Consulting Engineers
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GeoEngineers

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Results of UST Site Assessment and Ground Water Sampling Unocal Service Station No. 5580 Anchorage, Alaska

April 9, 1998

For
Unocal

GeoEngineers

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April 9, 1998

Consulting Engineers and Geoscientists
Offices in Washington, Oregon and Alaska

Unocal AMG - West Division
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Seattle, Washington 98111

Attention: Dr. Mark Brearley, R.G.

Results of UST Site Assessment and
Ground Water Sampling
Unocal Service Station No. 5580
Anchorage, Alaska
File No. 0161-409-00

INTRODUCTION

This letter presents the results of GeoEngineers' May 20 and 21, 1997, underground storage tank (UST) site assessment, as well as our May 22 and July 8, 1997, ground water monitoring and sampling at former Unocal Service Station No. 5580, located at 442 Gambell Street in Anchorage, Alaska. This work was requested by Mr. Robert Weimer of the Alaska Department of Environmental Conservation (ADEC) in a letter dated December 8, 1995. The purpose of GeoEngineers' UST site assessment was to further characterize and define the extent of soil and ground water contamination at the site. The facility is currently operated as a Texaco service station. The ADEC facility identification number for this site is #0000031. The ADEC Contaminated Sites Database file number for this site is L35.01. The general layout of the service station facilities and approximate locations of the monitoring wells are shown in Figure 1.

BACKGROUND

The site consists of a generally level concrete and asphalt paved lot occupied by an operating Texaco service station offering vehicle repair services. Facilities at the service station include two 8,000-gallon gasoline USTs, one 4,000-gallon diesel UST, one 500-gallon used oil UST, three dispensing islands and a station building with three service bays. A 280-gallon waste oil tank was formerly located west of the USTs and south of the station building. Presently four

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on-site monitoring wells are used to monitor ground water quality. GeoEngineers has conducted ground water monitoring and sampling at the site in the past and the site has been previously characterized by AGRA of Anchorage, Alaska. Selected data from this previous work are included in this report for comparison purposes.

SCOPE

This field exploration was designed to investigate the source of soil and ground water contamination at the site and to examine the condition of soil and ground water in the vicinity of the on-site USTs and fuel dispensing islands. Subsurface soil and ground water conditions were investigated by drilling three soil borings and installing monitoring wells in each of the three borings. The locations of borings and monitoring wells are shown in Figure 1.

A geologist from our staff determined the soil sampling locations, examined and classified the soils encountered, collected soil samples for chemical analysis, prepared detailed logs of the borings and prepared an as-built of each monitoring well installed. Soil encountered was classified visually in general accordance with ASTM D2488-84, the Standard Practice for Description and Identification of Soils, and the Unified Soil Classification (USC). Each soil sample was screened in the field for residual hydrocarbons using visual, water sheen and headspace vapor testing methods. Soil samples were submitted for analytical testing based upon field screening results. The field representative wore clean, disposable, vinyl gloves while collecting the soil samples. Soil samples submitted for analysis were placed in 4- or 8-ounce glass jars with teflon-lined caps or in 40-milliliter glass vials with septum caps in the field, and kept cool under chain-of-custody procedures during transport to the laboratory. Samples analyzed by Alaska Method AK101 for gasoline-range organics (GRO) were preserved in the field with methanol. Our specific scope of services performed during this project is presented below.

SOIL BORINGS AND MONITORING WELLS

1. Drilled three soil borings to depths of approximately 40 feet below ground surface (bgs) using hollow stem auger techniques.
2. Collected soil samples from each boring using a Dames and Moore 2.5-inch-diameter split-spoon sampler at approximate 5.0-foot intervals from the ground surface to 10 feet bgs, at 2.5 foot intervals from a depth of 10 feet bgs to 20 feet bgs, and at 5.0 foot intervals from a depth of 20 feet bgs to 40 feet bgs for field screening.
3. Clean drill equipment was used for each boring. All water generated during decontamination operations was contained in 55-gallon drums and temporarily stored on site. Decontamination water generated during the study was characterized for transport to Alaska Pollution Control for disposal.
4. Constructed 2-inch-diameter polyvinyl chloride (PVC) monitoring wells in each of the three soil borings to a depth of approximately 40 feet bgs. Each well consisted of 10 feet of 0.020-inch slot width screen (30 to 40 feet bgs) with end cap, 30 feet of blank Schedule 40

PVC (0 to 30 feet bgs) and locking watertight well cap. Each well was completed with a medium sand pack, bentonite well seal, concrete collar and a flush with grade steel monument.

5. All soil cuttings generated during drilling operations were contained in 55-gallon drums for temporary storage on site and characterized for transport to an authorized facility for disposal.
6. Submitted a minimum of two soil samples from each of the three borings based on field screening for chemical analysis of benzene, ethylbenzene, toluene and xylenes (BETX) by U.S. Environmental Protection Agency (EPA) Method 8020M, GRO by Alaska Method AK101 (field methanol extraction), diesel-range organics (DRO) by Alaska Method AK102 and lead by EPA Method 7000 Series. Soil samples with the highest field screening reading for residual hydrocarbons from each boring were submitted for testing to North Creek Analytical (NCA) in Bothell, Washington.
7. Measured the static water level in each of the three monitoring wells to determine the well casing water volume for development.
8. Developed each monitoring well by removing five standing well volumes of ground water, or bailing the well dry.
9. Contained all water generated during well development operations in 55-gallon drums and temporarily stored on site. Development water generated during the study was characterized for transport to an authorized facility for disposal.
10. Surveyed the elevations of new well casings.
11. Evaluated the field and laboratory data generated during the soil boring explorations with respect to existing regulatory concerns.

WATER QUALITY

1. Tested for the presence of free (floating) product in all of the on-site monitoring wells. Measured the static water level in each monitoring well to determine the well casing water volume for purging.
2. Measured combustible vapor concentrations for each well using a Bacharach TLV Sniffer.
3. Purged each monitoring well by removing a minimum of three well volumes of ground water, or bailing the well dry and allowing it to recharge prior to sampling. The monitoring wells were purged and sampled with disposable polyethylene bailers. Parameters of the purged ground water consisting of temperature, pH and conductivity were measured periodically during purging activities.
4. All water generated during well purging operations was placed in 55-gallon drums for temporary storage on site and characterized for transport to an authorized disposal facility.
5. Collected ground water samples from the seven monitoring wells when consecutive temperature, pH and conductivity readings were within 10 percent, or when five well volumes of ground water were removed from the well, or the well was bailed dry and

0020

allowed to recharge. A new bailer and cord were used to sample each monitoring well to minimize the possibility of cross contamination.

6. Submitted ground water samples from each monitoring well for chemical analysis of BETX by EPA Method 8020M, GRO by Alaska Method AK101 and DRO by Alaska Method AK102. Ground water samples collected from the three newly installed monitoring wells were also analyzed for lead by EPA Method 200 Series.
7. Evaluated the field and laboratory data generated during the ground water monitoring with respect to existing regulatory concerns.
8. Prepared a written report discussing the results of the subsurface explorations and laboratory testing, and presenting our conclusions.

A description of field methods for the above scope items is included in Attachment A.

REGULATORY CRITERIA

ADEC has established soil cleanup guidelines for sites where soil has been affected by releases of petroleum hydrocarbons from UST systems. ADEC soil matrix cleanup levels are based on five parameters: 1) depth to subsurface water, 2) mean annual precipitation, 3) soil type, 4) potential receptors (drinking water wells) and 5) volume of contaminated soil. GeoEngineers has scored the site based on the following available data:

1) Depth to ground water from base of contamination - less than 5 feet (Score=10)
2) Mean annual precipitation - 15.37 inches (Score=3)
3) Soil Type - Clean, coarse-grained soils (Score=10)
4) Potential Receptors - Municipal/private wells within 1 mile (Score=8)
5) Volume of contaminated soil (Score=5; Estimated less than 100 cubic yards)

Based on these data, the total matrix score is 36, resulting in a Level B Soil Cleanup Standard for the site. ADEC Level B soil cleanup guidelines for petroleum hydrocarbons are summarized below.

Compound	ADEC Cleanup Standard
Benzene	0.5 mg/kg
Total BETX	15 mg/kg
GRO	100 mg/kg
DRO	200 mg/kg
RRO	2,000 mg/kg

mg/kg = milligrams per kilogram

In addition, ADEC established draft ground water cleanup standards for sites where ground water is affected by releases of petroleum hydrocarbons from UST systems. ADEC draft cleanup standards for compounds detected at the site during this project are as follows:

0021

Compound	ADEC Cleanup Standard
Benzene	5 µg/l
Ethylbenzene	700 µg/l
Toluene	1,000 µg/l
Total xylenes	10,000 µg/l

µg/l = micrograms per liter

Cleanup standards for GRO and DRO compounds in ground water have not been established.

SOIL BORINGS

GeoEngineers installed a total of three soil borings (MW-5, MW-6 and MW-7), completed as monitoring wells, at the site on May 20 and 21, 1997. Soil samples were collected from each boring for field screening. Based on field screening results, two to three soil samples from each boring were submitted to North Creek Analytical Services analytical laboratory for chemical analysis. Each sample submitted was analyzed for BETX by EPA Method 8020 as well as for GRO and DRO by ADEC Methods AK101 and AK102, respectively. Detailed logs of each boring installed on May 20 and 21, 1997 are included in Attachment A.

BORING MW-5

Field screening indicated the possible presence of petroleum contamination in soils collected from depths between 12 feet and 16 feet bgs in boring MW-5. A slight sheen was noted on soil collected at depths of 12.5 feet and 15 feet bgs. The remaining soil samples collected from boring MW-5 did not exhibit signs of petroleum contamination, based on field observations.

Two soil samples from this boring (MW5-12.5′ and MW5-34.0′) were submitted for chemical analysis. BETX compounds were detected in the two samples at concentrations ranging from 0.101 mg/kg ethylbenzene to 2.43 mg/kg benzene. GRO and DRO were also detected in the two soil samples from boring MW-5 submitted for chemical analysis. GRO was detected in samples MW5-34.0′ and MW5-12.5′ at concentrations of 12.7 mg/kg and 18.5 mg/kg, respectively. DRO was detected in these samples at concentrations of 11.6 mg/kg (MW5-34.0′) and 46.4 mg/kg (MW5-12.5′). The laboratory reported that the DRO detected in sample MW5-12.5′ was primarily due to overlap from a heavy oil range product.

BORING MW-6

Field screening indicated the potential presence of petroleum contamination in soil samples collected from various depths in boring MW-6. Slight sheens were noted on soils collected from depths between 10 feet and 20 feet bgs in this boring. Slight, moderate and heavy sheens were noted on soils collected from above and at the ground water table at this location. In addition, petroleum odors were noted and vapor headspace screening indicated petroleum contamination at and above the ground water table in boring MW-6.

Three soil samples from boring MW-6 (MW6-25.0', MW6-30.0' and MW6-34.5') were submitted for chemical analysis. Benzene was not detected in any of the MW-6 samples. Other BETX compounds were detected in the samples collected from boring MW-6 at concentrations ranging from 0.0745 mg/kg toluene to 1.03 mg/kg xylenes. GRO was detected in only one of the three samples (MW6-34.5') at a concentration of 67.8 mg/kg. DRO was detected in two of the three samples (MW6-30.0' and MW6-34.5') at concentrations of 7.64 mg/kg and 46.6 mg/kg, respectively.

BORING MW-7

Field screening did not indicate the presence of petroleum contamination in soils sampled from boring MW-7. BETX compounds, GRO and DRO were not detected in samples from boring MW-7 (MW7-12.5' and MW7-34.0') that were submitted for chemical analysis.

WATER QUALITY RESULTS

WATER TABLE ELEVATIONS

Approximate depths to ground water beneath the site ranged from 34.98 feet to 37.55 feet below the ground surface on May 22, 1997. Ground water elevations based on these measurements are included in Figure 2. The ground water elevation in MW-1 could not be determined due to apparent damage to the well casing at depth. Free product was not encountered during our monitoring activities on May 22, 1997. Based on the May 1997 measurements, ground water at the site appears to flow generally toward the northeast at a gradient of approximately 0.0056. Water table elevations measured through May 22, 1997, are presented in Table 2.

COMBUSTIBLE VAPOR CONCENTRATIONS

GeoEngineers used a Bacharach TLV Sniffer to measure vapor concentrations in each of the seven on-site wells. Vapor concentrations were detected in all seven wells at concentrations less than 400 parts per million (ppm). Combustible vapor concentrations measured through May 22, 1997, are presented in Table 2.

GROUND WATER QUALITY

Ground water samples were not collected from monitoring well MW-1. Ground water samples were collected from all of the remaining wells on May 22, 1997. Wells MW-5, MW-6 and MW-7 were resampled on July 8, 1997. BETX was not detected in ground water samples obtained from wells MW-2, MW-3 and MW-4 on May 22, 1997. Benzene was detected in wells MW-5 and MW-6 at concentrations of 1,750 μg/l in well MW-5 and 11.8 μg/l in well MW-6. Other BETX compounds were detected in wells MW-5, MW-6 and MW-7 at concentrations ranging from 0.617 μg/l ethylbenzene in well MW-6 to 806 μg/l toluene in well MW-5.

Ground water samples obtained in May 1997 were also analyzed for GRO and DRO. GRO was not detected in ground water samples collected from wells MW-2, MW-3, MW-4 and MW-7

on May 22, 1997. GRO was detected in wells MW-5 and MW-6 at respective concentrations of 6,170 μg/l and 318 μg/l. DRO was not detected in the sample collected from well MW-2 on May 22, 1997. DRO was detected in water samples collected from all the remaining wells sampled at concentrations ranging from 0.171 milligrams per liter (mg/l) in sample "MW-3" to 0.647 mg/l in sample "MW-6."

Wells MW-5, MW-6 and MW-7 were resampled on July 8, 1997, to resolve discrepancies between field observations and analytical data and to resolve disparities between sample and field duplicate analytical results. The samples were analyzed for BETX, GRO and DRO, as were the samples collected in May.

BETX compounds were detected in samples collected from wells MW-5 and MW-6 on July 8, 1997. BETX was detected in well MW-5 in July, at concentrations ranging from 22.6 μg/l ethylbenzene to 1,730 μg/l benzene. Benzene and xylenes were detected in well MW-6 in July, at concentrations of 10.7 μg/l and 5.55 μg/l, respectively. GRO was also detected in samples collected from these wells in July at concentrations of 5,010 mg/kg and 66.2 mg/kg, respectively. DRO was detected in only one of the three wells (MW-6) resampled in July at a concentration of 0.129 mg/l.

The ground water chemical analytical data for samples obtained through July 8, 1997, are summarized in Table 3 and in Figure 2. The ADEC ground water cleanup standards are included in Table 3 for reference. The laboratory reports and chain-of-custody records for the May 22 and July 8, 1997, samples are included in Attachment B.

DISCUSSION

SOIL BORINGS

Boring MW-5 was drilled adjacent to the station's current waste oil UST. Borings MW-6 and MW-7 were drilled near the station's existing product USTs. The apparent ground water flow direction at the site is toward the northeast.

Boring MW-5

Field observations and field screening results indicated only low concentrations, if any, of petroleum contaminants in soil collected from boring MW-5. No indication of contamination at or near the water table was observed in the field at boring MW-5. Soil samples collected from 12.5 feet bgs and from the ground water table at boring MW-5 were chemically analyzed. Benzene was detected in each sample collected from boring MW-5 at concentrations exceeding ADEC Level B soil cleanup guidelines. GRO and DRO were also detected in both of the MW-5 soil samples. DRO was detected at a concentration of 46.4 mg/kg in the sample collected from 12.5 feet bgs. The laboratory noted that results in the diesel organics range in this sample are primarily due to overlap from a heavy oil range product.

Boring MW-6

Field observations and field screening results indicated moderate to high concentrations of petroleum contaminants in soil collected from above and at the ground water table in boring MW-6. Benzene was not detected in any of the MW-6 soil samples that were chemically analyzed. Total BETX was detected at relatively low concentrations in the MW-6 soil samples ranging from 0.327 mg/kg to 1.29 mg/kg. GRO was detected only in the sample collected from the ground water table in boring MW-6 at a concentration of 67.8 mg/kg, which is less than ADEC Level B soil cleanup guidelines. DRO was also detected in the soil sample collected from the ground water table in boring MW-6 at a concentration of 46.6 mg/kg.

Boring MW-7

Field screening and field observations revealed no evidence of petroleum contamination in samples collected from boring MW-7. BETX, GRO and DRO were not detected in the MW-7 soil samples.

WATER QUALITY

May 1997 Sampling Event

Ground water samples were collected from three of the four existing monitoring wells (MW-2 through MW-4) and from the three newly installed monitoring wells (MW-5, MW-6 and MW-7) on May 22, 1997. Field observations did not indicate the presence of petroleum contamination in any of the water samples collected in May, with one exception. A petroleum odor and sheen were observed on purge water obtained from well MW-6.

Benzene was detected in the sample collected from well MW-5 during the May sampling event at concentrations exceeding ADEC ground water cleanup standards. Other BETX compounds were also detected in the sample collected from well MW-5 in May, and GRO was detected in excess of 6,000 μg/l in this sample. No odor or sheen were observed on water removed from well MW-5 during sampling in May.

Benzene was detected at a concentration exceeding ADEC standards in well MW-6. Other BETX compounds and GRO were detected in the sample collected from MW-6 during the May sampling event. Concentrations of BETX and GRO detected in well MW-6 were significantly less than those detected in well MW-5.

A duplicate water sample was collected from well MW-6 on May 22, 1997. The sample was labelled "duplicate" on the laboratory chain-of-custody form and was analyzed for BETX and GRO. Neither BETX nor GRO were detected in the duplicate sample collected in May.

Toluene was detected in the May water sample collected from well MW-7 at a concentration of 0.759 μg/l which is within ADEC ground water cleanup standards. DRO was detected in the MW-7 water sample collected in May.

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July 1997 Sampling Event

Wells MW-5, MW-6 and MW-7 were resampled on July 8, 1997, to resolve apparent discrepancies between ground water analytical results and field observations made during water sampling, and to resolve confusion resulting from disparate sample and field duplicate data. The water samples, including a field duplicate, were assigned blind sample numbers "A" (corresponding to well MW-7), "B"(corresponding to well MW-5), "C" (corresponding to well MW-6) and "D" (duplicate sample of "C") on the laboratory chain-of-custody.

BETX and GRO were detected in the ground water sample collected from well MW-5 in July at concentrations similar to those detected during the May sampling event. No petroleum odor or sheen was noted on water generated during sampling of well MW-5 in either May or July.

Benzene and xylenes were detected in the sample collected from well MW-6 in July. GRO was also detected in the July MW-6 sample but at a decreased concentration relative to the sample collected in May. As during the May sampling event, a petroleum odor was noted on water removed from well MW-6 in July. BETX and GRO were also detected in the duplicate sample collected from well MW-6, but concentrations of these compounds were well outside of acceptable relative percent difference limits when compared to the MW-6 sample results. Neither BETX, GRO nor DRO were detected in the sample collected from well MW-7 in July.

LIMITATIONS

We have prepared this report for use by Unocal. This report may be made available to regulatory agencies and to other parties, as designated by Unocal. The report is not intended for use by others, and the information contained herein is not applicable to other sites.

Our interpretation of ground water conditions is based on field observations, our review of chemical analytical data and our review of information prepared by others.

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

0026

We appreciate the opportunity to be of service to Unocal. Please contact us if you have questions regarding this project.

Yours very truly,

GeoEngineers, Inc.

Jeffery W. Selbig
Staff Geotechnical Engineer

Scott E. Widness, P.E.
Principal

JWS:SEW:skl
Document ID: 01614091.ea

Attachments

Three copies submitted

cc: Mr. Robert Weimer
ADEC—Anchorage District

TABLE 1 (Page 1 of 2)
SUMMARY OF FIELD SCREENING AND SOIL ANALYTICAL RESULTS
FORMER UNOCAL SERVICE STATION #5580
442 GAMBELL STREET, ANCHORAGE, ALASKA
GEOENGINEERS JOB #0161-409-18

Sample No.	Date	Field Screening[1]		BETX[2] EPA Method 8020 (mg/kg)					GRO[3] (mg/kg)	DRO[4] (mg/kg)
		Headspace Vapor (ppm)	Sheen	B	E	T	X	Total BETX		
MW5-5.0'	05/20/97	0	NS	--	--	--	--	--	--	--
MW5-10.0'	05/20/97	0	NS	--	--	--	--	--	--	--
MW5-12.5'	05/20/97	0	SS	0.621	0.209	1.76	3.6	6.19	18.5	46.4 [5]
MW5-15.0'	05/20/97	0	SS	--	--	--	--	--	--	--
MW5-17.5'	05/20/97	0	NS	--	--	--	--	--	--	--
MW5-20.0'	05/20/97	0	NS	--	--	--	--	--	--	--
MW5-25.0'	05/20/97	0	NS	--	--	--	--	--	--	--
MW5-30.0'	05/20/97	0	NS	--	--	--	--	--	--	--
MW5-34.0'	05/20/97	0	NS	2.43	0.101	1.86	<0.200	4.39	12.7	11.6
MW5-40.0'	05/20/97	0	NS	--	--	--	--	--	--	--
MW6-5.0'	05/20/97	0	NS	--	--	--	--	--	--	--
MW6-10.0'	05/20/97	0	SS	--	--	--	--	--	--	--
MW6-12.5'	05/20/97	0	SS	--	--	--	--	--	--	--
MW6-15.0'	05/20/97	0	SS	--	--	--	--	--	--	--
MW6-17.5'	05/20/97	0	SS	--	--	--	--	--	--	--
MW6-20.0'	05/20/97	0	MS	--	--	--	--	--	--	--
MW6-25.0'	05/20/97	0	SS	<0.05	<0.05	0.148	0.179	0.327	<5.0	<4.0
MW6-30.0'	05/20/97	4	SS	<0.05	<0.05	0.0745	0.229	0.974	<5.0	7.64
MW6-34.5'	05/20/97	25	HS	<0.25	0.262	<0.25	1.03	1.29	67.8	46.6
MW6-36.0'	05/20/97	--	SS	--	--	--	--	--	--	--

Notes appear on page 2 of 2.

TABLE 1 (Page 2 of 2)

Sample No.	Date	Field Screening[1]		BETX[2] EPA Method 8020 (mg/kg)					GRO[3] (mg/kg)	DRO[4] (mg/kg)
		Headspace Vapor (ppm)	Sheen	B	E	T	X	Total BETX		
MW7-5.0'	05/21/97	0	NS	--	--	--	--	--	--	--
MW7-10.0'	05/21/97	0	NS	--	--	--	--	--	--	--
MW7-15.0'	05/21/97	0	NS	--	--	--	--	--	--	--
MW7-17.5'	05/21/97	0	NS	--	--	--	--	--	--	--
MW7-20.0'	05/21/97	0	NS	--	--	--	--	--	--	--
MW7-25.0'	05/21/97	0	NS	--	--	--	--	--	--	--
MW7-30.0'	05/21/97	0	NS	--	--	--	--	--	--	--
MW7-34.0'	05/21/97	0	NS	<0.05	<0.05	<0.05	<0.1	--	<5.0	<4.0
MW7-35.5'	05/21/97	0	NS	<0.05	<0.05	<0.05	<0.1	--	<5.0	<4.0
ADEC Level B Soil Cleanup Guidelines				0.5	--	--	--	15	100	200

Notes:

[1]Field screening methods are described in Attachment A. Headspace vapor measured using Photovac Microtip Photoionization Detector (PID) calibrated to 100 ppm isobutylene.

NS = no sheen, SS = slight sheen, MS = moderate sheen, HS = heavy sheen

[2]B = benzene, E = ethylbenzene, T = toluene, X = xylenes

[3]GRO = Gasoline-Range Organics by ADEC Method AK101

[4]DRO = Diesel-Range Organics by ADEC Method AK102

[5]Laboratory noted that results in the diesel organics range are primarily due to overlap from a heavy oil range product.

ppm = parts per million

EPA = U.S. Environmental Protection Agency

mg/kg = milligrams per kilogram

ADEC = Alaska Department of Environmental Conservation

TABLE 2 (Page 1 of 2)
GROUND WATER ELEVATION DATA
UNOCAL SERVICE STATION NO. 5580
GEI JOB #0161-409-18

Monitoring Well	Top of Casing Elevation (feet)[1]	Date	Depth to Water (top of casing) (feet)	Ground Water Elevation (feet)
MW-1	97.95	11/15/86 [2]	34.43	63.52
		03/23/87 [2]	34.56	63.39
		10/10/87 [2]	34.43	63.52
		01/14/88 [2]	34.22	63.73
		10/24/88 [2]	33.95	64.00
		04/27/90 [2]	31.83	66.12
		12/15/92 [2]	--	--
		12/05/94 [3]	--	--
		01/24/96 [3]	--	--
		05/22/97 [3]	--	--
MW-2	98.83	11/15/86 [2]	35.50	63.33
		03/23/87 [2]	35.64	63.19
		10/10/87 [2]	35.52	63.31
		01/14/88 [2]	35.32	63.51
		10/24/88 [2]	35.00	63.83
		04/27/90 [2]	32.04	66.79
		12/15/92 [2]	34.21	64.62
		12/05/94	35.19	63.64
		01/24/96	35.25	63.58
		05/22/97	35.90	62.93
MW-3	98.86	11/15/86 [2]	36.10	62.76
		03/23/87 [2]	36.24	62.62
		10/10/87 [2]	36.10	62.76
		01/14/88 [2]	35.92	62.94
		10/24/88 [2]	35.59	63.27
		04/27/90 [2]	33.56	65.30
		12/15/92 [2]	34.80	64.06
		12/05/94	35.74	63.12
		01/24/96	35.82	63.04
		05/22/97	36.51	62.35
MW-4	98.13	11/15/86 [2]	35.31	62.82
		03/23/87 [2]	--	--
		10/10/87 [2]	35.32	62.81
		01/14/88 [2]	35.14	62.99
		10/24/88 [2]	34.78	63.35
		04/27/90 [2]	32.79	65.34
		12/15/92 [2]	34.75	63.38
		12/05/94	34.98	63.15

Notes appear on page 2 of 2.

