F

Oregon

March 31, 1997

LEIGH CARLSON
UNOCAL CERT NORTHERN REGION
PO BOX 76
SEATTLE WA 98111

DEPARTMENT OF
ENVIRONMENTAL
QUALITY

NORTHWEST REGION

RE: Unocal Station #4487
File No. 03-93-0049

Dear Mr. Carlson:

The Department of Environmental Quality has completed its review of the information submitted to date concerning the underground storage tank (UST) decommissioning and cleanup conducted at 1321 Main Street, Oregon City, Oregon. The Department has determined that the cleanup appears to have met the requirements of Oregon Administrative Rules (OAR) 340-122-205 through 340-122-360 and that no further action is required at this time.

This determination is a result of our evaluation and judgment based on the regulations and facts as we now understand them, including:

1. Gasoline contamination in soil was discovered near the northwestern dispenser island during installation of a stage II vapor recovery system. Additionally, gasoline, diesel, and heavier oil contamination in soil was discovered in the vicinity of monitoring well #1 and monitoring well #2 during supplemental site assessment activities.

2. A soil matrix score sheet was prepared for this site. Based on the available information and the results of the matrix score sheet, it was determined that soil matrix level II cleanup requirements [i.e. residual soil contaminant concentrations of gasoline $\leq$ 80 parts per million (ppm) and of diesel or heavier oils $\leq$ 500 ppm] are applicable to this site.

3. Supplemental site assessment activities detected two pockets of soil contamination remaining on site. One pocket is located on site along the vapor recovery trench with soil contamination detected to a depth no greater than 4.5 feet below land surface (bls) and a maximum concentration of 1,500 ppm utilizing analytical method TPH-G. The estimated volume of contaminated soil remaining in this pocket above the cleanup standards is 50 cubic yards. The second pocket of contaminated soil is located on site near monitoring well MW-2 near the intersection of Main Street and 14th Street with soil contamination detected to a depth no greater than 10 feet below land surface (bls) and a maximum concentration of 1,100 ppm utilizing analytical method TPH-G and 410 ppm utilizing analytical method TPH-D. The estimated volume of contaminated soil remaining in this pocket above the cleanup standards is 45 cubic yards.

John A. Kitzhaber
Governor

2020 SW Fourth Avenue
Suite 400
Portland, OR 97201-4987
(503) 229-5263 Voice
TTY (503) 229-5471
DEQ-1

4. Approximately 11 tons of petroleum contaminated soil were excavated and treated at Oregon Hydrocarbon, Inc. in Portland, Oregon, by thermal desorption.

5. Water was not observed in the excavation for the stage II vapor recovery system. However, four groundwater monitoring wells were installed and groundwater was encountered between 42.46 and 44.75 feet bls. The results of groundwater sampling for gasoline constituents indicated that none of the gasoline parameters (i.e. benzene, toluene, ethylbenzene, xylenes) were detected. Low concentrations of chloroform (up to 7.0 ug/l), tetrachloroethene (up to 3.7 ug/l), trichloroethene (up to 0.3 ug/l), and lead (up to 0.004 mg/l) were detected in the groundwater. All of these levels are below the regulatory cleanup criteria.

Two pockets of soil contamination still exists on this property which exceed currently required cleanup levels for this site, but which the Department approves leaving pursuant to OAR 340-122-355(4) since the removal of this contamination would endanger structures and utility lines on the property or be prohibitively expensive, and the contamination does not threaten human health, safety, welfare and the environment.

The Department's approval to leave the two pockets of contamination is based on the site conditions described in the report as they exist today. Should conditions change allowing access to the contamination, you are responsible for further evaluation of the remaining contamination and any cleanup necessary at that time. You are also responsible for notifying potential purchasers of the property about this remaining pocket of contamination.

The Department's determination will not be applicable if new or undisclosed facts show that the cleanup does not comply with the referenced rules. The Department's determination also does not apply to any conditions at the site other than the release of the petroleum product specifically addressed in the report(s).

Please note that pursuant to OAR 340-122-360(2), a copy of your report must be retained until ten (10) years after the first transfer of the property. We recommend that a copy of this information be kept with the permanent facility records.

Your efforts to comply with the regulations to ensure that your facility has been adequately cleaned up have been appreciated. If you have any questions, please feel free to contact me at (503) 229-5493.

Sincerely,

Steven L. Hooper
UST Cleanup Specialist

cc: Patrick J. Sullivan
GeoEngineers, Inc.
7504 SW Bridgeport Road
Portland, OR 97224

UC4487.NFA

Geo Engineers

7504 SW Bridgeport Road
Portland, Oregon 97224
Telephone: (800) 446-4987
Fax: (503) 620-8046

FAX TRANSMITTAL

To: Department of Environmental Quality
Northwest Region
Portland, Oregon

Date: December 13, 1996

File: 0161-331-62

Fax Number: 229-6945

Attention: Mr. Steven Hooper

Regarding: Estimate of hydrocarbon-contaminated remaining in place at Unocal Service Station 4487

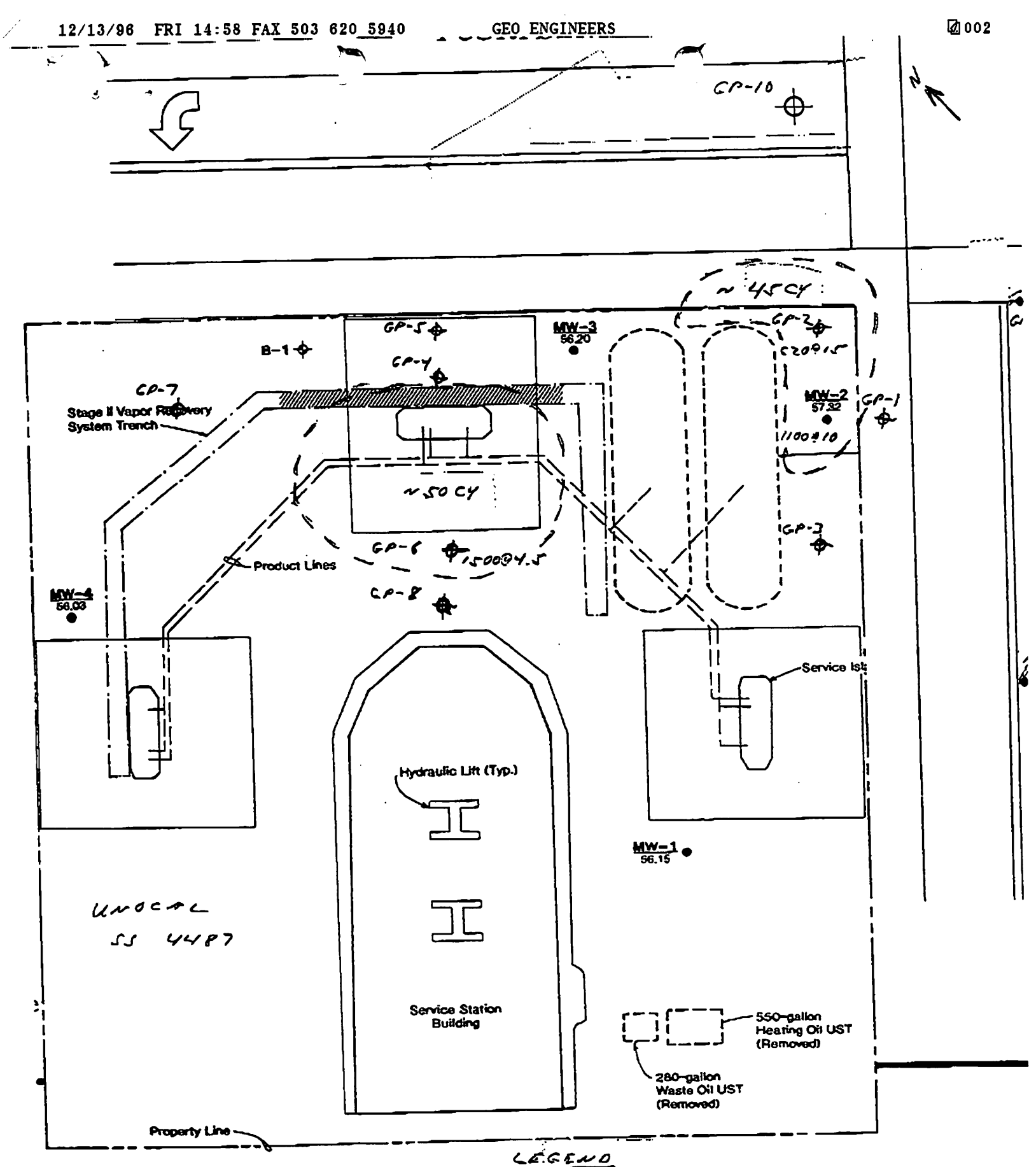
Pages	Date	Description
1	12/13/96	Fax Transmittal
1		Figure

Total Pages: 2

Comments: The attached figure shows our estimate of the areal extent of hydrocarbon-contaminated soil remaining in place at Unocal Service Station 4487. Approximately 50 cubic yards of gasoline-contaminated soil remains in the vicinity of the northeast service island, and approximately 45 cubic yards of gasoline-contaminated soil remains in the vicinity of the USTs. We used boring logs, field screening results and chemical analytical data in deriving this estimate. Please call if you have questions.

Signed: _____

Patrick J. Sullivan



LEGEND

LEVEL 2:

80 MG/KG GAS

500 MG/KG DIESEL + OIL

APPROX. EXTENT OF CONTAMINATED SOIL (> LEVEL 2) REMAINING IN PLACE

~50 CY APPROX. VOLUME (IN PLACE) OF CONTAMINATED SOIL

Oregon

DEPARTMENT OF
ENVIRONMENTAL
QUALITY

NORTHWEST REGION

November 29, 1996

LEIGH CARLSON
UNOCAL CERT NORTHERN REGION
PO BOX 76
SEATTLE WA 98111

RE: Unocal Station #4487
File No. 03-93-0049

Dear Mr. Carlson:

The Department of Environmental Quality (DEQ) has reviewed the report entitled "Supplemental Subsurface Geoprobe Exploration Results," dated November 25, 1996 regarding the ongoing cleanup located at 1321 Main Street, Oregon City, Oregon. Based on this review, please provide a volume estimate of soil contamination remaining on site above matrix cleanup requirements.

Please provide the requested information by **February 7, 1997.** The Department appreciates your efforts in complying with the UST Regulations. If you have any questions, please call me at (503) 229-5493.

Sincerely,

Steven L. Hooper
UST Cleanup Specialist

cc: Patrick J. Sullivan
GeoEngineers, Inc.
7504 SW Bridgeport Road
Portland, OR 97224

John A. Kitzhaber
Governor

2020 SW Fourth Avenue
Suite 400
Portland, OR 97201-4987
(503) 229-5263 Voice
TTY (503) 229-5471
DEQ-1

Steve H.

GeoEngineers

November 25, 1996

DEPT OF ENVIRONMENTAL QUALITY
RECEIVED
NOV 2 6 1996
NORTHWEST REGION

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

Unocal ERS - West Region
P.O. Box 76
Seattle, Washington 98111

Attention: Mr. Leigh Carlson

03-93-0049

Supplemental Subsurface Geoprobe
Exploration Results
Unocal Service Station 4487
1321 Main Street
Oregon City, Oregon
File No. 0161-331-62

INTRODUCTION

The purpose of this letter is to transmit the analytical laboratory testing results of soil samples obtained from Geoprobe explorations conducted at Unocal Service Station 4487 in Oregon City on November 4, 1996. The site is located at 1321 Main Street. The DEQ (Oregon Department of Environmental Quality) UST (underground storage tank) Cleanup List number for this site is 03-90-0513.

NOVEMBER 4, 1996 SUBSURFACE STUDY

On November 4, 1996, GeoTech Explorations, Inc. of Tualatin, Oregon drilled one on-site Geoprobe soil boring (GP-8) and two off-site Geoprobe soil borings (GP-9 and GP-10) to evaluate the extent of petroleum hydrocarbon-contaminated soil encountered beneath the site during previous studies. Soil samples were obtained continuously from the borings for field screening using visual, headspace vapor and sheen screening methods. Select soil samples were submitted to a laboratory for chemical analysis. The laboratory reports are attached.

Boring GP-8 was drilled to an approximate depth of 20.0 feet between the northeast service island and the service station building at the approximate location shown in Figure 1. Based on the field screening results, two soil samples (GP-8-4.0 and GP-8-8.0) were selected from boring GP-8 for qualitative analysis of petroleum hydrocarbons by DEQ Method TPH-HCID. Petroleum hydrocarbons were not detected in sample GP-8-4.0. Gasoline- and diesel-range

GeoEngineers, Inc.
7504 SW Bridgeport Road
Portland, OR 97224
Telephone (503) 624-9274
Fax (503) 620-5940

Printed on recycled paper.

hydrocarbons were not detected in sample GP-8-8.0; oil-range hydrocarbons were detected in sample GP-8-8.0. Sample GP-8-8.0 was quantitatively analyzed for oil-range hydrocarbons by DEQ Method TPH-418.1M. Oil-range hydrocarbons were not quantitatively detected in GP-8-8.0.

Boring GP-9 was drilled in Main Street and boring GP-10 was drilled in 14th Street to an approximate depth of 20.0 feet. The approximate locations of GP-9 and GP-10 are shown in Figure 2. Based on the field screening results, samples GP-9-10.0 and GP-9-14.0 for boring GP-9 and GP-10-10.0 and GP-10-14.0 from boring GP-10 were qualitatively analyzed for petroleum hydrocarbons by DEQ Method TPH-HCID. Petroleum hydrocarbons were not detected in soil samples GP-9-10.0, GP-9-14.0, GP-10 GP-10-10.0 and GP-10-14.0.

Based on the results of this study and previous studies, Unocal plans to abandon the monitoring wells at this site in the near future.

LIMITATIONS

We have prepared this letter for use by Unocal ERS - West Region. This letter may be made available to regulatory agencies. The letter is not intended for use by others and the information contained herein is not applicable to other sites.

Our interpretations of subsurface conditions are based on data from widely spaced borings at the site. It is always possible that contamination may exist in areas of the site that were not explored by drilling.

Within the limitations of scope and budget, our services have been executed in accordance with generally accepted practices in this area at the time this letter was prepared. No warranty, express or implied, should be understood.

Please call if you have questions regarding this project.

Yours very truly,

GeoEngineers, Inc.

Patrick J. Sullivan, R.G.
Project Geologist

Robert E. Belding for

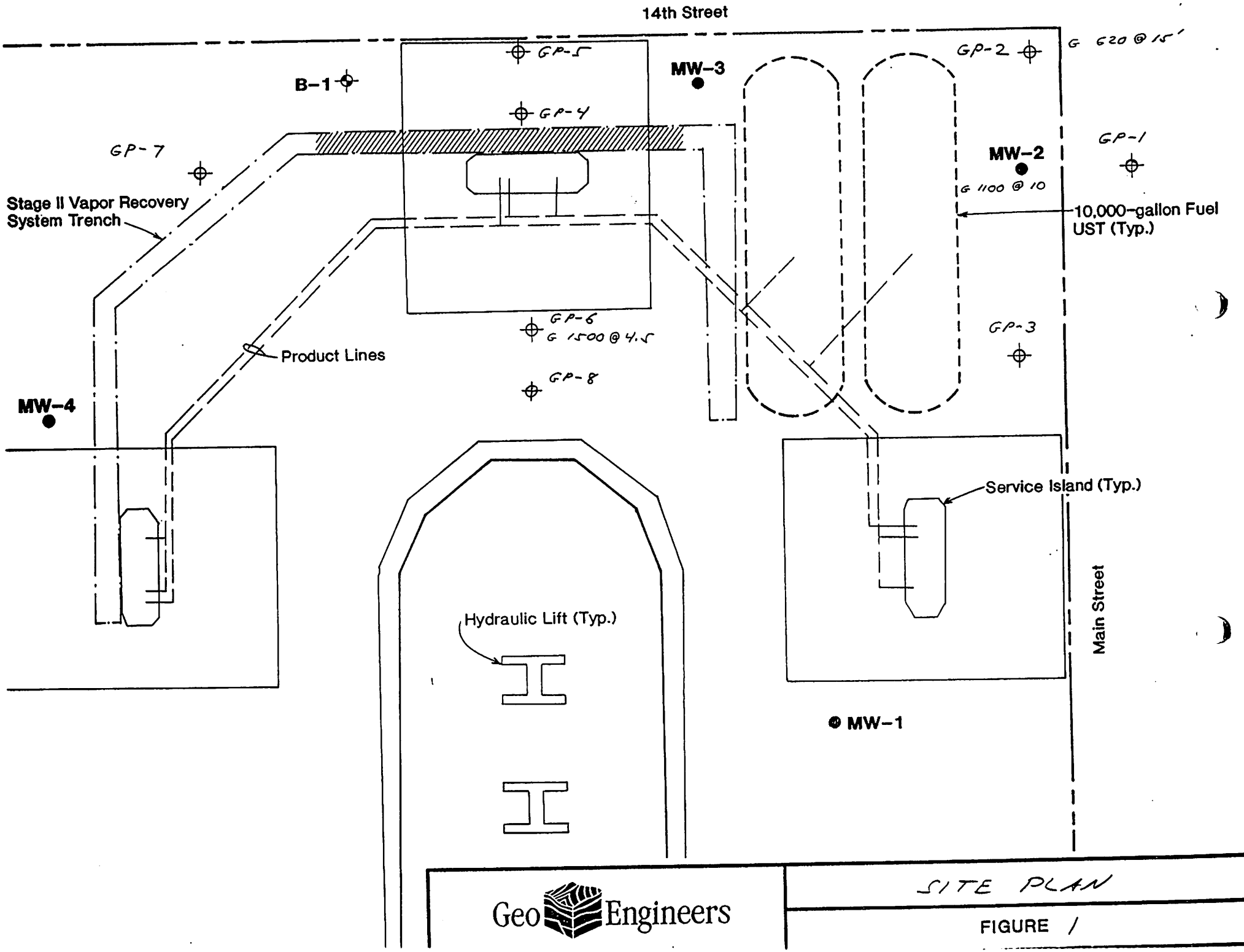
Julia Fowler, P.E.
Associate

PJS:JF:mln
Document ID: 01613311.go2

Attachments

Two copies submitted

cc: Mr. Steve Hooper
Oregon Department of Environmental Quality



Geo Engineers

SITE PLAN

FIGURE 1

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

Offices:
BOTHELL ■ (206) 481-9200 ■ FAX 485-2992
SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 643-9200 ■ FAX 644-2202

Correspondence to: 18939 - 120th Ave. NE, #101, Bothell, WA 98011

GeoEngineers, Inc.	Project:	UNOCAL #4487, Oregon City, OR	Sampled: 11/4/96
7504 S.W. Bridgeport Road	Project Number:	0161-331-62	Received: 11/5/96
Portland, OR 97224	Project Manager:	Pat Sullivan	Reported: 11/11/96 13:16

ANALYTICAL REPORT FOR SAMPLES:

Sample Description	Laboratory Sample Number	Sample Matrix	Date Sampled
GP-8-4.0	P611066-01	Soil	11/4/96
GP-8-8.0	P611066-02	Soil	11/4/96
GP-9-14.0	P611066-03	Soil	11/4/96
GP-9-10.0	P611066-04	Soil	11/4/96
GP-10-10.0	P611066-05	Soil	11/4/96
GP-10-14.0	P611066-06	Soil	11/4/96

GeoEngineers

NOV 2 0 1996

Routing _____

File _____

The results in this report apply to the samples analyzed in accordance with the chain of custody documen
This analytical report must be reproduced in its entiret

Philip Nerenberg, Laboratory Manager

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

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7504 S.W. Bridgeport Road	Project Number:	0161-331-62	Received: 11/5/96
Portland, OR 97224	Project Manager:	Pat Sullivan	Reported: 11/11/96 13:16

Hydrocarbon Identification per Oregon DEQ Method HCID
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
GP-8-4.0			**P611066-01**				**Soil**	
Gasoline Range Hydrocarbons	1160026	11/6/96	11/6/96		20.0	ND	mg/kg	
Diesel Range Hydrocarbons	"	"	"		50.0	ND	"	
Heavy Oil Range Hydrocarbons	"	"	"		100	ND	"	
Surrogate: 1-Chlorooctadecane	"	"	"	*50.0-150*		*103*	*%*	
GP-8-8.0			**P611066-02**				**Soil**	
Gasoline Range Hydrocarbons	1160026	11/6/96	11/7/96		20.0	ND	mg/kg	
Diesel Range Hydrocarbons	"	"	"		50.0	ND	"	1
Heavy Oil Range Hydrocarbons	"	"	"		100	**DET**	"	
Surrogate: 1-Chlorooctadecane	"	"	"	*50.0-150*		*88.0*	*%*	
GP-9-14.0			**P611066-03**				**Soil**	
Gasoline Range Hydrocarbons	1160026	11/6/96	11/6/96		20.0	ND	mg/kg	
Diesel Range Hydrocarbons	"	"	"		50.0	ND	"	
Heavy Oil Range Hydrocarbons	"	"	"		100	ND	"	
Surrogate: 1-Chlorooctadecane	"	"	"	*50.0-150*		*99.5*	*%*	
GP-9-10.0			**P611066-04**				**Soil**	
Gasoline Range Hydrocarbons	1160026	11/6/96	11/6/96		20.0	ND	mg/kg	
Diesel Range Hydrocarbons	"	"	"		50.0	ND	"	
Heavy Oil Range Hydrocarbons	"	"	"		100	ND	"	
Surrogate: 1-Chlorooctadecane	"	"	"	*50.0-150*		*98.3*	*%*	
GP-10-10.0			**P611066-05**				**Soil**	
Gasoline Range Hydrocarbons	1160026	11/6/96	11/7/96		20.0	ND	mg/kg	
Diesel Range Hydrocarbons	"	"	"		50.0	ND	"	
Heavy Oil Range Hydrocarbons	"	"	"		100	ND	"	
Surrogate: 1-Chlorooctadecane	"	"	"	*50.0-150*		*101*	*%*	
GP-10-14.0			**P611066-06**				**Soil**	
Gasoline Range Hydrocarbons	1160026	11/6/96	11/7/96		20.0	ND	mg/kg	
Diesel Range Hydrocarbons	"	"	"		50.0	ND	"	
Heavy Oil Range Hydrocarbons	"	"	"		100	ND	"	
Surrogate: 1-Chlorooctadecane	"	"	"	*50.0-150*		*98.0*	*%*	

North Creek Analytical, Inc.

**Refer to end of report for text of notes and definition*

Jay Clary for
Philip Nevenberg, Laboratory Manager

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

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PORTLAND ■ (503) 643-9200 ■ FAX 644-2202

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7504 S.W. Bridgeport Road	Project Number:	0161-331-62	Received: 11/5/96
Portland, OR 97224	Project Manager:	Pat Sullivan	Reported: 11/11/96 13:16

Hydrocarbon Identification per Oregon DEQ Method HCID/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit / Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 1160026	**Date Prepared: 11/6/96**					**Extraction Method: HCID (OR)**				
Blank	**1160026-BLK1**									
Gasoline Range Hydrocarbons	11/6/96			ND	mg/kg	20.0				
Diesel Range Hydrocarbons	"			ND	"	50.0				
Heavy Oil Range Hydrocarbons	"			ND	"	100				
Surrogate: 1-Chlorooctadecane	"	*DET*		*DET*	"	*50.0-150*	*102*			

North Creek Analytical, Inc.

**Refer to end of report for text of notes and definitions*

Philip Nerenberg, Laboratory Manager

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

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GeoEngineers, Inc.	Project:	UNOCAL #4487, Oregon City, OR	Sampled:	11/4/96
7504 S.W. Bridgeport Road	Project Number:	0161-331-62	Received:	11/5/96
Portland, OR 97224	Project Manager:	Pat Sullivan	Reported:	11/11/96 13:16

Notes and Definitions

#	Note
1	Detected hydrocarbons appear to be due to overlap of heavy/oil range hydrocarbons.
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
Recov.	Recovery
RPD	Relative Percent Difference

North Creek Analytical, Inc.

Philip Nerenberg, Laboratory Manager

user modified

HCID
09-8-96

Data File Name : C:\HPCHEM\1\DATA\S110696\011F0201.D

Operator	: LQN	Page Number	: 1
Instrument	: DUALFID1	Vial Number	: 11
Sample Name	: 611066-2	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 2
Acquired on	: 07 Nov 96 01:33 AM	Instrument Method	: HCID.MTH
Report Created on	: 07 Nov 96 02:13 AM	Analysis Method	: HCID.MTH
Last Recalib on	: 06 NOV 96 08:28 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

W/O CUST. C
18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508 (206) 481-9200 FAX 485-2992
East 11115 Montgomery, Suite B, Spokane, WA 99206-4779 (509) 924-9200 FAX 924-9290
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132 (503) 643-9200 FAX 644-2202

NORTH CREEK ANALYTICAL

UNOCAL CHAIN OF CUSTODY REPORT

UNOCAL INFORMATION

Facility Number: 4487
Site Address: 1321 Main Street
City, State, ZIP: Oregon City OR 97045
Site Release Number:
Unocal Manager:
CERT INFO: (check one) [X] Evaluation o Remediation o Detection o Demolition o Closure o Miscellaneous

CONSULTANT INFORMATION

Firm: GEI
Project Number: 0161-331-62
Address: 7504 SW Bridgeport Road Portland, OR 97224
Phone: (503) 624-9274
Fax: (503) 620-5940
Project Manager: PJS
Sample Collection by: CRH

Chain of Custody Record #: P611066

Quality Assurance Data Level: A [X] B
A: Standard Summary
B: Standard + Chromatograms

Laboratory Turnaround Days: 10 5 3 2 1

[X] Oregon o Washington Hydrocarbon Methods

SAMPLE IDENTIFICATION	SAMPLING DATE / TIME	MATRIX (W,S,O)	# OF CONTAINERS	TPH-HCID	TPH-Gas	BTEX (EPA 8020 Mod.)	TPH-Gas + BTEX	TPH-Diesel	TPH-Diesel Extended	TPH-418.1	Halogen. Volatiles (EPA 8010)	Aromatic Volatiles (EPA 8020)	Pesticides/PCBs or PCBs Only	GC/MS Volatiles (EPA 8240/8260)	GC/MS SemiVols. (EPA 8270)	PAHs by HPLC (EPA 8310)	Lead: Total or Dissolved	TCLP Metals (8)					NCA SAMPLE NUMBER
1. GP-8-4.0	11/4/96	S	1 4oz Jar	X and follow-up																			
2. GP-8-8.0	"	"	"	"					(X)														
3. GP-9-14.0	"	"	"	"					"														
4. GP-9-10.0	"	"	"	"					"														
5. GP-10-10.0	"	"	"	"					"														
6. GP-10-14.0	"	"	"	"					"														
7.																							
8.																							
9.																							
10.																							

	Relinquished by:	Firm:	Date & Time	Received by:	Firm:	Date & Time
1.	[signature]	GEI	11/5/96 1010	[signature]	NCA	11-5-96 1037
2.	[signature]	NCA	11-5-96 1350	Dana [signature]	NCA	11/5/96 1350
3.						

Final Report Approval

Were all requested results provided? [X] yes no
Were results within requested turnaround? [X] yes no
Define "No" on back
Final Approval Signature: [signature]
Firm: GEI
Date: 11/21/96

Page 1 of 1
Rev. 2.2, 11/94

Comments:

Distribution: White - Laboratory Yellow - Consultant Photocopy - Unocal

9

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

Offices:
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SPOKANE ■ (509) 924-9200 ■ FAX 924-9290
PORTLAND ■ (503) 643-9200 ■ FAX 644-2202

Correspondence to: 18939 - 120th Ave. NE, #101, Bothell, WA 98011

GeoEngineers, Inc.	Project:	UNOCAL #4487, Oregon City, OR	Sampled: 11/4/96
7504 S.W. Bridgeport Road	Project Number:	0161-331-62	Received: 11/5/96
Portland, OR 97224	Project Manager:	Pat Sullivan	Reported: 11/14/96 09:20

GeoEngineers
NOV 18 1996
Routing
File

ANALYTICAL REPORT FOR SAMPLES:

Sample Description	Laboratory Sample Number	Sample Matrix	Date Sampled
GP-8-8.0	P611169-01	Soil	11/4/96

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

Jay Chang for
Philip Nelenberg, Laboratory Manager

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

Offices:
BOTHELL ■ (206) 481-9200 ■ FAX 485-2992
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GeoEngineers, Inc.	Project:	UNOCAL #4487, Oregon City, OR	Sampled: 11/4/96
7504 S.W. Bridgeport Road	Project Number:	0161-331-62	Received: 11/5/96
Portland, OR 97224	Project Manager:	Pat Sullivan	Reported: 11/14/96 09:20

Heavy Oil Range Hydrocarbons per Oregon DEQ Method 418.1 (modified)
North Creek Analytical - Portland

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
GP-8-8.0			P611169-01				Soil	
Petroleum Oil Hydrocarbons	1160075	11/11/96	11/11/96	DEQ 418.1 M	20.0	ND	mg/kg	

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

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BOTHELL ■ (206) 481-9200 ■ FAX 485-2992
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Correspondence to: 18939 - 120th Ave. NE, #101, Bothell, WA 98011

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Portland, OR 97224	Project Manager:	Pat Sullivan	Reported: 11/14/96 09:20

Heavy Oil Range Hydrocarbons per Oregon DEQ Method 418.1 (modified)/Quality Control
North Creek Analytical - Portland

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit / Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 1160075	**Date Prepared: 11/11/96**					**Extraction Method: TPH 418.1 (OR)**				
Blank	**1160075-BLK1**									
Petroleum Oil Hydrocarbons	11/11/96			ND	mg/kg	20.0				
Blank Spike	**1160075-BS1**									
Petroleum Oil Hydrocarbons	11/11/96	125		97.3	mg/kg	50.0-150	77.8			
Duplicate	**1160075-DUP1**		**P611146-01**							
Petroleum Oil Hydrocarbons	11/11/96		63.7	59.8	mg/kg			50.0	6.32	
Duplicate	**1160075-DUP2**		**P611126-02**							
Petroleum Oil Hydrocarbons	11/11/96		105	300	mg/kg			50.0	96.3	

NORTH CREEK ANALYTICAL
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Portland, OR 97224	Project Manager: Pat Sullivan	Reported: 11/14/96 09:20

Notes and Definitions

#	Note
1	Analyses are not controlled on RPD values from sample concentrations less than 5 times the reporting limit.
2	Sample QC appears to be non-homogenous
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
Recov.	Recovery
RPD	Relative Percent Difference

North Creek Analytical, Inc.

Jay Craig for
Philip Nerenberg, Laboratory Manager

NORTH CREEK ANALYTICAL
18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508 (206) 481-9200 FAX 485-2992
East 11115 Montgomery, Suite B, Spokane, WA 99206-4779 (509) 924-9200 FAX 924-9290
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132 (503) 643-9200 FAX 644-2202

UNOCAL CHAIN OF CUSTODY REPORT

UNOCAL INFORMATION

Facility Number: 4487
Site Address: 1321 Main Street
City, State, ZIP: Oregon City OR 97045
Site Release Number:
Unocal Manager:
CERT INFO: (check one) ☒ Evaluation o Remediation
o Detection o Demolition o Closure o Miscellaneous

CONSULTANT INFORMATION

Firm: GEI Project Number: 0161-331-62
Address: 7504 SW Bridgeport Road
Portland, OR 97224
Phone: (503) 624-9274 Fax: (503) 620-5940
Project Manager: PJS
Sample Collection by: CRH

Chain of Custody Record #: PG 11066

Quality Assurance Data Level: A ☒ B
A: Standard Summary
B: Standard + Chromatograms

Laboratory Turnaround Days: 10 5 3 2 1

☒ Oregon o Washington Hydrocarbon Methods

SAMPLE IDENTIFICATION	SAMPLING DATE / TIME	MATRIX (W,S,O)	# OF CONTAINERS	TPH-HCID	TPH-Gas	BTEX (EPA 8020 Mod.)	TPH-Gas + BTEX	TPH-Diesel	TPH-Diesel Extended	TPH-418.1	Halogen. Volatiles (EPA 8010)	Aromatic Volatiles (EPA 8020)	Pesticides/PCBs or PCBs Only	GC/MS Volatiles (EPA 8240/8260)	GC/MS SemiVols. (EPA 8270)	PAHs by HPLC (EPA 8310)	Lead: Total or Dissolved	TCLP Metals (8)	NCA SAMPLE NUMBER
1. GP-8-4.0	11/4/96	S	4oz 1 jar	☒	and		follow	-up											
2. GP-8-8.0	"	"	"						"										
3. GP-9-14.0	"	"	"						"										
4. GP-9-10.0	"	"	"						"										
5. GP-10-10.0	"	"	"						"										
6. GP-10-14.0	"	"	"						"										
7.																			
8.																			
9.																			
10.																			

Relinquished by:	Firm:	Date & Time	Received by:	Firm:	Date & Time
1.	GEI	11/5/96 1010		NCA	11-5-96 1037
2.	NCA	11-5-96 1350		NCA	11/5/96 1350
3.					

Final Report Approval

Were all requested results provided? ☒ yes ☐ no Define
Were results within requested turnaround? ☒ yes ☐ no "No" on back
Final Approval Signature:
Firm: GEI Date: 11/21/96

Page 1 of 1
Rev. 2.2, 11/94

Comments:

Distribution: White - Laboratory Yellow - Consultant Photocopy - Unocal

Oregon

DEPARTMENT OF
ENVIRONMENTAL
QUALITY

NORTHWEST REGION

September 6, 1996

LEIGH CARLSON
UNOCAL CERT NORTHERN REGION
PO BOX 76
SEATTLE WA 98111

RE: Unocal Station #4487
File No. 03-93-0049

Dear Mr. Carlson:

The Department of Environmental Quality (DEQ) has reviewed the recent fax submittal received on September 6, 1996 depicting proposed supplemental soil boring locations for the ongoing cleanup located at 1321 Main Street, Oregon City, Oregon. Based on this review and a review of the file, the DEQ approves of the sampling locations as depicted with the addition that the soil between GP-6 and the service station building also be sampled.

Please provide the results from the required supplemental assessment by **November 1, 1996.** The Department appreciates your efforts in complying with the UST Regulations. If you have any questions, please call me at (503) 229-5493.

Sincerely,

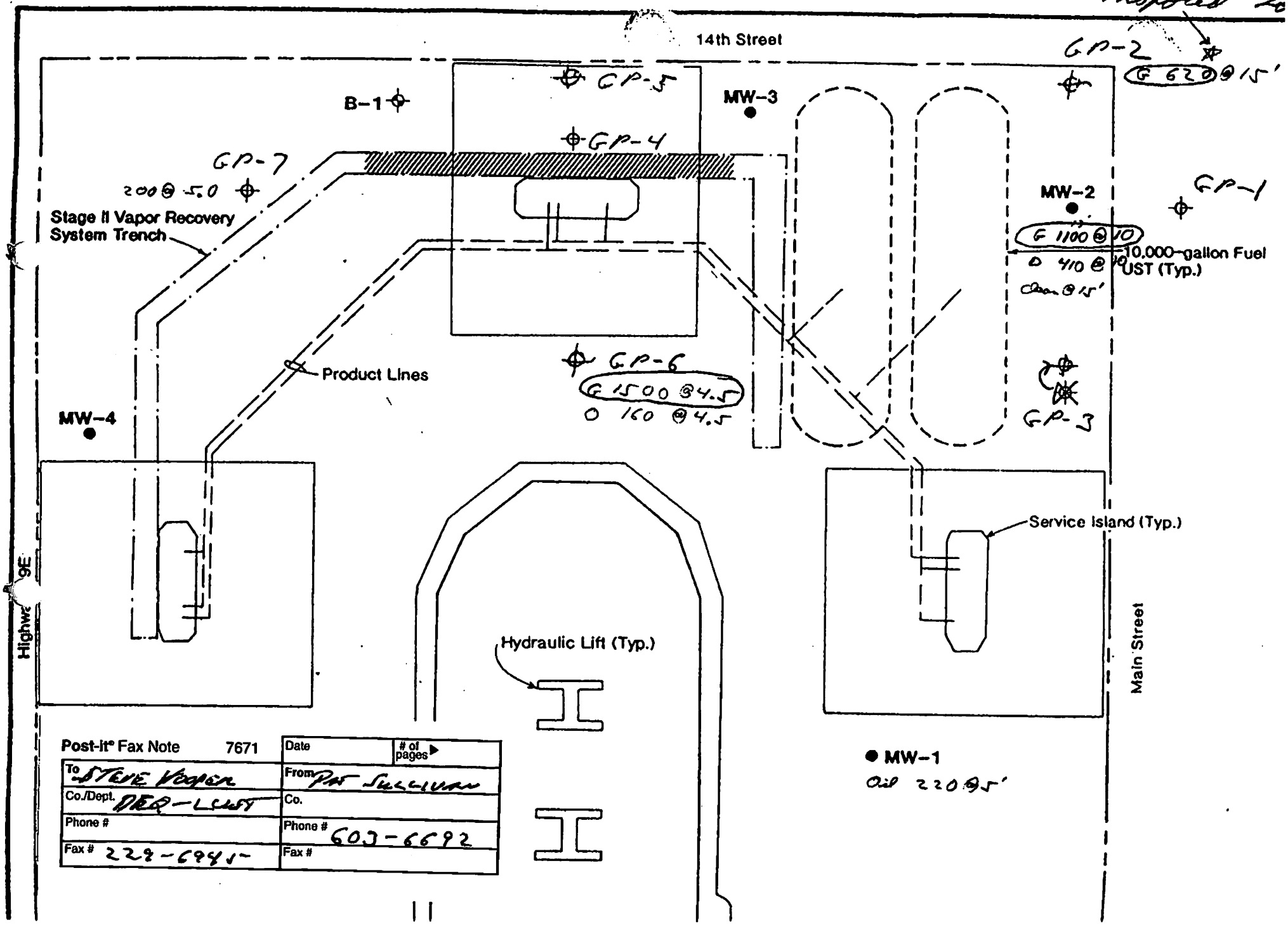
Steven L. Hooper
UST Cleanup Specialist

cc: Patrick J. Sullivan
GeoEngineers, Inc.
7504 SW Bridgeport Road
Portland, OR 97224

John A. Kitzhaber
Governor

2020 SW Fourth Avenue
Suite 400
Portland, OR 97201-4987
(503) 229-5263 Voice
TTY (503) 229-5471
DEQ-1

001 GEO ENGINEERS 09/06/96 FRI 11:03 FAX 503 620 5940



Post-it® Fax Note 7671	Date	# of pages ▶
To Steve Kogler	From Pat Sullivan	
Co./Dept. DEQ-LUST	Co.	
Phone #	Phone # 603-6692	
Fax # 229-6945	Fax #	

F

Oregon

DEPARTMENT OF
ENVIRONMENTAL
QUALITY

NORTHWEST REGION

August 22, 1996

LEIGH CARLSON
UNOCAL CERT NORTHERN REGION
PO BOX 76
SEATTLE WA 98111

RE: Unocal Station #4487
File No. 03-93-0049

Dear Mr. Carlson:

The Department has reviewed the recent submittal dated August 12, 1996 pertaining to the ongoing cleanup located at 1321 Main Street, Oregon City, Oregon. Based on this review and a review of the file, it appears that soil matrix rules apply to the petroleum cleanup at the site. Therefore, additional investigation will be required in order to define the full horizontal extent and to provide a volume estimate of soil contamination remaining on site above matrix cleanup requirements.

Please provide the above requested information by **October 27, 1996.** The Department appreciates your efforts in complying with the UST Regulations. If you have any questions, please call me at (503) 229-5493.

Sincerely,

Steven L. Hooper
UST Cleanup Specialist

cc: Patrick J. Sullivan
GeoEngineers, Inc.
7504 SW Bridgeport Road
Portland, OR 97224

John A. Kitzhaber
Governor

2020 SW Fourth Avenue
Suite 400
Portland, OR 97201-4987
(503) 229-5263 Voice
TTY (503) 229-5471

DEQ-1

03-93 0049

GeoEngineers

7504 SW Bridgeport Road
Portland, Oregon 97224
Telephone: (800) 446-4987
Fax: (503) 620-8046

LETTER OF TRANSMITTAL

To: Department of Environmental Quality
2020 Southwest Fourth Avenue, Suite 400
Portland, Oregon 97201-4987

Date: August 12, 1996

File: 0161-331-62

DEPT OF ENVIRONMENTAL QUALITY
RECEIVED

AUG 13 1996

NORTHWEST REGION

Attention: Mr. Steven L. Hooper

Regarding: Information related to Unocal Service Station 4487 in Oregon City

We are sending: ☒ Attached ☐ Under Separate Cover

Copies	Date	Description
1		Figure 2
1	07/15/96	Lab Data

These are transmitted as checked below:

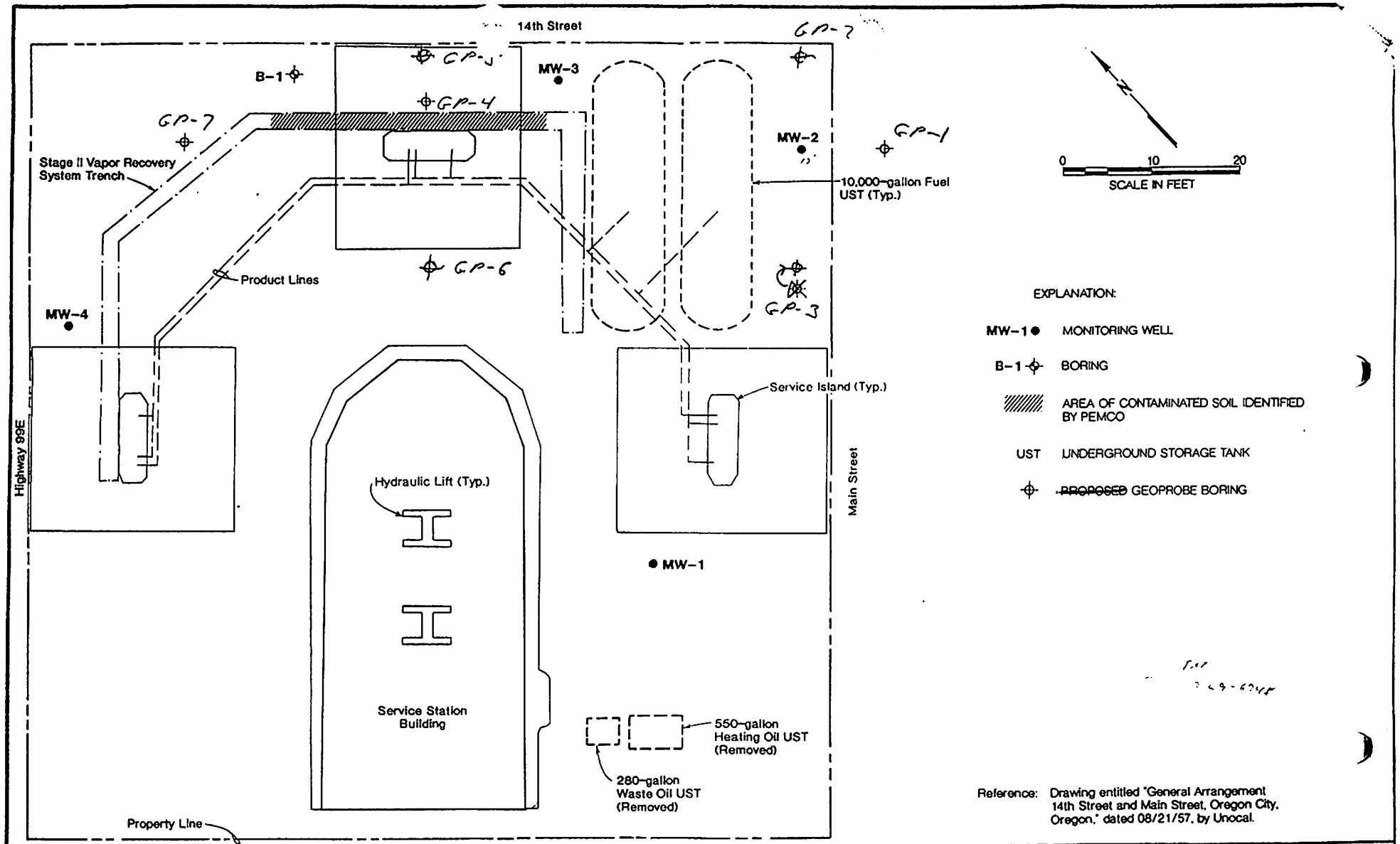
☐ For Your Use
☐ For Review and Comment
☒ As Requested
☐ Other (see remarks)
☐ Returned

Remarks: As you requested in your letter dated August 1, 1996, we have enclosed a site plan showing the approximate locations of the Geoprobe soil borings drilled at the site in June. We also have included a copy of the laboratory data. The laboratory data should have been attached to our letter dated July 31, 1996. Please call if you have questions.

Copy To: Mr. Leigh Carlson
Unocal ERS - West Region

Signed:

Patrick J. Sullivan



Reference: Drawing entitled "General Arrangement 14th Street and Main Street, Oregon City, Oregon," dated 08/21/57, by Unocal.

161-331-P18 PJS:MAD 06/15/93

Geo Engineers

CURRENT SITE PLAN

FIGURE 2

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

BOTHELL ▪ (206) 481-9200 ▪ FAX 485-2992
SPOKANE ▪ (509) 924-9200 ▪ FAX 924-9290
PORTLAND ▪ (503) 643-9200 ▪ FAX 644-2202

161-331

GeoEngineers
JUL 17 1996
Routing
File

July 15, 1996

GeoEngineers, Inc.
7504 S.W. Bridgeport Road
Portland, OR 97224

Attention: Pat Sullivan

RE: JOB # 0161-331-62
P.O.#
PROJECT - UNOCAL 4487, OREGON CITY, OR

Enclosed are test results for your samples received in this lab on Jun. 26, 1996. For your reference, these analyses have been assigned our NCA # P606387.

Solid samples are reported on a dry weight basis except for Oregon DEQ Fuels Methods and where otherwise noted.

This report will be accompanied by a separate Quality Control Data Report, unless omitted by client request.

Please call if you have any questions.

Respectfully,

Philip Nerenberg
Laboratory Manager

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

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SPOKANE ▪ (509) 924-9200 ▪ FAX 924-9290
PORTLAND ▪ (503) 643-9200 ▪ FAX 644-2202

TPH-HCID per Oregon DEQ
Results In mg/kg (ppm)

Client: GeoEngineers, Inc.
Project: UNOCAL 4487, OREGON CITY, OR

NCA Project #: P606387
Matrix: soil
Sampled: 06/26/96
Received: 06/26/96

Client ID	Lab ID	Analyte	Results	MRL	Date Prepared	Date Analyzed
G-1-13.0	P606387-1	Gasoline	ND	20	07/01/96	07/01/96
		Diesel	ND	50		
		Heavy/Oil	ND	100		
GP-1-15.0	P606387-2	Gasoline	ND	20	07/01/96	07/01/96
		Diesel	ND	50		
		Heavy/Oil	ND	100		
GP-2-15.0	P606387-3	Gasoline	DET	20	07/01/96	07/02/96
		Diesel	DET *1	50		
		Heavy/Oil	ND	100		
GP-2-21.0	P606387-4	Gasoline	ND	20	07/01/96	07/02/96
		Diesel	ND	50		
		Heavy/Oil	ND	100		
GP-3-13.0	P606387-5	Gasoline	ND	20	07/01/96	07/02/96
		Diesel	ND	50		
		Heavy/Oil	ND	100		
GP-3-17.0	P606387-6	Gasoline	ND	20	07/01/96	07/02/96
		Diesel	ND	50		
		Heavy/Oil	ND	100		
GP-4-5.0	P606387-7	Gasoline	ND	20	07/01/96	07/02/96
		Diesel	ND	50		
		Heavy/Oil	ND	100		
GP-4-11.0	P606387-8	Gasoline	ND	20	07/01/96	07/02/96
		Diesel	ND	50		
		Heavy/Oil	ND	100		
GP-5-5.0	P606387-9	Gasoline	ND	20	07/01/96	07/02/96
		Diesel	ND	50		
		Heavy/Oil	ND	100		
GP-5-11.0	P606387-10	Gasoline	ND	20	07/01/96	07/01/96
		Diesel	ND	50		
		Heavy/Oil	ND	100		

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

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SPOKANE ▪ (509) 924-9200 ▪ FAX 924-9290
PORTLAND ▪ (503) 643-9200 ▪ FAX 644-2202

TPH-HCID per Oregon DEQ
Results in mg/kg (ppm)

Client: GeoEngineers, Inc.
Project: UNOCAL 4487, OREGON CITY, OR

NCA Project #: P606387
Matrix: soil
Sampled: 06/26/96
Received: 06/26/96

Client ID	Lab ID	Analyte	Results	MRL	Date Prepared	Date Analyzed
GP-6-4.5	P606387-11	Gasoline	DET	20	07/01/96	07/01/96
		Diesel	DET *[2]	50		
		Heavy/Oil	DET	100		
GP-6-9.0	P606387-12	Gasoline	ND	20	07/01/96	07/01/96
		Diesel	ND	50		
		Heavy/Oil	ND	100		
GP-7-5.0	P606387-13	Gasoline	ND	20	07/01/96	07/02/96
		Diesel	DET *[3]	50		
		Heavy/Oil	DET	100		
GP-7-9.0	P606387-14	Gasoline	ND	20	07/01/96	07/01/96
		Diesel	ND	50		
		Heavy/Oil	ND	100		

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

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SPOKANE ▪ (509) 924-9200 ▪ FAX 924-9290
PORTLAND ▪ (503) 643-9200 ▪ FAX 644-2202

TPH-G per Oregon DEQ (C6-C10)
Results In mg/kg (ppm)

Client: GeoEngineers, Inc.
Project: UNOCAL 4487, OREGON CITY, OR

NCA Project #: P606387
Matrix: soil
Sampled: 06/26/96
Received: 06/26/96

Client ID	Lab ID	Analyte	Results	MRL	Date Prepared	Date Analyzed
GP-2-15.0	P606387-3	Gasoline/Related	620	20	07/09/96	07/12/96
GP-6-4.5	P606387-11	Gasoline/Related	1500	40	07/09/96	07/11/96

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

BOTHELL ▪ (206) 481-9200 ▪ FAX 485-2992
SPOKANE ▪ (509) 924-9200 ▪ FAX 924-9290
PORTLAND ▪ (503) 643-9200 ▪ FAX 644-2202

TPH-418.1M per Oregon DEQ
Results In mg/kg (ppm)

Client: GeoEngineers, Inc.
Project: UNOCAL 4487, OREGON CITY, OR

NCA Project #: P606387
Matrix: soil
Sampled: 06/26/96
Received: 06/26/96

Client ID	Lab ID	Analyte	Results	MRL	Date Prepared	Date Analyzed
GP-6-4.5	P606387-11	TPH	160	20	07/09/96	07/09/96
GP-7-5.0	P606387-13	TPH	200	100	07/09/96	07/09/96

MRL Method Reporting Level
ND None Detected at or above the method reporting level
* See Comment Section at end of report

15.9

NORTH CREEK ANALYTICAL
18939 120th Avenue ... Suite 101, Bothell, WA 98011-9508 (206) 481-9200 FAX 485-2992
East 11115 Montgomery, Suite B, Spokane, WA 99206-4779 (509) 924-9200 FAX 924-9290
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132 (503) 643-9200 FAX 644-2202

UNOCAL CHAIN OF CUSTODY REPORT

UNOCAL INFORMATION

Facility Number: SS 4487
Site Address:
City, State, ZIP: Oregon City
Site Release Number:
Unocal Manager: Leigh Carlson
CERT INFO: (check one) ~~o~~ Evaluation o Remediation
o Detection o Demolition o Closure o Miscellaneous

CONSULTANT INFORMATION

Firm: GeoEngineers Project Number: 0161-331-62
Address: 7504 SW Bridgeport Rd
Portland OR 97224
Phone: 624-9274 Fax:
Project Manager: Pat Sullivan
Sample Collection by: Nuse

Chain of Custody Record #: P006387

Quality Assurance Data Level: [X] A [ ] B
A: Standard Summary
B: Standard + Chromatograms

Laboratory Turnaround Days: 10 | [X] 5 | 3 | 2 | 1

o Oregon o Washington Hydrocarbon Methods

SAMPLE IDENTIFICATION	SAMPLING DATE / TIME	MATRIX (W,S,O)	# OF CONTAINERS	TPH-HCID	TPH-Gas	BTEX (EPA 8020 Mod.)	TPH-Gas - BTEX	TPH-Diesel	TPH-Diesel Extended	TPH-418.1	Halogen. Volatiles (EPA 8010)	Aromatic Volatiles (EPA 8020)	Pesticides/PCBs or PCBs Only	GC/MS Volatiles (EPA 8240/8260)	GC/MS SemiVols. (EPA 8270)	PAHs by HPLC (EPA 8310)	Lead Total or Dissolved	TCLP Metals (8)	NCA SAMPLE NUMBER
1. GP-1-13.0	6/26/96 825	S	1	X															
2. GP-1-15.0	830		1	X															
3. GP-2-15.0	930		1	X	(X)														
4. GP-2-21.0	945		1	X															
5. GP-3-13.0	1025		1	X															
6. GP-3-17.0	1035		1	X															
7. GP-4-5.0	1105		1	X															
8. GP-4-11.0	1120		1	X															
9. GP-5-5.0	1205		1	X															
10. GP-5-11.0	1220		1	X															

Relinquished by:	Firm:	Date & Time	Received by:	Firm:	Date & Time
1.	GeoEngineers	6/26/96 1505	Sara McCarty	NCA	6-26-96 1505
2.					
3.					

