GROUNDWATER TECHNOLOGY

Groundwater Technology, Inc.
19033 W. Valley Highway, Suite D-104, Kent, WA 98032

April 28, 1993

Mr. D. Mark Wells
Texaco Environmental Services
3400 188th Street SW, Suite 630
Lynnwood, WA 98037

RE: **Riverside Project Activity Update**
SR 522 and NE 180th Street

Dear Mr Wells:

This letter presents a Riverside project update covering weeks 12 through 22, February 15 through April 26, 1993, of the bioremediation cell operation.

Effluent airstream monitoring and sampling since February 15, 1992 showed that precarbon-treatment emissions of volatile compounds were non-detectable with a photoionization detector.

Monitoring of the bioremediation activity in the cell during the period showed an increase in oxygen usage during March, due to the corresponding increase in average daily temperatures (Figure 1). Despite the adequate temperatures in April, it appears, based on the April 26, 1993 monitoring data, that the biologic activity has declined to a marginal rate. This is most likely due to the lack of usable hydrocarbons remaining in the cell.

Twelve soil samples were collected from the cell on April 7, 1993 after 19 weeks of blower operation. The same nine-square grid established for the January, 1993 sampling was used as the sample pattern for this event. Each soil boring was placed approximately three feet from the January boring. One sample was collected at a depth of four feet from the center of each square in the north and south rows. Two samples, from two and five feet, were collected from the central three squares. Each sample was analyzed by GTEL Environmental Laboratories in Concord, California for total petroleum hydrocarbons (WTPH) by the Washington modified EPA Method 418.1 and for TPH-as-diesel (WTPHD) by modified EPA Method 8015. The samples were also analyzed for TPH-as-Lube Oil by EPA Method 8015 (TPHD-extended). The results are shown in Table 1. Results of the previous sampling events are also shown in Table 1.

Concentrations of WTPHD were reduced in nine of the twelve samples to less than the method detection limit of 10 milligrams/Kilogram (mg/Kg), with the remaining three sample concentrations below the 200 mg/Kg Compliance Cleanup Level (CCL)[1]. The average pretreatment WTPHD concentration from 12 random samples was 775 mg/Kg. A graph showing the WTPHD concentrations from the three soil sampling events associated with this project is presented in Figure 2.

The January analyses showed a doubling of the average WTPH concentration over the reported pretreatment concentrations, from 532 to 979 mg/Kg. This was most likely due to the presence of organic

[1] Model Toxics Control Act - Method A cleanup level (WAC 173-340).

material associated with the bioremediation process. Therefore, the WTPH analytical method[2] which includes a silica gel "clean-up" step (SOP-3 grams) to remove non-petroleum organic material, was altered and nine grams of gel were added to each of the April samples prior to analysis. The arithmetic mean of the 12 samples was 768 mg/Kg. The samples were analzed a second time with 18 grams of gel, the arithmetic mean was 484 mg/Kg. An average reduction of 49% was accomplished in 10 of 12 samples, two samples showed only a 7% reduction. Additional silica gel was not added. We concluded that the WTPH analysis method was not adequate or appropriate to determine the petroleum hydrocarbon concentrations in this soil. A graph showing the WTPH concentrations from the three soil sampling events associated with this project is presented in Figure 3.

As an alternative quantification to the WTPH analyses, the samples were analyzed by TPHD-extended, as they were in January, and those results do not confirm the IR hydrocarbon concentrations. In fact, the average lube oil concentration by TPHD-extended was 173 mg/Kg in January and 187 mg/Kg in April. Although three soil samples had reported concentrations in excess of the 200 mg/Kg CCL, the mean of all twelve samples is below. A graph showing the TPHD-extended concentrations from the three soil sampling events associated with this project is presented in Figure 4.

The bioremediation cell does not appear to be active, but hydrocarbon concentrations have reached minimum levels and are within the CCLs. Approximately 7,000 lbs of diesel range hydrocarbons were biologically degraded during the treatment of the 3,000 cubic yards petroleum contaminated soil. Due to the fluctuating 418.1 analytical data it is not possible to calculate a reduced quantity of longer chain hydrocarbons.

Groundwater Technology recommends decommissioning the biocell and backfilling the excavation. A. L. Sleister is calculating a cost to spread and compact soil, in excess of what can be compacted in the excavation, on the site and cover with four inches of crushed rock. This could be a considerable savings over the proposed transport and disposal at the Coal Creek Landfill.

Please contact me if you have any questions.

Sincerely,
GROUNDWATER TECHNOLOGY, INC.

Stan Haskins
Staff Geologist

PR MEM
Attachments

[2] Washington Department of Ecology - Guidance for Remediation of Releases from Underground Storage Tanks, Appendix L.

TABLE 1
SUMMARY OF SOIL ANALYTICAL DATA
WTPH-418.1, WTPHD-modified 8015, TPHD-extended
Results in milligrams/Kilogram

Sample date: 7/27-31/92			Sample date: 1/25/93				Sample date: 4/7/93			
Sample ID	WTPH 418.1	WTPHD 8015	Sample ID	WTPH 418.1	TPHD-ext	WTPHD 8015	Sample ID	WTPH 418.1	TPHD ext	WTPHD 8015
7/27-1	NA	810	-				-	3X/6X[1]		
7/27-8	280	620	1-4.0	370	27	<10	1-4.0	230/150	110	<10
7/28-7	920	1100	2-4.0	800	230	29	2-4.0	360/220	130	<10
7/28-20	640	1000	3-4.0	1200	150	34	3-4.0	270/130	140	<10
7/28-23	760	NA	4-2.0	840	140	29	4-2.0	160/68	160	<10
7/29-4	950	1500	4-4.0	1000	160	38	4-5.0	740/270	190	24
7/29-12	820	1300	5-2.0	180	120	18	5-2.0	1000/660	150	<10
7/29-20	410	510	5-4.0	790	170	24	5-5.0	830/410	170	<10
7/30-3	360	670	6-2.0	670	260	26	6-2.0	850/450	190	<10
7/30-12	390	570	6-4.0	1300	220	40	6-5.0	1300/570	330	<10
7/30-19	230	410	7-4.0	1500	230	30	7-4.0	680/280	170	<10
7/31-2	290	390	8-4.0	1500	280	93	8-4.0	1400/1300	280	96
7/31-9	330	430	9-4.0	1600	95	110	9-4.0	1400/1300	220	20
CCL	200	200		200		200		200		200
Mean	532	775		979	173	40		768/484	187	19
Std. Dev.	268	370		454	74	30		450/420	63	24

1 - Denotes quantity of silica gel added, in multiples of standard operating procedure quantities.