TABLE 2 (Page 2 of 2)

Monitoring Well	Top of Casing Elevation (feet)[1]	Date	Depth to Water (top of casing) (feet)	Ground Water Elevation (feet)
MW-4		01/24/96	35.06	63.07
(cont.)		05/22/97	35.55	62.58
MW-5[4]	98.61	05/22/97	35.65	62.96
MW-6[4]	99.06	05/22/97	36.28	62.78
MW-7[4]	98.83	05/22/97	35.96	62.87

Notes:

[1]Casing elevations relative to existing site datum.

[2]Data reported by RZA AGRA.

[3]Well casing apparently damaged.

[4]Wells MW-5, MW-6 and MW-7 were installed by GeoEngineers on May 20 and 21, 1997. Casing elevations were surveyed on August 19, 1997.

"--" = Indicates level was not taken or was unattainable.

TABLE 3 (Page 1 of 4)
SUMMARY OF COMBUSTIBLE VAPOR CONCENTRATIONS AND GROUND WATER ANALYTICAL RESULTS
UNOCAL SERVICE STATION NO. 5580
GEI JOB #0161-409-A8

Monitoring Well Number	Date Sampled	Combustible Vapor Concentration[1] (ppm)	BETX[2] (EPA Method 8020) (µg/l)				GRO[3] (µg/l)	DRO[4] (mg/l)	TPH[5] (mg/l)
			B	E	T	X			
MW-1	11/15/86 [6]	--	<1.0	<1.0	<1.0	<1.0	--	--	0.96
	10/10/87 [6]	--	<1.0	<1.0	<1.0	<1.0	--	--	0.13
	01/14/88 [6]	--	<1.0	<1.0	<1.0	<1.0	--	--	0.13
	05/02/88 [6]	--	25	0.2	<0.2	0.8	--	--	2.6
	10/24/88 [6]	--	<0.2	<0.2	<0.2	<0.6	--	--	--
	04/27/90 [6]	--	<1.0	<1.0	<1.0	4	--	--	32.0
	12/15/92 [6,7]	--	--	--	--	--	--	--	--
	12/05/94 [7]	--	--	--	--	--	--	--	--
	01/24/96 [7]	<400	--	--	--	--	--	--	--
	05/22/97 [7]	<400	--	--	--	--	--	--	--
MW-2	11/15/86 [6]	--	--	--	--	--	--	--	0.56
	10/10/87 [6]	--	<1.0	<1.0	<1.0	<1.0	--	--	0.12
	01/14/88 [6]	--	<1.0	<1.0	<1.0	<1.0	--	--	0.14
	05/02/88 [6]	--	<0.2	<0.2	<0.2	<0.6	--	--	<0.5
	10/24/88 [6]	--	0.4	0.4	2.3	1.5	--	--	--
	04/27/90 [6]	--	<1.0	6	3	<1.0	--	--	26.0
	12/15/92 [6]	--	<0.3	<0.3	<0.3	<0.3	--	--	<1.0
	12/15/92 [6*]	--	<0.3	<0.3	<0.3	<0.3	--	--	<1.0
	12/05/94	<400	0.6	<0.5	<0.5	<1.0	<100	--	<0.5
	01/24/96	<400	<0.5	<0.5	<0.5	<1.0	<100	0.33	--
	05/22/97	<400	<0.5	<0.5	<0.5	<1.0	<50.0	<0.1	--

Notes appear on page 4 of 4.

TABLE 3 (Page 2 of 4)

Monitoring Well Number	Date Sampled	Combustible Vapor Concentration[1] (ppm)	BETX[2] (EPA Method 8020) (µg/l)				GRO[3] (µg/l)	DRO[4] (mg/l)	TPH[5] (mg/l)
			B	E	T	X			
MW-3	11/15/86 [6]	--	71	7.7	236	1,159	--	--	2.3
	11/15/86 [6,8]	--	54	3.9	169	1,148	--	--	--
	10/10/87 [6]	--	2.3	<1.0	3.8	47.3	--	--	0.1
	01/14/88 [6]	--	5.2	18	2.8	94	--	--	0.24
	05/02/88 [6]	--	33	16	<1.0	18	--	--	0.8
	10/24/88 [6]	--	28	120	42	530	--	--	--
	04/27/90 [6]	--	40	356	75	3,040	--	--	15
	12/15/92 [6]	--	<0.3	110	5.6	600	--	--	<1.0
	12/05/94	<400	<0.5	5.8	<0.5	16	150	--	1.0
	01/24/96	<400	<0.5	<0.5	<0.5	<1.0	<100	0.33	--
	01/24/96 *	--	<0.5	<0.5	<0.5	<1.0	<100	0.28	--
	05/22/97	<400	<0.5	<0.5	<0.5	<1.0	<50.0	0.171	--
MW-4	11/15/86 [6]	--	1.8	<1.0	4	9.3	--	--	5.7
	10/10/87 [6]	--	<1.0	<1.0	<1.0	<1.0	--	--	0.29
	01/15/88 [6]	--	<1.0	<1.0	2.2	<1.0	--	--	0.16
	05/02/88 [6]	--	2,700	180	36	820	--	--	0.6
	10/24/88 [6]	--	0.4	1.3	9.5	7.7	--	--	--
	04/27/90 [6]	--	<1.0	<1.0	<1.0	<1.0	--	--	12
	12/15/92 [6]	--	<0.3	<0.3	<0.3	<0.3	--	--	<1.0
	12/05/94	<400	<0.5	<0.5	<0.5	<1.0	<100	--	<0.5
	01/24/96	<400	<0.5	<0.5	<0.5	<1.0	<100	0.73	--
	05/22/97	<400	<0.5	<0.5	<0.5	<1.0	<50.0	0.271	--
MW-5	05/22/97 [8]	<400	1,750	22.7	806	36.8	6,170	0.18	--
	07/08/97 [9]	--	1,730	22.6	1,190	85.7	5,010	<0.1	--

Notes appear on page 4 of 4.

TABLE 3 (Page 3 of 4)

Monitoring Well Number	Date Sampled	Combustible Vapor Concentration[1] (ppm)	BETX[2] (EPA Method 8020) (µg/l)				GRO[3] (µg/l)	DRO[4] (mg/l)	TPH[5] (mg/l)
			B	E	T	X			
MW-6	05/22/97 [8]	<400	11.8	0.617	1.33	16.1	318	0.647	--
	05/22/97 *	--	<0.5	<0.5	<0.5	<1.0	<50.0	--	--
	07/08/97 [9]	--	10.7	<0.5	<0.5	5.55	66.2	0.129	--
	07/08/97 *	--	36.7	0.861	1.49	22.0	250	--	--
MW-7	05/22/97 [8]	<400	<0.5	<0.5	0.759	<1.0	<50.0	0.185	--
	07/08/97 [9]	--	<0.5	<0.5	<0.5	<1.0	<50.0	<0.1	--
ADEC Ground Water Cleanup Standards			5	700	1,000	10,000	NE	NE	1

Notes appear on page 4 of 4.

TABLE 2 (Page 4 of 4)

Notes:

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

[2]B = benzene, E = ethylbenzene, T = toluene, X = xylenes

[3]GRO = Gasoline-Range Organics by EPA Method 8015 Modified

[4]DRO = Diesel-Range Organics by EPA Method 8100 Modified

[5]TPH = Total Petroleum Hydrocarbons by EPA Method 418.1

[6]Data reported by RZA AGRA.

[7]Insufficient water volume in well casing.

[8]Wells MW-5, MW-6 and MW-7 were also sampled for dissolved lead by EPA Series Methods 6010/7421. Lead was not detected above a reporting limit of 0.00200 mg/l in the samples.

[9]Wells MW-5, MW-6 and MW-7 were resampled on 07/08/97.

ppm = parts per million

EPA = U.S. Environmental Protection Agency

µg/l = micrograms per liter

mg/l = milligrams per liter

"--" = not analyzed or tested for this parameter

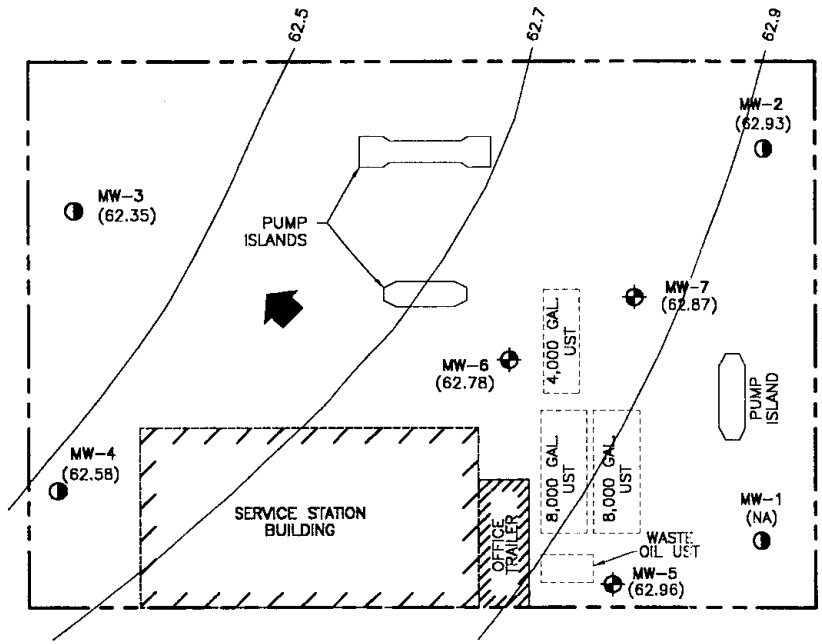
"<" = indicates non-detectable within the detection limit noted.

"*" = Blind field duplicate sample collected.

ADEC = Alaska Department of Environmental Conservation

NE = not established

Shading indicates concentrations greater than ADEC ground water cleanup standards.



0 20 40
SCALE IN FEET

EXPLANATION

MW-2 (62.93)	MONITORING WELL BY OTHERS
MW-5 (62.96)	MONITORING WELL BY GEDENGINEERS WITH GROUNDWATER ELEVATION
62.7	INFERRED PIEZOMETRIC SURFACE CONTOUR IN FEET
	INFERRED GROUNDWATER FLOW DIRECTION
(NA)	NOT APPLICABLE MEASUREMENT

UNOCAL STATION NO. 5580
442 GAMBELL ST.
ANCHORAGE, AK

Reference: Drawing Entitled "SITE PLAN – FIGURE 1" by RZA AGRA, INC. dated 5/10/93.

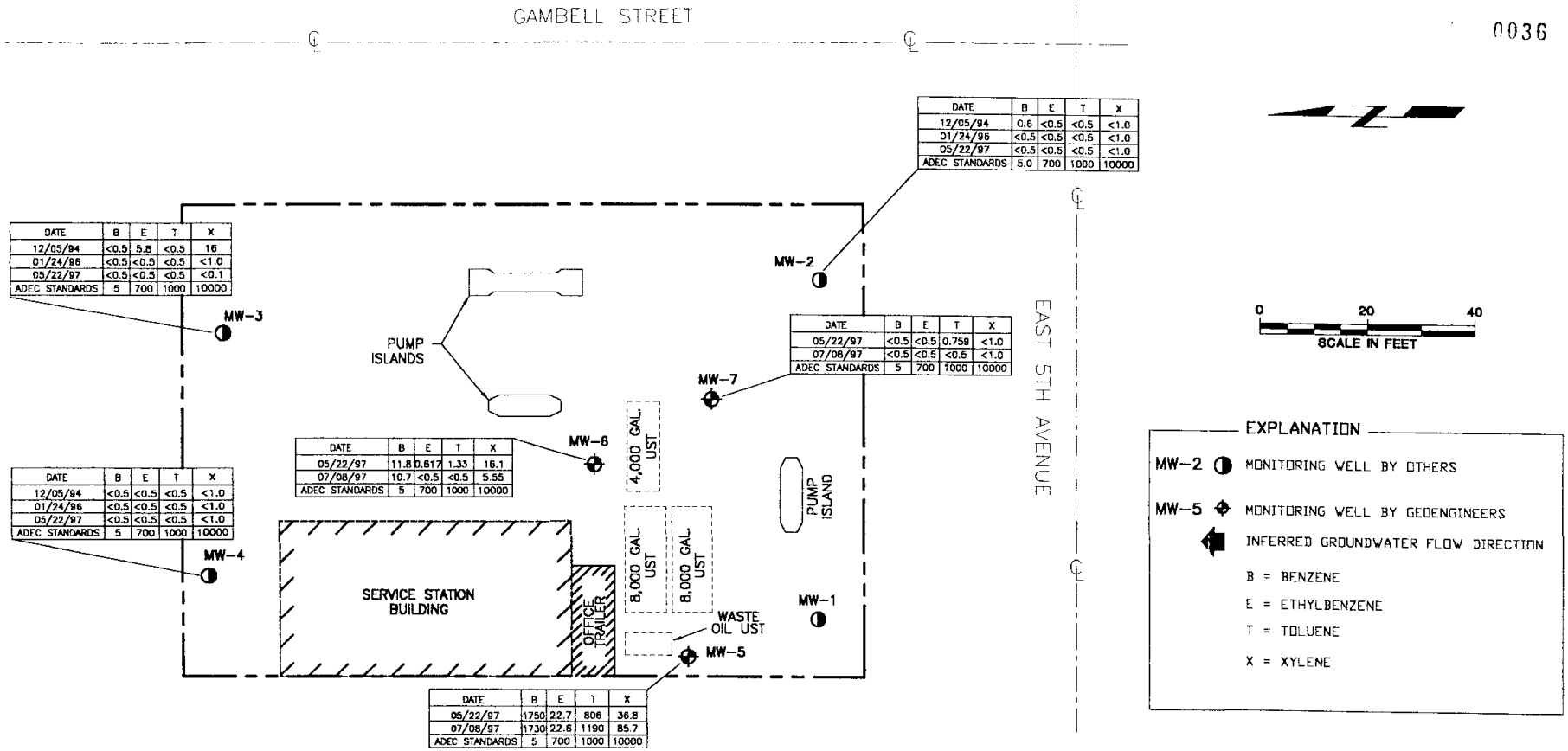
Note: The locations of all features shown are approximate.

Geo Engineers

GROUNDWATER ELEVATIONS
MAY 27, 1997

FIGURE 1

0161-409-A18LJD.JTH 08/27/97 DWG FILE: 01614092A.DWG



DATE	B	E	T	X
12/05/94	0.6	<0.5	<0.5	<1.0
01/24/96	<0.5	<0.5	<0.5	<1.0
05/22/97	<0.5	<0.5	<0.5	<1.0
ADEC STANDARDS	5.0	700	1000	10000

DATE	B	E	T	X
12/05/94	<0.5	5.8	<0.5	16
01/24/96	<0.5	<0.5	<0.5	<1.0
05/22/97	<0.5	<0.5	<0.5	<0.1
ADEC STANDARDS	5	700	1000	10000

DATE	B	E	T	X
05/22/97	<0.5	<0.5	0.759	<1.0
07/08/97	<0.5	<0.5	<0.5	<1.0
ADEC STANDARDS	5	700	1000	10000

DATE	B	E	T	X
05/22/97	11.8	0.617	1.33	16.1
07/08/97	10.7	<0.5	<0.5	5.55
ADEC STANDARDS	5	700	1000	10000

DATE	B	E	T	X
12/05/94	<0.5	<0.5	<0.5	<1.0
01/24/96	<0.5	<0.5	<0.5	<1.0
05/22/97	<0.5	<0.5	<0.5	<1.0
ADEC STANDARDS	5	700	1000	10000

DATE	B	E	T	X
05/22/97	1750	22.7	806	36.8
07/08/97	1730	22.6	1190	85.7
ADEC STANDARDS	5	700	1000	10000

EXPLANATION

MW-2 ◑ MONITORING WELL BY OTHERS

MW-5 ⊕ MONITORING WELL BY GEOENGINEERS

INFERRED GROUNDWATER FLOW DIRECTION

B = BENZENE

E = ETHYLBENZENE

T = TOLUENE

X = XYLENE

UNOCAL STATION NO. 5580
442 GAMBELL ST.
ANCHORAGE, AK

Reference: Drawing Entitled "SITE PLAN – FIGURE 1" by RZA AGRA, INC. dated 5/10/93.

Note: The locations of all features shown are approximate.

Geo Engineers

GROUNDWATER ANALYTICAL DATA

FIGURE 2

0161-409-A1BLD.JTH 08/27/97 DWG FILE: 01614092B.DWG

ATTACHMENT A

ATTACHMENT A

FIELD EXPLORATIONS

Subsurface soil and ground water conditions were explored at the former Unocal Service Station 5580 site by drilling three soil borings which were completed at monitoring wells. A geologist from our staff determined the soil sampling locations, examined and classified the soil encountered and prepared a detailed log of the borings in accordance with ASTM D2488-84, which is described in Figure A-1. A explanation of the field screening symbols is presented in Figure A-2. Soil samples were submitted for chemical analysis based on field screening results. The GeoEngineers field representative wore clean, disposable, nitrile gloves while collecting the soil samples. All soil samples submitted for analysis were placed in 8-ounce or 4-ounce glass jars with teflon lined caps, or were placed in 40-milliliter glass vials with methanol and sealed with septum caps, in the field. The samples were kept cool under chain-of-custody procedures during transport to the laboratory.

SOIL BORING AND SAMPLING

Three soil borings (MW-5, MW-6 and MW-7) were drilled and sampled on May 20 and 21, 1997, to depths ranging from 39.5 feet bgs to 41.5 feet bgs using hollow-stem auger drilling equipment operated by Discovery Drilling of Anchorage, Alaska. The approximate locations of the soil borings are shown in Figure 1. The boring logs are presented in Figures A-3 through A-6.

Soil samples were obtained from the borings using a split-spoon sampler (2.5-inch inside diameter). The sampler was driven 18 inches or until refusal by a 300-pound weight falling a vertical distance of 30 inches. The number of blows needed to advance the sampler the final 12 inches is termed the standard penetration resistance. This value is indicated to the left of the corresponding sample notations on the boring log.

Discovery Drilling steam cleaned their equipment (i.e., hollow stem auger, drill bits, and center rod) prior to mobilizing for the site. The split-spoon samplers were cleaned prior to each sampling attempt with an Alconox wash, a tap water rinse and a distilled water rinse. The GeoEngineers representative wore clean, disposable nitrile gloves while handling the sampler during sample collection.

Seven soil samples from the monitoring well borings were selected for chemical analysis. Each soil sample analyzed is denoted in our boring log with a "CA."

FIELD SCREENING OF SOIL SAMPLES

A GeoEngineers representative field screened soil samples obtained from the soil borings. Field screening results are used as a general guideline to delineate areas of potential 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 examination,

2) water sheen screening, and 3) headspace vapor screening using a Photovac Microtip photoionization detector (PID).

Visual screening consists of inspecting the soil for stains indicative of fuel-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 petroleum contamination at concentrations less than regulatory cleanup guidelines.

Water sheen screening involves placing soil in water and observing the water surface for signs of sheen. Sheen classifications are 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.
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 PID is inserted into the bag and the PID measures the concentration of combustible vapors present within the sample bag headspace. The PID measures ionizable vapor concentrations in parts per million (ppm) and is calibrated to isobutylene. Field screening results are site- and borehole-specific. The results vary with temperature, moisture content, soil type and type of contaminant.

GROUND WATER ELEVATIONS

The depths to the shallow ground water table relative to the monitoring well casing rims were measured in the monitoring wells to the nearest 0.01 foot using a Slope Indicator Company electronic interface probe on May 22, 1997. Water table elevations were calculated by subtracting the depths to water from the casing rim elevations. A water table elevation was not measured for monitoring well MW-1 due to apparent damage to the well casing at depth.

COMBUSTIBLE VAPOR CONCENTRATIONS

A Bacharach TLV Sniffer was used to measure combustible vapor concentrations from each well at the subject site. The Bacharach TLV Sniffer is calibrated to hexane. This instrument does not distinguish between methane and other combustible organic vapors. GeoEngineers equipped the Bacharach TLV Sniffer with a plastic drop hose to measure vapor levels at 1 foot above the ground water table with in each monitoring well. GeoEngineers allowed the TLV time to stabilize

prior to measuring each well's vapor level. The maximum vapor concentrations were then recorded for each well. The significant lower threshold for this method is 400 ppm.

GROUND WATER SAMPLING PROGRAM

Ground water samples were obtained by GeoEngineers from monitoring wells MW-2, MW-3, MW-4, MW-5, MW-6 and MW-7 on May 22, 1997. GeoEngineers collected additional samples from wells MW-5, MW-6 and MW-7 on June 8, 1997. At least three standing well volumes of ground water were removed from the wells with a disposable polyethylene bailer and the wells were allowed to recharge prior to sampling. Parameters of the purged ground water consisting of temperature, pH and conductivity were measured prior to sample collection. A new bailer and cord were used to sample each monitoring well to minimize the possibility of cross-contamination.

The water samples were transferred to 40-milliliter septum vials and 1-liter amber glass bottles in the field and kept cool during transport to the analytical laboratory. Chain-of-custody procedures were followed during transport of the samples to the analytical laboratory.

Purge water generated from the May and June 1997 sampling events (55 gallons) was treated by Alaska Pollution Control, Inc of Anchorage, Alaska.

SOIL CLASSIFICATION SYSTEM

0041

MAJOR DIVISIONS			GROUP SYMBOL	GROUP NAME
COARSE GRAINED SOILS	GRAVEL	CLEAN GRAVEL	GW	WELL-GRADED GRAVEL, FINE TO COARSE GRAVEL
			GP	POORLY-GRADED GRAVEL
	More Than 50% of Coarse Fraction Retained on No. 4 Sieve	GRAVEL WITH FINES	GM	SILTY GRAVEL
			GC	CLAYEY GRAVEL
More Than 50% Retained on No. 200 Sieve	SAND	CLEAN SAND	SW	WELL-GRADED SAND, FINE TO COARSE SAND
			SP	POORLY-GRADED SAND
	More Than 50% of Coarse Fraction Passes No. 4 Sieve	SAND WITH FINES	SM	SILTY SAND
			SC	CLAYEY SAND
FINE GRAINED SOILS	SILTY AND CLAY	INORGANIC	ML	SILT
			CL	CLAY
	Liquid Limit Less Than 50	ORGANIC	OL	ORGANIC SILT, ORGANIC CLAY
More Than 50% Passes No. 200 Sieve	SILTY AND CLAY	INORGANIC	MH	SILT OF HIGH PLASTICITY, ELASTIC SILT
			CH	CLAY OF HIGH PLASTICITY, FAT CLAY
	Liquid Limit 50 or More	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 blow count 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

ICE CLASSIFICATION SYSTEM

GROUP	ICE VISIBILITY	DESCRIPTION		SYMBOL	
N	Segregated ice not visible by eye	Poorly bonded or friable		Nf	
		Well Bonded	No excess ice	Nb	Nbn
			Excess microscopic ice		Nbe
V	Segregated ice is visible by eye and is one inch or less in thickness	Individual ice crystals or inclusions		Vx	
		Ice coatings on particles		Vc	
		Random or irregularly oriented ice		Vr	
		Stratified or distinctly oriented ice		Vs	
ICE	Ice greater than one inch in thickness	Ice with soil inclusions		ICE + soil type	
		Ice without soil inclusions		ICE	

GEI 85-85 Rev. 05/93

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SOIL AND ICE CLASSIFICATION SYSTEM

FIGURE A-1

LABORATORY TESTS:

CA Chemical Analysis

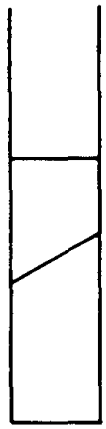
FIELD SCREENING TESTS:

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-5

0043

WELL SCHEMATIC

Casing Elevation (ft.):
Casing Stickup (ft.):

DEPTH IN FEET	Vapor Conc.(ppm) / Sheen	Blow Count	Samples	Group Symbol	DESCRIPTION (Surface Elevation (ft.):)
0				ASPHALT	Asphaltic concrete 0-3 inches
				SW-GW	
5	0 / NS				Brown, gravelly medium to coarse sand (loose, dry to damp)
10				SP	
	0 / NS	5			Brown, gravelly medium/coarse sand (loose, damp)
	0 / SS	41			Brown medium sand, trace gravel and coal (dense, damp)
15	0 / SS	38			Brown gravelly medium to coarse sand with scattered cobbles (dense, damp to moist)
	0 / NS	32			Brown medium to fine sand with trace gravel and coal (medium dense, moist)
20	0 / NS	28			Brown fine sand with trace gravel and coal (medium dense, damp)
25	0 / NS	39			Brown medium to fine sand with trace gravel (dense, moist)
30					

Aluminum surface monument
Pea gravel concrete
Medium sand backfill
Bentonite chips
2-inch Schedule 40 PVC well casing
Medium sand backfill

