSD1)</b>										
Chrysene	9.54	0.100	ug/l	10.0		95.4	50-150	0.631	25	
Fluorene	8.40	0.100	"	10.0		84.0	50-150	6.67	25	
Indeno (1,2,3-cd) pyrene	8.16	0.100	"	10.0		81.6	50-150	4.08	25	
Surrogate: 2-FBP	37.9		"	50.0		75.8	30-150			
Surrogate: Nitrobenzene-d5	43.7		"	50.0		87.4	30-150			
Surrogate: p-Terphenyl-d14	35.9		"	50.0		71.8	30-150			

North Creek Analytical - Bothell



Steve Davis, Project Manager

*The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.*



Seattle 18939 120th Avenue NE, Suite 101, Bothell, WA 98011-9508  
 425.420.9200 fax 425.420.9210  
 Spokane East 11115 Montgomery, Suite B, Spokane, WA 99206-4776  
 509.924.9200 fax 509.924.9290  
 Portland 9405 SW Nimbus Avenue, Beaverton, OR 97008-7132  
 503.906.9200 fax 503.906.9210  
 Bend 20332 Empire Avenue, Suite F-1, Bend, OR 97701-5711  
 541.383.9310 fax 541.382.7588

Geo Engineers - Seattle 600 Stewart Street, Suite 1215 Seattle WA, 98101	Project: PSE-Grady Way Project Number: 0186-407-00 Project Manager: Steve Woodward	Reported: 11/17/99 17:22
--	--	-----------------------------

**Conventional Chemistry Parameters by APHA/EPA Methods - Quality Control  
 North Creek Analytical - Bothell**

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
---------	--------	-----------------	-------	-------------	---------------	------	-------------	-----	-----------	-------

**Batch 9K14004: Prepared 11/14/99 Using EPA 418.1**

**Blank (9K14004-BLK1)**

Fats, Oil & Grease (total)	ND	1.00	mg/l							
Fats, Oil & Grease (non-polar)	ND	1.00	"							
Fats, Oil & Grease (polar)	ND	1.00	"							

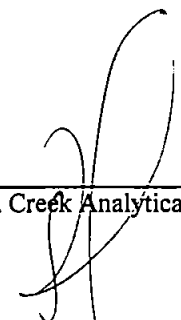
**LCS (9K14004-BS1)**

Fats, Oil & Grease (total)	2.84	1.00	mg/l	2.36		120	65.8-123			
Fats, Oil & Grease (non-polar)	2.84	1.00	"	2.36		120	65.8-123			

**LCS Dup (9K14004-BSD1)**

Fats, Oil & Grease (total)	2.84	1.00	mg/l	2.36		120	65.8-123	0	60	
Fats, Oil & Grease (non-polar)	2.63	1.00	"	2.36		111	65.8-123	7.68	60	

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Geo Engineers - Seattle  
600 Stewart Street, Suite 1215  
Seattle WA, 98101

Project: PSE-Grady Way  
Project Number: 0186-407-00  
Project Manager: Steve Woodward

Reported:  
11/17/99 17:22

### Notes and Definitions

DET Analyte DETECTED  
ND Analyte NOT DETECTED at or above the reporting limit  
NR Not Reported  
dry Sample results reported on a dry weight basis  
RPD Relative Percent Difference

North Creek Analytical - Bothell

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Steve Davis, Project Manager

North Creek Analytical, Inc.  
Environmental Laboratory Network

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Quantitation Report .

