ERM-West, Inc.

1777 Botelho Drive
Suite 260
Walnut Creek, CA 94596
(510) 946-0455
(510) 946-9968 (Fax)

December 1, 1997

Ms. Susan Hugo
Alameda County Health Care Services Agency
Department of Environmental Health
Division of Hazardous Materials
1131 Harbor Bay Parkway
Alameda, California 94502

SUBJECT: First and Second Quarter 1997
Ground Water Monitoring Report
Southern Pacific Transportation Company
1450 Sherwin Street
Emeryville, California

Dear Ms. Hugo:

On behalf of Southern Pacific Transportation Company (SPTCo), ERM-West, Inc., (ERM) is pleased to submit the enclosed First and Second Quarter 1997 Ground Water Monitoring Report of the SPTCo property adjacent the Sherwin Williams Plant, 1450 Sherwin Street, Emeryville, California. This report describes the results and procedures of ground water monitoring at the site for the first and second quarters 1997.

Please call me at (510) 946-0455 if you have any questions or comments.

Sincerely,

ERM-WEST, INC.

James Ackerman
Project Manager

JBA/jba/8057.33

Enclosure

cc: Craig Denny, Union Pacific Railroad (with enclosure)
Doug Hodson, ERM-West, Inc. (with enclosure)

FIRST AND SECOND QUARTER 1997
GROUND WATER MONITORING REPORT

Southern Pacific Transportation Company
1450 Sherwin Street
Emeryville, California

Prepared for:

Southern Pacific Transportation Company
One Market Plaza
San Francisco, CA 94105

Prepared by:

ERM-West, Inc.
1777 Botelho Drive, Suite 260
Walnut Creek, CA 94596

December 1, 1997

GROUND WATER INVESTIGATION REPORT

Southern Pacific Transportation Company
1450 Sherwin Street
Emeryville, California

Prepared By:

James B. Ackerman, R.G.
Project Manager

Reviewed By:

FOR

Doug Hodson
Program Director

TABLE OF CONTENTS

Figures

(Following Text)

TABLES

(Following Figures)

APPENDICES

SECTION 1

INTRODUCTION

On behalf of Southern Pacific Transportation Company (SPTCo), ERM-West, Inc (ERM) presents the results of quarterly ground water monitoring at the SPTCo property adjacent to the Sherwin Williams Plant, 1450 Sherwin Street, Emeryville, California. The location of the site is shown in Figure 1.

Ground water monitoring activities discussed in this report were conducted by Terranext. Transition of the project to ERM took place in August 1997. Four underground storage tanks (USTs) containing bunker C oil, which was used in the early twentieth century to fuel steam locomotives, were formerly located at the site. The monitoring wells used to assess the impact of the former USTs to ground water were installed by Levine-Fricke to monitor the ground water surrounding the adjacent Sherwin Williams Plant site. These monitoring wells are sampled on a cooperative basis with Levine-Fricke. This report documents the ground water monitoring results for the first and second quarter of 1997.

SECTION 2

BACKGROUND

According to SPTCo records, a fuel and water station was constructed at the subject site in 1930 to service steam locomotives used for transferring local customer freight in the Emeryville area. The station included a 17,000-gallon water tank, pump house, and four USTs containing bunker C fuel oil. It is not known when the station was abandoned and/or demolished.

The four former USTs were located on SPTCo property adjacent to the Sherwin Williams Plant (Figure 2). The Sherwin-Williams Plant has been in operation since the early 1900s, manufacturing various types of coating products and lead-arsenate pesticides. The manufacturing of pesticides was discontinued in the late 1940s, and the conversion from producing oil-based products to water-based products occurred in 1987. After the dismantling of the Sherwin-Williams oil and solvent tank facilities, two phases of soil and ground water investigations were conducted by Levine-Fricke on the behalf of Sherwin-Williams. During both phases of investigation, a series of monitoring wells were installed (LF-1 through LF-13) in the shallow aquifer (A-zone). The results of this investigation indicate that both soil and ground water were impacted by volatile organic compounds (VOCs), petroleum hydrocarbons in the gasoline range, and arsenic.

In 1990, Sherwin Williams retained Levine-Fricke to develop interim remedial measures for the site. Levine-Fricke recommended a remedial alternative of containment coupled with ground water extraction and treatment. A multimedia cap would seal and stabilize impacted soil and impede the infiltration of additional ground water. Impacted ground water would be contained laterally with a bentonite slurry wall. These recommendations, as well as the results of both phases of soil and ground water investigation, are discussed in the Levine-Fricke report (dated December 20, 1991) entitled *Evaluation of Interim Remedial Measures at the Sherwin Williams Facility, Emeryville, California.*

While conducting grading operations on January 28, 1994, to improve an access road to the Sherwin-Williams plant, contractors for Sherwin Williams discovered a UST containing what was described as a thick petroleum product. In response to a request for proposal dated March 2,

1994, SPTCo authorized Terranext (then Industrial Compliance or IC) to proceed with preparation for the project, which would include removal of up to four USTs containing bunker C oil. In a letter dated May 12, 1994, the Alameda County Health Care Services Agency, Department of Environmental Health (Alameda County), directed SPTCo and/or Sherwin Williams to properly close the previously discovered UST. IC responded in a letter dated May 23, 1994, and informed Alameda County that SPTCo intended to remove the USTs, but negotiations to choose a UST removal contractor and to secure right-of-way access onto the Sherwin-Williams facility delayed project implementation.

Between July 25 and August 5, 1994, all four USTs were located, evacuated of bunker C oil, and removed (shown on Figure 2). Each UST was approximately 30 feet in length and 6 feet in diameter; they were joined together by a 12-inch diameter piping manifold. Using steam, a total of 30,450 gallons of bunker C oil mixed with water was evacuated from the USTs. Approximately 250 cubic yards of soil was excavated from around the four USTs during the removal process. Removal activities resulted in an excavation approximately 80 feet long, 20 feet wide, and 8 feet deep. Ground water was encountered in the southern end of the excavation.

Eight confirmation soil samples were taken from the sidewalls of the excavation and analyzed as follows:

- Total petroleum hydrocarbons (TPH) as gasoline (TPH-G), TPH as diesel (TPH-D), and TPH as bunker C oil (TPH-B) using Environmental Protection Agency (EPA) Method 8015 modified;
- Benzene, toluene, ethylbenzene, and xylenes (BTEX) using EPA Method 8020;
- Oil and grease using EPA Method 5520;
- Halogenated VOCs using EPA Method 8010; and
- Semivolatile organic compounds (SVOCs) using EPA Method 8270.

Two grab samples were collected from the ground water which had filled the southern end of the excavation. The ground water samples were composited at the lab and analyzed for the same suite of analytes listed above, with the addition of the metals barium, cadmium, chromium, silver (all by EPA Method 6010); arsenic (EPA Method 7060); lead (EPA Method 7421); mercury (EPA Method 7470); and selenium (EPA Method 7740).

Concentrations of TPH-G ranging from 1.4 milligrams per kilogram (mg/kg) to 18 mg/kg were detected in four of eight confirmation samples. Concentrations of higher boiling petroleum hydrocarbons were greatest in soil samples taken from the eastern sidewall of the excavation (T1-SW, T1T3-SW, and T3-SW) .

Maximum concentrations of TPH-D, TPH-B, and oil and grease within these three samples were found in T1T3-SW, at 4,400 mg/kg, 28,000 mg/kg, and 7,700 mg/kg, respectively. In the remaining five samples, concentrations of TPH-D, TPH-B, and oil and grease ranged from <5.0 mg/kg to 230 mg/kg, 8.4 mg/kg to 780 mg/kg, and <50 mg/kg to 110 mg/kg, respectively. Low concentrations of selected SVOCs were detected in samples T1-SW and T4-SW only. BTEX and other VOCs were not detected at or above the method detection limit.

Within the composite ground water confirmation sample, TPH-G, TPH-D, and TPH-B were detected at concentrations of 150 micrograms per liter (µg/L), 3,200 µg/L, and 6,100 µg/L, respectively. Benzene, toluene, and xylenes were detected at concentrations of 1.2 µg/L, 0.8 µg/L, and 2.4 µg/L, respectively. The SVOC acenaphthene was detected at a concentration of 15 µg/L. No other analytes were detected at or above the respective method reporting limits within the ground water confirmation sample.

Although confirmation soil samples contained high concentrations of petroleum hydrocarbons, it was not feasible to extend the limits of the excavation due to the presence of SPTCo railroad tracks to the west and the proposed bentonite slurry cutoff wall for the Sherwin-Williams Plant to the east. Results of the UST removal were documented in an IC report entitled *Tank Closure Report, Southern Pacific Transportation Company, 1450 Sherwin Avenue, Emeryville, California* (dated September 29, 1994).

As a result of reviewing the *Tank Closure Report*, Alameda County requested in a letter dated February 28, 1995, that SPTCo submit a workplan to investigate the vertical and lateral extent of soil and ground water impacts. In a transmittal letter dated April 28, 1995, IC submitted a workplan to SPTCo, which was subsequently submitted to Alameda County in February 1996. The workplan proposed the use of monitoring wells which were scheduled to be installed by Levine-Fricke to monitor the ground water in the area of the former USTs.

In July 1995, two USTs were discovered by Sherwin Williams contractors during construction of the bentonite slurry wall, which was part the interim remedial measures recommended by Levine-Fricke. Due to the

proximity of these two USTs to the four USTs removed the previous year, it is possible that both sets of USTs were part of the same fueling facility. However, because the USTs straddled the Sherwin Williams/SPTCo property line and the need to ensure the timely construction of the bentonite-slurry cutoff wall, Sherwin Williams directed Levine-Fricke to remove the USTs. Between July 18 and August 2, 1995, the two USTs were removed and approximately 35 cubic yards of visually impacted soil were excavated (shown on Figure 2). The USTs contained a viscous petroleum product, 540 gallons of which were evacuated prior to removal. A similar petroleum product was found in the slurry wall trench northeast of the USTs. Analysis of the product within the UST, the product in the trench, and the confirmation samples indicated heavy hydrocarbons in the motor oil range. Results of the removal of the USTs was documented in a Levine-Fricke report entitled *Underground Storage Tank Removal Report, Sherwin-Williams Facility, Emeryville, California* dated March 15, 1996.

Between February 5 and April 5, 1995, Levine-Fricke installed monitoring wells LF-20, LF-21, LF-23, LF-24, and LF-25 (shown on Figure 2). LF-11, which was added to the monitoring program in March 1997 to improve the evaluation of potential upgradient sources, was installed by Levine-Fricke prior to 1991. To date, split ground water samples have been collected for four quarters of ground water monitoring, with the cooperation of Levine-Fricke.

SECTION 3

FIELD PROCEDURES

This section describes the procedures used for sampling monitoring wells LF-11, LF-20, LF-21, LF-23, LF-24, and LF-25. Because the monitoring wells were purged by Levine-Fricke, this section summarizes the procedures used by Levine-Fricke[1].

Monitoring Well Sampling

On March 18 and June 11, 1997, depth to ground water was measured and ground water samples were collected from monitoring wells in cooperation with Levine-Fricke. On the basis of depth to water measurements, the saturated well volume was calculated and a minimum of three well volumes were purged by bailing with a disposable polyethylene bailer. Ground water parameters of temperature, specific conductance, and pH were measured for each well volume. After purging was complete, each well was allowed to recover to 80 percent of the initial well volume before sampling. First quarter 1997 ground water purge characterization data are presented in Table 1. Second quarter 1997 ground water purge characterization data are presented in Table 2. Ground water level measurements and purge characterization logs are included in Appendix A.

Ground water samples were collected using a disposable polyethylene bailer. The water sample from the bailer was transferred into two amber glass bottles. After sample collection was completed, each sample was labeled with a unique sample number, the site name, date, and time of collection, initials of collector, and any other pertinent information. The samples were then placed in a chilled ice chest for transport to the analytical laboratory. A chain-of-custody document was completed concurrent with sample collection and accompanied the samples. All ground water samples were analyzed for total extractable petroleum hydrocarbons (TEPH) by EPA Method 8015 Modified. Samples with detectable concentrations of TPH were reanalyzed using Method 8015

1. Report of Quarterly Groundwater Monitoring for the period from April 1 through June 30, 1996, the Sherwin Williams Plant, Emeryville, California. Levine Fricke, July 24, 1996.

following a silica gel cleanup (EPA Method 3630). The analytical reports and chain-of-custody forms for samples are presented in Appendix B.

SECTION 4

GROUND WATER MONITORING RESULTS

Ground Water Flow and Direction

Depth to ground water measurements for the first and second quarter 1997 were taken by Levine-Fricke on March 18 and June 11, 1997, respectively. Ground water elevation data collected from monitoring wells LF-20, LF-21, LF-23, LF-24, and LF-25 (and LF-11 for March and June 1997), are summarized in Table 3.

Figure 3 is a contour map of ground water elevations for the first quarter March 1997. Ground water elevations ranged from 3.47 to 5.40 feet above mean sea level (MSL). Between the fourth quarter 1996 and first quarter 1997, ground water elevations increased in wells LF-20 and LF-24, and decreased in LF-21, LF-23, and LF-25. The total average decrease for all wells was 0.23 feet.

Figure 4 is a contour map of ground water elevations for the second quarter 1997. Ground water elevations ranged from 3.40 to 5.42 feet above MSL. Between the first quarter and second quarter 1997, ground water elevations increased in wells LF-11 and LF-21, unchanged in LF-20, and decreased in LF-23, LF-24, and LF-25. The total average decrease for all wells was 0.16 feet.

The average local hydraulic gradient calculated from water level measurements taken during the first quarter 1997 is 0.006, which has decreased slightly from 0.009 for the fourth quarter (November) 1996. The apparent ground water flow direction is to the east-northeast, which has changed slightly from north-northeast for the fourth quarter 1996. The average local hydraulic gradient calculated from water level measurements taken during the second quarter 1997 is 0.003, which has decreased slightly from 0.006 for first quarter 1997. The apparent ground water flow direction is to the north-northeast, which has changed slightly from east-northeast for the first quarter 1997. Prior to the placement of the slurry-bentonite cutoff wall, the hydraulic gradient was 0.005 and the flow

direction was to the northwest in the A-zone aquifer[2]. The decrease in ground water elevations and the slight changes in hydraulic gradient and flow direction is likely due to the readjustment of the A-zone aquifer to the placement of the bentonite-slurry cutoff wall and/or seasonal variation.

Analytical Results

Analytical results for the first and second quarter 1997, are summarized below and in Table 4. Analytical laboratory reports are included in Appendix B.

- In the first quarter 1997, TEPH was not detected at or above the reporting limit in samples collected from LF-24 and LF-25.
- Hydrocarbons in the diesel range which did not match the chromatographic standard were detected in samples collected during the first quarter 1997 from LF-11, LF-20, LF-21, and LF-23 at concentrations of 290 µg/L, 240 µg/L, 360 µg/L, and 1200 µg/L, respectively. Concentrations of TEPH were not detected in any of these four samples when reanalyzed following silica gel cleanup[3].
- In the second quarter 1997, TEPH was not detected at or above the reporting limit in samples collected from LF-24 and LF-25.
- In the second quarter 1997, hydrocarbons in the diesel range were detected in the sample collected from LF-23 at a concentration of 400 µg/L. Hydrocarbons in the diesel range that did not match the chromatographic standard were detected in samples collected from LF-11, LF-20, and LF-21, at concentrations of 680 µg/L, 600 µg/L, and 660 µg/L, respectively. Concentrations of TEPH were not detected in the LF-23 sample when reanalyzed following silica gel cleanup. Hydrocarbons in the diesel range that did not match the chromatographic standard were detected in samples from LF-11, LF-20, and LF-21 at concentrations of 180 µg/L, 62 µg/L, and 100 µg/L, respectively, when reanalyzed following silica gel cleanup.

---

2. Evaluation of Interim Remedial Measures at the Sherwin-Williams Facility, Emeryville, California, December 20, 1991, by Levine-Fricke.
3. Due to laboratory contamination during the 8015 analysis with silica gel cleanup of sample LF-20, the removal of hydrocarbons in the C_{10}-C_{13} range by silica gel cleanup cannot be verified (see explanation within laboratory reports of Appendix B).

All laboratory procedures (holding times, methods used, method blanks, documentation, etc.) and subsequent results were monitored throughout the analytical process according to standard quality assurance/quality control (QA/QC) procedures. In addition, all laboratory reports were evaluated as part of QA/QC procedures for ground water monitoring. The analytical data for the first quarter 1997 are considered quantitatively valid.

SECTION 5

DISCUSSION

Analytical results for the first and second quarters of 1997 suggest that hydrocarbons are present in the vicinity of wells LF-11, LF-20, LF-21 and LF-23. However, none of the first quarter 1997 samples and three of the second quarter 1997 samples contained detectable concentrations of TEPH after using silica gel cleanup[4].

During three quarters of ground water monitoring in which silica gel cleanup was used, a total of 18 samples were analyzed; TEPH was detected in 12 samples during initial 8015 analysis, but was detected in only four samples when reanalyzed following silica gel cleanup.

Treatment of samples using a silica gel cleanup prior to analysis using EPA Method 8015 removes polar biogenic (non-petroleum hydrocarbon related) compounds that can result in exaggerated TPH concentrations. Therefore, the majority of hydrocarbons detected in the monitoring well samples are not petroleum hydrocarbons dissolved in the ground water, but rather polar biogenic compounds resulting from either biodegradation of petroleum hydrocarbons on site, or other biogenic materials[5].

As noted in the previous ground water investigation, chromatograms from the analysis of second and fourth quarter 1996 samples suggest that the polar biogenic hydrocarbons detected in the LF-20 samples were produced from the degradation of a petroleum source other than the bunker C oil USTs near LF-21. The chromatograms from analysis of first quarter 1997 samples (Appendix C) continue to suggest this.