Note: See Figure A- 2 for explanation of symbols

SEW:LJD:PJT:skl 4/8/98

0161-409-18-0600

NHMW40

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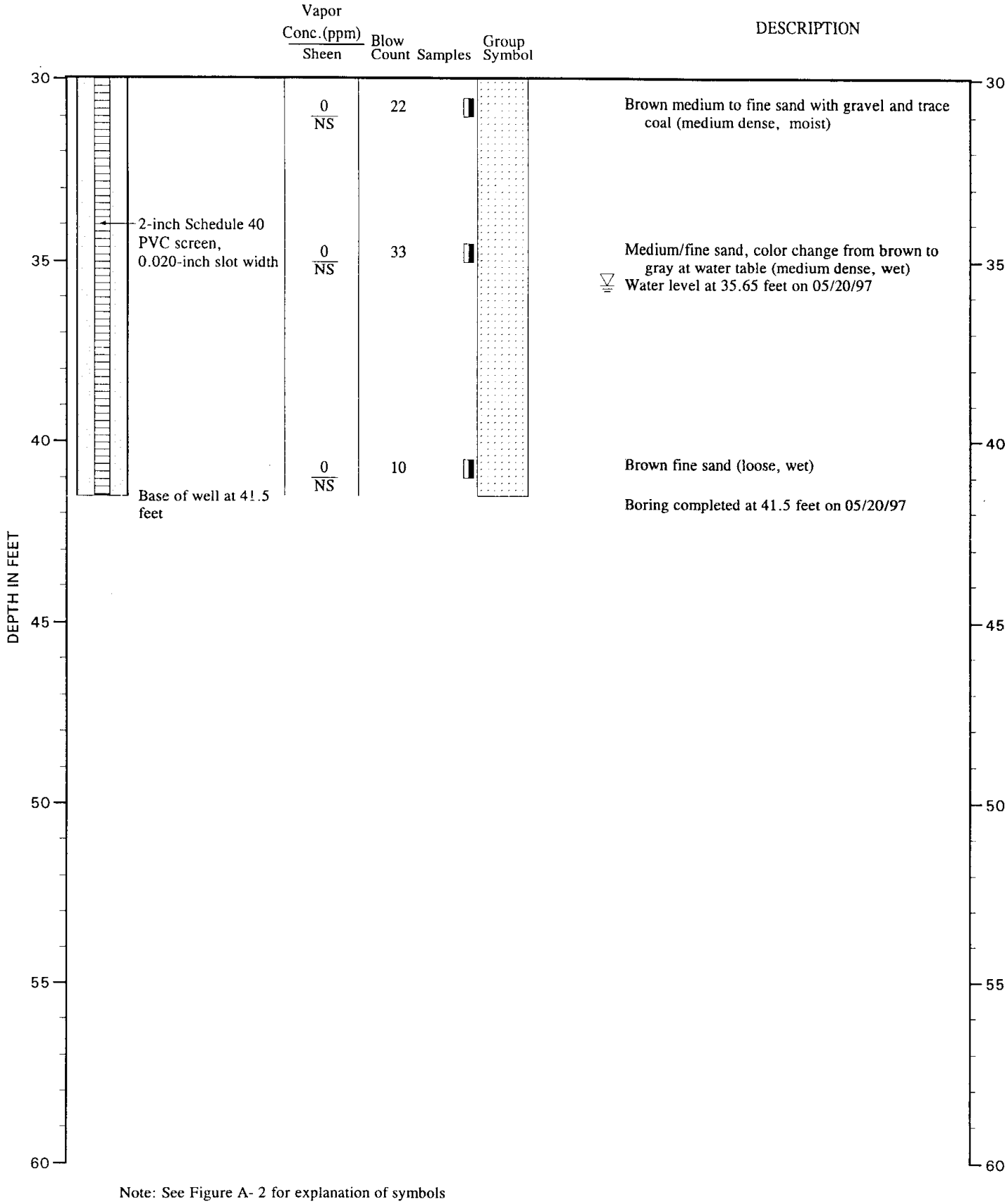
LOG OF MONITORING WELL

FIGURE A-3

MONITORING WELL MW-5
(Continued)

0044



Note: See Figure A- 2 for explanation of symbols

SEW:LJD:PJT:skl 4/8/98

0161-409-18-0600

NHMW40

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LOG OF MONITORING WELL

FIGURE A-3

MONITORING WELL MW-6

0045

WELL SCHEMATIC

Casing Elevation (ft.):

Casing Stickup (ft.):

DEPTH IN FEET	WELL SCHEMATIC	Vapor Conc.(ppm) / Sheen	Blow Count	Samples	Group Symbol	DESCRIPTION (Surface Elevation (ft.):)
0	Aluminum surface monument				ASPHALT	Asphaltic concrete 0-3 inches
					SW	
	Medium sand backfill					
5		0 / NS	32			Brown medium sand with medium gravel, scattered cobbles (medium dense, damp)
10	Bentonite chips	0 / SS	37			Brown/gray medium to coarse sand with gravel and scattered cobbles (dense, dry to damp)
		0 / SS	59			Brown, medium to coarse sand with gravel and scattered cobbles (very dense, dry to damp)
15		0 / SS	33			Brown medium to coarse sand with gravel and scattered cobbles (medium-dense, damp)
		0 / SS	33			Brown medium to coarse sand with gravel, scattered cobbles (medium-dense, dry to damp)
20	2-inch Schedule 40 PVC well casing	0 / MS	33			Brown, gravelly medium to coarse sand with cobbles (medium-dense, dry to damp)
25		0 / SS	35		SP	Brown medium to fine sand with trace gravel (medium-dense, damp to moist)
30	Medium sand backfill					

Note: See Figure A- 2 for explanation of symbols

SEW:LJD:PJT:skl 4/8/98

0161-409-18-0600

NHMW40

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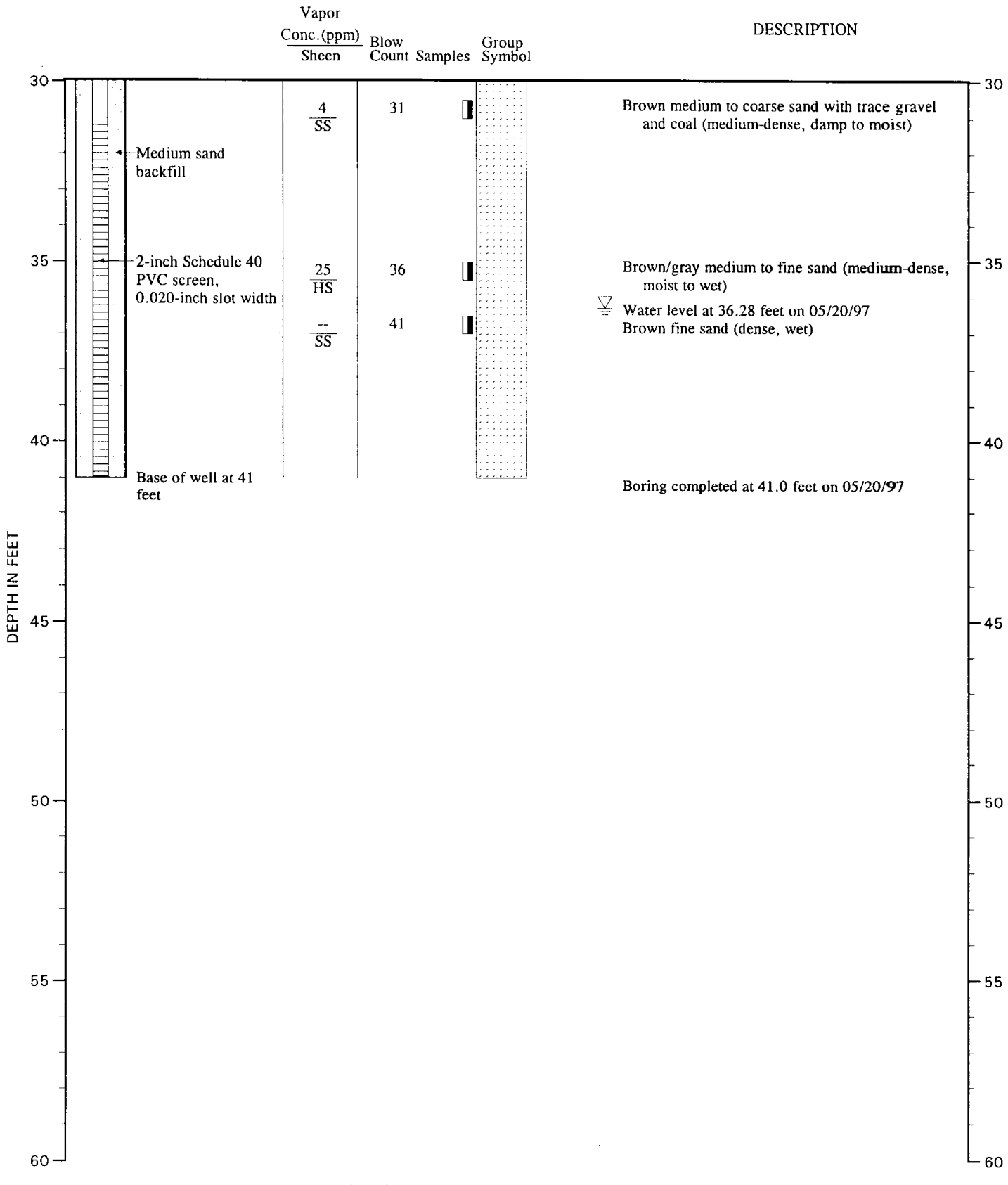
LOG OF MONITORING WELL

FIGURE A-4

MONITORING WELL MW-6
(Continued)

0046



Note: See Figure A- 2 for explanation of symbols

SEW:LJD:PJT:skl 4/8/98

0161-409-18-0600

NHMW40

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LOG OF MONITORING WELL

FIGURE A-4

MONITORING WELL MW-7

0047

WELL SCHEMATIC

Casing Elevation (ft.):
Casing Stickup (ft.):

Vapor Conc.(ppm) / Sheen	Blow Count	Samples	Group Symbol	DESCRIPTION (Surface Elevation (ft.):)
			ASPHALT	Asphaltic concrete 0-3 inches
			SW	
0 / NS	31			Brown, gravelly medium to coarse sand with scattered cobbles (medium-dense, dry to damp)
0 / NS	41			Brown, gravelly medium to coarse sand with cobbles (dense, dry to damp)
0 / NS	29			Brown, gravelly medium coarse sand with cobbles (medium-dense, dry to damp)
			SP	
0 / NS	33			Black medium to coarse sand with trace coal (medium-dense, dry to damp)
0 / NS	29		SP-SW	Black medium to coarse sand overlying damp, gray medium to coarse sand with gravel at 18.5 feet (medium-dense, dry to damp)
0 / NS	41			Gray-brown, gravelly medium sand with scattered cobbles and intermittent coal (dense, dry to damp)
0 / NS	31		SP	Brown, gravelly, medium sand overlying moist gray medium to fine sand with scattered small pebbles at 25.5 feet (medium-dense, damp to moist)

DEPTH IN FEET: 0, 5, 10, 15, 20, 25, 30

- Aluminum surface monument
- Medium sand backfill
- Bentonite chips
- 2-inch Schedule 40 PVC well casing
- Medium sand backfill

Note: See Figure A- 2 for explanation of symbols

SEW:LJD:PJT:skl 4/8/98

0161-409-18-0600

NHMW40

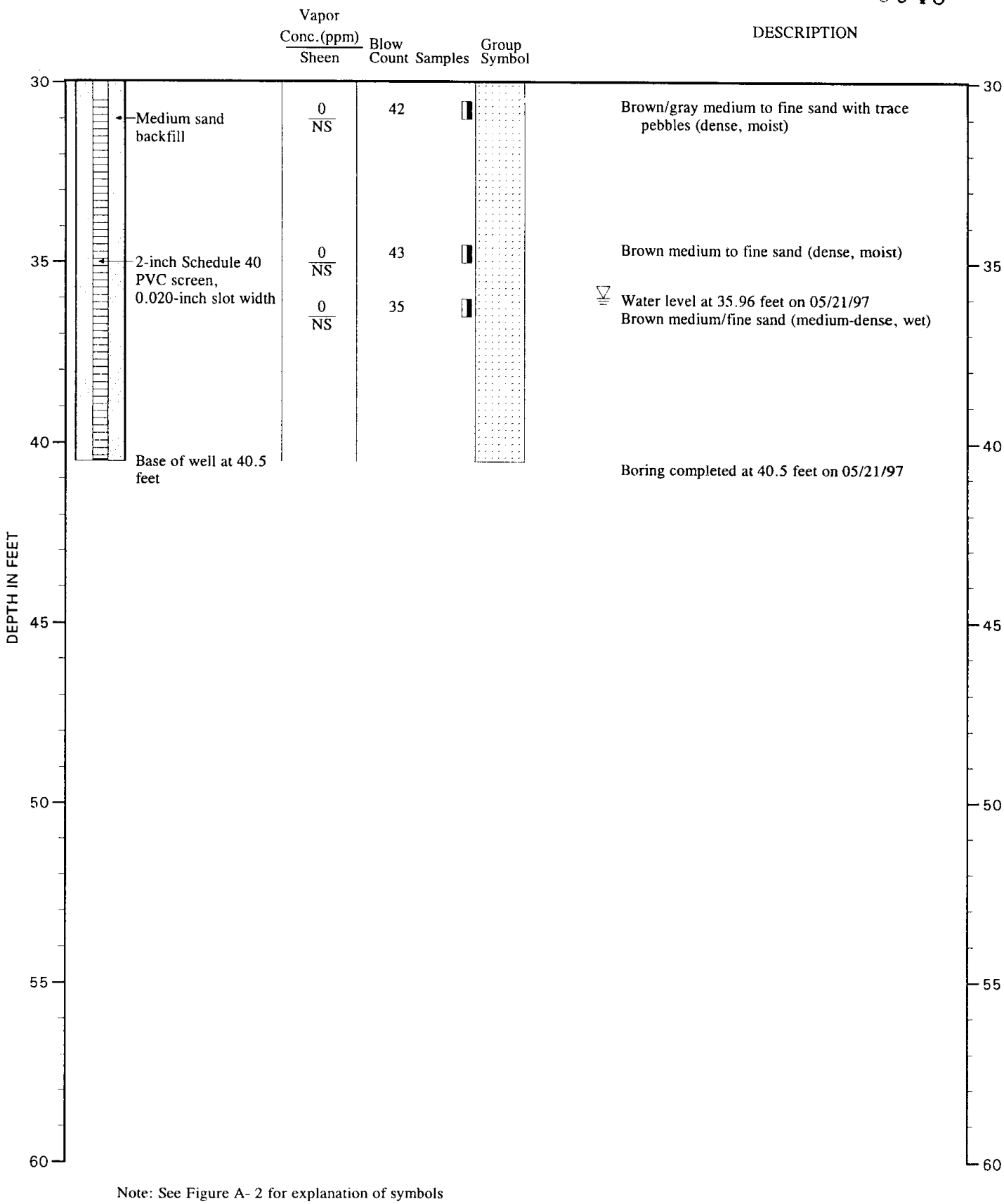
Geo Engineers

LOG OF MONITORING WELL

FIGURE A-5

MONITORING WELL MW-7
(Continued)

0048



Note: See Figure A- 2 for explanation of symbols

SEW:LJD:PJT:skl 4/8/98

0161-409-18-0600

NHMW40

Geo Engineers

LOG OF MONITORING WELL

FIGURE A-5

ATTACHMENT B

ATTACHMENT B

CHEMICAL ANALYTICAL PROGRAM

ANALYTICAL METHODS

Chain-of-custody procedures were followed during transport of the soil and ground water samples to North Creek Analytical Laboratory (NCA). North Creek is approved under ADEC's underground storage tank registration program for analytical laboratories. The samples were held in cold storage pending analysis and/or extraction. The analytical results, analytical methods reference and laboratory quality assurance/quality control (QA/QC) records are included in this attachment. The analytical results are also summarized in the text and Tables 1 and 3 of this report.

ANALYTICAL DATA REVIEW

North Creek Analytical maintains an internal quality assurance program as documented in its laboratory quality assurance manual. The laboratory uses a combination of blanks, surrogate recoveries, matrix spike and matrix spike duplicate recoveries, blank spike 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. Data quality goals were included in the laboratory report. The laboratory compared each group of samples with the existing data quality goals and noted any exceptions in the laboratory report. If data quality exceptions were documented by the laboratory in the laboratory report, the data quality exceptions were reviewed by GeoEngineers using the applicable data validation guidelines from the following documents: "National Functional Guidelines for Organic Data Review" draft dated 1991, and "Laboratory Data Validation Functional Guidelines for Evaluating Inorganic Analyses" dated 1988.

SUMMARY

NCA noted only one data quality exception in the laboratory report. The surrogate recovery for sample MW6-34.5′ could not be accurately quantified due to interference from coeluting organic compounds present in the sample during the AK101 analysis. NCA also noted that results in the diesel range organics range for sample MW5-12.5′ are primarily due to overlap from a heavy oil range product.

GeoEngineers collected blind field duplicate water samples from well MW-6 during the May and June 1997 sampling events. The duplicate sample was labelled "duplicate" on the laboratory chain-of-custody and was analyzed for BETX and GRO. BETX and GRO were detected in the MW-6 sample collected in May but not in the duplicate sample collected at that time. GeoEngineers notified NCA of the discrepancy and NCA recalculated the duplicate data confirming their initial results.

BETX and GRO were detected in both the MW-6 sample and the duplicate sample collected in June. Concentrations of these compounds detected in the duplicate sample, however, were well outside of acceptable relative percent difference limits when compared to the MW-6 sample results.

No data quality exceptions were documented in NCA's laboratory report. Our review of the data, however, revealed significant disparities between sample and blind field duplicate data. Subsequent water sampling events may remedy this disparity.

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Geo Engineers - Alaska	Project:	UNOCAL #5580	Sampled:	5/20/97 to 5/21/97
4951 Eagle Street	Project Number:	0161-~~354~~ 409-18	Received:	5/27/97
Anchorage, AK 99503-7432	Project Manager:	Laurie Jean Dworian	Reported:	6/11/97 09:23

ANALYTICAL REPORT FOR SAMPLES:

Sample Description	Laboratory Sample Number	Sample Matrix	Date Sampled
MW-5-12.5'	B705456-03	Soil	5/20/97
MW-5-34.0'	B705456-09	Soil	5/20/97
MW-6-25.0'	B705456-17	Soil	5/20/97
MW-6-30'	B705456-18	Soil	5/20/97
MW-6-34.5'	B705456-19	Soil	5/20/97
MW-7-34'	B705456-29	Soil	5/21/97
MW-7-35.5'	B705456-30	Soil	5/21/97

GeoEngineers
ANCHORAGE
JUN 13 1997
Routing LDO ☑ ☐ ☐ ☐
File 0161.409.-18

North Creek Analytical, Inc.

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.

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4951 Eagle Street	Project Number:	0161-354-18	Received: 5/27/97
Anchorage, AK 99503-7432	Project Manager:	Laurie Jean Dworian	Reported: 6/11/97 09:23

Gasoline Hydrocarbons (n-Hexane to <n-Decane) and BTEX by AK101
North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
MW-5-12.5'			**B705456-03**				**Soil**	
Gasoline Range Hydrocarbons	0670046	6/2/97	6/2/97		10.0	**18.5**	mg/kg dry	
Benzene	"	"	"		0.100	**0.621**	"	
Toluene	"	"	"		0.100	**1.76**	"	
Ethylbenzene	"	"	"		0.100	**0.209**	"	
Xylenes (total)	"	"	"		0.200	**3.60**	"	
Surrogate: 4-BFB (FID)	"	"	"	*50.0-150*		*87.3*	*%*	
Surrogate: a,a,a-TFT (FID)	"	"	"	*50.0-150*		*93.4*	"	
Surrogate: 4-BFB (PID)	"	"	"	*50.0-150*		*85.8*	"	
Surrogate: a,a,a-TFT (PID)	"	"	"	*50.0-150*		*96.7*	"	
MW-5-34.0'			**B705456-09**				**Soil**	
Gasoline Range Hydrocarbons	0670046	6/2/97	6/2/97		10.0	**12.7**	mg/kg dry	
Benzene	"	"	"		0.100	**2.43**	"	
Toluene	"	"	"		0.100	**1.86**	"	
Ethylbenzene	"	"	"		0.100	**0.101**	"	
Xylenes (total)	"	"	"		0.200	ND	"	
Surrogate: 4-BFB (FID)	"	"	"	*50.0-150*		*92.5*	*%*	
Surrogate: a,a,a-TFT (FID)	"	"	"	*50.0-150*		*90.8*	"	
Surrogate: 4-BFB (PID)	"	"	"	*50.0-150*		*90.8*	"	
Surrogate: a,a,a-TFT (PID)	"	"	"	*50.0-150*		*92.5*	"	
MW-6-25.0'			**B705456-17**				**Soil**	
Gasoline Range Hydrocarbons	0670046	6/2/97	6/2/97		5.00	ND	mg/kg dry	
Benzene	"	"	"		0.0500	ND	"	
Toluene	"	"	"		0.0500	**0.148**	"	
Ethylbenzene	"	"	"		0.0500	ND	"	
Xylenes (total)	"	"	"		0.100	**0.179**	"	
Surrogate: 4-BFB (FID)	"	"	"	*50.0-150*		*108*	*%*	
Surrogate: a,a,a-TFT (FID)	"	"	"	*50.0-150*		*91.9*	"	
Surrogate: 4-BFB (PID)	"	"	"	*50.0-150*		*108*	"	
Surrogate: a,a,a-TFT (PID)	"	"	"	*50.0-150*		*94.8*	"	
MW-6-30'			**B705456-18**				**Soil**	
Gasoline Range Hydrocarbons	0670046	6/2/97	6/2/97		5.00	ND	mg/kg dry	
Benzene	"	"	"		0.0500	ND	"	
Toluene	"	"	"		0.0500	**0.0745**	"	
Ethylbenzene	"	"	"		0.0500	ND	"	
Xylenes (total)	"	"	"		0.100	**0.229**	"	

North Creek Analytical, Inc.

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

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4951 Eagle Street	Project Number:	0161-354-18	Received: 5/27/97
Anchorage, AK 99503-7432	Project Manager:	Laurie Jean Dworian	Reported: 6/11/97 09:23

Gasoline Hydrocarbons (n-Hexane to <n-Decane) and BTEX by AK101
North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
MW-6-30' (continued)			**B705456-18**				**Soil**	
Surrogate: 4-BFB (FID)	*0670046*	*6/2/97*	*6/2/97*	*50.0-150*		*117*	*%*	
Surrogate: a,a,a-TFT (FID)	"	"	"	*50.0-150*		*96.1*	"	
Surrogate: 4-BFB (PID)	"	"	"	*50.0-150*		*114*	"	
Surrogate: a,a,a-TFT (PID)	"	"	"	*50.0-150*		*96.8*	"	
MW-6-34.5'			**B705456-19**				**Soil**	
Gasoline Range Hydrocarbons	0670046	6/2/97	6/3/97		25.0	**67.8**	mg/kg dry	1
Benzene	"	"	"		0.250	ND	"	
Toluene	"	"	"		0.250	ND	"	
Ethylbenzene	"	"	"		0.250	**0.262**	"	
Xylenes (total)	"	"	"		0.500	**1.03**	"	
Surrogate: 4-BFB (FID)	"	"	"	*50.0-150*		*NR*	*%*	*2*
Surrogate: a,a,a-TFT (FID)	"	"	"	*50.0-150*		*90.8*	"	
Surrogate: 4-BFB (PID)	"	"	"	*50.0-150*		*79.5*	"	
Surrogate: a,a,a-TFT (PID)	"	"	"	*50.0-150*		*77.3*	"	
MW-7-34'			**B705456-29**				**Soil**	
Gasoline Range Hydrocarbons	0670046	6/2/97	6/3/97		5.00	ND	mg/kg dry	
Benzene	"	"	"		0.0500	ND	"	
Toluene	"	"	"		0.0500	ND	"	
Ethylbenzene	"	"	"		0.0500	ND	"	
Xylenes (total)	"	"	"		0.100	ND	"	
Surrogate: 4-BFB (FID)	"	"	"	*50.0-150*		*112*	*%*	
Surrogate: a,a,a-TFT (FID)	"	"	"	*50.0-150*		*92.5*	"	
Surrogate: 4-BFB (PID)	"	"	"	*50.0-150*		*112*	"	
Surrogate: a,a,a-TFT (PID)	"	"	"	*50.0-150*		*95.2*	"	
MW-7-35.5'			**B705456-30**				**Soil**	
Gasoline Range Hydrocarbons	0670046	6/2/97	6/3/97		5.00	ND	mg/kg dry	
Benzene	"	"	"		0.0500	ND	"	
Toluene	"	"	"		0.0500	ND	"	
Ethylbenzene	"	"	"		0.0500	ND	"	
Xylenes (total)	"	"	"		0.100	ND	"	
Surrogate: 4-BFB (FID)	"	"	"	*50.0-150*		*77.2*	*%*	
Surrogate: a,a,a-TFT (FID)	"	"	"	*50.0-150*		*72.8*	"	
Surrogate: 4-BFB (PID)	"	"	"	*50.0-150*		*79.3*	"	
Surrogate: a,a,a-TFT (PID)	"	"	"	*50.0-150*		*77.2*	"	

North Creek Analytical, Inc.