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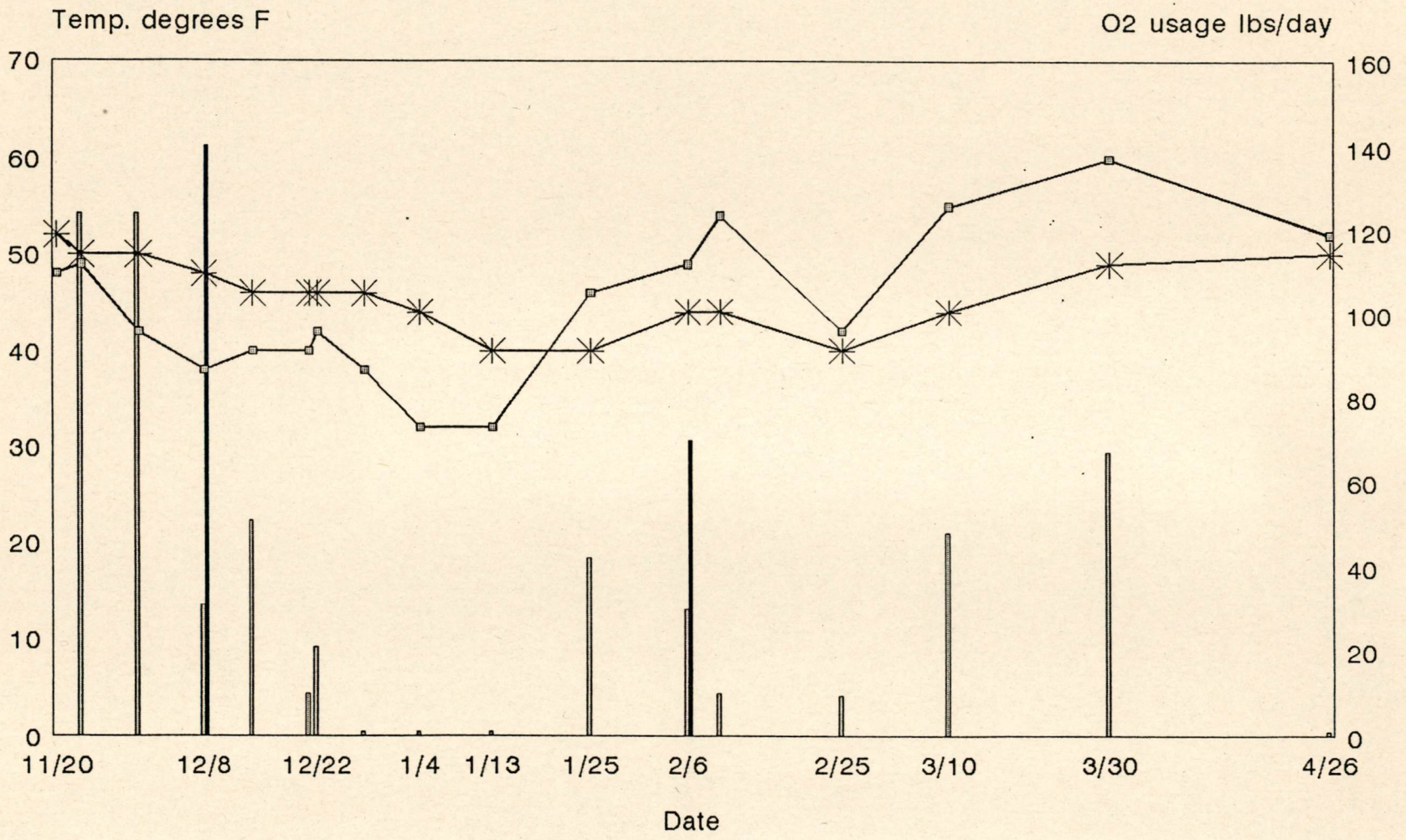
Figure 1
BIOREMEDIATION CELL CONDITIONS
Temperature and Oxygen Usage



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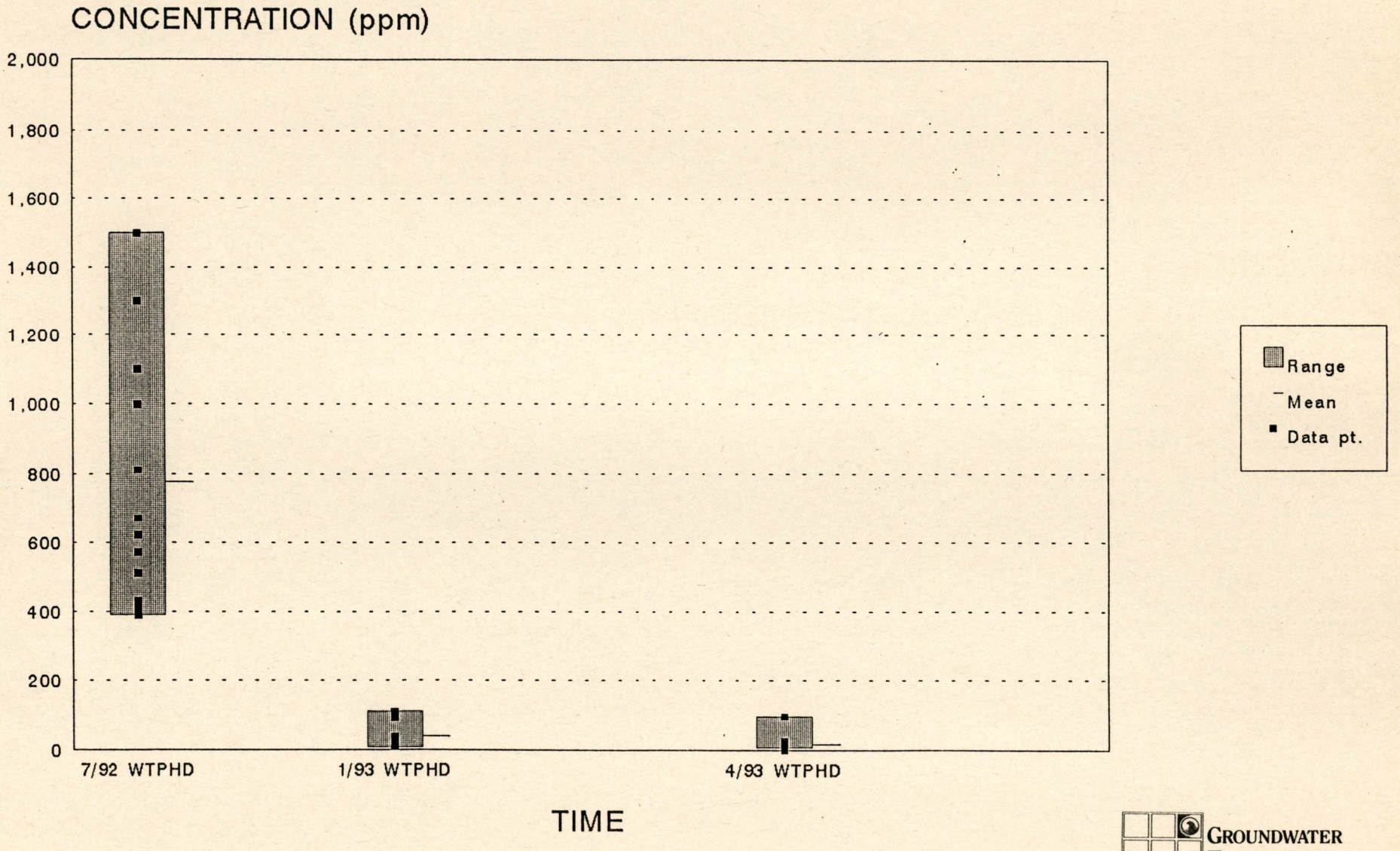
12/8 - Convert blower #1 to positive pressure. 12/22 - Reduce negative flow from 180 cfm to 90 cfm. 12/28, 1/4 & 13 cell inactive by flow calculation.
1/13 - Pile inactive by respirometry test. 2/6 - All 3 blowers to vacuum (270 cfm)