Final Report Approval

Were all requested results provided? [yes] no Define
Were results within requested turnaround? [yes] no "No"
Final Approval Signature: on back

Firm: GEL Date: 7/16/96

Page 1 of 2
Rev. 2.2, 11/94

Comments: Quantify as necessary by TPH-G, TPH-D, 418.1

Distribution: White - Laboratory Yellow - Consultant Pink - Unocal

NORTH CREEK ANALYTICAL

18939 120th Avenue [illegible], Suite 101, Bothell, WA 98011-9508 (206) 481-9200 FAX 485-2992
East 11115 Montgo[illegible]y, Suite B, Spokane, WA 99206-4779 (509) 924-9200 FAX 924-9290
9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132 (503) 643-9200 FAX 644-2202

UNOCAL CHAIN OF CUSTODY REPORT

UNOCAL INFORMATION

Facility Number: SS 4487
Site Address:
City, State, ZIP: Oregon City
Site Release Number:
Unocal Manager: Leigh Carlson
CERT INFO: (check one) ☒ Evaluation o Remediation
o Detection o Demolition o Closure o Miscellaneous

CONSULTANT INFORMATION

Firm: Geo Engineers Project Number: 0161-331-62
Address: 7504 SW Bridgeport Rd
Portland OR. 97224
Phone: 624-9274 Fax:
Project Manager: Pat Sullivan
Sample Collection by: DWC

Chain of Custody Record #: P606387

Quality Assurance Data Level: [X] A [ ] B
A: Standard Summary
B: Standard + Chromatograms

Laboratory Turnaround Days: 10 [X] 3 2 1

☒ Oregon o Washington Hydrocarbon Methods

SAMPLE IDENTIFICATION	SAMPLING DATE / TIME	MATRIX (W,S,O)	# OF CONTAINERS	TPH-HCID	TPH-Gas	BTEX (EPA 8020 Mod.)	TPH-Gas + BTEX	TPH-Diesel	TPH-Diesel Extended	TPH-418.1	Halogen. Volatiles (EPA 8010)	Aromatic Volatiles (EPA 8020)	Pesticides/PCBs or PCBs Only	GC/MS Volatiles (EPA 8240/8260)	GC/MS SemiVols. (EPA 8270)	PAHs by HPLC (EPA 8310)	Lead: Total or Dissolved	TCLP Metals (8)	NCA SAMPLE NUMBER
1. GP-6-4.5	6/26/96 1245	S	1	X	(X)					(X)									
2. GP-6-9.0	" 1255	S	1	X															
3. GP-7-5.0	" 1345	S	1	X						(X)									
4. GP-7-9.0	" 1355	S	1	X															
5.																			
6.																			
7.																			
8.																			
9.																			
10.																			

Relinquished by:	Firm:	Date & Time	Received by:	Firm:	Date & Time
1. David Nolan	GeoEngineers	6/26/96 1505	Sara McClung	NCA	6-26-96 1525
2.					
3.					

Final Report Approval

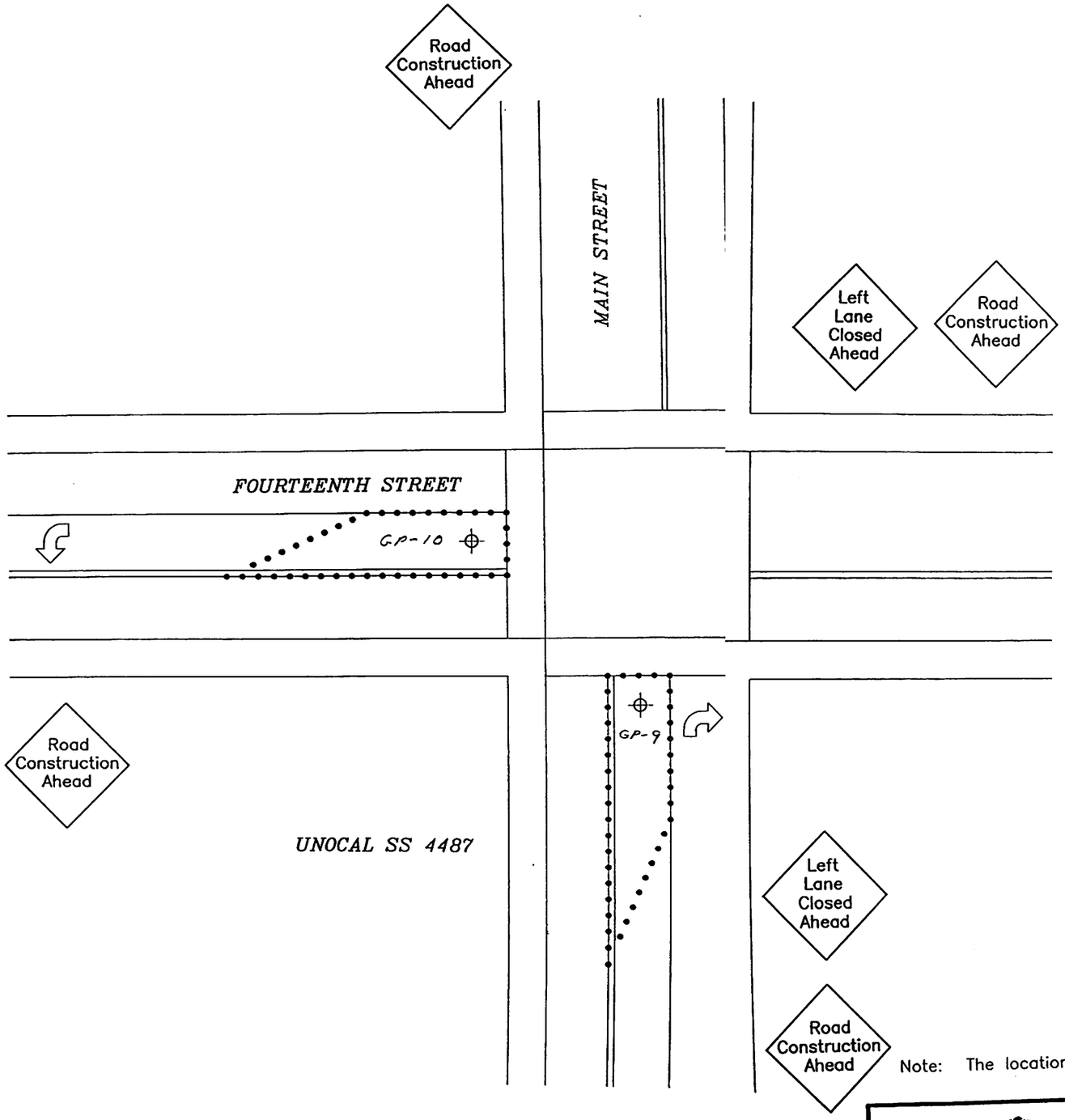
Were all requested results provided? [yes] no Define
Were results within requested turnaround? [yes] no "No" on back
Final Approval Signature:
Firm: CAL Date: 7/11/96

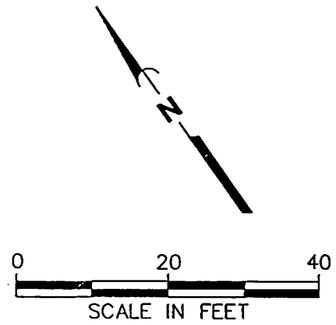
Page 2 of 2
Rev. 2.2, 11/94

Comments: Quantify as necessary by TPH-G, TPH-D, 418.1

Distribution: White - Laboratory Yellow - Consultant Photocopy - Unocal

P:\0161331\CAD\SOILBOR





EXPLANATION:

GP-9 ⊕ ~~PROPOSED~~ SOIL BORING

TRAFFIC CONES

Note: The locations of all features shown are approximate.

No Reference.

0161-331-62 PJS:WJJ 09/19/96

GeoEngineers

OFF-SITE BORING LOCATIONS

FIGURE 2

F

Oregon

DEPARTMENT OF
ENVIRONMENTAL
QUALITY

NORTHWEST REGION

August 1, 1996

LEIGH CARLSON
UNOCAL CERT NORTHERN REGION
PO BOX 76
SEATTLE WA 98111

RE: Unocal Station #4487
File No. 03-93-0049

Dear Mr. Carlson:

The Department has reviewed the recent submittal dated July 31, 1996 pertaining to the ongoing cleanup located at 1321 Main Street, Oregon City, Oregon. Based on this review, the following items are necessary in order to allow the Department to better evaluate conditions at the site:

1. Please provide a site map indicating the locations of the geoprobe samples collected.

2. Please provide lab data sheets along with chain of custody forms for all lab samples collected.

3. Please provide a table indicating the depths at which respective soil samples were collected.

Please provide the above requested information by **September 6, 1996.** The Department appreciates your efforts in complying with the UST Regulations. If you have any questions, please call me at (503) 229-5493.

Sincerely,

Steven L. Hooper
UST Cleanup Specialist

cc: Patrick J. Sullivan
GeoEngineers, Inc.
7504 SW Bridgeport Road
Portland, OR 97224

John A. Kitzhaber
Governor

2020 SW Fourth Avenue
Suite 400
Portland, OR 97201-4987
(503) 229-5263 Voice
TTY (503) 229-5471
DEQ-1

S. Hooper

GeoEngineers

03-93-0049

July 31, 1996

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

DEPT OF ENVIRONMENTAL QUALITY
RECEIVED
AUG 1 1996
NORTHWEST REGION

Unocal ERS - West Region
P.O. Box 76
Seattle, Washington 98111

Attention: Mr. Leigh Carlson

Subsurface Geoprobe Exploration Results
Unocal Service Station 4487
1321 Main Street
Oregon City, Oregon
File No. 0161-331-62

INTRODUCTION

The purpose of this letter is to transmit the analytical laboratory testing results of soil samples obtained from Geoprobe explorations conducted at Unocal Service Station 4487 in Oregon City on June 26, 1996. The site is located at 1321 Main Street. The DEQ (Oregon Department of Environmental Quality) UST (underground storage tank) Cleanup List number for this site is 03-90-0513.

JUNE 1996 SUBSURFACE EXPLORATION

On June 26, 1996, GeoTech Explorations, Inc. of Tualatin, Oregon drilled seven Geoprobe soil borings (GP-1 through GP-7) in the northern and northeastern portion of the site. Borings GP-1 through GP-3 were drilled in the vicinity of MW-2, and GP-4 through GP-7 were drilled in the vicinity of contaminated soil that PEMCO encountered in the Stage II vapor recovery trench. The depths of the borings ranged between approximately 16 and 24 feet. Soil samples were obtained continuously from the borings for field screening using visual, headspace vapor and sheen screening methods.

Based on the field screening results, two soil samples were selected from each boring for chemical analysis of hydrocarbon identification by DEQ Method TPH-HCID, followed by quantitative analysis, if appropriate. Gasoline-range hydrocarbons were detected in samples GP-2-15.0 (located in the east corner of the site) and GP-6-4.5 (located southwest of the northeast service island) at concentrations of 620 mg/kg (milligrams per kilogram) and

GeoEngineers, Inc.
7504 SW Bridgeport Road
Portland, OR 97224
Telephone (503) 624-9274
Fax (503) 620-5940

Printed on recycled paper.

1,500 mg/kg, respectively. Total petroleum hydrocarbons (by DEQ Method TPH-418.1M) were detected in samples GP-6-4.5 and GP-7-5.0 (located northwest of the northeast service island) at concentrations of 160 mg/kg and 200 mg/kg, respectively.

Petroleum hydrocarbons were not detected in soil samples obtained from borings GP-4, GP-5 and GP-7, located in the vicinity of the Stage II vapor recovery trench.

LIMITATIONS

We have prepared this letter for use by Unocal ERS - West Region. This letter may be made available to regulatory agencies. The letter is not intended for use by others and the information contained herein is not applicable to other sites.

Our interpretations of subsurface conditions are based on data from widely spaced borings at the site. It is always possible that contamination may exist in areas of the site that were not explored by drilling.

Within the limitations of scope and budget, our services have been executed in accordance with generally accepted practices in this area at the time this letter was prepared. No warranty, express or implied, should be understood.

Yours very truly,

GeoEngineers, Inc.

Patrick J. Sullivan, R.G.
Project Geologist

Julia Fowler, P.E.
Associate

PJS:JF:mln
Document ID: 01613311.geo

cc: Mr. Steve Hooper
Oregon Department of Environmental Quality

UST CLEANUP TELEPHONE USE REPORT

CALL FROM/(TO:) Pat Sullivan DATE: 6/13/96

WITH: Geo Engineers TIME: 15:25

TELEPHONE NO: (503) 603-6692

REGARDING: Unocal # 4487

FILE NO: 03-93-0049

SUMMARY OF CALL

I approved the soil boring locations as depicted on the FAX copy (dated June 13, 1996) of "proposed drilling location at Unocal Service station 4487 in Oregon City."

Staff Signature

Geo Engineers

7504 SW Bridgeport Road
Portland, Oregon 97224
Telephone: (503) 624-9274
Fax: (503) 620-5940

FAX TRANSMITTAL

To: DEQ - Northwest Region
Portland, OR

Date: June 13, 1996

File: 0161-331-62

Fax Number: 229-6945

Attention: Mr. Steve Hooper

Regarding: Proposed drilling locations at Unocal service station 4487 in Oregon City

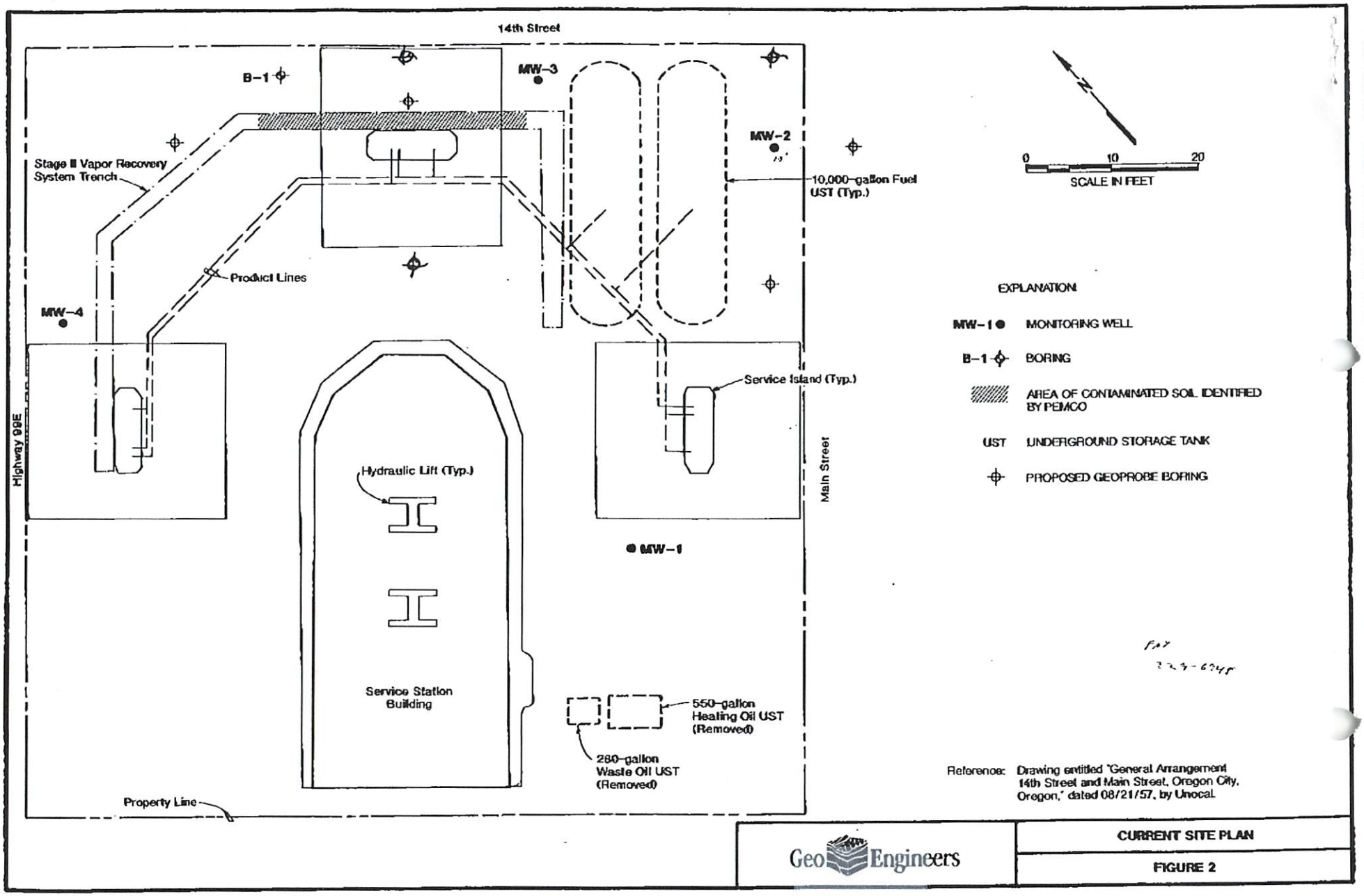
Pages	Date	Description
1	06/13/96	Fax Transmittal
1		Figure 2

Total Pages: 2

Comments: I have come up with the proposed locations shown on Figure 2 after our telephone conversation. Please review and call me at 603-6692 with your comments.

Signed: _____

Patrick J. Sullivan



161-331-P1B P/S:MAD 08/15/96

06/13/96 THU 15:14 FAX 503 620 5940 GEO ENGINEERS 002

March 28, 1996

Oregon

DEPARTMENT OF
ENVIRONMENTAL
QUALITY

NORTHWEST REGION

LEIGH CARLSON
UNOCAL CORP
PO BOX 76
SEATTLE WA 98111

RE: Unocal Station #4487 (#2)
File No.: 03-94-0049
3

Dear Mr. Carlson:

This is to notify you that your Underground Storage Tank cleanup project has been assigned to a project manager, Steve Hooper, in Northwest Region. He will contact you and/or your consultant if any additional information is required or as necessary as your cleanup project proceeds. Mr. Hooper can be reached at (503) 229-5493.

If you have any questions about the cost recovery process or invoices you receive, please contact the Waste Management and Cleanup Program at (503) 229-5812.

We look forward to a successful completion of your project.

Sincerely,

Richard P. Reiter
UST Section Manager

John A. Kitzhaber
Governor

2020 SW Fourth Avenue
Suite 400
Portland, OR 97201-4987
(503) 229-5263 Voice
TTY (503) 229-5471
DEQ-1

UST CLEANUP TELEPHONE USE REPORT

CALL FROM/TO: Linda Chalam DATE: 4-27-95

WITH: Unocal TIME: 1000

TELEPHONE NO: (714) 572-7589

REGARDING: Facility # 4187

FILE NO: 03-93-49

SUMMARY OF CALL

Lost approx. 5 gallons at dispenser, working on fixing the problem

Jim Maurer

Staff Signature

GeoEngineers

7504 SW Bridgeport Road
Portland, Oregon 97224
Telephone: (503) 624-9274
Fax: (503) 620-5940

LETTER OF TRANSMITTAL

To: Department of Environmental Quality
Northwest Region
2020 Southwest Fourth, Suite 400
Portland, Oregon 97201

Date: March 7, 1995

File: 0161-331-P62

Attention: Ms. Rachel Carlin Segal

Regarding: Soil Recycling Certificate for Unocal SS 4487 in Oregon City (DEQ File Number ~~03-94-049~~ 03-93-049)

We are sending: ☒ Attached ☐ Under Separate Cover

Copies	Date	Description
1		Soil Recycling Certificate
1		Manifest

DEPT OF ENVIRONMENTAL QUALITY
RECEIVED
MAR 0 8 1995
NORTHWEST REGION

These are transmitted as checked below:

☐ For Your Use ☒ As Requested ☐ Returned
☐ For Review and Comment ☐ Other (see remarks)

Remarks: The attached documentation was requested in your letter to Unocal dated December 9, 1994.

Copy To:

Signed: Patrick J. Sullivan

e - 55 44

V.L. CARLSON

DEC 17 1993

Soil Recycling Certificate

TPS Technologies Inc. does hereby certify that 11.03 tons of petroleum - contaminated soil received from

Unocal Corporation
Unocal #4487
1321 Main Street
Oregon City, Oregon

Under Manifest/authorization number 07-00264 has been properly recycled to approved regulatory standards at our Soil Recycling Facility in Portland, Oregon

Dated this 6th day of October, 19 93

Sworn and Attested by:
TPS Technologies Inc.

By: T. L. Beattie

Manifest

TPS Technologies Soil Recycling

Non-Hazardous Soils

Manifest #

Date of Shipment:	Responsible for Payment:	Transporter Truck #:	Facility #:	Given by TPS:	Load #
	GENERATOR	PEMCO	07	00264	001

Generator's Name and Billing Address:
UNOCAL CORPORATION
P.O. BOX 76
SEATTLE, WA 98111

Generator's Phone #: (206) 443-7512
Person to Contact: LEIGH CARLSON
FAX#: ( ) -
Generator's US EPA ID No.:
Customer Account Number with TPS: 1000533

Consultant's Name and Billing Address:
GEOENGINEERS

Consultant's Phone #: ( )
Person to Contact:
FAX#: ( )
Customer Account Number with TPS:
SALESPERSON

Generation Site (Transport from): (name & address)
UNOCAL 4487
1321 MAIN STREET
OREGON CITY, OR

Site Phone #: ( )
Person to Contact:
FAX#: ( ) -
BETX Levels: ppb
TPH Levels: 3520T45 ppm
AVG. Levels: ppb ppm

Designated Facility (Transport to): (name & address)
Oregon Hydrocarbon Inc.
9333 North Harborgate Street
Portland, OR 97203

Facility Phone #: (503) 735-9525
Person to Contact: Glenna Mullan
FAX#: (503) 240-1712
Facility Permit Numbers
$496.35

Transporter Name and Mailing Address:

Transporter's Phone #: ( ) -
Person to Contact:
FAX#: ( ) -
Transporter's US EPA ID No.:
Transporter's DOT No.:
Customer Account Number with TPS:

Description of Soil	Moisture Content	Contaminated by	Approx. Qty.	Description of Delivery	Gross Weight	Tare Weight	Net Weight
Sand ☐ Organic ☐ Clay ☐ Other ☐	0-10% ☐ 10-20% ☐ 20% - over ☐	Gas ☐ Diesel ☐ Other ☐			43060	21000	22060
Sand ☐ Organic ☐ Clay ☐ Other ☐	0-10% ☐ 10-20% ☐ 20% - over ☐	Gas ☐ Diesel ☐ Other ☐				11:03	

List any exception to items listed above:

Generator's and/or consultant's certification: I/We certify that the soil referenced herein is taken entirely from those soils described in the Soil Data Sheet completed and certified by me/us for the Generation Site shown above and nothing has been added or done to such soil that would alter it in any way.

Print or Type Name: Generator ☐ Consultant ☐ Signature and date: Month Day Year

Transporter's certification: I/We acknowledge receipt of the soil described above and certify that such soil is being delivered in exactly the same condition as when received. I/We further certify that this soil is being directly transported from the Generation Site to the Designated Facility without off-loading, adding to, subtracting from or in any way delaying delivery to such site.

Print or Type Name: Humbert Mike
Signature and date: Michael R. Humbert Month 9 Day 27 Year 93

Discrepancies:

Recycling Facility certifies the receipt of the soil covered by this manifest except as noted above:

Print or Type Name: Glenna Mullan
Signature and date: Glenna Mullan 9-27-93

TPS NUMERICAL COPY

State of Oregon
Department of Environmental Quality — Memorandum

Date: February 22, 1995

To: File, LUST #03-93-049

From: Gil Wistar, VCSAS/NWR

Subject: Referral of Unocal #4487 to Site Assessment due to chlorinated VOCs in groundwater

In a December 9, 1994 letter to Unocal regarding its site at 1321 Main St., in Oregon City, Rachel Segal indicated that VOCs had been found in all four monitoring wells, and that this information was being referred to Site Assessment. The VOCs detected are PCE, TCE, and chloroform, in all cases below MCLs. Although this data represents only one round of groundwater sampling, and further rounds of sampling are needed to confirm these low levels of VOCs, Site Assessment has decided not to add the site to the ECSI database at this time. This could be re-evaluated at any time, particularly if any VOC level increases to a point at which it consistently exceeds the MCL.

State of Oregon
Department of Environmental Quality — Memorandum

Date: February 22, 1995

To: File, LUST #03-93-049

From: Gil Wistar, VCSAS/NWR

Subject: Referral of Unocal #4487 to Site Assessment due to chlorinated VOCs in groundwater

In a December 9, 1994 letter to Unocal regarding its site at 1321 Main St., in Oregon City, Rachel Segal indicated that VOCs had been found in all four monitoring wells, and that this information was being referred to Site Assessment. The VOCs detected are PCE, TCE, and chloroform, in all cases below MCLs. Although this data represents only one round of groundwater sampling, and further rounds of sampling are needed to confirm these low levels of VOCs, Site Assessment has decided not to add the site to the ECSI database at this time. This could be re-evaluated at any time, particularly if any VOC level increases to a point at which it consistently exceeds the MCL.

GeoEngineers

7504 SW Bridgeport Road
Portland, Oregon 97224
Telephone: (503) 624-9274
Fax: (503) 620-5940

LETTER OF TRANSMITTAL

To: Department of Environmental Quality
Northwest Region
2020 Southwest Fourth Ave. Suite 400
Portland, Oregon 97201

Date: December 21, 1994

File: 0161-331-P62

DEPARTMENT OF ENVIRONMENTAL QUALITY
RECEIVED
DEC 22 1994
NORTHWEST REGION

Attention: Rachel Carlin Segal

Regarding: Unocal Service Station 4487 in Oregon City

We are sending: ☒ Attached ☐ Under Separate Cover

Copies	Date	Description
1	10/06/93	Soil Recycling Certificate

These are transmitted as checked below:

☐ For Your Use ☐ As Requested ☐ Returned
☐ For Review and Comment ☒ Other (see remarks)

Remarks: Leigh Carlson asked me to send this certificate to you. Please call if you have questions.

Copy To: Mr. Leigh Carlson
Unocal CERT - Northern Region

Signed: _____

Patrick J. Sullivan

File - CSS 4401 EF

V.L. CARLSON

DEC 17 1993

Soil Recycling Certificate

TPS Technologies Inc. does hereby certify that 11.03 tons of petroleum - contaminated soil received from

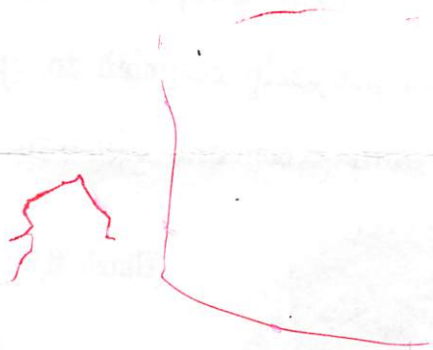
Unocal Corporation
Unocal #4487
1321 Main Street
Oregon City, Oregon

Under Manifest/authorization number 07-00264 has been properly recycled to approved regulatory standards at our Soil Recycling Facility in Portland, Oregon

Dated this 6th day of October, 19 93

Sworn and Attested by:
TPS Technologies Inc.

By: T. L. Beattie



Oregon

DEPARTMENT OF
ENVIRONMENTAL
QUALITY

NORTHWEST REGION

December 9, 1994

LEIGH CARLSON
UNOCAL CORPORATION
PO BOX 76
SEATTLE WA 98111

Re: Unocal Station #4487 (#2)
File No. 03-94-049

Dear Mr. Carlson:

The Department has completed its review of information submitted to date regarding the underground storage tank (UST) investigation and cleanup at 1321 Main Street in Oregon City, Oregon. This review included PEMCO's 20 Day Report, dated March 22, 1993, and GeoEngineers' Subsurface Characterization Study, dated February 9, 1994.

In summary, gasoline and diesel contamination was discovered during installation of Stage II vapor recovery piping. Approximately 15 cubic yards of contaminated soil were excavated and disposed of at Oregon Hydrocarbon, Inc. However, the Department has not received copies of the disposal receipts. Soil samples collected following this removal indicate that up to 3,520 parts per million (ppm) total petroleum hydrocarbons (TPH) as gasoline remain in soils.

During additional investigation, one soil boring and four groundwater monitoring wells were installed. Up to 1,100 ppm TPH as gasoline and 410 ppm TPH as diesel were detected at a depth of 10 feet in MW-2. Groundwater was encountered in the four monitoring wells at depths between 42 and 45 feet. Chloroform and tetrachloroethene were detected in MW-1, MW-2, and MW-4. Chloroform was detected in MW-3; trichloroethene was detected in MW-4.

Based on this review, it appears that additional investigation and cleanup is necessary. The vertical extent of contamination as well as the lateral extent of contamination south of the vapor recovery piping trench have not been defined. In addition, the lateral extent of contamination in the area around MW-2 has not been defined.

A review of the groundwater data indicates that the solvent contamination may be from an up-gradient, off-site source. Therefore, it appears that the soil matrix rules apply to the petroleum cleanup at the site. The UST Cleanup Section will refer the information concerning chlorinated solvents in groundwater to the Department's Voluntary Cleanup and Site Assessment Section (VCSAS).

2020 SW Fourth Avenue
Suite 400
Portland, OR 97201-4987
(503) 229-5263 Voice/TDD
DEQ-1

Responsible parties are required to pay costs incurred by DEQ for oversight of investigation and cleanup of a spill or release of hazardous materials (ORS 465.255). Projects are assigned based on a combination of factors, but generally so that the highest environmental priority sites receive oversight first. At this time, your UST project appears to be a lower environmental priority. As a result, your project will no longer be assigned to a project manager for oversight. Should you wish to continue to have Department oversight, please sign the enclosed cost recovery agreement and return it to Laurie McCulloch at the above address. If you have any questions regarding DEQ's cost recovery program or your invoice, please contact our Waste Management & Cleanup Division at (503) 229-6635.

In the meantime, please submit copies of the disposal receipts for the contaminated soil disposed of at Oregon Hydrocarbon, Inc. by **January 9, 1995**.

The Department appreciates your cooperation in complying with the UST regulations. If you have any questions, please call me at (503) 229-5492. If you have questions regarding the VCSAS program, pleas contact Gil Wistar at (503) 229-5512.

Sincerely,

Rachel Carlin Segal
UST Cleanup Specialist
Northwest Region

Enclosure

cc: Gil Wistar, VCSAS, NWR
Julia Fowler
GeoEngineers
7504 SW Bridgeport Rd.
Portland, OR 97224

Oregon

October 28, 1994

DEPARTMENT OF
ENVIRONMENTAL
QUALITY

NORTHWEST REGION

LEE CARLSON
UNOCAL
PO BOX 76
SEATTLE WA 98111

UNOCAL #4487
03-93-0049

Dear Mr. Carlson:

The purpose of this letter is to provide notification that you will be receiving an invoice from the Department of Environmental Quality (DEQ) for costs of DEQ oversight activities at the facility listed above. A release of petroleum (a hazardous material) at this facility was reported to DEQ as required. Groundwater has been impacted and investigation and/or cleanup may have been initiated.

Responsible parties are required to pay costs incurred by DEQ for oversight of investigation and cleanup of a spill or release of hazardous materials (ORS 465.255). DEQ oversight costs include direct and indirect costs. Direct costs include site-specific expenses and legal costs. Indirect costs are those general management and support costs of the DEQ and of the Waste Management & Cleanup Division allocable to DEQ oversight of this cleanup and not charged as direct, site-specific costs.

DEQ oversight begins with the initial site characterization and continues through site closure. Projects are assigned so that the highest environmental priority sites receive oversight first. At this time, your project has **not** been assigned to a project manager. However, as is true of your site, some sites may require a limited amount of DEQ oversight, even though a project manager has not yet been assigned.

2020 SW Fourth Avenue
Suite 400
Portland, OR 97201-4987
(503) 229-5263 Voice/TDD

To accommodate those responsible parties who desire DEQ oversight, but have a lower environmental priority site, we have developed a Responsible Party Priority Site Program. Signing the enclosed voluntary cost recovery letter agreement will put you in line for expedited assistance.

You will find more details about DEQ oversight costs and the Responsible Party Priority Site Program in the enclosed information. If you have any questions regarding DEQ's cost recovery program or your invoice, please contact our Waste Management & Cleanup Division at (503) 229-6635.

If you have technical questions about your cleanup project, please contact the Northwest Region Underground Storage Tank Duty Officer at (503) 229-5489.

Sincerely,

Laurie J. McCulloch

Laurie J. McCulloch
UST Section Manager
Northwest Region

enclosures

cc: WMC

Oregon

DEPARTMENT OF
ENVIRONMENTAL
QUALITY

NORTHWEST REGION

February 16, 1994

MR LEIGH CARLSON
UNOCAL CORPORATION
PO BOX 76
SEATTLE WASHINGTON 98111

Re: Unocal Station #4487
File No. 03-93-049

Dear Mr. Carlson:

The Department has completed its review of PEMCO's 20 day report, dated March 22, 1993, concerning the discovery of gasoline and oil contamination at 1321 Main Street in Oregon City, Oregon.

The report indicated that Unocal would be conducting additional investigation and cleanup at the site. To date, Unocal has not informed the DEQ of its plans. Please submit a letter by March 11, 1994, outlining your planned actions for the site. Please include in the letter the dates you anticipate beginning and ending each action.

In addition, the report indicates that 15 cubic yards of contaminated soil was stockpiled onsite for future disposal at Oregon Hydrocarbons. Please indicate in the letter if this disposal has occurred.

If you have any questions, please call me at (503) 229-5474.

Sincerely,

Andree Pollock

Andree Pollock
UST Cleanup Specialist

2020 SW Fourth Avenue
Suite 400
Portland, OR 97201-4987
(503) 229-5263 Voice/TDD

DEQ-1

PEMCO

437 N. Columbia Blvd.
P.O. Box 11569
Portland, Oregon 97211
Office (503) 283-2151
FAX (503) 283-6388

DEPT OF ENVIRONMENTAL QUALITY
RECEIVED
MAR 23 1993
NORTHWEST REGION

March 22, 1993

Department of Environmental Quality
Northwest Region
1500 SW 1st Avenue, Suite 750
Portland, Oregon 97201-5884

Attn: Mr. Andree Pollock

RE: Unocal Service Station #4487
LUST No. 03-93-049
20 Day Report

Dear Mr. Pollock:

Enclosed is the report dated March 22, 1993. This report is intended to serve as the 20 day report for the Unocal Service Station located at 1321 Main Street, Oregon City, Oregon.

If you have any questions, or require additional information, please do not hesitate to call.

Sincerely,

Bill Knutson

Bill Knutson, P.E.
Environmental Manager

cc: Mr. V.L. Carlson
Unocal
P.O. Box 76
Seattle, Washington 98111

PEMCO

437 N. Columbia Blvd.
P.O. Box 11569
Portland, Oregon 97211
Office (503) 283-2151
FAX (503) 283-6388

DEPT OF ENVIRONMENTAL QUALITY
RECEIVED
MAR 2 3 1993
NORTHWEST REGION

March 22, 1993

Unocal
P.O. Box 76
Seattle, Washington 98111

Attn: Mr. Leigh Carlson

RE: 20 Day Report - Facility ID#988
1321 Main Street, Oregon City, Oregon

Dear Mr. Carlson:

This letter presents a 20-day report on Unocal service station #4487, located in Oregon City, Oregon. The Oregon Department of Environmental Quality (DEQ) underground storage tank (UST) facility number is 988. A Leaking Underground Strage Tank (LUST) number of 03-93-049 has been assigned to the site by DEQ.

Background

PEMCO was contracted to install vapor recovery piping at Unocal service station #4487 in Oregon City. While digging the trench for the piping on 3/03/93, PEMCO construction personnel observed what appeared to be hydrocarbon contamination around the areas of the north and west pump islands. Suspect soil from the trench was stockpiled on the northwest side of the property.

PEMCO informed Unocal of the situation, and Unocal requested that PEMCO Environmental personnel report the site to DEQ and perform a site visit and contaminant characterization. Sampling of the stockpile and trench was conducted at this time. PEMCO was given verbal approval by Leigh Carlson of Unocal to perform the above mentioned activities.

Procedures

On 3/4/93, a PEMCO Engineer conducted a site visit and collected soil samples from the piping trench and the stockpile. Visual observations indicated the presence of petroleum hydrocarbon contamination in the areas noted on the attached sketch. PEMCO notified Tom Roick of DEQ that samples would be characterized utilizing DEQ method TPH-HCID. During this conversation with the DEQ, it was also discovered that a previous Leaking UST cleanup for a heating oil and diesel tank was closed as clean in March of 1991. According to DEQ records, these tanks appeared to have been located on the south side of the building. PEMCO informed Unocal that the piping installation could continue per DEQ while Unocal was developing a plan of action to remediate the contamination at the site.

Samples collected on 3/04/93 were field tested with an Organic Vapor Meter (OVM), with the results summarized below.

Sample#	Location	Depth (ft.)	OVM(ppm)	Odor
1	West Island Piping Trench	3'	38	Faint
2	20 ft. North of West Island Piping Trench	3'	4	Faint
4	Under North Island Piping Trench	3'	350	Strong
5	15 ft. West of North Island Piping Trench	5'	557	Strong
6	Stockpile	NA	486	Strong

Subsurface Conditions

Samples numbered 1 and 2 were collected from a native material that was a brown silt. Black colored silt was the dominant soil type observed while collecting samples 3, 4, and 5. The black silt had an oily look about it, and a hydrocarbon smell. Because sample #3 was collected in the same general area as sample #5, it was not analyzed.

Analytical results indicated the presence of both gasoline and heavy oil contaminants. The subsequent analyses performed on the samples were Oregon DEQ Method TPH-G and EPA Method 418.1 Modified. The results are summarized in Table 1 below. The chain of custody and certified analytical reports are attached.

Table 1
(Samples Collected 3/04/93- Results in ppm)

Sample #	Location	Depth (ft)	TPH-HCID	TPH-G	418.1M
1	West Island Piping Trench	3'	-	ND	ND
2	20' N. of W. Island Trench	3'	-	ND	ND
4	Under N. Island Piping Trench	3'	-	3,520	ND
5	15' W. of N. Island Trench	5'	-	700	87
6	Stockpile	NA	Gas, Heavy Oil	2,800	1,400
DEQ Level 2 Standards				80	500

All samples were collected using disposable vinyl gloves and were packed for minimal headspace. Samples were labeled and placed immediately on ice for transport to the laboratory, accompanied by chain of custody documentation.

Relation to Regulations

This site is considered a leaking UST site according to current DEQ regulations, as the piping trench is a portion of a UST system by definition. The DEQ Soil Matrix Score Sheet (attached) shows that this site is a Level 2 site. The acceptable parameters for the contaminants of concern for this site are: 80 ppm for gasoline and 500 ppm for heavy oil contamination.

Soil Stockpile Removal

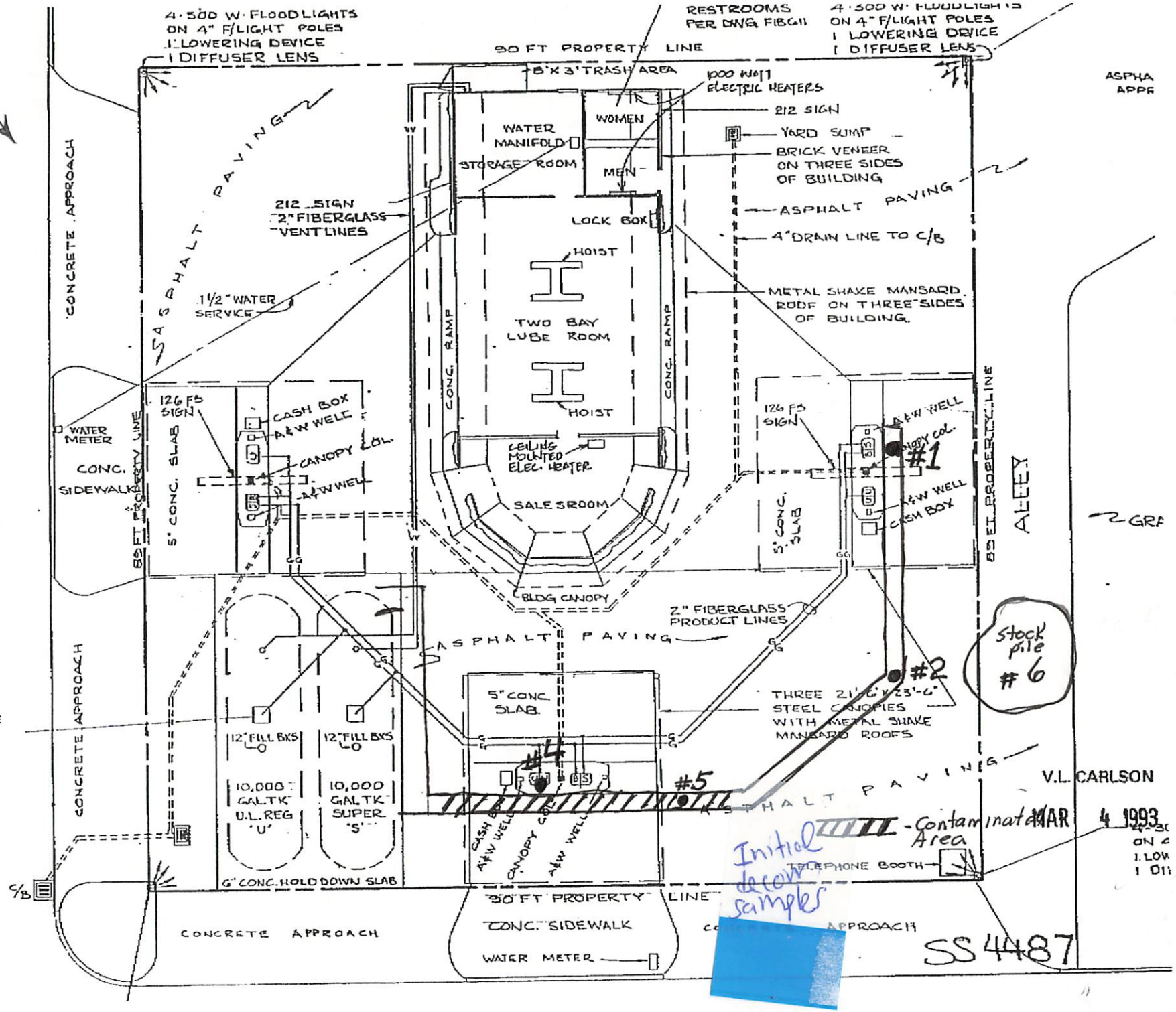
To date, the stockpile, consisting of approximatly 15 cubic yards, remains on site. It is PEMCO's understanding that this soil will be thermally treated at Oregon Hydrocarbon, Inc. (OHI) in the near future.

Unocal is currently conducting an in-house investigation of past owners, possible releases, and past uses of the property. The information accumulated by Unocal will be used in developing a scope of work for additional investigation and/or remediation at the site.

If you have any questions, please do not hesitate to call.

Sincerely,

Bill Knutson, P.E.
Environmental Manager



P. SUBMERSIBLE
C/W
DETECTORS

03/04/93 16:10 FAX 206 443 7561 UNOCAL SEATTLE 003
MAR-04-1993 16:13 206 443 7561 P.003

PEMCO

437 N. COLUMBIA BLVD.
P.O. BOX 11569
PORTLAND, OR 97217
(503) 283-2151

CHAIN OF CUSTODY

PROJ. NO. #5055

PROJECT NAME: Unocal # 4487

ADDRESS: 1321 Main St Oregon City OR

SAMPLER: Bill Knutson

SAMPLE NUMBER	DATE	TIME	SOIL	WATER	PRODUCT	SLUDGE	ICED	SAMPLE LOCATION TANK SIZE TANK PRODUCT	DEPTH (ft)
#1	3/4/93	7:40 AM	X				X	Next to West Island Piping Trench	3
#2	3/4/93	8:00 AM	X				X	20ft N. of W. Island Pipingm Trench	3
#4	3/4/93	8:10 AM	X				X	Under North Island - Piping Trench	3
#5	3/4/93	8:20 AM	X				X	15 ft. West of N. Island - Piping Trench	5
#6	3/4/93	8:30 AM	X				X	Stockpile (10c.y.)	N/A

TPH-HCID	TPH-G	TPH-D	TPH(418.1M)	EPA 418.1	BTEX 602/8020	PAH (8310)	Total Pb (7421)	EDB & EDC (8010)	TCLP(8 met)	TCLP(3 met)	PCB's 608/8080	Chlor. Solv. 601/8010	VOC's 8240	EPA 8015 Mod	Flashpt (1010)	TOX			
	X																		
	X																		
	X																		
	X																		
X																			

Relinquished by:	Date	Time	Received by:
Bill Knutson			
Relinquished by:			
Relinquished by:			

RUSH: YES NO

LAB #

AMTEST

AmTest Inc.
Professional Analytical Services
9205 S.W. Nimbus Ave.
Beaverton, OR 97005
Tel: 503 292 0564

ANALYSIS REPORT

CLIENT
Bill Knutson
PEMCO
P.O. Box 11569
Portland OR 97211

Date Received: 3/4/93
Date Analyzed: 3/4/93
Date Reported: 3/5/93
Job Number: 6309-13

Project Number - 5055
Project - Unocal #4487 Oregon City
Sample Type - Soil

1 5YDS BILLED DIR TO UNOCAL

Analysis - TPH-HCID

Lab Number	Client Identification	Results			
		Gasoline	Diesel	Other*	Surrogate** Recovery %
6313	#6 Stockpile	Positive	ND	Positive	MI/88
Lab Blank	3/4/93	ND	ND	ND	82/86

ND = None Detected

Detection Limits: Gasoline - 20 mg/Kg; Diesel - 50 mg/Kg
*Higher boiling petroleum products
**Trifluorotoluene/p-terphenyl

Reported By _____
QA Check _____

Greg Bolt
Laboratory Manager

AMTEST

AmTest Inc.
Professional Analytical Services
9208 S.W. Nimbus Ave.
Beaverton, OR 97008
Tel: 503 292 0564

ANALYSIS REPORT

CLIENT
Bill Knutson
PEMCO
P.O. Box 11569
Portland OR 97211

Date Received: 3/4/93
Date Analyzed: 3/5/93
Date Reported: 3/5/93
Job Number: 6309-13

Project Number - 5055
Project - Unocal #4487 Oregon City
Sample Type - Soil

Lab Number	Client Identification	Analysis - TPH-G Results mg/kg (ppm) Gasoline	Surrogate* % Recovery
6309	#1 Next to West Island	ND	60
6310	#2 20' N of W Island	ND	70
6311	#4 Under North Island	3,520	MI
6312	#5 15' W of N Island	700	MI
6313	#6 Stockpile	2,800	MI
Lab Blank	3/5/93	ND	76

ND = None Detected
MI = Mattrix Interference

Detection Limit - 5.0 mg/kg
*Trifluorotoluene

Reported By _____
QA Check _____

Greg Bolt
Laboratory Manager

AMTEST

AmTest Inc.
Professional Analytical Services
9208 S.W. Nimbus Ave.
Beaverton, OR 97006
Tel: 503 292 0554

ANALYSIS REPORT

CLIENT
Bill Knutson
PEMCO
P.O. Box 11569
Portland OR 97211

Date Received: 3/4/93
Date Analyzed: 3/8/93
Date Reported: 3/9/93
Job Number: 6308-13

Project Number - 5055
Project - Unocal #4487 Oregon City
Sample Type - Soil

Lab Number	Client Identification	Analysis - TPH-418.1 (Modified) Results mg/kg (ppm)
6309	#1 Next to West Island	ND
6310	#2 20' N of W Island	ND
6310-Dup	#2 20' N of W Island	ND
6311	#4 Under North Island	87
6312	#5 15' W of N Island	590
6313	#6 Stockpile	1,400
Lab Blank	3/8/93	ND

ND = None Detected

Detection Limit - 20 mg/kg

Reported By _____

QA Check _____

Greg Bolt
Laboratory Manager

MATRIX SCORE SHEET

1. Depth to Groundwater < 25 feet (10) 25 - 50 feet (7) 51 - 100 feet (4) > 100 feet (1)	10
2. Mean Annual Precipitation >45 inches (10) 20 - 45 inches (5) <20 inches (1)	5
3. Native Soil Type Coarse sands, gravels (10) Silts, fine sands (5) Clays (1)	5
4. Sensitivity of Uppermost Aquifer Sole Source (10) Current Potable (7) Future Potable (4) Non-potable (1)	4
5. Potential Receptors Many, near (10) Medium (5) Few, far (1)	10
TOTAL SCORE =	34

Matrix Score	Cleanup Level in ppm TPH	
	Gasoline	Diesel
Level 1: > 40 pts.	40	100
Level 2: 25 - 40 pts.	80	500
Level 3: < 25 pts.	130	1000

Oregon

DEPARTMENT OF ENVIRONMENTAL QUALITY

NORTHWEST REGION

Mailed: 3-12-93

DEQ FILE NO.: 3-3-93

SITE NAME: Unocal # 4487

SITE ADDRESS: 1321 MAIN Street
OREGON City, OREGON

RESPONSIBLE PARTY NAME: LEE CARLSON

RP COMPANY NAME: Unocal

MAILING ADDRESS: 2000 CROW CANYON PLACE - Suite 400
SAN RAMON CA. 94583

DATE RELEASE REPORTED TO DEQ: 3-3-93

A release has been reported from an underground storage tank (UST) system at your facility located at the address listed above. As the responsible party for the facility, you are required to clean up the release according to OAR 340-122-201 through 340-122-360.

An Initial Report Form for UST Cleanup Projects is enclosed, which needs to be completed and returned to this office within twenty (20) days from the date the release was reported. An outline of additional reporting requirements and due dates is also enclosed.

Please read the rules carefully. As the responsible party, you should be aware of the regulations and requirements, even if you have hired a qualified consultant or service provider to do the actual work.

Please reference the DEQ File Number listed in the top left corner of this letter in all future correspondence and reports.

The Department is required to recover oversight costs on projects that we review and provide a final notice of compliance or "closure letter". As provided in the law, all petroleum contamination sites are eligible for recovery of costs by the Department. In order to receive oversight and more effectively schedule your project you will be asked to sign, and return within 30 days, an agreement to pay oversight costs with the Department. Not entering into the agreement does not release you from responsibility for investigation and/or cleanup of the contamination. Please read the attached information on the cost recovery process; contact Darby Bacon at 503-229-6635 if you have questions on cost recovery.

Thank you for your cooperation and continued efforts to comply with the regulations. If you have any questions, please contact the UST Section of Northwest Region at 503-229-5263.

A copy of the UST Cleanup Manual
___ is enclosed
_X_ will be provided upon request

1500 SW First Avenue
Suite 750
Portland, OR 97201-5884
(503) 229-5263

TELEPHONE USE REPORT

CALL FROM/TO: Bill Knutson

COMPANY/TITLE: PEMCO

PHONE NO.: 283-2151

CITY: _____ COUNTY: _____

DATE: 3/4/93

TIME: 11:30

(Circle for filing)

AQ	Asbestos
WQ	OSS
SW	HW
General	Spill

RE: UNOCAL #4487
Facility # 988
Lust # 03-93-049

SUMMARY OF CALL:

Contamination found in piping trench during stage II recovery installation. Appears to be old bulk oil and possibly some gasoline (Bill suggested this may have been an old bulk plant site). We discussed the former LUST file for this site (03-90-513) which was closed 3/26/91. Bill asked if it was OK to analyze soil for 8015 modified rather than 418.1. I said ok as characterization (they will also do at least one HCID sample). The TPH-D or TPH-G will be required for confirmatory samples. Bill also asked if it was ok to proceed with the stage II installation. I said ok with the understanding that they do need to do full site characterization.