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

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Geo Engineers - Alaska	Project:	UNOCAL #5580	Sampled: 5/20/97 to 5/21/97
4951 Eagle Street	Project Number:	0161-354-18	Received: 5/27/97
Anchorage, AK 99503-7432	Project Manager:	Laurie Jean Dworian	Reported: 6/11/97 09:23

Diesel Hydrocarbons (C10-C25) by AK102
North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
MW-5-12.5'			**B705456-03**				**Soil**	
Diesel Range Hydrocarbons	0570702	5/28/97	6/7/97		8.00	**46.4**	mg/kg dry	3
Surrogate: 2-FBP	"	"	"	*50.0-150*		*96.0*	%	
MW-5-34.0'			**B705456-09**				**Soil**	
Diesel Range Hydrocarbons	0570702	5/28/97	5/29/97		4.00	**11.6**	mg/kg dry	
Surrogate: 2-FBP	"	"	"	*50.0-150*		*85.8*	%	
MW-6-25.0'			**B705456-17**				**Soil**	
Diesel Range Hydrocarbons	0570702	5/28/97	5/29/97		4.00	ND	mg/kg dry	
Surrogate: 2-FBP	"	"	"	*50.0-150*		*80.5*	%	
MW-6-30'			**B705456-18**				**Soil**	
Diesel Range Hydrocarbons	0570702	5/28/97	5/29/97		4.00	**7.64**	mg/kg dry	
Surrogate: 2-FBP	"	"	"	*50.0-150*		*77.6*	%	
MW-6-34.5'			**B705456-19**				**Soil**	
Diesel Range Hydrocarbons	0570702	5/28/97	5/29/97		4.00	**46.6**	mg/kg dry	
Surrogate: 2-FBP	"	"	"	*50.0-150*		*89.3*	%	
MW-7-34'			**B705456-29**				**Soil**	
Diesel Range Hydrocarbons	0570702	5/28/97	5/29/97		4.00	ND	mg/kg dry	
Surrogate: 2-FBP	"	"	"	*50.0-150*		*92.6*	%	
MW-7-35.5'			**B705456-30**				**Soil**	
Diesel Range Hydrocarbons	0570702	5/28/97	5/29/97		4.00	ND	mg/kg dry	
Surrogate: 2-FBP	"	"	"	*50.0-150*		*81.3*	%	

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4951 Eagle Street	Project Number:	0161-354-18	Received:	5/27/97
Anchorage, AK 99503-7432	Project Manager:	Laurie Jean Dworian	Reported:	6/11/97 09:23

Dry Weight Determination
North Creek Analytical - Bothell

Sample Name	Lab ID	Matrix	Result	Units
MW-5-12.5'	B705456-03	Soil	94.2	%
MW-5-34.0'	B705456-09	Soil	87.0	%
MW-6-25.0'	B705456-17	Soil	91.2	%
MW-6-30'	B705456-18	Soil	97.3	%
MW-6-34.5'	B705456-19	Soil	96.7	%
MW-7-34'	B705456-29	Soil	96.8	%
MW-7-35.5'	B705456-30	Soil	77.9	%

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4951 Eagle Street	Project Number:	0161-354-18	Received: 5/27/97
Anchorage, AK 99503-7432	Project Manager:	Laurie Jean Dworian	Reported: 6/11/97 09:23

Gasoline Hydrocarbons (n-Hexane to <n-Decane) and BTEX by AK101/Quality Control
North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit / Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0670046	**Date Prepared: 6/2/97**					**Extraction Method: MeOH Extraction**				
Blank	**0670046-BLK1**									
Gasoline Range Hydrocarbons	6/2/97			**ND**	mg/kg dry	**5.00**				
Benzene	"			**ND**	"	**0.0500**				
Toluene	"			**ND**	"	**0.0500**				
Ethylbenzene	"			**ND**	"	**0.0500**				
Xylenes (total)	"			**ND**	"	**0.100**				
Surrogate: 4-BFB (FID)	"	*6.00*		*6.18*	"	*50.0-150*	*103*			
Surrogate: a,a,a-TFT (FID)	"	*6.00*		*6.03*	"	*50.0-150*	*101*			
Surrogate: 4-BFB (PID)	"	*6.00*		*6.22*	"	*50.0-150*	*104*			
Surrogate: a,a,a-TFT (PID)	"	*6.00*		*6.25*	"	*50.0-150*	*104*			
LCS	**0670046-BS1**									
Gasoline Range Hydrocarbons	6/2/97	62.5		63.0	mg/kg dry	75.0-125	**101**			
Surrogate: 4-BFB (FID)	"	*6.00*		*6.80*	"	*50.0-150*	*113*			
Surrogate: a,a,a-TFT (FID)	"	*6.00*		*6.04*	"	*50.0-150*	*101*			
Duplicate	**0670046-DUP1**		**B705456-03**							
Gasoline Range Hydrocarbons	6/2/97		18.5	18.2	mg/kg dry			50.0	**1.63**	
Surrogate: 4-BFB (FID)	"	*2.12*		*1.86*	"	*50.0-150*	*87.7*			
Surrogate: a,a,a-TFT (FID)	"	*2.12*		*1.95*	"	*50.0-150*	*92.0*			
Matrix Spike	**0670046-MS1**		**B705456-17**							
Benzene	6/2/97	1.37	ND	1.49	mg/kg dry	60.0-140	**109**			
Toluene	"	1.37	0.148	1.80	"	60.0-140	**121**			
Ethylbenzene	"	1.37	ND	1.41	"	60.0-140	**103**			
Xylenes (total)	"	4.11	0.179	4.57	"	60.0-140	**107**			
Surrogate: 4-BFB (PID)	"	*6.58*		*6.71*	"	*50.0-150*	*102*			
Surrogate: a,a,a-TFT (PID)	"	*6.58*		*5.93*	"	*50.0-150*	*90.1*			
Matrix Spike Dup	**0670046-MSD1**		**B705456-17**							
Benzene	6/2/97	1.37	ND	1.44	mg/kg dry	60.0-140	**105**	20.0	**3.74**	
Toluene	"	1.37	0.148	1.77	"	60.0-140	**118**	20.0	**2.51**	
Ethylbenzene	"	1.37	ND	1.43	"	60.0-140	**104**	20.0	**0.966**	
Xylenes (total)	"	4.11	0.179	4.67	"	60.0-140	**109**	20.0	**1.85**	
Surrogate: 4-BFB (PID)	"	*6.58*		*7.13*	"	*50.0-150*	*108*			
Surrogate: a,a,a-TFT (PID)	"	*6.58*		*6.07*	"	*50.0-150*	*92.2*			

North Creek Analytical, Inc.

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4951 Eagle Street	Project Number:	0161-354-18	Received: 5/27/97
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Diesel Hydrocarbons (C10-C25) by AK102/Quality Control
North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0570702	**Date Prepared: 5/28/97**					**Extraction Method: EPA 3550**				
Blank	**0570702-BLK1**									
Diesel Range Hydrocarbons	5/28/97			**ND**	mg/kg dry	**4.00**				
Surrogate: 2-FBP	"	*11.7*		*10.9*	"	*50.0-150*	*93.2*			
LCS	**0570702-BS1**									
Diesel Range Hydrocarbons	5/28/97	68.0		70.5	mg/kg dry	60.0-120	**104**			
Surrogate: 2-FBP	"	*11.7*		*9.94*	"	*50.0-150*	*85.0*			
LCS Dup	**0570702-BSD1**									
Diesel Range Hydrocarbons	5/28/97	68.0		67.9	mg/kg dry	60.0-120	**99.9**	20.0	**4.02**	
Surrogate: 2-FBP	"	*11.7*		*9.29*	"	*50.0-150*	*79.4*			

North Creek Analytical, Inc.

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

Laura Dutton

Laura L Dutton, Director, Analytical Services

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9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

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

0059

Geo Engineers - Alaska	Project:	UNOCAL #5580	Sampled: 5/20/97 to 5/21/97
4951 Eagle Street	Project Number:	0161-354-18	Received: 5/27/97
Anchorage, AK 99503-7432	Project Manager:	Laurie Jean Dworian	Reported: 6/11/97 09:23

Notes and Definitions

#	Note
1	This sample appears to contain extractable diesel range organics.
2	The surrogate recovery for this sample cannot be accurately quantified due to interference from coeluting organic compounds present in the sample.
3	Results in the diesel organics range are primarily due to overlap from a heavy oil range product.
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.

Laura Dutton

Laura L Dutton, Director, Analytical Services

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9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132 (503) 643-9200 FAX 644-2202

UNOCAL CHAIN OF CUSTODY REPORT

UNOCAL INFORMATION

Facility Number: 5580
Site Address: 442 Gambell ST
City, State, ZIP: Anchorage AK 99501
Site Release Number: MXB -
Unocal Manager: Dr. Mark Beasley
CERT INFO: (check one) ✗ Evaluation o Remediation
o Detection o Demolition o Closure o Miscellaneous

CONSULTANT INFORMATION

Firm: Geoengineers Project Number: 0161-354-10
Address: 4951 Eagle ST
Anchorage AK 99503
Phone: 907/561-3478 Fax: 907/561-5723
Project Manager: Laurie Jean Duncan
Sample Collection by: Patrick Dinneen

Chain of Custody Record #: B705456

Quality Assurance Data Level: (A) B
A: Standard Summary
B: Standard + Chromatograms

Laboratory Turnaround Days: (10) 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 AK101	BTEX (EPA 8020 Mod.)	TPH-Gas + BTEX AK101/8020	TPH-Diesel AK102	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. MW-5-5.0'	5/20 9:40	S	4				X	X										B705456-01	Hold
2. MW-5-10.0'	5/20 9:50		4				X	X										02	Hold
3. MW-5-12.5'	10:00		4				X	X										03	Analyze
4. MW-5-15.0'	10:05		4				X											04	Hold
5. MW-5-17.5'	10:10		4															05	Hold
6. MW-5-20'	10:15		4															06	Hold one 8oz jar rec'd broken 5/27 LJD
7. MW-5-25'	10:25		4															07	Hold
8. MW-5-30'	10:35		3															08	Hold
9. MW-5-34'	10:45		3				X	X										09	Analyze
10. MW-5-40'	10:50	↓	3															10	Hold 8 oz jar rec'd broken 5/27 LJD

0900

Relinquished by:	Firm:	Date & Time	Received by:	Firm:	Date & Time
1.	NRI	5/22/97 12:00		NCA	5-27-97 07:00
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: Date:

Page 1 of 3

Rev. 2.2, 11/94

Comments:

Distribution: White, Laboratory; Yellow, Consultant; Photocopy, Unocal

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9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132 (503) 643-9200 FAX 644-2202

UNOCAL CHAIN OF CUSTODY REPORT

UNOCAL INFORMATION

Facility Number: 5582
Site Address: 442 Gambell St
City, State, ZIP: Anchorage, Ak 99501
Site Release Number:
Unocal Manager: Dr Mark Brearley
CERT INFO: (check one) ☒ Evaluation o Remediation
o Detection o Demolition o Closure o Miscellaneous

CONSULTANT INFORMATION

Firm: GeoEngineers Project Number: 0161-354-12
Address: 4951 Eagle St
Anchorage Ak 99503
Phone: 907/561-3478 Fax: 907/561-5723
Project Manager: Laurie Jean Dworian
Sample Collection by: Patrick Dimmer

Chain of Custody Record #: B705456

Quality Assurance Data Level: (A) B
A: Standard Summary
B: Standard + Chromatograms

Laboratory Turnaround Days: (10) 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 (EPA 8015 Mod.)	TPH-Diesel (EPA 8015 Mod.)	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. MW-6 - 5'	5/20 12:55	S	3																B705456-			11	Hold
2. MW-6 - 10'	13:05																					12	
3. MW-6 - 12.5'	13:10																					13	
4. MW-6 - 15'	13:15																					14	
5. MW-6 - 17.5'	13:20																					15	
6. MW-6 - 20'	13:30																					16	
7. MW-6 - 25'	13:40						X	X														17	PID = 0 ppm
8. MW-6 - 30'	13:50						X	X														18	PID = 4 ppm
9. MW-6 - 34.5'	14:00						X	X														19	PID = 25 ppm
10. MW-6 - 36'	14:05																					20	Hold

Relinquished by:	Firm:	Date & Time	Received by:	Firm:	Date & Time
1.	GPE	5/22/97 12:00		NCA	5-27-97 07:00
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: Date:

Page 2 of 3

Rev. 2.2, 11/94

Comments:

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NORTH CREEK ANALYTICAL

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9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132 (503) 643-9200 FAX 644-2202

UNOCAL CHAIN OF CUSTODY REPORT

UNOCAL INFORMATION

Facility Number: 5550
Site Address: 442 Gambell St
City, State, ZIP: Anchorage AK 99501
Site Release Number:
Unocal Manager: Dr Mark Brearley
CERT INFO: (check one) Evaluation o Remediation
o Detection o Demolition o Closure o Miscellaneous

CONSULTANT INFORMATION

Firm: GeoEngineers Project Number: 0161-354-18
Address: 4951 Boyer ST
Anchorage AK 99503
Phone: 907/561-3478 Fax: 907/561-5123
Project Manager: Laurie Jean Swanson
Sample Collection by: Patrick Timm

Chain of Custody Record #: B705456

Quality Assurance Data Level: (A) B
A: Standard Summary
B: Standard + Chromatograms

Laboratory Turnaround Days: (10) 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 AK101/8020	TPH-Diesel AK102	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. MW-7 - 5.0'	5/21 9:00	S	3															B705456-21				Hold TB-1
2. MW-7 - 10.0'	9:10																				22	TB-2
3. MW-7 - 12.5'	9:20																				23	TB-3
4. MW 7 - 15'	9:30																				24	
5. MW-7 - 17.5'	9:40																				25	
6. MW-7 - 20'	9:50																				26	
7. MW-7 - 25'	10:00																				27	
8. MW-7 - 30'	10:10																				28	
9. MW-7 - 34'	10:20						X	X													29	analyze
10. MW-7 - 35.5'	10:30						X	X													30	analyze

	Relinquished by:	Firm:	Date & Time	Received by:	Firm:	Date & Time
1.		GRI	5/22/97 12:00	Lisa Hurley	NCA	5-27-97 07:00
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: Date:

Page 3 of 3
Rev. 2.2, 11/94

Comments: NCA trip Blank also included

Distribution: White - Laboratory Yellow - Consultant Photocopy - Unocal

2900

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

0063

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

Geo Engineers - Alaska	Project:	UNOCAL #5580	Sampled: 5/20/97
4951 Eagle Street	Project Number:	0161-~~354-18~~ 409	Received: 5/27/97
Anchorage, AK 99503-7432	Project Manager:	Laurie Jean Dworian	Reported: 7/2/97 10:21

ANALYTICAL REPORT FOR SAMPLES:

Sample Description	Laboratory Sample Number	Sample Matrix	Date Sampled
MW-5-12.5'	B706598-01	Soil	5/20/97
MW-5-34.0'	B706598-02	Soil	5/20/97
MW-6-30'	B706598-03	Soil	5/20/97
MW-6-34.5'	B706598-04	Soil	5/20/97

GeoEngineers
ANCHORAGE

JUL 7 199

Routing. . . . . ☐ . . . .
. . . . . ☐ . . . . ☐
File. . . 0161:409.18

North Creek Analytical, Inc.

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.

Laura Dutton

Laura L Dutton, Director, Analytical Services

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NORTH CREEK ANALYTICAL
Environmental Laboratory Services

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

0064

Geo Engineers - Alaska	Project:	UNOCAL #5580	Sampled: 5/20/97
4951 Eagle Street	Project Number:	0161-354-18	Received: 5/27/97
Anchorage, AK 99503-7432	Project Manager:	Laurie Jean Dworian	Reported: 7/2/97 10:21

Gasoline Hydrocarbons (n-Hexane to <n-Decane) and BTEX by AK101
North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
MW-5-12.5'			**B706598-01**				**Soil**	
Gasoline Range Hydrocarbons	0770041	6/30/97	6/30/97		5.00	**16.2**	mg/kg dry	
Benzene	"	"	"		0.0500	**0.696**	"	
Toluene	"	"	"		0.0500	**1.78**	"	
Ethylbenzene	"	"	"		0.0500	**0.231**	"	
Xylenes (total)	"	"	"		0.100	**3.67**	"	
Surrogate: 4-BFB (FID)	"	"	"	*60.0-120*		*84.4*	%	
Surrogate: a,a,a-TFT (FID)	"	"	"	*50.0-150*		*102*	"	
Surrogate: 4-BFB (PID)	"	"	"	*60.0-120*		*74.5*	"	
Surrogate: a,a,a-TFT (PID)	"	"	"	*50.0-150*		*88.7*	"	
MW-5-34.0'			**B706598-02**				**Soil**	
Gasoline Range Hydrocarbons	0770041	6/30/97	6/30/97		5.00	**9.52**	mg/kg dry	
Benzene	"	"	"		0.0500	**2.13**	"	
Toluene	"	"	"		0.0500	**1.74**	"	
Ethylbenzene	"	"	"		0.0500	**0.110**	"	
Xylenes (total)	"	"	"		0.100	**0.198**	"	
Surrogate: 4-BFB (FID)	"	"	"	*60.0-120*		*88.8*	%	
Surrogate: a,a,a-TFT (FID)	"	"	"	*50.0-150*		*95.4*	"	
Surrogate: 4-BFB (PID)	"	"	"	*60.0-120*		*72.1*	"	
Surrogate: a,a,a-TFT (PID)	"	"	"	*50.0-150*		*78.7*	"	
MW-6-30'			**B706598-03**				**Soil**	
Gasoline Range Hydrocarbons	0770041	6/30/97	6/30/97		5.00	ND	mg/kg dry	
Benzene	"	"	"		0.0500	ND	"	
Toluene	"	"	"		0.0500	**0.141**	"	
Ethylbenzene	"	"	"		0.0500	ND	"	
Xylenes (total)	"	"	"		0.100	**0.370**	"	
Surrogate: 4-BFB (FID)	"	"	"	*60.0-120*		*89.0*	%	
Surrogate: a,a,a-TFT (FID)	"	"	"	*50.0-150*		*88.3*	"	
Surrogate: 4-BFB (PID)	"	"	"	*60.0-120*		*82.5*	"	
Surrogate: a,a,a-TFT (PID)	"	"	"	*50.0-150*		*89.6*	"	
MW-6-34.5'			**B706598-04**				**Soil**	
Gasoline Range Hydrocarbons	0770041	6/30/97	6/30/97		5.00	**68.6**	mg/kg dry	
Benzene	"	"	"		0.0500	**0.0578**	"	
Toluene	"	"	"		0.0500	**0.218**	"	
Ethylbenzene	"	"	"		0.0500	**0.346**	"	
Xylenes (total)	"	"	"		0.100	**1.06**	"	

North Creek Analytical, Inc.

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

Laura Dutton

Laura L Dutton, Director, Analytical Services

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

0065

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

Geo Engineers - Alaska	Project:	UNOCAL #5580	Sampled: 5/20/97
4951 Eagle Street	Project Number:	0161-354-18	Received: 5/27/97
Anchorage, AK 99503-7432	Project Manager:	Laurie Jean Dworian	Reported: 7/2/97 10:21

Gasoline Hydrocarbons (n-Hexane to <n-Decane) and BTEX by AK101
North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
MW-6-34.5' (continued)			**B706598-04**				**Soil**	
Surrogate: 4-BFB (FID)	*0770041*	*6/30/97*	*6/30/97*	*60.0-120*		*NR*	*%*	*1*
Surrogate: a,a,a-TFT (FID)	"	"	"	*50.0-150*		*98.4*	"	
Surrogate: 4-BFB (PID)	"	"	"	*60.0-120*		*94.6*	"	
Surrogate: a,a,a-TFT (PID)	"	"	"	*50.0-150*		*87.0*	"	

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

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

Geo Engineers - Alaska	Project:	UNOCAL #5580	Sampled: 5/20/97
4951 Eagle Street	Project Number:	0161-354-18	Received: 5/27/97
Anchorage, AK 99503-7432	Project Manager:	Laurie Jean Dworian	Reported: 7/2/97 10:21

Notes and Definitions

#	Note
1	The surrogate recovery for this sample cannot be accurately quantified due to interference from coeluting organic compounds present in the sample.
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

Relog New # B706598

NORTH CREEK ANALYTICAL
18939 120th Avenue N.E. Suite 101, Bothell, WA 98011 (425) 420-9200 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: 5580
Site Address: 442 Gambell ST
City, State, ZIP: Anchorage AK 99501
Site Release Number: MXB -
Unocal Manager: Dr. Mark Brumley
CERT INFO: (check one) ✗ Evaluation o Remediation
o Detection o Demolition o Closure o Miscellaneous

CONSULTANT INFORMATION

Firm: Gregineers Project Number: 0161-354-10
Address: 4951 Eagle ST
Anchorage AK 99503
Phone: 907/521-3479 Fax: 907/521-5723
Project Manager: Laurie Jean Duncan
Sample Collection by: Patrick Diener

Chain of Custody Record #: B705456

Quality Assurance Data Level: (A) B
A: Standard Summary
B: Standard + Chromatograms

Laboratory Turnaround Days: (10) 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 Analyzed	BTEX (EPA 8020 Mod.)	TPH-Gas + BTEX AK101/8021	TPH-Diesel AK102	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. MW-5-5.0'	5/20 9:40	S	4				X	X											B705456-01			Hold
2. MW-5-10.0'	5/20 9:50		4				X	X											02			Hold
3. MW-5-12.5'	10:00		4			X	X	X											03			Analyze
4. MW-5-15.0'	10:05		4				X												04			Hold
5. MW-5-17.5'	10:10		4																05			Hold
6. MW-5-20'	10:15		4																06			Hold
7. MW-5-25'	10:25		4																07			Hold
8. MW-5-30'	10:35		3																08			Hold
9. MW-5-34'	10:45		3			X	X												09			Analyze
10. MW-5-40'	10:50		3																10			Hold

Relog 6/25 RH

relog in on Today 6/27. give new #'s - asap

one 8oz jar rec'd broken 5/27 fwd

8 oz jar rec'd broken 5/27 fwd

Relinquished by:	Firm:	Date & Time	Received by:	Firm:	Date & Time
1.	GREI	5/22/97 12:00		NCA	5-27-97 07:00
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: Date:

Page 1 of 3
Rev. 2.2, 11/94

Comments:

Distribution: White - Laboratory Yellow - Consultant Photocopy - Unocal

NORTH CREEK ANALYTICAL
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9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132 (503) 643-9200 FAX 644-2202

relog NEW #

B706598

UNOCAL CHAIN OF CUSTODY REPORT

UNOCAL INFORMATION

Facility Number: 5582

Site Address: 142 Gambell St

City, State, ZIP: Anchorage, Ak 99501

Site Release Number:

Unocal Manager: Dr Mark Brearley

CERT INFO: (check one) ⊗ Evaluation o Remediation

o Detection o Demolition o Closure o Miscellaneous

CONSULTANT INFORMATION

Firm: GeoEngineers Project Number: 0161-354-12

Address: 4951 Eagle St
Anchorage AK 99503

Phone: 907/561-3478 Fax: 907/561-5723

Project Manager: Laurie Jean Dworian

Sample Collection by: Patrick Donner

Chain of Custody Record #: B705456

Quality Assurance Data Level: (A) B

A: Standard Summary

B: Standard + Chromatograms

Laboratory Turnaround Days: (10) 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
							AK101/8021	AK102														
1. MW-6 - 5'	5/20 12:55	S	3															B705456-	11			Hold
2. MW-6 - 10'	13:05																		12			
3. MW-6 - 12.5'	13:10																		13			
4. MW-6 - 15'	13:15																		14			
5. MW-6 - 17.5'	13:20																		15			
6. MW-6 - 20'	13:30																		16			
7. MW-6 - 25'	13:40						X	X											17			PID=0 ppm
8. MW-6 - 30'	13:50						X	X											18			PID=4 ppm
9. MW-6 - 34.5'	14:00						X	X											19			PID=25 ppm
10. MW-6 - 36'	14:05	↓	↓																20			Hold

0068

Relinquished by:	Firm:	Date & Time	Received by:	Firm:	Date & Time
1.	GPE	5/22/97 12:00		NCA	5-27-97 07:00
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: Date:

Page 2 of 3

Rev. 2.2, 11/94

Comments:

Distribution: White - Laboratory Yellow - Consultant Photocopy - Unocal

NORTH CREEK ANALYTICAL

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UNOCAL CHAIN OF CUSTODY REPORT

UNOCAL INFORMATION

Facility Number: 5550
Site Address: 442 Kenball ST
City, State, ZIP: Anchorage AK 99501
Site Release Number:
Unocal Manager: Dr Mark Brearley
CERT INFO: (check one) ◉ Evaluation o Remediation
o Detection o Demolition o Closure o Miscellaneous

CONSULTANT INFORMATION

Firm: Geo Engineers Project Number: 0161-354-10
Address: 4951 Roger ST
Anchorage AK 99503
Phone: 907/561-3478 Fax: 907/561-5123
Project Manager: Laura Jean Duncan
Sample Collection by: Patrick Timm

Chain of Custody Record #: B705456

Quality Assurance Data Level: (A) B
A: Standard Summary
B: Standard + Chromatograms

Laboratory Turnaround Days: (10) 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 (NWTPH-Gx/8020)	TPH-Diesel (NWTPH-Dx)	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 Semi Vols. (EPA 8270)	PAHs by HPLC (EPA 8310)	Lead: Total or Dissolved	TCLP Metals (8)					NCA SAMPLE NUMBER
1. MW-7 - 5.0'	5/21 9:00	S	3															B705456-21					Hold TB-1
2. MW-7 - 10.0'	9:10																				22		TB-2
3. MW-7 - 12.5'	9:20																				23		TB-3
4. MW-7 - 15'	9:30																				24		
5. MW-7 - 17.5'	9:40																				25		
6. MW-7 - 20'	9:50																				26		
7. MW-7 - 25'	10:00																				27		
8. MW-7 - 30'	10:10																				28		
9. MW-7 - 34'	10:20						X	X													29		analyze
10. MW-7 - 35.5'	10:30	↓	↓				X	X													30		analyze

Relinquished by:	Firm:	Date & Time	Received by:	Firm:	Date & Time
1.	GEI	5/22/97 12:00		NCA	5-27-97 07:00
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: Date:

Page 3 of 3
Rev. 2.2, 11/94

Comments: NCA trip BLANK also included

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0070

Geo Engineers - Alaska	Project:	UNOCAL #5580	Sampled: 5/22/97
4951 Eagle Street	Project Number:	9161-409-18	Received: 5/28/97
Anchorage, AK 99503-7432	Project Manager:	Laurie Jean Dworian	Reported: 6/10/97 13:16

ANALYTICAL REPORT FOR SAMPLES:

Sample Description	Laboratory Sample Number	Sample Matrix	Date Sampled
MW-2	B705505-01	Water	5/22/97
MW-3	B705505-02	Water	5/22/97
MW-4	B705505-03	Water	5/22/97
MW-5	B705505-04	Water	5/22/97
MW-6	B705505-05	Water	5/22/97
MW-7	B705505-06	Water	5/22/97
DUP	B705505-07	Water	5/22/97
TRIP BLANK	B705505-08	Water	5/22/97

GeoEngineers
ANCHORAGE
JUN 12 1997
Routing. GDD
File. 9161-409-18

Laura Dutton

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0071

Geo Engineers - Alaska	Project:	UNOCAL #5580	Sampled: 5/22/97
4951 Eagle Street	Project Number:	9161-409-18	Received: 5/28/97
Anchorage, AK 99503-7432	Project Manager:	Laurie Jean Dworian	Reported: 6/10/97 13:16

Gasoline Hydrocarbons (n-Hexane to <n-Decane) and BTEX by AK101
North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
MW-2			**B705505-01**				**Water**	
Gasoline Range Hydrocarbons	0670134	6/4/97	6/4/97		50.0	ND	ug/l	
Benzene	"	"	"		0.500	ND	"	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB (FID)	"	"	"	*50.0-150*		*95.0*	%	
Surrogate: 4-BFB (PID)	"	"	"	*50.0-150*		*106*	"	
MW-3			**B705505-02**				**Water**	
Gasoline Range Hydrocarbons	0670134	6/4/97	6/4/97		50.0	ND	ug/l	
Benzene	"	"	"		0.500	ND	"	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB (FID)	"	"	"	*50.0-150*		*97.5*	%	
Surrogate: 4-BFB (PID)	"	"	"	*50.0-150*		*108*	"	
MW-4			**B705505-03**				**Water**	
Gasoline Range Hydrocarbons	0670134	6/4/97	6/4/97		50.0	ND	ug/l	
Benzene	"	"	"		0.500	ND	"	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB (FID)	"	"	"	*50.0-150*		*95.6*	%	
Surrogate: 4-BFB (PID)	"	"	"	*50.0-150*		*109*	"	
MW-5			**B705505-04**				**Water**	
Gasoline Range Hydrocarbons	0670134	6/4/97	6/5/97		1250	**6170**	ug/l	
Benzene	"	"	"		12.5	**1750**	"	
Toluene	"	"	"		12.5	**806**	"	
Ethylbenzene	"	"	"		12.5	**22.7**	"	
Xylenes (total)	"	"	"		25.0	**36.8**	"	
Surrogate: 4-BFB (FID)	"	"	"	*50.0-150*		*91.9*	%	
Surrogate: 4-BFB (PID)	"	"	"	*50.0-150*		*101*	"	
MW-6			**B705505-05**				**Water**	
Gasoline Range Hydrocarbons	0670134	6/4/97	6/5/97		50.0	**318**	ug/l	
Benzene	"	"	"		0.500	**11.8**	"	

North Creek Analytical, Inc.