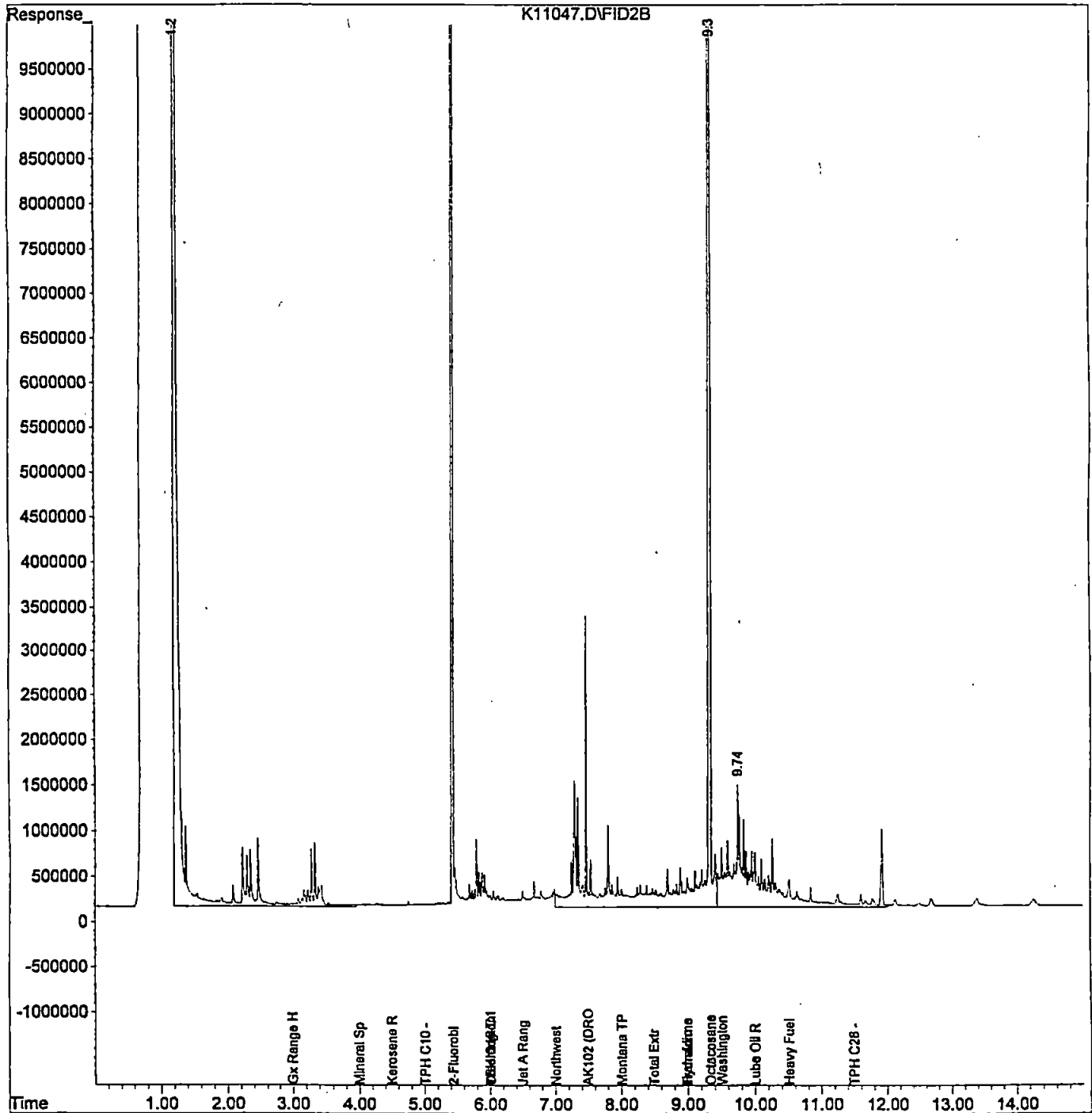
Data File : C:\HPCHEM\4\DATA.SEC\K11047.D  
Acq On : 11-11-99 6:58:07 PM  
Sample : b9k0175-04  
Misc : w  
IntFile : SURR.E  
Quant Time: Nov 11 20:24 1999

Vial: 33  
Operator: MC  
Inst : GC #7  
Multiplr: 1.00

Quant Results File: TPHD2.RES

Quant Method : C:\HPCHEM\4\METHODS\TPHD2.M (Chemstation Integrator)  
Title : TPH-D Rear Method  
Last Update : Wed Nov 10 09:55:24 1999  
Response via : Multiple Level Calibration  
DataAcq Meth : TPHD.M

Volume Inj. :  
Signal Phase :  
Signal Info :