Signature

RB3972 (2/86)

◂ MORE ON BACK ▸

UPDATES:
3-28-97
3-31-97

* PETROLEUM RELEASE FORM *

Please Check All That Apply

INCIDENT INFORMATION

LOG NBR: 03-93-0049
UST FAC NBR: 988
RECEIVED BY: Tom Roick
DATE REPORTED: 3-3-93

- [x] REGULATED UST
- [ ] NON-REGULATED UST
- [ ] HEATING OIL TANK

SITE NAME: Unocal #4487
SITE ADDRESS: 1321 Main Street
SITE CITY: Oregon City ZIP: 97045
SITE COUNTY: Clackamas PHONE:

FUNDING
- [x] LUST
- [ ] OHC
- [ ] HSRAF
- [ ] FINANCIAL ASST

PROJECT MANAGER: Steve Hooper

- [ ] INVOICE START
- [x] INVOICE STOP
- [ ] NFA SENT

LTR. AGR. DATE:

See file #03-90-513 (closed 3-26-91)

MAIL CONTACTS

REPORTED BY
NAME: Bill Knutson
COMPANY: PEMCO
ADDRESS: 437 N Columbia Blvd
CITY: Portland ZIP: 97211
STATE: OR PHONE: 283-6388

RESPONSIBLE PARTY
NAME: Lee Carlson
COMPANY: Unocal
ADDRESS: PO Box 76
CITY: Seattle ZIP: 98111
STATE: WA PHONE: 206-443-7523

INVOICE CONTACT
NAME:
COMPANY:
ADDRESS:
CITY: ZIP:
STATE: PHONE:

OTHER CONTACT(S)
NAME:
COMPANY:
ADDRESS:
CITY: ZIP:
STATE: PHONE:

SITE ASSESSMENT

DATE DISCOVERED: 3-3-93

- [ ] EMERGENCY RESP.
- [ ] ENFORCEMENT

* 3-31-97 *

- [x] FURTHER CLEANUP REQ.
- [ ] NO FURTHER CLEANUP REQ.
- [ ] OFFSITE MIGRATION

_____ L.I.P.S. SCORE (Region)

CONFIRMATION:
- [x] SI) STAFF
- [ ] LD) LAB:DEQ
- [ ] LR) LAB:RP
- [ ] LO) LAB:OTHER
- [ ] RR) RP REPORT
- [ ] CN) CONTRACTOR
- [ ] OT) OTHER

DISCOVERY:
- [ ] RM) ROUTINE MONITORING
- [ ] DC) DECOMMISSIONING
- [ ] CP) COMPLAINT
- [ ] IC) INVENTORY CONTROL
- [ ] SA) SITE ASSESSMENT
- [ ] TT) TANK TEST
- [x] OT) OTHER Stage II Installation

CAUSE:
- [ ] TL) TANK LEAK
- [ ] PL) PIPE LEAK
- [ ] OF) OVERFILL
- [ ] SS) SURFACE SPILL
- [ ] PV) PUMP/VALVE LEAK
- [ ] OT) OTHER
- [ ] UN) UNKNOWN

CONTAMINANTS - IMPACTS

CONTAMINANTS:

- ☐ UG) UNLEADED GASOLINE
- ☐ LG) LEADED GASOLINE
- ☒ MG) MISC. GASOLINE
- ☐ DS) DIESEL
- ☐ FO) FUEL OIL
- ☐ WO) WASTE OIL
- ☐ LB) LUBRICANT
- ☐ SV) SOLVENT
- ☐ BF) BUNKER FUEL
- ☐ OP) OTHER PET. DIST.
- ☐ CH) CHEMICAL
- ☐ HO) HEATING OIL
- ☐ UN) UNKNOWN
- ☐ OT) OTHER _____

MEDIA/IMPACT:

- ☒ SL) SOIL
- ☐ GW) GROUNDWATER
- ☐ SW) SURFACE WATER
- ☐ DW) DRINKING WATER
- ☐ FV) FACILITY (VAPOR)
- ☐ FP) FACILITY (FREE PROD)

SITE - SOIL MANAGEMENT

RELEASE STOPPED: _____

CLEANUP STARTED: _____

REMEDIATION COMPLETED: 1-14-97

NO FURTHER ACTION: 3-31-97

SWLA PERMIT NUMBER: _____

DATE ISSUED: _____

AMOUNT OF SOIL (yds3) TREATED ON SITE: _____

AMOUNT OF SOIL (yds3) TREATED OFF SITE: _____

TREATMENT METHOD:

- ☐ AREATION
- ☐ THERMAL
- ☐ BIOLOGICAL
- ☐ OTHER _____

AMOUNT OF SOIL (yds3) DISPOSED OF: _____ ☐ TREATED ☐ UNTREATED

FINAL DISPOSITION OF SOIL:

- ☐ ONSITE
- ☐ LANDFILL
- ☐ ROAD BASE
- ☐ OTHER _____

NOTES/COMMENTS: _____

This Space Provided For Regional Use

LUST 03-90-5
CLOSED 3/26/91

LUST FORM

INCIDENT INFORMATION

LUST Incident Nbr: _____ LUST Log Nbr: 03-93-049 UST Facility ID: 988
Date Received: 3/3/93 Received By: Tom Roick Emergency Resp Taken: Y N
Tank Identification: File Name: UNOCAL 4487
Street: 1321 MAIN Street
City: Oregon City Zip: 97045
County: Clackamas Phone: _____
Incident Comments: Discovered contaminated soil during Stage II installation

CONTACT & MAIL TYPES

Reported By:
Name: BILL KNUTSON
Company: PEMCO
Street: 437 N. Columbia Blvd. (P.O. Box 11569)
City: PORTLAND Zip: 9724
State: OR Phone: 283-6388

LUST Contact:
Name: LEE CARLSON
Company: UNOCAL
Street: P.O. Box 76
City: SEATTLE Zip: 98111
State: WA Phone: (206)-443-7522

Responsible Party:
Name: (LEE CARLSON)
Company: UNOCAL
Street: 2000 Crow Canyon Pl. Ste 400
City: SAN RAMON Zip: 94583
State: CA Phone: (415) 945-7676
P.O. Box 5155

SITE ASSESSMENT

LUST Incident Nbr: (XXXXXXXXXXXXX)
Date Investigated: _____ Investigated By: _____
Release Exists: (Y) N (Circle)
Confirmation Method: (A)Staff B)Lab:DEQ C)Lab:RP D)Lab:Other E)RP F)Other (Circle)
Cleanup Necessary: (Y) N (Circle)
Regulated Tank: (Y) N (Circle)
Exposure Assessment: Y N (Circle)
Off-Site Migration: Y N ? (Circle)
Estimated Gallons Released: _____
Priority: 236
Discovery Date: _____

How Discovered: (Circle)
A)Routine Monitoring B)Inventory Control C)Decommissioning D)Site Assessment
E)Complaint F)Tank Test (G)Other STAGE II installation

Material Released: (Circle)
A)Unleaded Gasoline B)Leaded Gasoline (C)Misc. Gasoline
D)Diesel E)Fuel Oil F)Waste Oil
G)Lubricant H)Solvent I)Bunker Fuel
J)Other Pet. Dist. K)Chemical L)Unknown

Source of Release: (Circle)
A)Tank Leak B)Pipe Leak C)Overfill D)Surface Spill
E)Pump/Valve Leak F)Other G)Unknown

Impacts: (Circle)					
Soil	Y	N	%	?
Groundwater	Y	N	%	?
Surface Water	Y	N	%	?
Drinking Water	Y	N	%	?
Facility (Vapor)	Y	N	%	?
Facility (Free Product)	Y	N	%	?

Site Assessment Comments: _____

SITE MANAGEMENT

LUST Incident Nbr: (XXXXXXXXXXXXX)
Date Released Stopped: _____
Cleanup Activity: Start Date: _____ Under Control Date: _____
End Date: _____ Contractor Name: _____
Cleanup Guideline: (Circle) Matrix C.A.P. Cleanup Lead: (Circle) RP SLW/TF SLW/oTF

Free Product Disposal:
Est. Gallons: _____
Resp. Party: _____
Disposal Location: _____
Removal Date: _____

Soil Disposal:
Est. Cu/Yds: _____
Resp. Party: _____
Disposal Location: _____
Removal Date: _____

Enforcement Action: Y N (Circle)
Cost Recovery Initiated: Y N (Circle)
Source of Cost Recovery:
Pct. R.P.: _____
Pct. SLW/TF: _____
Pct. SLW/oTF: _____

Estimations: Cost of Cleanup: _____ Staff Time On Project: _____
Site Management Comments: See LUST File No. 03-90-513

[Version 102]

NWR UST CLEANUP SITE CHECKLIST
(for regional use only)

This site is:

_____ <40 ppm Matrix

_X_ Regulated Tank

_____ Exempt Tank

_____ Oil Heat Commission eligible

_____ Other _____
(surface spill, non-petroleum UST, etc.)

Assign site to:

_____ Staff (your initials or staff for major RP)

_____ Unassigned at this time
(matrix only, soil aeration not anticipated)

_____ Needs to be tracked (supervisor to assign)
Reason:

Action:

_____ Send Initial Letter (with rules)

_X_ Send Modified Letter (without rules)

_____ Send <40 ppm Letter (without rules)

_____ No letter required _____
(sending other letter, etc.)

Regulated Tank Information (Y/N):

_X_ Tanks registered ID No._____

_____ Decommissioning notice (30 day) received

_____ 3 day notice received

_____ Fees current

_____ New tanks to be installed

Misc. Notes:

DEPT OF ENVIRONMENTAL QUALITY
RECEIVED
FEB 11 1994
NORTHWEST REGION

Report of Geoenvironmental Services
Subsurface Characterization Study
Unocal Service Station 4487
Oregon City, Oregon

February 9, 1994

03-93-49

For

Unocal CERT - Northern Region

GeoEngineers

February 9, 1994

Geotechnical,
Geoenvironmental and
Geologic Services

Unocal CERT - Northern Region
P.O. Box 76
Seattle, Washington 98111

Attention: Mr. Leigh Carlson

We are submitting two copies of our "Report of Geoenvironmental Services, Subsurface Characterization Study" for Unocal Service Station 4487 in Oregon City, Oregon. Our services for this project were authorized by Mr. Leigh Carlson. Contractual terms for our services are described in blanket contract number B1982G.

We appreciate the opportunity to be of continued service to Unocal. Please call if you have questions regarding this report.

Yours very truly,

GeoEngineers, Inc.

Julia Fowler
Associate

SEW:mln
Document ID: 0161331r.rl

File No. 0161-331-P18

cc: Mr. Greg Toran
Department of Environmental Quality
Northwest Region

GeoEngineers, Inc.
7504 SW Bridgeport Road
Portland, OR 97224
Telephone (503) 624-9274
Fax (503) 620-5940

Printed on recycled paper.

CONTENTS

TABLES

FIGURES

CONTENTS (continued)

REPORT OF GEOENVIRONMENTAL SERVICES
SUBSURFACE CHARACTERIZATION STUDY
UNOCAL SERVICE STATION 4487
OREGON CITY, OREGON
FOR
UNOCAL CERT - NORTHERN REGION

INTRODUCTION

This report presents the results of GeoEngineers' subsurface characterization study at the site of Unocal Service Station 4487, located at 1321 Main Street in Oregon City, Oregon. The DEQ (Oregon Department of Environmental Quality) UST (underground storage tank) Cleanup List number for this site is 03-90-0513. The site is shown relative to surrounding physical features in Figure 1.

BACKGROUND

We reviewed a report prepared by PHR (PHR Environmental Consultants, Inc.) summarizing their review of Unocal's real estate and environmental documents related to Service Station 4487. Photographs in Unocal's files showed that a Conoco service station was located on the site prior to April 1957 at the west corner of the intersection between Main Street and 14th Street. A residence also was located on the site at the corner of 14th Street and Highway 99 East.

Unocal Service Station 4487 was constructed on the site in January 1958. The service station consisted of one building with two service bays, one 4,000-gallon UST, two 3,000-gallon USTs, one 280-gallon waste oil UST, and three service islands. The 1958 site plan is shown in Figure 2. Unocal purchased the site in January 1963 and replaced the gasoline USTs in 1982 with two 10,000-gallon fiberglass USTs. A heating oil UST also was installed in 1982 at the approximate location shown in Figure 3. This background information is summarized in PHR's report dated July 15, 1993.

PC&T (Petroleum Construction and Testing, Inc.) of Bend, Oregon, removed one 280-gallon waste oil UST and one 550-gallon heating oil UST on June 20, 1990. Brown and Caldwell monitored removal of the USTs and preliminarily classified this site as a Level 2 Matrix site. Petroleum hydrocarbons were not detected at concentrations exceeding DEQ Level 2 cleanup standards from soil samples obtained from the limits of the heating oil/waste oil UST excavation. The results of the UST removal monitoring are presented in Brown and Caldwell's report dated July 31, 1990. DEQ issued a letter of "no further action" for the site dated March 26, 1991.

PEMCO (Petroleum Equipment and Maintenance Company) of Portland, Oregon, constructed a Stage II vapor recovery system at the site in March 1993. Gasoline-contaminated soil was encountered at depths of 3 feet and 5 feet below ground surface in a vapor recovery

system piping trench near the northwest service island at concentrations exceeding DEQ Level 2 cleanup standards. The approximate location of the gasoline-contaminated soil identified by PEMCO in the Stage II vapor recovery system piping trench is shown in Figure 3. PEMCO removed approximately 15 cubic yards of gasoline-contaminated soil from the piping trench and stockpiled on site during the installation of the recovery system. We understand that the excavated soil was transported to Oregon Hydrocarbon, Inc. in Portland, Oregon, for treatment. Results of the recovery system installation and soil sampling are presented in PEMCO's report dated March 22, 1993.

SAFE (SAFE Research, Inc.) conducted historical research of the service station site and surrounding properties for Unocal to examine possible sources of petroleum hydrocarbon contamination in the vicinity of the site. Possible upgradient petroleum hydrocarbon sources identified by SAFE in the immediate vicinity of the site include the following:

- A Signal/Enco service station formerly located northeast of the site, across 14th Street.
- An automobile dealership currently located northeast of the site across 14th Street at the location of the former Signal/Enco service station.
- The John Link Pontiac-GMC automobile dealership currently located east of the site across the intersection between Main Street and 14th Street.

Possible secondary sources of petroleum hydrocarbon contamination in the general vicinity of Unocal Service Station 4487 also were identified by SAFE. The results of the historical research are summarized in SAFE's report dated July 26, 1993.

SCOPE

The purpose of our services was to further investigate the extent of soil contamination encountered at the site during construction of the Stage II vapor recovery system and to explore for the possible presence of soil and ground water contamination associated with either on-site or off-site sources. Our specific scope of services is as follows.

1. Contract with a utility locate service to conduct a magnetometer survey at each of the proposed boring locations in order to locate on-site utilities and to explore for undocumented USTs prior to drilling.
2. Monitor the drilling of five soil borings to depths ranging between 21.5 feet and 56.5 feet using hollow-stem auger drilling methods.
3. Obtain soil samples from the borings at approximate 5-foot intervals. Field screen the soil samples for evidence of hydrocarbons using visual examination, sheen screening and headspace vapor screening methods. Visually classify the soil samples in general accordance with ASTM (American Society for Testing and Materials) D 2488, the Standard Practice for Description and Identification of Soils.
4. Select two soil samples from each boring for chemical analysis of petroleum hydrocarbons by DEQ Methods TPH-HCID, TPH-G, TPH-D and/or TPH-418.1M.

5. Construct 2-inch-diameter ground water monitoring wells with lockable flush-grade surface monuments in the four deepest borings.
6. Develop the well screens by hand-bailing with disposable polyethylene bailers.
7. Collect ground water samples from the monitoring wells and test the samples for one or more of the following: BETX (benzene, ethylbenzene, toluene and xylenes) by EPA (U.S. Environmental Protection Agency) Method 8020, TPH (total petroleum hydrocarbons) by EPA Method 418.1, dissolved lead by EPA Method 7421 and halogenated VOCs (volatile organic compounds) including EDB (ethylene dibromide) and EDC (ethylene dichloride) by EPA Method 8010.
8. Determine the monitoring well casing elevations to an accuracy of 0.01 foot using an engineer's level and an assumed site datum.
9. Measure the airspace in each well casing for combustible vapors using a Bacharach TLV Sniffer.
10. Measure water table depths in the wells and measure each well for the presence of free (floating) product.
11. Evaluate the field and laboratory data with regard to existing regulatory criteria.

SITE CONDITIONS

GENERAL

The site of Unocal Service Station 4487 is relatively level and has a ground surface elevation of approximately 45 feet above mean sea level. The site is located on a bench on the east side of the Willamette River near downtown Oregon City. The service station is currently in operation, but the service bays are not in use. Two of the three service islands are operational. The entire site is covered with cement and/or asphalt concrete pavement.

SUBSURFACE SOIL CONDITIONS

Soil conditions beneath the site were explored by drilling five soil borings (MW-1 through MW-4 and B-1) on November 9 and 10, 1993. The borings were drilled near the site's three service islands and two gasoline USTs at the approximate locations shown in Figure 3. The borings were drilled to depths ranging from 21.5 to 56.5 feet below ground surface. Soil cuttings from the borings were placed in ODOT- (Oregon Department of Transportation) approved 55-gallon drums. The drilling program is described in Appendix A.

Each boring penetrated approximately 3 inches of asphalt concrete pavement at the surface. Pea gravel was encountered in borings MW-2 and MW-3 from the base of the pavement to approximate depths of 4 and 7 feet, respectively. In general, brown silty sand was encountered from the base of the pea gravel or the asphalt concrete pavement to the total depth explored in borings MW-2, MW-3, MW-4 and B-1. Silty sand was encountered beneath the asphalt concrete pavement in boring MW-1 to a depth of 56.0 feet. Vesicular basalt was encountered beneath the silty sand in boring MW-1. Boring logs are presented in Appendix A.

GROUND WATER CONDITIONS

Ground water conditions were explored at the site by constructing monitoring wells in borings MW-1 through MW-4. The monitoring wells were constructed of 2-inch-diameter, 0.02-inch machine-slotted, Schedule 40 PVC (polyvinyl chloride) well screen. The upper portion of each well is constructed with unslotted 2-inch-diameter, Schedule 40 PVC well casing. Construction details for each monitoring well are presented in Appendix A.

We established a temporary benchmark at the base of a light pole near the corner of 14th Street and Main Street and surveyed the monitoring well casing rims relative to the temporary benchmark on November 10. We measured the depths to the ground water table in all of the monitoring wells on November 22, 1993; ground water depths ranged between 42.46 and 44.75 feet below the ground surface. The general direction of the shallow ground water flow beneath the site is to the west, toward the Willamette River, based on our November 22 measurements.

DEQ REGULATORY CRITERIA

SOIL

DEQ has developed soil Matrix cleanup standards for UST sites with petroleum-contaminated soil where ground water has not been affected. Based on our analysis, the site would receive a Matrix score of 36, as listed below:

	Parameter	Score
1.	Depth to ground water (25 - 50 feet)	7
2.	Mean annual precipitation (20 - 45 inches)	5
3.	Native soil type (silty sand)	10
4.	Sensitivity of the uppermost aquifer (potable, not currently used)	4
5.	Potential receptors (assume nearby wells and many people served)	10
	TOTAL:	36

The score results in a Level 2 designation for this site, with corresponding soil cleanup standards of 80 mg/kg (milligrams per kilogram) for gasoline-contaminated soil and 500 mg/kg for soil contaminated with diesel and/or heavier petroleum products.

GROUND WATER

DEQ's UST Cleanup Section has developed cleanup standards for ground water affected by releases from UST systems. The cleanup standards, which became effective October 1, 1992, include standards for BETX and dissolved lead. A cleanup standard was not established for TPH. DEQ's ground water cleanup standards for select compounds are as follows:

Compound	Ground Water Cleanup Level
Benzene	5 µg/l (micrograms per liter)
Ethylbenzene	700 µg/l
Toluene	1,000 µg/l
Xylenes	10,000 µg/l
Lead	5 µg/l

In addition, EPA has established primary MCLs (maximum contaminant levels) for drinking water. Compounds detected at the site for which DEQ has not established cleanup standards, but for which EPA has established primary MCLs, include tetrachloroethene, trichloroethene and chloroform. EPA has not established MCLs for methylene chloride and TPH. The current MCLs for those compounds detected at the site are as follows:

Compound	MCLs
Chloroform	100 µg/l
Tetrachloroethene	5 µg/l
Trichloroethene	5 µg/l

SUBSURFACE CONTAMINATION

GENERAL

Possible subsurface contamination from petroleum products was evaluated by collecting soil samples for field screening, obtaining ground water samples from the monitoring wells and submitting the soil and ground water samples for chemical analysis, measuring for the presence of free product in the monitoring wells, and measuring combustible vapor concentrations in the monitoring wells. Field screening procedures are described in Appendix A. Laboratory reports, chain-of-custody records and a review of the laboratory QA/QC (quality assurance/quality control) procedures also are presented in Appendix B.

SOIL

Soil samples were obtained from each boring at 5-foot intervals for field screening. In this report, samples are identified by the boring number followed by the sample depth. For example, sample MW1-5 was obtained from a depth of 5 feet in boring MW-1.

Combustible headspace vapor concentrations measured during field screening ranged between less than 100 ppm (parts per million) and 1,000 ppm in the soil samples obtained from

the borings. Combustible headspace vapor concentrations ranged from less than 100 ppm to 350 ppm in the soil samples submitted for chemical analysis. Slight sheens were observed during field screening of soil samples obtained from each boring for chemical analysis, except a moderate sheen was observed in the soil sample obtained from a depth of 10 feet in MW-2 (MW2-10). Field screening results for the soil samples are presented in the boring logs (Appendix A) and in Table 1 for those samples submitted for chemical analysis.

Two soil samples from each boring were submitted for chemical analysis by DEQ Methods TPH-HCID, TPH-G, TPH-D and/or TPH-418.1M. Diesel- and oil-range hydrocarbons were qualitatively detected in soil sample MW1-5 by the TPH-HCID analysis. Quantitative analysis of soil sample MW1-5 by DEQ Method TPH-418.1M indicated that the concentration was less than DEQ's corresponding Level 2 cleanup standard. Hydrocarbons were not detected in sample MW1-10 (obtained from 5 feet beneath sample MW1-5). Gasoline- and diesel-range hydrocarbons were qualitatively detected in soil sample MW2-10 by the TPH-HCID analysis. Quantitative analysis of soil sample MW2-10 by TPH-G and TPH-D analyses indicated that the gasoline concentration was greater than the corresponding DEQ Level 2 soil Matrix cleanup standard. The TPH-HCID chromatogram for soil sample MW2-10 appears to be similar to aged gasoline or stoddard solvent, based on our review of the chromatogram. Hydrocarbons were not detected in sample MW2-15, obtained from approximately 5 feet beneath sample MW2-10, or in soil samples obtained from borings MW-3, MW-4 and B-1. Results of soil sample analyses are summarized in Table 1.

GROUND WATER

Combustible vapor concentrations were measured in the monitoring well casings on November 22, 1993. The concentration of combustible vapors measured in monitoring well MW-2 was greater than 10,000 ppm. The concentration measured in monitoring well MW-3 was 400 ppm. Concentrations of combustible vapors measured in monitoring wells MW-1 and MW-4 were less than 400 ppm.

Ground water samples were obtained from the monitoring wells on November 22, 1993, and analyzed for TPH by EPA Method 418.1, BETX by EPA Method 8020, VOCs by EPA Method 8010, and lead by EPA Method 7421.

TPH and BETX were not detected in the ground water samples. Chloroform was detected in all ground water samples at concentrations less than regulatory criteria. Tetrachloroethene was detected in the ground water samples obtained from monitoring wells MW-1, MW-2 and MW-4 at concentrations less than EPA's MCL for drinking water. Tetrachloroethene was not detected in ground water obtained from MW-3. Trichloroethene was detected in ground water obtained from MW-4 at a concentration less than EPA's MCLs. Trichloroethene was not detected in the ground water samples obtained from MW-1 through MW-3. Dissolved lead was detected in the ground water samples obtained from MW-1, MW-3 and MW-4 at concentrations less than either

EPA's MCL or DEQ's UST cleanup guidelines. Dissolved lead was not detected in the ground water sample obtained from MW-2. The results of the ground water sample analyses are summarized in Table 2.

CONCLUSIONS

Petroleum hydrocarbons similar to aged gasoline or stoddard solvent were detected in a soil sample obtained from 10 feet below the ground surface in boring MW-2 at a concentration exceeding DEQ's Level 2 cleanup standard for gasoline. Petroleum hydrocarbons were not detected in the sample tested from 15 feet in boring MW-2. In addition, petroleum hydrocarbons were not detected in soil samples obtained from the other borings. The petroleum hydrocarbon-contaminated soil that was documented near the northeast pump island during construction of the Stage II vapor recovery system trench was not encountered in the borings.

Halogenated VOCs, including chloroform, tetrachloroethene, and/or trichloroethene, were detected in the ground water samples obtained from each of the monitoring wells at concentrations less than regulatory cleanup standards. The source of the tetrachloroethene, detected in three of the ground water samples, and trichloroethene, detected in one of the ground water samples, is unknown.

RECOMMENDATIONS

We recommend that ground water monitoring be conducted at the site on a quarterly basis. Ground water samples should be obtained from each of the monitoring wells and analyzed for halogenated VOCs by EPA Method 8010 and lead by EPA Method 7421. Testing for BETX should not be necessary because BETX constituents were not detected in the monitoring well samples during this investigation.

LIMITATIONS

We have prepared this report for use by Unocal CERT - Northern Region. This report may be made available to prospective buyers of the property and to regulatory agencies. The report is not intended for use by others and the information contained herein is not applicable to other sites.

Our interpretations of subsurface conditions are based on data from widely spaced borings at the site. It is always possible that contamination may exist in areas of the site that were not explored by drilling.

Within the limitations of scope and budget, our services have been executed in accordance with generally accepted practices in this area at the time this report was prepared. No warranty, express or implied, should be understood.

We appreciate the opportunity to be of continued service to Unocal CERT - Northern Region. Please contact us if you have questions regarding this report.

Yours very truly,

GeoEngineers, Inc.

Patrick J. Sullivan, R.G.
Geologist

Scott E. Widness, P.E.
Principal

PJS:SEW:mln
Document ID: 0161331r.rl

TABLE 1
SUMMARY OF SOIL CHEMICAL ANALYTICAL DATA[1]

Boring Number-Sample Depth (feet)	Date Sampled	Field Screening Results[2]		Hydrocarbon Identification (DEQ Method TPH-HCID[3])			Gasoline-range Hydrocarbons (DEQ Method TPH-G[4]) (mg/kg)	Diesel-range Hydrocarbons (DEQ Method TPH-D[5]) (mg/kg)	Oil-range Hydrocarbons (DEQ Method TPH-418.1M[6]) (mg/kg)
		Headspace Vapor (ppm)	Sheen	Gasoline	Diesel	Oil			
MW1-5	11/09/93	150	SS	ND	Detected	Observed	--	--	220
MW1-10	11/09/93	<100	SS	ND	ND	NO	--	--	--
MW2-10	11/09/93	350	MS	Detected	Detected	NO	1,100	410	--
MW2-15	11/09/93	<100	SS	ND	ND	NO	--	--	--
MW3-20	11/10/93	300	SS	ND	ND	NO	--	--	--
MW3-55	11/10/93	<100	SS	ND	ND	NO	--	--	--
MW4-10	11/10/93	180	SS	ND	ND	NO	--	--	--
MW4-25	11/10/93	140	SS	ND	ND	NO	--	--	--
B1-5	11/10/93	<100	SS	ND	ND	NO	--	--	--
B1-10	11/10/93	<100	SS	ND	ND	NO	--	--	--
DEQ Level 2 Cleanup Standards							80	500	500

Notes:

[1]Chemical analyses conducted by Analytical Technologies, Inc. of Durham, Oregon.

[2]Field screening methods are described in Appendix A.

SS = slight sheen, MS = moderate sheen

[3]Reporting limits are 20 mg/kg for gasoline, 50 mg/kg for diesel and not established for oil.

[4]Detection limit is 5 mg/kg.

[5]Detection limit is 20 mg/kg.

[6]Detection limit is 20 mg/kg.

ppm = parts per million

mg/kg = milligrams per kilogram

ND = not detected

"--" = not analyzed

NO = not observed

Shading indicates concentrations greater than DEQ Level 2 cleanup standards.

TABLE 2
SUMMARY OF COMBUSTIBLE VAPOR CONCENTRATIONS AND GROUND WATER CHEMICAL ANALYTICAL DATA

Monitoring Well Number	Date Monitored or Sampled	Water Table Elevation (feet)	Combustible Vapor Concentration[2] (ppm)	TPH[3] (EPA Method 418.1) (mg/l)	Aromatic VOCs[4] (EPA Method 8020) (µg/l)				Halogenated VOCs[5] (EPA Method 8010) (µg/l)	Lead (EPA Method 7421) (mg/l)
					B	E	T	X		
MW-1	11/22/93	56.15	<400	<0.6	<0.5	<0.5	<0.5	<0.5	2.9 - Chloroform 2.1 - Tetrachloroethene	0.003
MW-2	11/22/93	57.32	>10,000	<0.6	<0.5	<0.5	<0.5	<0.5	7.0 - Chloroform 1.5 - Tetrachloroethene	<0.002
MW-3	11/22/93	56.20	400	<0.7	<0.5	<0.5	<0.5	<0.5	4.2 - Chloroform	0.002
MW-4	11/22/93	56.03	<400	<0.6	<0.5	<0.5	<0.5	<0.5	1.1 - Chloroform 3.7 - Tetrachloroethene 0.3 - Trichloroethene	0.004
Trip Blank	11/22/93	--	--	--	<0.5	<0.5	<0.5	<0.5	14 - Methylene chloride	--
Regulatory Criteria					5[6]	700[6]	1,000[6]	10,000[6]	100 - Chloroform[7] 5 - Tetrachloroethene[7] 5 - Trichloroethene[7]	0.005[6]

Notes:

[1]Chemical analyses conducted by Analytical Technologies, Inc. of Durham, Oregon.

[2]Combustible vapor concentrations were obtained in the monitoring well casings approximately 1 foot above the water table surface with a Bacharach TLV Sniffer calibrated to hexane. The lower threshold of significance for the TLV Sniffer in this application is 400 ppm.

[3]TPH = total petroleum hydrocarbons

[4]VOCs = volatile organic compounds

[5]Only those analytes detected are listed. See the laboratory report for a complete list of analytes and detection limits.

[6]DEQ (Oregon Department of Environmental Quality) cleanup standard

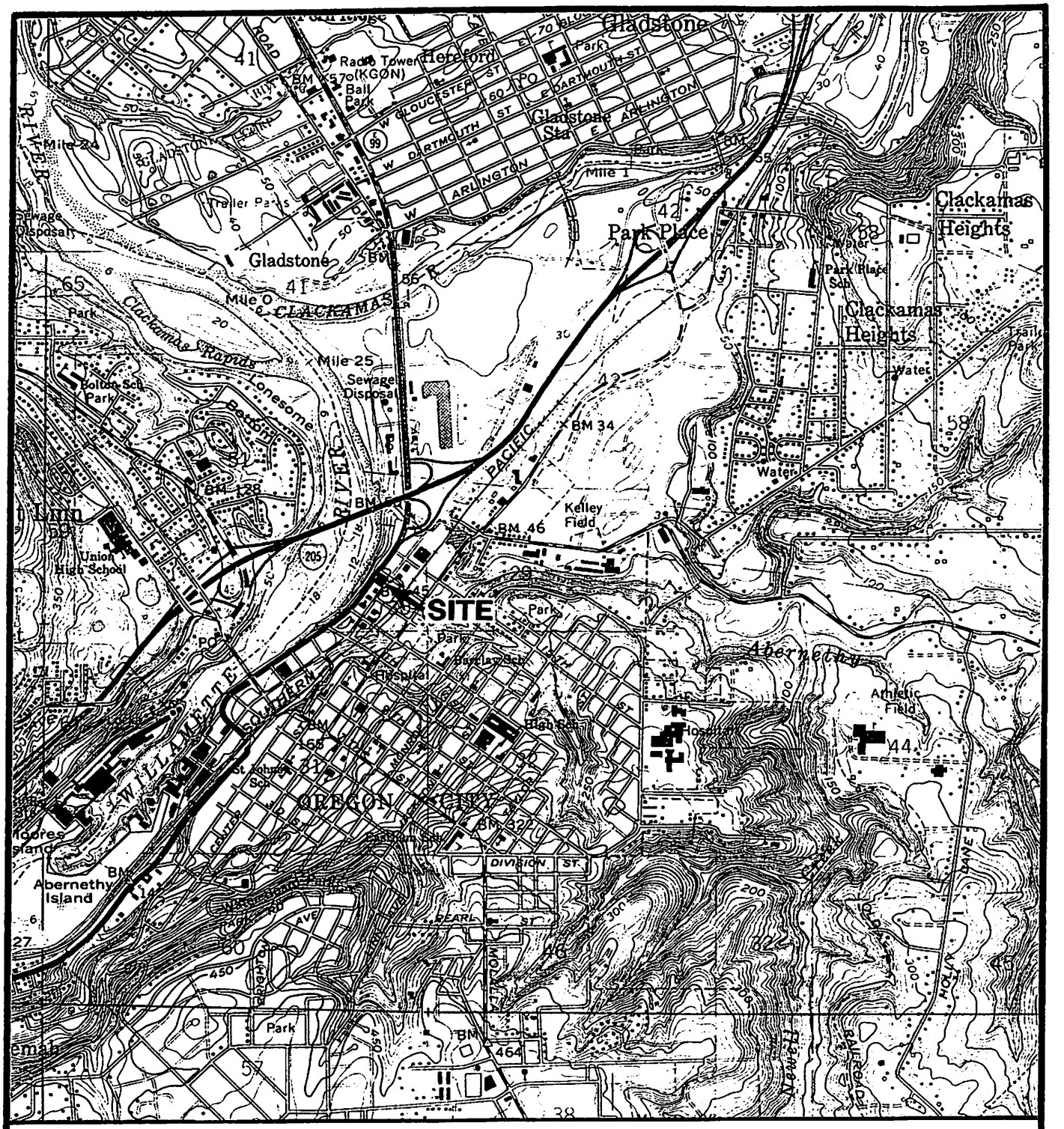
[7]EPA (U.S. Environmental Protection Agency) Primary Drinking Water Standards as presented in 40 CFR (Code of Federal Regulations) Parts 140 through 143.

ppm = parts per million

mg/l = milligrams per liter

µg/l = micrograms per liter

"--" = not analyzed



0 2000 4000

SCALE IN FEET

N

References: USGS 7.5' topographic quadrangle maps, "Gladstone, OR" photorevised 1984 and "Oregon City, OR" photorevised 1985.

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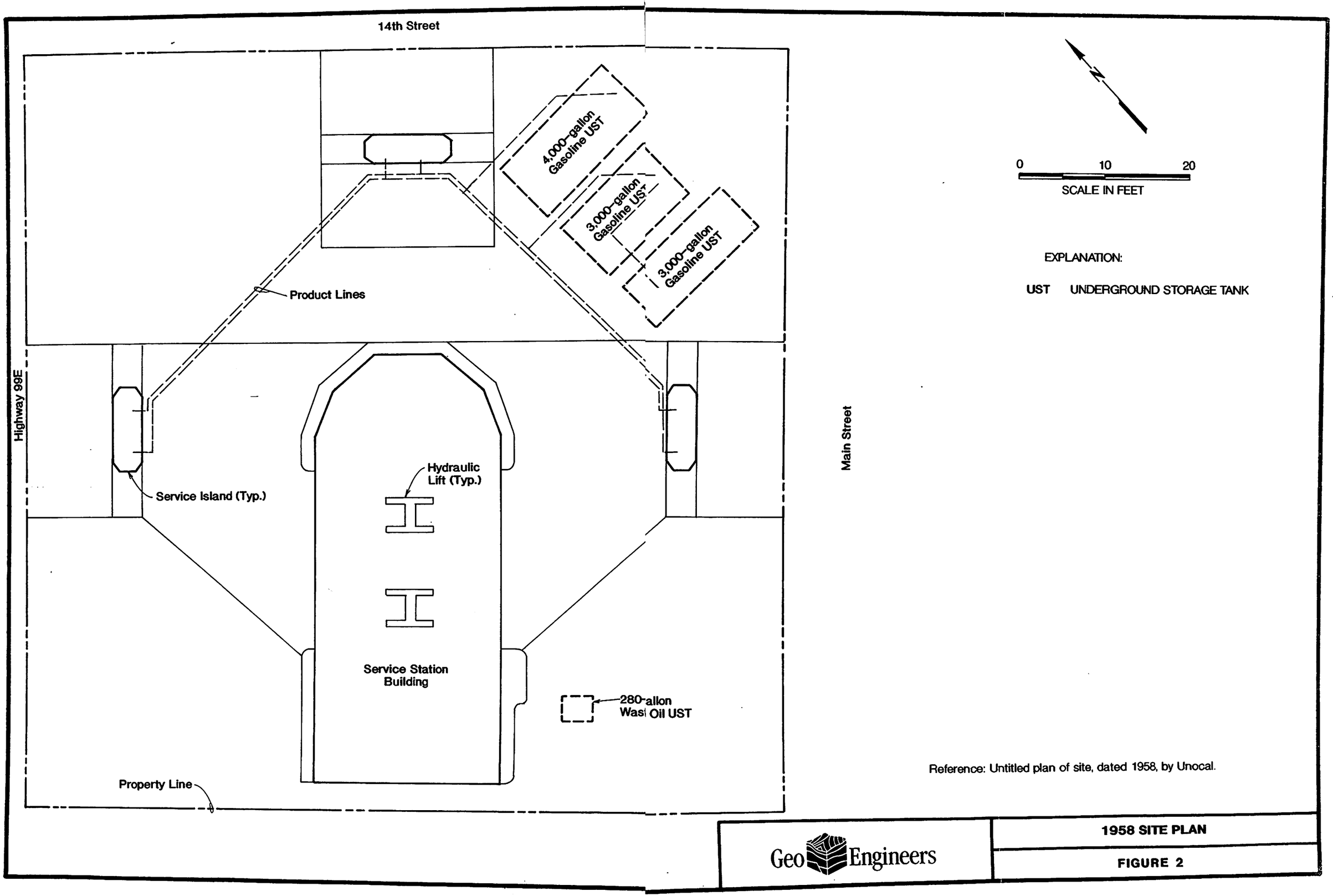
VICINITY MAP

FIGURE 1



Reference: Untitled plan of site, dated 1958, by Unocal.

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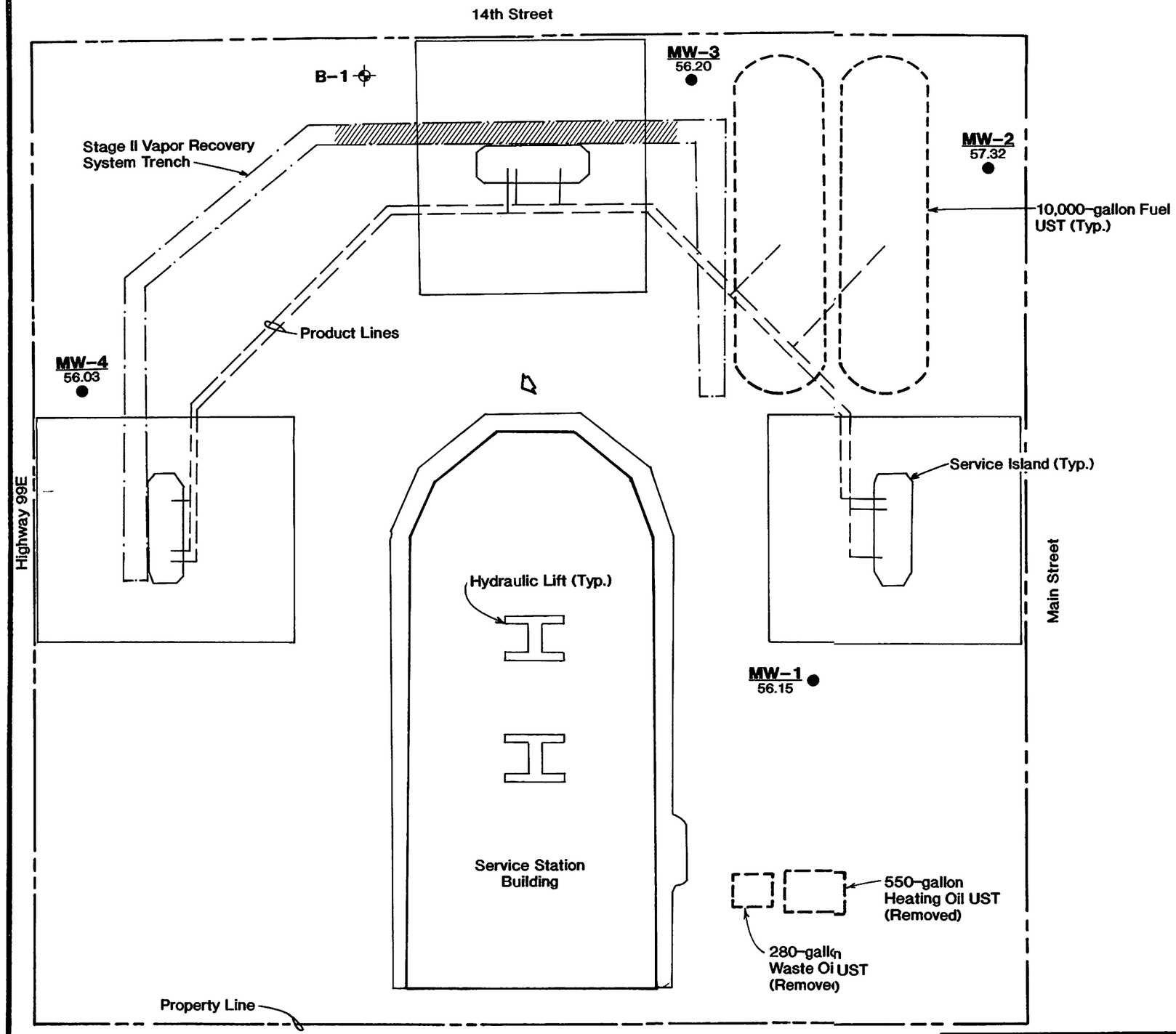
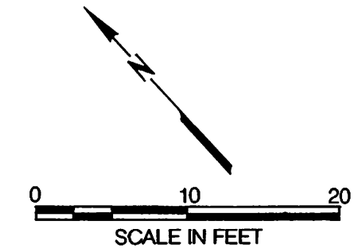
1958 SITE PLAN

FIGURE 2





EXPLANATION:

MW-1 56.15 ● MONITORING WELL
GROUND WATER ELEVATION (IN FEET) ON 11/22/93

B-1 ⊕ BORING

AREA OF CONTAMINATED SOIL IDENTIFIED BY PEMCO

UST UNDERGROUND STORAGE TANK

INFERRED DIRECTION OF GROUND WATER FLOW

Reference: Drawing entitled "General Arrangement 14th Street and Main Street, Oregon City, Oregon," dated 08/21/57, by Unocal.

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CURRENT SITE PLAN

FIGURE 3

APPENDIX A

APPENDIX A

FIELD EXPLORATIONS

DRILLING AND SOIL SAMPLING PROGRAM

Subsurface conditions at Unocal Service Station 4487 were explored by drilling five soil borings (MW-1 through MW-4, and B-1) using hollow-stem auger drilling equipment owned and operated by Crisman Drilling, Inc. of Tualatin, Oregon. The borings were drilled on November 9 and 10, 1993. The drilling and soil sampling equipment was cleaned with a hot-water pressure washer between drilling each boring.

A representative from our staff examined and classified the soils encountered and prepared a detailed log of each boring. Soils encountered were visually classified in general accordance with ASTM D 2488, the Standard Practice for Description and Identification of Soils, which is described in Figure A-1. An explanation of the boring log symbols is presented in Figure A-2 and the boring logs are presented in Figures A-3 through A-7.

Soil samples were obtained from each boring using a split-spoon sampler (1.5-inch inside diameter). The sampler was driven 18 inches using a 140-pound weight falling a distance of approximately 30 inches. The number of blows needed to advance the sampler the final 12 inches is indicated to the left of the corresponding sample notations on the vertical boring log.

The sampler was cleaned between each sampling attempt with Liquinox, and rinsed with tap water and distilled water. Two soil samples were selected from each boring for chemical analysis. The soil samples submitted for chemical analysis are denoted with a "CA" in the boring logs.

FIELD SCREENING OF SOIL SAMPLES

A GeoEngineers geologist field screened soil samples obtained from the excavations, test pit and stockpiles. Field screening results are used as a general guideline to delineate areas of possible petroleum-related contamination. In addition, screening results are used to aid in the selection of soil samples for chemical analysis. The screening methods used include (1) visual screening, (2) water sheen screening and (3) headspace vapor screening.

Visual screening consists of inspecting the soil for stains indicative of petroleum-related contamination. Visual screening is generally more effective when contamination is related to heavy petroleum hydrocarbons such as motor oil, or when hydrocarbon concentrations are high. Water sheen screening and headspace vapor screening are more sensitive methods that have been effective in detecting contamination at concentrations less than regulatory cleanup guidelines. However, field screening results are site-specific. The effectiveness of field screening results will vary with temperature, moisture content, organic content, soil type and type and age of contaminant. The presence or absence of a sheen or headspace vapors does not necessarily indicate the presence or absence of petroleum hydrocarbons.

Water sheen screening involves placing soil in a pan of water and observing the water surface for signs of sheen. Sheen screening may detect both volatile and nonvolatile petroleum hydrocarbons. Sheens observed are classified as follows:

No Sheen (NS)	No visible sheen on water surface.
Slight Sheen (SS)	Light, colorless, dull sheen; spread is irregular, not rapid; sheen dissipates rapidly. Natural organic matter in the soil may produce a slight sheen.
Moderate Sheen (MS)	Light to heavy sheen; may have some color/iridescence; spread is irregular to flowing, may be rapid; few remaining areas of no sheen on water surface.
Heavy Sheen (HS)	Heavy sheen with color/iridescence; spread is rapid; entire water surface may be covered with sheen.

Headspace vapor screening involves placing a soil sample in a plastic sample bag. Air is captured in the bag, and the bag is shaken to expose the soil to the air trapped in the bag. The probe of a Bacharach TLV Sniffer is inserted in the bag, and the TLV Sniffer measures the concentration of combustible vapors present within the sample bag headspace. Headspace vapor screening targets volatile petroleum hydrocarbon compounds. The TLV Sniffer measures combustible vapor concentrations in ppm (parts per million) and is calibrated to hexane. The TLV Sniffer is designed to quantify combustible gas concentrations up to 10,000 ppm.

MONITORING WELL CONSTRUCTION

Two-inch diameter, Schedule 40 PVC pipe was installed in four soil borings (MW-1 through MW-4) at the completion of drilling. The lower portion of the PVC pipe is machine-slotted (0.02-inch slot width) to allow entry of water, floating hydrocarbons and hydrocarbon vapors into the well casings. Medium sand was placed in the borehole annulus surrounding the slotted portion of the PVC pipe. The well casings are protected with lockable, flush-grade surface monuments. Monitoring well construction details are shown in Figures A-3 through A-7.

The monitoring wells were developed by surging and removal of at least three standing well volumes of water. The monitoring well casing rim elevations were determined to an accuracy of 0.01 foot using an engineer's level and an assumed site datum of 100 feet on November 10, 1993.

GROUND WATER ELEVATIONS

The depths to the ground water table relative to the monitoring well casing rims were measured in monitoring wells MW-1 through MW-4 on November 22, 1993. The depth to ground water was measured using an ORS (Oil Recovery Systems, Inc.) water interface probe to an accuracy of 0.01 foot. Water table elevations were calculated by subtracting the water table depths from the casing rim elevations. Ground water elevations are included in Table 2 and are presented in Figure 3.

COMBUSTIBLE VAPOR CONCENTRATIONS

Combustible vapor concentrations were measured in the monitoring well casings of MW-1 through MW-4 on November 22, 1993. Combustible vapor concentrations were measured using a Bacharach TLV Sniffer calibrated to hexane. The lower threshold of significance for the TLV Sniffer in this application is 400 ppm, or 3.6 percent of the lower explosive limit for hexane. Combustible vapor concentrations are summarized in Table 2.

GROUND WATER SAMPLING PROGRAM

Ground water samples were obtained from monitoring wells MW-1 through MW-4 on November 22, 1993, using disposable polyethylene bailers after at least three well volumes of water were removed from each well casing. A new bailer and cord were used in each monitoring well to reduce the possibility of cross-contamination. The samples submitted for analysis of dissolved lead were filtered in the field using a 0.45 micron filter.

The water samples were transferred to 40-ml (milliliter) septum vials preserved with hydrochloric acid, amber 1-liter bottles, and polyethylene 500-milliliter bottles preserved with nitric acid in the field. Water samples were kept cool during transport to the testing laboratory. Chain-of-custody procedures were followed during sample transport.

SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOL	GROUP NAME
COARSE GRAINED SOILS MORE THAN 50% RETAINED ON NO. 200 SIEVE	GRAVEL MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVEL	GW	WELL-GRADED GRAVEL, FINE TO COARSE GRAVEL
			GP	POORLY-GRADED GRAVEL
		GRAVEL WITH FINES	GM	SILTY GRAVEL
			GC	CLAYEY GRAVEL
	SAND MORE THAN 50% OF COARSE FRACTION PASSES NO. 4 SIEVE	CLEAN SAND	SW	WELL-GRADED SAND, FINE TO COARSE SAND
			SP	POORLY-GRADED SAND
		SAND WITH FINES	SM	SILTY SAND
			SC	CLAYEY SAND
FINE GRAINED SOILS MORE THAN 50% PASSES NO. 200 SIEVE	SILT AND CLAY LIQUID LIMIT LESS THAN 50	INORGANIC	ML	SILT
			CL	CLAY
		ORGANIC	OL	ORGANIC SILT, ORGANIC CLAY
	SILT AND CLAY LIQUID LIMIT 50 OR MORE	INORGANIC	MH	SILT OF HIGH PLASTICITY, ELASTIC SILT
			CH	CLAY OF HIGH PLASTICITY, FAT CLAY
		ORGANIC	OH	ORGANIC CLAY, ORGANIC SILT
HIGHLY ORGANIC SOILS			PT	PEAT

NOTES:

1. Field classification is based on visual examination of soil in general accordance with ASTM D2488-90.
2. Soil classification using laboratory tests is based on ASTM D2487-90.
3. Descriptions of soil density or consistency are based on interpretation of blowcount data, visual appearance of soils, and/or test data.

SOIL MOISTURE MODIFIERS:

Dry – Absence of moisture, dusty, dry to the touch

Moist – Damp, but no visible water

Wet – Visible free water or saturated, usually soil is obtained from below water table

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SOIL CLASSIFICATION SYSTEM

FIGURE A-1

LABORATORY TESTS:

CA Chemical Analysis

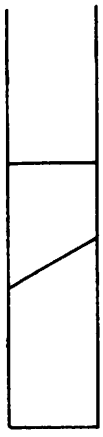
FIELD SCREENING TESTS:

Headspace vapor concentration data given in parts per million

Sheen classification system:

NS No Visible Sheen
SS Slight Sheen
MS Moderate Sheen
HS Heavy Sheen
NT Not Tested

SOIL GRAPH:



SM Soil Group Symbol (See Note 2)

Distinct Contact Between Soil Strata

Gradual or Approximate Location of Change Between Soil Strata

Water Level

Bottom of Boring

BLOW-COUNT/SAMPLE DATA:

Blows required to drive a 2.4-inch I.D. split-barrel sampler 12 inches or other indicated distances using a 300-pound hammer falling 30 inches.

22 ■ Location of relatively undisturbed sample

12 ⊠ Location of disturbed sample

17 □ Location of sampling attempt with no recovery

Blows required to drive a 1.5-inch I.D. (SPT) split-barrel sampler 12 inches or other indicated distances using 140-pound hammer falling 30 inches.

10 ◨ Location of sample obtained in general accordance with Standard Penetration Test (ASTM D-1586) procedures

26 ◫ Location of SPT sampling attempt with no recovery

▤ Location of grab sample

"P" indicates sampler pushed with weight of hammer or against weight of drill rig.

NOTES:

1. The reader must refer to the discussion in the report text, the Key to Boring Log Symbols and the exploration logs for a proper understanding of subsurface conditions.