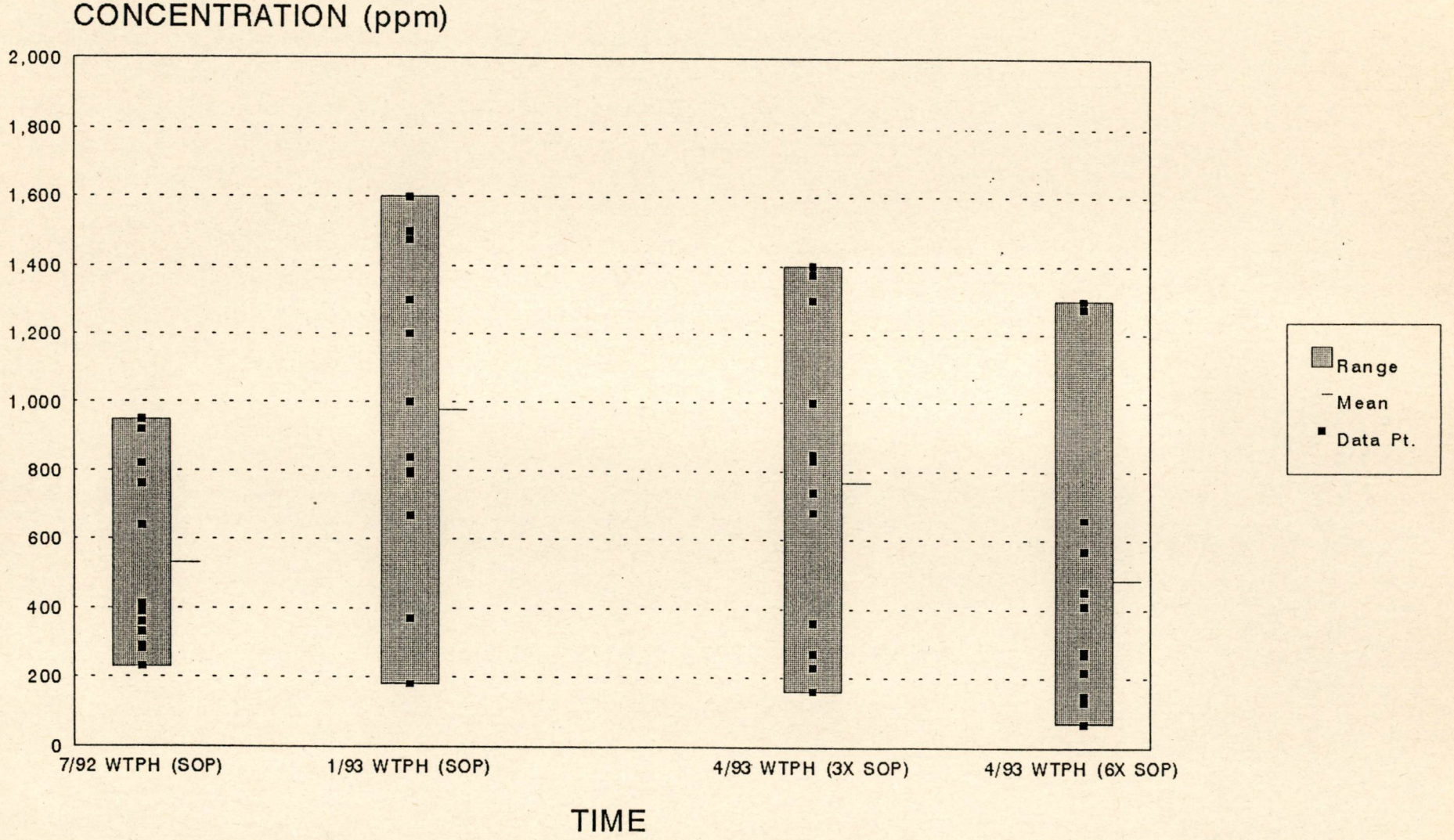
FIGURE 2
HYDROCARBON CONCENTRATIONS
WTPHD VS. TIME



GROUNDWATER TECHNOLOGY

Range and mean depict data from 12 soil samples.