Quantitation Report

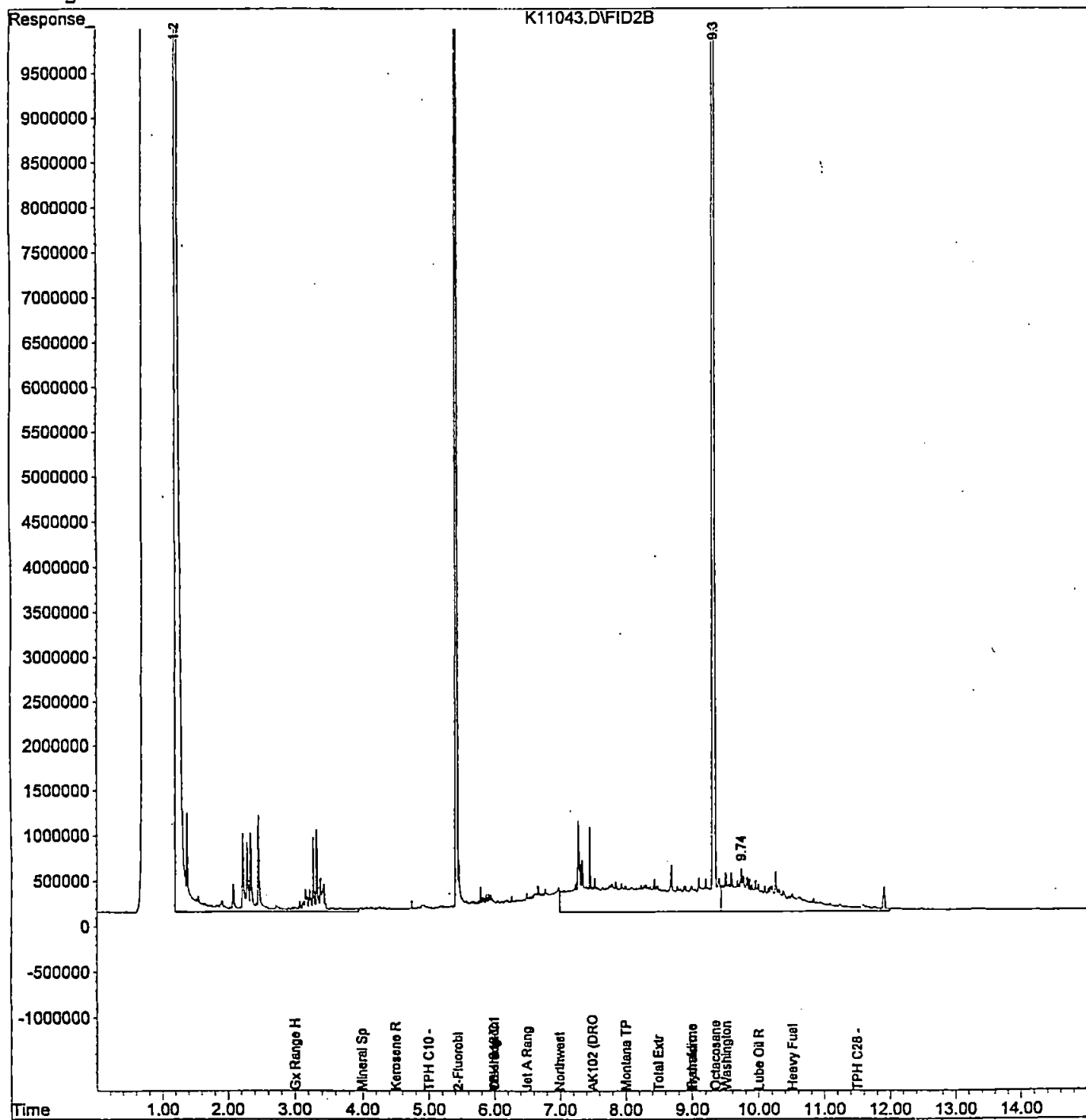
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Sample : b9k0175-01  
Misc : w  
IntFile : SURR.E  
Quant Time: Nov 11 20:23 1999

Vial: 31  
Operator: MC  
Inst : GC #7  
Multiplr: 1.00

Quant Results File: TPHD2.RES

Quant Method : C:\HPCHEM\4\METHODS\TPHD2.M (Chemstation Integrator)  
Title : TPH-D Rear Method  
Last Update : Wed Nov 10 09:55:24 1999  
Response via : Multiple Level Calibration  
DataAcq Meth : TPHD.M

Volume Inj. :  
Signal Phase :  
Signal Info :