In addition, analytical results for confirmation samples from the original UST excavation indicated a predominance of heavier hydrocarbons in the motor oil range (quantified as bunker C oil) over lighter diesel range hydrocarbons. During four quarters of ground water monitoring, no hydrocarbons have been detected in the motor oil (fuel oil 6) range. This

---

4. Due to laboratory contamination during the 8015 analysis with silica gel cleanup of sample LF-20, the removal of hydrocarbons in the C_{10}-C_{13} range by silica gel cleanup cannot be verified (see explanation within laboratory reports of Appendix B).
5. Zemo, D.A. and Synowiec, K.A., 1995. *Portions in Ground Water: Indentification and Elimination of Positive Interferences.* Proceedings of the 1995 Petroleum Hydrocarbons and Organic Chemicals in Ground Water: Prevention Detection and Remediation (conference). NGWA/APC, Houston, Texas.

would be expected as ground water migration of heavier hydrocarbons is less likely. However, this also supports the premise that hydrocarbons detected in monitoring wells surrounding the former location of the USTs are of a different source than the bunker C oil USTs.

The data for the first and second quarter 1997 continue to demonstrate that the impact of the USTs to the surrounding ground water is limited and/or negligible, and therefore the status of the site should be designated as a "low-risk" for the following reasons:

- The majority of hydrocarbons detected in site ground water are polar biogenic and not dissolved petroleum hydrocarbons;
- The biogenic hydrocarbons may have come from a source other than the USTs; and
- The hydraulic gradient in the vicinity is relatively low (0.003-0.009), suggesting that migration rates in the generally low conductivity Bay Muds would be minimal.

ERM believes that monitoring site ground water for one year as stated in the workplan dated April 28, 1995, has been satisfied, that this site meets the requirements for a low risk ground water case, and should be considered for closure.

SECTION 6

GLOSSARY OF ACRONYMS

Alameda County	Alameda County Health Care Services Agency, Department of Environmental Health
bgs	Below ground surface
BTEX	Benzene, toluene, ethylbenzene and xylenes
cy	Cubic yards
EPA	Environmental Protection Agency
IC	Industrial Compliance
mg/kg	Milligrams per kilogram
µg/L	Micrograms per liter
MSL	Mean sea level
QA/QC	Quality Assurance/Quality Control
SPTCo	Southern Pacific Transportation Company
SVOCs	Semivolatile organic compounds
TPH	Total petroleum hydrocarbons
TPH-B	Total petroleum hydrocarbons as bunker C oil
TPH-D	Total petroleum hydrocarbons as diesel
TPH-G	Total petroleum hydrocarbons as gasoline
USTs	Underground storage tanks
VOCs	Volatile organic compounds

FIGURES

CAD File: g:\cad\8057\03\80570301.dwg | Drawn By: D. Ludlam | Date: 11/6/97 | Project No. 8057.03

SCALE 1:24000

1 MILE 0 1/2 1

7000 FEET 6000 5000 4000 3000 2000 1000 0 1000

1 KILOMETER 0 .5 1

N

Figure 1

Site Location Map
Union Pacific Railroad
1450 Sherwin Street
Emeryville, CA

ERM-West, Inc. 9/97

CVS File:	Drawn By:	Date:	Project No.:
g:\cad\8057\03\80570305.cvs	H. Lutsky	11/06/97	8057.03

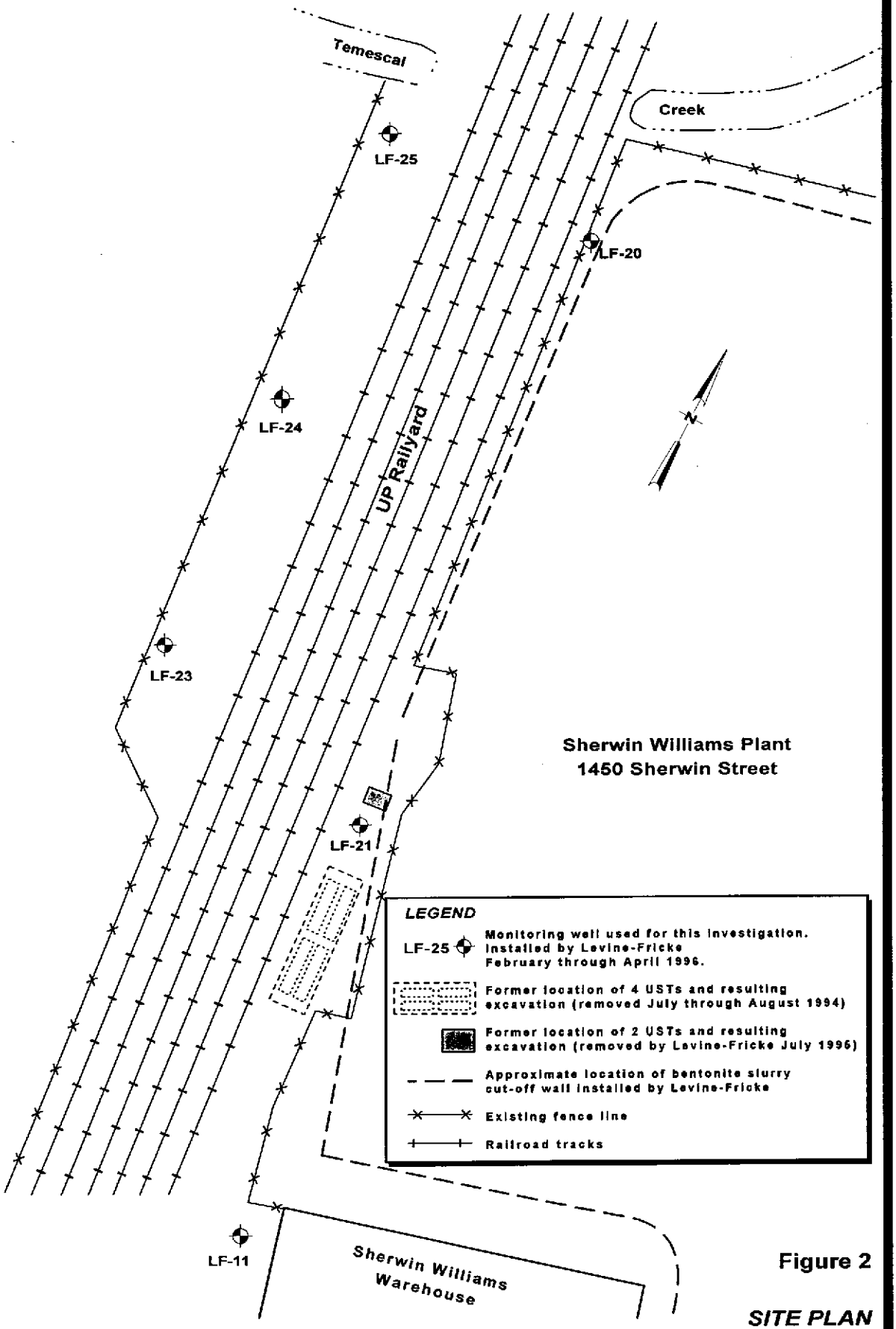


Figure 2

SITE PLAN
UNION PACIFIC RAILROAD
1450 SHERWIN STREET
EMERYVILLE, CA

ERM-West, Inc. 11/97

CVS File:	Drawn By:	Date:	Project No.:
g:\cad\8057\03\80570306.cvs	H. Lutsky	11/06/97	8057.03

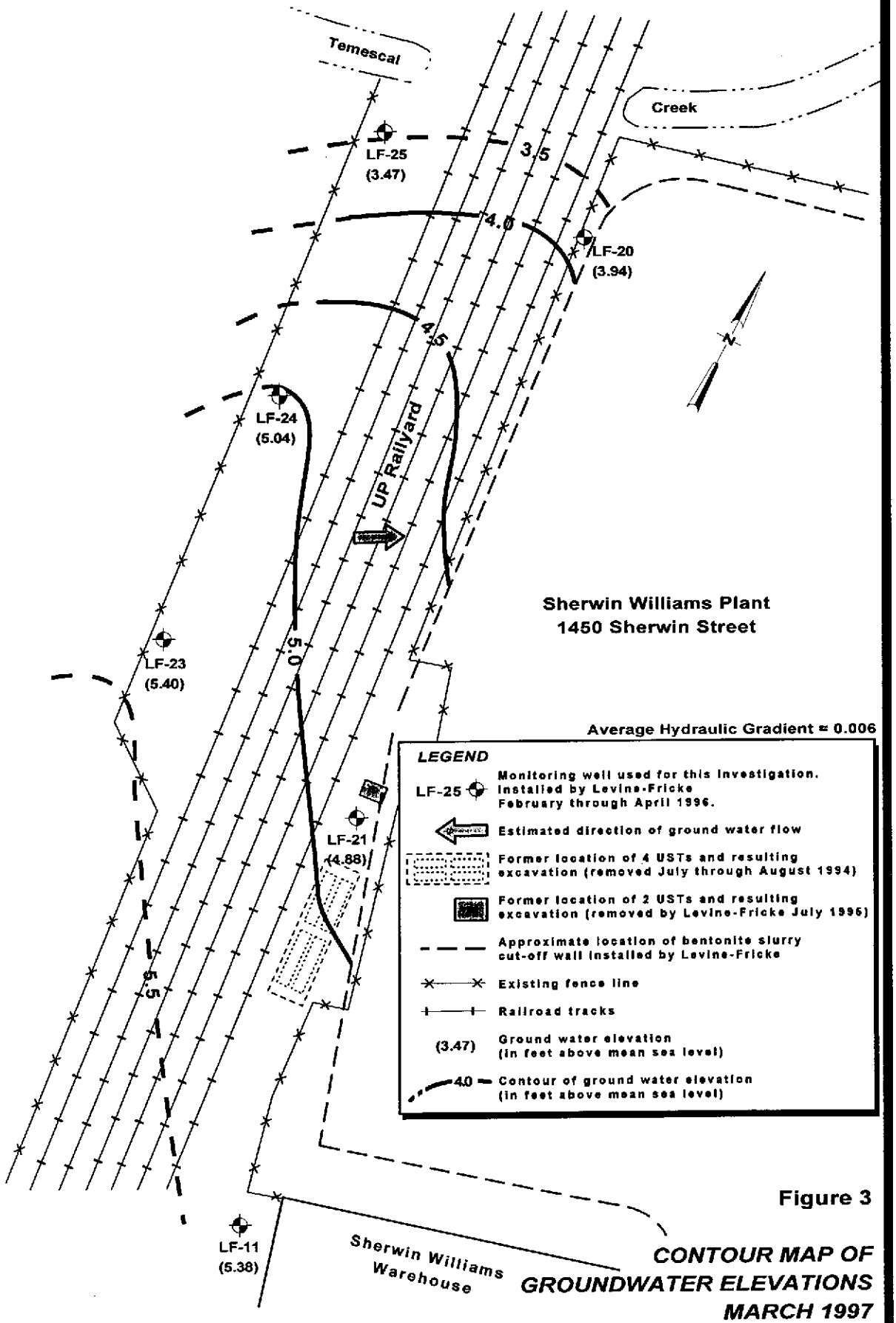


Figure 3

CONTOUR MAP OF GROUNDWATER ELEVATIONS MARCH 1997 UNION PACIFIC RAILROAD 1450 SHERWIN STREET EMERYVILLE, CA

ERM-West, Inc. 11/97

Project No.:	Date:	Drawn By:	CVS File:
8057.03	11/06/97	H. Lutsky	g:\cad\8057\03\80570307.cvs

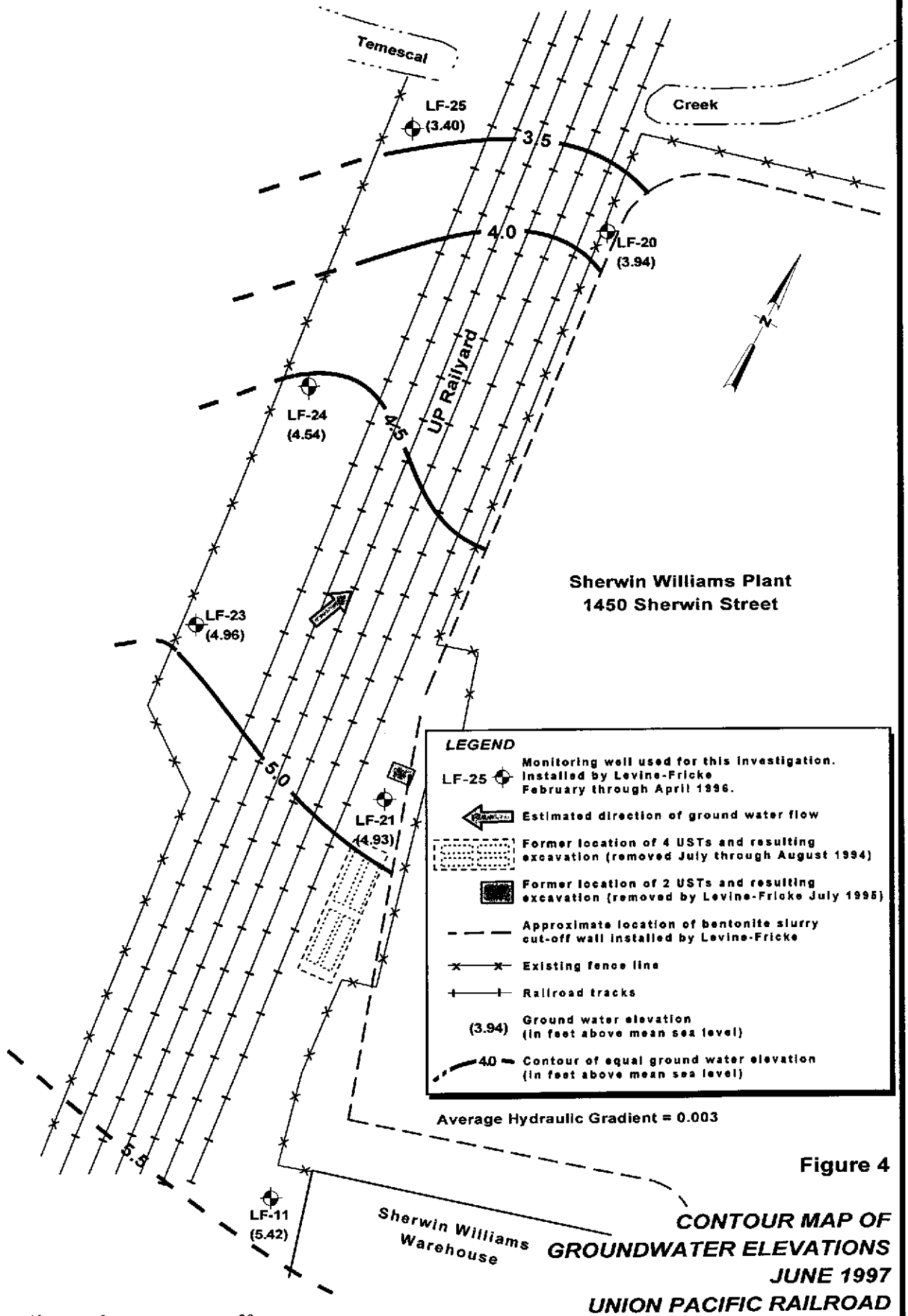


Figure 4

CONTOUR MAP OF GROUNDWATER ELEVATIONS
JUNE 1997
UNION PACIFIC RAILROAD
1450 SHERWIN STREET
EMERYVILLE, CA

ERM-West, Inc. 11/97

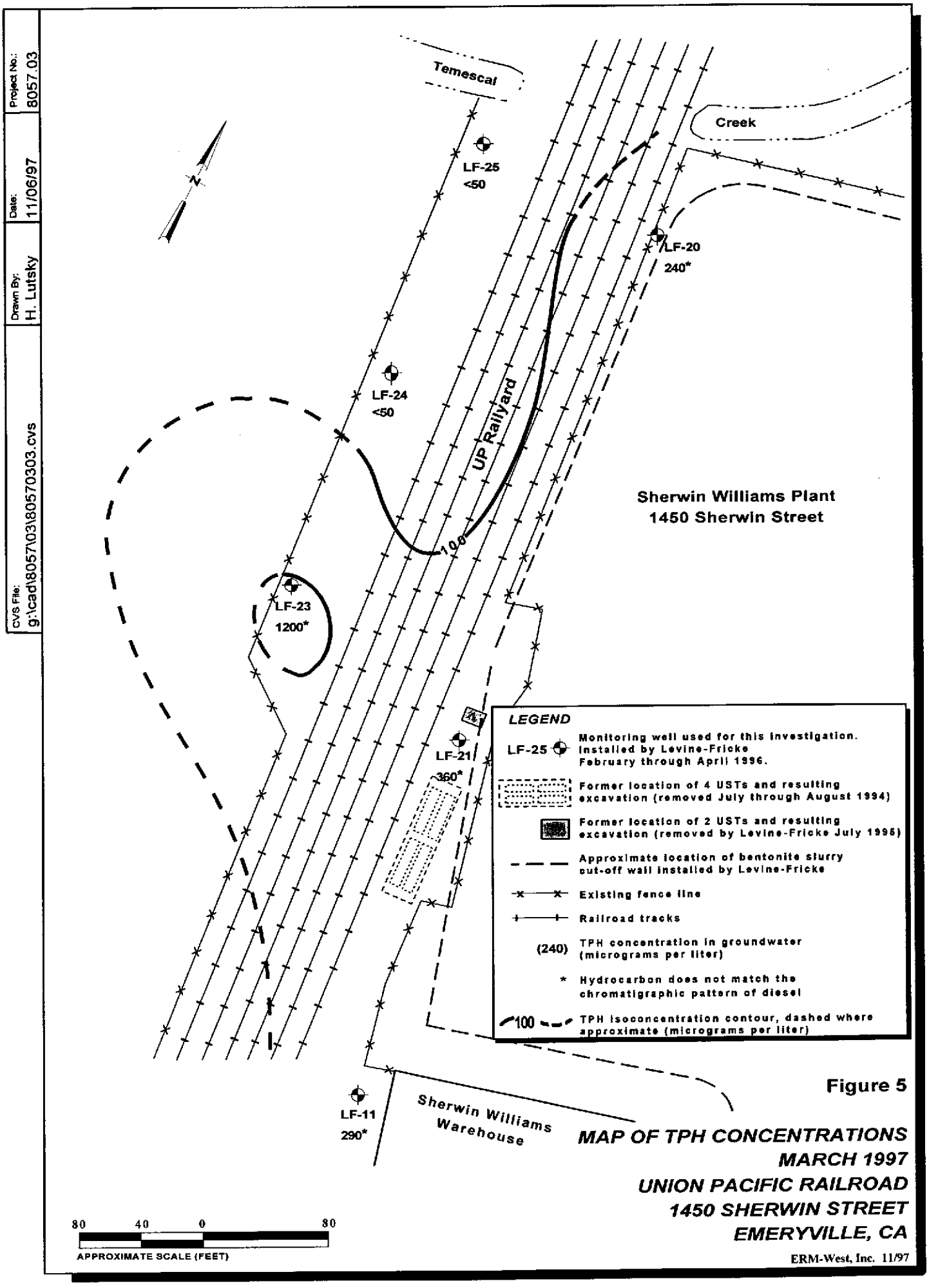


Figure 5

MAP OF TPH CONCENTRATIONS
MARCH 1997
UNION PACIFIC RAILROAD
1450 SHERWIN STREET
EMERYVILLE, CA

ERM-West, Inc. 11/97

CVS File:	Drawn By:	Date:	Project No.:
g:\cad\8057\03\80570304.cvs	H. Lutsky	11/06/97	8057.03