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

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Geo Engineers - Alaska	Project:	UNOCAL #5580	Sampled: 5/22/97
4951 Eagle Street	Project Number:	9161-409-18	Received: 5/28/97
Anchorage, AK 99503-7432	Project Manager:	Laurie Jean Dworian	Reported: 6/10/97 13:16

Gasoline Hydrocarbons (n-Hexane to <n-Decane) and BTEX by AK101
North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
MW-6 (continued)			**B705505-05**				**Water**	
Toluene	0670134	6/4/97	6/5/97		0.500	**1.33**	ug/l	
Ethylbenzene	"	"	"		0.500	**0.617**	"	
Xylenes (total)	"	"	"		1.00	**16.1**	"	
Surrogate: 4-BFB (FID)	"	"	"	*50.0-150*		*98.8*	%	
Surrogate: 4-BFB (PID)	"	"	"	*50.0-150*		*104*	"	
MW-7			**B705505-06**				**Water**	
Gasoline Range Hydrocarbons	0670134	6/4/97	6/4/97		50.0	ND	ug/l	
Benzene	"	"	"		0.500	ND	"	
Toluene	"	"	"		0.500	**0.759**	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB (FID)	"	"	"	*50.0-150*		*88.1*	%	
Surrogate: 4-BFB (PID)	"	"	"	*50.0-150*		*102*	"	
DUP			**B705505-07**				**Water**	
Gasoline Range Hydrocarbons	0670134	6/4/97	6/4/97		50.0	ND	ug/l	
Benzene	"	"	"		0.500	ND	"	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB (FID)	"	"	"	*50.0-150*		*88.7*	%	
Surrogate: 4-BFB (PID)	"	"	"	*50.0-150*		*100*	"	
TRIP BLANK			**B705505-08**				**Water**	
Gasoline Range Hydrocarbons	0670134	6/4/97	6/4/97		50.0	ND	ug/l	
Benzene	"	"	"		0.500	ND	"	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB (FID)	"	"	"	*50.0-150*		*82.5*	%	
Surrogate: 4-BFB (PID)	"	"	"	*50.0-150*		*102*	"	

NORTH CREEK ANALYTICAL
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Geo Engineers - Alaska	Project:	UNOCAL #5580	Sampled: 5/22/97
4951 Eagle Street	Project Number:	9161-409-18	Received: 5/28/97
Anchorage, AK 99503-7432	Project Manager:	Laurie Jean Dworian	Reported: 6/10/97 13:16

Diesel Hydrocarbons (C10-C25) by AK102
North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
MW-2			**B705505-01**				**Water**	
Diesel Range Hydrocarbons	0570789	5/30/97	6/2/97		0.100	ND	mg/l	
Surrogate: 2-FBP	"	"	"	*50.0-150*		*81.2*	%	
MW-3			**B705505-02**				**Water**	
Diesel Range Hydrocarbons	0570789	5/30/97	6/2/97		0.100	**0.171**	mg/l	
Surrogate: 2-FBP	"	"	"	*50.0-150*		*80.0*	%	
MW-4			**B705505-03**				**Water**	
Diesel Range Hydrocarbons	0570789	5/30/97	6/2/97		0.100	**0.271**	mg/l	
Surrogate: 2-FBP	"	"	"	*50.0-150*		*78.2*	%	
MW-5			**B705505-04**				**Water**	
Diesel Range Hydrocarbons	0570789	5/30/97	6/2/97		0.100	**0.180**	mg/l	
Surrogate: 2-FBP	"	"	"	*50.0-150*		*83.6*	%	
MW-6			**B705505-05**				**Water**	
Diesel Range Hydrocarbons	0570789	5/30/97	6/3/97		0.100	**0.647**	mg/l	
Surrogate: 2-FBP	"	"	"	*50.0-150*		*80.6*	%	
MW-7			**B705505-06**				**Water**	
Diesel Range Hydrocarbons	0570789	5/30/97	6/3/97		0.100	**0.185**	mg/l	
Surrogate: 2-FBP	"	"	"	*50.0-150*		*86.1*	%	

North Creek Analytical, Inc.

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NORTH CREEK ANALYTICAL
Environmental Laboratory Services

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

Geo Engineers - Alaska	Project:	UNOCAL #5580	Sampled: 5/22/97
4951 Eagle Street	Project Number:	9161-409-18	Received: 5/28/97
Anchorage, AK 99503-7432	Project Manager:	Laurie Jean Dworian	Reported: 6/10/97 13:16

Dissolved Metals by EPA 6010/7000 Series Methods
North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Specific Method	Reporting Limit	Result	Units	Notes*
MW-5			**B705505-04**				**Water**	
Lead	0670225	6/7/97	6/7/97	EPA 7421	0.00200	ND	mg/l	
MW-6			**B705505-05**				**Water**	
Lead	0670225	6/7/97	6/7/97	EPA 7421	0.00200	ND	mg/l	
MW-7			**B705505-06**				**Water**	
Lead	0670225	6/7/97	6/7/97	EPA 7421	0.00200	ND	mg/l	

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0075

Geo Engineers - Alaska	Project:	UNOCAL #5580	Sampled: 5/22/97
4951 Eagle Street	Project Number:	9161-409-18	Received: 5/28/97
Anchorage, AK 99503-7432	Project Manager:	Laurie Jean Dworian	Reported: 6/10/97 13:16

Gasoline Hydrocarbons (n-Hexane to <n-Decane) and BTEX by AK101/Quality Control
North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit / Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0670134	**Date Prepared: 6/4/97**					**Extraction Method: EPA 5030**				
Blank	**0670134-BLK1**									
Gasoline Range Hydrocarbons	6/4/97			**ND**	ug/l	**50.0**				
Benzene	"			**ND**	"	**0.500**				
Toluene	"			**ND**	"	**0.500**				
Ethylbenzene	"			**ND**	"	**0.500**				
Xylenes (total)	"			**ND**	"	**1.00**				
Surrogate: 4-BFB (FID)	"	*16.0*		*14.2*	"	*50.0-150*	*88.7*			
Surrogate: 4-BFB (PID)	"	*16.0*		*16.0*	"	*50.0-150*	*100*			
LCS	**0670134-BS1**									
Gasoline Range Hydrocarbons	6/4/97	500		508	ug/l	80.0-120	**102**			
Surrogate: 4-BFB (FID)	"	*16.0*		*14.7*	"	*50.0-150*	*91.9*			
Duplicate	**0670134-DUP2**		**B705505-01**							
Gasoline Range Hydrocarbons	6/4/97		ND	ND	ug/l			25.0		**n/a**
Surrogate: 4-BFB (FID)	"	*16.0*		*14.2*	"	*50.0-150*	*88.7*			
Matrix Spike	**0670134-MS1**		**B705396-01**							
Benzene	6/4/97	10.0	ND	11.3	ug/l	70.0-130	**113**			
Toluene	"	10.0	ND	10.5	"	70.0-130	**105**			
Ethylbenzene	"	10.0	ND	10.3	"	70.0-130	**103**			
Xylenes (total)	"	30.0	ND	29.4	"	70.0-130	**98.0**			
Surrogate: 4-BFB (PID)	"	*16.0*		*16.3*	"	*50.0-150*	*102*			
Matrix Spike Dup	**0670134-MSD1**		**B705396-01**							
Benzene	6/4/97	10.0	ND	11.2	ug/l	70.0-130	**112**	15.0	**0.889**	
Toluene	"	10.0	ND	10.3	"	70.0-130	**103**	15.0	**1.92**	
Ethylbenzene	"	10.0	ND	10.0	"	70.0-130	**100**	15.0	**2.96**	
Xylenes (total)	"	30.0	ND	28.8	"	70.0-130	**96.0**	15.0	**2.06**	
Surrogate: 4-BFB (PID)	"	*16.0*		*16.2*	"	*50.0-150*	*101*			

North Creek Analytical, Inc.

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

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NORTH CREEK ANALYTICAL
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Geo Engineers - Alaska	Project:	UNOCAL #5580	Sampled: 5/22/97
4951 Eagle Street	Project Number:	9161-409-18	Received: 5/28/97
Anchorage, AK 99503-7432	Project Manager:	Laurie Jean Dworian	Reported: 6/10/97 13:16

Diesel Hydrocarbons (C10-C25) by AK102/Quality Control
North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit / Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0570789	**Date Prepared: 5/30/97**					**Extraction Method: EPA 3520/600 Series**				
Blank	**0570789-BLK1**									
Diesel Range Hydrocarbons	6/2/97			**ND**	mg/l	**0.100**				
Surrogate: 2-FBP	"	*0.350*		*0.289*	"	*50.0-150*	*82.6*			
LCS	**0570789-BS1**									
Diesel Range Hydrocarbons	6/2/97	2.04		1.77	mg/l	60.0-120	**86.8**			
Surrogate: 2-FBP	"	*0.350*		*0.224*	"	*50.0-150*	*64.0*			
LCS Dup	**0570789-BSD1**									
Diesel Range Hydrocarbons	6/2/97	2.04		2.04	mg/l	60.0-120	**100**	20.0	**14.1**	
Surrogate: 2-FBP	"	*0.350*		*0.270*	"	*50.0-150*	*77.1*			

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0077

Geo Engineers - Alaska	Project:	UNOCAL #5580	Sampled: 5/22/97
4951 Eagle Street	Project Number:	9161-409-18	Received: 5/28/97
Anchorage, AK 99503-7432	Project Manager:	Laurie Jean Dworian	Reported: 6/10/97 13:16

Dissolved Metals by EPA 6010/7000 Series Methods/Quality Control
North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit / Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0670225	**Date Prepared: 6/7/97**					**Extraction Method: EPA 3020**				
Blank	**0670225-BLK1**									
Lead	6/7/97			**ND**	mg/l	**0.00200**				
LCS	**0670225-BS1**									
Lead	6/7/97	0.0260		0.0247	mg/l	75.0-125	**95.0**			
Duplicate	**0670225-DUP1**		**B706097-03**							
Lead	6/7/97		ND	ND	mg/l			20.0		**n/a**
Matrix Spike	**0670225-MS1**		**B706097-03**							
Lead	6/7/97	0.0260	ND	0.0236	mg/l	70.0-130	**90.8**			
Matrix Spike Dup	**0670225-MSD1**		**B706097-03**							
Lead	6/7/97	0.0260	ND	0.0243	mg/l	70.0-130	**93.5**	20.0	**2.93**	

North Creek Analytical, Inc.

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

Laura L Dutton, Director, Analytical Services

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

0078

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Geo Engineers - Alaska	Project:	UNOCAL #5580	Sampled: 5/22/97
4951 Eagle Street	Project Number:	9161-409-18	Received: 5/28/97
Anchorage, AK 99503-7432	Project Manager:	Laurie Jean Dworian	Reported: 6/10/97 13:16

Notes and Definitions

#	Note
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.

Laura L Dutton, Director, Analytical Services

18939 120th Avenue N.E., Suite 101, Bothell, WA 98011-9508
East 11115 Montgomery, Suite B, Spokane, WA 99206-4776
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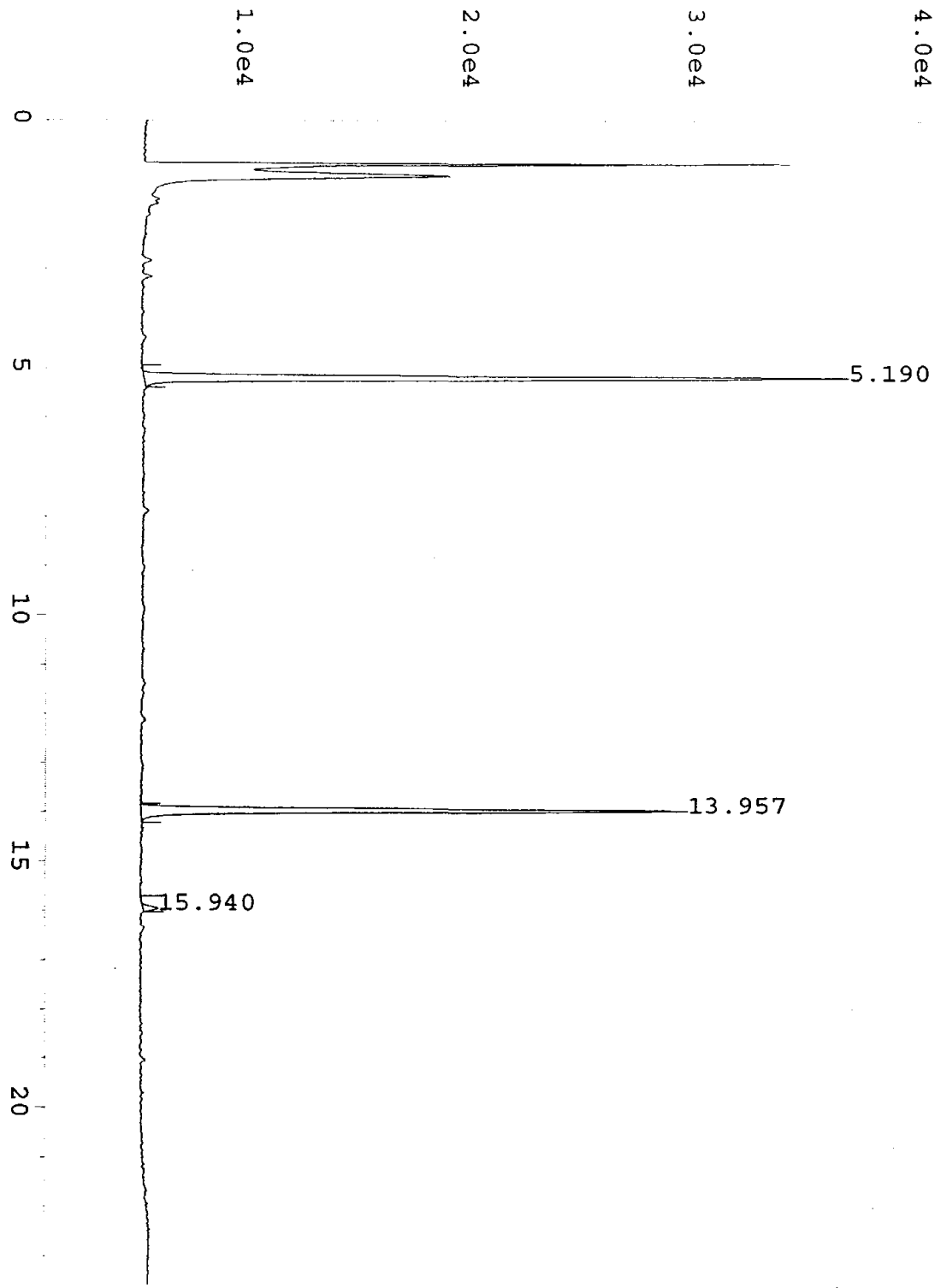
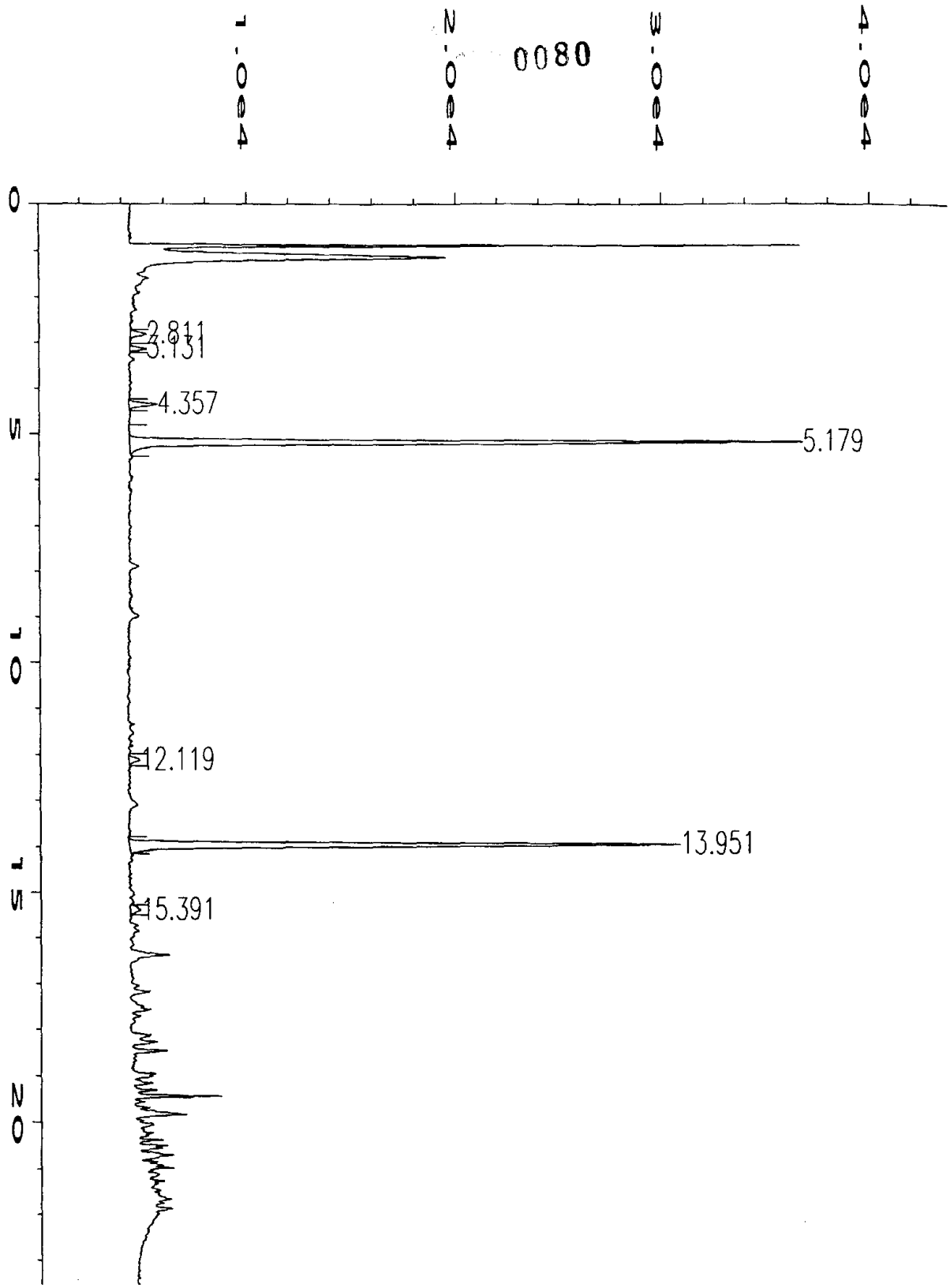
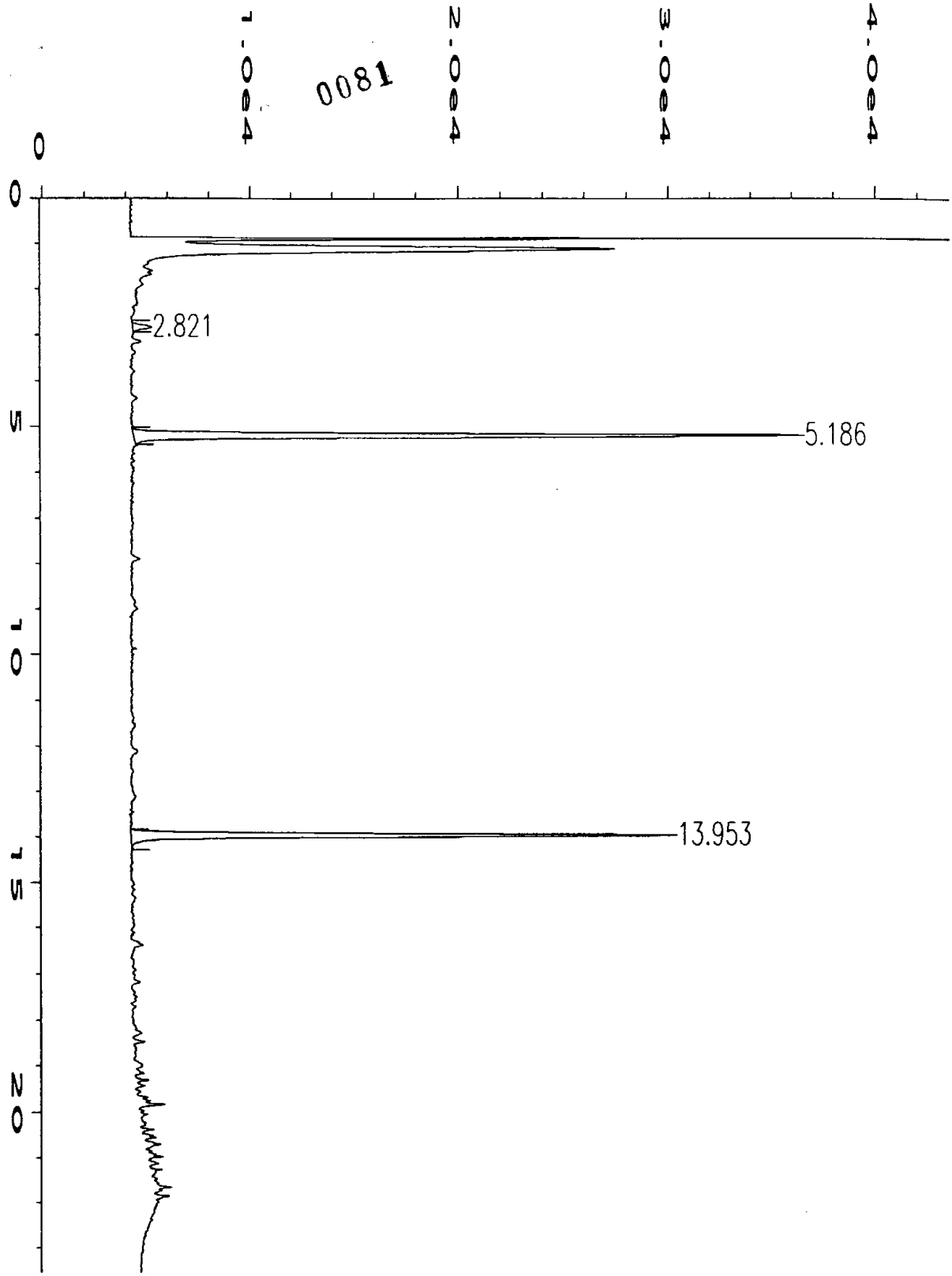
0079