2. Soil classification system is summarized in Figure A-1.

GEI 121-90

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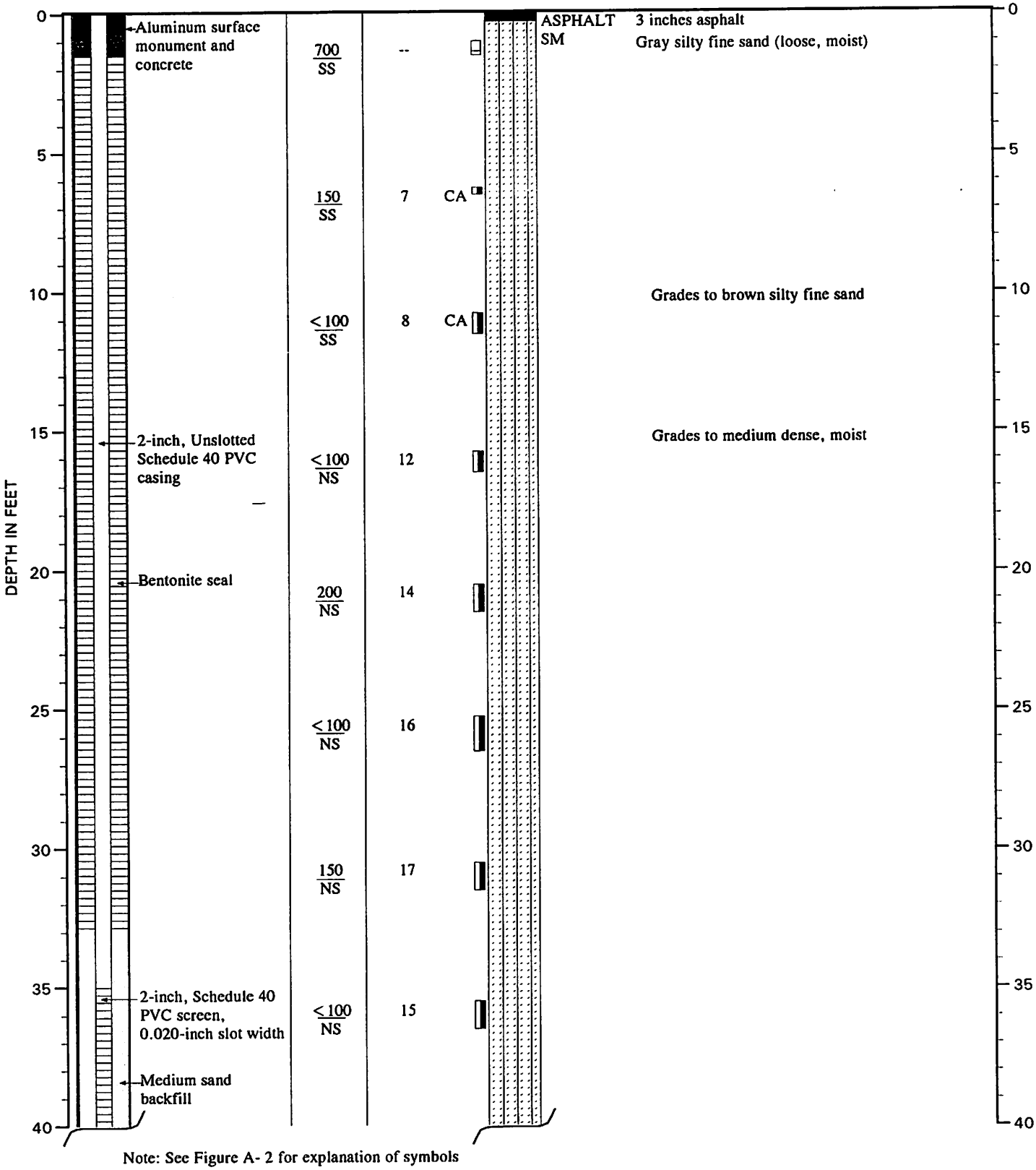
KEY TO BORING LOG SYMBOLS

FIGURE A-2

MONITORING WELL MW-1



Note: See Figure A- 2 for explanation of symbols

:PJS:LGE:MLN 1/12/94

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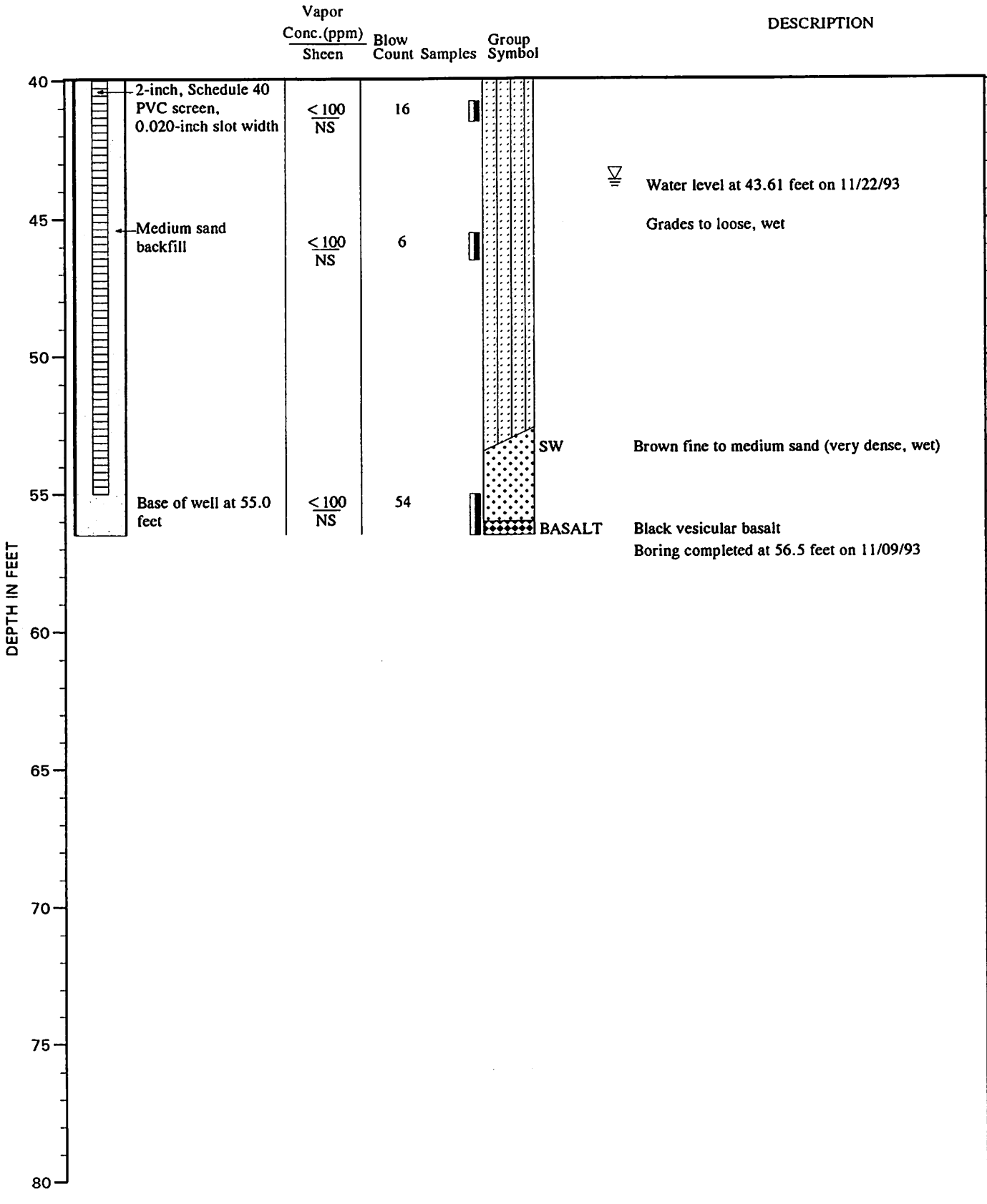
LOG OF MONITORING WELL

FIGURE A-3

MONITORING WELL MW-1
(Continued)



Note: See Figure A- 2 for explanation of symbols

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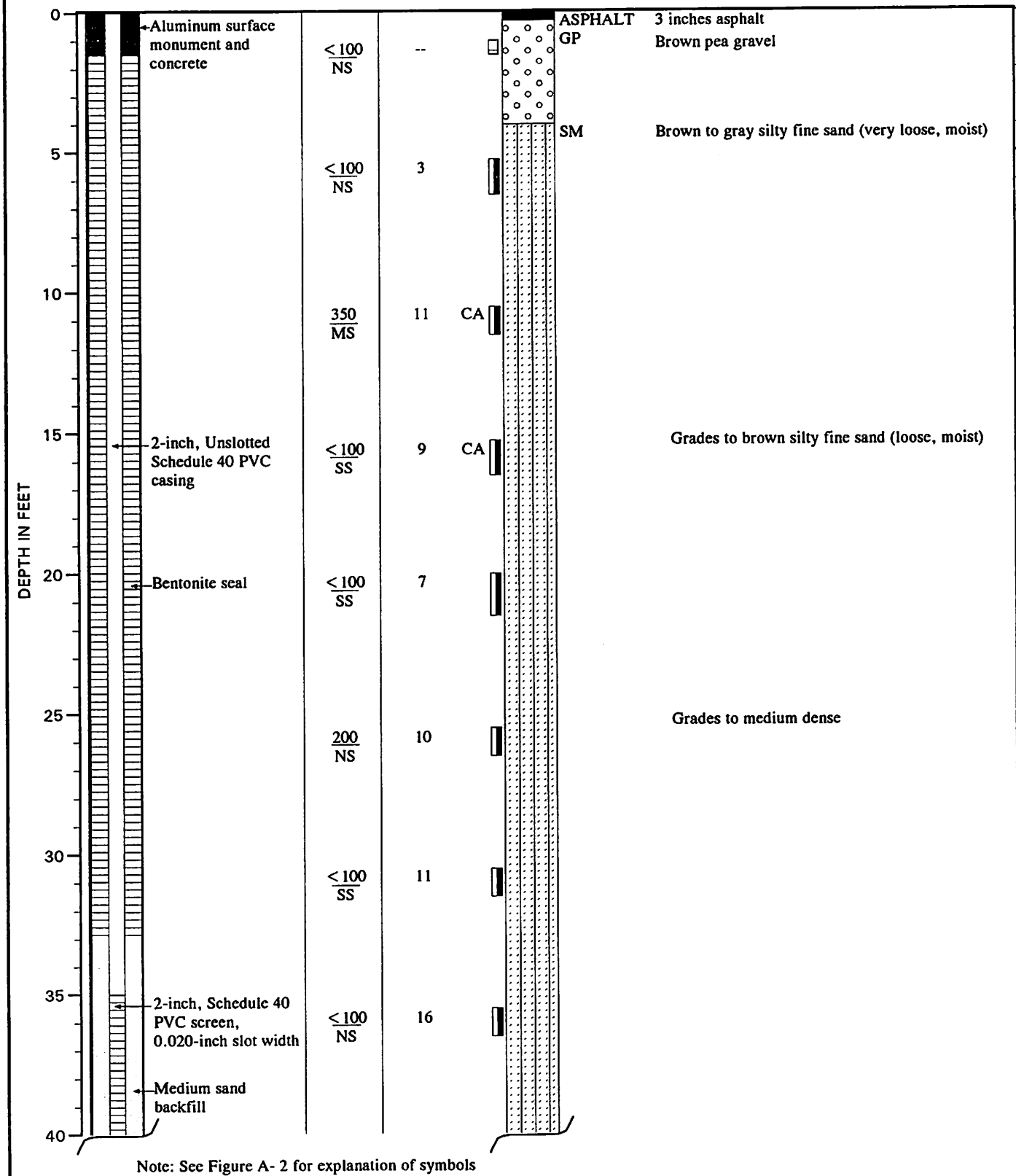
LOG OF MONITORING WELL

FIGURE A-3

MONITORING WELL MW-2

WELL SCHEMATIC

Casing Elevation (ft.): 99.78



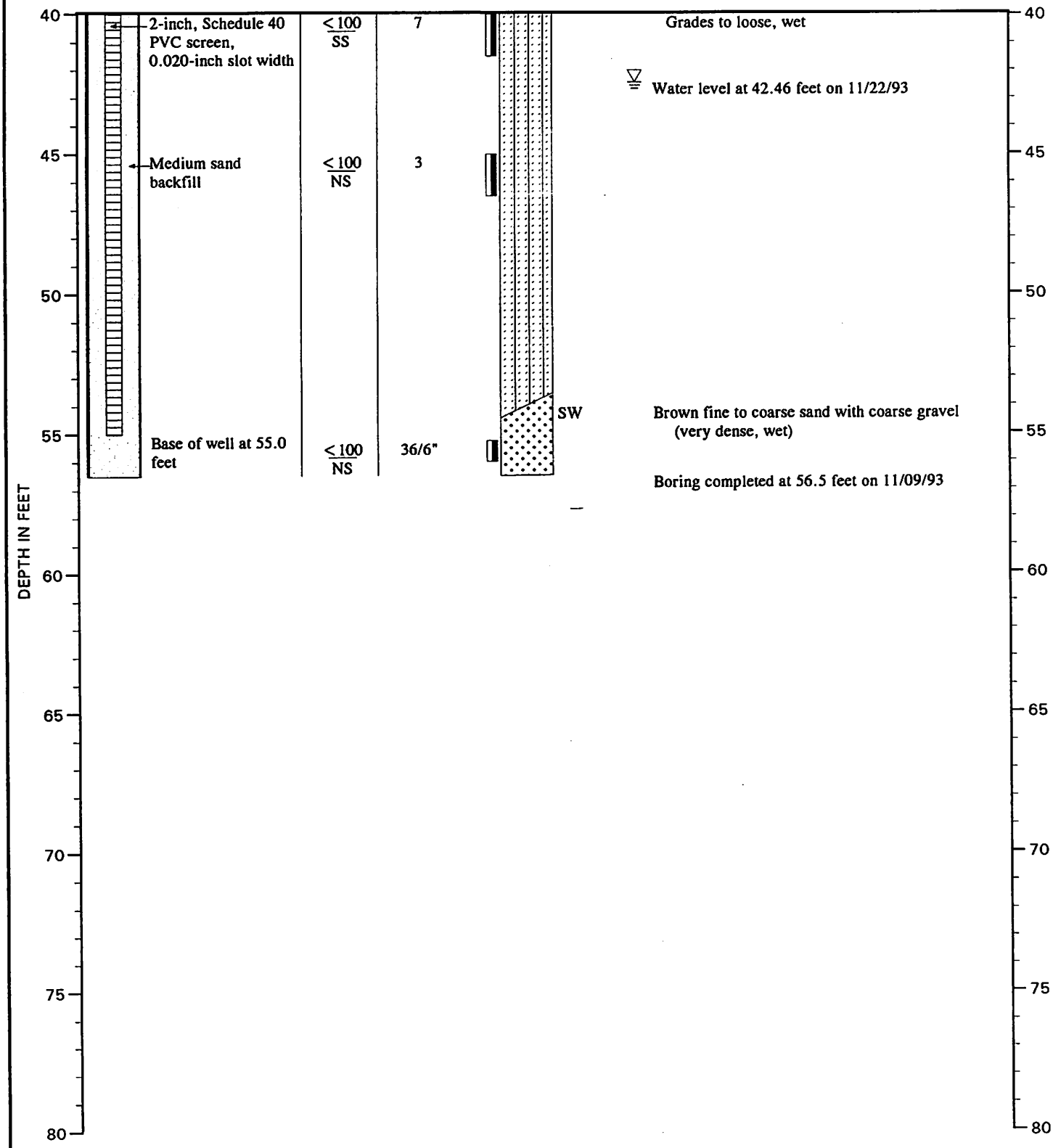
Note: See Figure A- 2 for explanation of symbols

Geo Engineers

LOG OF MONITORING WELL

FIGURE A-4

MONITORING WELL MW-2
(Continued)



Note: See Figure A- 2 for explanation of symbols

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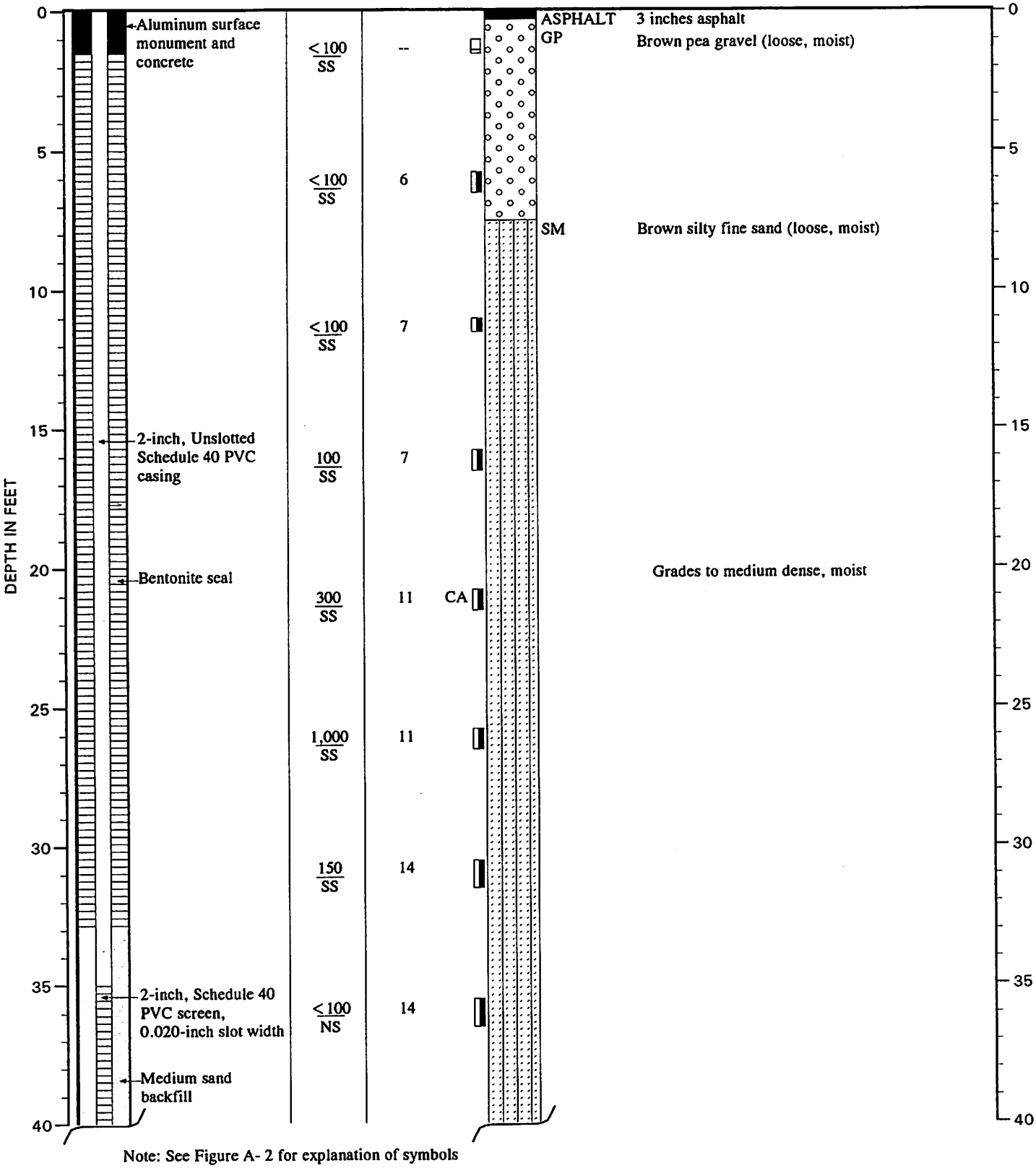
LOG OF MONITORING WELL

FIGURE A-4

MONITORING WELL MW-3

WELL SCHEMATIC

Casing Elevation (ft.): 99.70



Note: See Figure A- 2 for explanation of symbols

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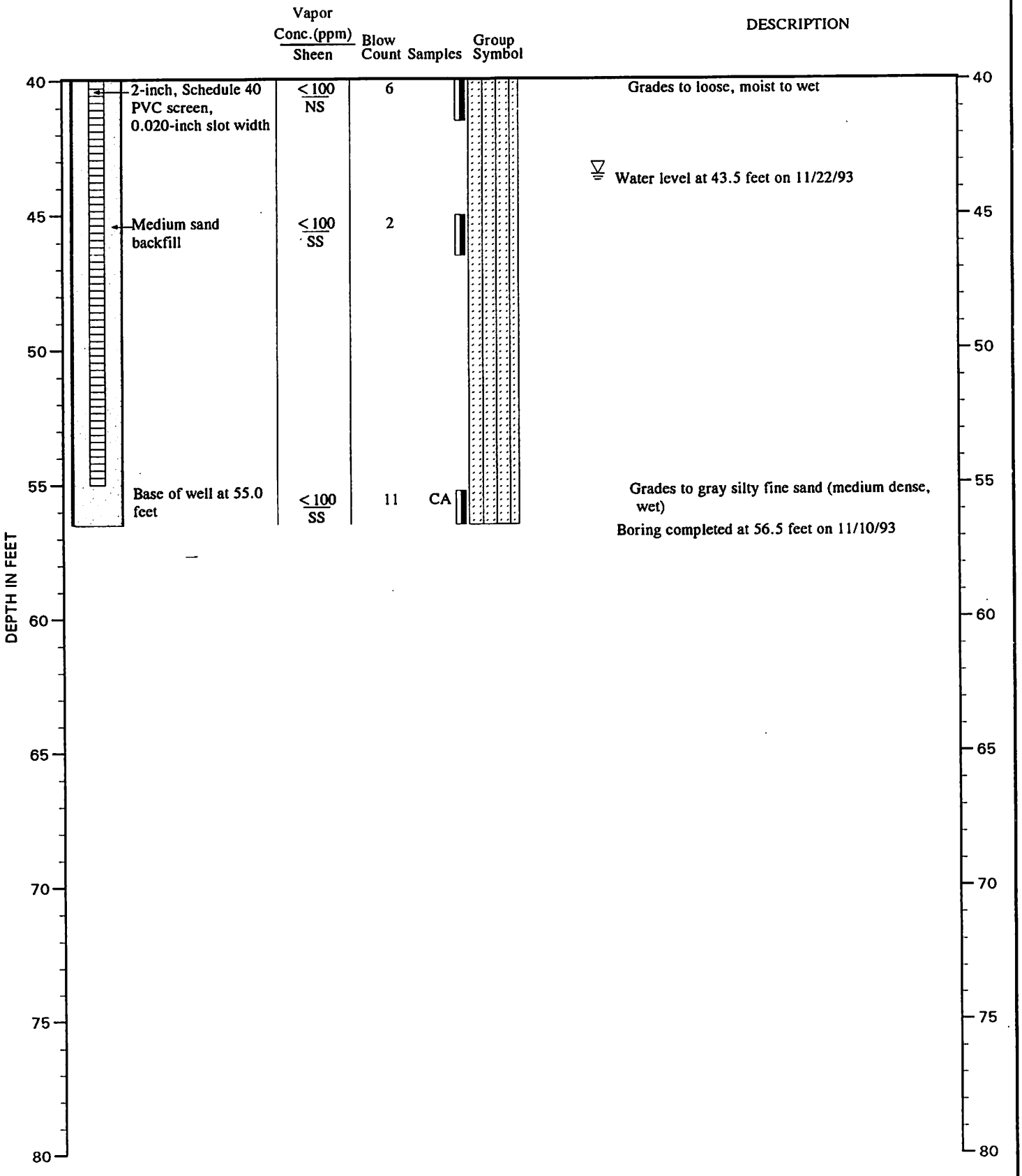
LOG OF MONITORING WELL

FIGURE A-5

MONITORING WELL MW-3
(Continued)



Note: See Figure A- 2 for explanation of symbols

0161-331-P18 PJS:LGE:MLN 7/12/94

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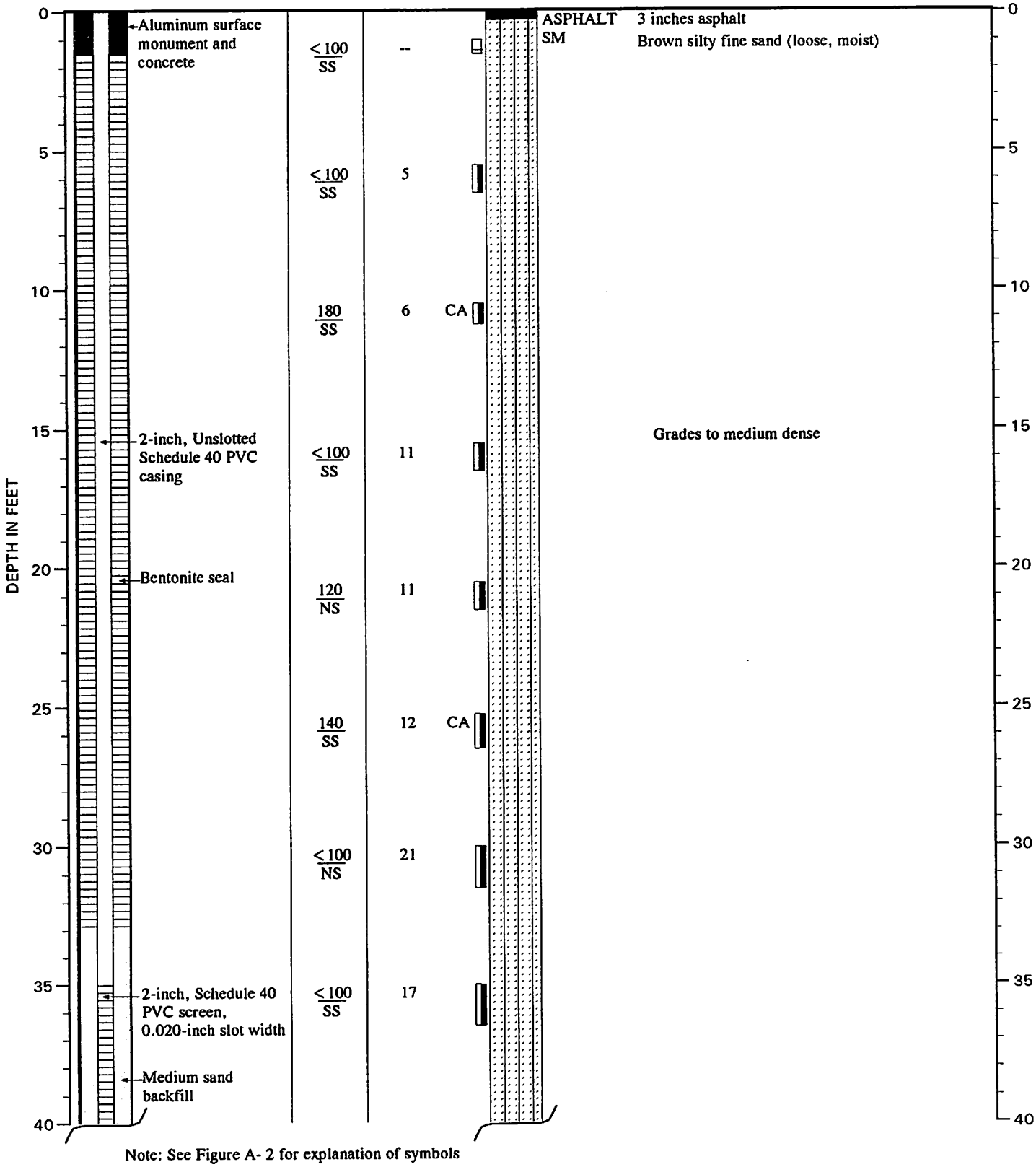
LOG OF MONITORING WELL

FIGURE A-5

MONITORING WELL MW-4



Note: See Figure A- 2 for explanation of symbols

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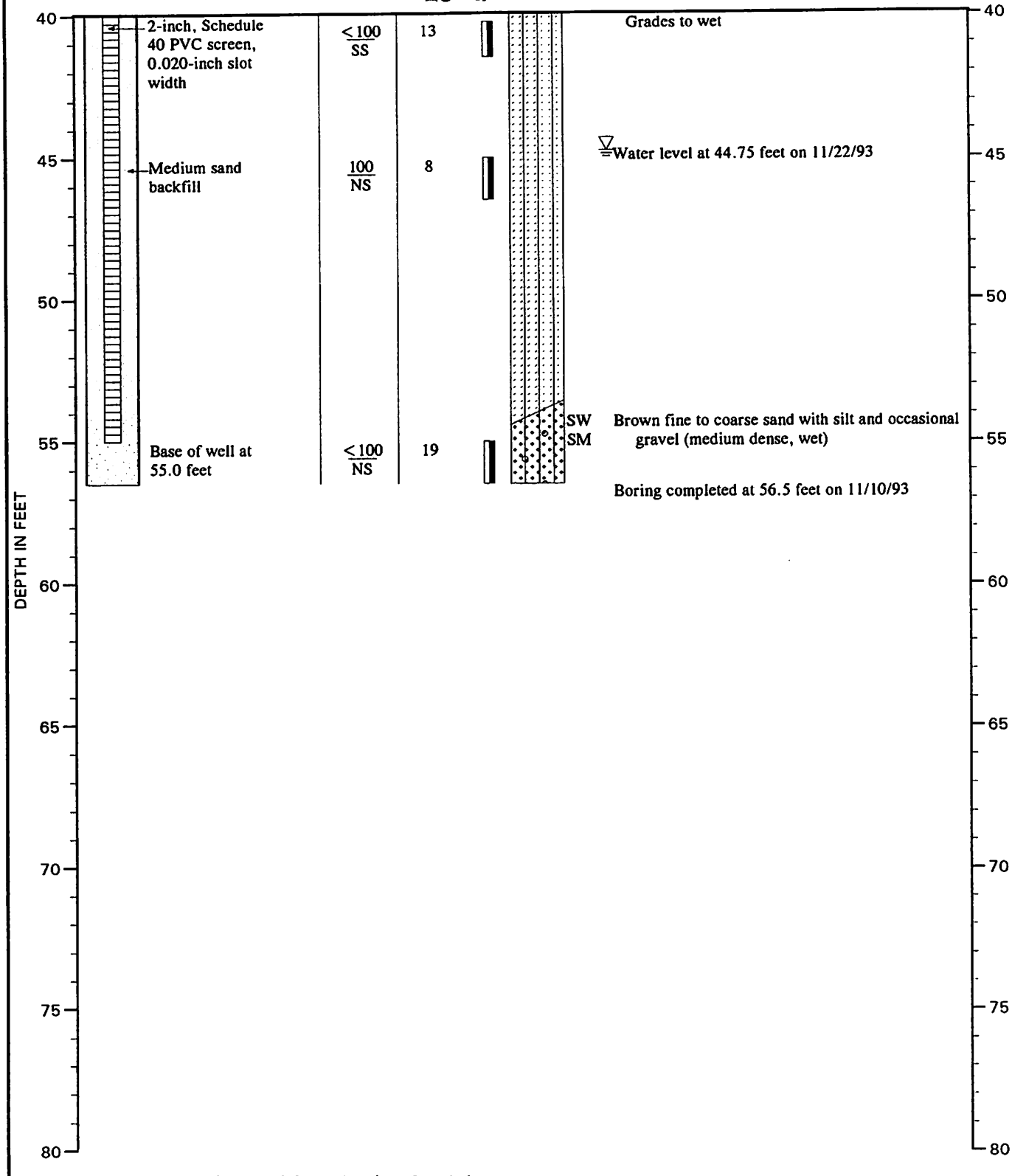
LOG OF MONITORING WELL

FIGURE A-6

MONITORING WELL NO. MW-4
(Continued)



Note: See Figure A--2 for explanation of symbols

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LOG OF MONITORING WELL

FIGURE A--6

TEST DATA

BORING B-1

DESCRIPTION

Depth (feet)	Sheen	Vapor Conc. (ppm)	Other Test	Blow Count	Samples	Group Symbol	Description
0						ASPHALT	3 inches asphalt
						GP	6 inches coarse base gravel
	SS	< 100		--		SM	Brown silty fine sand (medium dense, moist)
5	SS	< 100	CA	12			
10	SS	< 100	CA	5			Grades to loose, moist
15	SS	< 100		8			
20	SS	< 100		10			
							Boring completed at 21.5 feet on 11/10/93

DEPTH IN FEET

0 5 10 15 20 25 30 35 40

Note: See Figure A-2 for explanation of symbols

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LOG OF BORING

FIGURE A-7

APPENDIX B

APPENDIX B

CHEMICAL ANALYTICAL PROGRAM

ANALYTICAL METHODS

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

ANALYTICAL DATA REVIEW

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

TRIP BLANK

One trip blank was obtained and analyzed by EPA Methods 8010 and 8020 tests to evaluate handling (both field and laboratory) procedures and the analysis process. Methylene chloride was detected in the trip blank.

ANALYTICAL DATA REVIEW SUMMARY

No significant data quality exceptions were noted in the laboratory report or during our review. Based on the data quality review all data are acceptable for their intended use.

Analytical**Technologies,**Inc.

17400 S.W. Upper Boones Ferry Road, Suite 270 Durham, OR. 97224
(503) 684-0447 (503) 620-0393 (FAX)

ATI I.D. 311563

November 29, 1993

Pat Sullivan
GeoEngineers, Inc.
7504 SW Bridgeport Rd.
Portland, OR 97224

Project Name/Number: Oregon City / 0161-331-P18

Attention: Pat Sullivan

On November 11,1993, Analytical Technologies, Inc. received ten soil samples for analysis for the above listed project. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

If you have any questions or comments, please do not hesitate to contact us at (503)684-0447.

Fred Voosen
Project Manager

Alan J. Kleinschmidt
Laboratory Manager

AJK:alm
Enclosure

Analytical Technologies, Inc.

SAMPLE CROSS REFERENCE SHEET

CLIENT:	GeoEngineers, Inc.	**ATI I.D.:**	311563
PROJECT #:	0161-331-P18		
PROJECT NAME:	Oregon City	**MATRIX:**	Soil

ATI #	CLIENT DESCRIPTION	DATE SAMPLED
311563-1	MW1-5	11/09/93
311563-2	MW1-10	11/09/93
311563-3	MW2-10	11/09/93
311563-4	MW2-15	11/09/93
311563-5	MW3-20	11/10/93
311563-6	MW3-55	11/10/93
311563-7	MW4-10	11/10/93
311563-8	MW4-25	11/10/93
311563-9	B1-5	11/10/93
311563-10	B1-10	11/10/93

----------TOTALS----------

MATRIX	# SAMPLES
Soil	10

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of the report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

Analytical Technologies, Inc.

ANALYTICAL SCHEDULE

CLIENT:	GeoEngineers, Inc.	**ATI I.D.:**	311563
PROJECT #:	0161-331-P18		
PROJECT NAME:	Oregon City		

ANALYSIS	TECHNIQUE	REFERENCE	LAB
Hydrocarbon Identification	GC/FID	OR TPH-HCID	PLD
Petroleum Hydrocarbon	GC/PID	OR TPH-G	PLD
Petroleum Hydrocarbon	GC/FID	OR TPH-D	PLD
Petroleum Hydrocarbon	IR	OR TPH-418.1	PLD

PLD = ATI - Portland
R = ATI - Renton
SD = ATI - San Diego
PHX = ATI - Phoenix
PNR = ATI - Pensacola
FC = ATI - Fort Collins
SUB = Subcontract

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST:	TPH-HCID (Oregon)	**ATI I.D.:**	311563-0
CLIENT I.D.:	Method Blank	**DATE SAMPLED:**	N/A
CLIENT:	GeoEngineers, Inc.	**DATE RECEIVED:**	N/A
PROJECT #:	0161-331-P18	**DATE EXTRACTED:**	11/12/93
PROJECT NAME:	Oregon City	**DATE ANALYZED:**	11/13/93
SAMPLE MATRIX:	SOIL	**DILUTION FACTOR:**	1
		UNITS:	mg/Kg

PARAMETER	RESULTS
GASOLINE (C6 - C10)	LESS THAN 20 mg/Kg
DIESEL (C10 - C28)	LESS THAN 50 mg/Kg
C28-C40	NOT OBSERVED
SURROGATES:	
1-CHLOROOCTANE (50% - 150%)	99%
O-TERPHENYL (50% - 150%)	109%

Analyst: BA 11/15/93

Reviewer: CS 11-16-93

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST:	TPH-HCID (Oregon)	**ATI I.D.:**	311563-1
CLIENT I.D.:	MW1-5	**DATE SAMPLED:**	11/09/93
CLIENT:	GeoEngineers, Inc.	**DATE RECEIVED:**	11/11/93
PROJECT #:	0161-331-P18	**DATE EXTRACTED:**	11/12/93
PROJECT NAME:	Oregon City	**DATE ANALYZED:**	11/13/93
SAMPLE MATRIX:	SOIL	**DILUTION FACTOR:**	1
		UNITS:	mg/Kg

PARAMETER	RESULTS
GASOLINE (C6 - C10)	LESS THAN 20 mg/Kg
DIESEL (C10 - C28)	GREATER THAN 50 mg/Kg *
C28-C40	OBSERVED

SURROGATES:

1-CHLOROOCTANE (50% - 150%)	101%
O-TERPHENYL (50% - 150%)	111%

* = Petroleum hydrocarbons heavier than diesel

Analyst: BD 11/15/93

Reviewer: CS 11-15-93

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST:	TPH-HCID (Oregon)	**ATI I.D.:**	311563-2
CLIENT I.D.:	MW1-10	**DATE SAMPLED:**	11/09/93
CLIENT:	GeoEngineers, Inc.	**DATE RECEIVED:**	11/11/93
PROJECT #:	0161-331-P18	**DATE EXTRACTED:**	11/12/93
PROJECT NAME:	Oregon City	**DATE ANALYZED:**	11/13/93
SAMPLE MATRIX:	SOIL	**DILUTION FACTOR:**	1
		UNITS:	mg/Kg

PARAMETER	RESULTS
GASOLINE (C6 - C10)	LESS THAN 20 mg/Kg
DIESEL (C10 - C28)	LESS THAN 50 mg/Kg
C28-C40	NOT OBSERVED
SURROGATES:	
1-CHLOROOCTANE (50% - 150%)	98%
O-TERPHENYL (50% - 150%)	108%

Analyst: BA 11/15/93

Reviewer: CS 11-15-93

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST:	TPH-HCID (Oregon)	**ATI I.D.:**	311563-3
CLIENT I.D.:	MW2-10	**DATE SAMPLED:**	11/09/93
CLIENT:	GeoEngineers, Inc.	**DATE RECEIVED:**	11/11/93
PROJECT #:	0161-331-P18	**DATE EXTRACTED:**	11/12/93
PROJECT NAME:	Oregon City	**DATE ANALYZED:**	11/13/93
SAMPLE MATRIX:	SOIL	**DILUTION FACTOR:**	1
		UNITS:	mg/Kg

PARAMETER	RESULTS
GASOLINE (C6 - C10)	GREATER THAN 20 mg/Kg
DIESEL (C10 - C28)	GREATER THAN 50 mg/Kg
C28-C40	NOT OBSERVED

SURROGATES:

1-CHLOROOCTANE (50% - 150%)	136%
O-TERPHENYL (50% - 150%)	117%

Analyst: TA 11/15/93

Reviewer: CS 11-15-93

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST:	TPH-HCID (Oregon)	**ATI I.D.:**	311563-4
CLIENT I.D.:	MW2-15	**DATE SAMPLED:**	11/09/93
CLIENT:	GeoEngineers, Inc.	**DATE RECEIVED:**	11/11/93
PROJECT #:	0161-331-P18	**DATE EXTRACTED:**	11/12/93
PROJECT NAME:	Oregon City	**DATE ANALYZED:**	11/13/93
SAMPLE MATRIX:	SOIL	**DILUTION FACTOR:**	1
		UNITS:	mg/Kg

PARAMETER	RESULTS
GASOLINE (C6 - C10)	LESS THAN 20 mg/Kg
DIESEL (C10 - C28)	LESS THAN 50 mg/Kg
C28-C40	NOT OBSERVED
SURROGATES:	
1-CHLOROOCTANE (50% - 150%)	99%
O-TERPHENYL (50% - 150%)	110%

Analyst: BA 11/15/93

Reviewer: CS 11-15-93

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST:	TPH-HCID (Oregon)	**ATI I.D.:**	311563-5
CLIENT I.D.:	MW3-20	**DATE SAMPLED:**	11/10/93
CLIENT:	GeoEngineers, Inc.	**DATE RECEIVED:**	11/11/93
PROJECT #:	0161-331-P18	**DATE EXTRACTED:**	11/12/93
PROJECT NAME:	Oregon City	**DATE ANALYZED:**	11/13/93
SAMPLE MATRIX:	SOIL	**DILUTION FACTOR:**	1
		UNITS:	mg/Kg

PARAMETER	RESULTS
GASOLINE (C6 - C10)	LESS THAN 20 mg/Kg
DIESEL (C10 - C28)	LESS THAN 50 mg/Kg
C28-C40	NOT OBSERVED

SURROGATES:

1-CHLOROOCTANE (50% - 150%)	100%
O-TERPHENYL (50% - 150%)	111%

Analyst: [signature] 11/15/93

Reviewer: [signature] 11-15-93

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST:	TPH-HCID (Oregon)	**ATI I.D.:**	311563-6
CLIENT I.D.:	MW3-55	**DATE SAMPLED:**	11/10/93
CLIENT:	GeoEngineers, Inc.	**DATE RECEIVED:**	11/11/93
PROJECT #:	0161-331-P18	**DATE EXTRACTED:**	11/12/93
PROJECT NAME:	Oregon City	**DATE ANALYZED:**	11/13/93
SAMPLE MATRIX:	SOIL	**DILUTION FACTOR:**	1
		UNITS:	mg/Kg

PARAMETER	RESULTS
GASOLINE (C6 - C10)	LESS THAN 20 mg/Kg
DIESEL (C10 - C28)	LESS THAN 50 mg/Kg
C28-C40	NOT OBSERVED

SURROGATES:

1-CHLOROOCTANE (50% - 150%)	100%
O-TERPHENYL (50% - 150%)	111%

Analyst: DA 11/15/93

Reviewer: CS 11-15-93

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST:	TPH-HCID (Oregon)	**ATI I.D.:**	311563-7
CLIENT I.D.:	MW4-10	**DATE SAMPLED:**	11/10/93
CLIENT:	GeoEngineers, Inc.	**DATE RECEIVED:**	11/11/93
PROJECT #:	0161-331-P18	**DATE EXTRACTED:**	11/12/93
PROJECT NAME:	Oregon City	**DATE ANALYZED:**	11/13/93
SAMPLE MATRIX:	SOIL	**DILUTION FACTOR:**	1
		UNITS:	mg/Kg

PARAMETER	RESULTS
GASOLINE (C6 - C10)	LESS THAN 20 mg/Kg
DIESEL (C10 - C28)	LESS THAN 50 mg/Kg
C28-C40	NOT OBSERVED
SURROGATES:	
1-CHLOROOCTANE (50% - 150%)	105%
O-TERPHENYL (50% - 150%)	116%

Analyst: BA 11/15/93

Reviewer: CS 11-15-93

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST:	TPH-HCID (Oregon)	**ATI I.D.:**	311563-8
CLIENT I.D.:	MW4-25	**DATE SAMPLED:**	11/10/93
CLIENT:	GeoEngineers, Inc.	**DATE RECEIVED:**	11/11/93
PROJECT #:	0161-331-P18	**DATE EXTRACTED:**	11/12/93
PROJECT NAME:	Oregon City	**DATE ANALYZED:**	11/13/93
SAMPLE MATRIX:	SOIL	**DILUTION FACTOR:**	1
		UNITS:	mg/Kg

PARAMETER	RESULTS
GASOLINE (C6 - C10)	LESS THAN 20 mg/Kg
DIESEL (C10 - C28)	LESS THAN 50 mg/Kg
C28-C40	NOT OBSERVED
SURROGATES:	
1-CHLOROOCTANE (50% - 150%)	103%
O-TERPHENYL (50% - 150%)	114%

Analyst: B.M. 11/15/93

Reviewer: CS 11-15-93

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST:	TPH-HCID (Oregon)	**ATI I.D.:**	311563-9
CLIENT I.D.:	B1-5	**DATE SAMPLED:**	11/10/93
CLIENT:	GeoEngineers, Inc.	**DATE RECEIVED:**	11/11/93
PROJECT #:	0161-331-P18	**DATE EXTRACTED:**	11/12/93
PROJECT NAME:	Oregon City	**DATE ANALYZED:**	11/13/93
SAMPLE MATRIX:	SOIL	**DILUTION FACTOR:**	1
		UNITS:	mg/Kg

PARAMETER	RESULTS
GASOLINE (C6 - C10)	LESS THAN 20 mg/Kg
DIESEL (C10 - C28)	LESS THAN 50 mg/Kg
C28-C40	NOT OBSERVED
SURROGATES:	
1-CHLOROOCTANE (50% - 150%)	97%
O-TERPHENYL (50% - 150%)	107%

Analyst: BM 11/15/93

Reviewer: CS 11-15-93

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST:	TPH-HCID (Oregon)	**ATI I.D.:**	311563-10
CLIENT I.D.:	B1-10	**DATE SAMPLED:**	11/10/93
CLIENT:	GeoEngineers, Inc.	**DATE RECEIVED:**	11/11/93
PROJECT #:	0161-331-P18	**DATE EXTRACTED:**	11/12/93
PROJECT NAME:	Oregon City	**DATE ANALYZED:**	11/13/93
SAMPLE MATRIX:	SOIL	**DILUTION FACTOR:**	1
		UNITS:	mg/Kg

PARAMETER	RESULTS
GASOLINE (C6 - C10)	LESS THAN 20 mg/Kg
DIESEL (C10 - C28)	LESS THAN 50 mg/Kg
C28-C40	NOT OBSERVED

SURROGATES:

1-CHLOROOCTANE (50% - 150%)	98%
O-TERPHENYL (50% - 150%)	108%

Analyst: BD 11/15/93

Reviewer: CS 11-15-93

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY SPIKE RESULTS

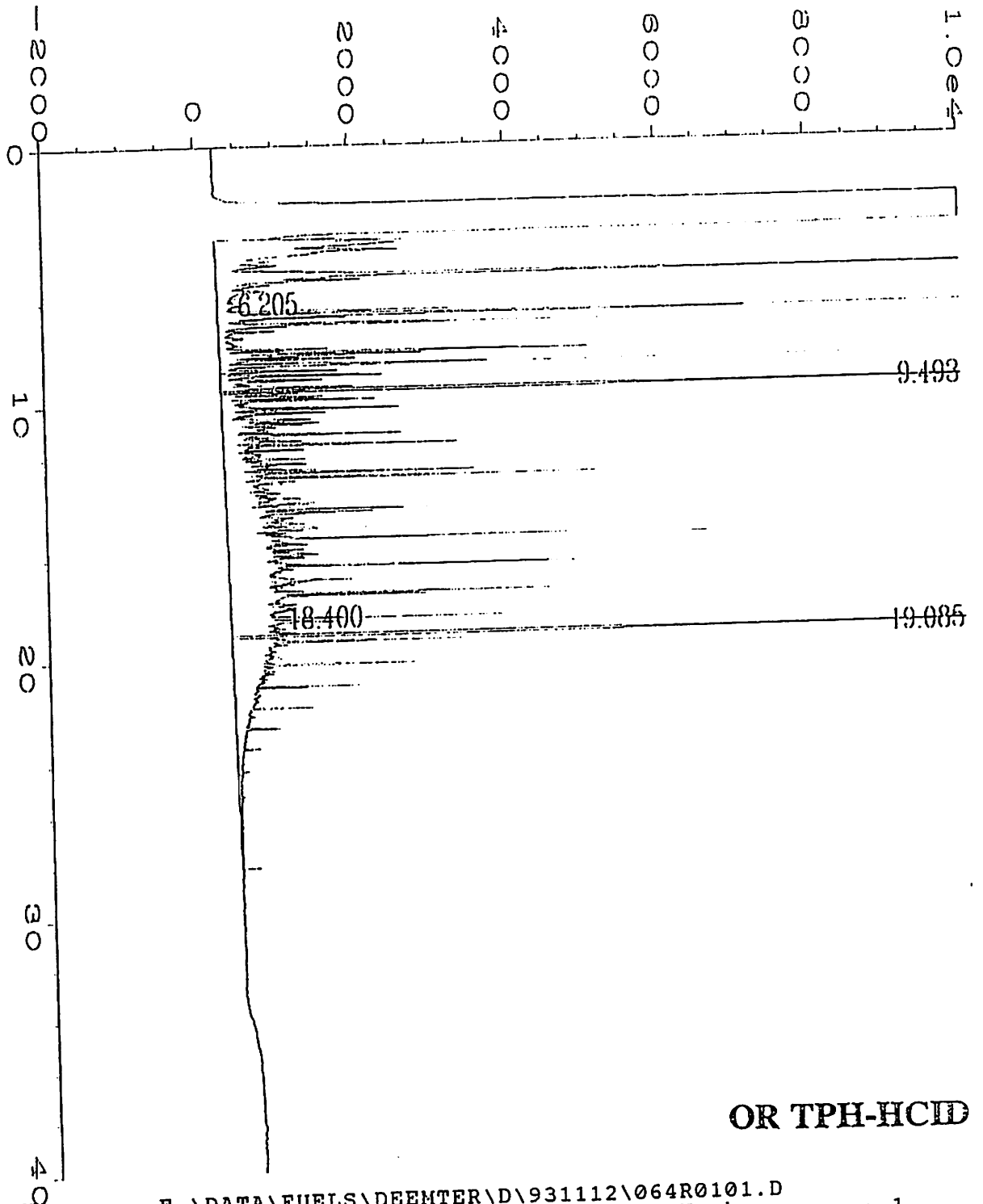
TEST:	TPH-HCID (Oregon)	ATI ACCESSION:	311563
CLIENT:	GeoEngineers, Inc.	QC SAMPLE:	Method Blank
PROJECT #:	0161-331-P18	DATE EXTRACTED:	11/12/93
PROJECT NAME:	Oregon City	DATE ANALYZED:	11/13/93
SAMPLE MATRIX:	SOIL	DILUTION FACTOR:	1
		UNITS:	mg/Kg

PARAMETER	SAMPLE RESULT	SPIKE CONC.	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
DIESEL	< 50	100	100	100	101	101	1
SURROGATE:							
1-CHLOROOCTANE (50% - 150%)			100%		94%		
O-TERPHENYL (50% - 150%)			110%		103%		

	CONTROL LIMITS	
	% REC	RPD
DIESEL	70 - 130	20

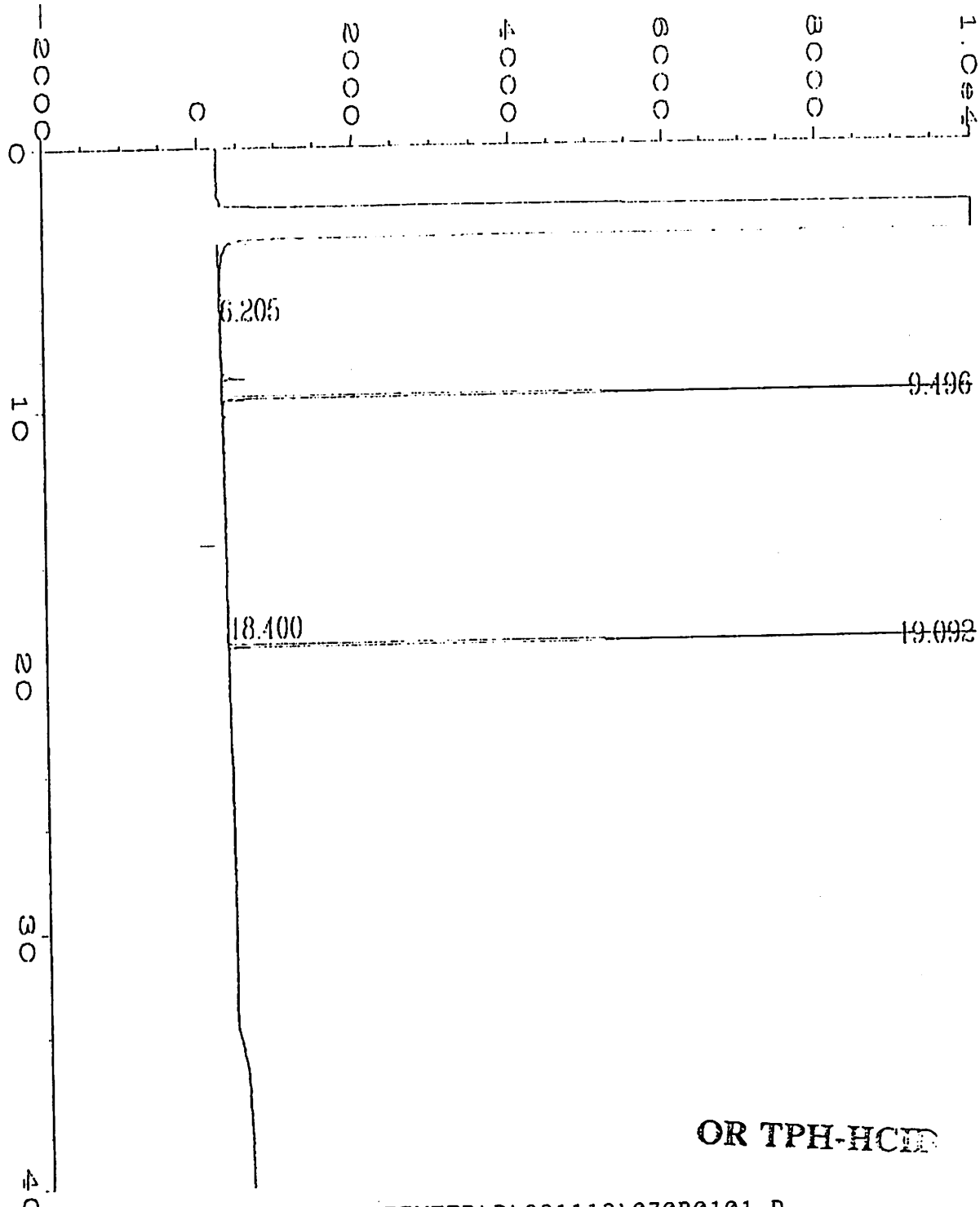
Analyst: BD. 11/15/93

Reviewer: CS 11-15-93



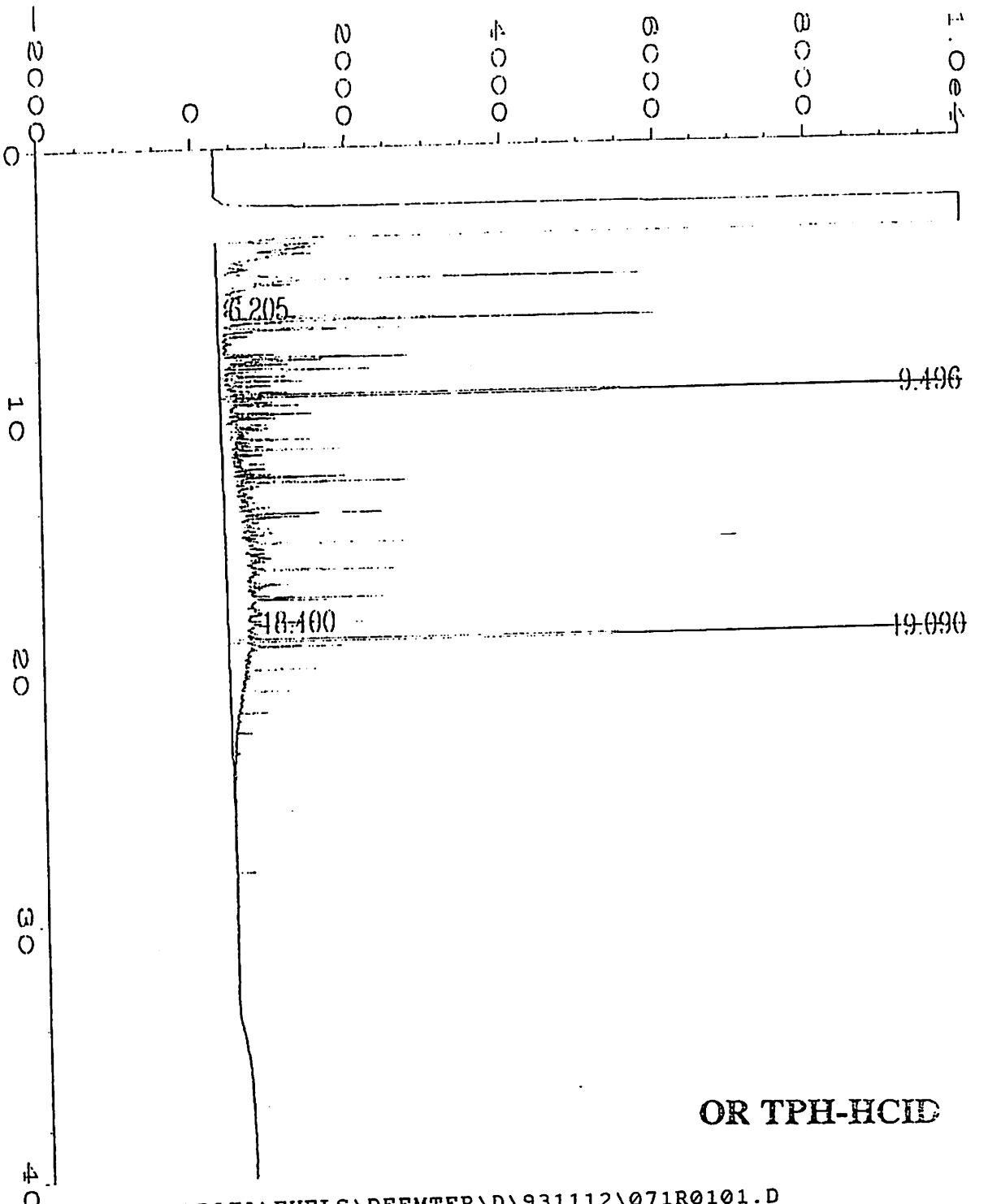
OR TPH-HCID

Data File Name	: F:\DATA\FUELS\DEEMTER\D\931112\064R0101.D		
Operator	: FUELS	Page Number	: 1
Instrument	: DEEMTER	Vial Number	: 64
Sample Name	: DG 200	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 12 Nov 93 08:55 PM	Instrument Method	: OHCID.MTH
Report Created on	: 14 Nov 93 08:10 AM	Analysis Method	: OR-HCID.M
Last Recalib on	: 04 AUG 93 09:41 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