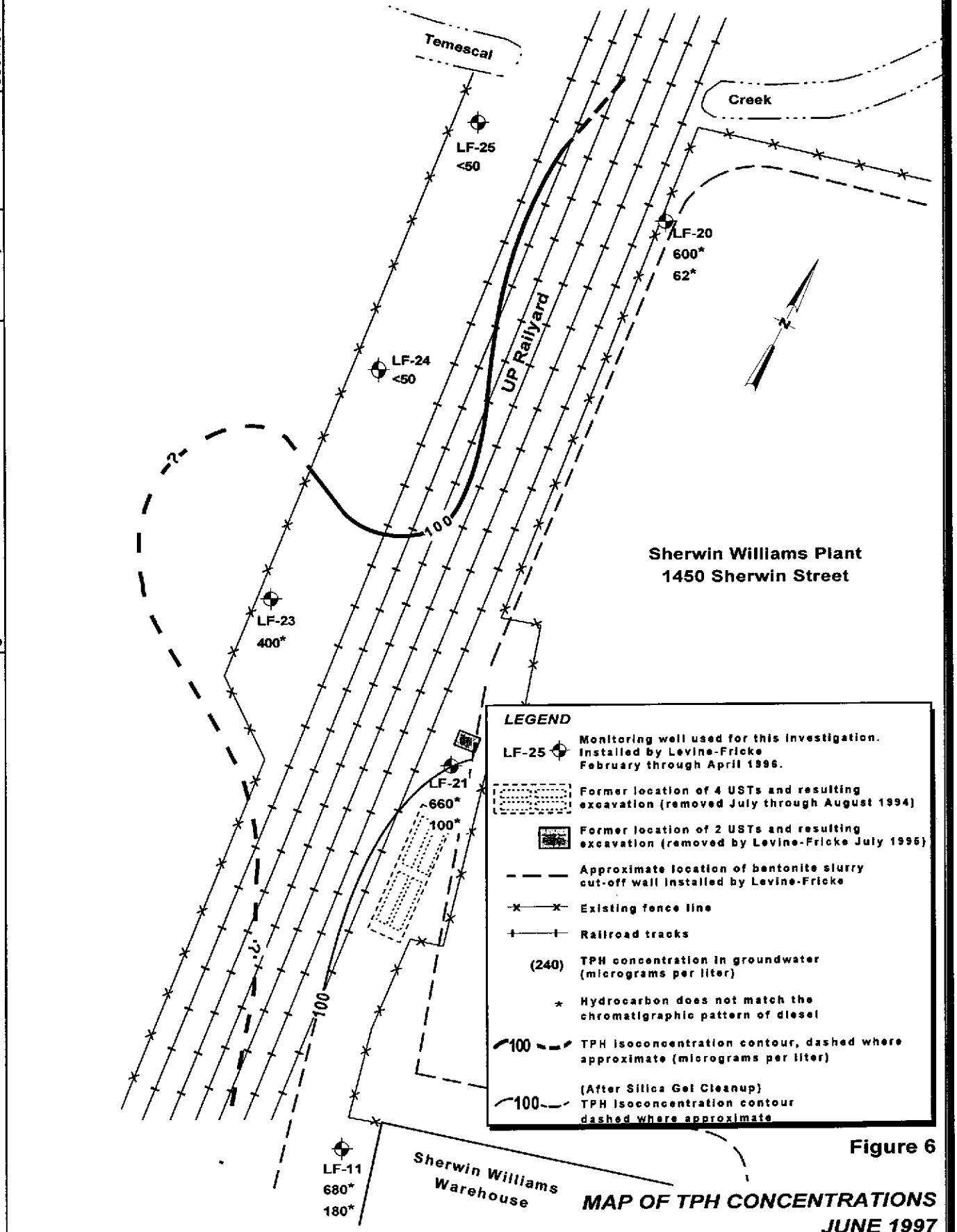


Figure 6

MAP OF TPH CONCENTRATIONS
JUNE 1997
UNION PACIFIC RAILROAD
1450 SHERWIN STREET
EMERYVILLE, CA

ERM-West, Inc. 11/97

TABLES

TABLE 1

GROUND WATER PURGE CHARACTERIZATION DATA
MARCH 1997

Monitoring Well[a]	Date Measured	Purge Volume (gallons)	Electrical Conductivity (mmhos/cm)	Temperature (°C)	Field pH
LF-11	03/18/97	2	919	16.8	7.09
		4	919	16.8	7.11
		6	913	16.7	7.07
LF-20	03/18/97	2	1358	17.5	6.81
		4	1364	17.6	6.78
		6	1377	17.6	6.76
LF-21	03/18/97	1.5	925	17.8	6.95
		3	939	17.8	6.95
		4.5	933	17.8	6.97
LF-23	03/18/97	2	1394	16.7	6.90
		4	1329	16.8	6.84
		6	1278	16.8	6.86
LF-24	03/18/97	2.5	594	17.1	6.87
		5.0	576	17.1	6.85
		7.5	594	17.1	6.80
LF-25	03/18/97	2	714	17.1	6.94
		4	714	16.9	6.94
		6	723	17.0	6.93

a See Figure 2 for approximate monitoring well locations.
mmhos/cm Micromhos per centimeter
°C Degrees Celsius
Note: Purge characterization logs for March 1997 are included in Appendix A.

f:\macfiles\project\unionpac\8057.03\80571S97.tbl

TABLE 2

GROUND WATER PURGE CHARACTERIZATION DATA
JUNE, 1997

Monitoring Well[a]	Date Measured	Purge Volume (gallons)	Electrical Conductivity (mmhos/cm)	Temperature (°C)	Field pH
LF-11	06/11/97	2	739	20.5	7.12
		4	708	20.4	7.08
		6	777	20.3	7.07
LF-20	06/11/97	2	742	20.7	6.80
		4	738	20.0	6.78
		6	731	20.0	6.76
LF-21	06/11/97	1.5	663	22.4	6.88
		3	643	22.0	6.87
		4.5	645	21.9	6.87
LF-23	06/11/97	2	619	20.8	6.90
		4	623	20.5	6.86
		6	641	20.1	6.75
LF-24	06/11/97	2.5	442	20.1	7.11
		5.0	445	19.0	7.04
		7.5	405	18.8	6.94
LF-25	06/11/97	2	501	20.1	6.89
		4	498	19.7	6.89
		6	495	19.6	6.87

a See Figure 2 for approximate monitoring well locations.
mmhos/cm Micromhos per centimeter
°C Degrees Celsius
Note: Purge characterization logs for June 1997 are included in Appendix A.

TABLE 3
GROUND WATER ELEVATION DATA

Monitoring Well[a]	Date Measured	Top of Casing Elevation[b] (feet MSL)	Depth to Ground Water (feet TOC)	Ground Water Elevation (feet MSL)
LF-11	03/18/97	10.05	4.67	5.38
	06/11/97		4.63	5.42
LF-20	04/24/96	11.77	7.55	4.22
	11/21/96		7.90	3.87
	03/18/97		7.83	3.94
	06/11/97		7.83	3.94
LF-21	04/24/96	10.37	3.65	6.72
	11/21/96		5.33	5.04
	03/18/97		5.49	4.88
	06/11/97		5.44	4.93
LF-23	04/24/96	10.64	4.08	6.56
	11/21/96		4.54	6.10
	03/18/97		5.24	5.40
	06/11/97		5.68	4.96
LF-24	04/24/96	10.22	4.40	5.82
	11/21/96		5.35	4.87
	03/18/97		5.18	5.04
	06/11/97		5.70	4.52
LF-25	04/24/96	11.31	7.15	4.16
	11/21/96		7.29	4.02
	03/18/97		7.84	3.47
	06/11/97		7.91	3.40

a See Figure 2 for approximate location of monitoring wells installed by Levine-Fricke.
b Top of casing elevation is a surveyed point marked on the top of the well casing.
MSL Mean sea level
TOC Top of casing

TABLE 4
GROUND WATER ANALYTICAL RESULTS

Monitoring Well[a]	Date Sampled	Total Petroleum Hydrocarbons (µg/L)		
		Diesel	Motor Oil	Diesel w/ Silica Gel Cleanup
EPA Method		8015M		8015M/3630 Modified
LF-11	03/18/97	290[b]	<500	ND
	06/11/97	680[b]	<500	180[b]
LF-20	04/12/96	1,000[c]	NQ	82
	11/21/96	1,800	<540	NA
	03/18/97	240[b]	<500	ND[d]
	06/11/97	600[b]	<500	62[b]
LF-21	04/10/96	910[c]	NQ	<50
	11/21/96	1,100	<590	NA
	03/18/97	360[b]	<500	ND
	06/11/97	660[b]	<500	100[b]
LF-23	04/10/96	340[c]	NQ	<50
	11/21/96	420	<540	NA
	03/18/97	1,200[b]	<500	ND
	06/11/97	400	<500	<50
LF-24	04/12/96	<50	<50	NA
	11/21/96	<50	<530	NA
	03/18/97	<50	<500	NA
	06/11/97	<50	<500	NA
LF-25	04/12/96	88[c]	NQ	<50
	11/21/96	<53	<530	NA
	03/18/97	<50	<500	NA
	06/11/97	<50	<500	NA

a	Refer to Figure 2
b	Reported hydrocarbons in the diesel range do not match chromatographic diesel pattern.
c	Unknown hydrocarbon mixture atypical of diesel fuel in the carbon range of C_{10}-C_{32}. Hydrocarbons from C_{10}-C_{24} were quantified based on comparison with a diesel standard.
d	Due to laboratory contamination during the 8015 analysis with silica gel cleanup of sample LF-20, the removal of hydrocarbons in the C_{10}-C_{13} range by silica gel cleanup cannot be verifed (see explanation within laboratory reports of Appendix B).
µg/L	Micrograms per liter, equivalent to parts per billion (ppb).
<	Indicates the constituent was not detected at or above reporting limit as listed.
ND	Not Detected.
NA	Not analyzed
NQ	Hydrocarbons in the motor oil range ($> C_{24}$) were not quantified.

APPENDIX A

GROUND WATER ELEVATION MEASUREMENT
AND
PURGE CHARACTERIZATION LOGS

MARCH AND JUNE 1997

GROUND WATER ELEVATION MEASUREMENT LOG

Sheet 1 of 1

Project Name: EMERYVILLE UST'S Project No. 05100680 Task/Phase: 38000/03

Date: 6-11-97 Equipment: KEMTEC SOUNDER Weather: SUNNY

Well Number	Reference Elevation (feet-MSL)	Time (military)	Depth to Water (feet)	Depth to Product (feet)	Total Depth (feet)	PT (feet)	PT x 0.8 (feet)	Adjusted DTW[1] (feet)	Ground Water Elevation[2] (feet-MSL)
LF-11	10.05	0910	4.63		15.25				5.42
LF-20	11.77	1025	7.83		19.15				3.94
LF-21	10.37	0945	5.44		15.40				4.93
LF-22	10.64	1120	5.68		18.30				4.96
LF-24	10.22	1205	5.70		19.60				4.52
LF-25	11.31	1240	7.91		20.30				3.40
Comments:		WATER LEVEL MEASUREMENTS TAKEN BY JEFF RODGERS OF LEVINE-FRICKE							

1 Adjusted depth to water = DTW - (PT x 0.8)

2 Ground water elevation = Reference elevation - Adjusted DTW

MSL Mean sea level

DTW Depth to water (to 0.01 foot)

PT Product thickness (0.01 foot)

Signature James Ackerman

TerraNext

PURGE CHARACTERIZATION AND SAMPLE LOG

Project Number: 05100680 Project Name: EMERYVILLE USTs Date: 6-11-97

Well Number: LF-11 Sampler: JAMES ACKERMAN AND JEFF RODGERS of LEVINE-FRICKE Weather: SUNNY

Military Time	0913	0915	0917	0950			
Gallons Purged	2	4	6	5			
Purge Rate				A			
pH	7.12	7.08	7.07	M			
Conductivity	739	708	771	P			
Temperature (C)	20.5	20.4	20.3	L			
Salinity (0/00)				E			
Turbidity	SL TURBID	SL TURBID	SL TURBID				
Color	GREENISH GRAY	→	→				
Water Level Casing							
Calibration	pH:						

Depth to bottom (DB): 15.25
Depth to water (DW): 4.63
Height of water column (H) = DB - DW: 10.62
One casing volume (CV) = H x multiplier: 1.7
Three casing volumes (3CV): 5.10
Multipliers: (2") well = 0.16 gallons/foot
4" well = 0.65 gallons/foot
6" well = 1.47 gallons/foot
8" well = 2.61 gallons/foot
S.C.:

Sample #	Quantity	Volume	Type	Preserv.	Analysis	Lab	Sample Equip.	Purge Equip.	Field Comments
LF-11	2	1LT	AMBER	NONE	TPH-D	CHROMA	TEFLON DISPOSABLE BAILER →		
Cleaning:									
Comments:									

Sampler's Signature: James Ackerman

Terranext

PURGE CHARACTERIZATION AND SAMPLE LOG

Project Number: 05100680 Project Name: EMERYVILLE USTs Date: 6-11-97

Well Number: LF-20 Sampler: JAMES ACKERMAN AND JEFF RODGERS OF LEVINE-FRICKE Weather: SUNNY

Military Time	1032	1034	1036	1050			
Gallons Purged				S			
Purge Rate				A			
pH	6.80	6.78	6.76	M			
Conductivity	742	738	731	P			
Temperature (C)	20.7	20.0	20.0	L			
Salinity (0/00)				E			
Turbidity	SL. TURB	→	→	→	→	→	
Color	GRN GRAY	→	→	→	→	→	
Water Level Casing							
Calibration	pH:						

Depth to bottom (DB): 19.15
Depth to water (DW): 7.83
Height of water column (H) = DB - DW: 11.32
One casing volume (CV) = H x multiplier: 1.81
Three casing volumes (3CV): 5.43
Multipliers (2" well = 0.16 gallons/foot)
4" well = 0.65 gallons/foot
6" well = 1.47 gallons/foot
8" well = 2.61 gallons/foot
S.C.:

Sample #	Quantity	Volume	Type	Preserv.	Analysis	Lab	Sample Equip.	Purge Equip.	Field Comments
LF-20	2	AMBER LT		NONE	TPH-D	CHROMA	DISPOSABLE TEFLON BAILER →		
Cleaning:									
Comments:									

Sampler's Signature: James Ackerman

Terranext

PURGE CHARACTERIZATION AND SAMPLE LOG

Project Number: 05100680 Project Name: EMERYVILLE USTs Date: 6-11-97

Well Number: LF-21 Sampler: JAMES ACKERMAN AND JEFF RODGERS OF LEVINE-FRICKE Weather: SUNNY

Military Time	0953	0955	0957	1005			
Gallons Purged	1.5	3.0	4.5	5			
Purge Rate				A			
pH	6.88	6.87	6.87	M			
Conductivity	663	643	645	P			
Temperature (C)	22.4	22.0	21.9	L			
Salinity (0/00)				E			
Turbidity	SL TURB.	→	→	→	→	→	→
Color	GRN GRAY	→	→	→	→	→	→
Water Level Casing							
Calibration	pH:						

Depth to bottom (DB): 15.40

Depth to water (DW): 5.44

Height of water column (H) = DB - DW: 9.96

One casing volume (CV) = H x multiplier: 1.59

Three casing volumes (3CV): 4.78

Multipliers: 2" well = 0.16 gallons/foot

4" well = 0.65 gallons/foot

6" well = 1.47 gallons/foot

8" well = 2.61 gallons/foot

S.C.:

Sample #	Quantity	Volume	Type	Preserv.	Analysis	Lab	Sample Equip.	Purge Equip.	Field Comments
LF-21	2	1Lt	AMBER	NONE	TPH-D	CARONA			
Cleaning:									
Comments:									

Sampler's Signature: James Ackerman

Terranext

PURGE CHARACTERIZATION AND SAMPLE LOG

Project Number: 05100680 Project Name: EMERYVILLE USTs Date: 6-11-97

Well Number: LF-23 Sampler: JAMES ACKERMAN AND JEFF RODGES OF LEVINE-FRICKE Weather: SUNNY

Military Time	1127	1127	1131	1145			
Gallons Purged	2	4	6	5			
Purge Rate				A			
pH	6.90	6.86	6.75	M			
Conductivity	619	623	641	P			
Temperature (C)	20.8	20.5	20.1	L			
Salinity (0/00)				E			
Turbidity	5L TURB	→	→				
Color	BRN GRAY	→	→				
Water Level Casing							
Calibration	pH:						

Depth to bottom (DB): 18.30

Depth to water (DW): 5.68

Height of water column (H) = DB - DW: 12.62

One casing volume (CV) = H x multiplier: 2.02

Three casing volumes (3CV): 6.05

Multipliers: (2" well = 0.16 gallons/foot)

4" well = 0.65 gallons/foot

6" well = 1.47 gallons/foot

8" well = 2.61 gallons/foot

S.C.:

Sample #	Quantity	Volume	Type	Preserv.	Analysis	Lab	Sample Equip.	Purge Equip.	Field Comments
LF-23	2	1L	AMBER	NONE	TPH-D	CHROMA	DISPOSABLE TEFLON BAILER	→	
Cleaning:									
Comments:									

Sampler's Signature: James Ackerman

Terranext

PURGE CHARACTERIZATION AND SAMPLE LOG

Project Number: LF-24 ↑ Project Name: EMERYVILLE USTs Date: 6-11-97

Well Number: ↓ 05100680 Sampler: JAMES ACKERMAN AND JEFF RODGERS OF LEVINE-FRICKE Weather: SUNNY