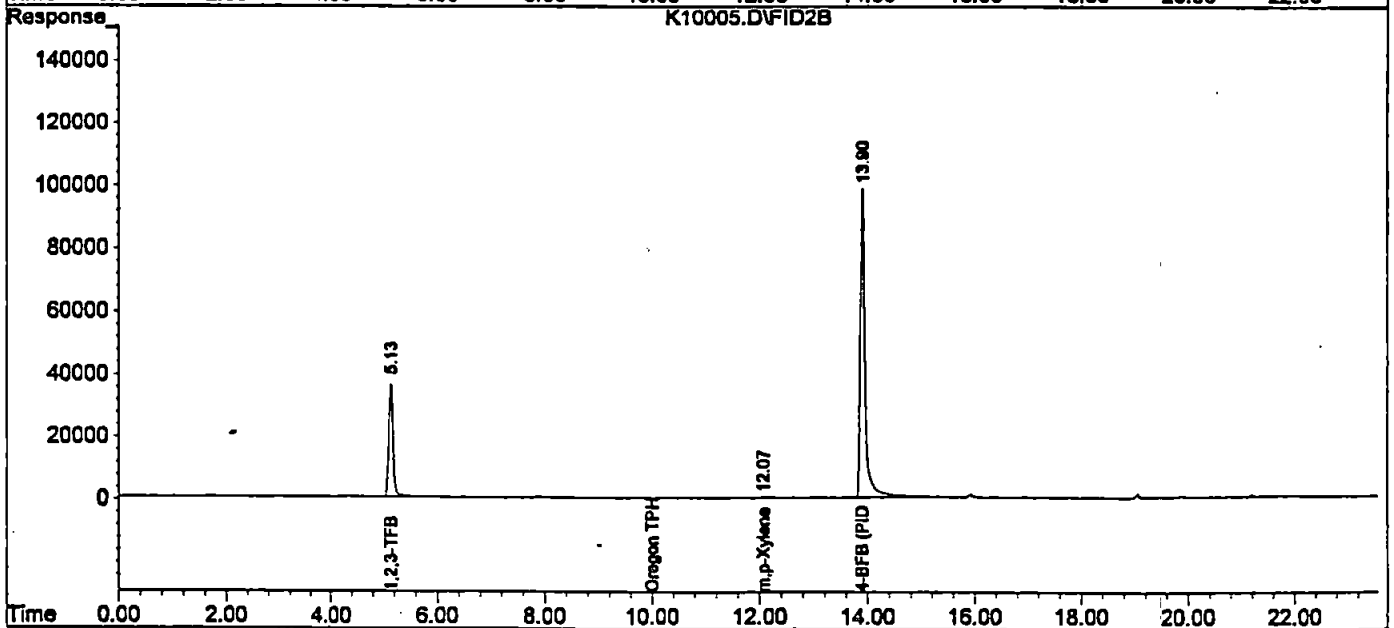
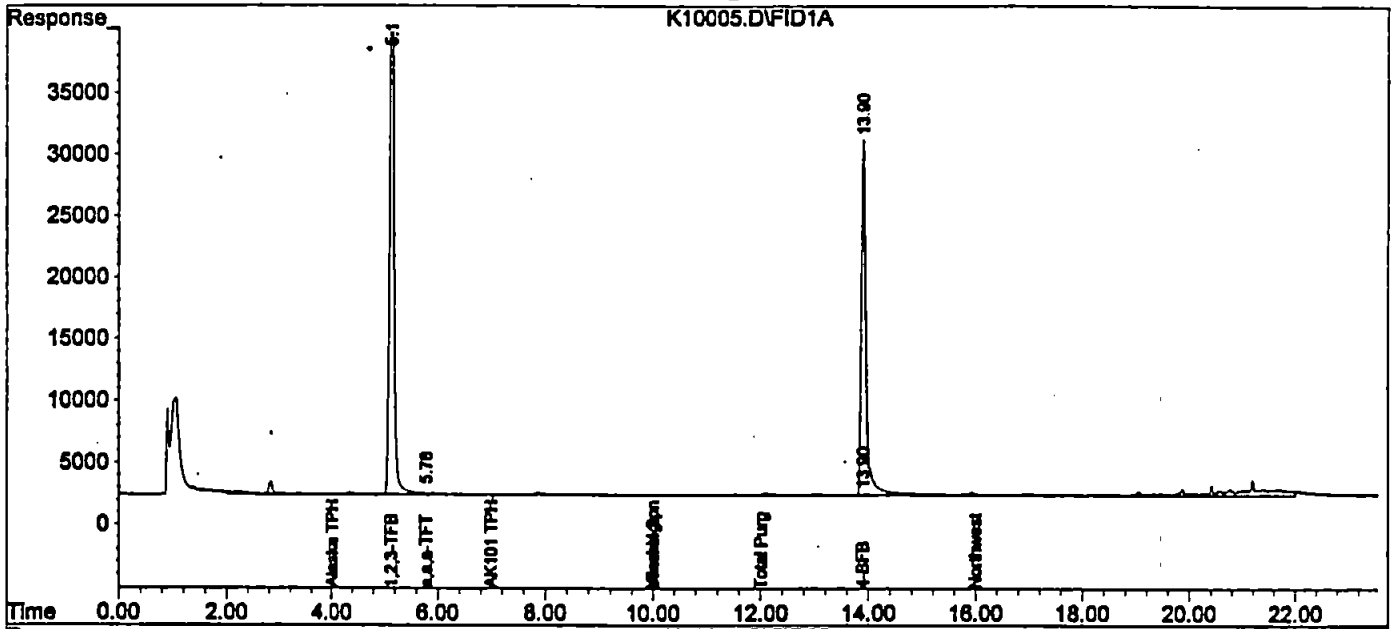
Data File : C:\HPCHEM\4\DATA\111099\K10005.D\FID1A.CH Vial: 5  
Acq On : 10 Nov 1999 8:50 am Operator: ys  
Sample : b9k0175-08, BTEX only Inst : GC #8  
Misc : 5 mL Multiplr: 1.00  
IntFile : TPH.E