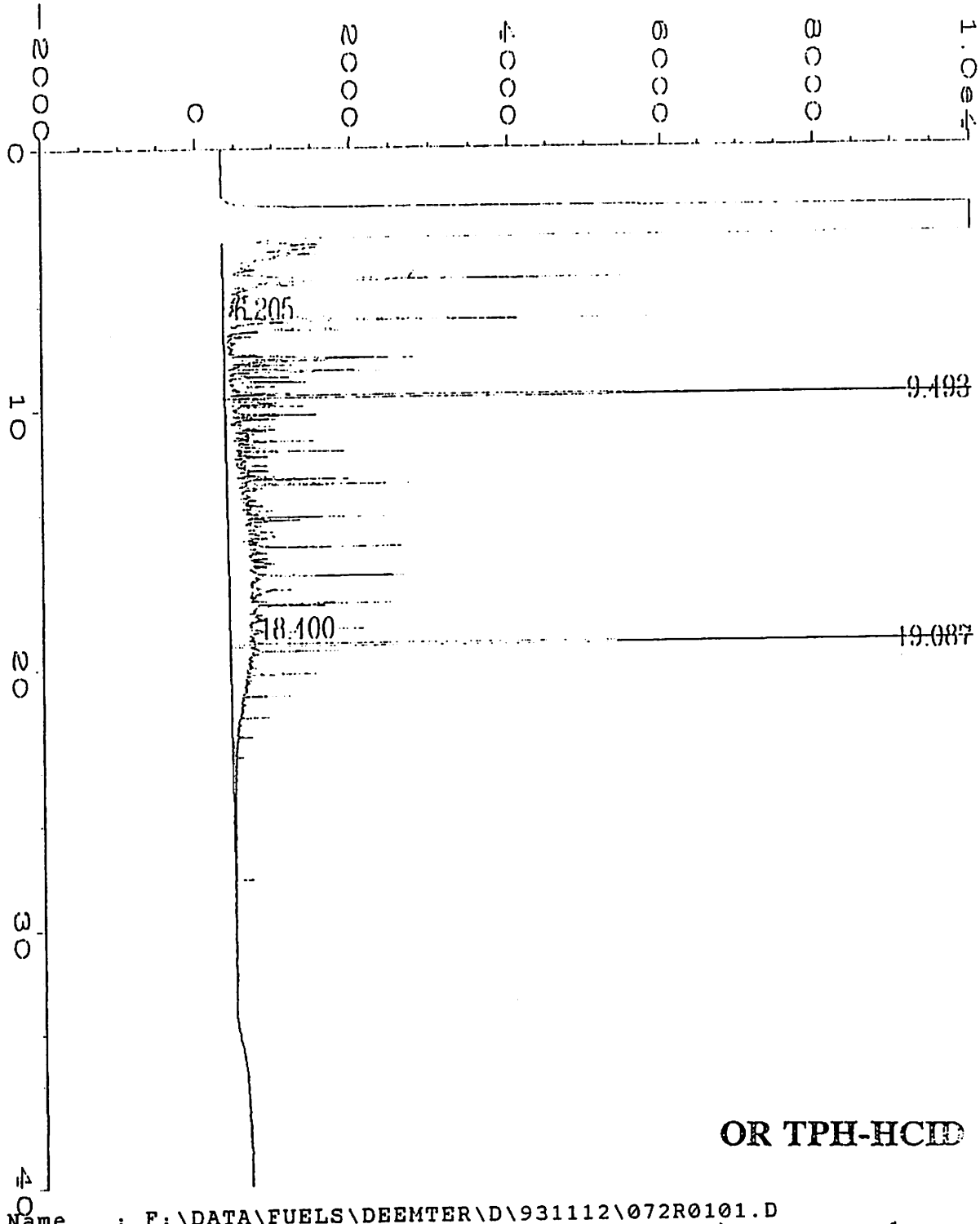
OR TPH-HCID

Data File Name	: F:\DATA\FUELS\DEEMTER\D\931112\070R0101.D		
Operator	: FUELS	Page Number	: 1
Instrument	: DEEMTER	Vial Number	: 70
Sample Name	: MB 11/12	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 13 Nov 93 02:34 AM	Instrument Method	: OHCID.MTH
Report Created on:	14 Nov 93 08:22 AM	Analysis Method	: OR-HCID.M
Last Recalib on	: 04 AUG 93 09:41 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



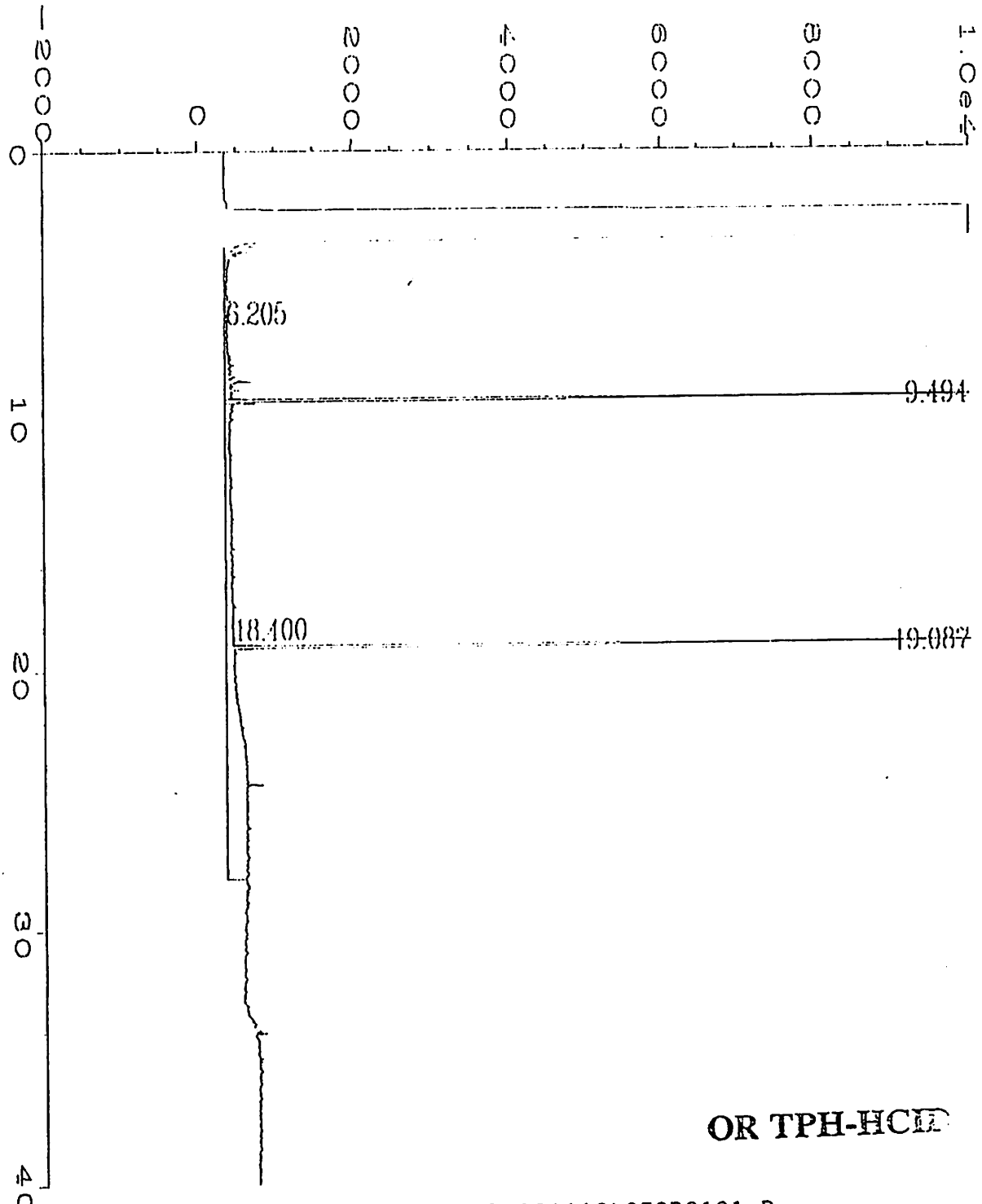
OR TPH-HCID

Data File Name	: F:\DATA\FUELS\DEEMTER\D\931112\071R0101.D	Page Number	: 1
Operator	: FUELS	Vial Number	: 71
Instrument	: DEEMTER	Injection Number	: 1
Sample Name	: BS 11/12	Sequence Line	: 1
Run Time Bar Code:		Instrument Method	: OHCID.MTH
Acquired on	: 13 Nov 93 03:32 AM	Analysis Method	: OR-HCID.M
Report Created on:	14 Nov 93 08:25 AM	Sample Amount	: 0
Last Recalib on	: 04 AUG 93 09:41 AM	ISTD Amount	:
Multiplier	: 1		



OR TPH-HCID

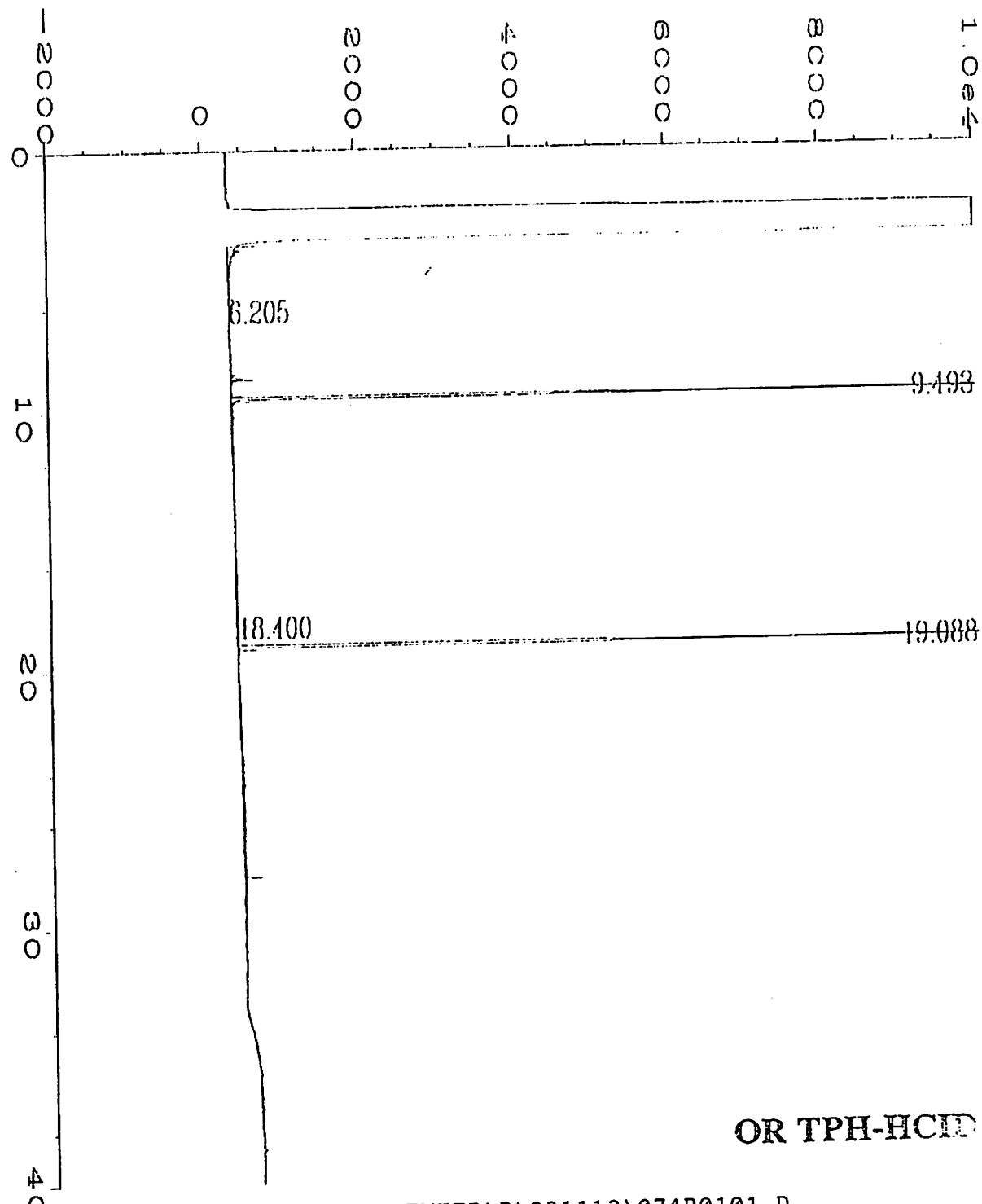
Data File Name	: F:\DATA\FUELS\DEEMTER\D\931112\072R0101.D		
Operator	: FUELS	Page Number	: 1
Instrument	: DEEMTER	Vial Number	: 72
Sample Name	: BSD 11/12	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 13 Nov 93 04:29 AM	Instrument Method	: OHCID.MTI
Report Created on:	14 Nov 93 08:27 AM	Analysis Method	: OR-HCID.I
Last Recalib on	: 04 AUG 93 09:41 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



OR TPH-HCID

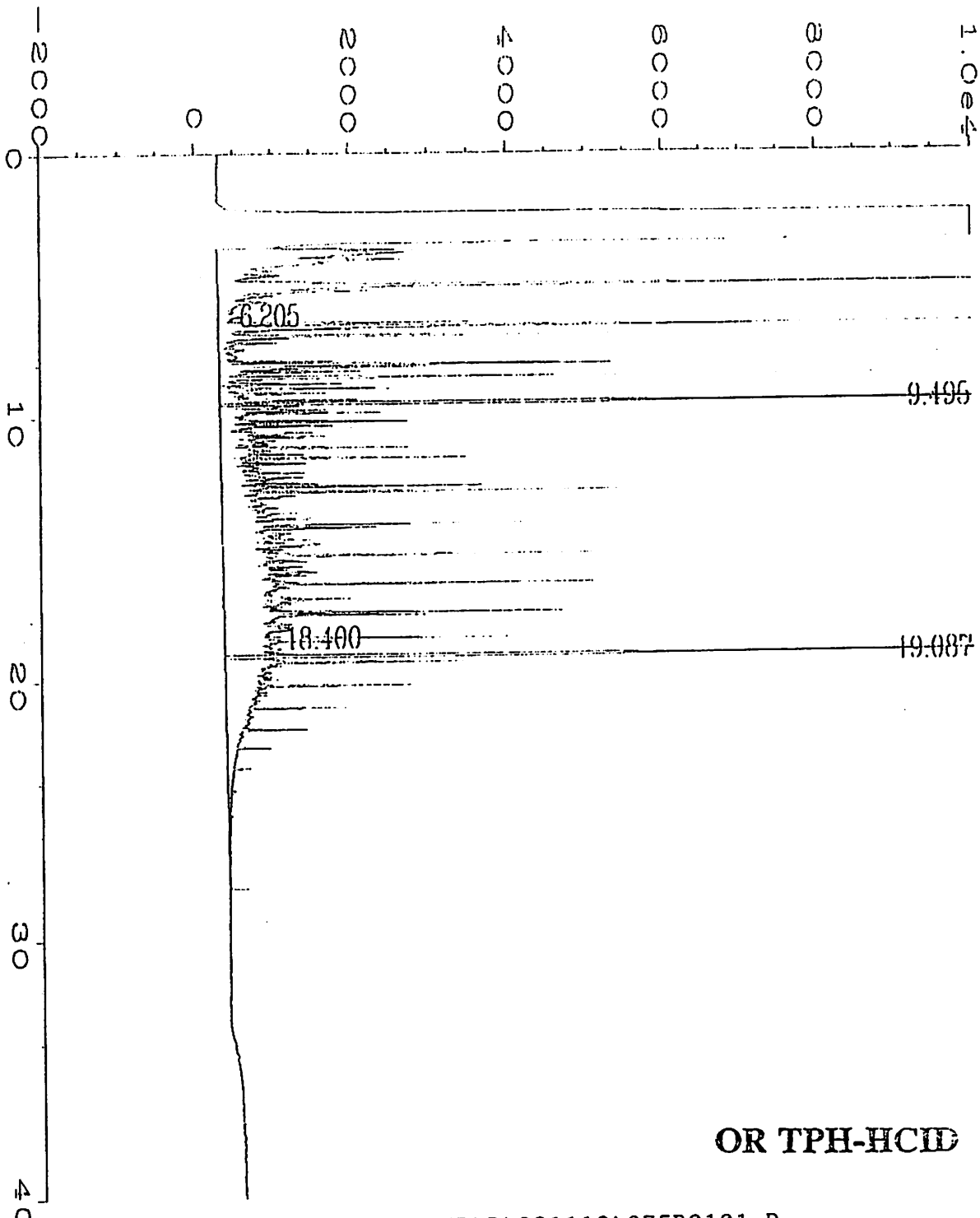
Data File Name : F:\DATA\FUELS\DEEMTER\D\931112\073R0101.D
Operator : FUELS
Instrument : DEEMTER
Sample Name : 311563-1
Run Time Bar Code:
Acquired on : 13 Nov 93 05:26 AM
Report Created on: 14 Nov 93 08:29 AM
Last Recalib on : 04 AUG 93 09:41 AM
Multiplier : 1

Page Number : 1
Vial Number : 73
Injection Number : 1
Sequence Line : 1
Instrument Method: OHCID.MTH
Analysis Method : OR-HCID.M
Sample Amount : 0
ISTD Amount :



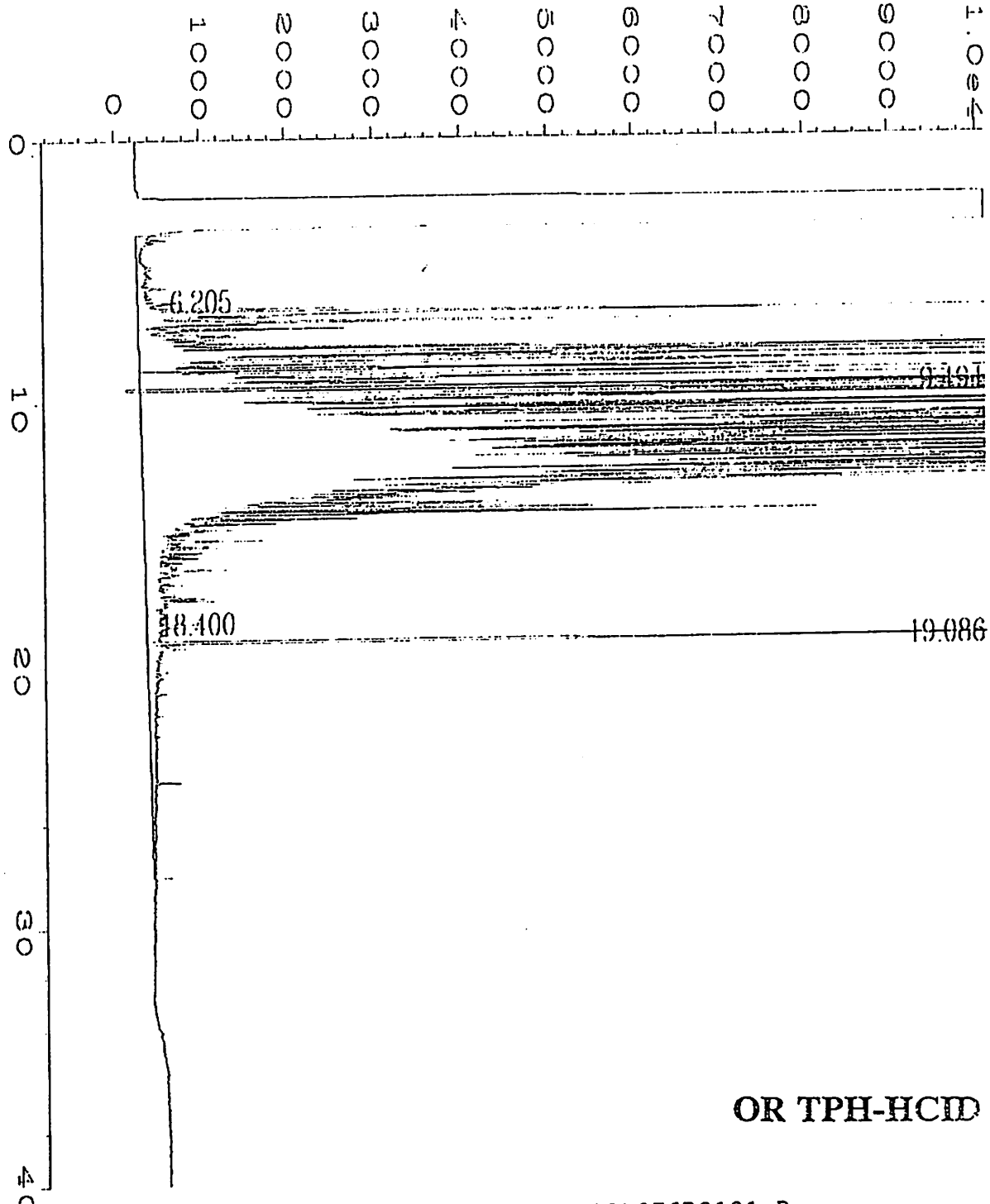
OR TPH-HCID

Data File Name	: F:\DATA\FUELS\DEEMTER\D\931112\074R0101.D	Page Number	: 1
Operator	: FUELS	Vial Number	: 74
Instrument	: DEEMTER	Injection Number	: 1
Sample Name	: 311563-2	Sequence Line	: 1
Run Time Bar Code:		Instrument Method	: OHCID.MTH
Acquired on	: 13 Nov 93 06:24 AM	Analysis Method	: OR-HCID.M
Report Created on	: 14 Nov 93 08:33 AM	Sample Amount	: 0
Last Recalib on	: 04 AUG 93 09:41 AM	ISTD Amount	:
Multiplier	: 1		



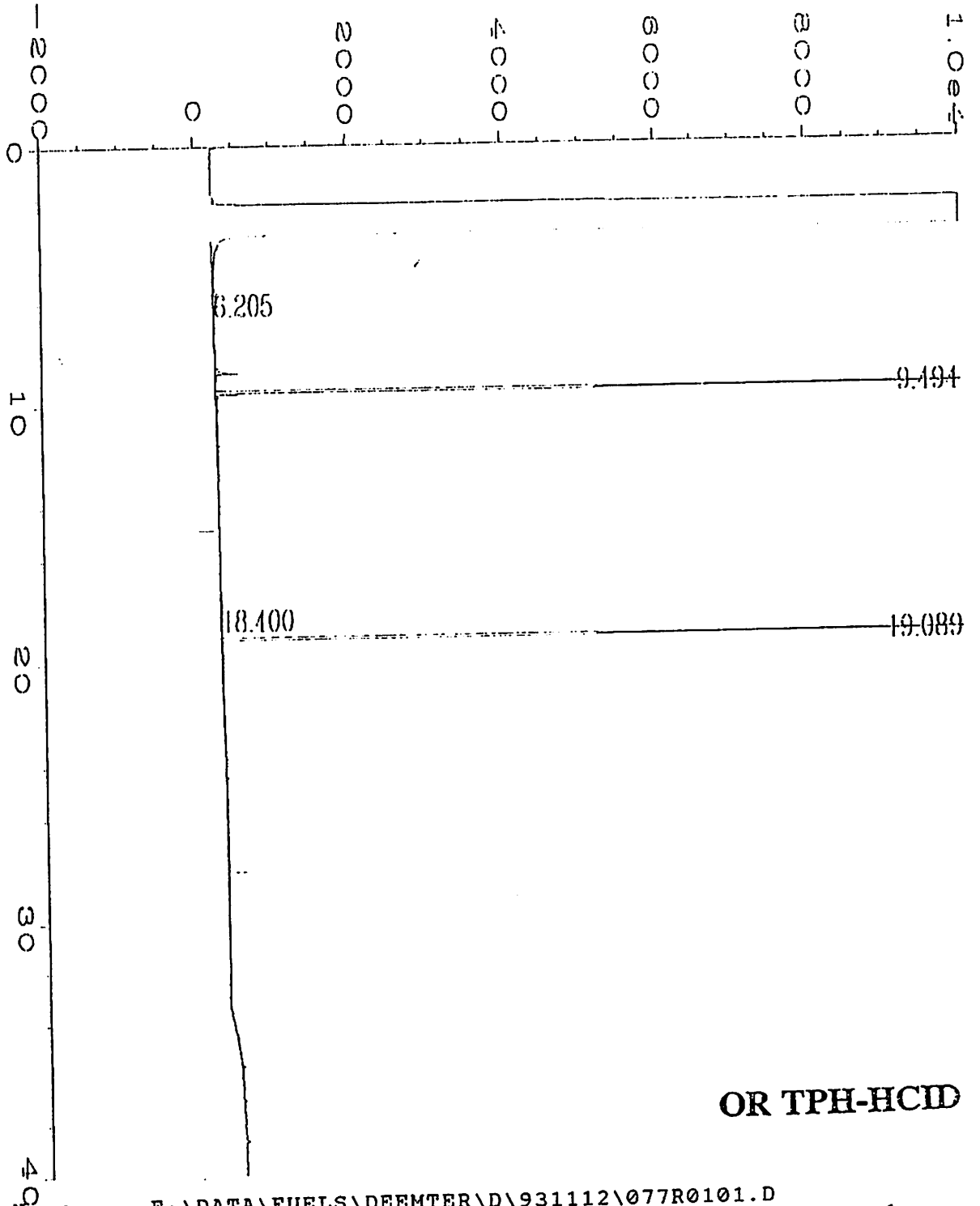
OR TPH-HCID

Data File Name	: F:\DATA\FUELS\DEEMTER\D\931112\075R0101.D	Page Number	: 1
Operator	: FUELS	Vial Number	: 75
Instrument	: DEEMTER	Injection Number	: 1
Sample Name	: DG 200	Sequence Line	: 1
Run Time Bar Code:		Instrument Method	: OHCID.MTH
Acquired on	: 13 Nov 93 07:22 AM	Analysis Method	: OR-HCID.M
Report Created on	: 14 Nov 93 08:36 AM	Sample Amount	: 0
Last Recalib on	: 04 AUG 93 09:41 AM	ISTD Amount	:
Multiplier	: 1		



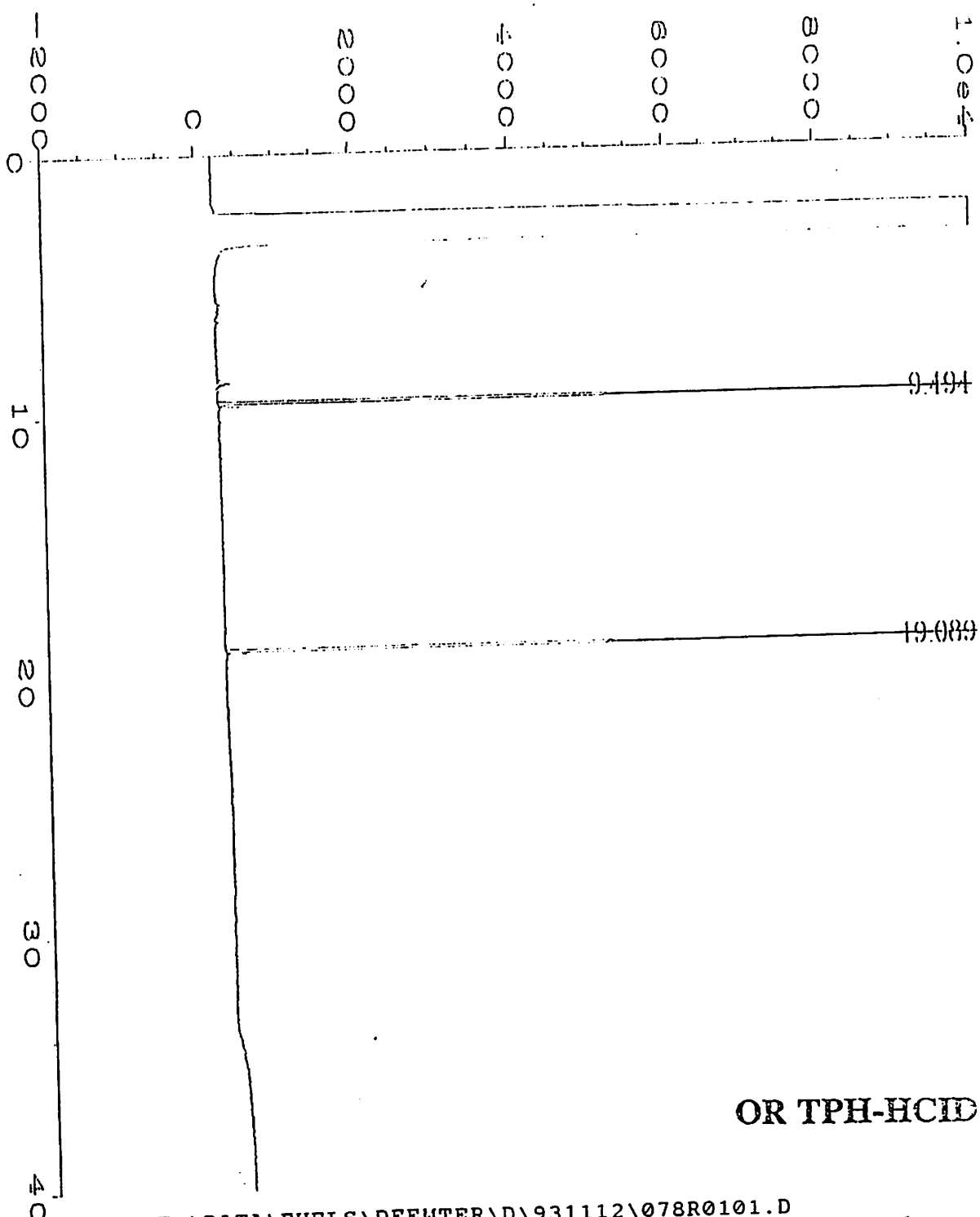
OR TPH-HCID

Data File Name	: F:\DATA\FUELS\DEEMTER\D\931112\076R0101.D		
Operator	: FUELS	Page Number	: 1
Instrument	: DEEMTER	Vial Number	: 76
Sample Name	: 311563-3	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 13 Nov 93 08:18 AM	Instrument Method	: OHCID.MTH
Report Created on:	14 Nov 93 08:38 AM	Analysis Method	: OR-HCID.M
Last Recalib on	: 04 AUG 93 09:41 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



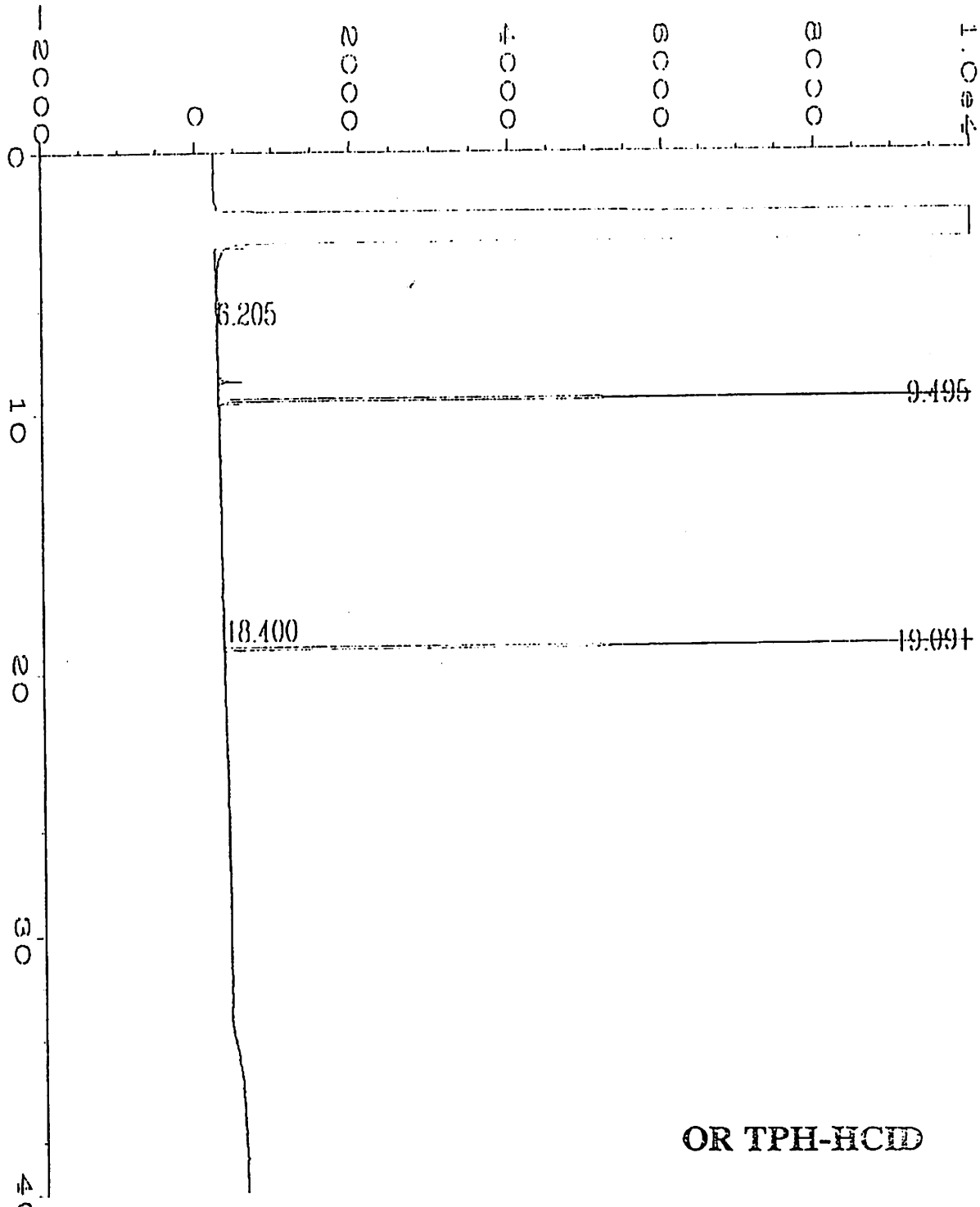
OR TPH-HCID

Data File Name	: F:\DATA\FUELS\DEEMTER\D\931112\077R0101.D	Page Number	: 1
Operator	: FUELS	Vial Number	: 77
Instrument	: DEEMTER	Injection Number	: 1
Sample Name	: 311563-4	Sequence Line	: 1
Run Time Bar Code:		Instrument Method	: OHCID.MTH
Acquired on	: 13 Nov 93 09:13 AM	Analysis Method	: OR-HCID.M
Report Created on	: 14 Nov 93 08:40 AM	Sample Amount	: 0
Last Recalib on	: 04 AUG 93 09:41 AM	ISTD Amount	:
Multiplier	: 1		



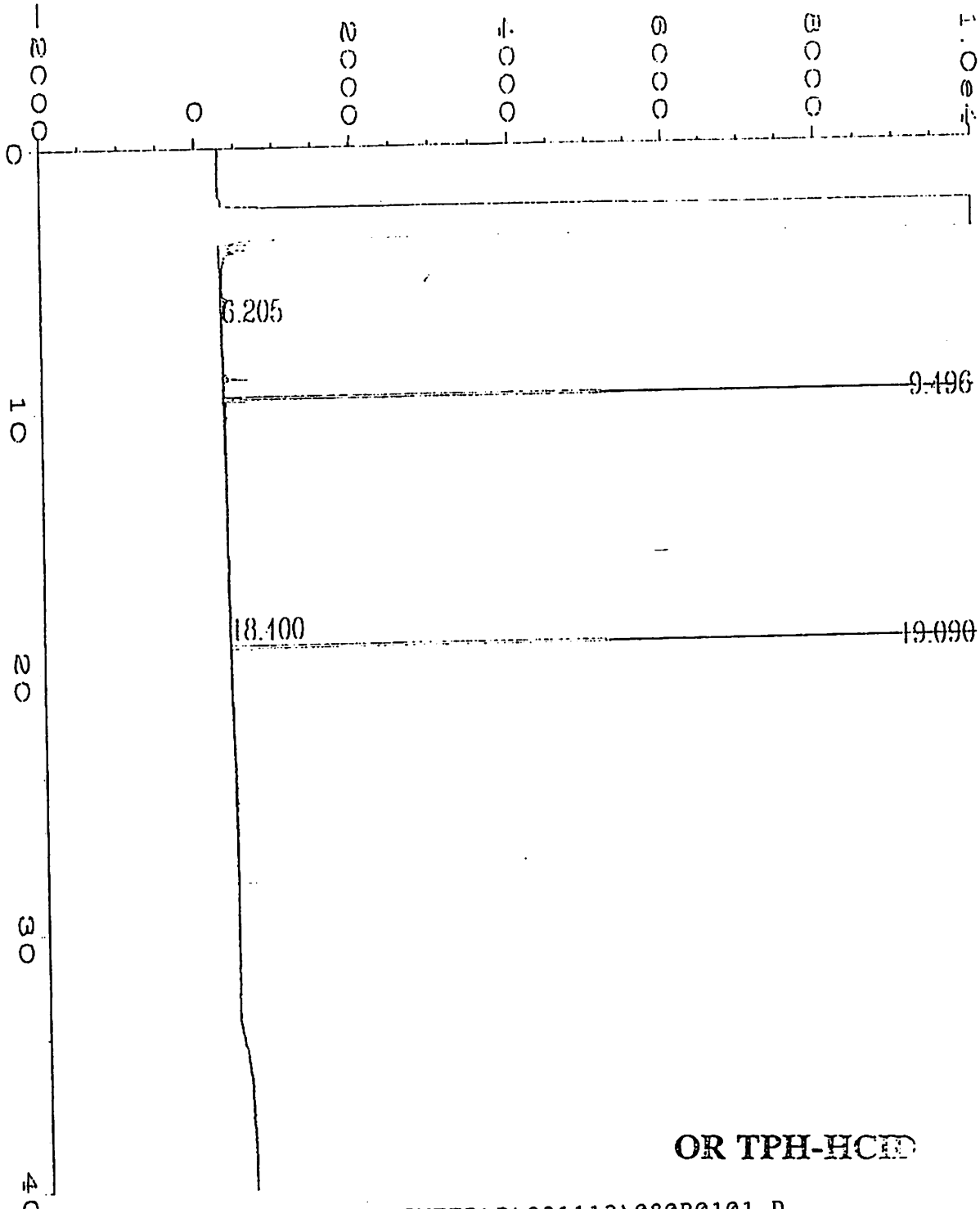
OR TPH-HCID

Data File Name	: F:\DATA\FUELS\DEEMTER\D\931112\078R0101.D	Page Number	: 1
Operator	: FUELS	Vial Number	: 78
Instrument	: DEEMTER	Injection Number	: 1
Sample Name	: 311563-5	Sequence Line	: 1
Run Time Bar Code:		Instrument Method	: OHCID.MTH
Acquired on	: 13 Nov 93 10:11 AM	Analysis Method	: OR-HCID.M
Report Created on	: 14 Nov 93 08:42 AM	Sample Amount	: 0
Last Recalib on	: 04 AUG 93 09:41 AM	ISTD Amount	:
Multiplier	: 1		



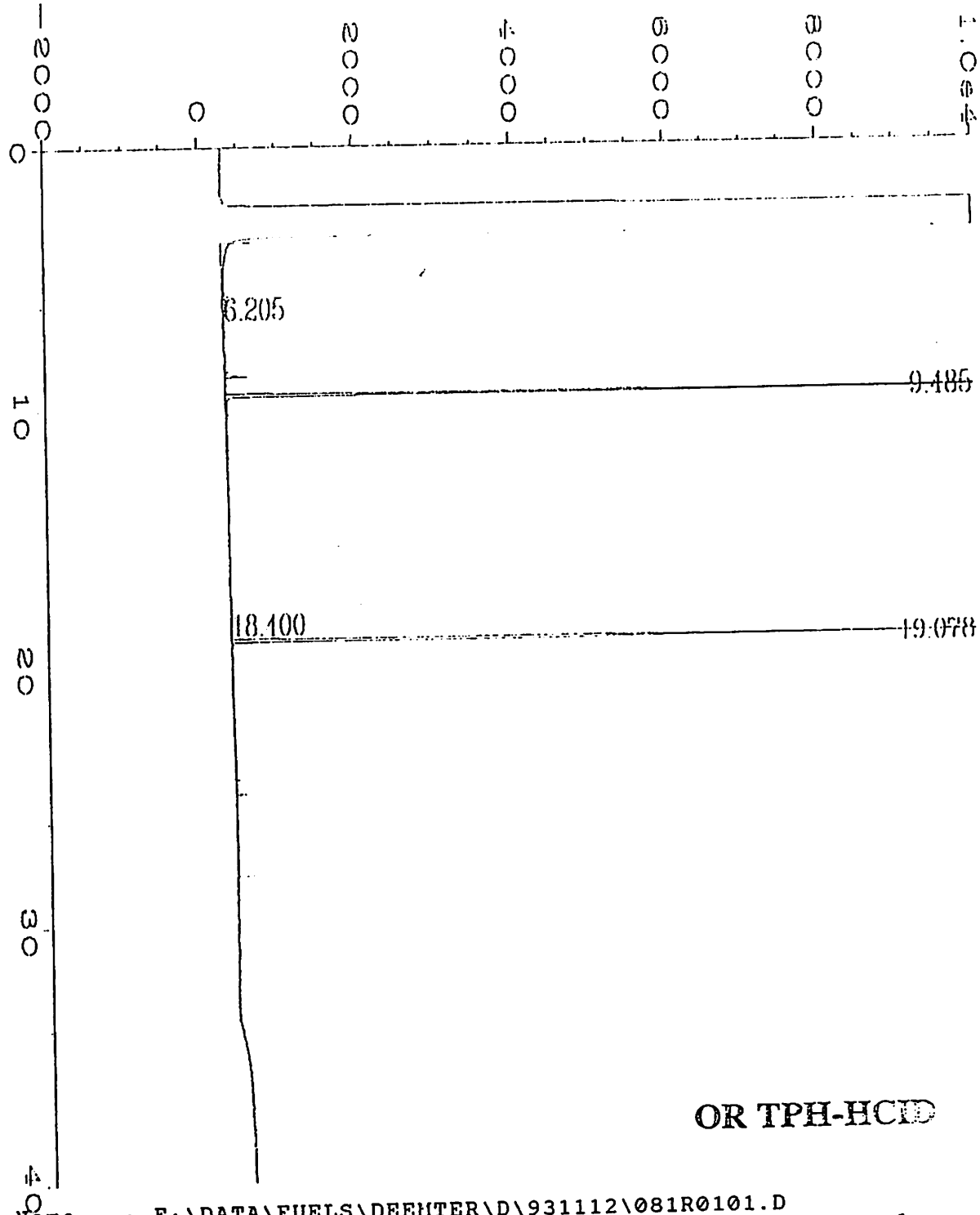
OR TPH-HCID

Data File Name	: F:\DATA\FUELS\DEEMTER\D\931112\079R0101.D		
Operator	: FUELS	Page Number	: 1
Instrument	: DEEMTER	Vial Number	: 79
Sample Name	: 311563-6	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 13 Nov 93 11:09 AM	Instrument Method	: OHCID.MTH
Report Created on:	14 Nov 93 08:43 AM	Analysis Method	: OR-HCID.M
Last Recalib on	: 04 AUG 93 09:41 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



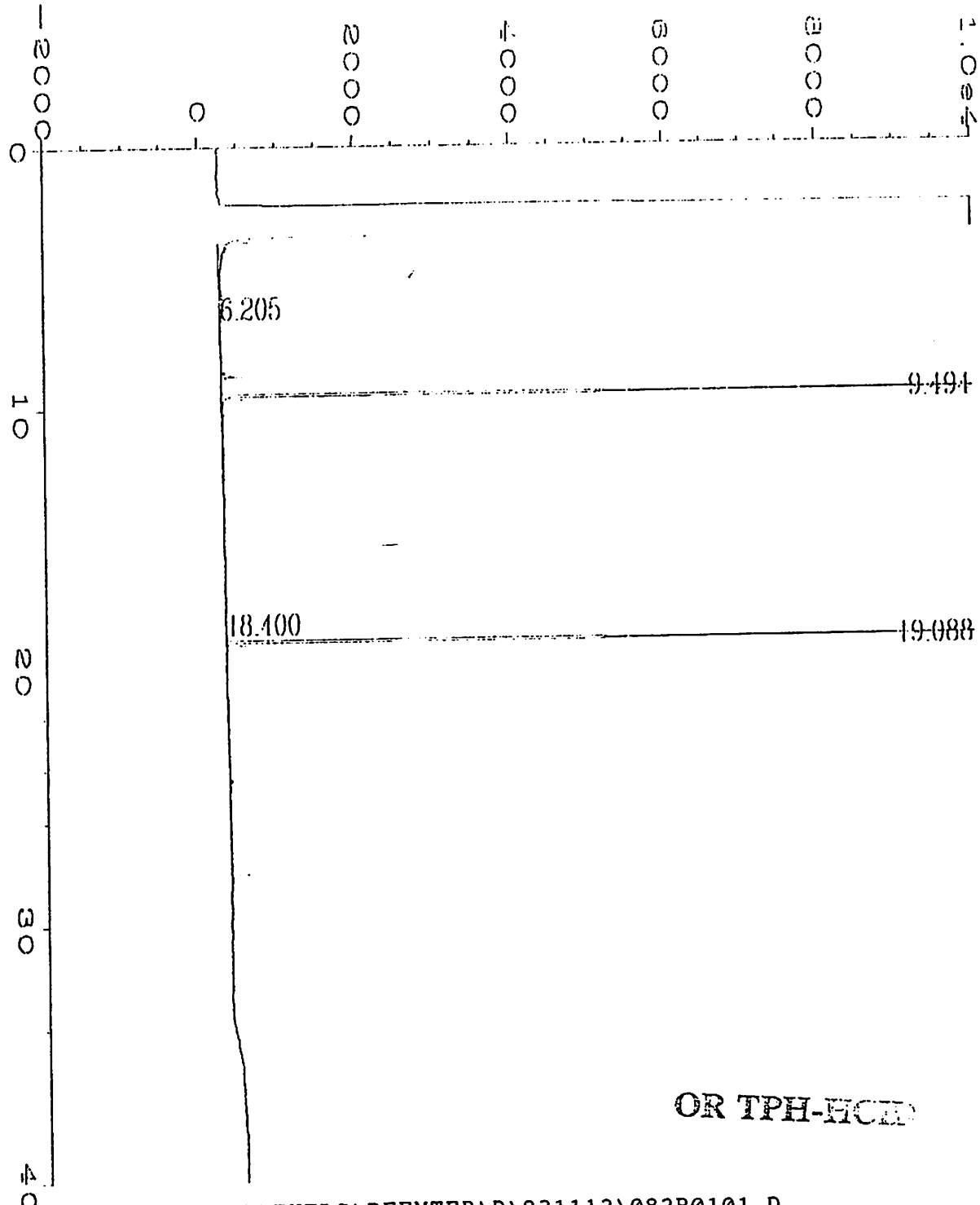
OR TPH-HCID

Data File Name	: F:\DATA\FUELS\DEEMTER\D\931112\080R0101.D	Page Number	: 1
Operator	: FUELS	Vial Number	: 80
Instrument	: DEEMTER	Injection Number	: 1
Sample Name	: 311563-7	Sequence Line	: 1
Run Time Bar Code:		Instrument Method	: OHCID.MTH
Acquired on	: 13 Nov 93 12:08 PM	Analysis Method	: OR-HCID.MT
Report Created on	: 14 Nov 93 08:45 AM	Sample Amount	: 0
Last Recalib on	: 04 AUG 93 09:41 AM	ISTD Amount	:
Multiplier	: 1		



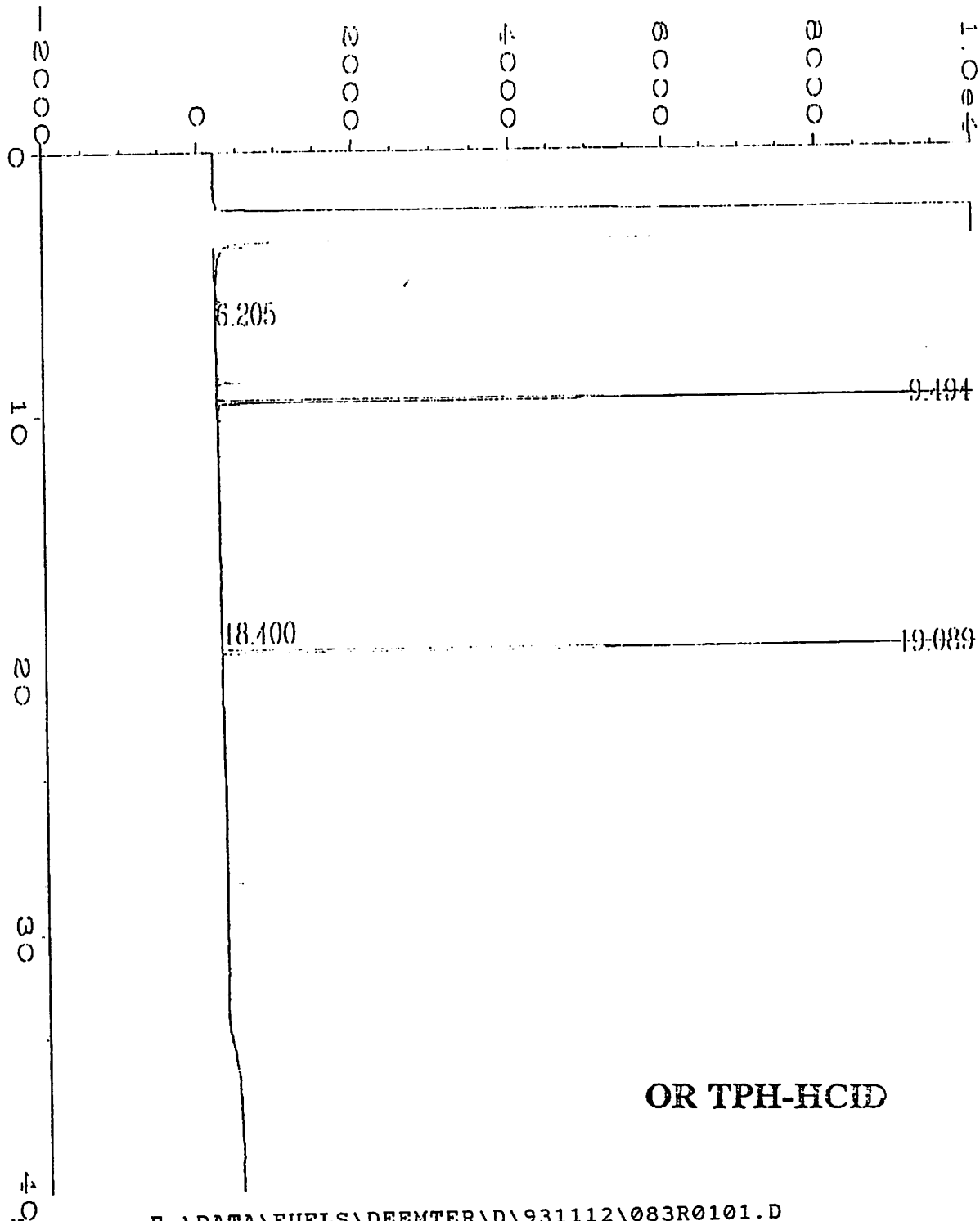
OR TPH-HCID

Data File Name	: F:\DATA\FUELS\DEEMTER\D\931112\081R0101.D		
Operator	: FUELS	Page Number	: 1
Instrument	: DEEMTER	Vial Number	: 81
Sample Name	: 311563-8	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 13 Nov 93 01:04 PM	Instrument Method	: OHCID.MTH
Report Created on:	14 Nov 93 08:47 AM	Analysis Method	: OR-HCID.M
Last Recalib on	: 04 AUG 93 09:41 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