Military Time	1210	1213	1216	1225		
Gallons Purged	2.5	5	7.5	S		
Purge Rate				A		
pH	7.11	7.04	6.94	M		
Conductivity	442	445	405	P		
Temperature (C)	20.1	19.0	18.8	L		
Salinity (0/00)				E		
Turbidity	SL TURB	→				
Color	GRN GRY	→				
Water Level Casing						
Calibration	pH:					

Depth to bottom (DB): 19.60
Depth to water (DW): 5.70
Height of water column (H) = DB - DW: 13.90
One casing volume (CV) = H x multiplier: 2.22
Three casing volumes (3CV): 6.67
Multipliers = 2" well = 0.16 gallons/foot
4" well = 0.65 gallons/foot
6" well = 1.47 gallons/foot
8" well = 2.61 gallons/foot
S.C.:

Sample #	Quantity	Volume	Type	Preserv.	Analysis	Lab	Sample Equip.	Purge Equip.	Field Comments
LF-24	2	1LT	AMBER	NONE	TPH-D SILICA GEL	CHROMA.	DISPOSABLE TEFLON BAILER	→	
Cleaning:									
Comments:									

Sampler's Signature: James Ackerman

TerraNext

PURGE CHARACTERIZATION AND SAMPLE LOG

Project Number: 05100680 **Project Name:** EMERYVILLE USTs **Date:** 6-11-97

Well Number: LF-25 **Sampler:** JAMES ACKERMAN AND JEFF RODGERS OF LEVINE-FRICKE **Weather:** SUNNY / HAZY

Military Time	1246	1248	1250	1300			
Gallons Purged	2	4	6	5			Depth to Bottom (DB): 20.30
Purge Rate				A			Depth to Water (DW): 7.91
pH	6.89	6.89	6.87	M			Height of Water Column (H) = DB - DW: 12.39
Conductivity	501	498	495	P			One Casing Volume (CV) = H x multiplier: 1.98
Temperature (C)	20.1	19.7	19.6	L			Three Casing Volumes (3CV): 37.17
Salinity				E			Multipliers = 2" well = 0.16 gallons/foot
Turbidity	TURB.	→	→				4" well = 0.65 gallons/foot
Color	PARK GRN GRAY	→	→				6" well = 1.47 gallons/foot
Water Level Casing							8" well = 2.61 gallons/foot
Calibration	pH:						S.C.:

Sample No.	Quantity	Volume	Type	Preserv.	Analysis	Lab	Sample Equipment	Purge Equipment	Field Comments
LF-25	2	1L+	AMBER	NONE	TPH-D	GREGG	DISPOSABLE TEFLON BAILER	→	
Cleaning:									
Comments:									

Sampler's Signature: James Ackerman

GROUND WATER ELEVATION MEASUREMENT LOG

Project Name: EMERYVILLE USTs Project No. 05100680 Task/Phase: 01/44000

Date: 3-18-97 Equipment: ELECTRIC SOUNDER Weather: FOGGY/SUNNY

Well Number	Reference Elevation (feet-MSL)	Time (military)	Depth to Water (feet)	Depth to Product (feet)	Total Depth (feet)	PT (feet)	PT x 0.8 (feet)	Adjusted DTW[1] (feet)	Ground Water Elevation[2] (feet-MSL)
LF-11	10.05	0830	4.67		15.26			4.67	5.38
LF-20	11.77	0950	7.83		11.33			7.83	3.94
LF-21	10.37	0910	5.49		15.40			5.49	4.88
LF-23	10.64	1035	5.24		18.30			5.24	5.40
LF-24	10.22	1115	5.18		19.60			5.18	5.04
LF-25	11.31	1155	7.84		20.30			7.84	3.47
Comments:		WATER LEVEL READINGS TAKEN BY JEFF RODIGERS OF LEVINE-FRICKE							

1 Adjusted depth to water = DTW - (PT x 0.8)

2 Ground water elevation = Reference elevation - Adjusted DTW

MSL Mean sea level

DTW Depth to water (to 0.01 foot)

PT Product thickness (0.01 foot)

Signature James Thornton

TerraNext

PURGE CHARACTERIZATION AND SAMPLE LOG

Project Number: 05100680 **Project Name:** EMERYVILLE USTs **Date:** 3-18-97

Well Number: LF-11 **Sampler:** JAMES ACKERMAN, JEFF RODGER OF LEVINE-FRICKE **Weather:** FOGGY

Military Time	0835	0840	0845	0855		
Gallons Purged	2	4	6	5		
Purge Rate				A		
pH	7.09	7.11	7.07	M		
Conductivity (mMhos/cm)	919	919	913	P		
Temperature (C)	16.8	16.8	16.7	L		
Salinity				E		
Turbidity	CLOUDY	→	→			
Color	GRAYISH GREEN	→	→			
Water Level Casing						
Calibration	pH:					

Depth to Bottom (DB): 15.25
Depth to Water (DW): 4.67
Height of Water Column (H) = DB - DW: 10.58
One Casing Volume (CV) = H x multiplier: 1.69
Three Casing Volumes (3CV): 5.08
Multipliers = 2" well = (0.16) gallons/foot
4" well = 0.65 gallons/foot
6" well = 1.47 gallons/foot
8" well = 2.61 gallons/foot
S.C.:

Sample No.	Quantity	Volume	Type	Preserv.	Analysis	Lab	Sample Equipment	Purge Equipment	Field Comments
LF-11	2	1LT	AMBER	NONE	TPH-D EDISM	CHROMA LAB	TEFLON DISPOSABLE BAILER	SAME	

Cleaning:
Comments: SLIGHT PET. ODOR, NO SHEEN

Sampler's Signature: James Ackerman

TerraNext

PURGE CHARACTERIZATION AND SAMPLE LOG

Project Number: 05100680 **Project Name:** EMERYVILLE USTs **Date:** 3-18-97

Well Number: LF-20 **Sampler:** JAMES ACKERMAN **Weather:** FOGGY

JEFF RODGERS OF LEGINE-FRICKE

Military Time	1001	1003	1006	1015			
Gallons Purged	2	4	6	5			Depth to Bottom (DB): 19.15
Purge Rate				A			Depth to Water (DW): 7.83
pH	6.81	6.78	6.76	M			Height of Water Column (H) = DB - DW: 11.33
Conductivity (MMHOS/cm)	1358	1364	1377	P			One Casing Volume (CV) = H x multiplier: 1.81
Temperature (C)	17.5	17.6	17.6	L			Three Casing Volumes (3CV): 5.4
Salinity				E			Multipliers = 2" well = 0.16 gallons/foot
Turbidity	CLOUDY	→	→				4" well = 0.65 gallons/foot
Color	BRAWN/GREEN	→	→				6" well = 1.47 gallons/foot
Water Level Casing							8" well = 2.61 gallons/foot
Calibration	pH:						S.C.:

Sample No.	Quantity	Volume	Type	Preserv.	Analysis	Lab	Sample Equipment	Purge Equipment	Field Comments
LF-20	2	1LT	AMBER	NONE	TPH-D BTEX	CALSCIENCE LAB	DISPOSABLE TEFLON BAILER	SAME	
Cleaning:									
Comments:	SLIGHT PET. ODOR, NO SHEEN								

Sampler's Signature: James Ackerman

Terranext

PURGE CHARACTERIZATION AND SAMPLE LOG

Project Number: 05100680 **Project Name:** Emeryville USTs **Date:** 3-18-97

Well Number: LF-21 **Sampler:** James Ackerman / Jeff Rodgers of Levine·Fricke **Weather:** Foggy

Military Time	0920	0922	0925	0930		
Gallons Purged	1.5	3	4.5	S		
Purge Rate				A		
pH	6.95	6.95	6.97	M		
Conductivity	925	939	933	P		
Temperature (C)	17.8	17.8	17.8	L		
Salinity				E		
Turbidity	Cloudy	→	→			
Color	Greenish Gray	→	→			
Water Level Casing						
Calibration	pH:					

Depth to Bottom (DB): 15.40

Depth to Water (DW): 5.49

Height of Water Column (H) = DB - DW: 9.91

One Casing Volume (CV) = H x multiplier: 1.59

Three Casing Volumes (3CV): 4.77

Multipliers = 2" well = 0.16 gallons/foot

4" well = 0.65 gallons/foot

6" well = 1.47 gallons/foot

8" well = 2.61 gallons/foot

S.C.:

Sample No.	Quantity	Volume	Type	Preserv.	Analysis	Lab	Sample Equipment	Purge Equipment	Field Comments
LF-21	2	1Lt	Amber	None	TPH-D 8015	Chroma-Lab	Disposable Teflon Bailer	Same	

Cleaning:

Comments:

Sampler's Signature:

TerraNext

PURGE CHARACTERIZATION AND SAMPLE LOG

Project Number: 05100680 **Project Name:** EMERYVILLE USTs **Date:** 3-18-97

Well Number: LF-23 **Sampler:** JAMES ACKERMAN **Weather:** FOGGY

JEFF RODGERS OF LEVINE-FRICKE

Military Time	1044	1046	1049	1100			
Gallons Purged	2	4	6				Depth to Bottom (DB): 18.30
Purge Rate							Depth to Water (DW): 5.24
pH	6.90	6.84	6.86				Height of Water Column (H) = DB - DW: 13.06
Conductivity (umhos/cm)	1394	1329	1278				One Casing Volume (CV) = H x multiplier: 2.09
Temperature (C)	16.7	16.8	16.8				Three Casing Volumes (3CV): 6.27
Salinity							Multipliers = 2" well = (0.16) gallons/foot
Turbidity	CLOUDY	→	→				4" well = 0.65 gallons/foot
Color	GRAYISH BROWN	→	→				6" well = 1.47 gallons/foot
Water Level Casing							8" well = 2.61 gallons/foot
Calibration	pH:						S.C.:

Sample No.	Quantity	Volume	Type	Preserv.	Analysis	Lab	Sample Equipment	Purge Equipment	Field Comments
LF-23	2	1LT	AMBER	NONE	TPH-D 8015	CHROMA LAB	DISPOSABLE TEFLON BAILER	SAME	
Cleaning:									
Comments:	SLIGHT PET. ODOR, NO SHEEN								

Sampler's Signature: James Ackerman

TerraNext

PURGE CHARACTERIZATION AND SAMPLE LOG

Project Number: 05100680 **Project Name:** EMERYVILLE USTs **Date:** 3-18-97

Well Number: LF-24 **Sampler:** JAMES ACKERMAN **Weather:** FOGGY / SUNNY

JEFF RODGERS OF LEVINE-FRICKE

Military Time	1123	1126	1129	1140			
Gallons Purged	2.5	5.0	7.5				Depth to Bottom (DB): 19.60
Purge Rate							Depth to Water (DW): 5.18
pH	6.87	6.85	6.80				Height of Water Column (H) = DB - DW: 14.42
Conductivity (uMhos/cm)	594	576	594				One Casing Volume (CV) = H x multiplier: 2.31
Temperature (C)	17.1	17.1	17.1				Three Casing Volumes (3CV): 6.92
Salinity							Multipliers = 2" well = (0.16) gallons/foot
Turbidity	CLOUDY	→	→				4" well = 0.65 gallons/foot
Color	GRAYISH GREEN	→	→				6" well = 1.47 gallons/foot
Water Level Casing							8" well = 2.61 gallons/foot
Calibration	pH:						S.C.:

Sample No.	Quantity	Volume	Type	Preserv.	Analysis	Lab	Sample Equipment	Purge Equipment	Field Comments
LF-24	2	1LT	AMBER	NONE	TPH-D 8015	CHEMAT LAB	DISPOSABLE TEFLON BAILER	SAME	
Cleaning:									
Comments:									

Sampler's Signature: James Ackerman

TerraNext

PURGE CHARACTERIZATION AND SAMPLE LOG

Project Number: 05100680 **Project Name:** EMERYVILLE USTs **Date:** 3-18-97

Well Number: LF-25 **Sampler:** JAMES ACKERMAN **Weather:** SUNNY

JEFF RODGERS (LEVINE-FRICKE)

Military Time	1202	1204	1207	1215		
Gallons Purged	2	4	6			
Purge Rate						
pH	6.94	6.94	6.93			
Conductivity (µMHOS/CM)	714	714	723			
Temperature (C)	17.1	16.9	17.0			
Salinity						
Turbidity	CLOUDY	→	→			
Color	GRAYISH GREEN	→	→			
Water Level Casing						
Calibration	pH:					

Depth to Bottom (DB): 20.30

Depth to Water (DW): 7.84

Height of Water Column (H) = DB - DW: 12.46

One Casing Volume (CV) = H x multiplier: 1.99

Three Casing Volumes (3CV): 5.98

Multipliers = 2" well = ~~0.16~~ gallons/foot

4" well = 0.65 gallons/foot

6" well = 1.47 gallons/foot

8" well = 2.61 gallons/foot

S.C.:

Sample No.	Quantity	Volume	Type	Preserv.	Analysis	Lab	Sample Equipment	Purge Equipment	Field Comments
LF-25	2	1LT	AMBER	NONE	TPH-D 8015	CHROMA LAB	DISPOSABLE TEFLON BAILER	SAME	

Cleaning:

Comments:

Sampler's Signature: _____

APPENDIX B

ANALYTICAL LABORATORY REPORTS, CHAIN-OF-CUSTODY DOCUMENTS AND CHROMATOGRAMS OF 8015M ANALYSIS

MARCH AND JUNE 1997

CHROMALAB, INC.

Environmental Services (SDB)

October 28, 1997

Submission #: 9703230
revised from 03/26/97

ERM WEST-OAKLAND

Atten: James Ackerman

Project: EMERYVILLE USTS *Project#:* 05100680
Received: March 18, 1997

re: 6 samples for TEPH analysis.
Method: *EPA 8015M*

Matrix: WATER *Extracted:* March 24, 1997
Sampled: March 18, 1997 *Run#:* 5893 *Analyzed:* March 26, 1997

Spl#	CLIENT SPL ID	Kerosene (ug/L)	Diesel (ug/L)	Motor Oil (ug/L)
121681	LF-11	N.D.	290	N.D.
	Note: Hydrocarbon reported does not match the pattern of our Diesel Standard.			
121682	LF-21	N.D.	360	N.D.
	Note: Hydrocarbon reported is in the late Diesel Range and does not match our Diesel Standard.			
121683	LF-20	N.D.	240	N.D.
	Note: Hydrocarbon reported does not match the pattern of our Diesel Standard.			
121684	LF-23	N.D.	1200	N.D.
	Note: Hydrocarbon reported does not match the pattern of our Diesel Standard.			
121685	LF-24	N.D.	N.D.	N.D.
121686	LF-25	N.D.	N.D.	N.D.
	Reporting Limits	50	50	500
	Blank Result	N.D.	N.D.	N.D.
	Blank Spike Result (%)	--	93.0	--

Bruce Havlik
Chemist

Alex Tam
Semivolatiles Supervisor

510-553-0650 GC 03/25

1220 Quarry Lane • Pleasanton, California 94566-4756
(510) 484-1919 • Facsimile (510) 484-1096
Federal ID #68-0140157

CHROMALAB, INC.

Environmental Services (SDB)

April 16, 1997 *Submission:* 9703371

TERRANEXT OAKLAND

Atten: James Ackerman

Project: EMERYVILLE USTS
Received: March 18, 1997

re: 4 samples for TEPH with silica gel cleanup analysis.
Method: EPA 8015M/3630

Matrix: SOIL
Sampled: March 18, 1997 *Analyzed:* March 26, 1997

Dear James,

We have performed silica gel cleanup with TEPH analysis on extracts remaining from the four water samples previously reported to you as submission 9703230. The chromatograms of the results are attached.

Chromatograms of LF-11, LF-21, and LF-23 show that silica gel cleanup removed all the TEPH, and the hydrocarbon content is N.D. for Kerosene, Diesel, and Motor Oil range hydrocarbons at standard reporting limits.

Chromatograms of LF-20 show that results for this sample was affected by a contamination that occurred in the laboratory that made the results of nC10 to nC13 invalid. Results for nC13 through nC36 would be N.D., using our standard response factors for Diesel and Motor Oil. Because some of the hydrocarbon interference occurs in the diesel range, it is not appropriate for us to state a reporting limit or result for the diesel-range hydrocarbon in these samples.

I hope this gives you the information you need for these tests.