Data File : C:\HPCHEM\4\DATA\111099\K10005.D\FID2B.CH Vial: 5  
Acq On : 10 Nov 99 8:50 am Operator: ys  
Sample : b9k0175-08, BTEX only Inst : GC #8  
Misc : 5 mL Multiplr: 1.00  
IntFile : SURR2.E

Quant Time: Nov 10 9:14 1999 Quant Results File: TPHG0499.RES

Quant Method : C:\HPCHEM\4\METHODS\TPHG0499.M (Chemstation Integrator)  
Title : TPH-G Water Method  
Last Update : Mon Nov 08 15:17:26 1999  
Response via : Multiple Level Calibration  
DataAcq Meth : TPHG0499.M

Volume Inj. :  
Signal #1 Phase : Signal #2 Phase:  
Signal #1 Info : Signal #2 Info :



Quantitation Report

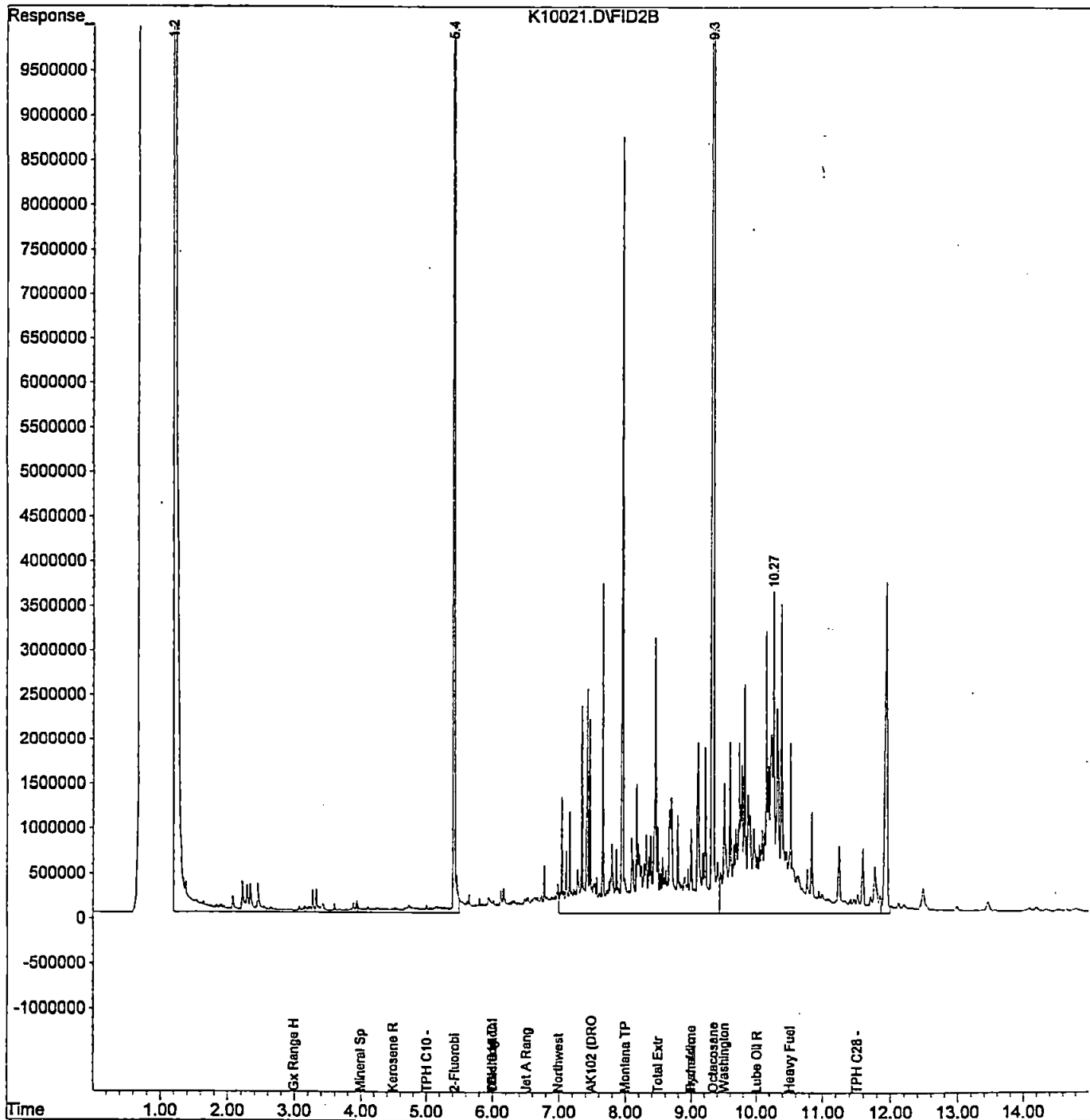
Data File : C:\HPCHEM\4\DATA.SEC\K10021.D  
Acq On : 11-10-99 1:24:56 PM  
Sample : b9k0175-07  
Misc : w  
IntFile : SURR.E  
Quant Time: Nov 10 13:58 1999