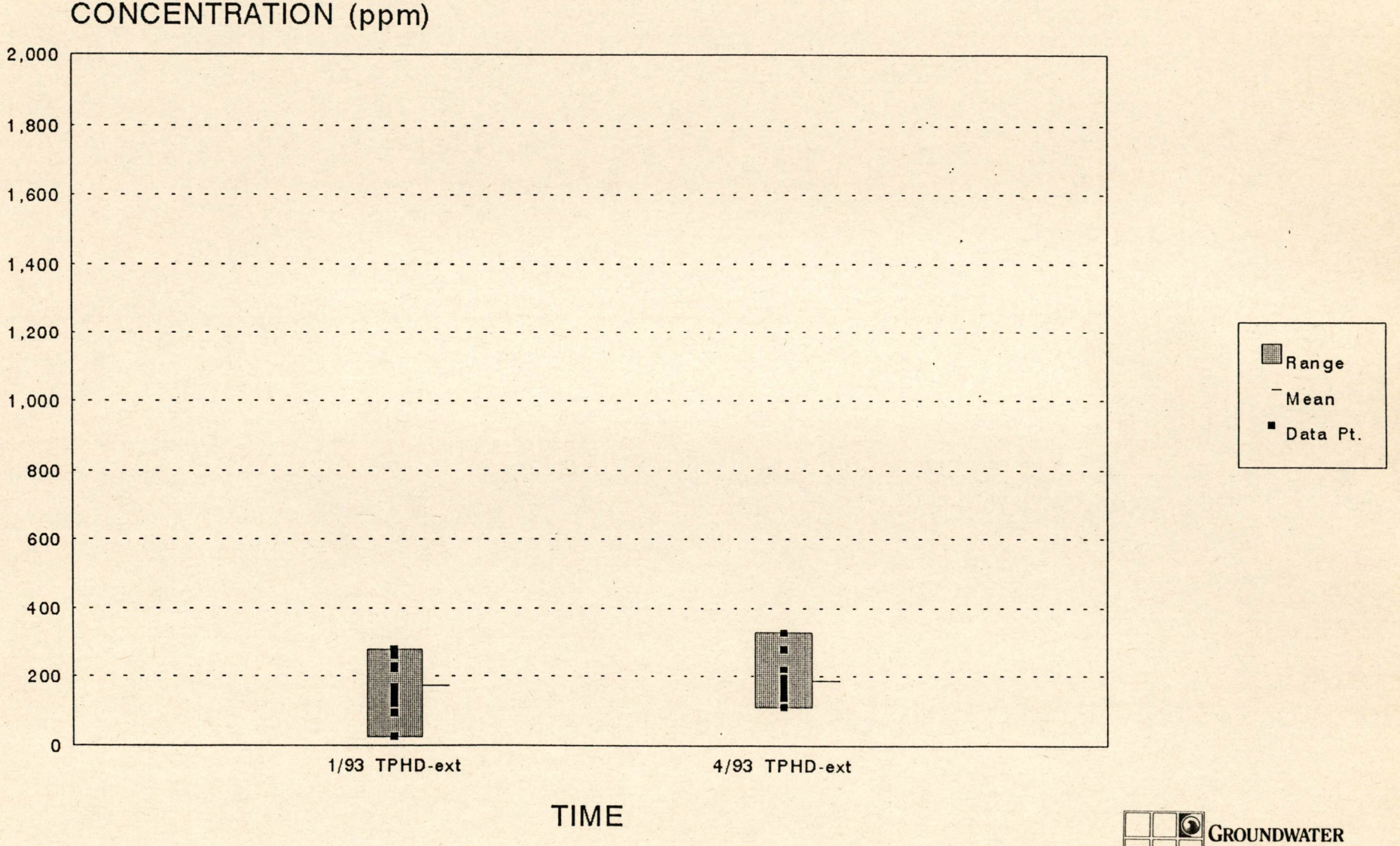
FIGURE 3
HYDROCARBON CONCENTRATIONS
WTPH VS. TIME



Range and mean depict data from 12 soil samples.
SOP refers to the addition of silica gel in multiples of SOP quantities.

GROUNDWATER TECHNOLOGY

FIGURE 4
HYDROCARBON CONCENTRATIONS
TPHD-extended VS. TIME



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Range and mean depict data from 12 soil samples.

GTEL
ENVIRONMENTAL
LABORATORIES, INC.

Northwest Region
4080-C Pike Lane
Concord, CA 94520
(510) 685-7852
(800) 544-3422 *from inside California*
(800) 423-7143 *from outside California*
(510) 825-0720 (FAX)

Client Number: 020603332
Project ID: Riverside
Work Order Number: C3-04-0128
Date Reissued: 04-27-93

April 27, 1993

Mark Nichols
Groundwater Technology, Inc.
19033 W. Valley Hwy., D-104
Kent, WA 98032

Enclosed please find the analytical results for samples received by GTEL Environmental Laboratories, Inc. on 04/08/93, under chain of custody records 25833 and 25867.

A formal Quality Assurance/Quality Control (QA/QC) program is maintained by GTEL, which is designed to meet or exceed the EPA requirements. Analytical work for this project met QA/QC criteria, unless otherwise stated in the footnotes.

GTEL is certified by the California State Department of Health Services, Laboratory certificate numbers 194 and 1075, to perform analyses for drinking water, wastewater, and hazardous waste materials according to EPA protocols.

If you have any questions concerning this analysis or if we can be of further assistance, please call our Customer Service Representative.

Sincerely,

GTEL Environmental Laboratories, Inc.

Ron Martinez

Asst Lab Director for

Eileen F. Bullen
Laboratory Director

Client Number: 020603332
Project ID: Riverside
Work Order Number: C3-04-0128
Date Reissued: 04-27-93

Table 1

ANALYTICAL RESULTS

Hydrocarbons in Soil

Method: WTPH-HCID[a]

GTEL Sample Number		01	02	03	04
Client Identification		1-4.0 4/7	2-4.0 4/7	3-4.0 4/7	4-2.0 4/7
Date Sampled		04/07/93	04/07/93	04/07/93	04/07/93
Date Analyzed		04/21/93	04/21/93	04/21/93	04/21/93
Analyte	Detection Limit, mg/Kg	Concentration, mg/Kg			
TPH as diesel fuel	10	<10	<10	<10	<10
TPH as motor oil	100	110	130	140	160
Detection Limit Multiplier		1	1	1	1
Percent solids		88.0	87.4	86.4	67.3
O-Terphenyl surrogate, % recovery		106	103	119	94.9

a. Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Revision 0, USEPA, November, 1986. "Modification in TPH Methods as per the state of Washington Department of Ecology, Appendix L, April, 1992." Results reported on a dry weight basis.

GTEL ENVIRONMENTAL LABORATORIES, INC.

Client Number: 020603332
Project ID: Riverside
Work Order Number: C3-04-0128
Date Reissued: 04-27-93

Table 1 (continued)

ANALYTICAL RESULTS

Hydrocarbons in Soil

Method: WTPH-HCID[a]

GTEL Sample Number		05	06	07	08
Client Identification		4-5.0 4/7	5-2.0 4/7	5-5.0 4/7	6-2.0 4/7
Date Sampled		04/07/93	04/07/93	04/07/93	04/07/93
Date Analyzed		04/21/93	04/21/93	04/21/93	04/21/93
Analyte	Detection Limit, mg/Kg	Concentration, mg/Kg			
TPH as diesel fuel	10	24	<10	<10	<10
TPH as motor oil	100	190	150	170	190
Detection Limit Multiplier		1	1	1	1
Percent solids		89.2	73.2	85.9	87.5
O-Terphenyl surrogate, % recovery		104	96.1	101	106

a. Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Revision 0, USEPA, November, 1986. "Modification in TPH Methods as per the state of Washington Department of Ecology, Appendix L, April, 1992." Results reported on a dry weight basis.

GTEL ENVIRONMENTAL LABORATORIES, INC

Client Number: 020603332
Project ID: Riverside
Work Order Number: C3-04-0128
Date Reissued: 04-27-93

Table 1 (continued)

ANALYTICAL RESULTS

Hydrocarbons in Soil

Method: WTPH-HCID[a]

GTEL Sample Number		09	10	11	12
Client Identification		6-5.0 4/7	7-4.0 4/7	8-4.0 4/7	9-4.0 4/7
Date Sampled		04/07/93	04/07/93	04/07/93	04/07/93
Date Analyzed		04/21/93	04/21/93	04/21/93	04/21/93
Analyte	Detection Limit, mg/Kg	Concentration, mg/Kg			
TPH as diesel fuel	10	<10	<10	96	20
TPH as motor oil	100	330	170	280	220
Detection Limit Multiplier		1	1	1	1
Percent solids		86.1	86.1	83.1	86.5
O-Terphenyl surrogate, % recovery		106	110	126	118

a. Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Revision 0, USEPA, November, 1986. "Modification in TPH Methods as per the state of Washington Department of Ecology, Appendix L, April, 1992." Results reported on a dry weight basis.