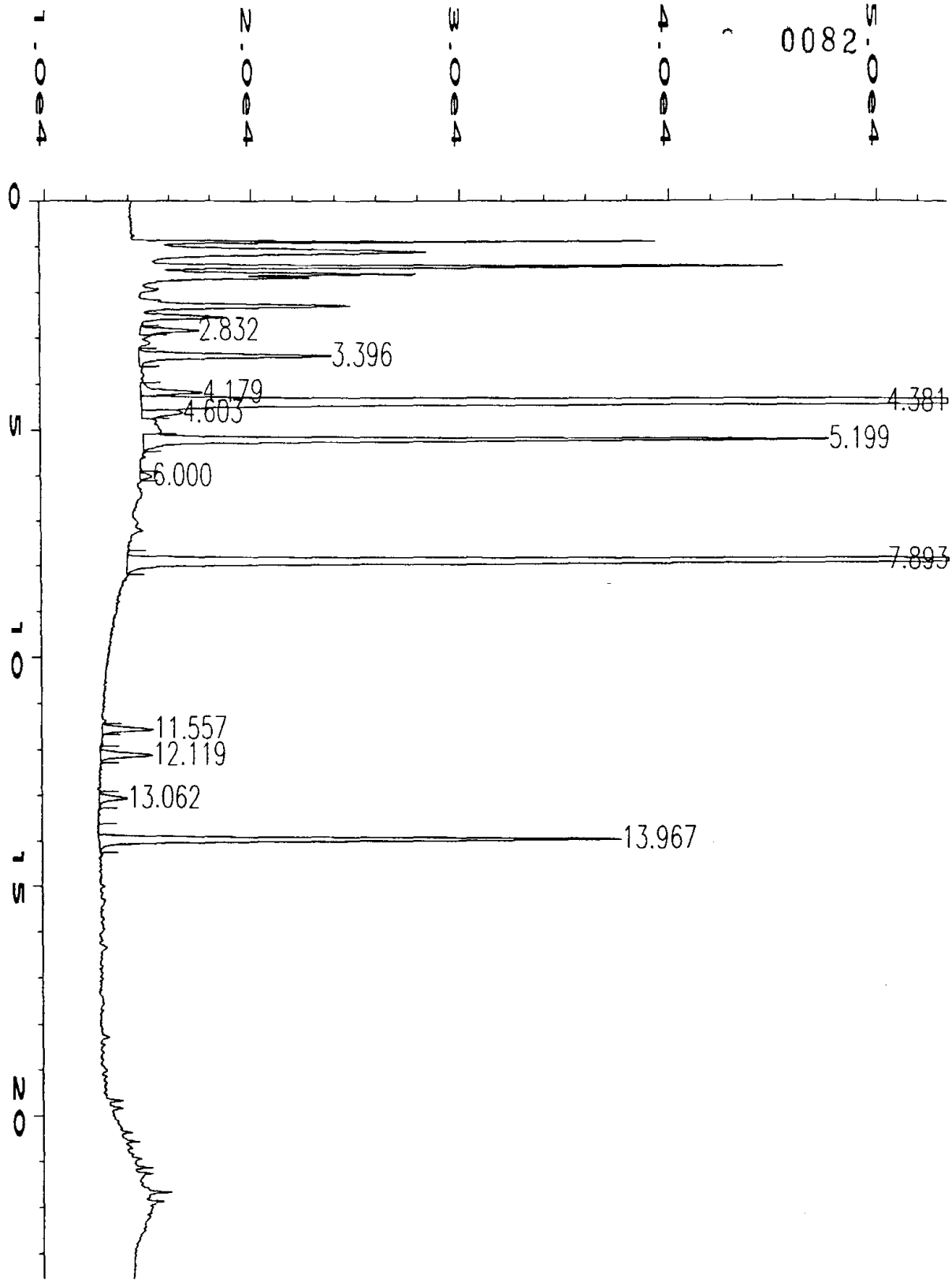
Data File Name	: C:\HPCHEM\2\DATA\060497\024F0201.D		
Operator	: TLC	Page Number	: 1
Instrument	: GC #4	Vial Number	: 24
Sample Name	: b705505-01 dup	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 2
Acquired on	: 04 Jun 97 07:05 PM	Instrument Method	: AK101WA.MTH
Report Created on	: 04 Jun 97 07:28 PM	Analysis Method	: AK101WA.MTH
Sample Info	: 5 ml		



Data File Name	: C:\HPCHEM\2\DATA\060497\015F0201.D		
Operator	: TLC	Page Number	: 1
Instrument	: GC #4	Vial Number	: 15
Sample Name	: b705505-02	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 2
Acquired on	: 04 Jun 97 02:36 PM	Instrument Method	: AK101WA.MTH
Report Created on	: 04 Jun 97 02:59 PM	Analysis Method	: AK101WA.MTH
Sample Info	: 5 ml		



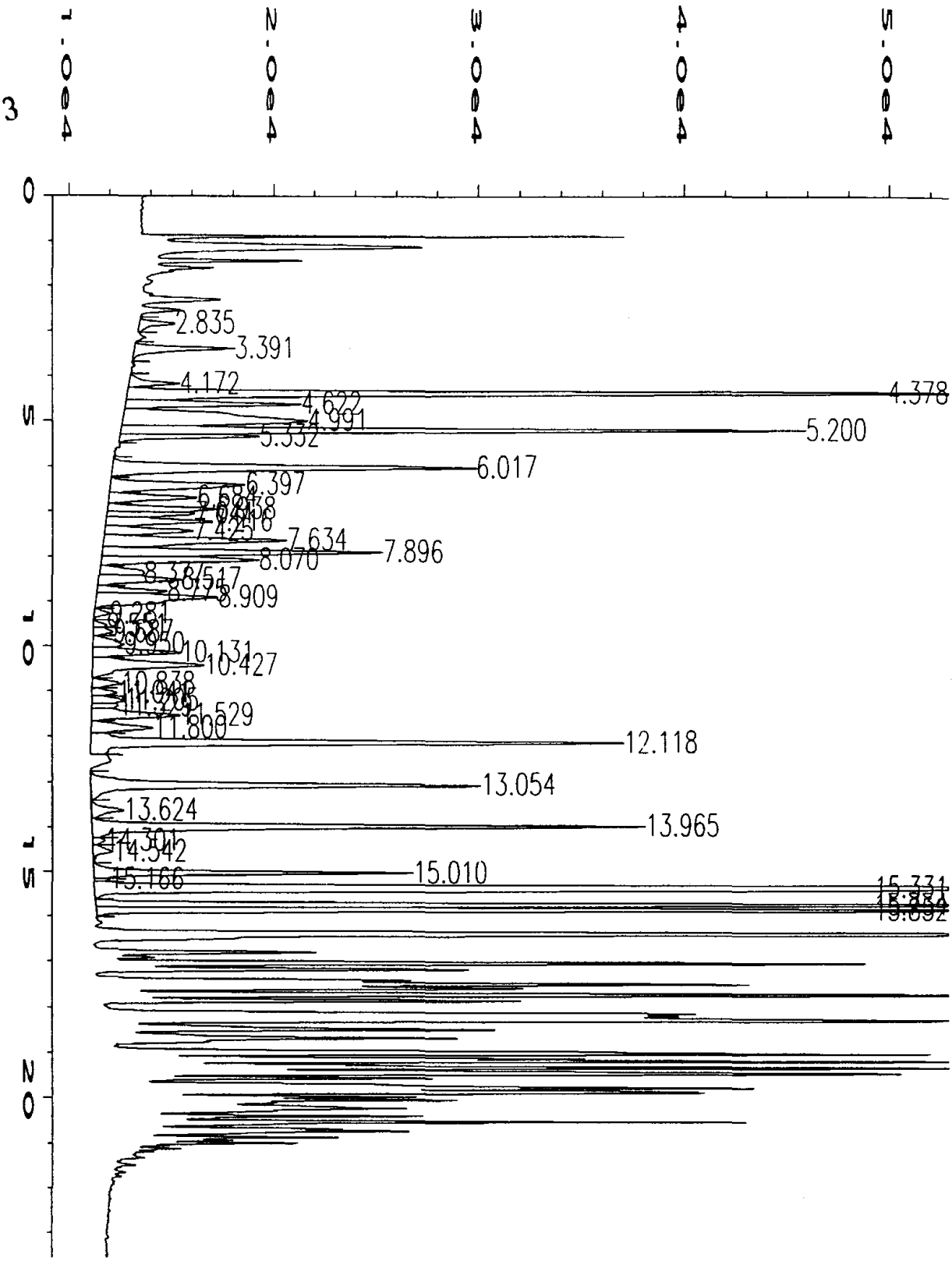
Data File Name	: C:\HPCHEM\2\DATA\060497\016F0201.D		
Operator	: TLC	Page Number	: 1
Instrument	: GC #4	Vial Number	: 16
Sample Name	: b705505-03	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 2
Acquired on	: 04 Jun 97 03:06 PM	Instrument Method	: AK101WA.MTH
Report Created on	: 04 Jun 97 03:29 PM	Analysis Method	: AK101WA.MTH
Sample Info	: 5 ml		



Data File Name : C:\HPCHEM\2\DATA\060597\005F0101.D
Operator : TLC
Instrument : GC #4
Sample Name : b705505-04 r1
Run Time Bar Code:
Acquired on : 05 Jun 97 10:22 AM
Report Created on: 05 Jun 97 12:15 PM
Multiplier : 25

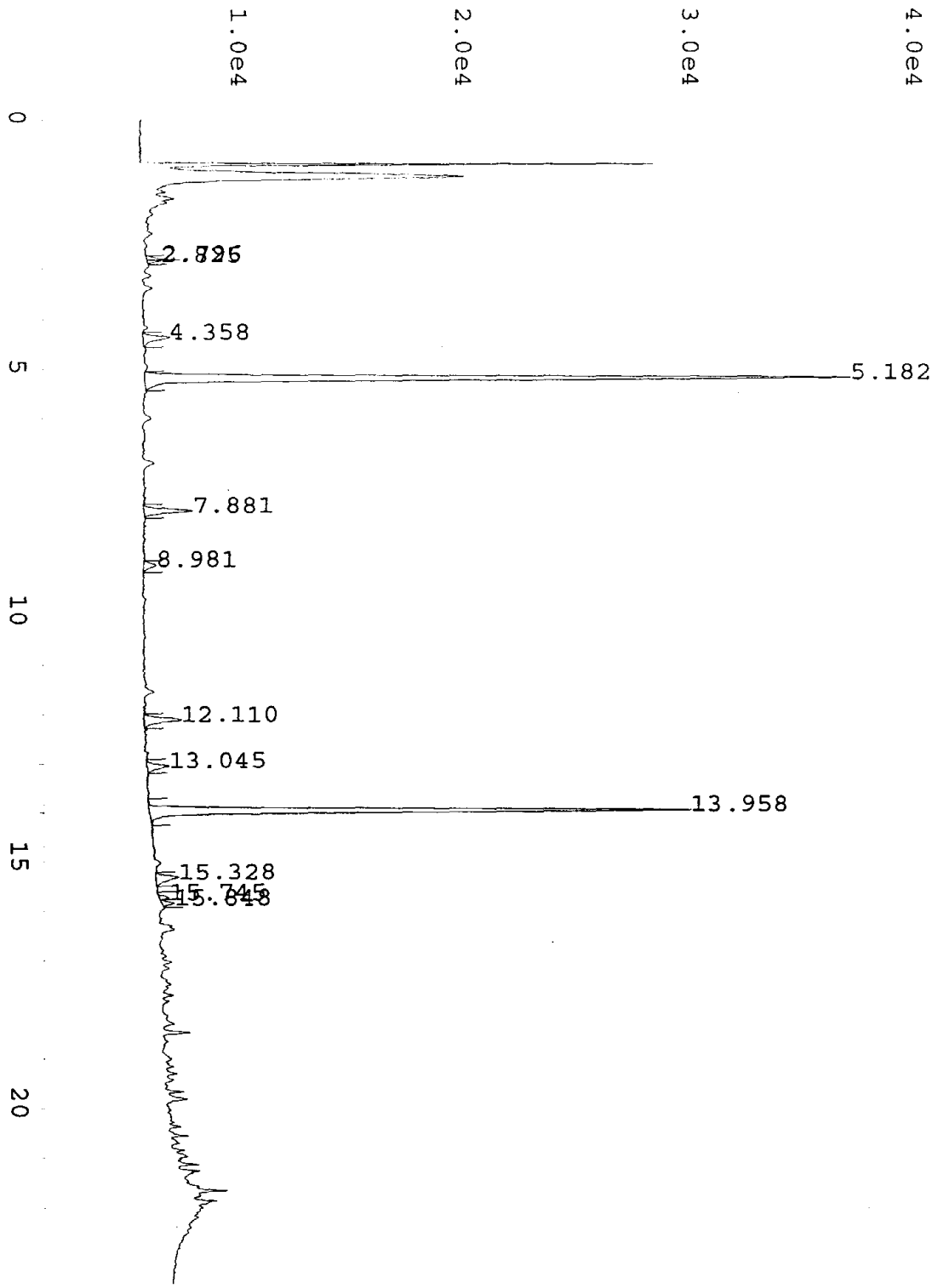
Page Number : 1
Vial Number : 5
Injection Number : 1
Sequence Line : 1
Instrument Method: WA-WATER.MTH
Analysis Method : AK101WA.MTH

0083



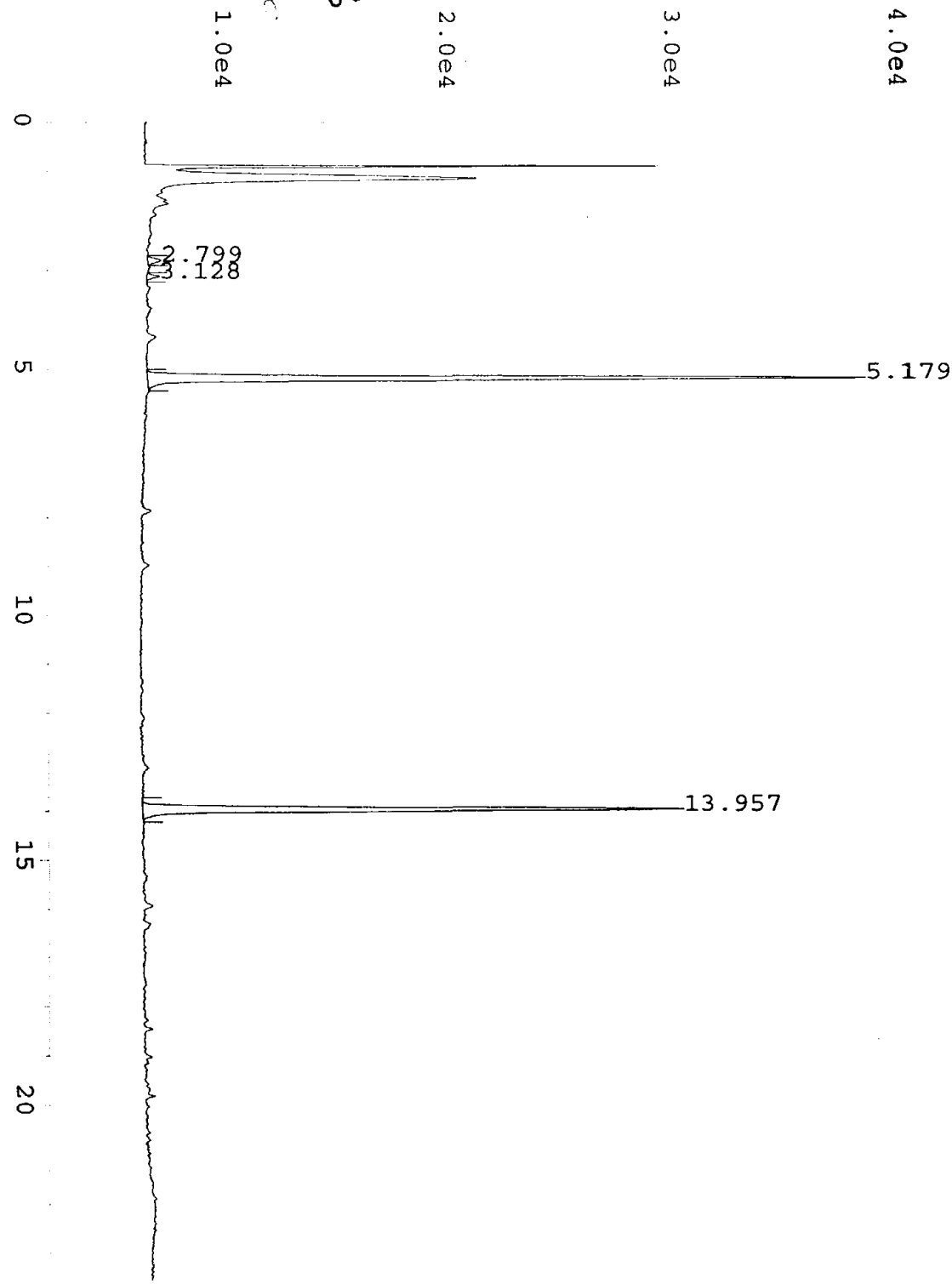
Data File Name : C:\HPCHEM\2\DATA\060597\006F0101.D
Operator : TLC
Instrument : GC #4
Sample Name : b705505-05 r1
Run Time Bar Code:
Acquired on : 05 Jun 97 10:52 AM
Report Created on: 05 Jun 97 12:17 PM

Page Number : 1
Vial Number : 6
Injection Number : 1
Sequence Line : 1
Instrument Method: WA-WATER.MTH
Analysis Method : AK101WA.MTH

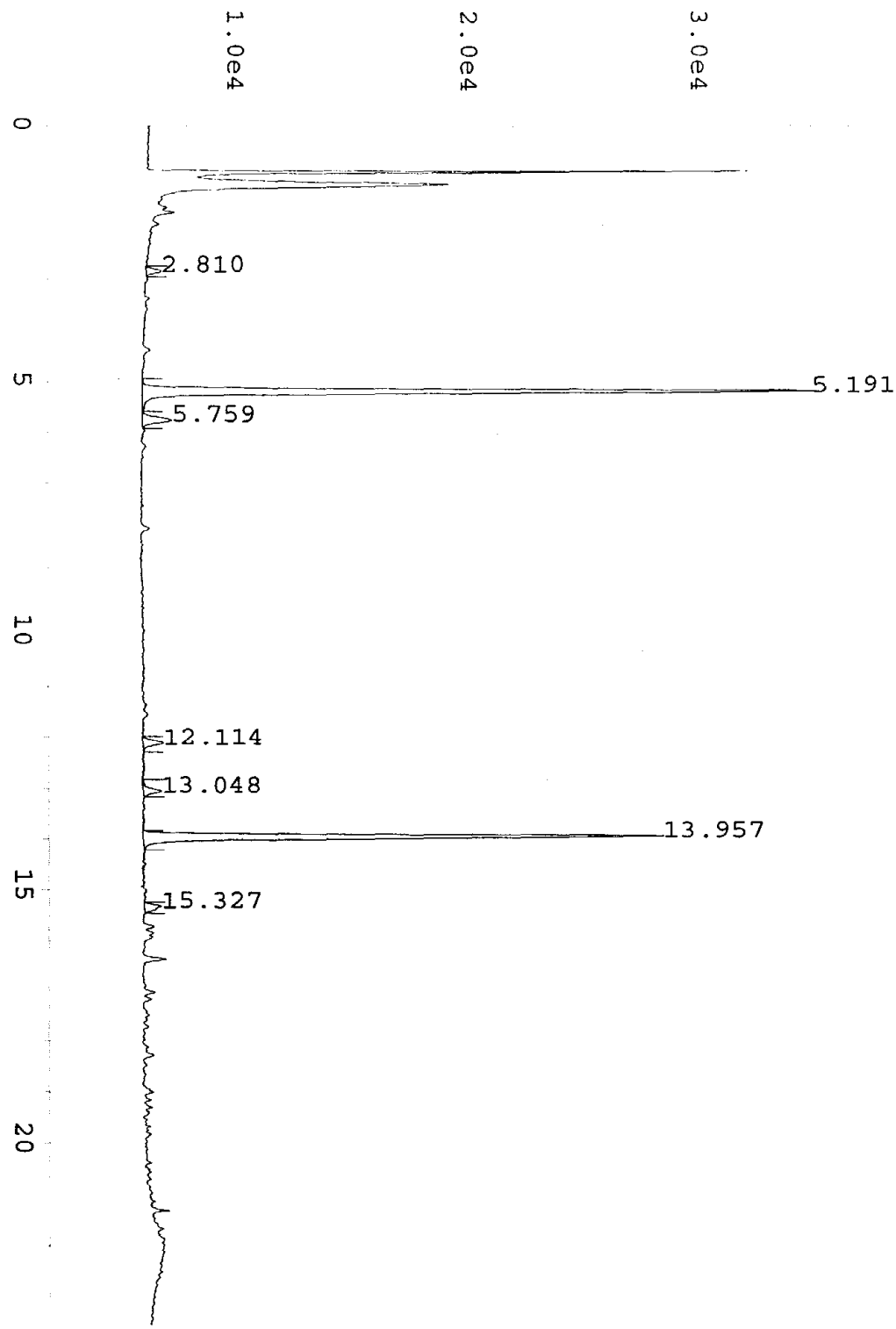


Data File Name	: C:\HPCHEM\2\DATA\060497\021F0201.D		
Operator	: TLC	Page Number	: 1
Instrument	: GC #4	Vial Number	: 21
Sample Name	: b705505-06	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 2
Acquired on	: 04 Jun 97 05:34 PM	Instrument Method	: AK101WA.MTH
Report Created on	: 04 Jun 97 05:58 PM	Analysis Method	: AK101WA.MTH
Sample Info	: 5 ml		

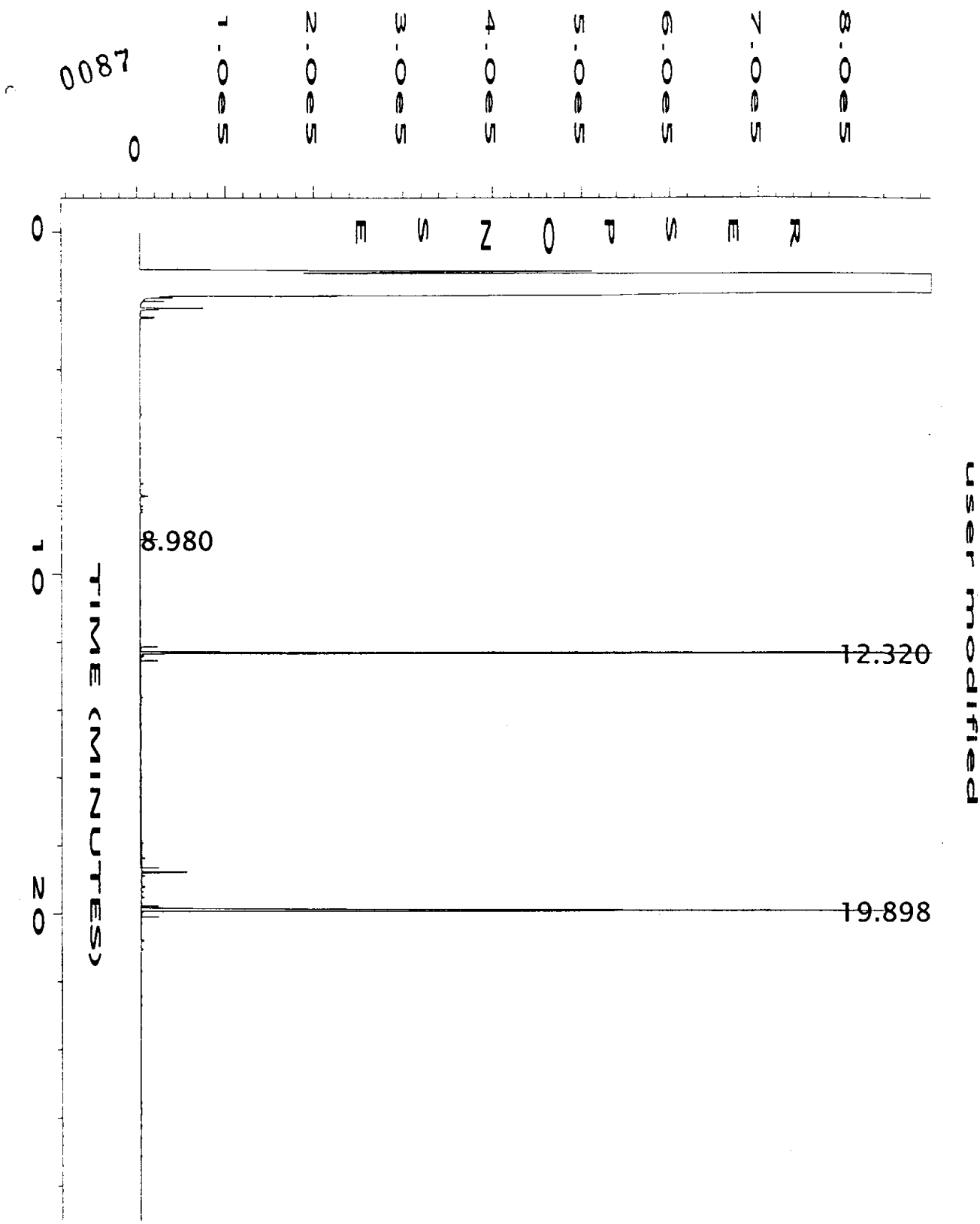
0085



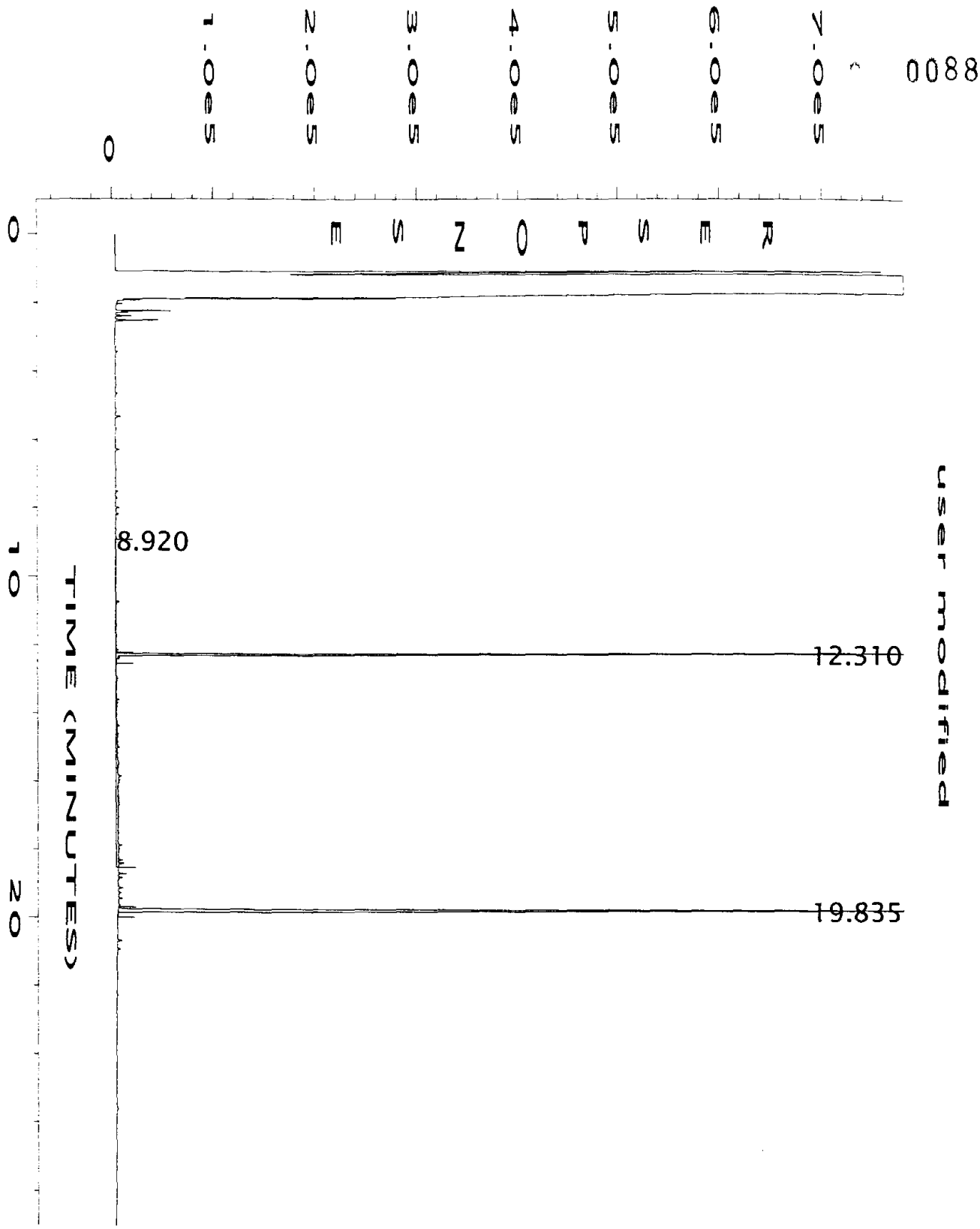
Data File Name	: C:\HPCHEM\2\DATA\060497\022F0201.D		
Operator	: TLC	Page Number	: 1
Instrument	: GC #4	Vial Number	: 22
Sample Name	: b705505-07	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 2
Acquired on	: 04 Jun 97 06:04 PM	Instrument Method	: AK101WA.MTH
Report Created on	: 04 Jun 97 06:28 PM	Analysis Method	: AK101WA.MTH
Sample Info	: 5 ml		