Sincerely,

Gary Cook

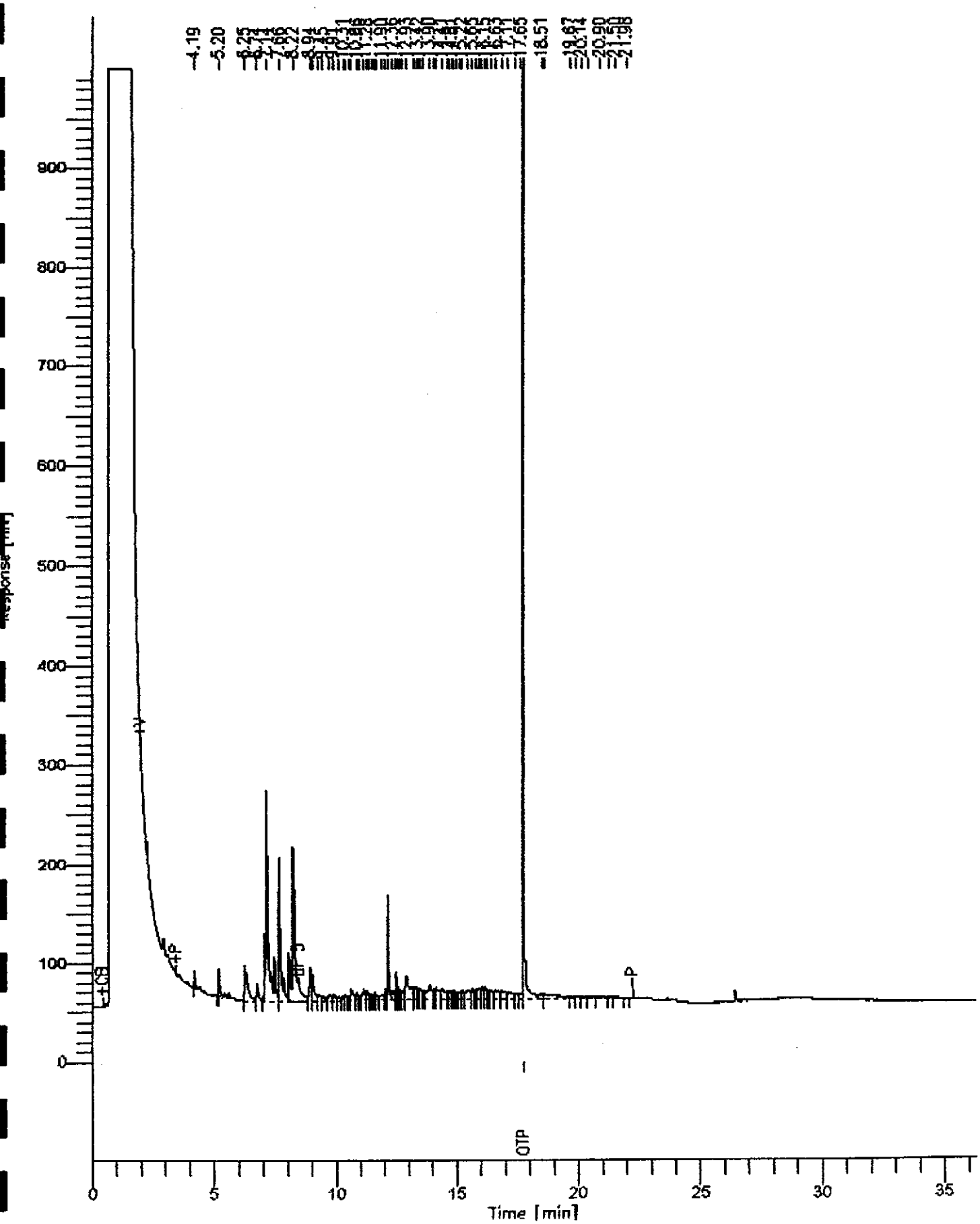
Gary Cook

1220 Quarry Lane • Pleasanton, California 94566-4756
(510) 484-1919 • Facsimile (510) 484-1096
Federal ID #68-0140157

diesel analysis

Sample Name : 9703230/EF11
FileName : F:\M925035.raw
Method : 4D0305
Start Time : 0.00 min End Time : 36.33 min
Scale Factor: 0.0 Plot Offset: 0 mV

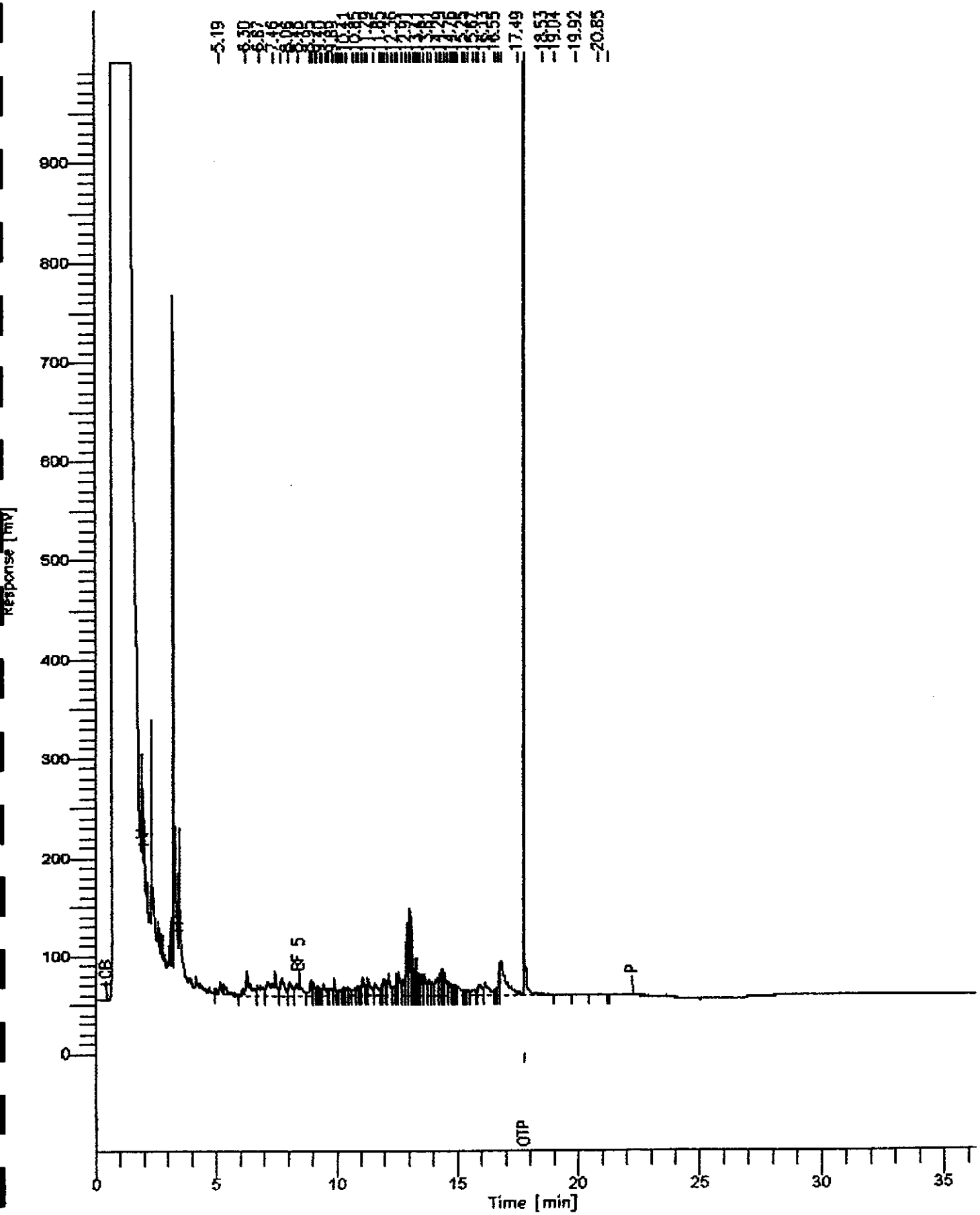
Sample #: 121681 Page 1 of 1
Date : 3/26/97 14:25
Time of Injection: 3/26/97 13:48
Low Point : 0.00 mV High Point : 1000.00 mV
Plot Scale: 1000.0 mV



diesel analysis

Sample Name : 9703230/LYZO
FileName : F:\M125031.raw
Method : 4D0305
Start Time : 0.00 min End Time : 36.33 min
Scale Factor: 0.0 Plot Offset: 0 mV

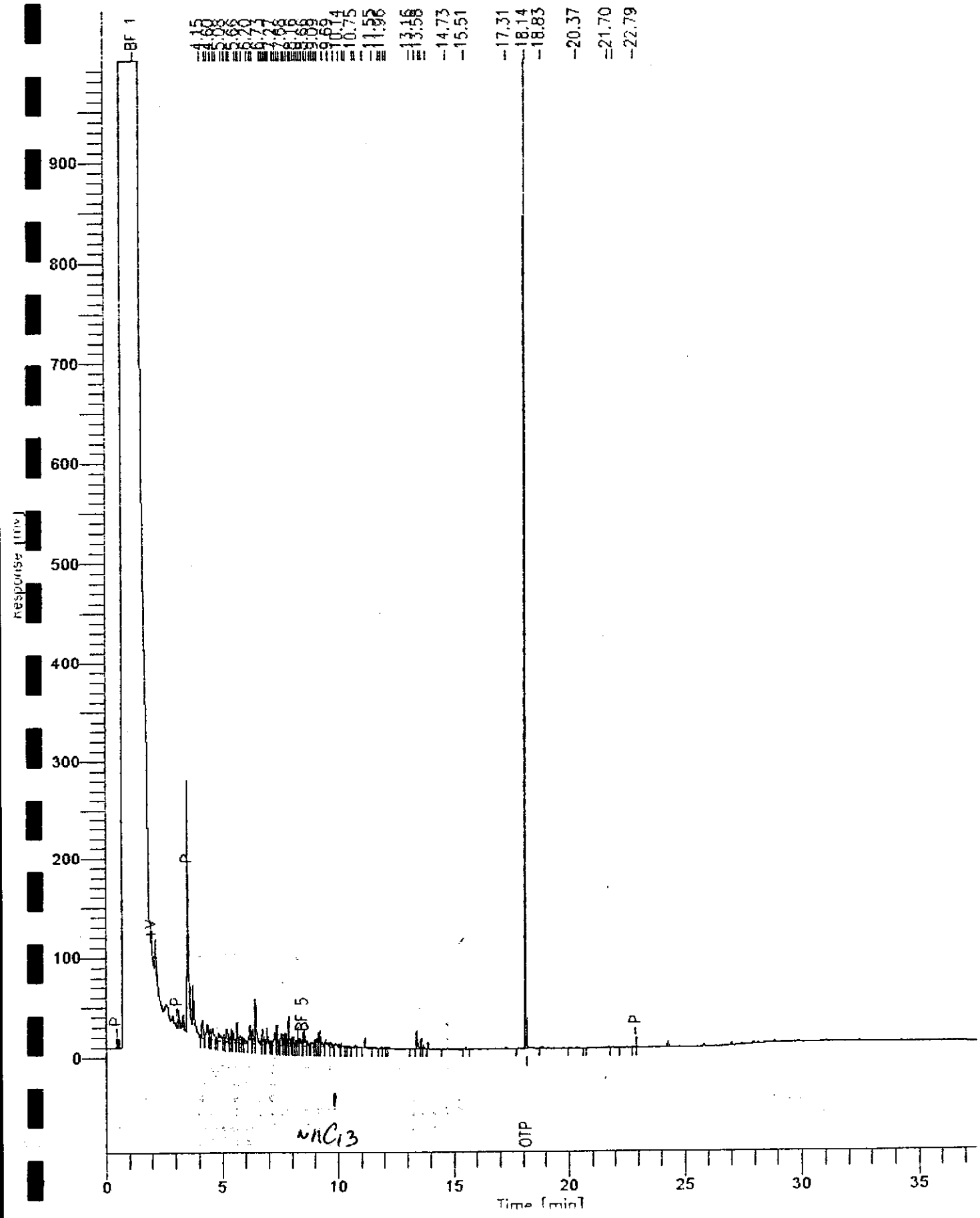
Sample #: 121683 Page 1 of 1
Date : 3/26/97 11:14
Time of Injection: 3/26/97 10:37
Low Point : 0.00 mV High Point : 1000.00 mV
Plot Scale: 1000.0 mV



diesel analysis

ample Name : 9703230/LF20 W/
ile Name : N:\T328013.raw
et hod : 2D0326
ta Time : 0.00 min End Time : 37.50 min
cale Factor: 0.0 Plot Offset: 0 mV

Sample #: 121683 Page 1 of 1
Date : 3/29/97 03:48
Time of Injection: 3/29/97 03:10
Low Point : 0.00 mV High Point : 1000.00 mV
Plot Scale: 1000.0 mV

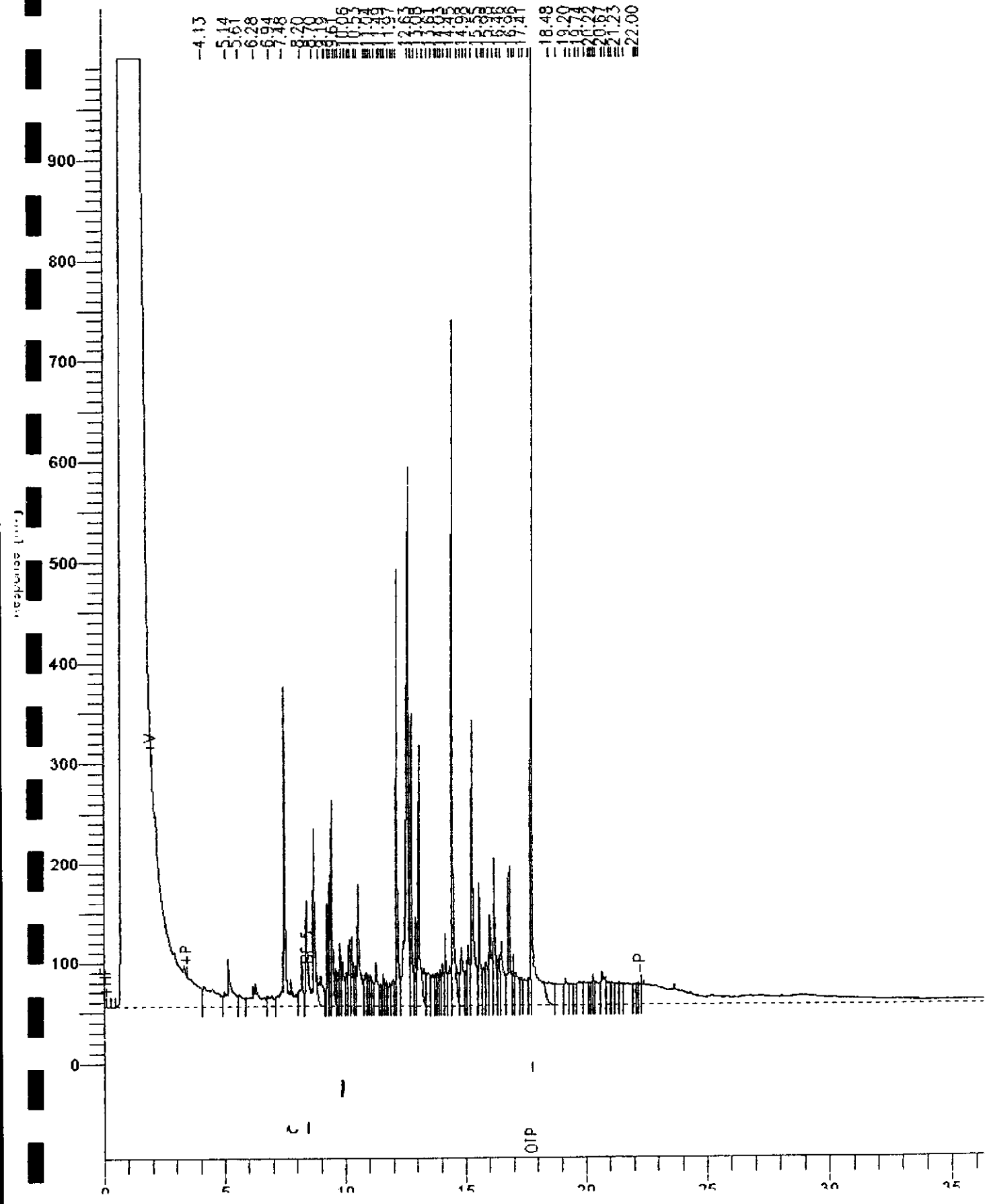


diesel analysis

Sample Name : 9703230/LF-23
File Name : P:\H325030.RAW
Method : 4D0305.MTH
Start Time : 0.00 min
Scale Factor: 0.0

End Time : 36.33 min
Plot Offset: 0 mV

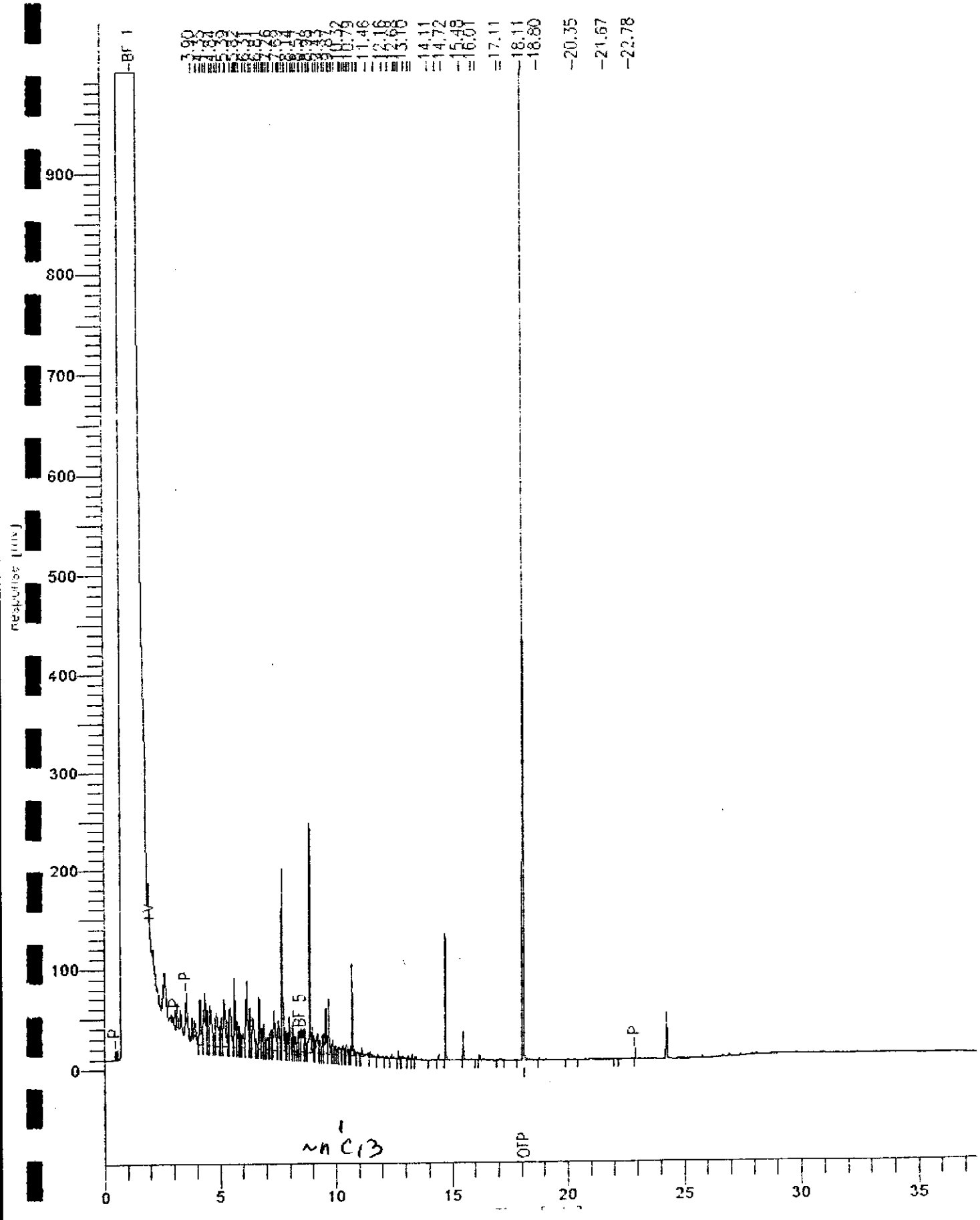
Sample #: 121684
Date : 3/26/97 13:19
Time of Injection: 3/26/97 09:50
Low Point : 0.00 mV
Plot Scale: 1000.0 mV



diesel analysis

ample Name : 9703230/LF-23
ile Name : N:\T328019.raw
et d : 2D0326
tart Time : 0.00 min End Time : 37.50 min
cale Factor: 0.0 Plot Offset: 0 mV