GTEL ENVIRONMENTAL LABORATORIES, INC

Client Number: 020603332
Project ID: Riverside
Work Order Number: C3-04-0128
Date Reissued: 04-27-93

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Table 1 (continued)

ANALYTICAL RESULTS

Hydrocarbons in Soil

Method: WTPH-HCID[a]

GTEL Sample Number		041493 GCK-1			
Client Identification		METHOD BLANK			
Date Sampled		--			
Date Analyzed		04/21/93			
Analyte	Detection Limit, mg/Kg	Concentration, mg/Kg			
TPH as diesel fuel	10	<10			
TPH as motor oil	100	<100			
Detection Limit Multiplier		1			
Percent solids		NA			
O-Terphenyl surrogate, % recovery		98.4			

a. Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Revision 0, USEPA, November, 1986. "Modification in TPH Methods as per the state of Washington Department of Ecology, Appendix L, April, 1992." Results reported on a dry weight basis. NA = Not Applicable.

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(510) 825-0720 (FAX)

RECEIVED APR 26 1993

Client Number: 020603332
Project ID: Riverside
Work Order Number: C3-04-0128

April 22, 1993

Mark Nichols
Groundwater Technology, Inc.
19033 W. Valley Hwy., D-104
Kent, WA 98032

Enclosed please find the analytical results for samples received by GTEL Environmental Laboratories, Inc. on 04/08/93, under chain of custody records 25833 and 25867.

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If you have any questions concerning this analysis or if we can be of further assistance, please call our Customer Service Representative.

Sincerely,
GTEL Environmental Laboratories, Inc.

Eileen F. Bullen
Laboratory Director

Client Number: 020603332
Project ID: Riverside
Work Order Number: C3-04-0128

Table 1

ANALYTICAL RESULTS

Total Petroleum Hydrocarbons in Soil by Infrared Spectrometry[1]

EPA 3550 (Mod.)/WTPH-418.1 (SM 5520 FC)[2]

GTEL Sample Number		01	02	03	04
Client Identification		1-4.0 4/7	2-4.0 4/7	3-4.0 4/7	4-2.0 4/7
Date Sampled		04/07/93	04/07/93	04/07/93	04/07/93
Date Prepared		04/21/93	04/21/93	04/21/93	04/21/93
Date Analyzed		04/21/93	04/21/93	04/21/93	04/21/93
Analyte	Detection Limit, mg/Kg	Concentration, mg/Kg			
Total Petroleum Hydrocarbons	5	230	360	270	160
Detection Limit Multiplier		1	1	1	1
Percent solids		88.0	87.4	86.4	67.3

1. The sample is extracted using a horn sonication. The extract is analyzed, as in EPA 418.1 (SM 5520 CF), to yield results reported as Total Petroleum Hydrocarbons. Results are reported on a dry weight basis.
2. Standard Methods for the Examination of Water and Wastewater, 17th ed., American Public Health Association, 1989. "Modification in TPH Methods as per the state of Washington Department of Ecology, Appendix L, April, 1992."

Note: Used three times the amount of recommended silica gel as per chain of custody.

GTEL ENVIRONMENTAL LABORATORIES, INC.

Client Number: 020603332
Project ID: Riverside
Work Order Number: C3-04-0128

Table 1 (Continued)

ANALYTICAL RESULTS

Total Petroleum Hydrocarbons in Soil
by Infrared Spectrometry[1]

EPA 3550 (Mod.)/WTPH-418.1 (SM 5520 FC)[2]

GTEL Sample Number		05	06	07	08
Client Identification		4-5.0 4/7	5-2.0 4/7	5-5.0 4/7	6-2.0 4/7
Date Sampled		04/07/93	04/07/93	04/07/93	04/07/93
Date Prepared		04/21/93	04/21/93	04/21/93	04/21/93
Date Analyzed		04/21/93	04/21/93	04/21/93	04/21/93
Analyte	Detection Limit, mg/Kg	Concentration, mg/Kg			
Total Petroleum Hydrocarbons	5	740	1000	830	850
Detection Limit Multiplier		1	1	1	1
Percent solids		89.2	73.2	85.9	87.5

1. The sample is extracted using a horn sonication. The extract is analyzed, as in EPA 418.1 (SM 5520 CF), to yield results reported as Total Petroleum Hydrocarbons. Results are reported on a dry weight basis.
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GTEL ENVIRONMENTAL LABORATORIES, INC.

Client Number: 020603332
Project ID: Riverside
Work Order Number: C3-04-0128

Table 1 (Continued)

ANALYTICAL RESULTS

Total Petroleum Hydrocarbons in Soil
by Infrared Spectrometry[1]

EPA 3550 (Mod.)/WTPH-418.1 (SM 5520 FC)[2]

GTEL Sample Number		09	10	11	12
Client Identification		6-5.0 4/7	7-4.0 4/7	8-4.0 4/7	9-4.0 4/7
Date Sampled		04/07/93	04/07/93	04/07/93	04/07/93
Date Prepared		04/21/93	04/21/93	04/21/93	04/21/93
Date Analyzed		04/21/93	04/21/93	04/21/93	04/21/93
Analyte	Detection Limit, mg/Kg	Concentration, mg/Kg			
Total Petroleum Hydrocarbons	5	1300	680	1400	1400
Detection Limit Multiplier		1	1	1	1
Percent solids		86.1	88.1	83.1	86.5

1. The sample is extracted using a horn sonication. The extract is analyzed, as in EPA 418.1 (SM 5520 CF), to yield results reported as Total Petroleum Hydrocarbons. Results are reported on a dry weight basis.
2. Standard Methods for the Examination of Water and Wastewater, 17th ed., American Public Health Association, 1989. "Modification in TPH Methods as per the state of Washington Department of Ecology, Appendix L, April, 1992."

Note: Used three times the amount of recommended silica gel as per chain of custody.

GTEL ENVIRONMENTAL LABORATORIES, INC.