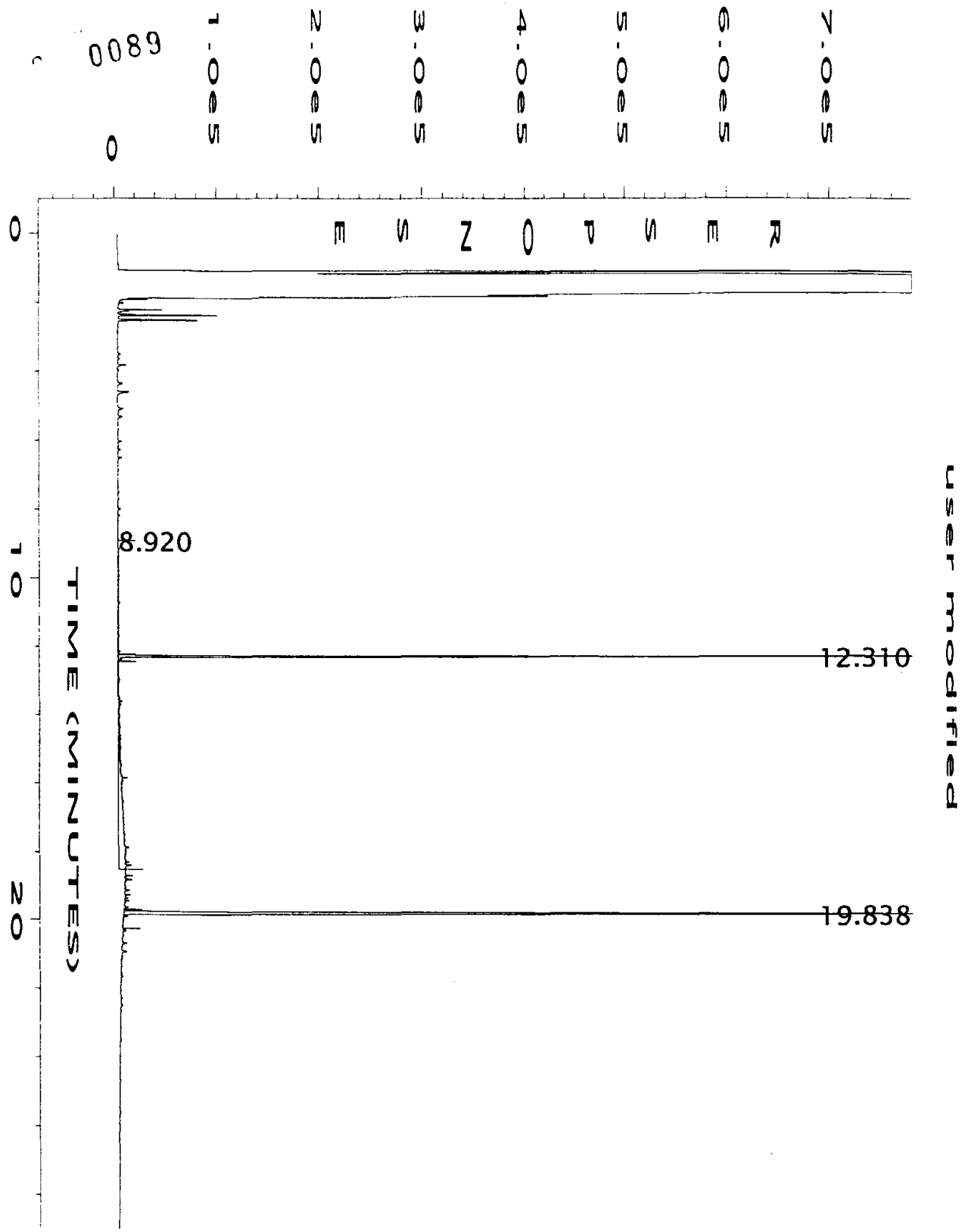
Data File Name	: C:\HPCHEM\2\DATA\060497\023F0201.D		
Operator	: TLC	Page Number	: 1
Instrument	: GC #4	Vial Number	: 23
Sample Name	: b705505-08	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 2
Acquired on	: 04 Jun 97 06:34 PM	Instrument Method	: AK101WA.MTH
Report Created on	: 04 Jun 97 06:58 PM	Analysis Method	: AK101WA.MTH
Sample Info	: 5 ml		



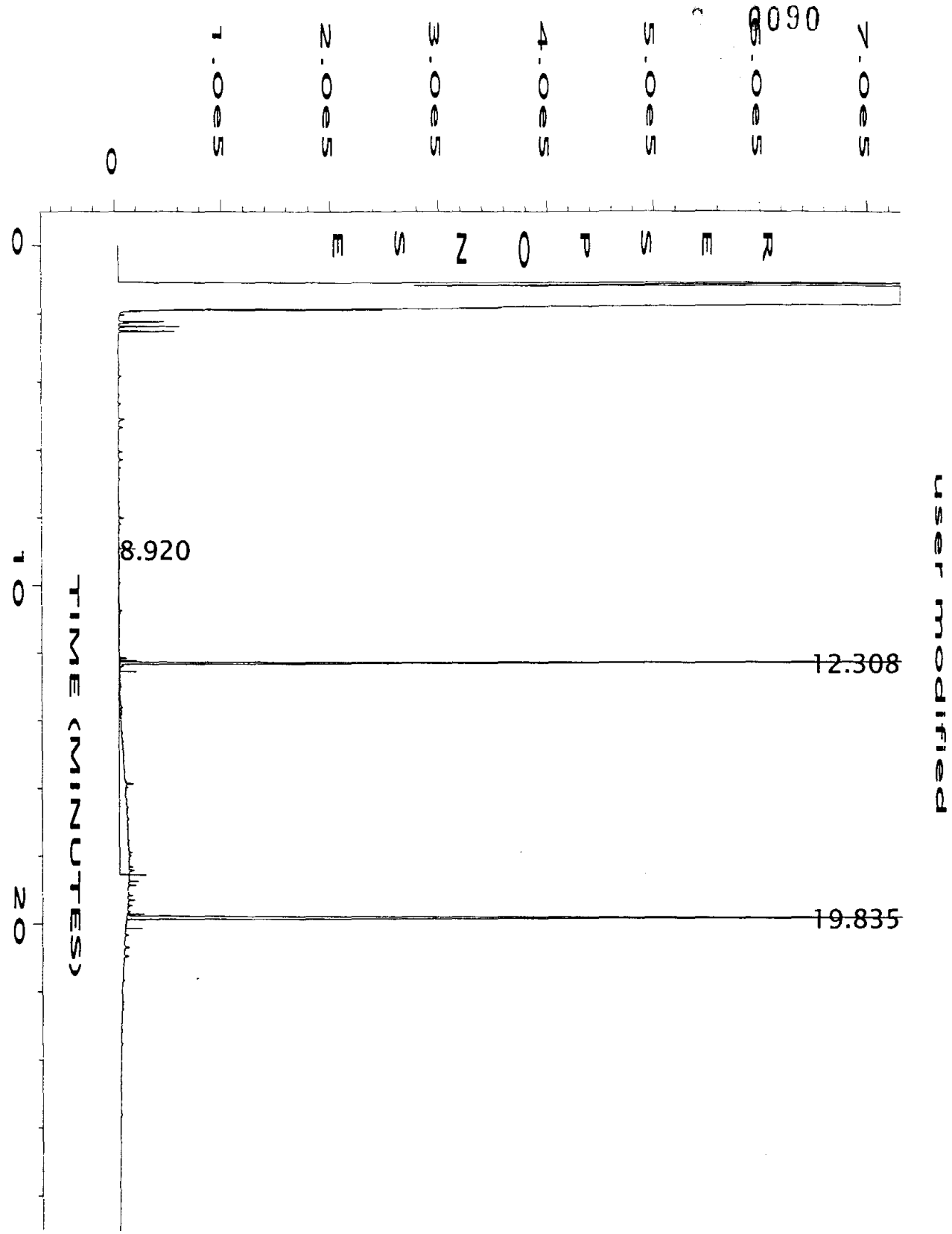
Data File Name	: C:\HPCHEM\3\DATA\JUN02\010F1101.D		
Operator	: TF	Page Number	: 1
Instrument	: FUBAR	Vial Number	: 10
Sample Name	: 0570789-BLK W	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 11
Acquired on	: 02 Jun 97 06:47 PM	Instrument Method	: TPHER.MTH
Report Created on	: 03 Jun 97 10:05 AM	Analysis Method	: AK102.MTH



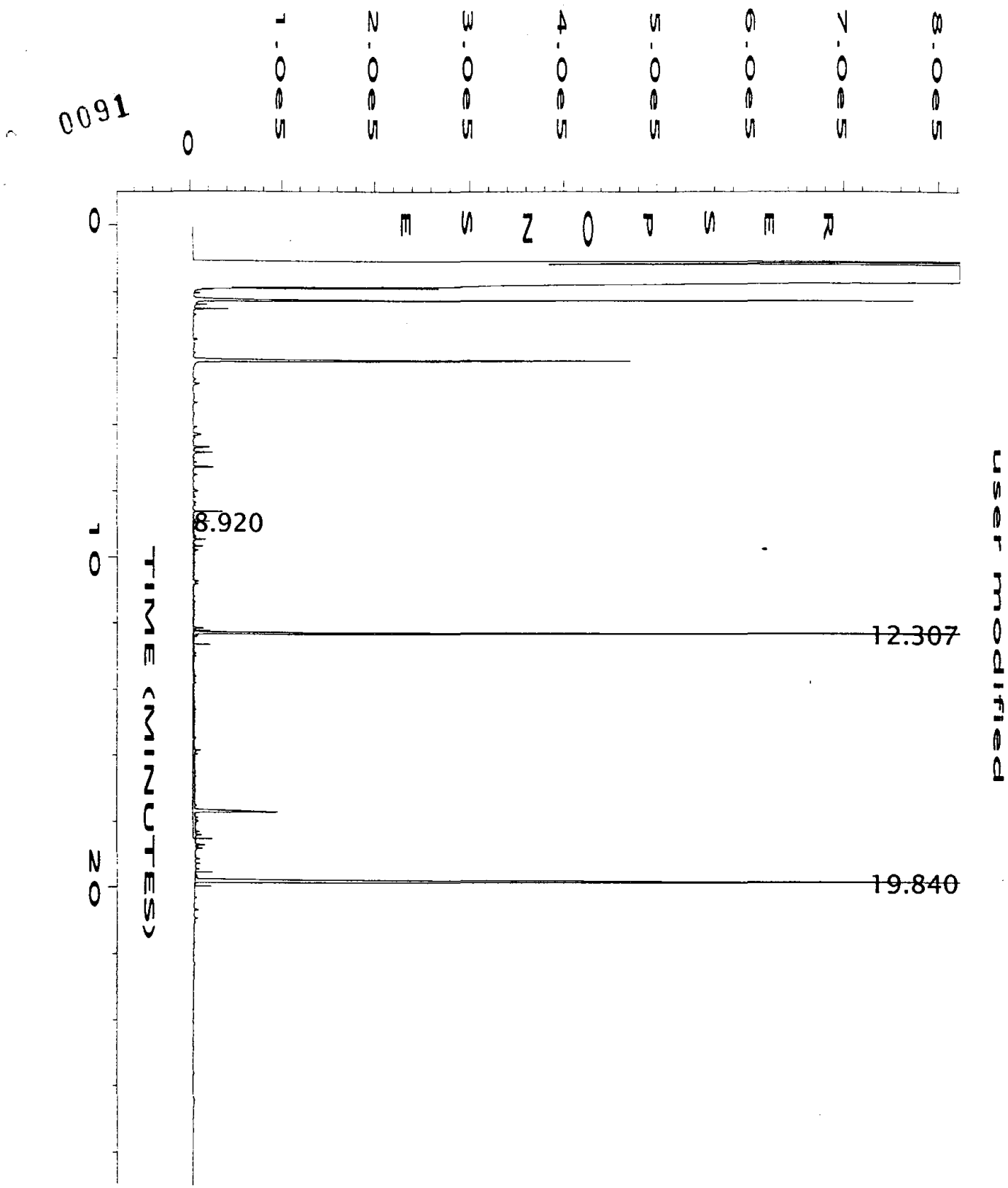
Data File Name	: C:\HPCHEM\3\DATA\JUN02\057R1301.D		
Operator	: TF	Page Number	: 1
Instrument	: FUBAR	Vial Number	: 57
Sample Name	: 705505-01 W	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 13
Acquired on	: 02 Jun 97 06:47 PM	Instrument Method	: TPHER.MTH
Report Created on	: 03 Jun 97 10:07 AM	Analysis Method	: AK102.MTH



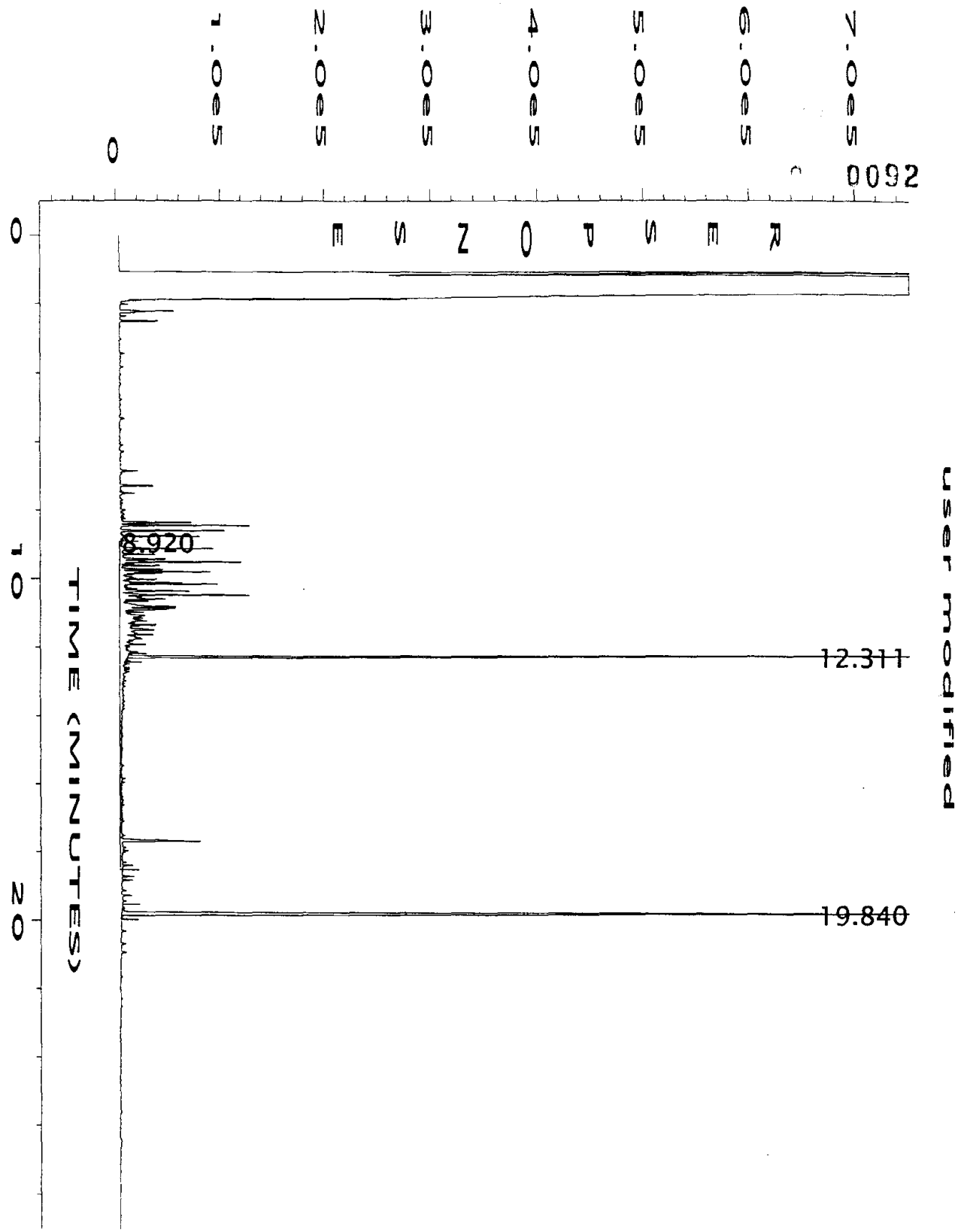
Data File Name	: C:\HPCHEM\3\DATA\JUN02\058R1301.D		
Operator	: TF	Page Number	: 1
Instrument	: FUBAR	Vial Number	: 58
Sample Name	: 705505-02 W	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 13
Acquired on	: 02 Jun 97 07:27 PM	Instrument Method	: TPHER.MTH
Report Created on	: 03 Jun 97 10:08 AM	Analysis Method	: AK102.MTH



Data File Name	: C:\HPCHEM\3\DATA\JUN02\059R1301.D		
Operator	: TF	Page Number	: 1
Instrument	: FUBAR	Vial Number	: 59
Sample Name	: 705505-03 W	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 13
Acquired on	: 02 Jun 97 08:07 PM	Instrument Method	: TPHER.MTH
Report Created on	: 03 Jun 97 10:09 AM	Analysis Method	: AK102.MTH

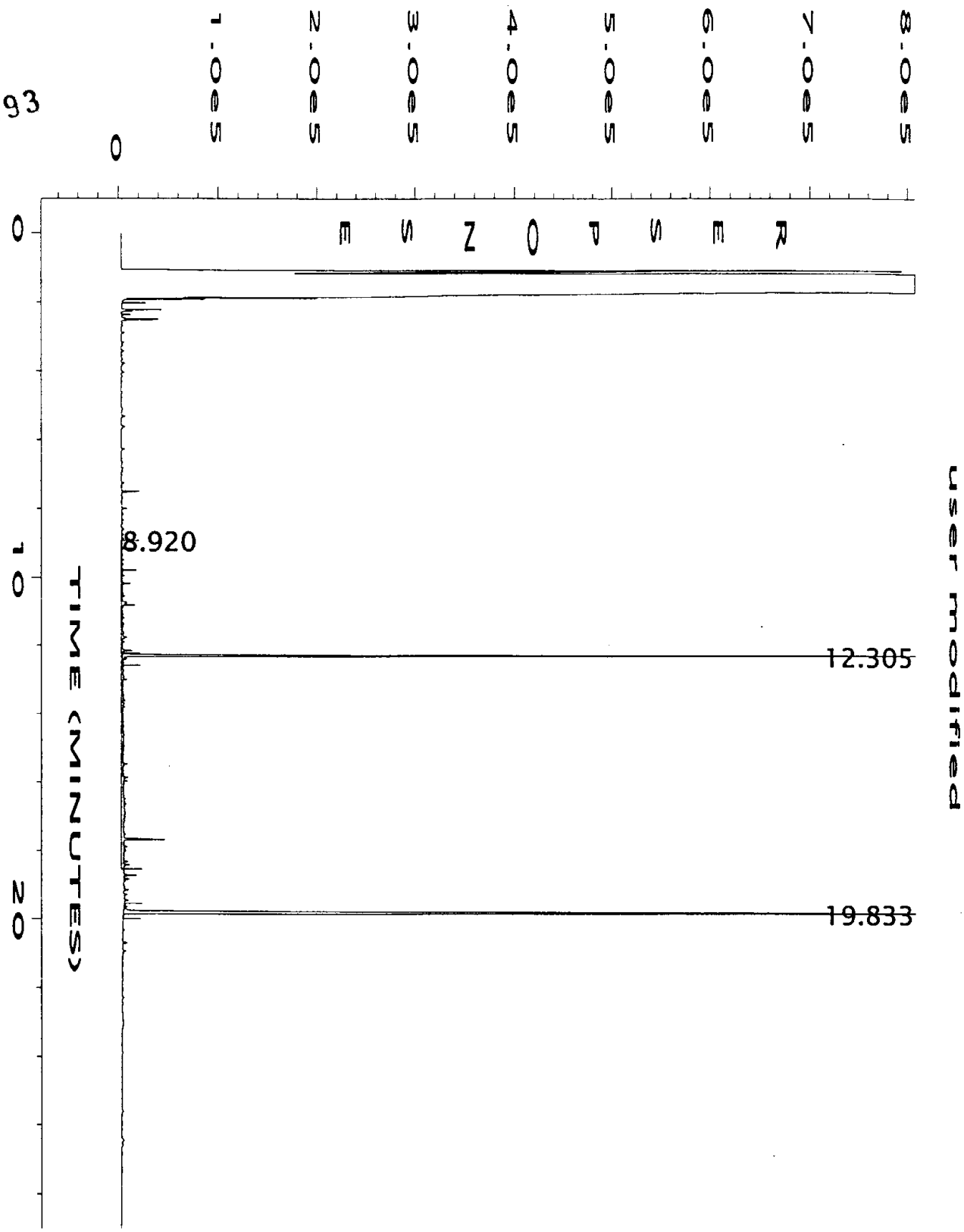


Data File Name	: C:\HPCHEM\3\DATA\JUN02\060R1301.D		
Operator	: TF	Page Number	: 1
Instrument	: FUBAR	Vial Number	: 60
Sample Name	: 705505-04 W	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 13
Acquired on	: 02 Jun 97 08:46 PM	Instrument Method	: TPHER.MTH
Report Created on	: 03 Jun 97 10:10 AM	Analysis Method	: AK102.MTH



Data File Name	: C:\HPCHEM\3\DATA\JUN02\061R1501.D		
Operator	: TF	Page Number	: 1
Instrument	: FUBAR	Vial Number	: 61
Sample Name	: 705505-05 W	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 15
Acquired on	: 03 Jun 97 03:50 AM	Instrument Method	: TPHER.MTH
Report Created on	: 03 Jun 97 10:10 AM	Analysis Method	: AK102.MTH

0093



Data File Name	: C:\HPCHEM\3\DATA\JUN02\062R1501.D		
Operator	: TF	Page Number	: 1
Instrument	: FUBAR	Vial Number	: 62
Sample Name	: 705505-06 W	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 15
Acquired on	: 03 Jun 97 04:30 AM	Instrument Method	: TPHDR.MTH
Report Created on	: 03 Jun 97 10:11 AM	Analysis Method	: AK102.MTH

NORTH CREEK ANALYTICAL

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9405 S.W. Nimbus Avenue, Beaverton, OR 97008-7132 (503) 643-9200 FAX 644-2202

UNOCAL CHAIN OF CUSTODY REPORT

UNOCAL INFORMATION

Facility Number: 5580
Site Address: 442 Gamball ST
City, State, ZIP: Anchorage, AK
Site Release Number:
Unocal Manager: DR. MARK BRADLEY
CERT INFO: (check one) ø Evaluation o Remediation
o Detection o Demolition o Closure o Miscellaneous

CONSULTANT INFORMATION

Firm: GEOENGINEERS Project Number: 9161-409-18
Address: 4991 EAGLE ST ANCHORAGE, AK. 99503
Phone: 907-561-3478 Fax:
Project Manager: Laurie Dean-Devereaux
Sample Collection by: PATRICK TIMMONS

Chain of Custody Record #: B705505
Quality Assurance Data Level: (A) B
A: Standard Summary
B: Standard + Chromatograms
Laboratory Turnaround Days: (10) 5 3 2 1

o Oregon o Washington Hydrocarbon Methods AK X

SAMPLE IDENTIFICATION	SAMPLING DATE / TIME	MATRIX (W,S,O)	# OF CONTAINERS	TPH-HCID	TPH-Gas	BTEX (EPA 8020 Mod.)	TPH-Gas + BTEX AK101	TPH-Diesel AK102	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 Semi Vols. (EPA 8270)	PAHs by HPLC (EPA 8310)	Lead: Total or Dissolved	TCLP Metals (8)	NCA SAMPLE NUMBER
1. MW-2	5-22-97/0945	W	3				X	X											B705505-01
2. MW-3	/1010		3				X	X											02
3. MW-4	/1030		3				X	X											03
4. MW-5	/1055		4				X	X									X		04
5. MW-6	/1120		4				X	X									X		05
6. MW-7	/1200		4				X	X									X		06
7. TRIP	/		2				X												07
8. TRIP BLANK	/		2				X												08
9.																			
10.																			