Vial: 16  
Operator: ME  
Inst : GC #7  
Multiplr: 1.00

Quant Results File: TPHD2.RES

Quant Method : C:\HPCHEM\4\METHODS\TPHD2.M (Chemstation Integrator)  
Title : TPH-D Rear Method  
Last Update : Wed Nov 10 09:55:24 1999  
Response via : Multiple Level Calibration  
DataAcq Meth : TPHD.M

Volume Inj. :  
Signal Phase :  
Signal Info :



Quantitation Report

Data File : C:\HPCHEM\4\DATA\K10018.D  
Acq On : 11-10-99 12:37:44 PM  
Sample : b9k0175-06  
Misc : w  
IntFile : SURR.E  
Quant Time: Nov 10 13:59 1999

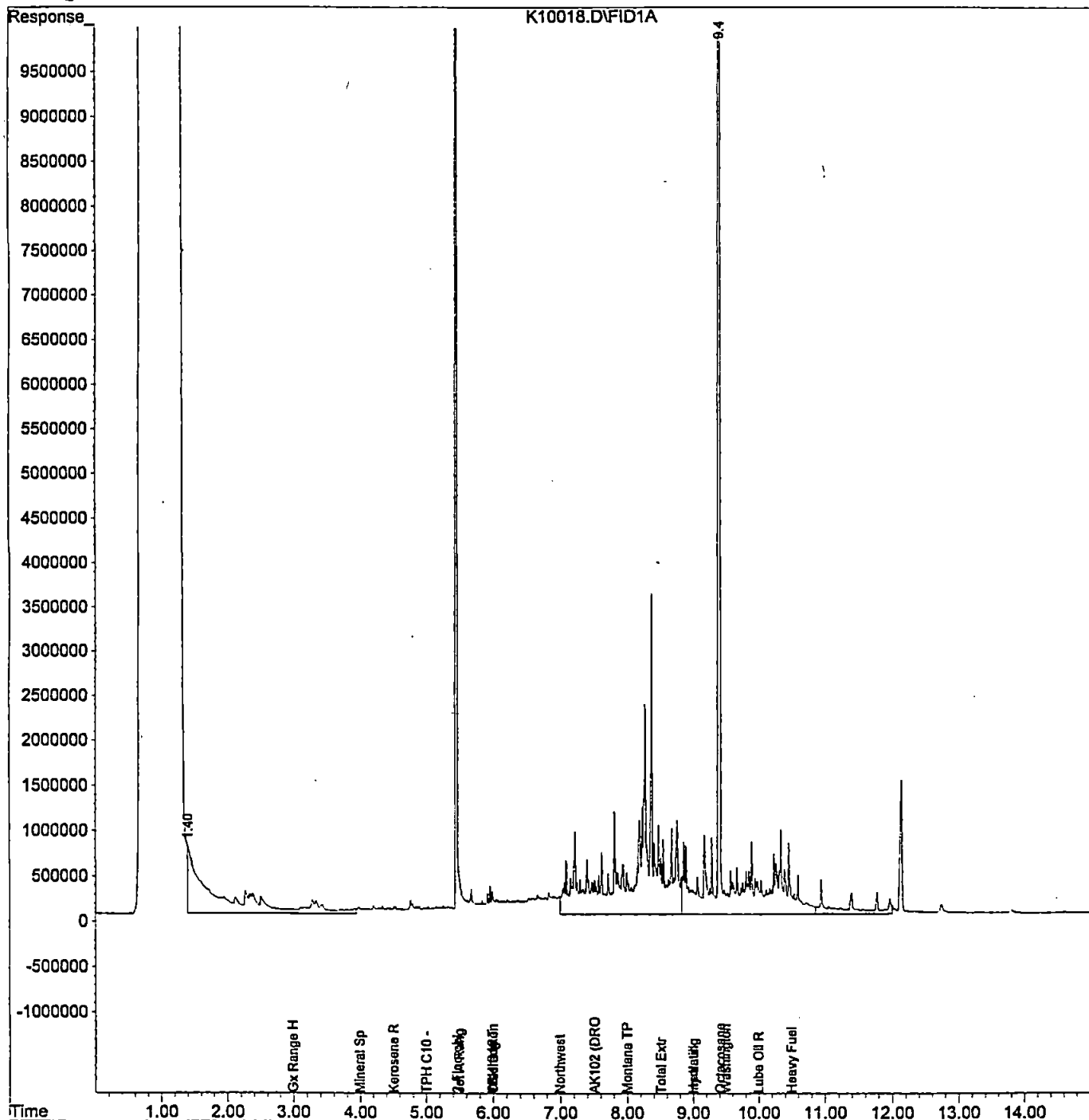
Vial: 15  
Operator: ME  
Inst : GC #7  
Multiplr: 1.00