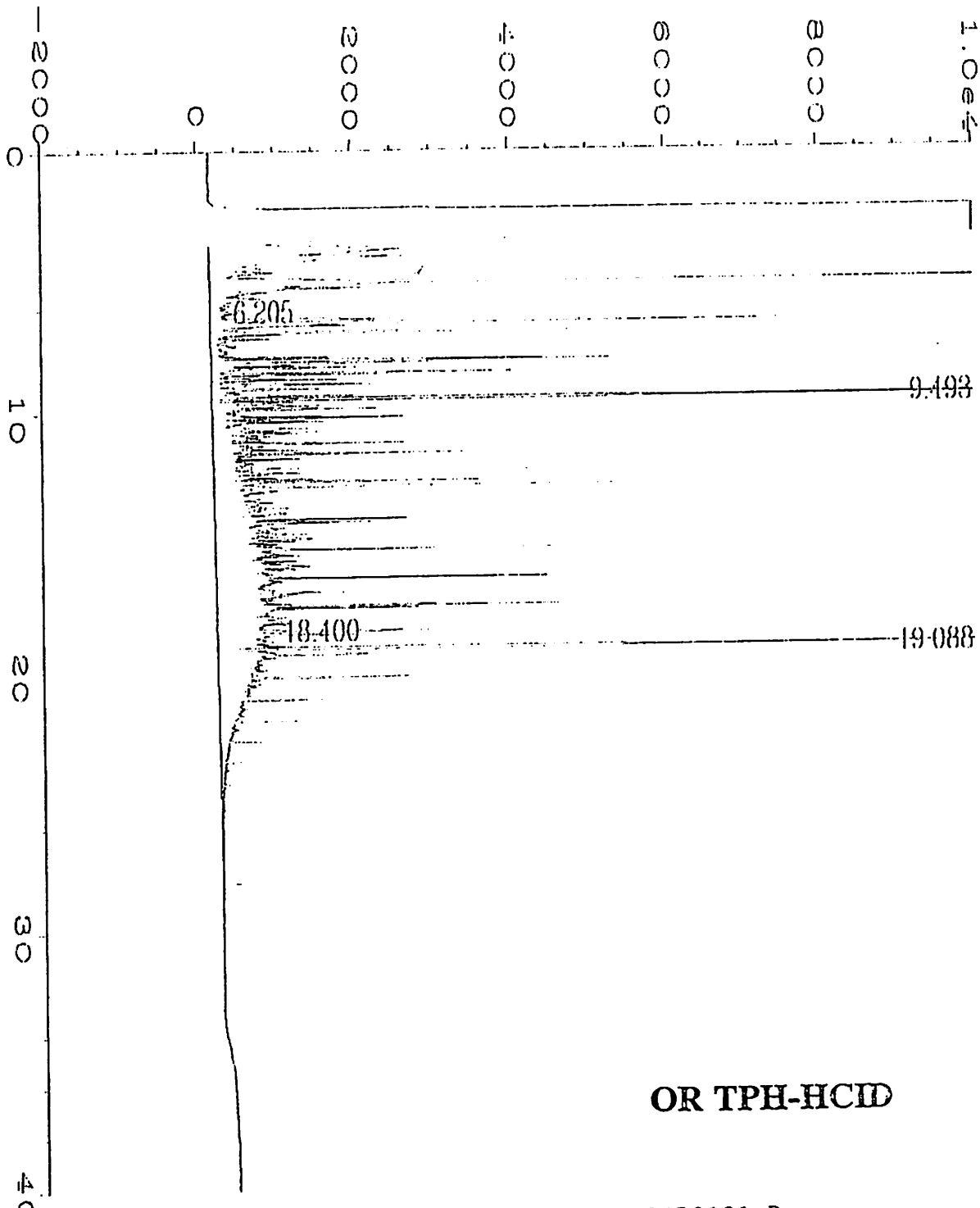


OR TPH-HCID

Data File Name	: F:\DATA\FUELS\DEENTER\D\931112\082R0101.D	Page Number	: 1
Operator	: FUELS	Vial Number	: 82
Instrument	: DEENTER	Injection Number	: 1
Sample Name	: 311563-9	Sequence Line	: 1
Run Time Bar Code:		Instrument Method	: OHCID.MTH
Acquired on	: 13 Nov 93 01:59 PM	Analysis Method	: OR-HCID.M
Report Created on:	14 Nov 93 08:48 AM	Sample Amount	: 0
Last Recalib on	: 04 AUG 93 09:41 AM	ISTD Amount	:
Multiplier	: 1		



Data File Name	: F:\DATA\FUELS\DEEMTER\D\931112\083R0101.D	Page Number	: 1
Operator	: FUELS	Vial Number	: 83
Instrument	: DEEMTER	Injection Number	: 1
Sample Name	: 311563-10	Sequence Line	: 1
Run Time Bar Code:		Instrument Method	: OHCID.MTI
Acquired on	: 13 Nov 93 02:56 PM	Analysis Method	: OR-HCID.
Report Created on:	14 Nov 93 08:50 AM	Sample Amount	: 0
Last Recalib on	: 04 AUG 93 09:41 AM	ISTD Amount	:
Multiplier	: 1		



OR TPH-HCID

Data File Name	: F:\DATA\FUELS\DEEMTER\D\931112\084R0101.D		
Operator	: FUELS	Page Number	: 1
Instrument	: DEEMTER	Vial Number	: 84
Sample Name	: DG 200	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 13 Nov 93 03:53 PM	Instrument Method	: OHCID.MTH
Report Created on:	14 Nov 93 08:51 AM	Analysis Method	: OR-HCID.M
Last Recalib on	: 04 AUG 93 09:41 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST:	TPH-GASOLINE (Oregon)	**ATI I.D.:**	311563-0
CLIENT I.D.:	Method Blank	**DATE SAMPLED:**	N/A
CLIENT:	GeoEngineers, Inc.	**DATE RECEIVED:**	N/A
PROJECT #:	0161-331-P18	**DATE EXTRACTED:**	11/16/93
PROJECT NAME:	Oregon City	**DATE ANALYZED:**	11/16/93
SAMPLE MATRIX:	SOIL	**DILUTION FACTOR:**	1
		UNITS:	mg/Kg

PARAMETER	RESULTS
GASOLINE	< 5.0
BENZENE-NAPHTHALENE	
SURROGATE:	
TRIFLUOROTOLUENE (50% - 150%)	103%

Analyst: 11/17/93

Reviewer: 11/17/93

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST:	TPH-GASOLINE (Oregon)	ATI I.D.:	311563-3
CLIENT I.D.:	MW2-10	DATE SAMPLED:	11/09/93
CLIENT:	GeoEngineers, Inc.	DATE RECEIVED:	11/11/93
PROJECT #:	0161-331-P18	DATE EXTRACTED:	11/16/93
PROJECT NAME:	Oregon City	DATE ANALYZED:	11/16/93
SAMPLE MATRIX:	SOIL	DILUTION FACTOR:	20
		UNITS:	mg/Kg

PARAMETER	RESULTS
GASOLINE	1100
BENZENE-NAPHTHALENE	
SURROGATE:	
TRIFLUOROTOLUENE (50% - 150%)	97%

Analyst: 11/17/93

Reviewer: 11/17/93

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY DUPLICATE RESULTS

		ATI ACCESSION:	311563
TEST:	TPH-GASOLINE (Oregon)	QC SAMPLE:	311585-6
CLIENT:	GeoEngineers, Inc.	DATE EXTRACTED:	11/16/93
PROJECT #:	0161-331-P18	DATE ANALYZED:	11/16/93
PROJECT NAME:	Oregon City	DILUTION FACTOR:	1
SAMPLE MATRIX:	SOIL	UNITS:	mg/Kg

PARAMETER	SAMPLE RESULT	SAMPLE DUP RESULT	RPD
GASOLINE	< 5.0	< 5.0	N/A
SURROGATE: TRIFLUOROTOLUENE(50% - 150%)	86%	87%	

CONTROL LIMITS

	RPD
GASOLINE	20

Analyst: 11/18/93

Reviewer: CS 11-19-93

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY SPIKE RESULTS

TEST:	TPH-GASOLINE (Oregon)	ATI ACCESSION:	311563
CLIENT:	GeoEngineers, Inc.	QC SAMPLE:	311585-7
PROJECT #:	0161-331-P18	DATE EXTRACTED:	11/16/93
PROJECT NAME:	Oregon City	DATE ANALYZED:	11/16/93
SAMPLE MATRIX:	SOIL	DILUTION FACTOR:	1
		UNITS:	mg/Kg

PARAMETER		SAMPLE RESULT	SPIKE CONC.	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
GASOLINE	<	5.0	100	92	92	92	92	0
SURROGATE: TRIFLUOROTOLUENE (50% - 150%)				98%		94%		

CONTROL LIMITS

	% REC	RPD
Gasoline	50 - 119	20

Analyst: 11/17/93

Reviewer: 11/17/93

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY SPIKE RESULTS

		ATI ACCESSION:	311563
TEST:	TPH-GASOLINE (Oregon)	QC SAMPLE:	Method Blank
CLIENT:	GeoEngineers, Inc.	DATE EXTRACTED:	11/16/93
PROJECT #:	0161-331-P18	DATE ANALYZED:	11/16/93
PROJECT NAME:	Oregon City	DILUTION FACTOR:	1
SAMPLE MATRIX:	SOIL	UNITS:	mg/Kg

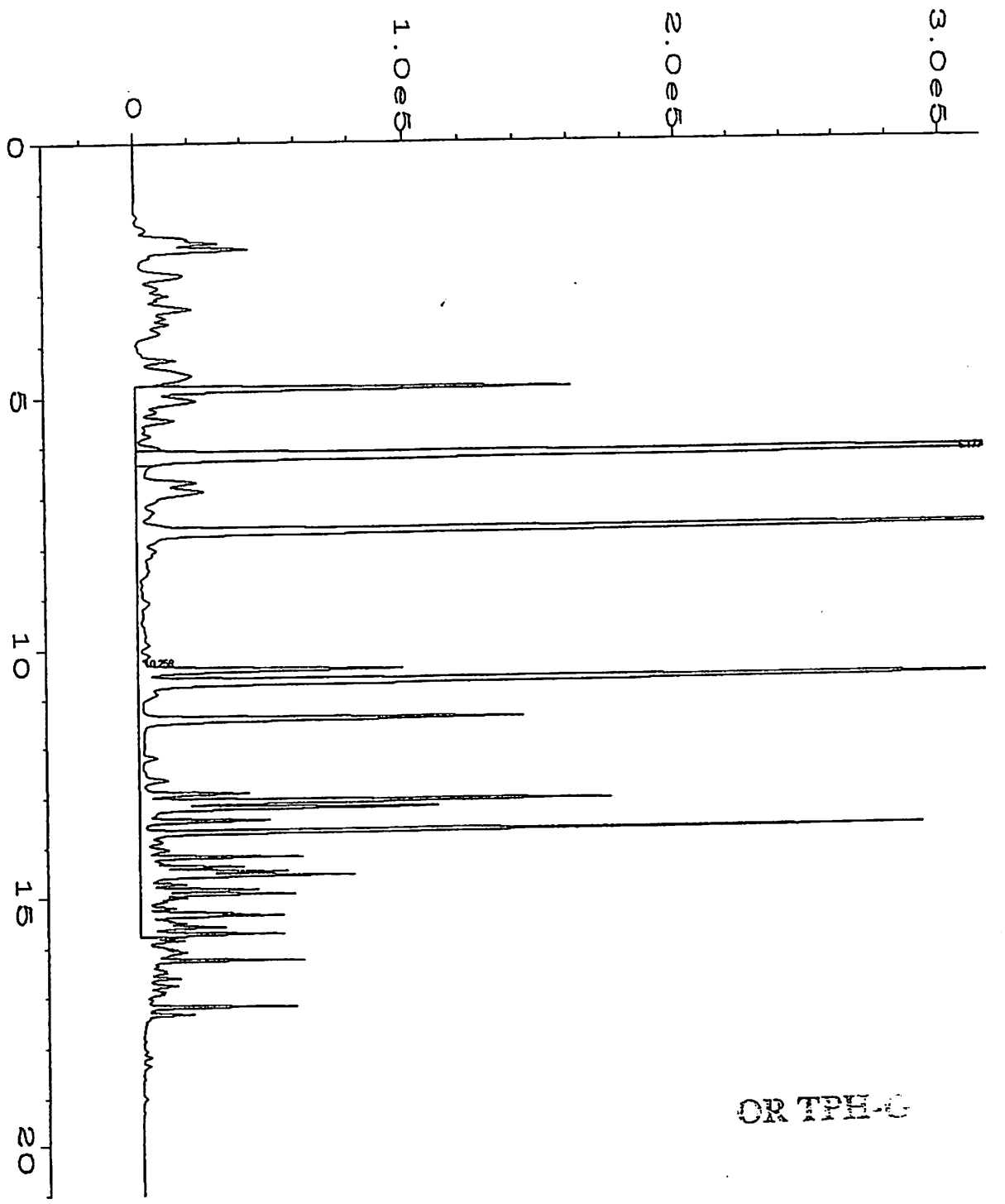
PARAMETER		SAMPLE RESULT	SPIKE CONC.	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
GASOLINE	<	5.0	100	108	108	102	102	6
SURROGATE: TRIFLUOROTOLUENE (50% - 150%)					106%		101%	

CONTROL LIMITS

	% REC	RPD
Gasoline	72 - 124	20

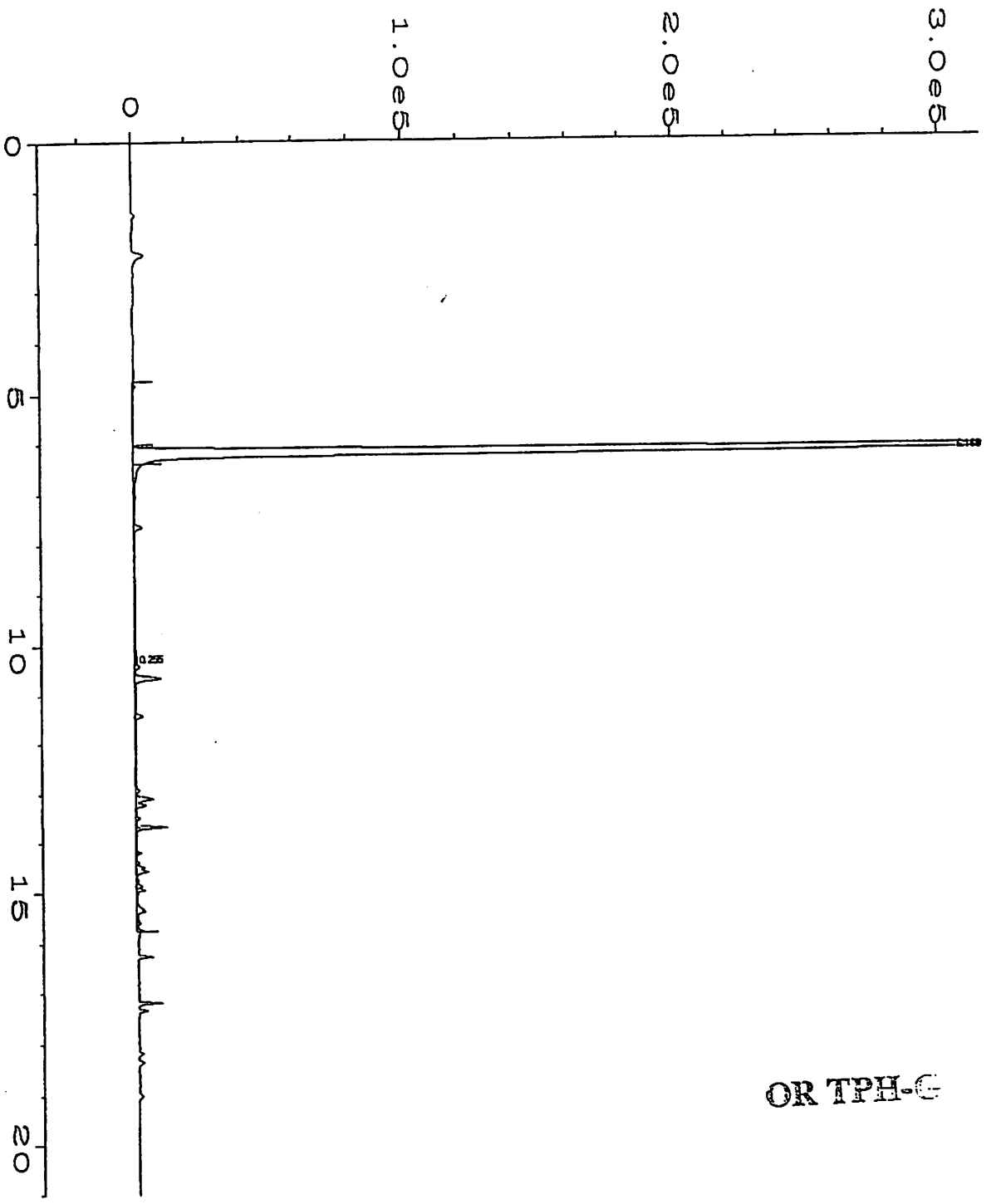
Analyst: 11/17/93

Reviewer: 11/17/93



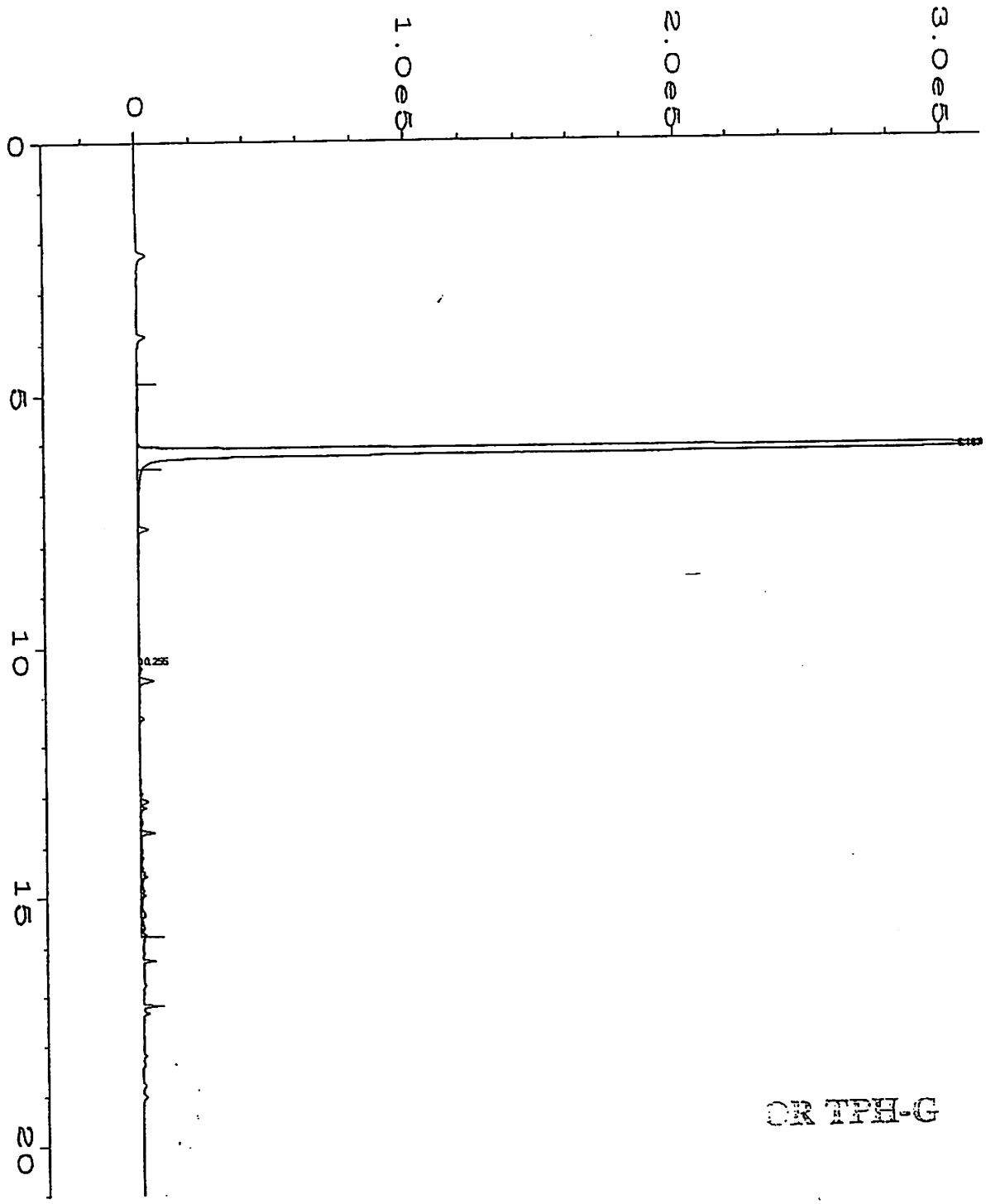
OR TPH-G

Data File Name	: F:\DATA\FUELS\WATSON\D\931116\001F0101.D		
Operator	: !!!FUELS!!!	Page Number	: 1
Instrument	: WATSON	Vial Number	: 1
Sample Name	: STD-C	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 16 Nov 93 11:06 AM	Instrument Method	: BETX1.MTH
Report Created on	: 16 Nov 93 11:41 AM	Analysis Method	: OTPHG.MTH
Last Recalib on	: 10 NOV 93 09:01 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

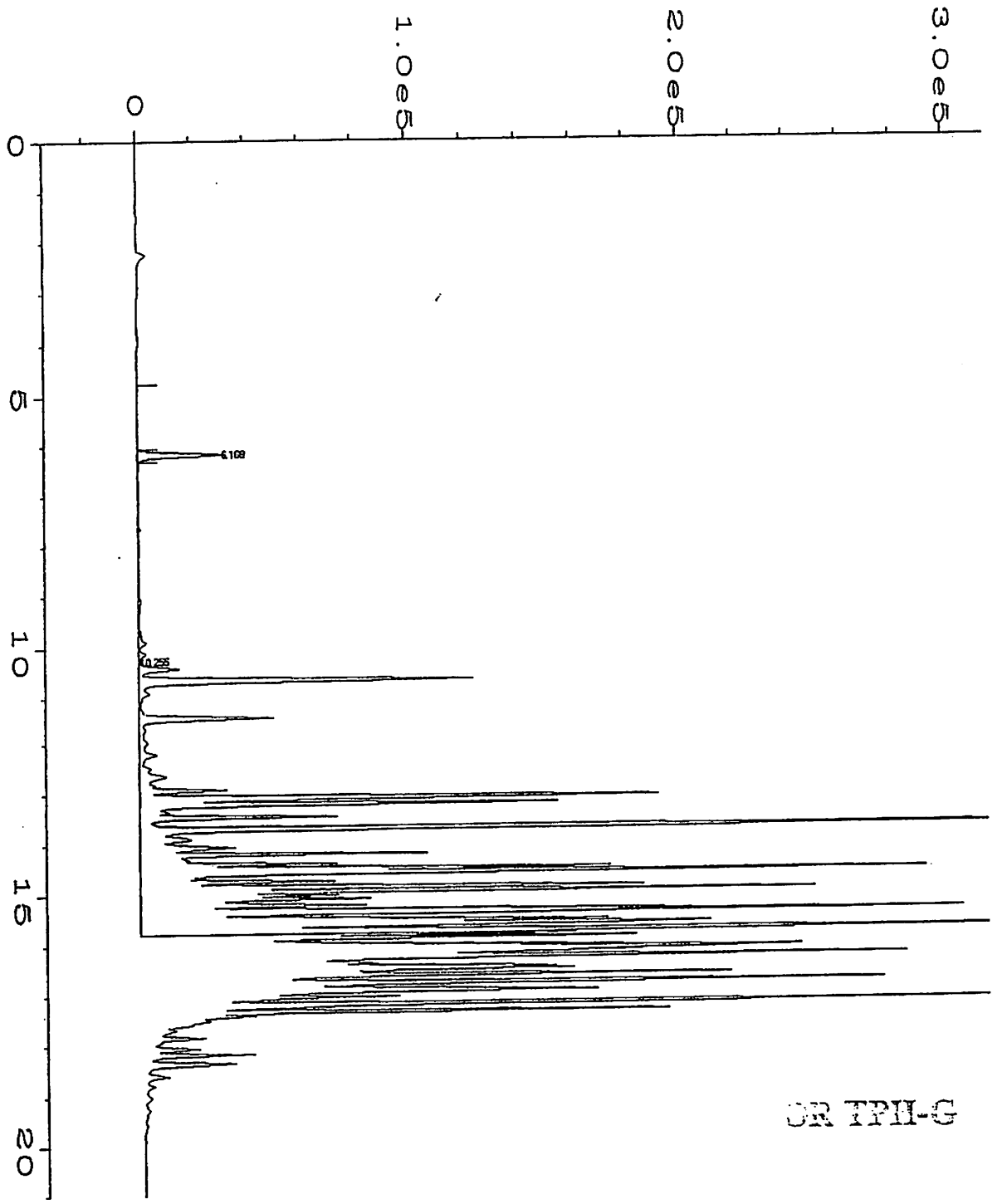


OR TPH-G

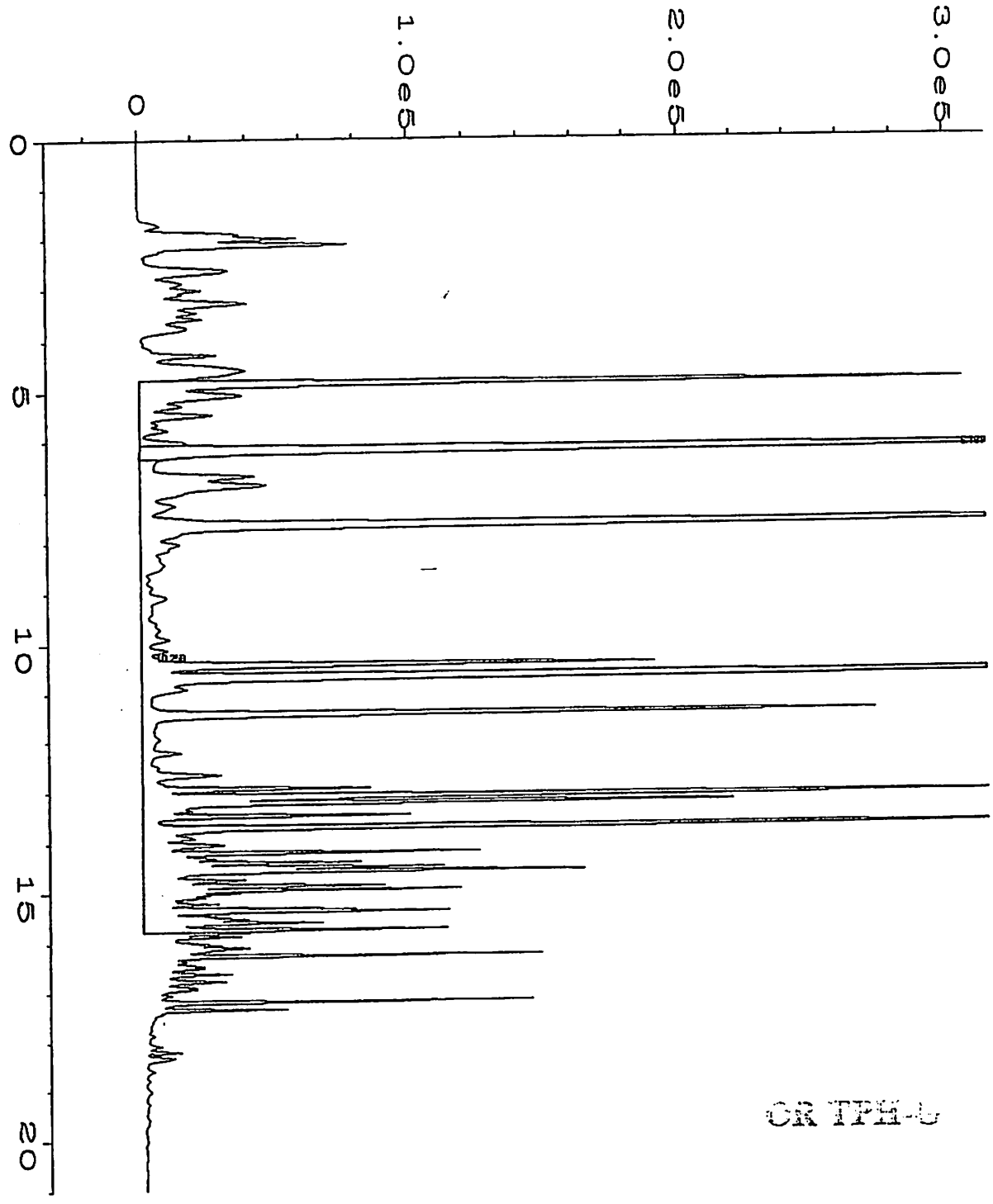
Data File Name	: F:\DATA\FUELS\WATSON\D\931116\002F0101.D		
Operator	: !!!FUELS!!!	Page Number	: 1
Instrument	: WATSON	Vial Number	: 2
Sample Name	: WRB	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 16 Nov 93 11:34 AM	Instrument Method	: BETX1.MTH
Report Created on	: 16 Nov 93 11:57 AM	Analysis Method	: OTPHG.MTH
Last Recalib on	: 10 NOV 93 09:01 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



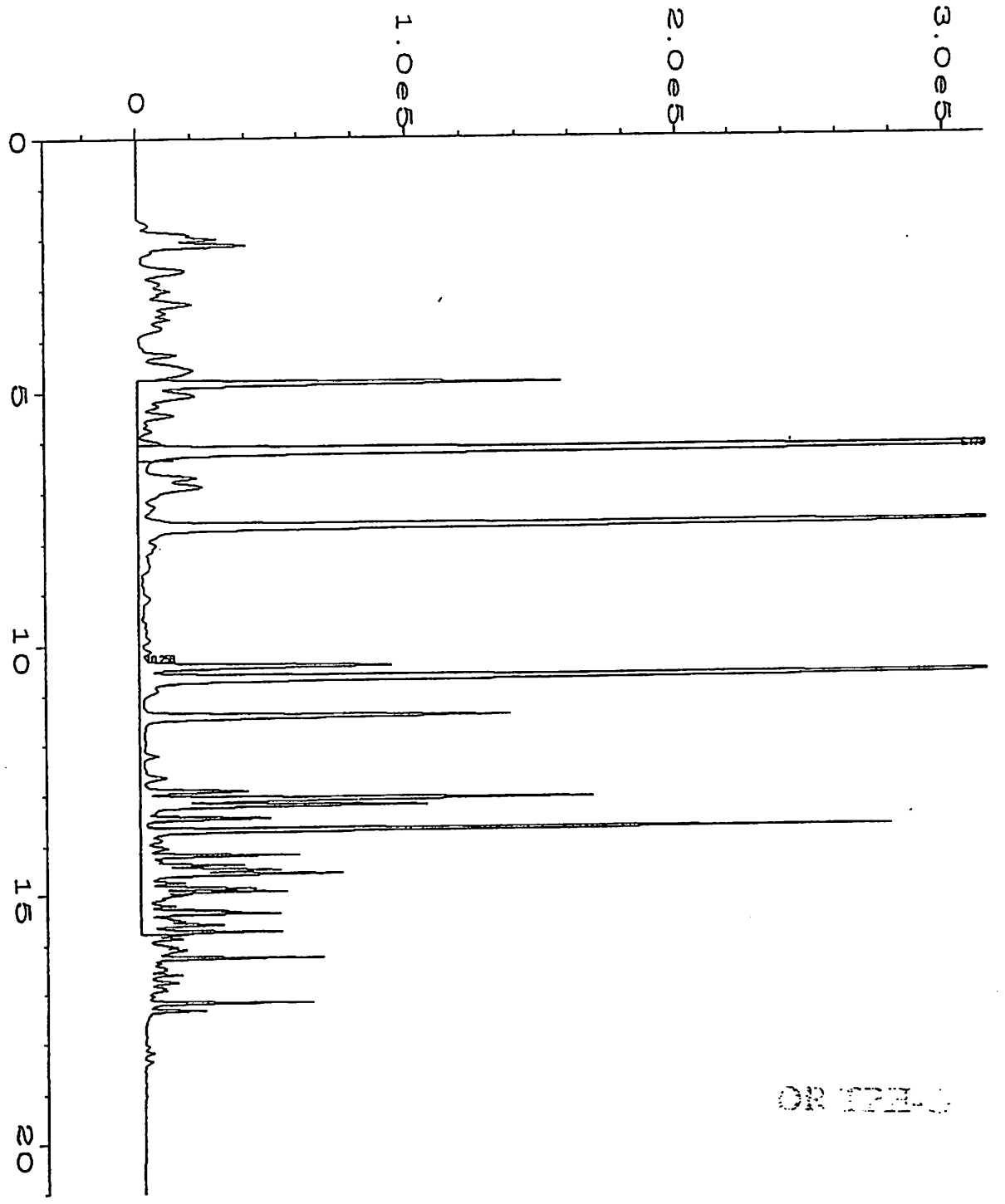
Data File Name	: F:\DATA\FUELS\WATSON\D\931116\007F0101.D		
Operator	: !!!FUELS!!!	Page Number	: 1
Instrument	: WATSON	Vial Number	: 7
Sample Name	: MB 11-16	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 16 Nov 93 04:44 PM	Instrument Method	: BETX1.MTH
Report Created on:	17 Nov 93 09:12 AM	Analysis Method	: OTPHG.MTH
Last Recalib on	: 10 NOV 93 09:01 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



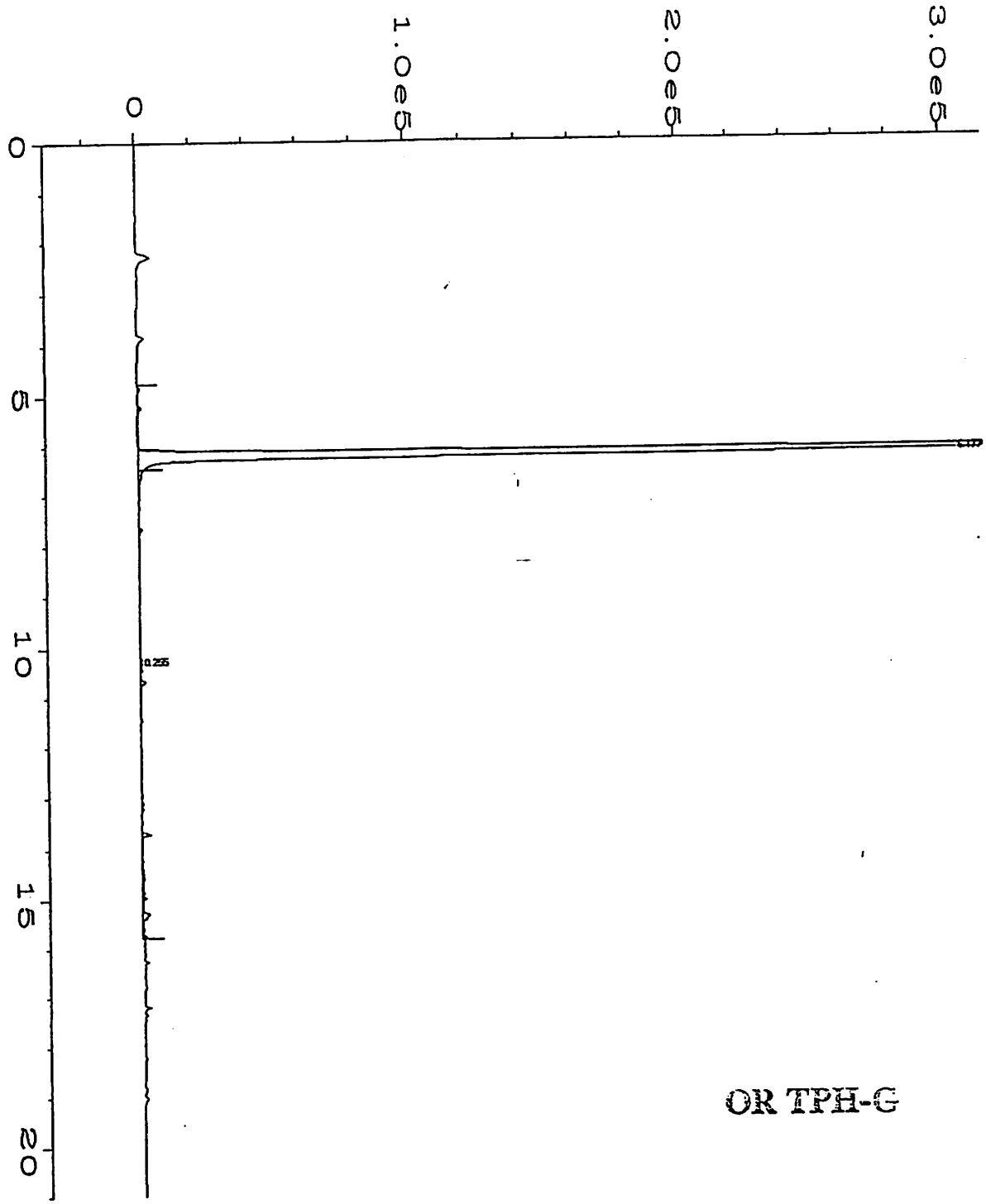
Data File Name	: F:\DATA\FUELS\WATSON\D\931116\008F0101.D		
Operator	: !!!FUELS!!!	Page Number	: 1
Instrument	: WATSON	Vial Number	: 8
Sample Name	: 311563-3 1:20	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 16 Nov 93 05:12 PM	Instrument Method	: BETX1.MTH
Report Created on:	17 Nov 93 09:16 AM	Analysis Method	: OTPHG.MTH
Last Recalib on	: 10 NOV 93 09:01 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



Data File Name	: F:\DATA\FUELS\WATSON\D\931116\012F0101.D		
Operator	: !!!FUELS!!!	Page Number	: 1
Instrument	: WATSON	Vial Number	: 12
Sample Name	: BS 11-16	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 16 Nov 93 07:07 PM	Instrument Method	: BETX1.MTH
Report Created on	: 17 Nov 93 09:25 AM	Analysis Method	: OTPHG.MTH
Last Recalib on	: 10 NOV 93 09:01 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

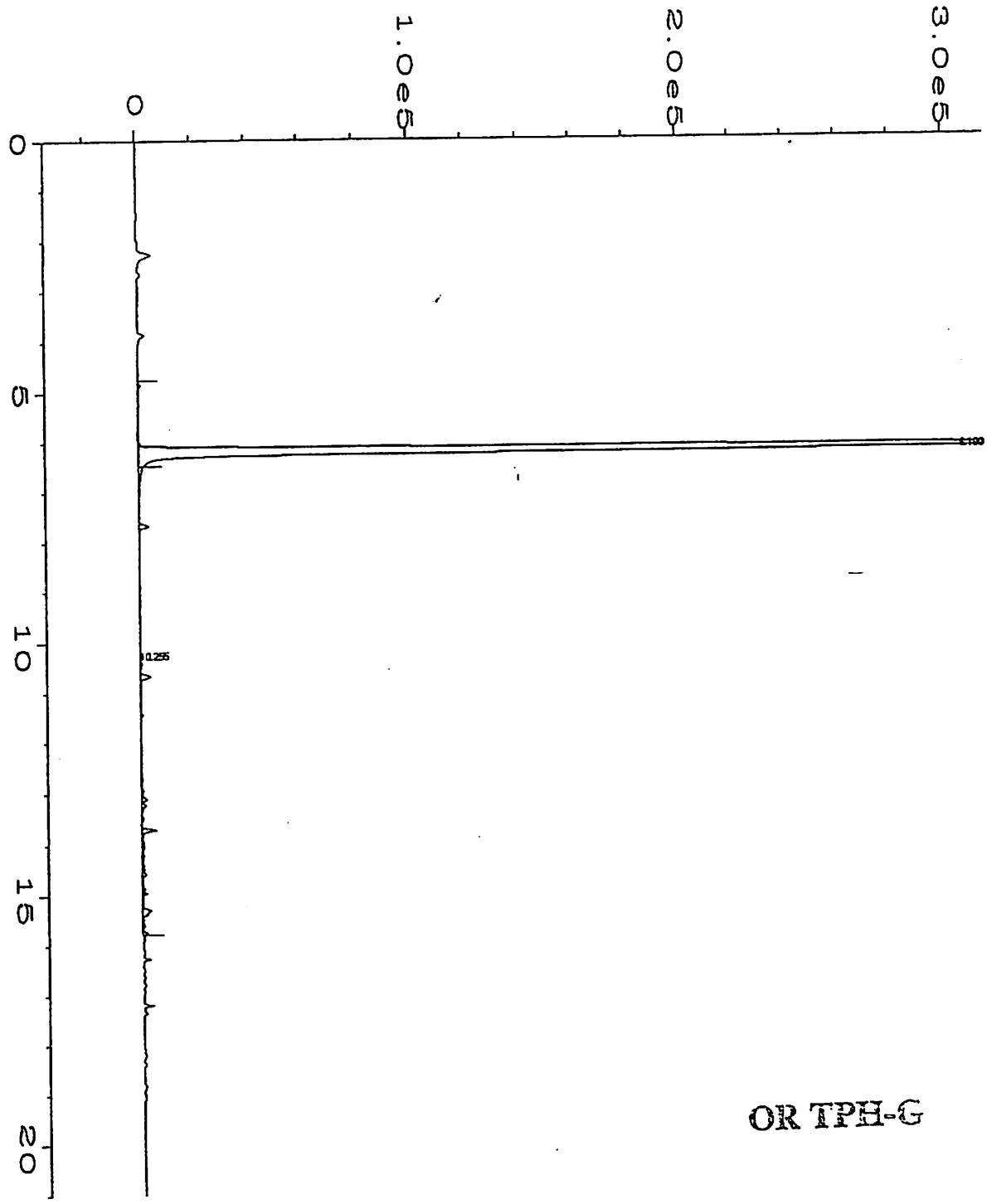


Data File Name	: F:\DATA\FUELS\WATSON\D\931116\013F0101.D		
Operator	: !!!FUELS!!!	Page Number	: 1
Instrument	: WATSON	Vial Number	: 13
Sample Name	: STD-C	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 16 Nov 93 07:36 PM	Instrument Method	: BETX1.MTH
Report Created on:	17 Nov 93 09:27 AM	Analysis Method	: OTPHG.MTH
Last Recalib on	: 10 NOV 93 09:01 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



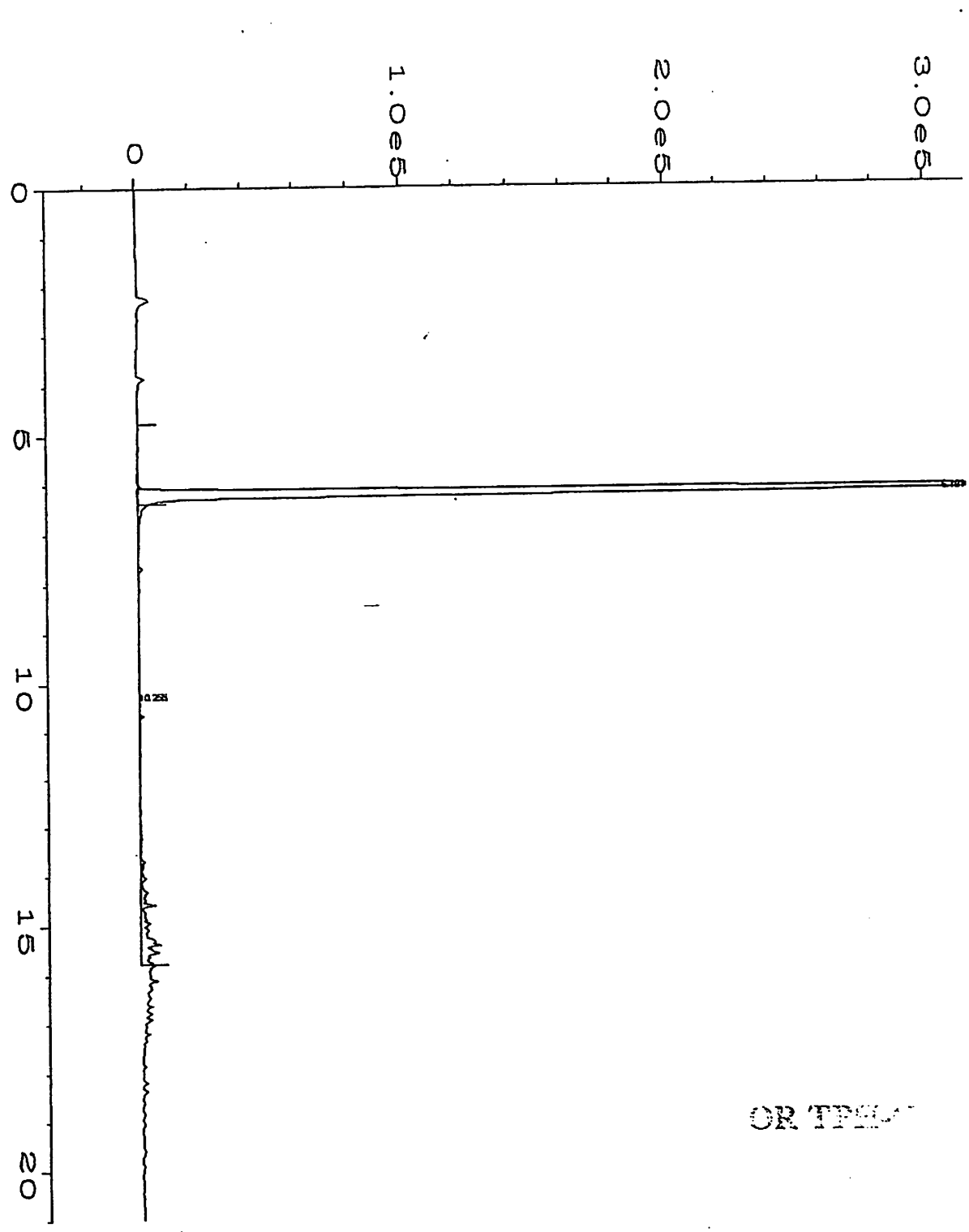
OR TPH-G

Data File Name	: F:\DATA\FUELS\WATSON\D\931116\018F0101.D		
Operator	: !!!FUELS!!!	Page Number	: 1
Instrument	: WATSON	Vial Number	: 18
Sample Name	: 311585-6	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 16 Nov 93 10:01 PM	Instrument Method	: BETX1.MTH
Report Created on	: 17 Nov 93 09:37 AM	Analysis Method	: OTPHG.MTH
Last Recalib on	: 10 NOV 93 09:01 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



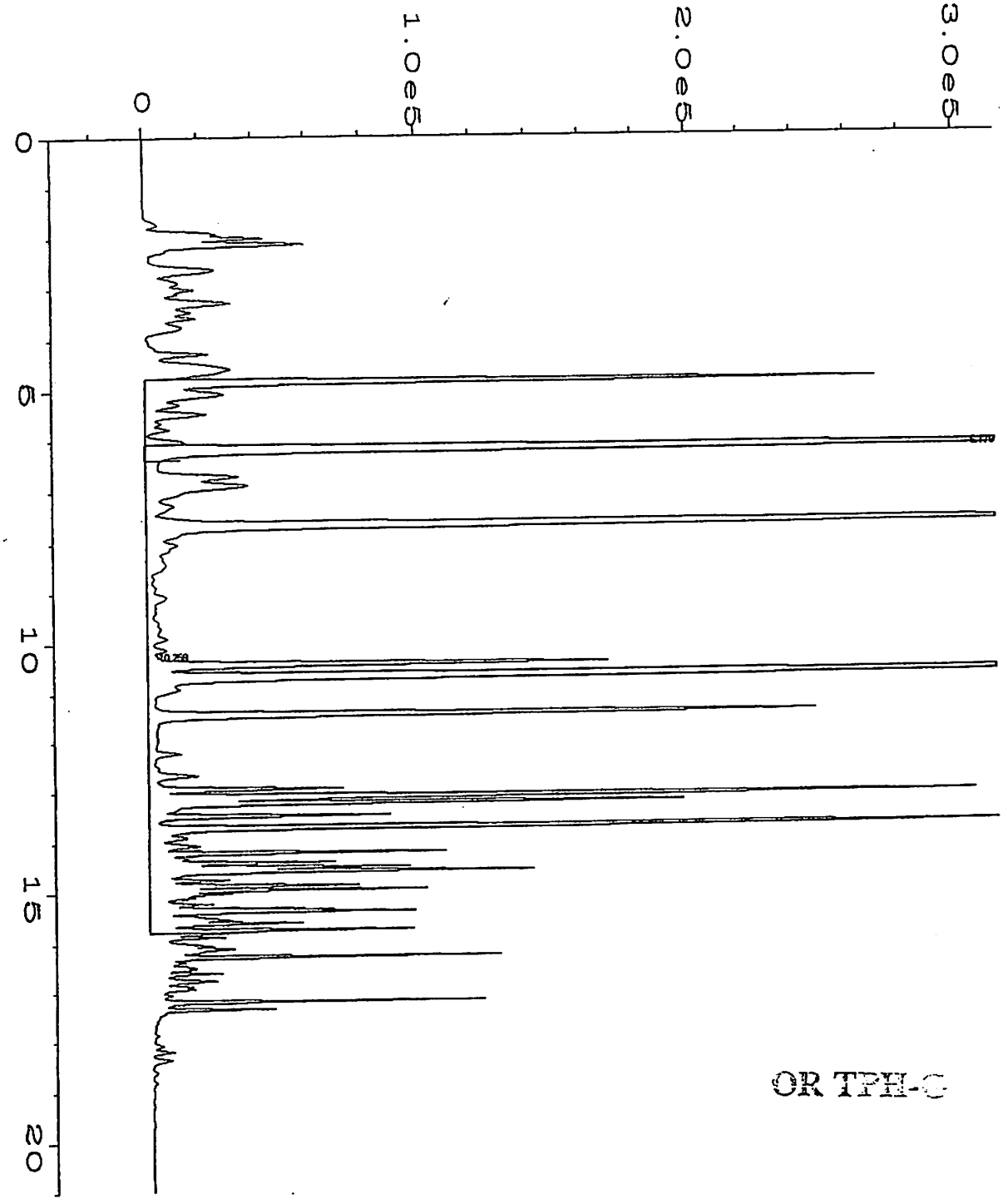
OR TPH-G

Data File Name	: F:\DATA\FUELS\WATSON\D\931116\019F0101.D		
Operator	: !!!FUELS!!!	Page Number	: 1
Instrument	: WATSON	Vial Number	: 19
Sample Name	: 311585-6 DUP	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 16 Nov 93 10:31 PM	Instrument Method	: BETX1.MTH
Report Created on	: 17 Nov 93 09:38 AM	Analysis Method	: OTPHG.MTH
Last Recalib on	: 10 NOV 93 09:01 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