Sample #: 121684 Page 1 of 1
Date : 4/1/97 16:14
Time of Injection: 3/29/97 07:44
Low Point : 0.00 mV High Point : 1000.00 mV
Plot Scale: 1000.0 mV

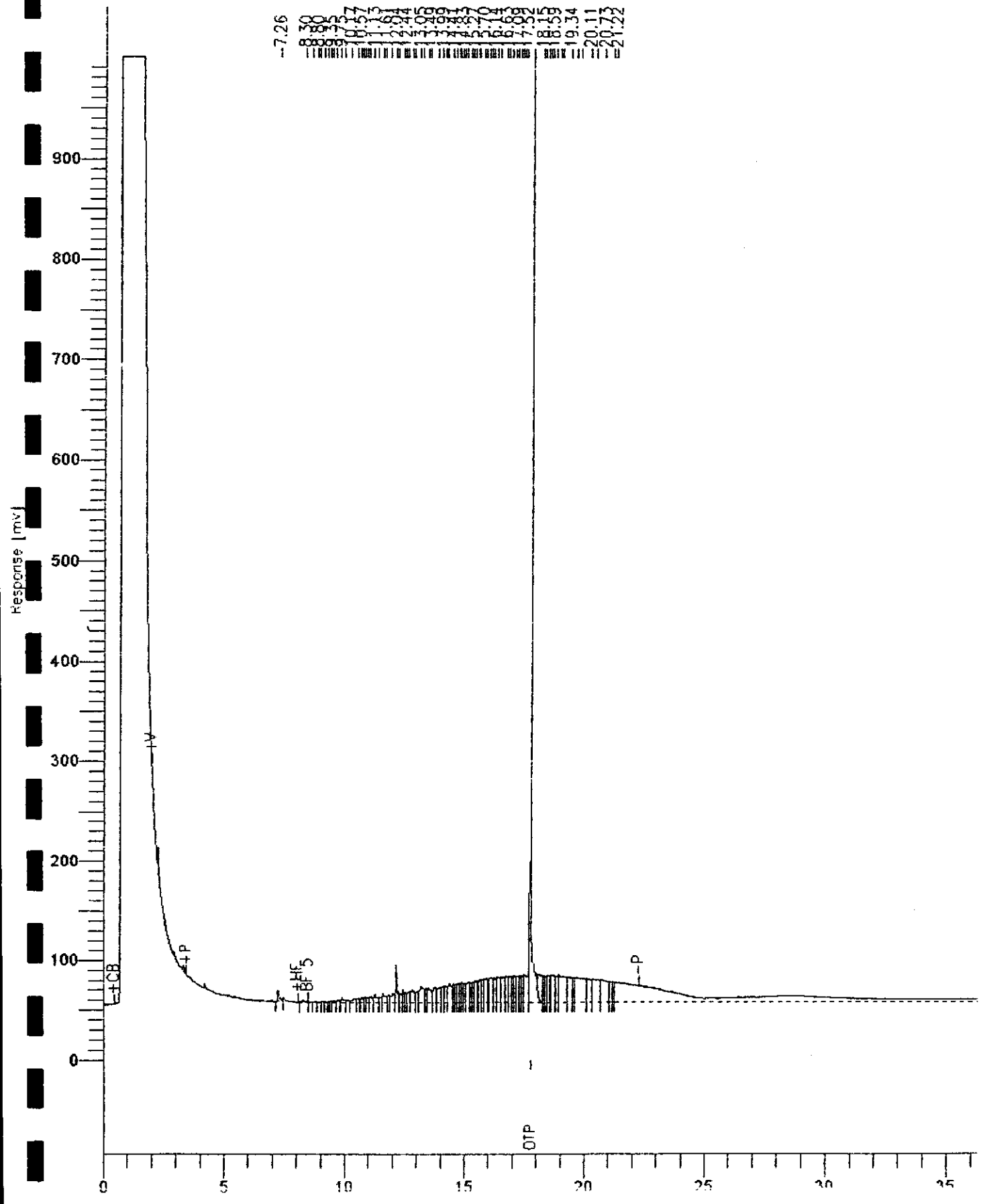


diesel analysis

Sample Name : 9703230/LF21
File Name : P:\H325034.RAW
Method : 4D0305.MTH
Start Time : 0.00 min
Scale Factor: 0.0

End Time : 36.33 min
Plot Offset: 0 mV

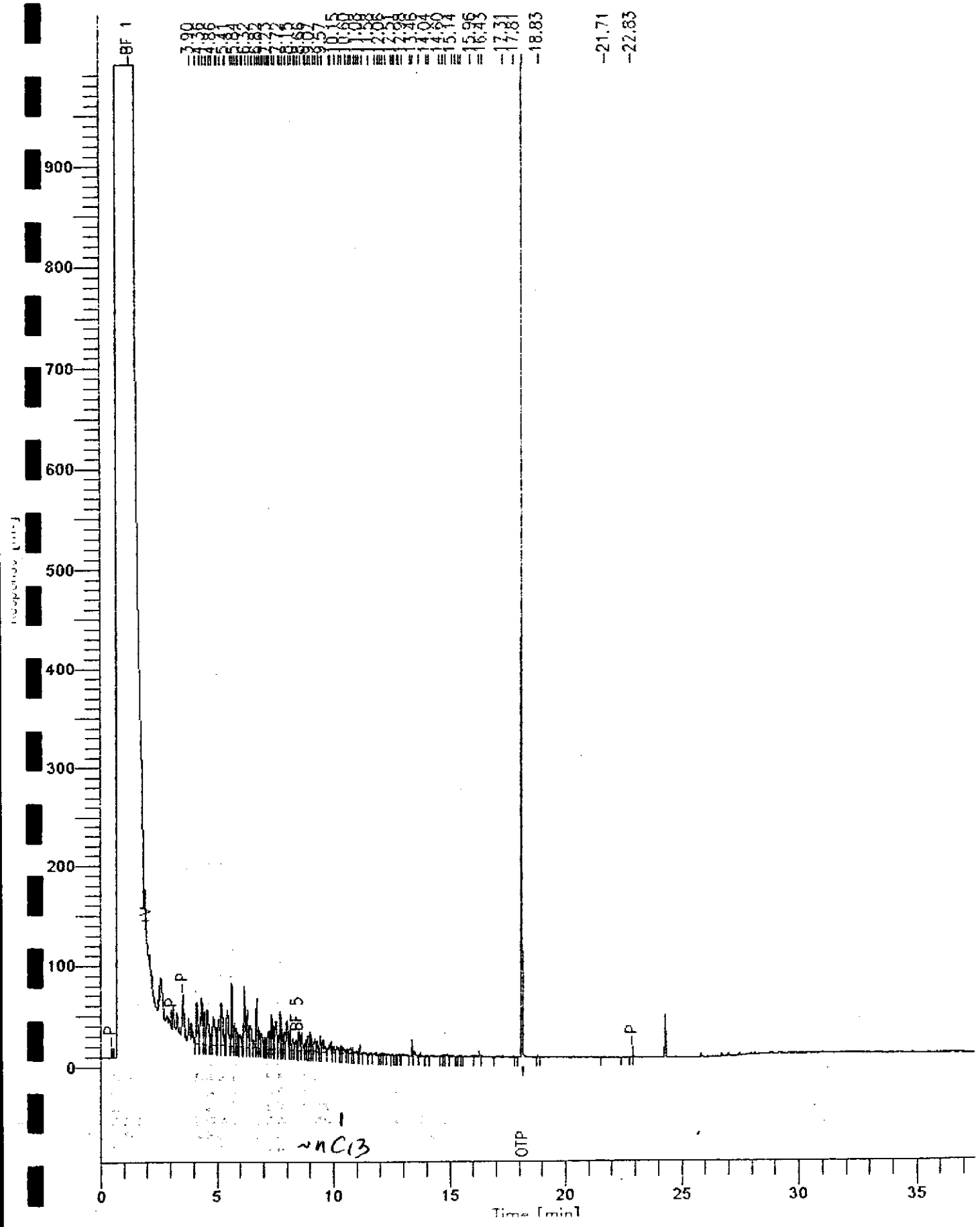
Sample #: 121682
Date : 3/26/97 13:42
Time of Injection: 3/26/97 13:01
Low Point : 0.00 mV
Plot Scale: 1000.0 mV



diesel analysis

Sample Name : 9703230/LF-21 W/
File Name : N:\T328014.raw
Method : 2D0326
Start Time : 0.00 min End Time : 37.50 min
Scale Factor: 0.0 Plot Offset: 0 mV

Sample #: 121682 Page 1 of 1
Date : 3/29/97 04:34
Time of Injection: 3/29/97 03:56
Low Point : 0.00 mV High Point : 1000.00 mV
Plot Scale: 1000.0 mV



03371/ 122735 - 122738

CHROMALAB, INC.

Environmental Services (SDB) (DOHS 1094)

ADD ON/CHANGE ORDER

New Submission No: 9703371

Order No: 32743

SUBM #: 9703371 REP: GC
CLIENT: TERRA-OAK
DUE: 04/02/97
REF #:32743/9703230

Original Submission Info

Client Name: Terranext

Project Mgr: Carl Taylor

Project Name: Emeryville USTS

Project No: 24187

PO#: -

Date Received: 3/18

Submission No: 9703230

Name of Caller:

Call Date: 3/26 Time:

Add on Due Date: 4/2/97 Date Sampled

Comments: Include Chromatograms - use Geomatrix Si Gel method.

ANALYSIS REPORT

SAMPLE ID.	DATE	TIME	MATRIX	PRESERV.	TPH - Gasoline (EPA 5030, 8015)	TPH - Gasoline (5030, 8015) w/BTEX (EPA 602, 8020)	TPH - Diesel, TEPH (EPA 3510/3550, 8015)	PURGEABLE AROMATICS BTEX (EPA 602, 8020)	PURGEABLE HALOCARBONS (EPA 601, 8010)	VOLATILE ORGANICS (EPA 624, 8240, 524.2)	BASE/NEUTRALS, ACIDS (EPA 625/627, 8270, 525)	TOTAL OIL & GREASE (EPA 5520, B+F, E+F)	PCB (EPA 608, 8080)	PESTICIDES (EPA 608, 8080)	TOTAL RECOVERABLE HYDROCARBONS (EPA 418.1)	Silica Gel Extract & TEPH on extract before run	LUFT METALS: Cd, Cr, Pb, Zn, Ni	CAM METALS (17)	PRIORITY POLLUTANT METALS (13)	TOTAL LEAD	EXTRACTION (TCLP, STLC)				NUMBER OF CONTAINERS
LF-11	3/18/97															X									
LF-20	↓															X									
LF-23	↓															X									
LF-21	↓															X									

03280/121681-121686

32589

CHAIN-OF-CUSTODY RECORD

P.O. Box 24374 Oakland, CA 94623-1324

No. 20613

INDUSTRIAL COMPLIANCE • ~~9888 OLD PLACERVILLE ROAD, SUITE 100 • SACRAMENTO, CA 95827-3559 •~~ 510-238-9540 Phone ~~916 369 8971~~ • 510-238-9145 FAX ~~916 369 8370~~

PROJECT NAME	PROJECT LOCATION
Emeryville USTs	Emeryville, CA

PROJ. NO.	PROJECT CONTACT	PROJECT TELEPHONE NO.
05100680	James Ackerman	(510) 238-9540

CLIENT'S REPRESENTATIVE	PROJECT MANAGER/SUPERVISOR
	Carl Taylor

ITEM NO.	SAMPLE NUMBER	DATE	TIME	COMP	GRAB	SAMPLE LOCATION (INCLUDE MATRIX AND POINT OF SAMPLE)	NUMBER OF CONTAINERS	ANALYSIS DESIRED (INDICATE SEPARATE CONTAINERS)	REMARKS
1	LF-11	3-18	0855		X	GRAB GW SAMPLE FROM WELL LF-11	2	X	NOTE: SILICA GEL CLEANUP MAY BE RUN ON FUTURE NOTICE
2	LF-21		0930		X	LF-21	2	X	SUBM #: 9703230 REP: GC
3	LF-20		1015		X	LF20	2	X	CLIENT: TERRA-OAK
4	~~LF-23~~		1100		X	LF23	2	X	DUE: 03/25/97
5	LF-24		1140		X	LF24	2	X	REF #:32589
6	LF-25		1215		X	LF-25	2	X	
7									
8									
9									
10									

JBA TPH TPH-D 8015

TRANSFER NUMBER	ITEM NUMBER	TRANSFERS RELINQUISHED BY	TRANSFERS ACCEPTED BY	DATE	TIME
1	JBA 1 & 6	James Ackerman		3/18/97	1545
2			C. Aquilla Chromalab	3/18/97	1600
3					
4					

REMARKS

STANDARD 5 DAY T.A.T.

SEND COPIES OF CHROMATOGRAMS

P.O. # 24187

SAMPLER'S NAME: James Ackerman

SAMPLER'S SIGNATURE: James Ackerman

LAB COPY

CHROMALAB, INC.

Environmental Services (SDB)

June 18, 1997 *Submission #:* 9706117

TERRANEXT-OAKLAND

Atten: James Ackerman

Project: EMERYVILLE USTS *Project#:* 05100680
Received: June 11, 1997

re: 6 samples for TEPH analysis.
Method: *EPA 8015M*

Matrix: WATER *Extracted:* June 17, 1997
Sampled: June 11, 1997 *Run#:* 7315 *Analyzed:* June 17, 1997

Spl# CLIENT SPL ID	Kerosene (ug/L)	Diesel (ug/L)	Motor Oil (ug/L)
135391 LF-11	N.D.	680	N.D.
Note: Hydrocarbon reported does not match the pattern of our Diesel standard.			
135392 LF-21	N.D.	660	N.D.
Note: Hydrocarbon reported does not match the pattern of our Diesel standard.			
135393 LF-20	N.D.	600	N.D.
Note: Hydrocarbon reported does not match the pattern of our Diesel standard.			
135394 LF-23	N.D.	400	N.D.
135395 LF-24	N.D.	N.D.	N.D.
135396 LF-25	N.D.	N.D.	N.D.
Reporting Limits	50	50	500
Blank Result	N.D.	N.D.	N.D.
Blank Spike Result (%)	--	68.5	--

Bruce Havlik
Chemist

Alex Tam
Semivolatiles Supervisor

1220 Quarry Lane • Pleasanton, California 94566-4756
(510) 484-1919 • Facsimile (510) 484-1096
Federal ID #68-0140157

HERE ARE THE CHROMATOGRAMS YOU REQUESTED

ATTENTION: Jane Ackerman

AT: Terranext

SUBMISSION#: 9706117

# of chromatograms: 5

grc 6/12/97

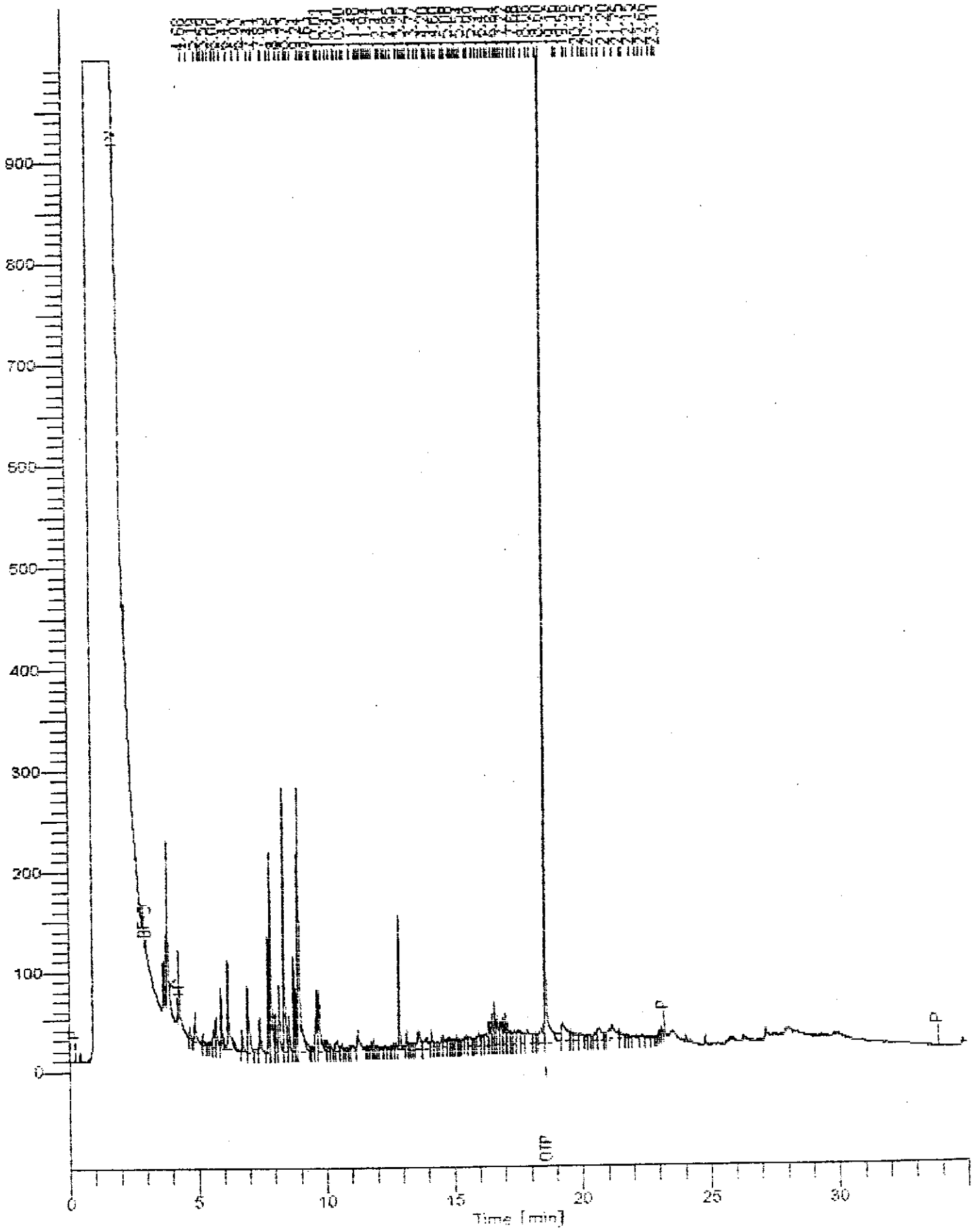
diesel analysis

Sample Name : 9706117/LF11
[redacted]eName : G:\G617002.raw
[redacted]thod : 3D0326
[redacted]rt Time : 0.00 min
Scale Factor: 0.0