Client Number: 020603332
Project ID: Riverside
Work Order Number: C3-04-0128

Table 1 (Continued)

ANALYTICAL RESULTS

Total Petroleum Hydrocarbons in Soil
by Infrared Spectrometry[1]

EPA 3550 (Mod.)/WTPH-418.1 (SM 5520 FC)[2]

GTEL Sample Number		042193 SOIL			
Client Identification		METHOD BLANK			
Date Sampled		--			
Date Prepared		04/21/93			
Date Analyzed		04/21/93			
Analyte	Detection Limit, mg/Kg	Concentration, mg/Kg			
Total Petroleum Hydrocarbons	5	<5			
Detection Limit Multiplier		1			
Percent solids		NA			

1. The sample is extracted using a horn sonication. The extract is analyzed, as in EPA 418.1 (SM 5520 CF), to yield results reported as Total Petroleum Hydrocarbons. Results are reported on a dry weight basis.
2. Standard Methods for the Examination of Water and Wastewater, 17th ed., American Public Health Association, 1989. "Modification in TPH Methods as per the state of Washington Department of Ecology, Appendix L, April, 1992." NA = Not Applicable.

Note: Used three times the amount of recommended silica gel as per chain of custody.

GTEL ENVIRONMENTAL LABORATORIES, INC.

GTEL ENVIRONMENTAL LABORATORIES, INC.
CONCORD, CA 94520
(510) 685-7852
(800) 423-7143

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

25867

Company Name: Groundwater Tech.
Phone #: 206-251-5441
FAX #: 251-8452
Company Address: 19033 W Valley D104 Kent Wa 98032
Site location: Bothell.
Project Manager: Mark Nichols
Client Project ID: (#) 020603326160
(NAME) TES-Riverside
Sampler Name (Print): JEAN Josey

I attest that the proper field sampling procedures were used during the collection of these samples.

Field Sample ID	GTEL Lab # (Lab use only)	# Containers	Matrix: WATER	SOIL	AIR	SLUDGE	PRODUCT	OTHER	Method Preserved: HCl	HNO_3	H_2SO_4	ICE	UNPRESERVED	OTHER (SPECIFY)	Sampling: DATE	TIME
1-4.0 4/7	1	1		X								X			4-7	2:00
2-4.0 4/7	2	1		X								X			4-7	1:55
3-4.0 4/7	3	1		X								X			4-7	1:50
4-2.0 4/7	4	1		X								X			4-7	1:35
4-5.0 4/7	5	1		X								X			4-7	1:40
5-2.0 4/7	6	1		X								X			4-7	1:25
5-5.0 4/7	7	1		X								X			4-7	1:30
6-2.0 4/7	8	1		X								X			4-7	1:05
6-5.0 4/7	9	1		X								X			4-7	1:10
															~~4-8~~	

ANALYSIS REQUEST

BTEX/602 ☐ 8020 ☐ - with MTBE ☐	BTEX/Gas Hydrocarbons PID/FID ☐ with MTBE ☐	Hydrocarbons GC/FID Gas ☐ Diesel ☒ Screen ☐	Hydrocarbon Profile (SIMDIS) ☐	Oil and Grease 413.1 ☐ 413.2 ☐ SM 503 ☐	TPH/IR 418.1 ☒ SM 503 ☐	EDB by 504 ☐ DBCP by 504 ☐	EPA 503.1 ☐ EPA 502.2 ☐	EPA 601 ☐ EPA 8010 ☐	EPA 602 ☐ EPA 8020 ☐	EPA 608 ☐ 8080 ☐ PCB only ☐	EPA 624/PPL ☐ 8240/TAL ☐ NBS (+15) ☐	EPA 625/PPL ☐ 8270/TAL ☐ NBS (+25) ☐	EPA 610 ☐ 8310 ☐	EP TOX Metals ☐ Pesticides ☐ Herbicides ☐	TCLP Metals ☐ VOA ☐ Semi-VOA ☐ Pest ☐ Herb ☐	EPA Metals - Priority Pollutant ☐ TAL ☐ RCRA ☐	CAM Metals TTLC ☐ STLC ☐	Lead 239.2 ☐ 200.7 ☐ 7420 ☐ 7421 ☐ 6010 ☐	Organic Lead ☐	Corrosivity ☐ Flash Point ☐ Reactivity ☐	8015-oil
		X			X																X
		X			X																X
		X			X																X
		X			X																X
		X			X																X
		X			X																X
		X			X																X
		X			X																X
		X			X																X

TAT
- Priority (24 hr) ☐
- Expedited (48 hr) ☐
- 7 Business Days ☐
- Other 10 Business Days ☒

Special Handling
- GTEL Contact
- Quote/Contract #
- Confirmation #
- PO #

QA / QC LEVEL
BLUE ☐ CLP ☐ OTHER

SPECIAL DETECTION LIMITS
418.1-use 3X SOP silica Gel

SPECIAL REPORTING REQUIREMENTS
FAX ☐

REMARKS
Washington Method

Lab Use Only Lo

Work Order # 128

CUSTODY RECORD

Relinquished by Sampler: Jean Josey	Date	Time	Received by:
Relinquished by:	Date	Time	Received by:
Relinquished by:	Date 4/8/93	Time 11:30	Received by Laboratory: Connie Belsey

Waybill #

v. 7/91

GTEL
ENVIRONMENTAL
LABORATORIES, INC.

Northwest Region
4080-C Pike Lane
Concord, CA 94520
(510) 685-7852
(800) 544-3422 *from inside California*
(800) 423-7143 *from outside California*
(510) 825-0720 (FAX)

RECEIVED APR 27 1993

Client Number: 020605332
Project ID: Bothell
Work Order Number: C3-04-0350

April 26, 1993

Mark Nichols
Groundwater Technology, Inc.
19033 W. Valley Hwy., D-104
Kent, WA 98032

Enclosed please find the analytical results for samples received by GTEL Environmental Laboratories, Inc. on 04/08/93, under chain of custody records 25833 and 25867.

A formal Quality Assurance/Quality Control (QA/QC) program is maintained by GTEL, which is designed to meet or exceed the EPA requirements. Analytical work for this project met QA/QC criteria, unless otherwise stated in the footnotes.

GTEL is certified by the California State Department of Health Services, Laboratory certificate numbers 194 and 1075, to perform analyses for drinking water, wastewater, and hazardous waste materials according to EPA protocols.

If you have any questions concerning this analysis or if we can be of further assistance, please call our Customer Service Representative.

Sincerely,
GTEL Environmental Laboratories, Inc.

Eileen F. Bullen

Eileen F. Bullen
Laboratory Director

Client Number: 020605332
Project ID: Bothell
Work Order Number: C3-04-0350

Table 1

ANALYTICAL RESULTS

Total Petroleum Hydrocarbons in Soil by Infrared Spectrometry[1]

EPA 3550 (Mod.)/WTPH-418.1 (SM 5520 FC)[2]

GTEL Sample Number		01	02	03	04
Client Identification		1-4.0 4/7	2-4.0 4/7	3-4.0 4/7	4-2.0 4/7
Date Sampled		04/07/93	04/07/93	04/07/93	04/07/93
Date Prepared		04/23/93	04/23/93	04/23/93	04/23/93
Date Analyzed		04/23/93	04/23/93	04/23/93	04/23/93
Analyte	Detection Limit, mg/Kg	Concentration, mg/Kg			
Total Petroleum Hydrocarbons	5	150	220	130	68
Detection Limit Multiplier		1	1	1	1
Percent solids		88.0	87.4	86.4	67.3

1. The sample is sonication extracted using a horn sonication of EPA 3550. The extract is analyzed, as in EPA 418.1 (SM 5520 CF), to yield results reported as Total Petroleum Hydrocarbons. Results are reported on a dry weight basis.
2. Standard Methods for the Examination of Water and Wastewater, 17th ed., American Public Health Association, 1989. "Modification in TPH Methods as per the state of Washington Department of Ecology, Appendix L, April, 1992."