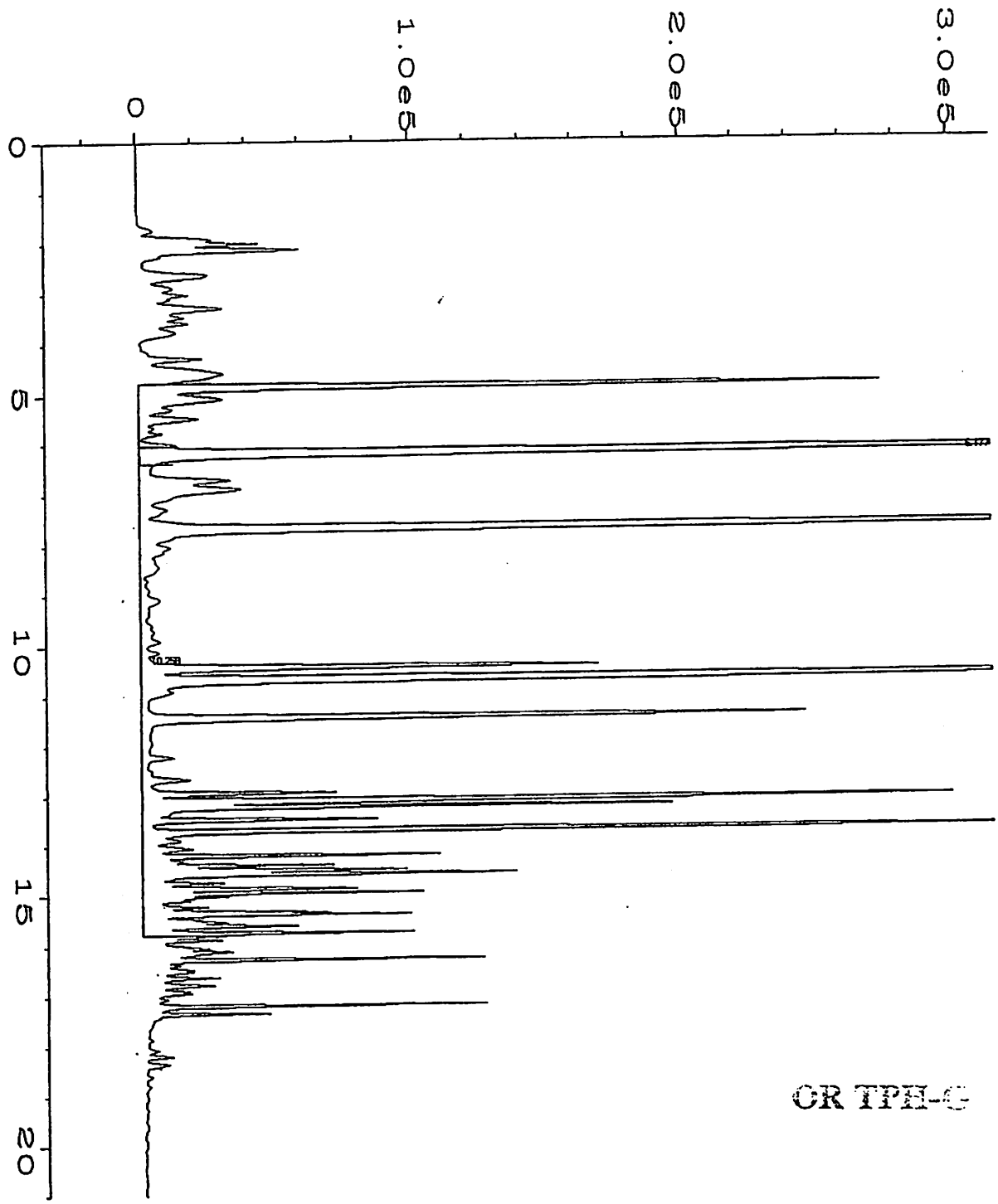


OR TPH

Data File Name	: F:\DATA\FUELS\WATSON\D\931116\020F0101.D		
Operator	: !!!FUELS!!!	Page Number	: 1
Instrument	: WATSON	Vial Number	: 20
Sample Name	: 311585-7	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 16 Nov 93 11:00 PM	Instrument Method	: BETX1.MTH
Report Created on	: 17 Nov 93 09:42 AM	Analysis Method	: OTPHG.MTH
Last Recalib on	: 10 NOV 93 09:01 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

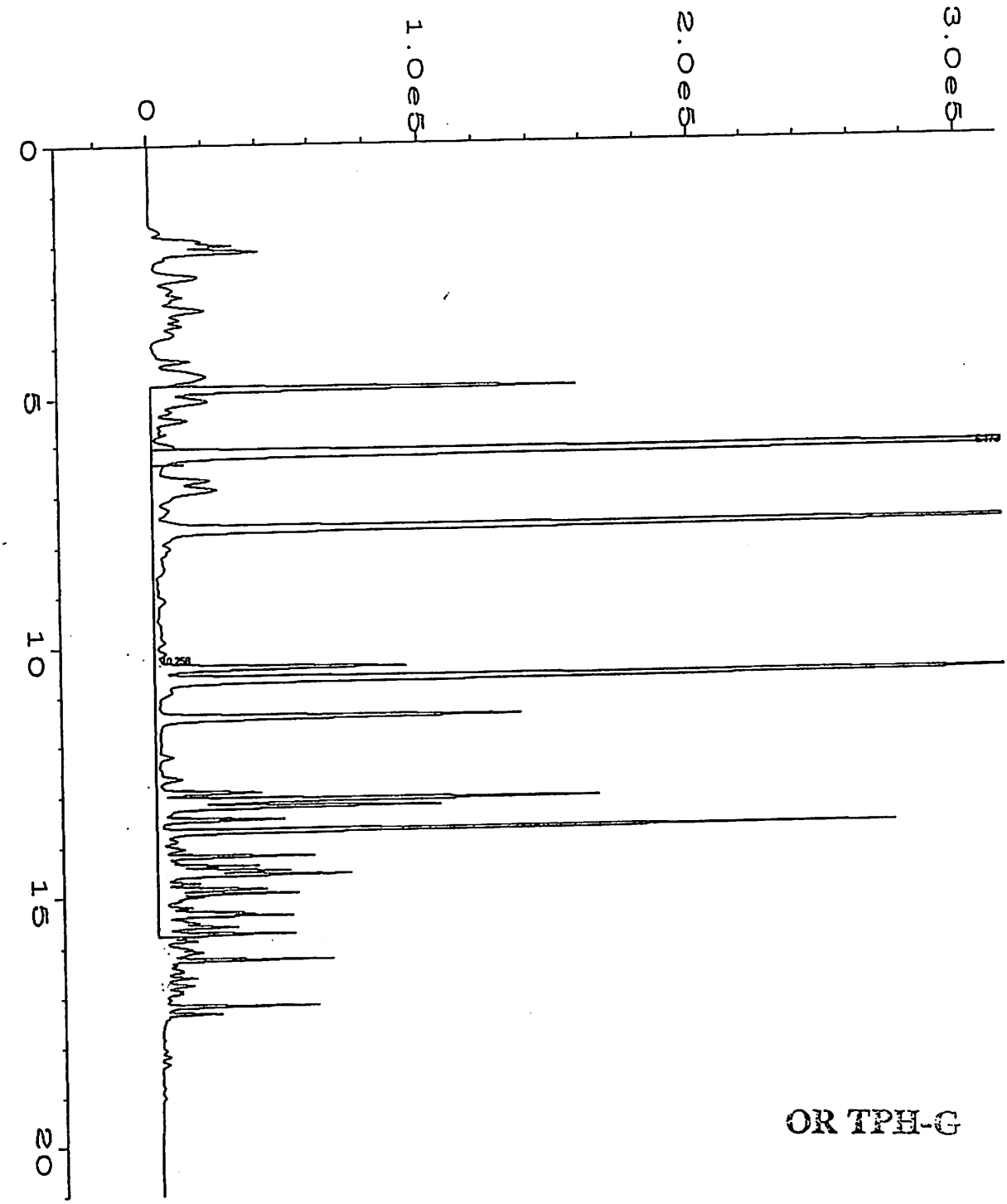


Data File Name	: F:\DATA\FUELS\WATSON\D\931116\021F0101.D		
Operator	: !!!FUELS!!!	Page Number	: 1
Instrument	: WATSON	Vial Number	: 21
Sample Name	: 311585-7 MS	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 16 Nov 93 11:29 PM	Instrument Method	: BETX1.MTH
Report Created on	: 17 Nov 93 09:44 AM	Analysis Method	: OTPHG.MTH
Last Recalib on	: 10 NOV 93 09:01 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



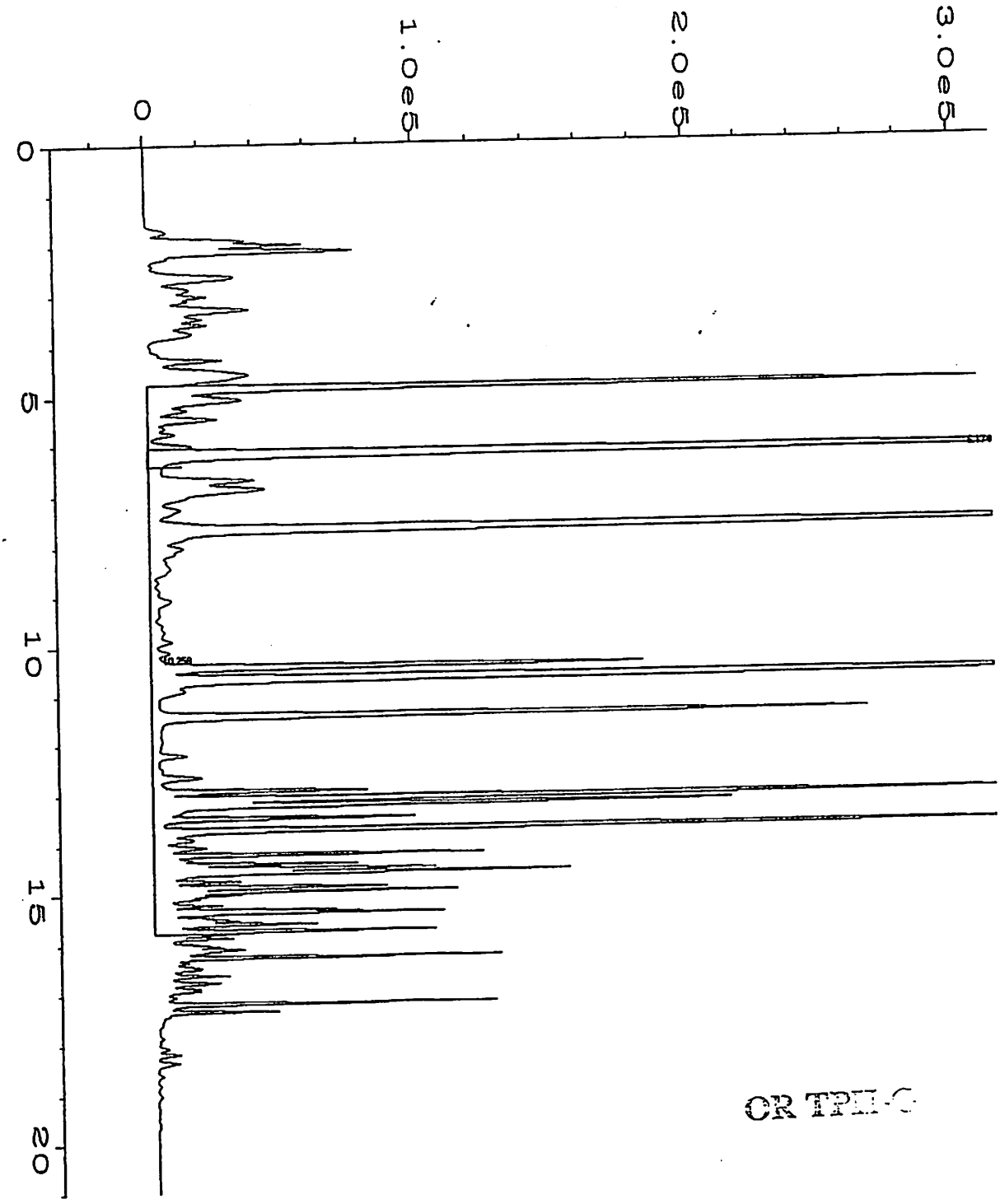
Data File Name : F:\DATA\FUELS\WATSON\D\931116\022F0101.D
Operator : !!!FUELS!!!
Instrument : WATSON
Sample Name : 311585-7 MSD
Run Time Bar Code:
Acquired on : 16 Nov 93 11:58 PM
Report Created on: 17 Nov 93 09:49 AM
Last Recalib on : 10 NOV 93 09:01 AM
Multiplier : 1

Page Number : 1
Vial Number : 22
Injection Number : 1
Sequence Line : 1
Instrument Method: BETX1.MTH
Analysis Method : OTPHG.MTH
Sample Amount : 0
ISTD Amount :



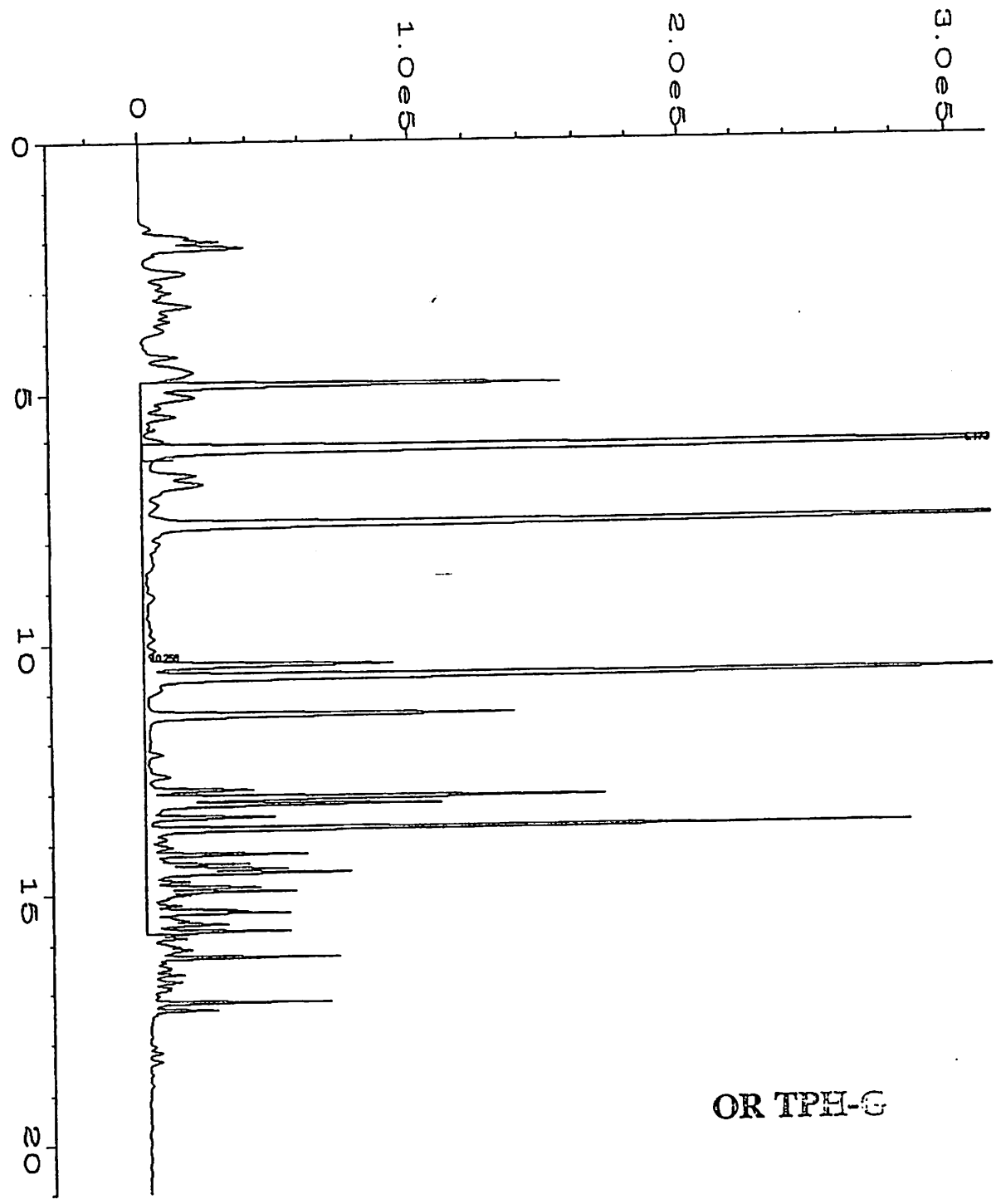
OR TPH-G

Data File Name	: F:\DATA\FUELS\WATSON\D\931116\024F0101.D		
Operator	: !!!FUELS!!!	Page Number	: 1
Instrument	: WATSON	Vial Number	: 24
Sample Name	: STD-C	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 17 Nov 93 00:56 AM	Instrument Method	: BETX1.MTH
Report Created on	: 17 Nov 93 10:08 AM	Analysis Method	: OTPHG.MTH
Last Recalib on	: 10 NOV 93 09:01 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



OR TPH-G

Data File Name	: F:\DATA\FUELS\WATSON\D\931116\025F0101.D		
Operator	: !!!FUELS!!!	Page Number	: 1
Instrument	: WATSON	Vial Number	: 25
Sample Name	: BSD 11-16	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 17 Nov 93 01:25 AM	Instrument Method	: BETX1.MTH
Report Created on:	17 Nov 93 10:09 AM	Analysis Method	: OTPHG.MTH
Last Recalib on	: 10 NOV 93 09:01 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



OR TPH-G

Data File Name	: F:\DATA\FUELS\WATSON\D\931116\027F0101.D		
Operator	: !!!FUELS!!!	Page Number	: 1
Instrument	: WATSON	Vial Number	: 27
Sample Name	: STD-C	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 17 Nov 93 02:22 AM	Instrument Method	: BETX1.MTH
Report Created on	: 17 Nov 93 09:06 AM	Analysis Method	: OTPHG.MTH
Last Recalib on	: 10 NOV 93 09:01 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST:	TPH-DIESEL (Oregon)	**ATI I.D.:**	311563-0
CLIENT I.D.:	Method Blank	**DATE SAMPLED:**	N/A
CLIENT:	GeoEngineers, Inc.	**DATE RECEIVED:**	N/A
PROJECT #:	0161-331-P18	**DATE EXTRACTED:**	11/19/93
PROJECT NAME:	Oregon City	**DATE ANALYZED:**	11/19/93
SAMPLE MATRIX:	Soil	**DILUTION FACTOR:**	1
		UNITS:	mg/Kg

PARAMETER	RESULTS
DIESEL C10 - C28	< 20
SURROGATE: O-TERPHENYL (50% - 150%)	96%

Analyst: B.D. 11/22/93

Reviewer: LD 11/22/93

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST:	TPH-DIESEL (Oregon)	**ATI I.D.:**	311563-3
CLIENT I.D.:	MW2-10	**DATE SAMPLED:**	11/09/93
CLIENT:	GeoEngineers, Inc.	**DATE RECEIVED:**	11/11/93
PROJECT #:	0161-331-P18	**DATE EXTRACTED:**	11/19/93
PROJECT NAME:	Oregon City	**DATE ANALYZED:**	11/19/93
SAMPLE MATRIX:	Soil	**DILUTION FACTOR:**	5
		UNITS:	mg/Kg

PARAMETER	RESULTS
DIESEL C10 - C28	410
SURROGATE: O-TERPHENYL (50% - 150%)	97%

Analyst: BS 11/22/93

Reviewer: LO 11/22/93

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY DUPLICATE RESULTS

TEST:	TPH-Diesel (Oregon)	ATI ACCESSION:	311563
CLIENT:	GeoEngineers, Inc.	QC SAMPLE:	311550-3
PROJECT #:	0161-331-P18	DATE EXTRACTED:	11/19/93
PROJECT NAME:	Oregon City	DATE ANALYZED:	11/19/93
SAMPLE MATRIX:	Soil	DILUTION FACTOR:	2
		UNITS:	mg/Kg

PARAMETER	SAMPLE RESULT	SAMPLE DUP RESULT	RPD
DIESEL	630	530	17
SURROGATE: O-TERPHENYL (50% - 150%)	98%	98%	

	CONTROL LIMITS
	RPD
DIESEL	20

Analyst: T.G. 11/22/93

Reviewer: LD 11/22/93

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY SPIKE RESULTS

		ATI ACCESSION:	311563
TEST:	TPH-DIESEL (Oregon)	QC SAMPLE:	311563-3
CLIENT:	GeoEngineers, Inc.	DATE EXTRACTED:	11/19/93
PROJECT #:	0161-331-P18	DATE ANALYZED:	11/19/93
PROJECT NAME:	Oregon City	DILUTION FACTOR:	5
SAMPLE MATRIX:	Soil	UNITS:	mg/Kg

PARAMETER	SAMPLE RESULT	SPIKE CONC.	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
DIESEL	410	500	826	83	864	91	4
SURROGATE: O-TERPHENYL (50% - 150%)			98%		99%		

	CONTROL LIMITS	
	% REC	RPD
DIESEL	50 - 134	20

Analyst: BAN 11/22/93

Reviewer: LO 11/22/93

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY SPIKE RESULTS

TEST:	TPH-DIESEL (Oregon)	ATI ACCESSION:	311563
CLIENT:	GeoEngineers, Inc.	QC SAMPLE:	Method Blank
PROJECT #:	0161-331-P18	DATE EXTRACTED:	11/19/93
PROJECT NAME:	Oregon City	DATE ANALYZED:	11/19/93
SAMPLE MATRIX:	Soil	DILUTION FACTOR:	1
		UNITS:	mg/Kg

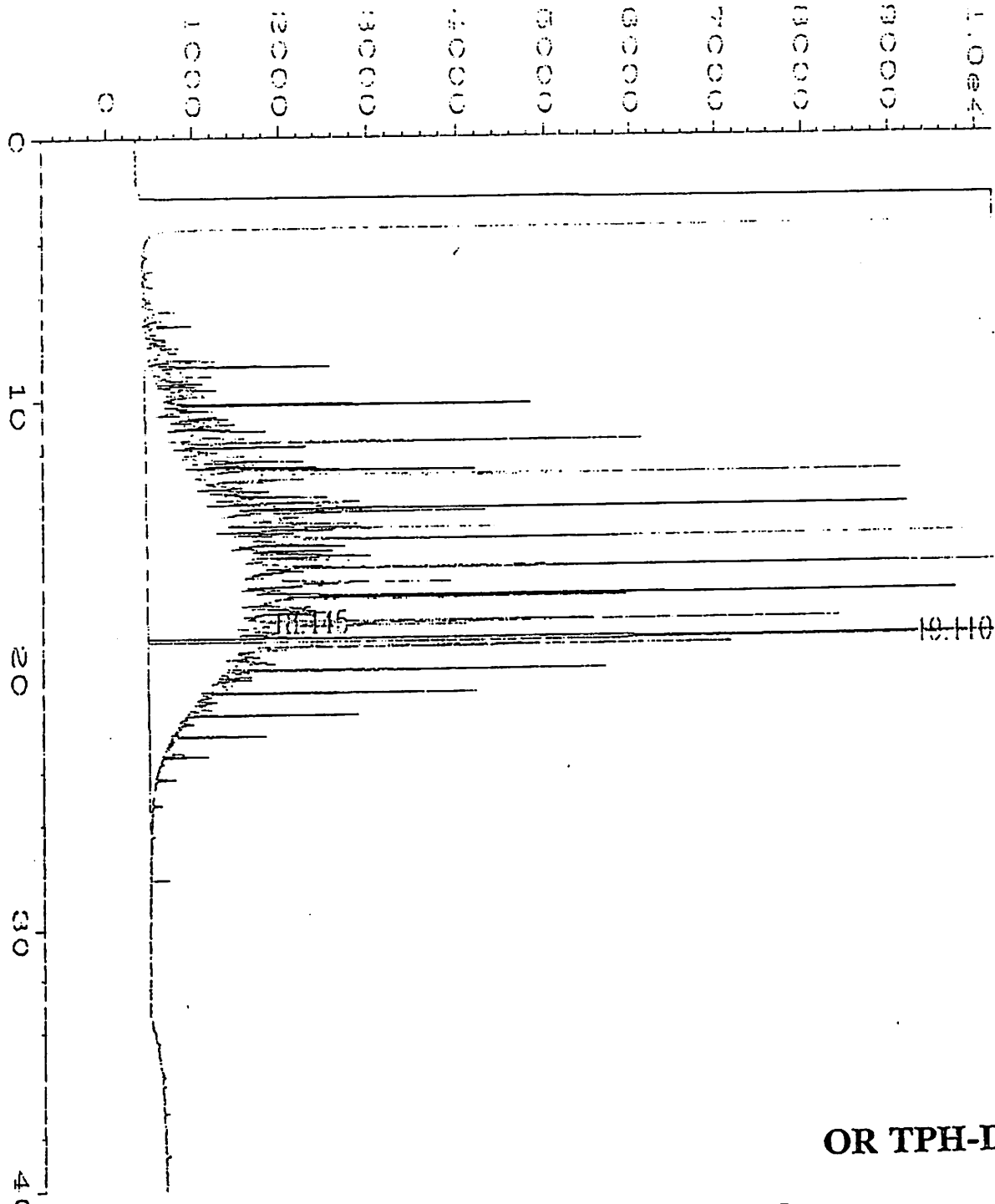
PARAMETER	SAMPLE RESULT	SPIKE CONC.	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
DIESEL	< 20	250	225	90	228	91	1
SURROGATE: O-TERPHENYL (50% - 150%)			98%		97%		

CONTOL LIMITS

	% REC	RPD
DIESEL	75 - 121	20

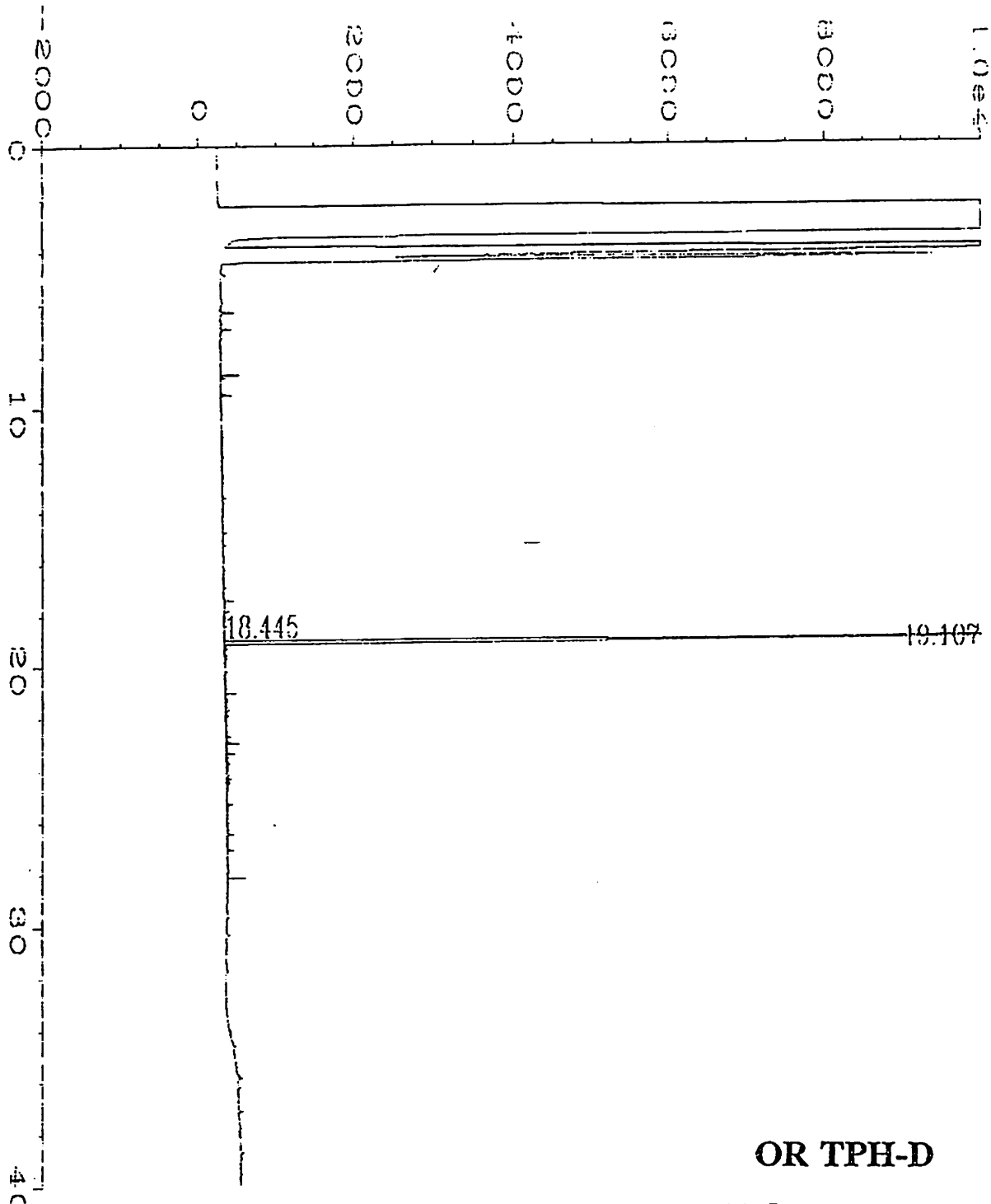
Analyst: BA 11/22/93

Reviewer: LD 11/22/93



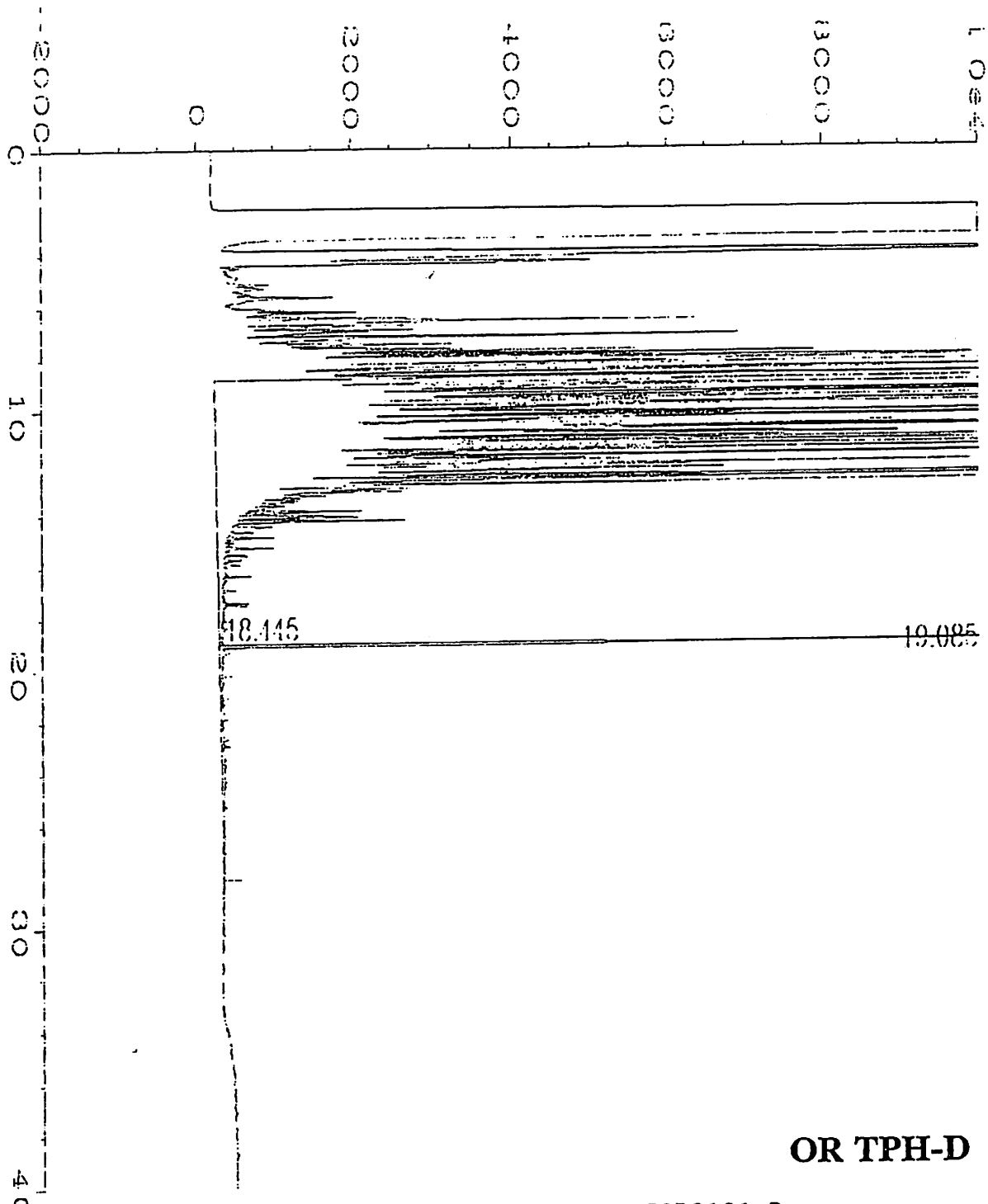
OR TPH-D

Data File Name	: F:\DATA\FUELS\DEEHTER\D\931119\051R0101.D		
Operator	: FUELS	Page Number	: 1
Instrument	: DEEHTER	Vial Number	: 51
Sample Name	: DIESEL 400	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 19 Nov 93 09:05 AM	Instrument Method	: OHCID.MTH
Report Created on	: 19 Nov 93 11:10 AM	Analysis Method	: OR-TPHD.MTH
Last Recalib on	: 30 JUL 93 11:15 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



OR TPH-D

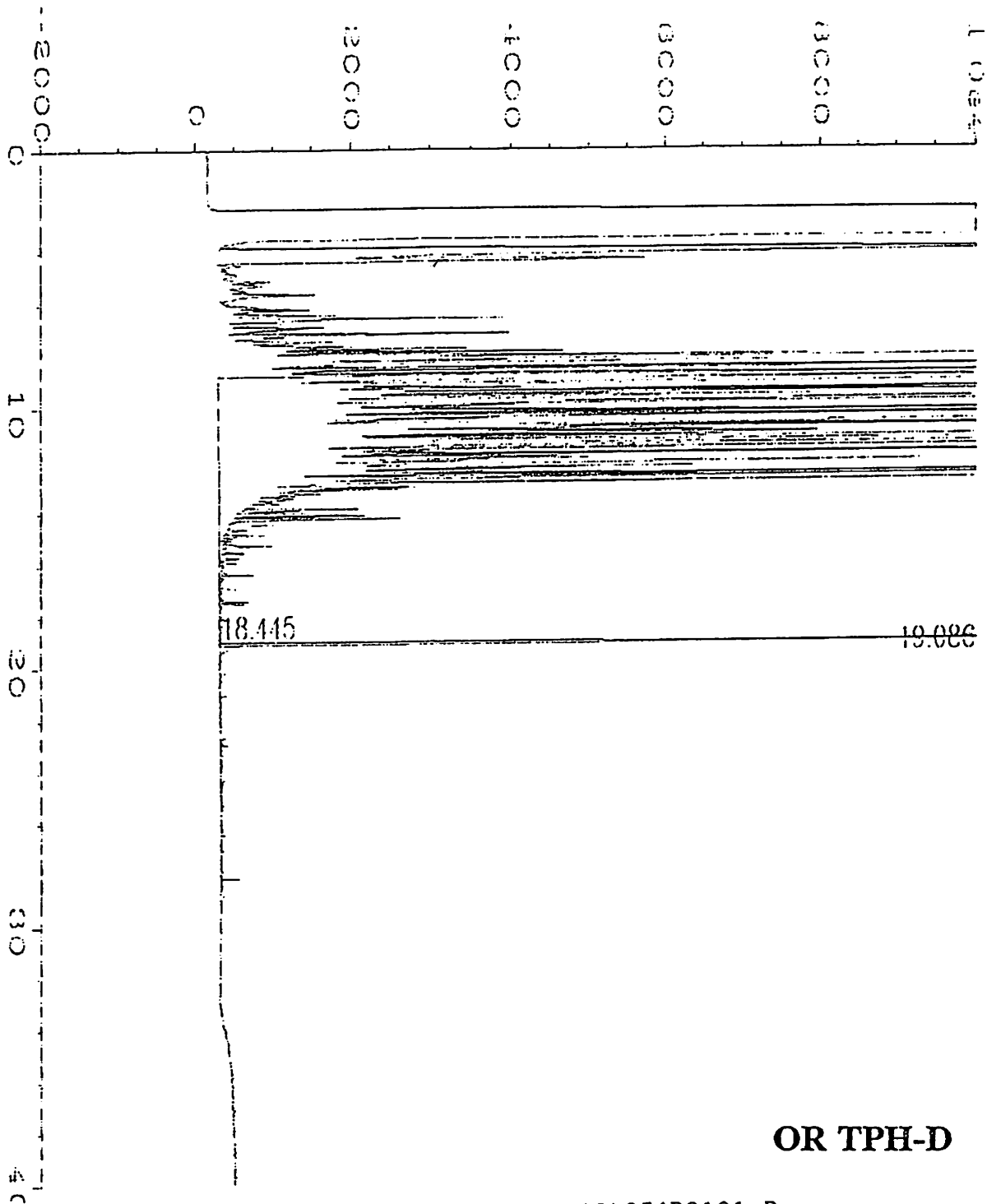
Data File Name	: F:\DATA\FUELS\DEEHTER\D\931119\052R0101.D		
Operator	: FUELS	Page Number	: 1
Instrument	: DEEHTER	Vial Number	: 52
Sample Name	: MB 11/19	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 19 Nov 93 11:33 AM	Instrument Method	: OHCID.MTH
Report Created on	: 19 Nov 93 02:29 PM	Analysis Method	: OR-TPHD.MTH
Last Recalib on	: 30 JUL 93 11:15 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



OR TPH-D

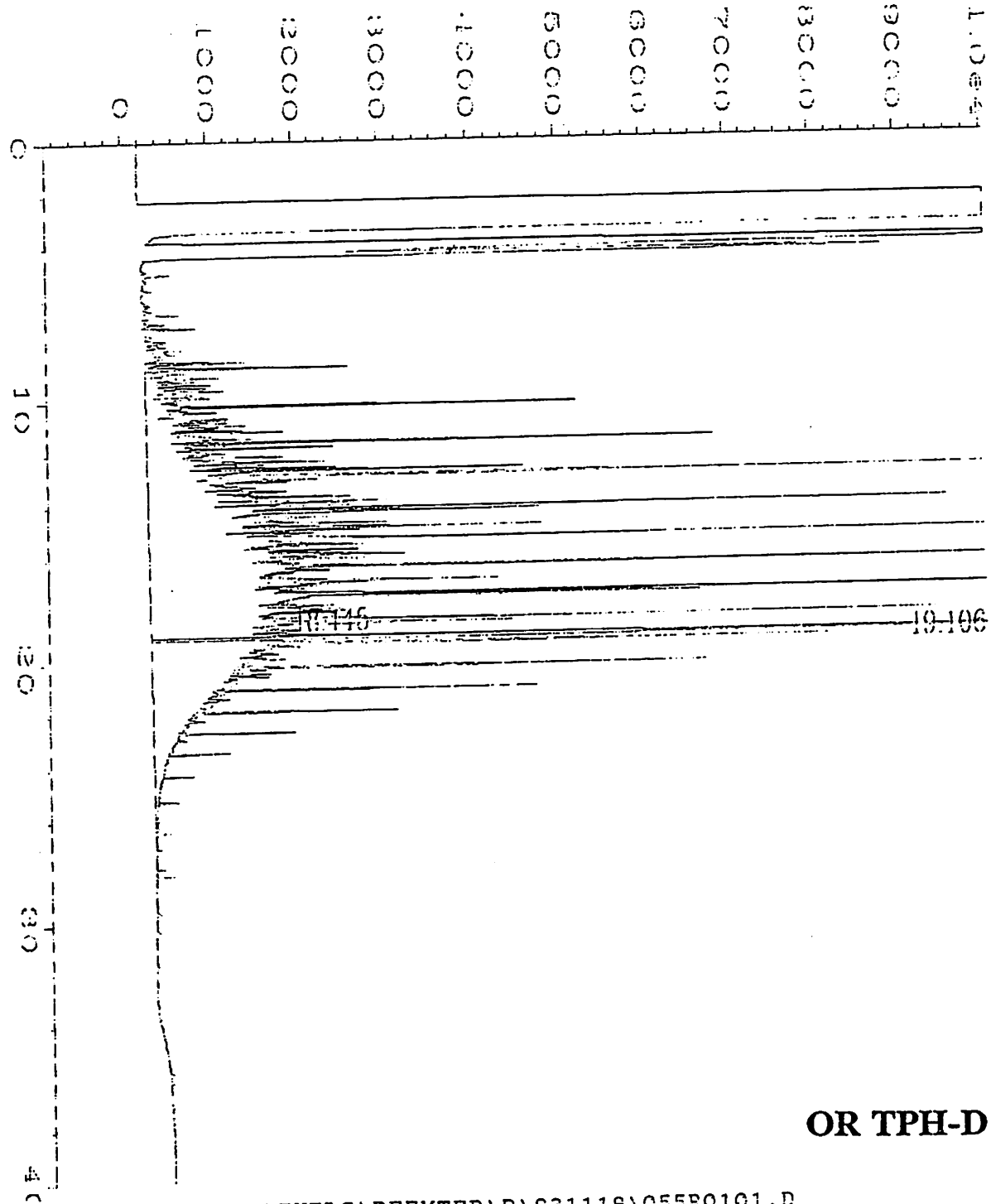
Data File Name : F:\DATA\FUELS\DEEHTER\D\931119\053R0101.D
Operator : FUELS
Instrument : DEEHTER
Sample Name : 311550-3 1:2
Run Time Bar Code:
Acquired on : 19 Nov 93 12:14 PM
Report Created on: 19 Nov 93 03:30 PM
Last Recalib on : 30 JUL 93 11:15 AM
Multiplier : 1

Page Number : 1
Vial Number : 53
Injection Number : 1
Sequence Line : 1
Instrument Method: OHCID.MTH
Analysis Method : OR-TPHD.M
Sample Amount : 0
ISTD Amount :



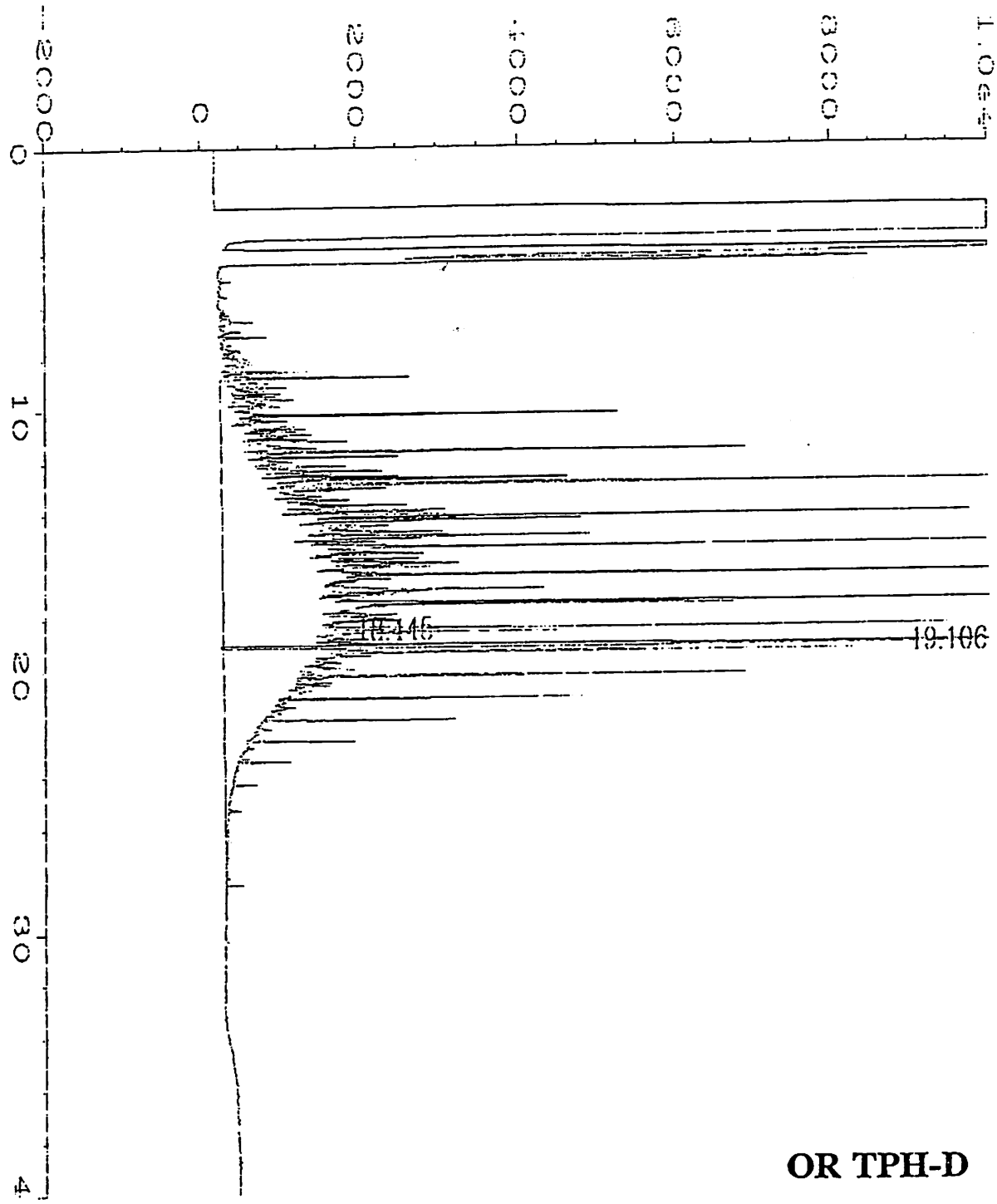
OR TPH-D

Data File Name	: F:\DATA\FUELS\DEEHTER\D\931119\054RG1G1.D		
Operator	: FUELS	Page Number	: 1
Instrument	: DEEHTER	Vial Number	: 54
Sample Name	: 311550-3 DUP 1:2	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 19 Nov 93 01:09 PM	Instrument Method	: OHCID.MTH
Report Created on	: 19 Nov 93 03:22 PM	Analysis Method	: OR-TPHD.MTH
Last Recalib on	: 30 JUL 93 11:15 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



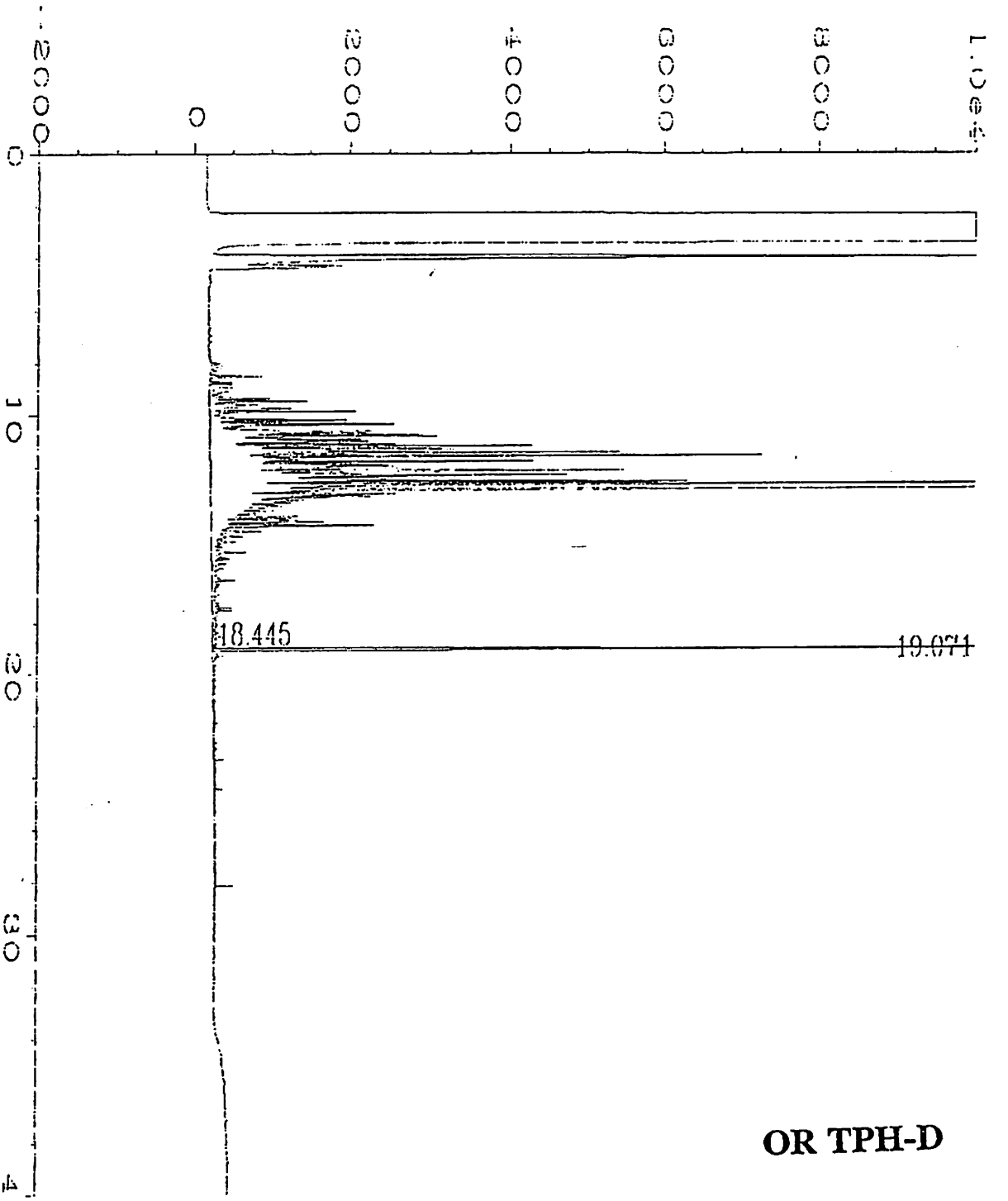
OR TPH-D

Data File Name	: F:\DATA\FUELS\DEEMTER\D\931119\055R0101.D		
Operator	: FUELS	Page Number	: 1
Instrument	: DEEMTER	Vial Number	: 55
Sample Name	: 83 11/19	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 19 Nov 93 02:03 PM	Instrument Method	: OHCID.MTH
Report Created on	: 19 Nov 93 03:34 PM	Analysis Method	: OR-TPHD.MT
Last Recalib on	: 30 JUL 93 11:15 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



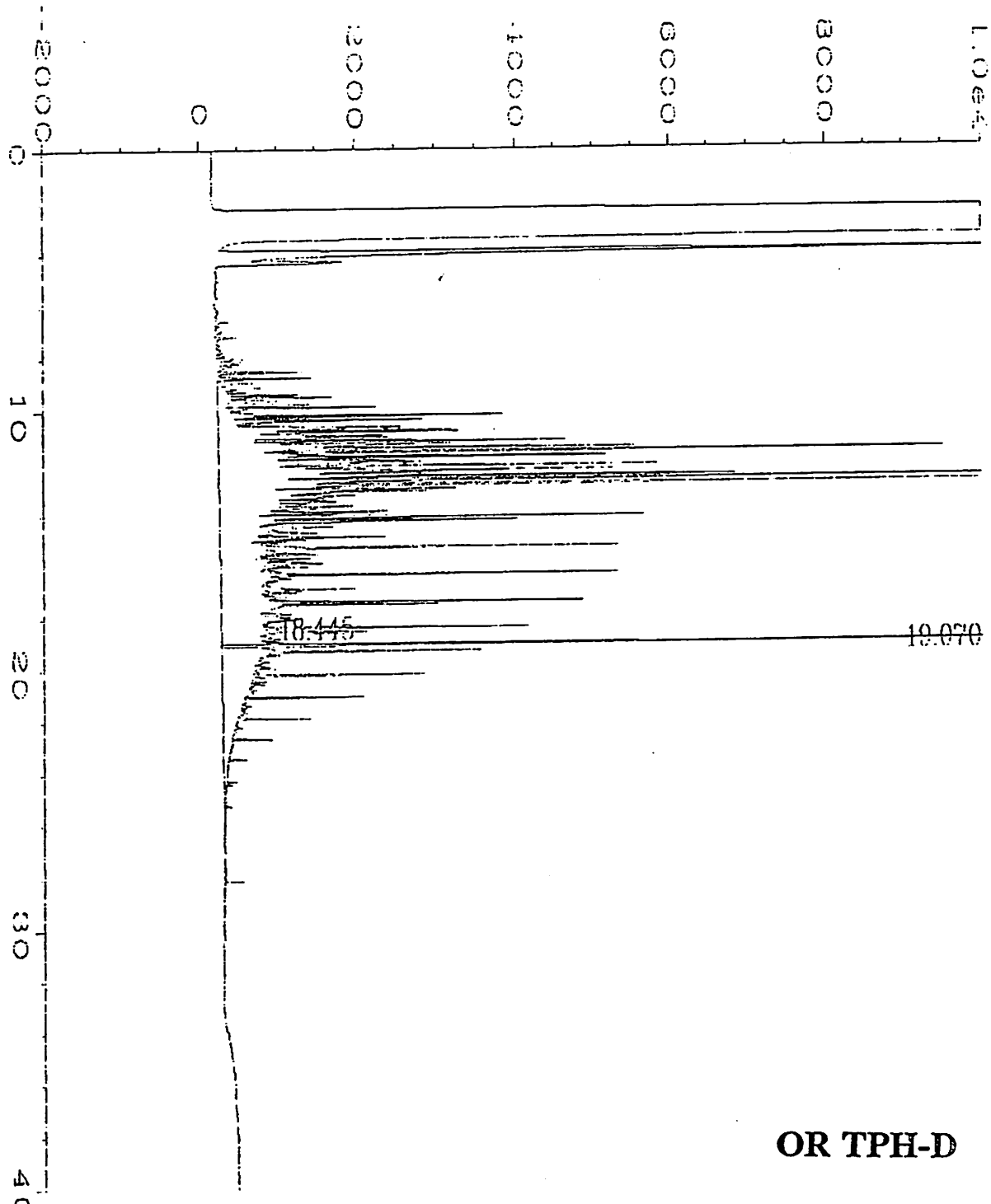
OR TPH-D

Data File Name	: F:\DATA\FUELS\DEEHTER\D\931119\056R0101.D		
Operator	: FUELS	Page Number	: 1
Instrument	: DEEHTER	Vial Number	: 56
Sample Name	: BSD 11/19	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 19 Nov 93 02:56 PM	Instrument Method	: OHCID.MTH
Report Created on	: 20 Nov 93 10:03 AM	Analysis Method	: OR-TPHD.MTH
Last Recalib on	: 30 JUL 93 11:15 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