Quant Results File: TPHD.RES

Quant Method : C:\HPCHEM\4\METHODS\TPHD.M (Chemstation Integrator)

Title : TPH-D Front Method  
Last Update : Wed Nov 10 09:33:44 1999  
Response via : Multiple Level Calibration  
DataAcq Meth : TPHD.M

Volume Inj. :  
Signal Phase :  
Signal Info :



Quantitation Report

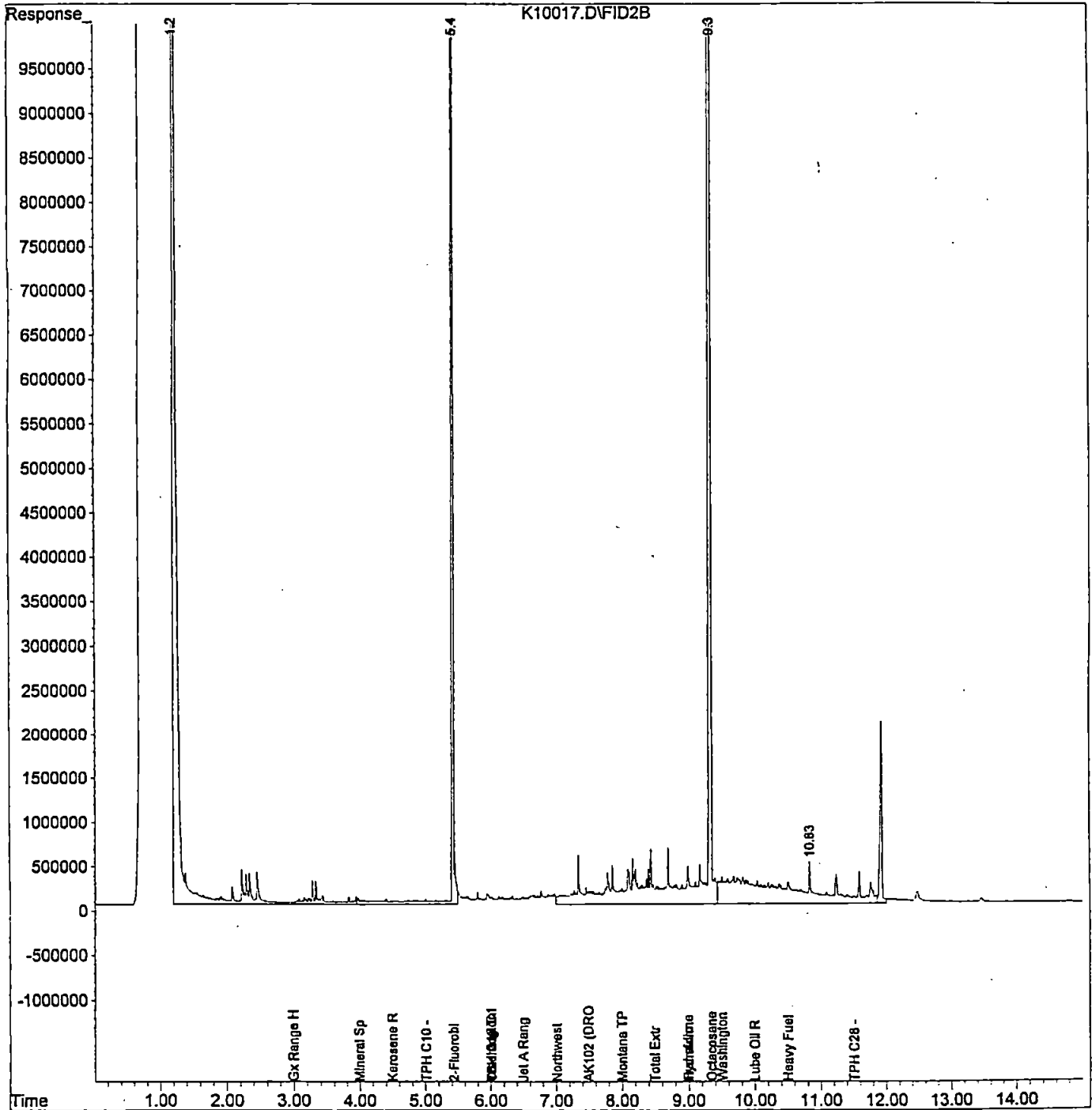
Data File : C:\HPCHEM\4\DATA.SEC\K10017.D  
Acq On : 11-10-99 12:37:44 PM  
Sample : b9k0175-05  
Misc : w  
IntFile : SURR.E  
Quant Time: Nov 10 13:57 1999