Note: Used six times the amount of recommended silica gel as per chain of custody.

GTEL ENVIRONMENTAL LABORATORIES, INC.

Client Number: 020605332
Project ID: Bothell
Work Order Number: C3-04-0350

Table 1 (Continued)

ANALYTICAL RESULTS

Total Petroleum Hydrocarbons in Soil by Infrared Spectrometry[1]

EPA 3550 (Mod.)/WTPH-418.1 (SM 5520 FC)[2]

GTEL Sample Number		05	06	07	08
Client Identification		4-5.0 4/7	5-2.0 4/7	5-5.0 4/7	6-2.0 4/7
Date Sampled		04/07/93	04/07/93	04/07/93	04/07/93
Date Prepared		04/23/93	04/23/93	04/23/93	04/23/93
Date Analyzed		04/23/93	04/23/93	04/23/93	04/23/93
Analyte	Detection Limit, mg/Kg	Concentration, mg/Kg			
Total Petroleum Hydrocarbons	5	270	660	410	450
Detection Limit Multiplier		1	1	1	1
Percent solids		89.2	73.2	85.9	87.5

1. The sample is sonication extracted using a horn sonication of EPA 3550. The extract is analyzed, as in EPA 418.1 (SM 5520 CF), to yield results reported as Total Petroleum Hydrocarbons. Results are reported on a dry weight basis.
2. Standard Methods for the Examination of Water and Wastewater, 17th ed., American Public Health Association, 1989. "Modification in TPH Methods as per the state of Washington Department of Ecology, Appendix L, April, 1992."

Note: Used six times the amount of recommended silica gel as per chain of custody.

Client Number: 020605332
Project ID: Bothell
Work Order Number: C3-04-0350

Table 1 (Continued)

ANALYTICAL RESULTS

Total Petroleum Hydrocarbons in Soil
by Infrared Spectrometry[1]

EPA 3550 (Mod.)/WTPH-418.1 (SM 5520 FC)[2]

GTEL Sample Number		09	10	11	12
Client Identification		6-5.0 4/7	7-4.0 4/7	8-4.0 4/7	9-4.0 4/7
Date Sampled		04/07/93	04/07/93	04/07/93	04/07/93
Date Prepared		04/23/93	04/23/93	04/23/93	04/23/93
Date Analyzed		04/23/93	04/23/93	04/23/93	04/23/93
Analyte	Detection Limit, mg/Kg	Concentration, mg/Kg			
Total Petroleum Hydrocarbons	5	570	280	1300	1300
Detection Limit Multiplier		1	1	1	1
Percent solids		86.1	88.1	83.1	86.5

1. The sample is sonication extracted using a horn sonication of EPA 3550. The extract is analyzed, as in EPA 418.1 (SM 5520 CF), to yield results reported as Total Petroleum Hydrocarbons. Results are reported on a dry weight basis.
2. Standard Methods for the Examination of Water and Wastewater, 17th ed., American Public Health Association, 1989. "Modification in TPH Methods as per the state of Washington Department of Ecology, Appendix L, April, 1992."

Note: Used six times the amount of recommended silica gel as per chain of custody.

GTEL ENVIRONMENTAL LABORATORIES, INC.

Client Number: 020605332
Project ID: Bothell
Work Order Number: C3-04-0350

Table 1 (Continued)

ANALYTICAL RESULTS

Total Petroleum Hydrocarbons in Soil
by Infrared Spectrometry[1]

EPA 3550 (Mod.)/WTPH-418.1 (SM 5520 FC)[2]

GTEL Sample Number		042393 SOIL			
Client Identification		METHOD BLANK			
Date Sampled		--			
Date Prepared		04/23/93			
Date Analyzed		04/23/93			
Analyte	Detection Limit, mg/Kg	Concentration, mg/Kg			
Total Petroleum Hydrocarbons	5	<5			
Detection Limit Multiplier		1			
Percent solids		NA			

1. The sample is sonication extracted using a horn sonication of EPA 3550. The extract is analyzed, as in EPA 418.1 (SM 5520 CF), to yield results reported as Total Petroleum Hydrocarbons. Results are reported on a dry weight basis.
2. Standard Methods for the Examination of Water and Wastewater, 17th ed., American Public Health Association, 1989. "Modification in TPH Methods as per the state of Washington Department of Ecology, Appendix L, April, 1992." NA = Not Applicable.

Note: Used six times the amount of recommended silica gel as per chain of custody.

GTEL ENVIRONMENTAL LABORATORIES, INC.

Client Number: 020605332
Project ID: Bothell
Work Order Number: C3-04-0350

ANALYTICAL RESULTS

TPH as Lubricating Oil in Soil

Method: WTPH-HCID[a]

GTEL Sample Number		.05	042393 SOIL-1		
Client Identification		4-5.0 4/7	METHOD BLANK		
Date Sampled		04/07/93	--		
Date Extracted		04/23/93	04/23/93		
Date Analyzed		04/23/93	04/23/93		
Analyte	Detection Limit, mg/Kg	Concentration, mg/Kg			
TPH as lubricating oil	100	<100	<100		
Detection Limit Multiplier		1	1		
Percent Solids		89.2	NA		
OTP surrogate, % recovery		102	101		

a. NA = not applicable. o-Terphenyl surrogate recovery acceptability limits of 50-150% are derived from the 99% confidence interval of all samples during the previous quarter. Expected surrogate value is 0.100 mg/Kg. "Modification in TPH as per the State of Washington Department of Ecology, Appendix L, April, 1992." Results reported on a dry weight basis

GTEL ENVIRONMENTAL LABORATORIES, INC.

GTEL ENVIRONMENTAL LABORATORIES, INC.