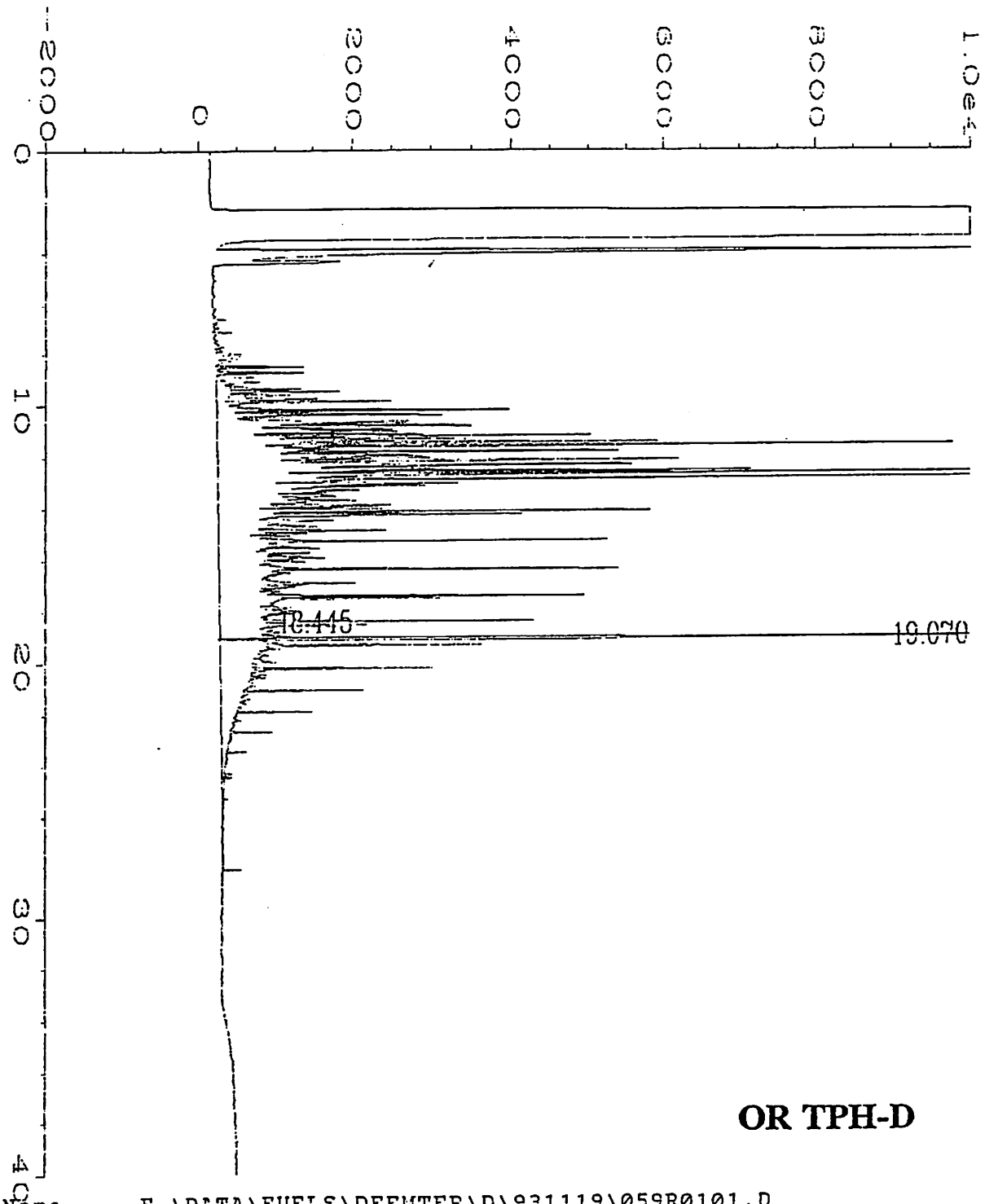
OR TPH-D

Data File Name	: F:\DATA\FUELS\DEEMTER\D\931119\057R0101.D		
Operator	: FUELS	Page Number	: 1
Instrument	: DEEMTER	Vial Number	: 57
Sample Name	: 311563-3 1:5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 19 Nov 93 03:50 PM	Instrument Method	: OHCID.MTH
Report Created on:	20 Nov 93 10:06 AM	Analysis Method	: OR-TPHD.MTH
Last Recalib on	: 30 JUL 93 11:15 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



OR TPH-D

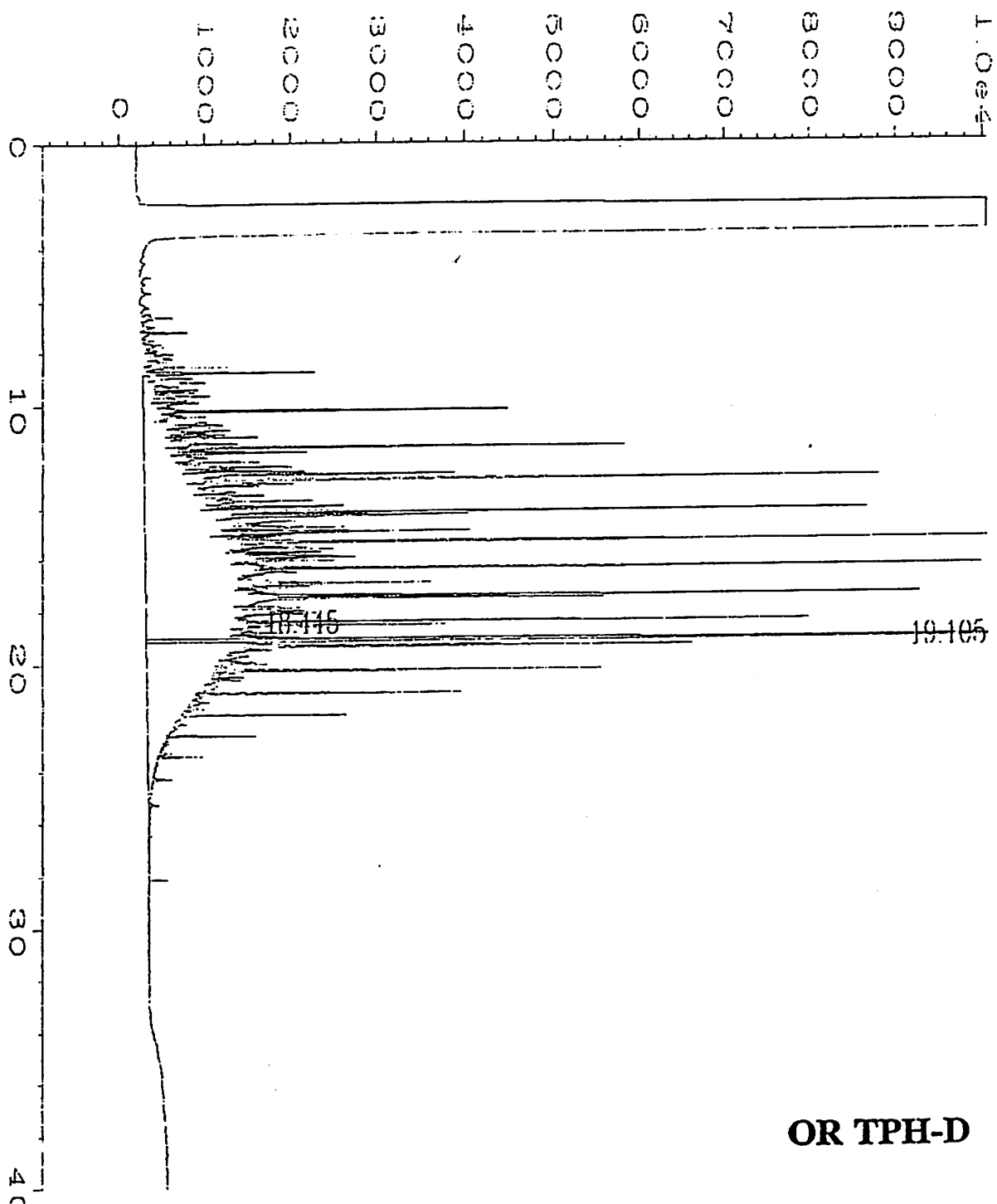
Data File Name	: F:\DATA\FUELS\DEEHTER\D\931119\058R0101.D		
Operator	: FUELS	Page Number	: 1
Instrument	: DEEHTER	Vial Number	: 58
Sample Name	: 311563-3 HS 1:5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 19 Nov 93 04:46 PM	Instrument Method	: OHCID.MTH
Report Created on:	20 Nov 93 10:08 AM	Analysis Method	: OR-TPHD.MT
Last Recalib on	: 30 JUL 93 11:15 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:



OR TPH-D

Data File Name : F:\DATA\FUELS\DEEMTER\D\931119\059R0101.D
Operator : FUELS
Instrument : DEEMTER
Sample Name : 311563-3 MSD 1:5
Run Time Bar Code:
Acquired on : 19 Nov 93 05:40 PM
Report Created on: 20 Nov 93 10:09 AM
Last Recalib on : 30 JUL 93 11:15 AM
Multiplier : 1

Page Number : 1
Vial Number : 59
Injection Number : 1
Sequence Line : 1
Instrument Method: OHCID.MTH
Analysis Method : OR-TPHD.MT
Sample Amount : 0
ISTD Amount :



OR TPH-D

Data File Name	: F:\DATA\FUELS\DEEMTER\D\931119\060R0101.D		
Operator	: FUELS	Page Number	: 1
Instrument	: DEEMTER	Vial Number	: 60
Sample Name	: DIESEL 400	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 19 Nov 93 06:38 PM	Instrument Method	: OHCID.MTH
Report Created on	: 20 Nov 93 10:01 AM	Analysis Method	: OR-TPHD.MTH
Last Recalib on	: 30 JUL 93 11:15 AM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

CASE NARRATIVE
Accession # 311563
TPH - 418.1 (OREGON)

Twenty grams of sample was extracted with methylene chloride by horn sonication (EPA Method 3550). The methylene chloride was exchanged for 1,1,2-trichloro-1,2,2-trifluoroethane (Freon-113). The final volume was 25 milliliters.

The extracts were analyzed using an infrared spectrophotometer, scanning at approximately 2930 cm^{-1}. At least five point calibration curves were used for quantitation.

ATI Accession #311557-5 was spiked with 400 mg/Kg of motor oil and used for the matrix spike (MS) and matrix spike duplicate (MSD). The sample was diluted 1:5 and had a hit of 1500 mg/Kg. The MS and MSD were analyzed at a 10 fold dilution and had recoveries of 10% and 15% respectively. These recoveries are below the established control limits of 50% - 130%. The results are "H" flagged, indicating out of limits. The blank spikes met all criteria and are reported along with the matrix spikes.

Analytical Technologies, Inc.

INFRARED SPECTROPHOTOMETRY RESULTS

TEST:	TPH - 418.1 (OREGON)	**ATI I.D.:**	311563-0
CLIENT I.D.:	Method Blank	**DATE SAMPLED:**	N/A
CLIENT:	GeoEngineers, Inc.	**DATE RECEIVED:**	N/A
PROJECT #:	0161-331-P18	**DATE EXTRACTED:**	11/19/93
PROJECT NAME:	Oregon City	**DATE ANALYZED:**	11/20/93
SAMPLE MATRIX:	SOIL	**DILUTION FACTOR:**	1
		UNITS:	mg/Kg

PARAMETER	RESULTS
PETROLEUM HYDROCARBONS	< 20

Analyst: B.D. 11/22/93

Reviewer: CS 11-22-93

Analytical Technologies, Inc.

INFRARED SPECTROPHOTOMETRY RESULTS

TEST:	TPH - 418.1 (OREGON)	**ATI I.D.:**	311563-1
CLIENT I.D.:	MW1-5	**DATE SAMPLED:**	11/09/93
CLIENT:	GeoEngineers, Inc.	**DATE RECEIVED:**	11/11/93
PROJECT #:	0161-331-P18	**DATE EXTRACTED:**	11/19/93
PROJECT NAME:	Oregon City	**DATE ANALYZED:**	11/20/93
SAMPLE MATRIX:	SOIL	**DILUTION FACTOR:**	1
		UNITS:	mg/Kg

PARAMETER	RESULTS
PETROLEUM HYDROCARBONS	220

Analyst: B.Q. 11/22/93

Reviewer: CS 11-22-93

Analytical Technologies, Inc.

INFRARED SPECTROPHOTOMETRY DUPLICATE RESULTS

		ATI ACCESSION:	311563
TEST:	TPH - 418.1 (OREGON)	QC SAMPLE:	311604-2
CLIENT:	GeoEngineers, Inc.	DATE EXTRACTED:	11/19/93
PROJECT #:	0161-331-P18	DATE ANALYZED:	11/20/93
PROJECT NAME:	Oregon City	DILUTION FACTOR:	1
SAMPLE MATRIX:	SOIL	UNITS:	mg/Kg

PARAMETER	SAMPLE RESULT		DUP. RESULT	RPD
PETROLEUM HYDROCARBONS	110	_	120	9

CONTROL LIMITS

	RPD
Petroleum Hydrocarbons	20

Analyst: BE. 11/22/93

Reviewer: CS 11-22-93

Analytical Technologies, Inc.

INFRARED SPECTROPHOTOMETRY SPIKE RESULTS

		ATI ACCESSION:	311563
TEST:	TPH - 418.1 (OREGON)	QC SAMPLE:	311557-5
CLIENT:	GeoEngineers, Inc.	DATE EXTRACTED:	11/19/93
PROJECT #:	0161-331-P18	DATE ANALYZED:	11/20/93
PROJECT NAME:	Oregon City	DILUTION FACTOR:	10
SAMPLE MATRIX:	SOIL	UNITS:	mg/Kg

PARAMETER	SAMPLE RESULT	SPIKE CONC.	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
MOTOR OIL	1500	400	1540	10 H	1560	15 H	1

H = Out of Limits

	CONTROL LIMITS %REC	RPD
Motor Oil	50 - 130	20

Analyst: TH. 11/24/93

Reviewer: CS 11-22-93

Analytical Technologies, Inc.

INFRARED SPECTROPHOTOMETRY SPIKE RESULTS

		ATI ACCESSION:	311563
TEST:	TPH - 418.1 (OREGON)	QC SAMPLE:	Method Blank
CLIENT:	GeoEngineers, Inc.	DATE EXTRACTED:	11/19/93
PROJECT #:	0161-331-P18	DATE ANALYZED:	11/20/93
PROJECT NAME:	Oregon City	DILUTION FACTOR:	1
SAMPLE MATRIX:	SOIL	UNITS:	mg/Kg

PARAMETER	SAMPLE RESULT	SPIKE CONC.	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
MOTOR OIL	< 20	400	408	102	423	106	4

CONTROL LIMITS

	%REC	RPD
Motor Oil	64 - 120	20

Analyst: [signature] 11/22/93

Reviewer: CS 11-22-93

DATE 11-Nov-93 PAGE 1 OF 1

AnalyticalTechnologies,Inc.
17400 S.W. Upper Boones Ferry Rd., Suite 270
Durham, Oregon 97224 • (503) 684-0447 FAX: (503) 620-0393

Chain of Custody

LABORATORY NUMBER: 311563
PROJECT NOTICE NUMBER: _____

PROJECT MANAGER: Pat Sullivan
COMPANY: GeoEngineers, Inc.
ADDRESS: 7504 SW Bridgeport Road Portland, OR
PHONE: 624-9274 SAMPLED BY: Larry Eaton

SAMPLE DISPOSAL INSTRUCTIONS
☐ ATI Disposal @ $5.00 each ☐ Return

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	PETROLEUM HYDROCARBONS: State: QB/PWA TPH-HCID	State: OR/WA TPH-G	State: OR/WA TPH-D	State: QB/PWA 418.1	413.2 Oil & Grease	8015M	8020M-BETX only	8310 HPLC PAHs	7421 Lead	% Moisture	ORGANICS: 8010 Halogenated VOCs	8020 Aromatic VOCs	8040 Phenols	8240 GCMS Volatiles	8270 GCMS Semivolatiles	8080 OC Pesticides/PCBs	8080M PCBs only	8140 Phosphate Pesticides	8150 Herbicides	TOC 9060	TOX 9020A	INORGANICS: Selected metals:	Drinking Water (8)	Priority Pollutant Metals (13)	Cyanide	TCL Metals (23)	TCLP: TCLP Metals (8)	TCLP Volatiles 8240 ZH-EXT	TCLP Semivolatiles 8270	TCLP Pesticides 8080	OTHER				NUMBER OF CONTAINERS
MW1-5	09-Nov-93	0900	soil	1	X			X																														1
MW1-10	09-Nov-93	0910	soil	2	X																																	1
MW2-10	09-Nov-93	1405	soil	3	X	X	X																															1
MW2-15	09-Nov-93	1420	soil	4	X																																	1
MW3-20	10-Nov-93	0915	soil	5	X																																	1
MW3-55	10-Nov-93	1010	soil	6	X																																	1
MW4-10	10-Nov-93	1325	soil	7	X																																	1
MW4-25	10-Nov-93	1400	soil	8	X																																	1
B1-5	10-Nov-93	1600	soil	9	X																																	1
B1-10	10-Nov-93	1710	soil	10	X																																	1

PROJECT INFORMATION		SAMPLE RECEIPT	
PROJECT NUMBER: 0161-331-P15		TOTAL NUMBER OF CONTAINERS	10
PROJECT NAME: Oregon City		COC SEALS/INTACT? Y \ N \ NA	
PURCHASE ORDER NUMBER: —		RECEIVED INTACT? Y \ N	
ONGOING PROJECT? YES ☐ NO ☐		RECEIVED COLD? Y \ N	

PRIOR AUTHORIZATION REQUIRED FOR RUSH PROJECTS

TAT: (NORMAL) ☐ 2 WKS (RUSH) ☐ 24 HR ☐ 48 HRS ☐ 72 HRS ☐ 1 WK

GREATER THAN 24 HR. NOTICE? YES ☐ NO ☐ (LAB USE ONLY)

SPECIAL INSTRUCTIONS: Test for TPH-HCID; follow-up w/ OR 418.1 method 11/17/93 to #1 ATI. TPH-G, TPH-D and/or 418.1 OR TPH-G & D added 11/17/93 to #3 ATI as appropriate

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY 3.
Signature: Time: 1425	Signature Time:	Signature Time:
Printed Name: Date: Larry G. Eaton 11-Nov-93	Printed Name: Date:	Printed Name: Date.
Company: GeoEngineers Inc.	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: Time: 1425	Signature Time:	Signature Time:
Printed Name: Date: Andi Mangl 11/11/93	Printed Name: Date:	Printed Name: Date:
Company: ATI-PDX	Company:	Analytical Technologies, Inc.

ATI Labs: San Diego (619) 458-9141 • Phoenix (602) 496-4400 • Seattle (206) 228-8335 • Pensacola (904) 474-1001 • Portland (503) 684-0447 • Fort Collins (303) 490-1511
DISTRIBUTION: White, Canary - ATI • Pink - Originator

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Analytical**Technologies,**Inc. 17400 S.W. Upper Boones Ferry Road, Suite 270 Durham, OR. 97224
(503) 684-0447 (503) 620-0393 (FAX)

ATI I.D. 311636

December 2, 1993

Pat Sullivan
GeoEngineers, Inc.
7504 SW Bridgeport Rd.
Portland, OR 97224

Project Name/Number: Unocal / 0161-331-P18

Attention: Pat Sullivan

On November 22,1993, Analytical Technologies, Inc. received five water samples for analysis for the above listed project. The samples were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

If you have any questions or comments, please do not hesitate to contact us at (503)684-0447.

Fred Voosen
Project Manager

Alan J. Kleinschmidt
Laboratory Manager

AJK:alm
Enclosure

Analytical Technologies, Inc.

SAMPLE CROSS REFERENCE SHEET

CLIENT:	GeoEngineers, Inc.	**ATI I.D.:**	311636
PROJECT #:	0161-331-P18		
PROJECT NAME:	Unocal	**MATRIX:**	Water

ATI #	CLIENT DESCRIPTION	DATE SAMPLED
311636-1	MW-1	11/22/93
311636-2	MW-2	11/22/93
311636-3	MW-3	11/22/93
311636-4	MW-4	11/22/93
311636-5	Trip Blank	11/22/93

----------TOTALS----------

MATRIX	# SAMPLES
Water	5

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of the report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

Analytical Technologies, Inc.

ANALYTICAL SCHEDULE

CLIENT: GeoEngineers, Inc. **ATI I.D.:** 311636
PROJECT #: 0161-331-P18
PROJECT NAME: Unocal

ANALYSIS	TECHNIQUE	REFERENCE	LAB
Petroleum Hydrocarbon	IR	EPA 418.1	PLD
Total Lead	AA/GF	EPA 7421	PLD
Halogenated VOCs	GC/ELCD	EPA 8010	PLD
Aromatic VOCs	GC/PID	EPA 8020	PLD

PLD = ATI - Portland
R = ATI - Renton
SD = ATI - San Diego
PHX = ATI - Phoenix
PNR = ATI - Pensacola
FC = ATI - Fort Collins
SUB = Subcontract

AnalyticalTechnologies,Inc.

INFRARED SPECTROPHOTOMETRY RESULTS

TEST:	EPA - 418.1	**ATI I.D.:**	311636-0
CLIENT I.D.:	Method Blank	**DATE SAMPLED:**	N/A
CLIENT:	GeoEngineers, Inc.	**DATE RECEIVED:**	N/A
PROJECT #:	0161-331-P18	**DATE EXTRACTED:**	11/30/93
PROJECT NAME:	Unocal	**DATE ANALYZED:**	11/30/93
SAMPLE MATRIX:	WATER	**DILUTION FACTOR:**	1
		UNITS:	mg/L

PARAMETER	RESULTS
PETROLEUM HYDROCARBONS	< 0.5

Analyst: BM 11/30/93

Reviewer: 12/1/93

Analytical Technologies, Inc.

INFRARED SPECTROPHOTOMETRY RESULTS

TEST:	EPA - 418.1	**ATI I.D.:**	311636-1
CLIENT I.D.:	MW-1	**DATE SAMPLED:**	11/22/93
CLIENT:	GeoEngineers, Inc.	**DATE RECEIVED:**	11/22/93
PROJECT #:	0161-331-P18	**DATE EXTRACTED:**	11/30/93
PROJECT NAME:	Unocal	**DATE ANALYZED:**	11/30/93
SAMPLE MATRIX:	WATER	**DILUTION FACTOR:**	1
		UNITS:	mg/L

PARAMETER	RESULTS
PETROLEUM HYDROCARBONS	< 0.6 *

* MRL increased due to limited sample volume available.

Analyst: BB 12/1/93

Reviewer: 12/1/93

Analytical Technologies, Inc.

INFRARED SPECTROPHOTOMETRY RESULTS

TEST:	EPA - 418.1	**ATI I.D.:**	311636-2
CLIENT I.D.:	MW-2	**DATE SAMPLED:**	11/22/93
CLIENT:	GeoEngineers, Inc.	**DATE RECEIVED:**	11/22/93
PROJECT #:	0161-331-P18	**DATE EXTRACTED:**	11/30/93
PROJECT NAME:	Unocal	**DATE ANALYZED:**	11/30/93
SAMPLE MATRIX:	WATER	**DILUTION FACTOR:**	1
		UNITS:	mg/L

PARAMETER	RESULTS
PETROLEUM HYDROCARBONS	< 0.6 *

* MRL increased due to limited sample volume available.

Analyst: BJ 12/1/93

Reviewer 12/1/93

Analytical Technologies, Inc.

INFRARED SPECTROPHOTOMETRY RESULTS

TEST:	EPA - 418.1	**ATI I.D.:**	311636-3
CLIENT I.D.:	MW-3	**DATE SAMPLED:**	11/22/93
CLIENT:	GeoEngineers, Inc.	**DATE RECEIVED:**	11/22/93
PROJECT #:	0161-331-P18	**DATE EXTRACTED:**	11/30/93
PROJECT NAME:	Unocal	**DATE ANALYZED:**	11/30/93
SAMPLE MATRIX:	WATER	**DILUTION FACTOR:**	1
		UNITS:	mg/L

PARAMETER	RESULTS
PETROLEUM HYDROCARBONS	< 0.7 *

* MRL increased due to limited sample volume available.

Analyst: BH. 12/1/93

Reviewer: 12/1/93

Analytical Technologies, Inc.

INFRARED SPECTROPHOTOMETRY RESULTS

TEST:	EPA - 418.1	**ATI I.D.:**	311636-4
CLIENT I.D.:	MW-4	**DATE SAMPLED:**	11/22/93
CLIENT:	GeoEngineers, Inc.	**DATE RECEIVED:**	11/22/93
PROJECT #:	0161-331-P18	**DATE EXTRACTED:**	11/30/93
PROJECT NAME:	Unocal	**DATE ANALYZED:**	11/30/93
SAMPLE MATRIX:	WATER	**DILUTION FACTOR:**	1
		UNITS:	mg/L

PARAMETER	RESULTS
PETROLEUM HYDROCARBONS	< 0.6 *

* MRL increased due to limited sample volume available.

Analyst: 12/1/93

Reviewer: 12/1/93

Analytical Technologies, Inc.

INFRARED SPECTROPHOTOMETRY SPIKE RESULTS

		ATI ACCESSION:	311636
TEST:	EPA - 418.1	QC SAMPLE:	311652-2
CLIENT:	GeoEngineers, Inc.	DATE EXTRACTED:	11/30/93
PROJECT #:	0161-331-P18	DATE ANALYZED:	11/30/93
PROJECT NAME:	Unocal	DILUTION FACTOR:	1
SAMPLE MATRIX:	WATER	UNITS:	mg/L

PARAMETER	SAMPLE RESULT	SPIKE CONC.	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
3-Component Oil	< 0.5	10.0	8.7	87	8.7	87	0

CONTROL LIMITS

	%REC	RPD
3-Component Oil	60 - 120	20

Analyst: SA 11/30/93

Reviewer: 12/1/93

Analytical**Technologies,**Inc.

INFRARED SPECTROPHOTOMETRY SPIKE RESULTS

		ATI ACCESSION:	311636
TEST:	EPA - 418.1	**QC SAMPLE:**	Method Blank
CLIENT:	GeoEngineers, Inc.	**DATE EXTRACTED:**	11/30/93
PROJECT #:	0161-331-P18	**DATE ANALYZED:**	11/30/93
PROJECT NAME:	Unocal	**DILUTION FACTOR:**	1
SAMPLE MATRIX:	WATER	**UNITS:**	mg/L

PARAMETER	SAMPLE RESULT	SPIKE CONC.	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
3-Component Oil	< 0.5	10.0	9.1	91	9.4	94	3

CONTROL LIMITS

	%REC	RPD
3-Component Oil	67 - 110	20

Analyst: BA. 11/30/93

Reviewer: 12/11/93

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST:	EPA 8010/8020	ATI I.D.:	311636-0
CLIENT I.D.:	Method Blank	DATE SAMPLED:	N/A
CLIENT:	GeoEngineers, Inc.	DATE RECEIVED:	N/A
PROJECT #:	0161-331-P18	DATE ANALYZED:	11/22/93
PROJECT NAME:	Unocal	DILUTION FACTOR:	1
SAMPLE MATRIX:	WATER	UNITS:	ug/L

PARAMETER	RESULTS	
BENZENE	<	0.5
BROMODICHLOROMETHANE	<	0.2
BROMOFORM	<	0.5
BROMOMETHANE	<	2.0
CARBON TETRACHLORIDE	<	0.2
CHLOROBENZENE	<	0.5
CHLOROETHANE	<	2.0
CHLOROFORM	<	0.2
CHLOROMETHANE	<	1.0
1,2-DIBROMOETHANE (EDB)	<	0.5
1,2-DICHLOROBENZENE	<	0.5
1,3-DICHLOROBENZENE	<	0.5
1,4-DICHLOROBENZENE	<	0.5
DIBROMOCHLOROMETHANE	<	0.2
1,1-DICHLOROETHANE	<	0.2
1,2-DICHLOROETHANE (EDC)	<	0.2
1,1-DICHLOROETHENE	<	0.2
CIS-1,2-DICHLOROETHENE	<	0.2
TRANS-1,2-DICHLOROETHENE	<	0.2
1,2-DICHLOROPROPANE	<	0.2
CIS-1,3-DICHLOROPROPENE	<	0.2
TRANS-1,3-DICHLOROPROPENE	<	0.2
ETHYLBENZENE	<	0.5
METHYLENE CHLORIDE	<	2.0
1,1,2,2-TETRACHLOROETHANE	<	0.2
TETRACHLOROETHENE	<	0.2
TOLUENE	<	0.5
1,1,1-TRICHLOROETHANE	<	0.5
1,1,2-TRICHLOROETHANE	<	0.2
TRICHLOROETHENE	<	0.2
TRICHLOROFLUOROMETHANE	<	0.5
VINYL CHLORIDE	<	1.0
TOTAL XYLENES	<	0.5

SURROGATES:	
BROMOFLUOROBENZENE (66% - 132%)	100%
TRIFLUOROTOLUENE (70- 130%)	101%

Analyst: LD 11/23/93

Reviewer: [illegible] 11-24-93

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST:	EPA 8010/8020	**ATI I.D.:**	311636-1
CLIENT I.D.:	MW-1	**DATE SAMPLED:**	11/22/93
CLIENT:	GeoEngineers, Inc.	**DATE RECEIVED:**	11/22/93
PROJECT #:	0161-331-P18	**DATE ANALYZED:**	11/22/93
PROJECT NAME:	Unocal	**DILUTION FACTOR:**	1
SAMPLE MATRIX:	WATER	**UNITS:**	ug/L

PARAMETER	RESULTS	
BENZENE	<	0.5
BROMODICHLOROMETHANE	<	0.2
BROMOFORM	<	0.5
BROMOMETHANE	<	2.0
CARBON TETRACHLORIDE	<	0.2
CHLOROBENZENE	<	0.5
CHLOROETHANE	<	2.0
CHLOROFORM		2.9
CHLOROMETHANE	<	1.0
1,2-DIBROMOETHANE (EDB)	<	0.5
1,2-DICHLOROBENZENE	<	0.5
1,3-DICHLOROBENZENE	<	0.5
1,4-DICHLOROBENZENE	<	0.5
DIBROMOCHLOROMETHANE	<	0.2
1,1-DICHLOROETHANE	<	0.2
1,2-DICHLOROETHANE (EDC)	<	0.2
1,1-DICHLOROETHENE	<	0.2
CIS-1,2-DICHLOROETHENE	<	0.2
TRANS-1,2-DICHLOROETHENE	<	0.2
1,2-DICHLOROPROPANE	<	0.2
CIS-1,3-DICHLOROPROPENE	<	0.2
TRANS-1,3-DICHLOROPROPENE	<	0.2
ETHYLBENZENE	<	0.5
METHYLENE CHLORIDE	<	2.0
1,1,2,2-TETRACHLOROETHANE	<	0.2
TETRACHLOROETHENE		2.1
TOLUENE	<	0.5
1,1,1-TRICHLOROETHANE	<	0.5
1,1,2-TRICHLOROETHANE	<	0.2
TRICHLOROETHENE	<	0.2
TRICHLOROFLUOROMETHANE	<	0.5
VINYL CHLORIDE	<	1.0
TOTAL XYLENES	<	0.5

SURROGATES:	
BROMOFLUOROBENZENE (66% - 132%)	88%
TRIFLUOROTOLUENE (70- 130%)	102%

Analyst: 10 11/23/93

Reviewer: CS 11-24-93

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST:	EPA 8010/8020	ATI I.D.:	311636-2
CLIENT I.D.:	MW-2	DATE SAMPLED:	11/22/93
CLIENT:	GeoEngineers, Inc.	DATE RECEIVED:	11/22/93
PROJECT #:	0161-331-P18	DATE ANALYZED:	11/22/93
PROJECT NAME:	Unocal	DILUTION FACTOR:	1
SAMPLE MATRIX:	WATER	UNITS:	ug/L

PARAMETER	RESULTS
BENZENE	< 0.5
BROMODICHLOROMETHANE	< 0.2
BROMOFORM	< 0.5
BROMOMETHANE	< 2.0
CARBON TETRACHLORIDE	< 0.2
CHLOROBENZENE	< 0.5
CHLOROETHANE	< 2.0
CHLOROFORM	7.0
CHLOROMETHANE	< 1.0
1,2-DIBROMOETHANE (EDB)	< 0.5
1,2-DICHLOROBENZENE	< 0.5
1,3-DICHLOROBENZENE	< 0.5
1,4-DICHLOROBENZENE	< 0.5
DIBROMOCHLOROMETHANE	< 0.2
1,1-DICHLOROETHANE	< 0.2
1,2-DICHLOROETHANE (EDC)	< 0.2
1,1-DICHLOROETHENE	< 0.2
CIS-1,2-DICHLOROETHENE	< 0.2
TRANS-1,2-DICHLOROETHENE	< 0.2
1,2-DICHLOROPROPANE	< 0.2
CIS-1,3-DICHLOROPROPENE	< 0.2
TRANS-1,3-DICHLOROPROPENE	< 0.2
ETHYLBENZENE	< 0.5
METHYLENE CHLORIDE	< 2.0
1,1,2,2-TETRACHLOROETHANE	< 0.2
TETRACHLOROETHENE	1.5
TOLUENE	< 0.5
1,1,1-TRICHLOROETHANE	< 0.5
1,1,2-TRICHLOROETHANE	< 0.2
TRICHLOROETHENE	< 0.2
TRICHLOROFLUOROMETHANE	< 0.5
VINYL CHLORIDE	< 1.0
TOTAL XYLENES	< 0.5

SURROGATES:	
BROMOFLUOROBENZENE (66% - 132%)	91%
TRIFLUOROTOLUENE (70- 130%)	103%

Analyst: LD 11/23/93

Reviewer: CS 11-24-93

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST:	EPA 8010/8020	ATI I.D.:	311636-3
CLIENT I.D.:	MW-3	DATE SAMPLED:	11/22/93
CLIENT:	GeoEngineers, Inc.	DATE RECEIVED:	11/22/93
PROJECT #:	0161-331-P18	DATE ANALYZED:	11/22/93
PROJECT NAME:	Unocal	DILUTION FACTOR:	1
SAMPLE MATRIX:	WATER	UNITS:	ug/L

PARAMETER	RESULTS
BENZENE	< 0.5
BROMODICHLOROMETHANE	< 0.2
BROMOFORM	< 0.5
BROMOMETHANE	< 2.0
CARBON TETRACHLORIDE	< 0.2
CHLOROBENZENE	< 0.5
CHLOROETHANE	< 2.0
CHLOROFORM	4.2
CHLOROMETHANE	< 1.0
1,2-DIBROMOETHANE (EDB)	< 0.5
1,2-DICHLOROBENZENE	< 0.5
1,3-DICHLOROBENZENE	< 0.5
1,4-DICHLOROBENZENE	< 0.5
DIBROMOCHLOROMETHANE	< 0.2
1,1-DICHLOROETHANE	< 0.2
1,2-DICHLOROETHANE (EDC)	< 0.2
1,1-DICHLOROETHENE	< 0.2
CIS-1,2-DICHLOROETHENE	< 0.2
TRANS-1,2-DICHLOROETHENE	< 0.2
1,2-DICHLOROPROPANE	< 0.2
CIS-1,3-DICHLOROPROPENE	< 0.2
TRANS-1,3-DICHLOROPROPENE	< 0.2
ETHYLBENZENE	< 0.5
METHYLENE CHLORIDE	< 2.0
1,1,2,2-TETRACHLOROETHANE	< 0.2
TETRACHLOROETHENE	< 0.2
TOLUENE	< 0.5
1,1,1-TRICHLOROETHANE	< 0.5
1,1,2-TRICHLOROETHANE	< 0.2
TRICHLOROETHENE	< 0.2
TRICHLOROFLUOROMETHANE	< 0.5
VINYL CHLORIDE	< 1.0
TOTAL XYLENES	< 0.5

SURROGATES:	
BROMOFLUOROBENZENE (66% - 132%)	104%
TRIFLUOROTOLUENE (70- 130%)	114%

Analyst: LO 11/23/93

Reviewer: CS 11-24-93

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

TEST:	EPA 8010/8020	**ATI I.D.:**	311636-4
CLIENT I.D.:	MW-4	**DATE SAMPLED:**	11/22/93
CLIENT:	GeoEngineers, Inc.	**DATE RECEIVED:**	11/22/93
PROJECT #:	0161-331-P18	**DATE ANALYZED:**	11/22/93
PROJECT NAME:	Unocal	**DILUTION FACTOR:**	1
SAMPLE MATRIX:	WATER	**UNITS:**	ug/L

PARAMETER	RESULTS	
BENZENE	<	0.5
BROMODICHLOROMETHANE	<	0.2
BROMOFORM	<	0.5
BROMOMETHANE	<	2.0
CARBON TETRACHLORIDE	<	0.2
CHLOROBENZENE	<	0.5
CHLOROETHANE	<	2.0
CHLOROFORM		1.1
CHLOROMETHANE	<	1.0
1,2-DIBROMOETHANE (EDB)	<	0.5
1,2-DICHLOROBENZENE	<	0.5
1,3-DICHLOROBENZENE	<	0.5
1,4-DICHLOROBENZENE	<	0.5
DIBROMOCHLOROMETHANE	<	0.2
1,1-DICHLOROETHANE	<	0.2
1,2-DICHLOROETHANE (EDC)	<	0.2
1,1-DICHLOROETHENE	<	0.2
CIS-1,2-DICHLOROETHENE	<	0.2
TRANS-1,2-DICHLOROETHENE	<	0.2
1,2-DICHLOROPROPANE	<	0.2
CIS-1,3-DICHLOROPROPENE	<	0.2
TRANS-1,3-DICHLOROPROPENE	<	0.2
ETHYLBENZENE	<	0.5
METHYLENE CHLORIDE	<	2.0
1,1,2,2-TETRACHLOROETHANE	<	0.2
TETRACHLOROETHENE		3.7
TOLUENE	<	0.5
1,1,1-TRICHLOROETHANE	<	0.5
1,1,2-TRICHLOROETHANE	<	0.2
TRICHLOROETHENE		0.3
TRICHLOROFLUOROMETHANE	<	0.5
VINYL CHLORIDE	<	1.0
TOTAL XYLENES	<	0.5

SURROGATES:	
BROMOFLUOROBENZENE (66% - 132%)	88%
TRIFLUOROTOLUENE (70- 130%)	107%

Analyst: LO 11/23/93

Reviewer: CS 11-24-93

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY RESULTS

TEST:	EPA 8010/8020	ATI I.D.:	311636-5
CLIENT I.D.:	Trip Blank	DATE SAMPLED:	11/22/93
CLIENT:	GeoEngineers, Inc.	DATE RECEIVED:	11/22/93
PROJECT #:	0161-331-P18	DATE ANALYZED:	11/22/93
PROJECT NAME:	Unocal	DILUTION FACTOR:	1
SAMPLE MATRIX:	WATER	UNITS:	ug/L

PARAMETER	RESULTS	
BENZENE	<	0.5
BROMODICHLOROMETHANE	<	0.2
BROMOFORM	<	0.5
BROMOMETHANE	<	2.0
CARBON TETRACHLORIDE	<	0.2
CHLOROBENZENE	<	0.5
CHLOROETHANE	<	2.0
CHLOROFORM	<	0.2
CHLOROMETHANE	<	1.0
1,2-DIBROMOETHANE (EDB)	<	0.5
1,2-DICHLOROBENZENE	<	0.5
1,3-DICHLOROBENZENE	<	0.5
1,4-DICHLOROBENZENE	<	0.5
DIBROMOCHLOROMETHANE	<	0.2
1,1-DICHLOROETHANE	<	0.2
1,2-DICHLOROETHANE (EDC)	<	0.2
1,1-DICHLOROETHENE	<	0.2
CIS-1,2-DICHLOROETHENE	<	0.2
TRANS-1,2-DICHLOROETHENE	<	0.2
1,2-DICHLOROPROPANE	<	0.2
CIS-1,3-DICHLOROPROPENE	<	0.2
TRANS-1,3-DICHLOROPROPENE	<	0.2
ETHYLBENZENE	<	0.5
METHYLENE CHLORIDE		14
1,1,2,2-TETRACHLOROETHANE	<	0.2
TETRACHLOROETHENE	<	0.2
TOLUENE	<	0.5
1,1,1-TRICHLOROETHANE	<	0.5
1,1,2-TRICHLOROETHANE	<	0.2
TRICHLOROETHENE	<	0.2
TRICHLOROFLUOROMETHANE	<	0.5
VINYL CHLORIDE	<	1.0
TOTAL XYLENES	<	0.5

SURROGATES:	
BROMOFLUOROBENZENE (66% - 132%)	86%
TRIFLUOROTOLUENE (70- 130%)	109%

Analyst: LD 11/23/93

Reviewer: [illegible] 11-24-93

Analytical**Technologies**, Inc.

GAS CHROMATOGRAPHY SPIKE RESULTS

TEST:	EPA 8010/8020	**ATI I.D.:**	311636
CLIENT:	GeoEngineers, Inc.	**QC SAMPLE:**	311625-1
PROJECT #:	0161-331-P18	**DATE ANALYZED:**	11/22/93
PROJECT NAME:	Unocal	**DILUTION FACTOR:**	1
SAMPLE MATRIX:	WATER	**UNITS:**	ug/L

PARAMETER		SAMPLE RESULT	SPIKE CONC.	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
BENZENE	<	0.5	10.0	10.0	100	11.2	112	11
CHLOROBENZENE	<	0.5	10.0	8.4	84	9.7	97	14
1,1-DICHLOROETHENE	<	0.2	10.0	8.9	89	10.1	101	13
TRICHLOROETHENE	<	0.2	10.0	10.2	102	11.4	114	11
TOLUENE	<	0.5	10.0	10.2	102	11.3	113	10
SURROGATES:								
BROMOFLUOROBENZENE (66% - 132%)					89%		96%	
TRIFLUOROTOLUENE (70% - 130%)					100%		102%	

	CONTROL LIMITS % REC	RPD
BENZENE	69% - 133%	20
CHLOROBENZENE	59% - 137%	20
1,1-DICHLOROETHENE	41% - 154%	30
TRICHLOROETHENE	74% - 133%	20
TOLUENE	66% - 134%	20

Analyst: 11/23/93

Reviewer: CS 11-24-93

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY SPIKE RESULTS

TEST:	EPA 8010/8020	**ATI I.D.:**	311636
CLIENT:	GeoEngineers, Inc.	**QC SAMPLE:**	Method Blank
PROJECT #:	0161-331-P18	**DATE ANALYZED:**	11/22/93
PROJECT NAME:	Unocal	**DILUTION FACTOR:**	1
SAMPLE MATRIX:	WATER	**UNITS:**	ug/L

PARAMETER		SAMPLE RESULT	SPIKE CONC.	SPIKED RESULT	% REC.	DUP. SPIKED RESULT	DUP. % REC.	RPD
BENZENE	<	0.5	10.0	10.6	106	10.6	106	0
CHLOROBENZENE	<	0.5	10.0	7.6	76	8.0	80	5
1,1-DICHLOROETHENE	<	0.2	10.0	9.9	99	9.9	99	0
TRICHLOROETHENE	<	0.2	10.0	10.8	108	11.0	110	2
TOLUENE	<	0.5	10.0	10.7	107	10.8	108	1
SURROGATES:								
BROMOFLUOROBENZENE (66% - 132%)					98%		95%	
TRIFLUOROTOLUENE (70% - 130%)					101%		99%	

	CONTROL LIMITS % REC	RPD
BENZENE	75% - 125%	20
CHLOROBENZENE	60% - 131%	20
1,1-DICHLOROETHENE	41% - 149%	27
TRICHLOROETHENE	75% - 133%	20
TOLUENE	82% - 123%	20

Analyst: 11/23/93

Reviewer: 11-24-93

Analytical**Technologies,**Inc.

METALS RESULTS

CLIENT I.D.:	Method Blank	**ATI I.D.:**	311636-0
CLIENT:	GeoEngineers, Inc.	**DATE SAMPLED:**	NA
PROJECT #:	0161-331-P18	**DATE RECEIVED:**	NA
PROJECT NAME:	Unocal	**DATE DIGESTED:**	11/23/93
SAMPLE MATRIX:	WATER	**DATE ANALYZED:**	11/23/93
		DILUTION FACTOR:	1
		UNITS:	mg/L

PARAMETER	RESULTS	METHOD
LEAD	< 0.002	7421

Analyst: DT 11/24/93

Reviewer: LLL 11/24/93

Analytical Technologies, Inc.

METALS RESULTS

CLIENT I.D.:	MW-1	ATI I.D.:	311636-1
CLIENT:	GeoEngineers, Inc.	DATE SAMPLED:	11/22/93
PROJECT #:	0161-331-P18	DATE RECEIVED:	11/22/93
PROJECT NAME:	Unocal	DATE DIGESTED:	11/23/93
SAMPLE MATRIX:	WATER	DATE ANALYZED:	11/24/93
		DILUTION FACTOR:	1
		UNITS:	mg/L

PARAMETER	RESULTS	METHOD
LEAD	0.003	7421

Analyst: D. J. 11/24/93

Reviewer: J.W. 11/24/93

Analytical Technologies, Inc.

METALS RESULTS

CLIENT I.D.:	MW-2	ATI I.D.:	311636-2
CLIENT:	GeoEngineers, Inc.	DATE SAMPLED:	11/22/93
PROJECT #:	0161-331-P18	DATE RECEIVED:	11/22/93
PROJECT NAME:	Unocal	DATE DIGESTED:	11/23/93
SAMPLE MATRIX:	WATER	DATE ANALYZED:	11/24/93
		DILUTION FACTOR:	1
		UNITS:	mg/L

PARAMETER	RESULTS	METHOD
LEAD	< 0.002	7421

Analyst: D.T. 11/24/93

Reviewer: Bill. 11/24/93

Analytical Technologies, Inc.

METALS RESULTS

CLIENT I.D.:	MW-3	**ATI I.D.:**	311636-3
CLIENT:	GeoEngineers, Inc.	**DATE SAMPLED:**	11/22/93
PROJECT #:	0161-331-P18	**DATE RECEIVED:**	11/22/93
PROJECT NAME:	Unocal	**DATE DIGESTED:**	11/23/93
SAMPLE MATRIX:	WATER	**DATE ANALYZED:**	11/24/93
		DILUTION FACTOR:	1
		UNITS:	mg/L

PARAMETER	RESULTS	METHOD
LEAD	0.002	7421

Analyst: D.T. 11/24/93

Reviewer: JLL. 11/24/93

Analytical**Technologies,**Inc.

METALS DUPLICATE RESULTS

CLIENT I.D.:	MW-1	ATI I.D.:	311636-1
CLIENT:	GeoEngineers, Inc.	DATE SAMPLED:	11/22/93
PROJECT #:	0161-331-P18	DATE RECEIVED:	11/22/93
PROJECT NAME:	Unocal	DATE DIGESTED:	11/23/93
SAMPLE MATRIX:	WATER	DATE ANALYZED:	11/24/93
		DILUTION FACTOR:	1
		UNITS:	mg/L

PARAMETER	SAMPLE RESULT	DUPLICATE RESULT	RPD	RPD CONTROL LIMIT
LEAD	0.003	< 0.002	NC	20

NC - Not calculable.

Analyst: D.J. 11/24/93

Reviewer: J.W. 11/24/93

AnalyticalTechnologies,Inc.

METALS SPIKE RESULTS

CLIENT I.D.:	MW-1	ATI I.D.:	311636-1
CLIENT:	GeoEngineers, Inc.	DATE SAMPLED:	11/22/93
PROJECT #:	0161-331-P18	DATE RECEIVED:	11/22/93
PROJECT NAME:	Unocal	DATE DIGESTED:	11/23/93
SAMPLE MATRIX:	WATER	DATE ANALYZED:	11/24/93
		DILUTION FACTOR:	1
		UNITS:	mg/L

PARAMETER	SAMPLE RESULT	SPIKE CONC	SPIKE RESULT	% RECOV	CONTROL LIMIT
LEAD	0.003	0.020	0.025	110	75-125%

Analyst: D.T. 11/24/93

Reviewer: [illegible] 11/24/93

Analytical Technologies, Inc.

METALS BLANK SPIKE RESULTS

CLIENT I.D.:	Blank Spike	ATI I.D.:	311636
CLIENT:	GeoEngineers , Inc.	DATE SAMPLED:	NA
PROJECT #:	0161-331-P18	DATE RECEIVED:	NA
PROJECT NAME:	Unocal	DATE DIGESTED:	11/23/93
SAMPLE MATRIX:	WATER	DATE ANALYZED:	11/23/93
		DILUTION FACTOR:	1
		UNITS:	mg/L

PARAMETER	RESULT	TRUE VALUE	% RECOV	CONTROL LIMIT
LEAD	0.020	0.020	100	75-125%

Analyst: [illegible] 11/24/93

Reviewer: [illegible] 11/24/93

Analytical Technologies, Inc.
17400 S.W. Upper Boones Ferry Rd., Suite 270
Durham, Oregon 97224 • (503) 684-0447 FAX: (503) 620-0393

DATE 11/22/93 PAGE 1 OF 1

Chain of Custody

LABORATORY NUMBER: 311636
PROJECT NOTICE NUMBER: _____

PROJECT MANAGER: PAT SULLIVAN
COMPANY: GEI
ADDRESS: 7504 SW BRIDGEPORT RD
PORTLAND OR 97224
PHONE: 624-9274 SAMPLED BY: PAT TIMMINS

SAMPLE DISPOSAL INSTRUCTIONS
☒ ATI Disposal @ $5.00 each ☐ Return

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	TPH-HCID State: OR/WA	TPH-G State: OR/WA	TPH-D State: OR/WA	418.1 State: OR/WA	EPA 418.1	8015M	8020M-BETX only	8310 HPLC PAHs	7421 Lead	% Moisture	8010 Halogenated VOCs	8020 Aromatic VOCs	8040 Phenols	8240 GCMS Volatiles	8270 GCMS Semivolatiles	8080 OC Pesticides/PCBs	8080M PCBs only	Drinking Water (8)	Priority Pollutant Metals (13)	Cyanide	TCLP Metals (8)	TCLP Volatiles 8240 ZH-EXT	TCLP Semivolatiles 8270										NUMBER OF CONTAINERS
MW-1	11/22/93	0:35	H_2O	1					X		X		X		X	X																					5
MW-2	11/22/93	1430		2					X		X		X		X	X																					5
MW-3	11/22/93	1221		3					X		X		X		X	X																					5
MW-4	11/22/93	1250		4					X		X		X		X	X																					5
TRIP BLANK			"	5							X				X	X																					2

66

PROJECT INFORMATION	SAMPLE RECEIPT	
PROJECT NUMBER: 0161-331-P18	TOTAL NUMBER OF CONTAINERS	22
PROJECT NAME: UNOCAL	COC SEALS/INTACT? Y \ N \ NA	
PURCHASE ORDER NUMBER:	RECEIVED INTACT? Y \ N	
ONGOING PROJECT? YES ☒ NO ☐	RECEIVED COLD Y \ N	

PRIOR AUTHORIZATION REQUIRED FOR RUSH PROJECTS

TAT: (NORMAL) ☒ 2 WKS (RUSH) ☐ 24 HR ☐ 48 HRS ☐ 72 HRS ☐ 1 WK
GREATER THAN 24 HR. NOTICE? YES ☐ NO ☐ (LAB USE ONLY)
SPECIAL INSTRUCTIONS:

Received via: HAND

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY 3.
Signature: Time: 14:30	Signature Time: 2:50	Signature Time:
Printed Name: PATRICK TIMMINS Date: 11/22/93	Printed Name: PATRICK J. SULLIVAN Date: 11/22/93	Printed Name: Date:
Company: GEI	Company: GEI	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: Time: 14:30	Signature Time: 1450	Signature Time:
Printed Name: PATRICK J SULLIVAN 11/22/93	Printed Name: ANDI MILLER 11/22/93	Printed Name: Date:
Company: GEI	Company: ATI-PDX	Analytical Technologies, Inc.

Analytical Technologies, Inc.

METALS RESULTS

CLIENT I.D.:	MW-4	ATI I.D.:	311636-4
CLIENT:	GeoEngineers, Inc.	DATE SAMPLED:	11/22/93
PROJECT #:	0161-331-P18	DATE RECEIVED:	11/22/93
PROJECT NAME:	Unocal	DATE DIGESTED:	11/23/93
SAMPLE MATRIX:	WATER	DATE ANALYZED:	11/24/93
		DILUTION FACTOR:	1
		UNITS:	mg/L

PARAMETER	RESULTS	METHOD
LEAD	0.004	7421

Analyst: L.T. 11/24/93

Reviewer: FCH. 11/24/93