Vial: 14  
Operator: ME  
Inst : GC #7  
Multiplr: 1.00

Quant Results File: TPHD2.RES

Quant Method : C:\HPCHEM\4\METHODS\TPHD2.M (Chemstation Integrator)  
Title : TPH-D Rear Method  
Last Update : Wed Nov 10 09:55:24 1999  
Response via : Multiple Level Calibration  
DataAcq Meth : TPHD.M

Volume Inj. :  
Signal Phase :  
Signal Info :



CHAIN OF CUSTODY RECORD

B91K0175

GEOENGINEERS, INC.  
8410 154TH AVENUE N.E.  
REDMOND, WASHINGTON 98052  
(206) 861-6000



DATE 11-9-99  
PAGE 1 OF 1  
LAB NCA  
LAB NO.

PROJECT NAME/LOCATION					ANALYSIS REQUIRED					NOTES/COMMENTS (Preserved, filtered, etc.)		
PROJECT NUMBER					TPH by Ecology	NWTPH-D extended	PCBs by EPA 8082	PAHs by 8270	BETX by EPA 80216		Tox by EPA 418.1/413.2	
PROJECT MANAGER												
SAMPLED BY												
SAMPLE IDENTIFICATION		SAMPLE COLLECTION			# OF							
LAB	GEOENGINEERS	DATE	TIME	MATRIX	JARS							
	GMW-4/4a	11-9-99		W	2	X	X				B91K0175-01	Normal TAT
	GMW-5			W	1		X				-02	" "
	GMW-7			W	1			X			-03	" "
	GMW-12/12a			W	1	X					-04	" "
	GMW-15			W	2	X		X			-05	24 hr TAT (See
	GMW-16			W	2	X		X			-06	24 hr TAT note
	GMW-17			W	2	X		(X)			-07	24 hr TAT (below)
	Purge 11-9-99			W	4		X		X	X	-08	

RELINQUISHED BY SIGNATURE <i>[Signature]</i> PRINTED NAME Brian Peterka DATE 11-9-99 TIME 1615 FIRM GET	RELINQUISHED BY SIGNATURE PRINTED NAME DATE TIME FIRM	RELINQUISHED BY SIGNATURE PRINTED NAME DATE TIME FIRM
RECEIVED BY SIGNATURE <i>[Signature]</i> PRINTED NAME P. TONTY DATE 11/9/99 TIME 1614 FIRM NCA	RECEIVED BY SIGNATURE PRINTED NAME DATE TIME FIRM	RECEIVED BY SIGNATURE PRINTED NAME DATE TIME FIRM

ADDITIONAL COMMENTS:  
24 hr TAT on GMW-15, 16 + 17 NWTPH-Dx. Hold PAH analysis for these samples UNTIL further notice. PAH analysis will be on a 24 hr TAT following notification to run them.