CONCORD, CA 94520
(510) 685-7852
(800) 423-7143

[CHAIN OF CUSTODY] AND ANALYSIS REQUEST

Company Name: Groundwater Tech.
Phone #: 206-251-5441
FAX #: 251-8452
Company Address: 19033 W Valley Dr 104, Kent Wa 98032
Site location: Bothell
Project Manager: MArk Nichols
Client Project ID: (#) 020603332-6160
(NAME) TES-Riverside
I attest that the proper field sampling procedures were used during the collection of these samples.
Sampler Name (Print): JEAN Josey

ANALYSIS REQUEST: BTEX/602 ☐ 8020 ☐ with MTBE ☐; BTEX/Gas Hydrocarbons PID/FID ☐ with MTBE ☐; Hydrocarbons GC/FID Gas ☐ Diesel ☒ Screen ☐; Hydrocarbon Profile (SIMDIS) ☐; Oil and Grease 413.1 ☐ 413.2 ☐ SM 503 ☐; TPH/IR 418.1 ☒ SM 503 ☐; EDB by 504 ☐ DBCP by 504 ☐; EPA 503.1 ☐ EPA 502.2 ☐; EPA 601 ☐ EPA 8010 ☐; EPA 602 ☐ EPA 8020 ☐; EPA 608 ☐ 8080 ☐ PCB only ☐; EPA 624/PPL ☐ 8240/TAL ☐ NBS (+15) ☐; EPA 625/PPL ☐ 8270/TAL ☐ NBS (+25) ☐; EPA 610 ☐ 8310 ☐; EP TOX Metals ☐ Pesticides ☐ Herbicides ☐; TCLP Metals ☐ VOA ☐ Semi-VOA ☐ Pest ☐ Herb ☐; EPA Metals - Priority Pollutant ☐ TAL ☐ RCRA ☐; CAM Metals TTLC ☐ STLC ☐; Lead 239.2 ☐ 200.7 ☐ 7420 ☐ 7421 ☐ 6010 ☐; Organic Lead ☐; Corrosivity ☐ Flash Point ☐ Reactivity ☐; OTHER: 8015-oil

Field Sample ID	GTEL Lab # (Lab use only)	# Containers	Matrix: Soil	Method Preserved: Ice	Sampling Date	Sampling Time	Hydrocarbons GC/FID Diesel	TPH/IR 418.1	8015-oil
1-4.0 4/7	01	1	X	X	4-7	2:00	X	X	X
2-4.0 4/7	02	1	X	X	4-7	1:55	X	X	X
3-4.0 4/7	03	1	X	X	4-7	1:50	X	X	X
4-2.0 4/7	04	1	X	X	4-7	1:35	X	X	X
4-5.0 4/7	05	1	X	X	4-7	1:40	X	X	X
5-2.0 4/7	06	1	X	X	4-7	1:25	X	X	X
5-5.0 4/7	07	1	X	X	4-7	1:30	X	X	X
6-2.0 4/7	08	1	X	X	4-7	1:05	X	X	X
6-5.0 4/7	09	1	X	X	4-7	1:10	X	X	X
					~~4-8~~				

TAT: Priority (24 hr) ☐; Expedited (48 hr) ☐; 7 Business Days ☐; Other 10 Business Days ☒

Special Handling: GTEL Contact ____; Quote/Contract # ____; Confirmation # ____; PO # ____

QA / QC LEVEL: BLUE ☐ CLP ☐ OTHER ____

SPECIAL DETECTION LIMITS: 418.1-USE 3X SOP silica Gel

SPECIAL REPORTING REQUIREMENTS: FAX ☐

REMARKS: Washington Method

Lab Use Only Lo[t #] ... [Storage Locati]on:
Work Order #: 128

CUSTODY RECORD

Relinquished by	Date	Time	Received by
Relinquished by Sampler: Jean Josey			Received by:
Relinquished by:			Received by:
Relinquished by:	4/8/93	11:30	Received by Laboratory: Corinne Belskey

Waybill #

GTEL ENVIRONMENTAL LABORATORIES, INC.

4080 PIKE LANE, SUITE C
CONCORD, CA 94520
(510) 685-7852
(800) 423-7143

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

Company Name: Groundwater Tech.
Phone #: 251-5441 206
FAX #: 251-84452
Company Address: 19033 W. Valley Hwy #104 Kent Wa. 98032
Site location: Bothell
Project Manager: MARK Nichols
Client Project ID: (#) 020603332.61.60
(NAME) TES-Riverside
Test that the proper field sampling procedures were used during the collection of these samples.
Sampler Name (Print): JEAN Josey

Field Sample ID	GTEL Lab # (Lab use only)	# Containers	Matrix: WATER	SOIL	AIR	SLUDGE	PRODUCT	OTHER	Method Preserved: HCl	HNO_3	H_2SO_4	ICE	UNPRESERVED	OTHER (SPECIFY)	Sampling: DATE	TIME
-4.0 4/7		1		X								X			4-7	12:29
-4.0 4/7		1		X								X			4-7	12:20
-4.0 4/7		1		X								X			4-7	12:12

ANALYSIS REQUEST

BTEX/602 ☐ 8020 ☐ with MTBE ☐	BTEX/Gas Hydrocarbons PID/FID ☐ with MTBE ☐	Hydrocarbons GC/FID Gas ☐ Diesel ☐ Screen ☐	Hydrocarbon Profile (SIMDIS) ☐	Oil and Grease 413.1 ☐ 413.2 ☐ SM 503 ☐	TPH/IR 418.1 ☐ SM 503 ☐	EDB by 504 ☐ DBCP by 504 ☐	EPA 503.1 ☐ EPA 502.2 ☐	EPA 601 ☐ EPA 8010 ☐	EPA 602 ☐ EPA 8020 ☐	EPA 608 ☐ 8080 ☐ PCB only ☐	EPA 624/PPL ☐ 8240/TAL ☐ NBS (+15) ☐	EPA 625/PPL ☐ 8270/TAL ☐ NBS (+25) ☐	EPA 610 ☐ 8310 ☐	EP TOX Metals ☐ Pesticides ☐ Herbicides ☐	TCLP Metals ☐ VOA ☐ Semi-VOA ☐ Pest ☐ Herb ☐	EPA Metals - Priority Pollutant ☐ TAL ☐ RCRA ☐	CAM Metals TTLC ☐ STLC ☐	Lead 239.2 ☐ 200.7 ☐ 7420 ☐ 7421 ☐ 6010 ☐	Organic Lead ☐	Corrosivity ☐ Flash Point ☐ Reactivity ☐	OTHER
		X			X															8015-oil
		X			X															
		X			X															

TAT
- Priority (24 hr) ☐
- Expedited (48 hr) ☐
- 5 Business Days ☐
- Other 10
- Business Days ☒

Special Handling
- GTEL Contact
- Quote/Contract #
- Confirmation #
- PO #

QA / QC LEVEL
LUE ☐ CLP ☐ OTHER

SPECIAL DETECTION LIMITS
4/18.1 USE 3x SUP silica Gel

SPECIAL REPORTING REQUIREMENTS
FAX ☐

REMARKS
Washington Method

Lab Use Only Lot #
Storage Location:
Work Order #

Relinquished by Sampler:	Date	Time	Received by:
Jean Josey			
Relinquished by:	Date	Time	Received by:
Relinquished by:	Date	Time	Received by Laboratory:
	4/8/93	11:30	Quinn Belsky