End Time : 35.00 min
Plot Offset: 0 mV

Sample #: 135391
Date : 6/17/97 18:22
Time of Injection: 6/17/97 17:46
Low Point : 0.00 mV
Plot Scale: 1000.0 mV

High Point : 1000.00 mV



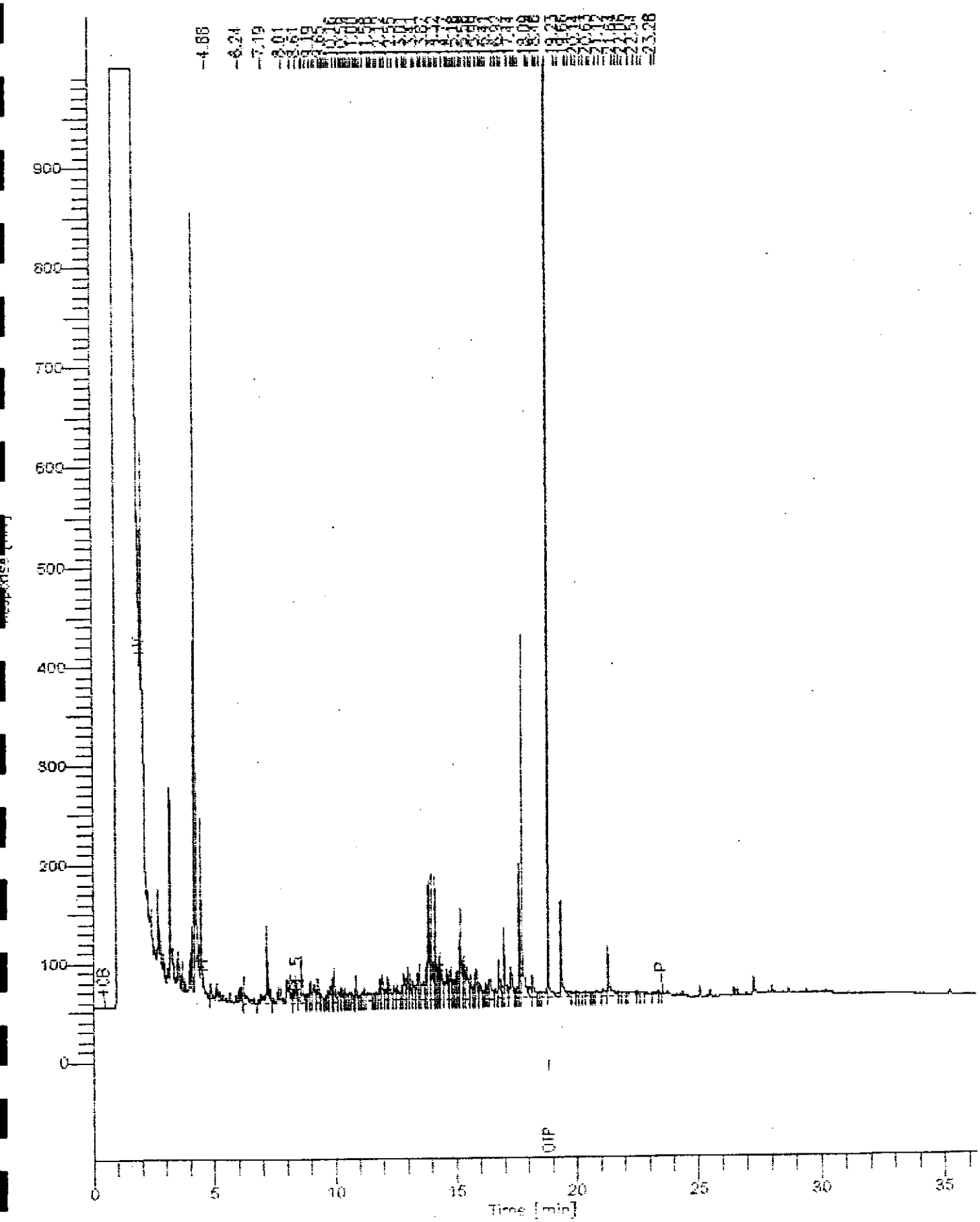
diesel analysis

Sample Name : 9706117/1820
leName : P:\H6170i2.raw
thod : 400403
art Time : 0.00 min
Scale Factor: 0.0

End Time : 36.39 min
Plot Offset: 0 mV

Sample #: 135393
Date : 6/17/97 19:09
Time of Injection: 6/17/97 18:27
Low Point : 0.00 mV
Plot Scale: 1000.0 mV

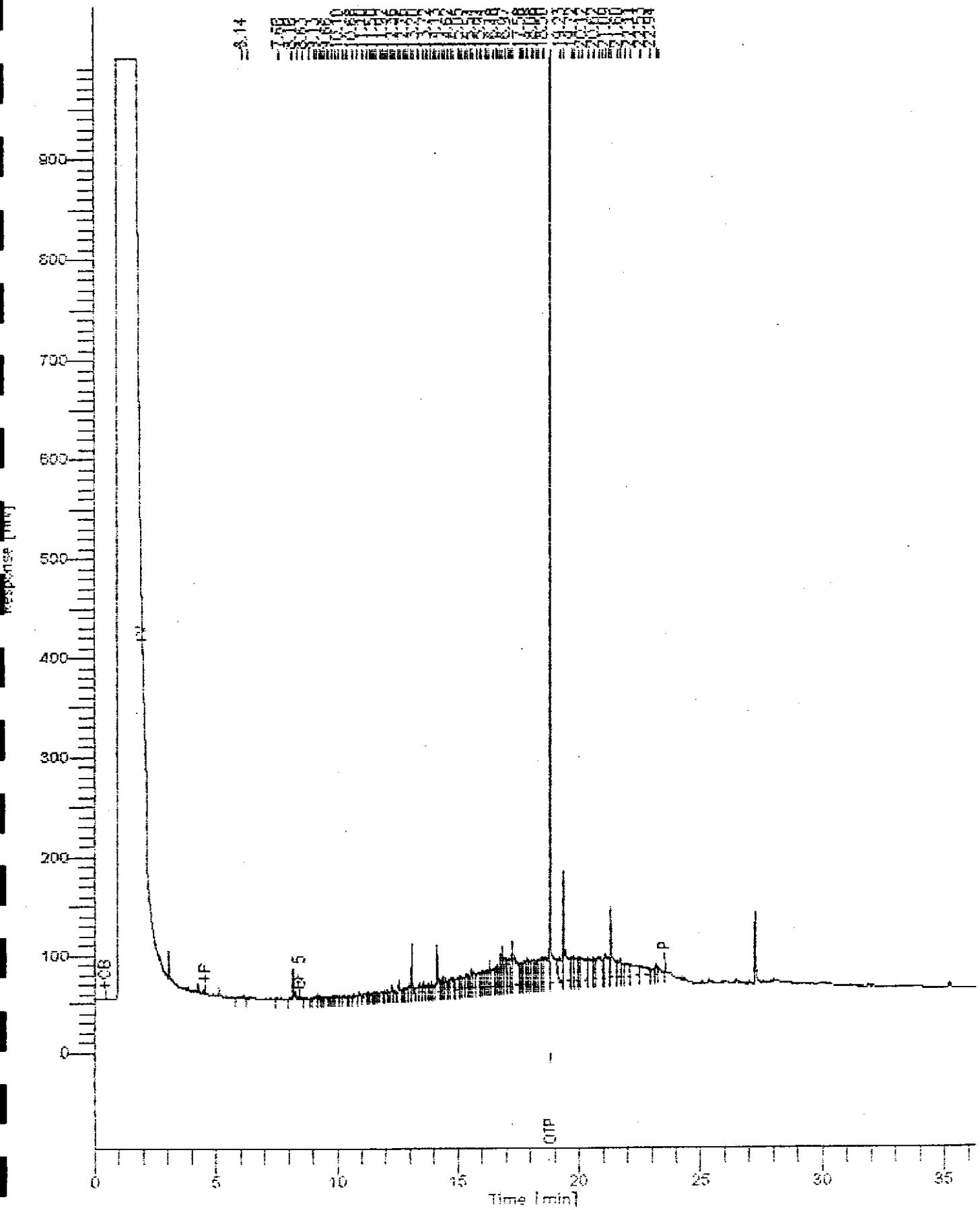
High Point : 1000.00 mV



diesel analysis

Sample Name : 9706117/LFZ1
FileName : F:\M617011.raw
Method : 4D0403
Start Time : 0.00 min End Time : 36.35 min
Scale Factor: 0.0 Plot Offset: 0 mV

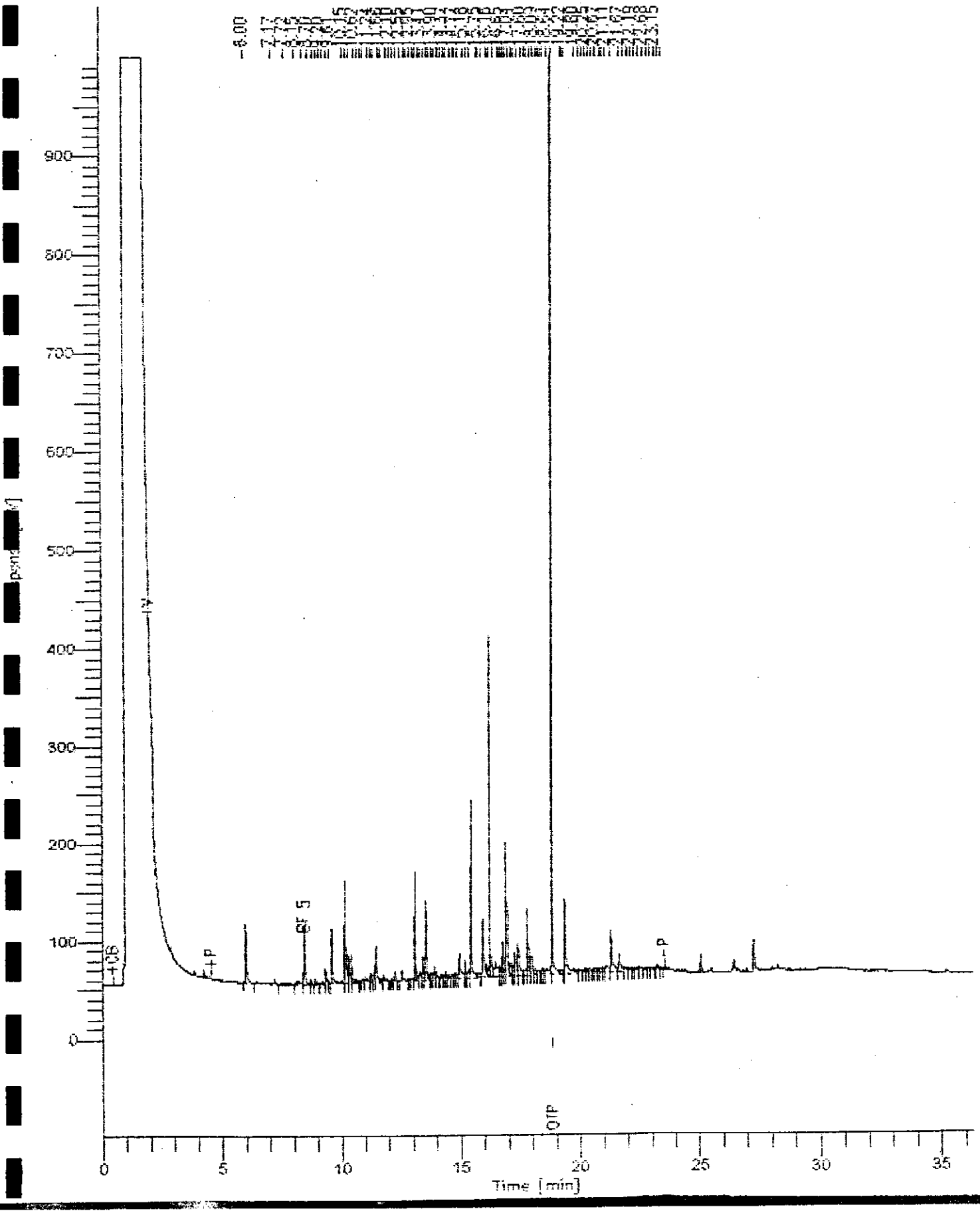
Sample #: 135392 Page 1 of 1
Date : 6/17/97 18:17
Time of Injection: 6/17/97 17:40
Low Point : 0.00 mV High Point : 1000.00 mV
Plot Scale: 1000.0 mV



diesel analysis

Sample Name : 9706117/LF23
FileName : F:\MS17014.raw
Method : 4D0403
Start Time : 0.00 min End Time : 36.33 min
Scale Factor: 0.0 Plot Offset: 0 mV

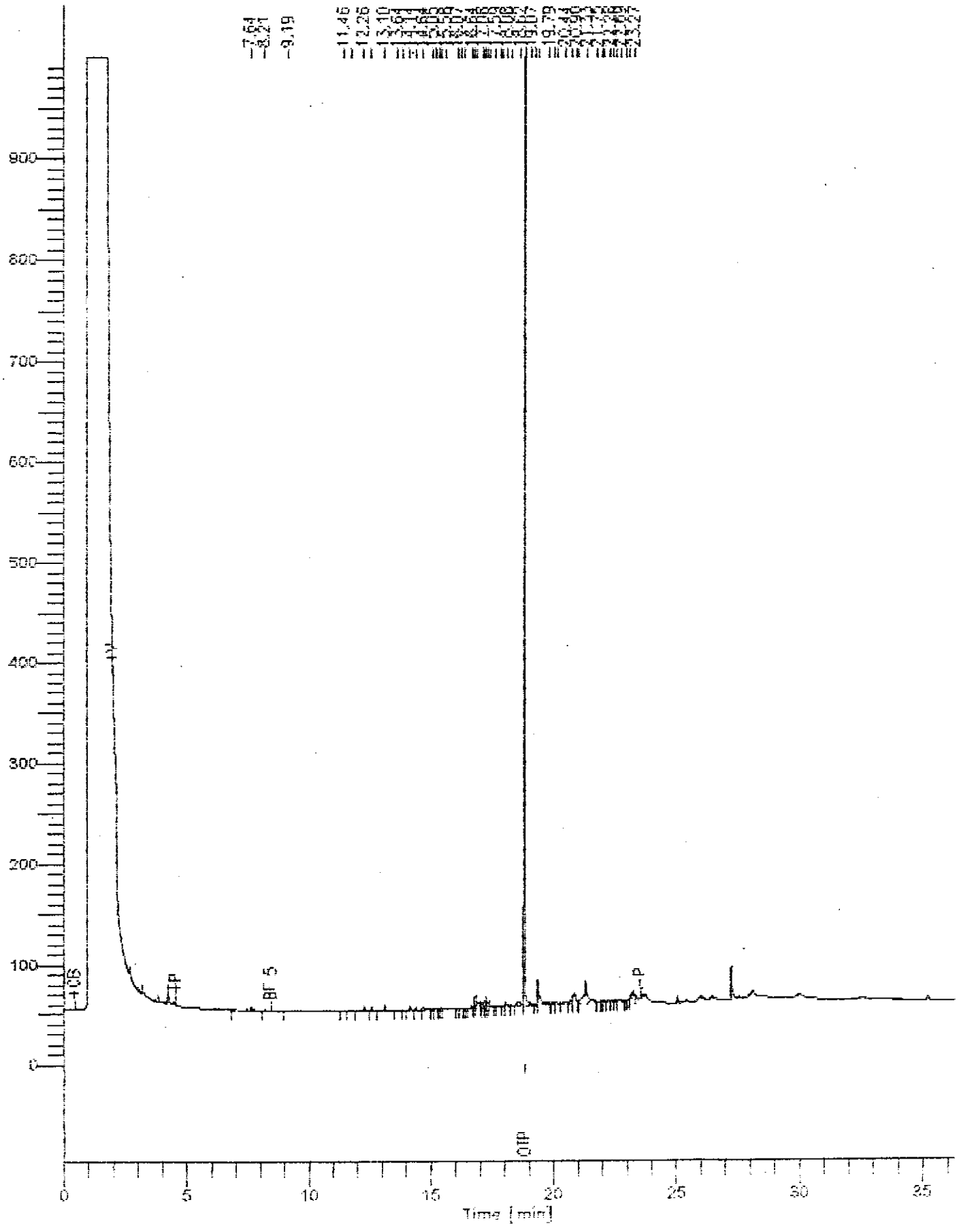
Sample #: 135394 Page 1 of 1
Date : 6/17/97 20:36
Time of Injection: 6/17/97 19:55
Low Point : 0.00 mV High Point : 1000.00 mV
Plot Scale: 1000.0 mV



diesel analysis

Sample Name : 9706117/LFI3
FileName : D:\M617019.raw
Method : 4L0403
Start Time : 0.00 min End Time : 56.33 min
Scale Factor: 0.0 Plot Offset: 0 mV

Sample #: 135396 Page 1 of 1
Date : 6/18/97 00:28
Time of Injection: 6/17/97 23:51
Low Point : 0.00 mV High Point : 1000.00 mV
Plot Scale: 1000.0 mV



CHROMALAB, INC.

Environmental Services (SDB)

June 25, 1997 *Submission #:* 9706206

TERRANEXT-OAKLAND

Atten: James Ackerman

Project: EMERYVILLE USTS *Project#:* 05100
Received: June 11, 1997

re: 4 samples for TPH - Diesel analysis.
Method: *EPA 8015M*

Matrix: WATER *Extracted:* June 17, 1997
Sampled: June 11, 1997 *Run#:* 7464 *Analyzed:* June 18, 1997

Spl#	CLIENT SPL ID	DIESEL (ug/L)	REPORTING LIMIT (ug/L)	BLANK RESULT (ug/L)	BLANK SPIKE (%)	DILUTION FACTOR
136097	LF-11	180	50	N.D.	69.0	1
	Note: Hydrocarbon reported is in the early Diesel range and does not match our Diesel standard. Silica gel cleanup.					
136098	LF-21	100	50	N.D.	69.0	1
	Note: Hydrocarbon reported does not match the pattern of our Diesel standard. Silica gel cleanup.					
136100	LF-20	62	50	N.D.	69.0	1
	Note: Hydrocarbon reported does not match the pattern of our Diesel standard. Silica gel cleanup.					
136101	LF-23	N.D.	50	N.D.	69.0	1
	Note: Silica gel cleanup.					

Bruce Havlik
Chemist

Alex Tam
Semivolatiles Supervisor

510-553-0650 GC 06/25

1220 Quarry Lane • Pleasanton, California 94566-4756
(510) 484-1919 • Facsimile (510) 484-1096
Federal ID #68-0140157

9706206/13607-13610

CHROMALAB, INC.

Environmental Services (SDB) (DOHS 1094)

ADD ON/CHANGE ORDER

New Submission No: _____

Order No: 34244

JBM #: 9706206 REP: GC
LIENT: TERRA-OAK
UE: 06/25/97
EF #:34244/9706117

Name of Caller: _____

Original Submission Info

Call Date: _____ Time: _____

Client Name: TERRA-NEXT-OAK

Add on Due Date: 6/25/97 Date Sampled 6/11/97

Project Mgr: JAMES ACKERMAN

Comments: DIESEL W/SILICA GEL CLEAN-UP / RUN FROM EXTRACTS

Project Name: EMERYVILLE USTS

Project No: 05100

PO#: _____

Date Received: 6/11/97

Submission No: 9706117

SAMPLE ID.	DATE	TIME	MATRIX	PRESERV.	TPH - Gasoline (EPA 5030, 8015)	TPH - Gasoline (5030, 8015) w/BTEX (EPA 602, 8020)	TPH (Diesel) TEPH (EPA 3510/3550, 8015)	PURGEABLE AROMATICS BTEX (EPA 602, 8020)	PURGEABLE HALOCARBONS (EPA 601, 8010)	VOLATILE ORGANICS (EPA 624, 8240, 524.2)	BASE/NEUTRALS, ACIDS (EPA 625/627, 8270, 525)	TOTAL OIL & GREASE (EPA 5520, B+F, E+F)	PCB (EPA 608, 8080)	PESTICIDES (EPA 608, 8080)	TOTAL RECOVERABLE HYDROCARBONS (EPA 418.1)		LUFT METALS: Cd, Cr, Pb, Zn, Ni	CAM METALS (17)	PRIORITY POLLUTANT METALS (13)	TOTAL LEAD	EXTRACTION (TCLP, STLC)				NUMBER OF CONTAINERS
					ANALYSIS REPORT																			
LF-11	6/11/97		W				X																	1
LF-21	↓		↓				↓																	1
LF-20																								1
LF-23																								1
LF-24																								1
LF-25	↓		↓				↓																	1

9706206

34244

CHROMALAB, INC.

ORGANIC RE-EXTRACTION REQUEST FORM

Date: 6/18/97

Requested By: BAA

X Diesel Analysis

___ Pesticides/PCB's Analysis

___ Semi-Volatile Analysis

Sub. #	Samp# / Client ID:	Need MS&MSD?	Reason for Re-extraction
9706117	135391/LF11		Silica gel
	135392/LF21		
	135393/LF20		
	135394/LF23		

Add-on
5 day TAT
per Jane Ackerman
TerraNext
thanks
Gary
6/18/97

Analyst Signature [signature] Date: 6/18/97

~~Organic Manager~~ Approval Date:

SEMIVOLATILES

DATE 06/18/97

CHROMALAB

Change request received by: G Cook

Date Requested: 6/25/97

SAMPLE STATUS CHANGE FORM

Submission#	Client Samp.ID	Old Status Description	Description of Changes	Requested by (Client's name)
9706206	LF-24 LF-25	Logged for Diesel w/SILICA GEL CLEAN-UP	Deleted as per G. Cook	

Changes were done in lims by(login): CRowley On: 6/25/97

CC: Lab.Director Dept.manager Analyst Proj.Manager

06117/135391 - 135396

CHAIN-OF-CUSTODY RECORD

34136

No. 20584

P.O. Box 24374 Oakland, CA 94623-1374

INDUSTRIAL COMPLIANCE ~~9838 OLD PLACERVILLE ROAD, SUITE 100 SACRAMENTO, CA 95827-3550~~ • Phone ~~916-362-8871~~ 510-238-9190 • FAX ~~916-362-8370~~ 510-238-9195

PROJECT NAME	PROJECT LOCATION
EMERYVILLE USTS	EMERYVILLE, CA

PROJ. NO.	PROJECT CONTACT	PROJECT TELEPHONE NO.
05100680	JAMES ACKERMAN	(510) 553-0600

CLIENT'S REPRESENTATIVE	PROJECT MANAGER/SUPERVISOR
	CARL TAYLOR

ITEM NO.	SAMPLE NUMBER	DATE	TIME	COMP	GRAB	SAMPLE LOCATION (INCLUDE MATRIX AND POINT OF SAMPLE)	NUMBER OF CONTAINERS	ANALYSIS DESIRED (INDICATE SEPARATE CONTAINERS) TEPH (8015)*
1	LF-11	6-11	0950		X	GROUND WATER SAMPLE FROM WELL LF-11	2	X
2	LF-21		1005		X	LF-21	2	X
3	LF-20		1050		X	LF-20	2	X
4	LF-23		1145		X	LF-23	2	X
5	LF-24		1225		X	LF-24	2	X
6	LF-25		1300		X	LF-25	2	X
7								
8								
9								
10								

URM #: 9706117 REP: GC
CLIENT: TERRA-OAK
DUE: 06/18/97
EF #: 34136

*HOLD SECOND BOTTLE OF EACH SAMPLE FOR POSSIBLE REANALYSIS FOR TEPH WITH SILICA GEL CLEANUP AFTER REVIEW OF INITIAL DATA

TRANSFER NUMBER	ITEM NUMBER	TRANSFERS RELINQUISHED BY	TRANSFERS ACCEPTED BY	DATE	TIME
1	6	James Ackerman		6/11/97	1608
2			Chris Rowley	6/11/97	1732
3					
4					

REMARKS

STANDARD 5 DAY T.A.T.

SEND COPIES OF CHROMATOGRAMS

P.O. # 24187

SAMPLER'S NAME: JAMES ACKERMAN

SAMPLER'S SIGNATURE:

COPY

CHROMALAB, INC.

Environmental Service (SDB)

Sample Receipt Checklist

Client Name: **TERRANEXT-OAKLAND** Date/Time Received: **06/11/97** | 1608

Reference/Submis: **34136** | **9706117** Received by: BM

Checklist completed by: Chris Rowley 6/12/97 Reviewed by: JN 6/12
Signature Date Initials | Date

Matrix: H2O Carrier name: Client - C/L

Shipping container/cooler in good condition?	Yes ✓	No	Not Present
Custody seals intact on shipping container/cooler?	Yes	No	Not Present ✓
Custody seals intact on sample bottles?	Yes	No	Not Present ✓
Chain of custody present?	Yes ✓	No	
Chain of custody signed when relinquished and received?	Yes ✓	No	
Chain of custody agrees with sample labels?	Yes ✓	No	
Samples in proper container/bottle?	Yes ✓	No	
Sample containers intact?	Yes ✓	No	
Sufficient sample volume for indicated test?	Yes ✓	No	
All samples received within holding time?	Yes ✓	No	
Container/Temp Blank temperature in compliance? Temp: 3.1 °C	Yes ✓	No	
Water - VOA vials have zero headspace? No VOA vials submitted ✓	Yes	No	

Water - pH acceptable upon receipt? YES Adjusted? ___ Checked by CK
chemist for VOAs

Any No and/or NA (not applicable) response must be detailed in the comments section below.

==========

Client contacted: _____ **Date contacted:** _____ **Person contacted:** _____

Contacted by: _____ **Regarding:** _____

Comments: _____

Corrective Action: _____

CHROMALAB, INC.

Environmental Services (SDB)

INVOICE

INVOICE NO: 033267

DATE: 06/27/97

JOB/PO NO: 05100

BILL TO: Terranext
Jeff Bishop
165 S. Union Blvd., Suite 1000
Lakewood, CO 80228

REPORT TO: James Ackerman
Terranext
7700 Edgewater Dr., Suite 549
Oakland, CA 94621

CUST NO: INDCOMP
FILE NO: 034244
COPY NO: 001
AE: MV

QTY.	ITEM NO.	DESCRIPTION	PRICE	AMOUNT
4	TPH-B1LUFT	Diesel - Soil	50.00	$200.00

TERMS: 2%-10/Net 30

SUBTOTAL	$200.00
DISCOUNT	$.00
	$.00
	$.00
	$.00
TOTAL	$200.00

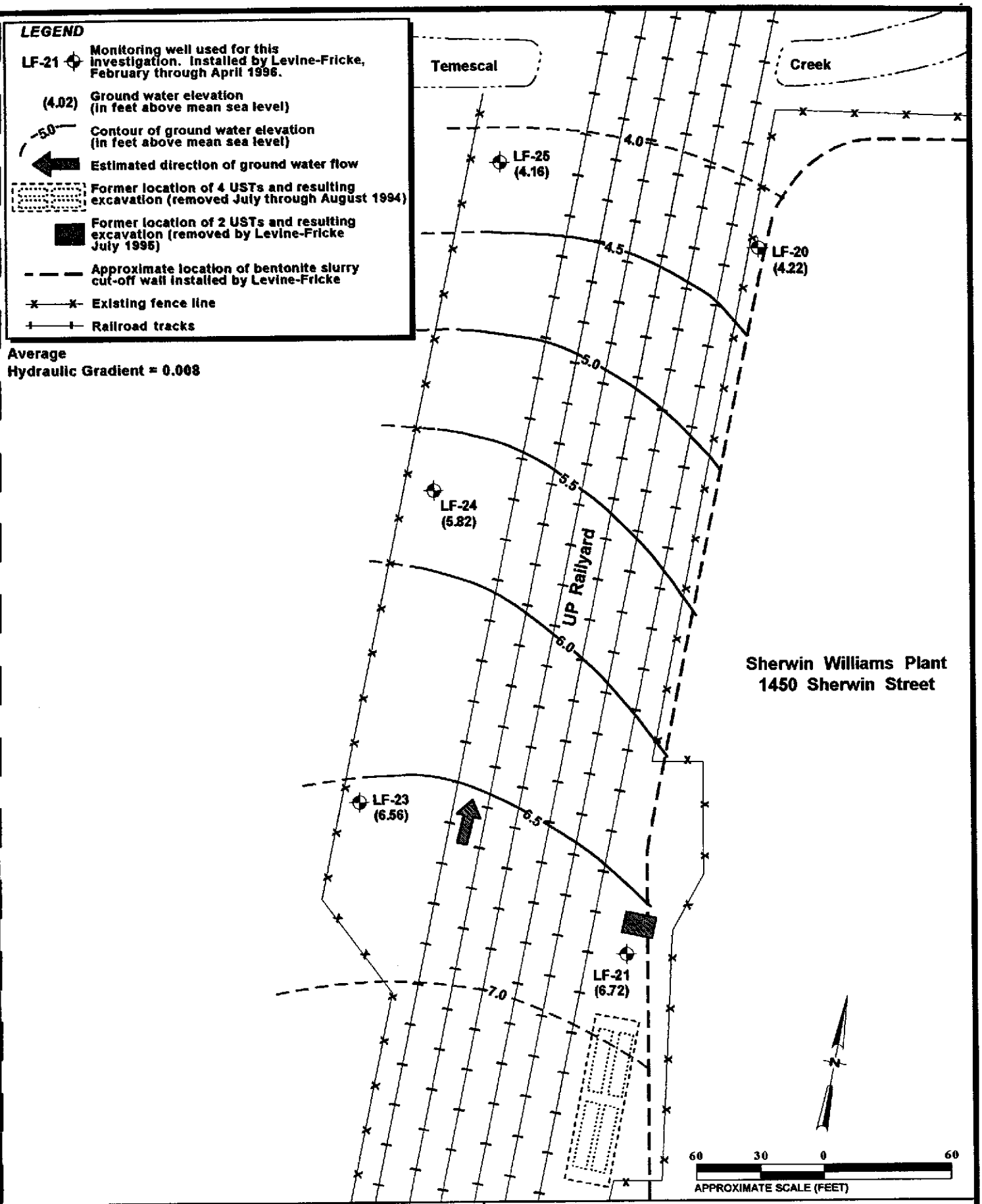
COMMENTS:
Submission # 9706206
Add-On To Submission # 9706117

Service Charge of Past Due Accounts: 1.5% per month - 18% annum

1220 Quarry Lane • Pleasanton, California 94566-4756
(510) 484-1919 • Facsimile (510) 484-1096
Federal ID #68-0140157

APPENDIX C

GROUND WATER ELEVATION CONTOUR MAPS
PREVIOUS MONITORING EVENTS

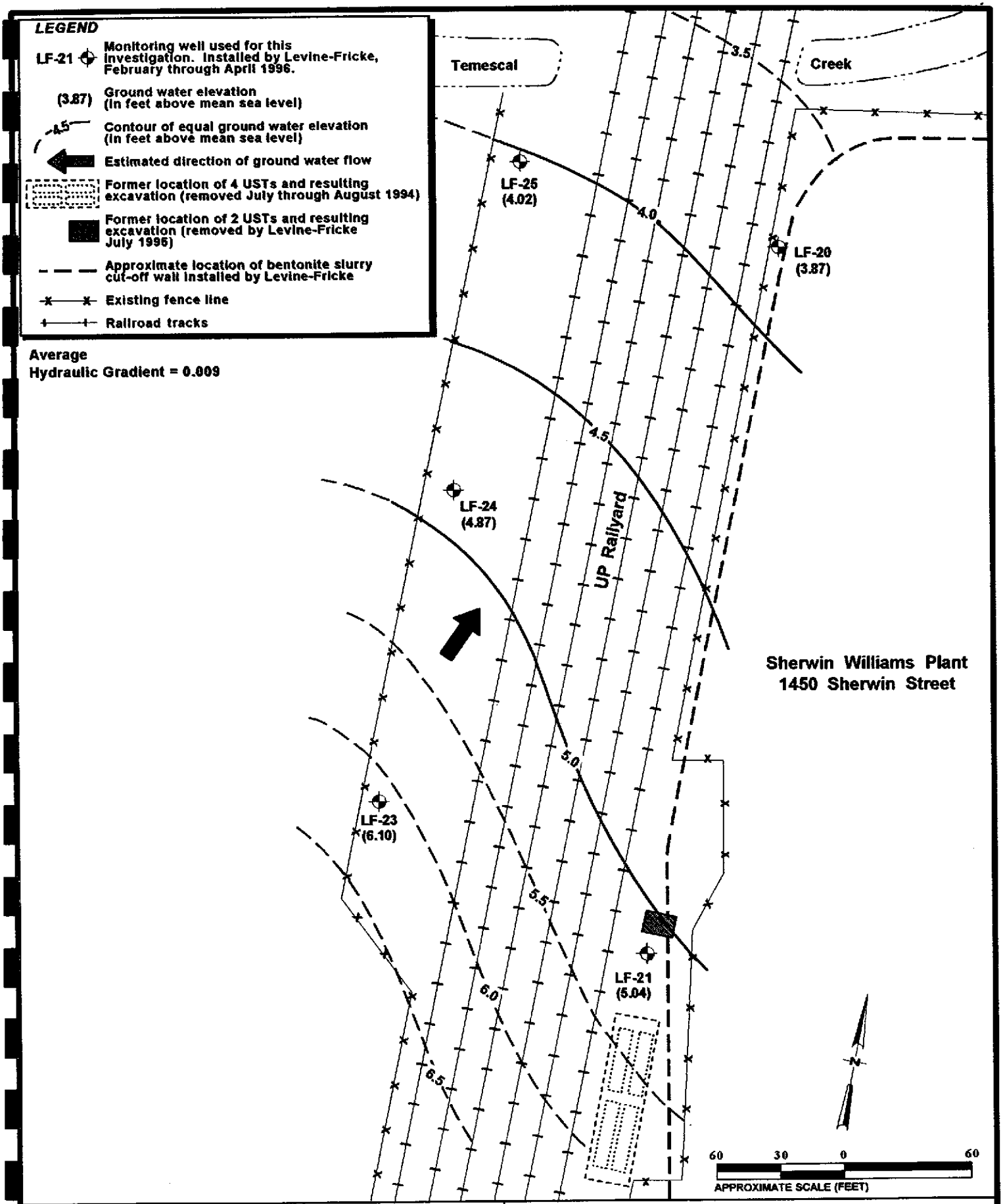


Project No.: 05100680	Figure No: 7
Scale: 1" = 60'	Page No.: -
File No.: D5001185	Drawn By: Janelle Hurtado
Date: 03/03/97	Approved By: James Ackerman

TerraNext

CONTOUR MAP OF GROUND WATER ELEVATIONS
APRIL 1996

UNION PACIFIC RAILROAD COMPANY
1450 SHERWIN STREET
EMERYVILLE, CALIFORNIA



Project No.: 05100680	Figure No.: 8
Scale: 1" = 60'	Page No.: -
File No.: D5001187	Drawn By: Janelle Hurtado
Date: 03/03/97	Approved By: James Ackerman

TerraNext

CONTOUR MAP OF GROUND WATER ELEVATIONS
NOVEMBER 1996

UNION PACIFIC RAILROAD COMPANY
1450 SHERWIN STREET
EMERYVILLE, CALIFORNIA