Relinquished by:	Firm:	Date & Time	Received by:	Firm:	Date & Time
1.	GEO/ANW	5/27/97/1330		NCA	5/28/97 815
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: Date:

Page 1 of 1
Rev. 2.2, 11/94

Comments: Lead Samples field filtered

0094

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

0095

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

Geo Engineers - Alaska	Project:	UNOCAL #5580	Sampled: 7/8/97
4951 Eagle Street	Project Number:	0161-409-18	Received: 7/10/97
Anchorage, AK 99503-7432	Project Manager:	Laurie Jean Dworian	Reported: 7/29/97 17:01

ANALYTICAL REPORT FOR SAMPLES:

Sample Description	Laboratory Sample Number	Sample Matrix	Date Sampled
A	B707217-01	Water	7/8/97
B	B707217-02	Water	7/8/97
C	B707217-03	Water	7/8/97
D	B707217-04	Water	7/8/97

GeoEngineers
ANCHORAGE

AUG 4 1997

Routing... GD ☐
.....☐.....☐
File... 0161-409-18

North Creek Analytical, Inc.

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.

Laura Dutton

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Geo Engineers - Alaska	Project:	UNOCAL #5580	Sampled: 7/8/97
4951 Eagle Street	Project Number:	0161-409-18	Received: 7/10/97
Anchorage, AK 99503-7432	Project Manager:	Laurie Jean Dworian	Reported: 7/29/97 17:01

Gasoline Hydrocarbons (n-Hexane to <n-Decane) and BTEX by AK101
North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
A			**B707217-01**				**Water**	
Gasoline Range Hydrocarbons	0770569	7/18/97	7/18/97		50.0	ND	ug/l	
Benzene	"	"	"		0.500	ND	"	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	ND	"	
Surrogate: 4-BFB (FID)	"	"	"	*60.0-120*		*97.5*	*%*	
Surrogate: 4-BFB (PID)	"	"	"	*60.0-120*		*86.7*	"	
B			**B707217-02**				**Water**	
Gasoline Range Hydrocarbons	0770569	7/18/97	7/18/97		1250	**5010**	ug/l	
Benzene	"	"	"		12.5	**1730**	"	
Toluene	"	"	"		12.5	**1190**	"	
Ethylbenzene	"	"	"		0.500	**22.6**	"	
Xylenes (total)	"	"	"		1.00	**85.7**	"	
Surrogate: 4-BFB (FID)	"	"	"	*60.0-120*		*98.5*	*%*	
Surrogate: 4-BFB (PID)	"	"	"	*60.0-120*		*92.9*	"	
C			**B707217-03**				**Water**	
Gasoline Range Hydrocarbons	0770569	7/18/97	7/18/97		50.0	**66.2**	ug/l	
Benzene	"	"	"		0.500	**10.7**	"	
Toluene	"	"	"		0.500	ND	"	
Ethylbenzene	"	"	"		0.500	ND	"	
Xylenes (total)	"	"	"		1.00	**5.55**	"	
Surrogate: 4-BFB (FID)	"	"	"	*60.0-120*		*94.2*	*%*	
Surrogate: 4-BFB (PID)	"	"	"	*60.0-120*		*89.2*	"	
D			**B707217-04**				**Water**	
Gasoline Range Hydrocarbons	0770569	7/18/97	7/18/97		50.0	**250**	ug/l	
Benzene	"	"	"		0.500	**36.7**	"	
Toluene	"	"	"		0.500	**1.49**	"	
Ethylbenzene	"	"	"		0.500	**0.861**	"	
Xylenes (total)	"	"	"		1.00	**22.0**	"	
Surrogate: 4-BFB (FID)	"	"	"	*60.0-120*		*103*	*%*	
Surrogate: 4-BFB (PID)	"	"	"	*60.0-120*		*86.5*	"	

North Creek Analytical, Inc.

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

Laura Dutton

Laura L Dutton, Director, Analytical Services

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

0097

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

Geo Engineers - Alaska	Project:	UNOCAL #5580	Sampled: 7/8/97
4951 Eagle Street	Project Number:	0161-409-18	Received: 7/10/97
Anchorage, AK 99503-7432	Project Manager:	Laurie Jean Dworian	Reported: 7/29/97 17:01

Diesel Hydrocarbons (C10-C25) by AK102
North Creek Analytical - Bothell

Analyte	Batch Number	Date Prepared	Date Analyzed	Surrogate Limits	Reporting Limit	Result	Units	Notes*
A			**B707217-01**				**Water**	
Diesel Range Hydrocarbons	0770459	7/15/97	7/17/97		0.100	ND	mg/l	
Surrogate: 2-FBP	"	"	"	*50.0-150*		*62.9*	%	
B			**B707217-02**				**Water**	
Diesel Range Hydrocarbons	0770459	7/15/97	7/17/97		0.100	ND	mg/l	
Surrogate: 2-FBP	"	"	"	*50.0-150*		*66.1*	%	
C			**B707217-03**				**Water**	
Diesel Range Hydrocarbons	0770459	7/15/97	7/17/97		0.100	**0.129**	mg/l	
Surrogate: 2-FBP	"	"	"	*50.0-150*		*66.0*	%	

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

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

0098

Geo Engineers - Alaska	Project: UNOCAL #5580	Sampled: 7/8/97
4951 Eagle Street	Project Number: 0161-409-18	Received: 7/10/97
Anchorage, AK 99503-7432	Project Manager: Laurie Jean Dworian	Reported: 7/29/97 17:01

Gasoline Hydrocarbons (n-Hexane to <n-Decane) and BTEX by AK101/Quality Control
North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0770569	**Date Prepared: 7/18/97**					**Extraction Method: EPA 5030**				
Blank	**0770569-BLK1**									
Gasoline Range Hydrocarbons	7/18/97			ND	ug/l	50.0				
Benzene	"			ND	"	0.500				
Toluene	"			ND	"	0.500				
Ethylbenzene	"			ND	"	0.500				
Xylenes (total)	"			ND	"	1.00				
Surrogate: 4-BFB (FID)	"	*48.0*		*30.0*	"	*60.0-120*	*62.5*			
Surrogate: 4-BFB (PID)	"	*48.0*		*38.7*	"	*60.0-120*	*80.6*			
LCS	**0770569-BS1**									
Gasoline Range Hydrocarbons	7/18/97	500		488	ug/l	60.0-120	**97.6**			
Surrogate: 4-BFB (FID)	"	*48.0*		*36.3*	"	*60.0-120*	*75.6*			
LCS	**0770569-BS2**									
Benzene	7/18/97	10.0		10.6	ug/l	60.0-120	**106**			
Toluene	"	10.0		10.7	"	60.0-120	**107**			
Ethylbenzene	"	10.0		10.4	"	60.0-120	**104**			
Xylenes (total)	"	30.0		30.5	"	60.0-120	**102**			
Surrogate: 4-BFB (PID)	"	*48.0*		*40.6*	"	*60.0-120*	*84.6*			
LCS Dup	**0770569-BSD1**									
Gasoline Range Hydrocarbons	7/18/97	500		492	ug/l	60.0-120	**98.4**	20.0	**0.816**	
Surrogate: 4-BFB (FID)	"	*48.0*		*50.5*	"	*60.0-120*	*105*			
Matrix Spike	**0770569-MS1**		**B707217-01**							
Benzene	7/18/97	10.0	ND	10.3	ug/l	60.0-120	**103**			
Toluene	"	10.0	ND	10.5	"	60.0-120	**105**			
Ethylbenzene	"	10.0	ND	10.1	"	60.0-120	**101**			
Xylenes (total)	"	30.0	ND	29.5	"	60.0-120	**98.3**			
Surrogate: 4-BFB (PID)	"	*48.0*		*44.5*	"	*60.0-120*	*92.7*			
Matrix Spike Dup	**0770569-MSD1**		**B707217-01**							
Benzene	7/18/97	10.0	ND	10.5	ug/l	60.0-120	**105**	20.0	**1.92**	
Toluene	"	10.0	ND	10.7	"	60.0-120	**107**	20.0	**1.89**	
Ethylbenzene	"	10.0	ND	10.3	"	60.0-120	**103**	20.0	**1.96**	
Xylenes (total)	"	30.0	ND	29.7	"	60.0-120	**99.0**	20.0	**0.710**	
Surrogate: 4-BFB (PID)	"	*48.0*		*42.8*	"	*60.0-120*	*89.2*			

North Creek Analytical, Inc.

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

Laura L Dutton, Director, Analytical Services

NORTH CREEK ANALYTICAL
Environmental Laboratory Services

0099

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

Geo Engineers - Alaska	Project:	UNOCAL #5580	Sampled: 7/8/97
4951 Eagle Street	Project Number:	0161-409-18	Received: 7/10/97
Anchorage, AK 99503-7432	Project Manager:	Laurie Jean Dworian	Reported: 7/29/97 17:01

Diesel Hydrocarbons (C10-C25) by AK102/Quality Control
North Creek Analytical - Bothell

Analyte	Date Analyzed	Spike Level	Sample Result	QC Result	Units	Reporting Limit / Recov. Limits	Recov. %	RPD Limit	RPD %	Notes*
Batch: 0770459	**Date Prepared: 7/15/97**					**Extraction Method: EPA 3510/600 Series**				
Blank	**0770459-BLK1**									
Diesel Range Hydrocarbons	7/17/97			**ND**	mg/l	**0.100**				
Surrogate: 2-FBP	"	*0.350*		*0.237*	"	*50.0-150*	*67.7*			
LCS	**0770459-BS1**									
Diesel Range Hydrocarbons	7/17/97	2.04		2.17	mg/l	60.0-120	**106**			
Surrogate: 2-FBP	"	*0.350*		*0.231*	"	*50.0-150*	*66.0*			
LCS Dup	**0770459-BSD1**									
Diesel Range Hydrocarbons	7/17/97	2.04		2.18	mg/l	60.0-120	**107**	20.0	**0.939**	
Surrogate: 2-FBP	"	*0.350*		*0.238*	"	*50.0-150*	*68.0*			

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

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0100

Geo Engineers - Alaska	Project:	UNOCAL #5580	Sampled: 7/8/97
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Anchorage, AK 99503-7432	Project Manager:	Laurie Jean Dworian	Reported: 7/29/97 17:01

Notes and Definitions

#	Note
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.

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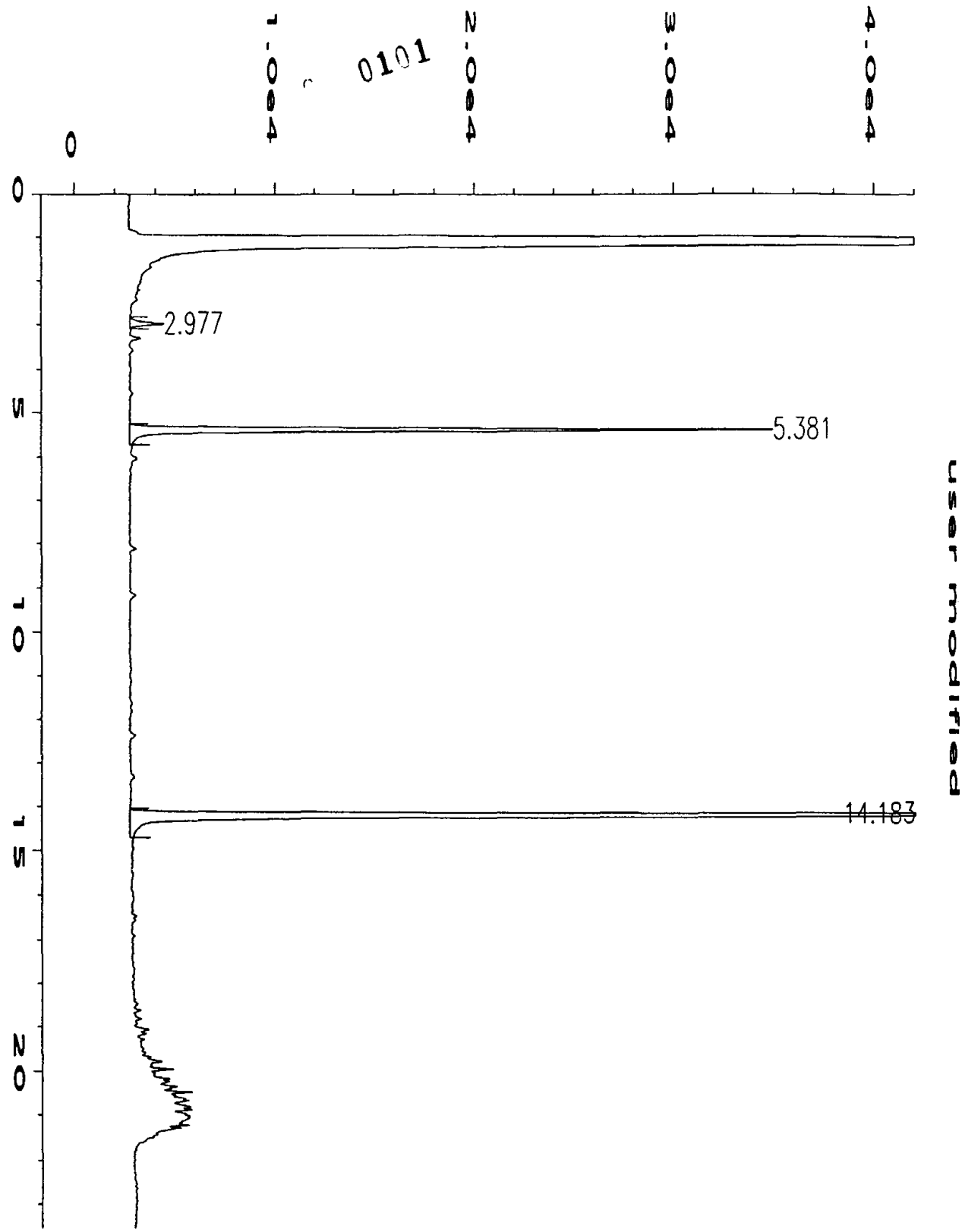

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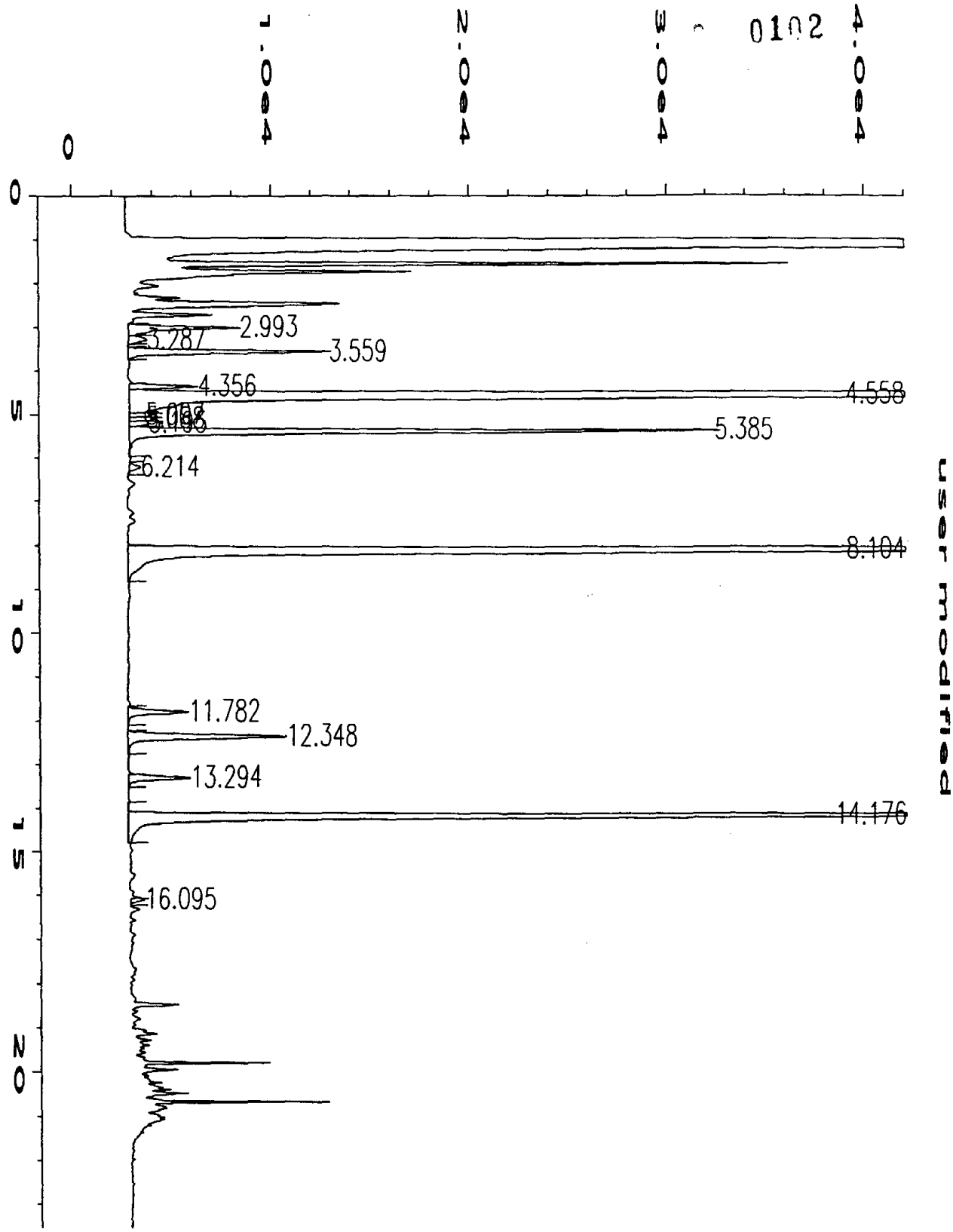
Operator : jc
Instrument : GC #8
Sample Name : b707217-01
Run Time Bar Code:
Acquired on : 18 Jul 97 10:48 AM
Report Created on: 18 Jul 97 01:05 PM

Page Number : 1
Vial Number : 6
Injection Number : 1
Sequence Line : 3
Instrument Method: AK101-W.MTH
Analysis Method : AK101-W.MTH

5ml



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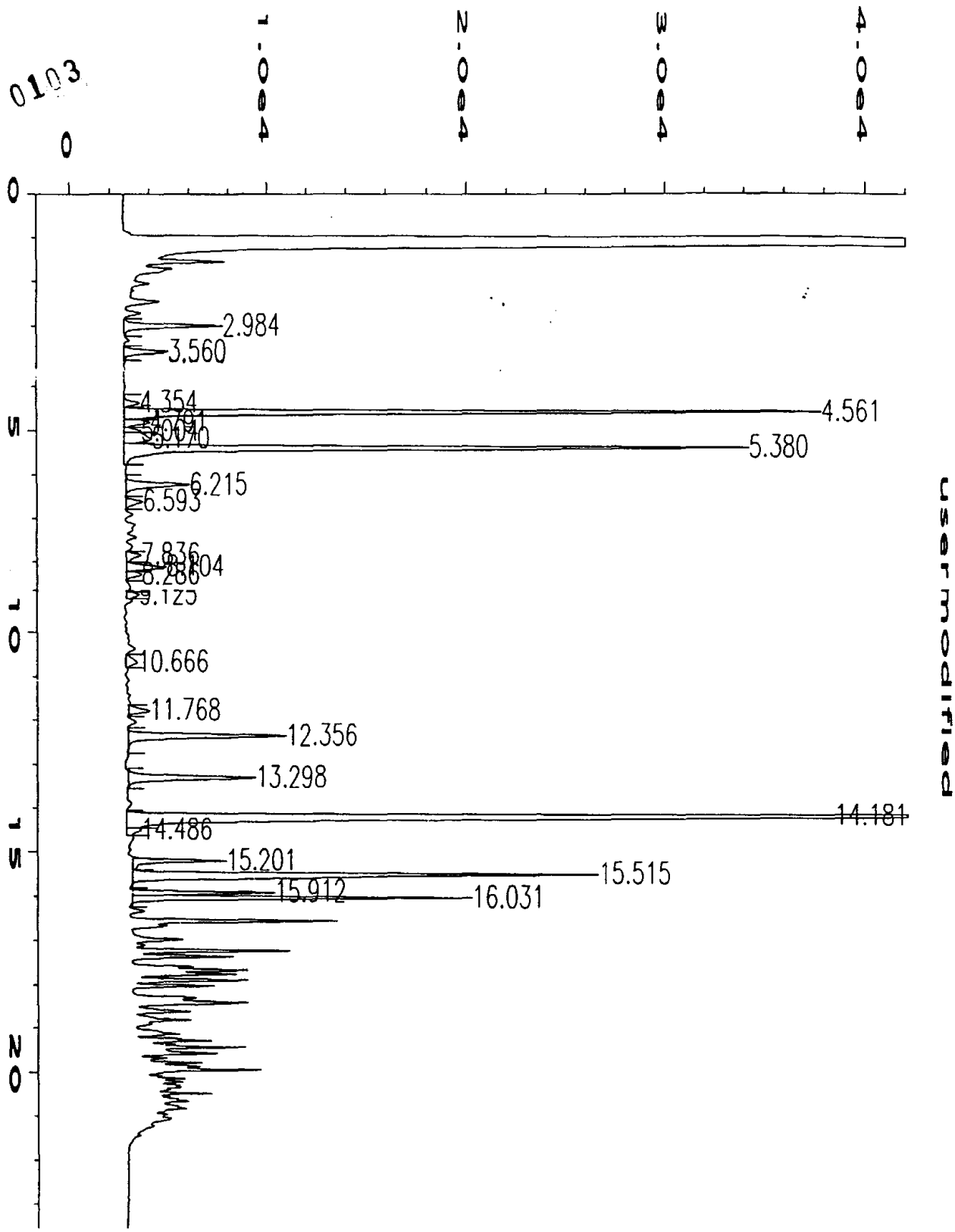
Operator	: jc	Page Number	: 1
Instrument	: GC #8	Vial Number	: 11
Sample Name	: b707217-02 r1	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 3
Acquired on	: 18 Jul 97 01:24 PM	Instrument Method	: AK101-W.MTH
Report Created on	: 18 Jul 97 03:48 PM	Analysis Method	: AK101-W.MTH
Multiplier	: 25		

200 µl



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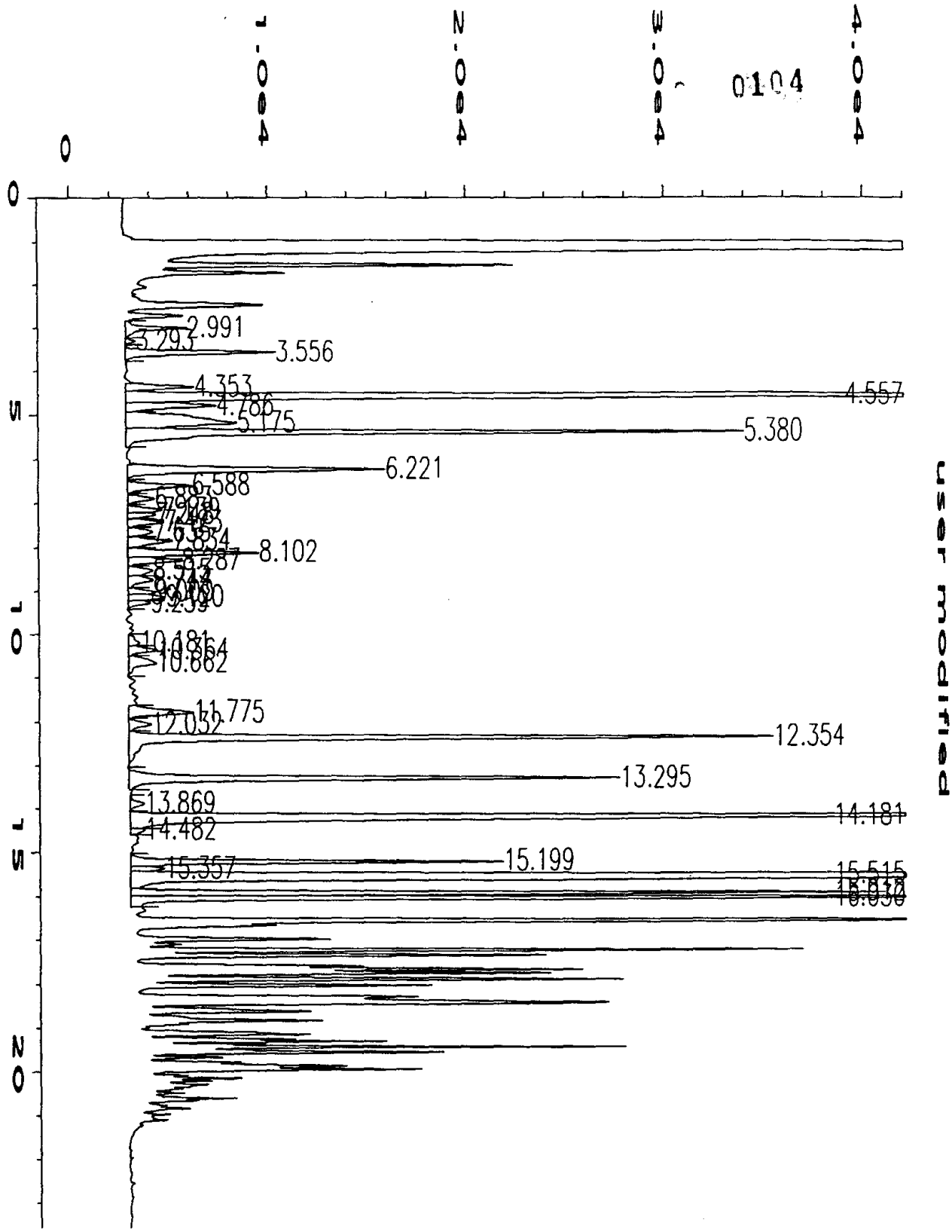
Operator	: jc	Page Number	: 1
Instrument	: GC #8	Vial Number	: 19
Sample Name	: b707217-03 r1	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 3
Acquired on	: 18 Jul 97 05:22 PM	Instrument Method	: AK101-W.MTH
Report Created on:	19 Jul 97 09:10 AM	Analysis Method	: AK101-W.MTH



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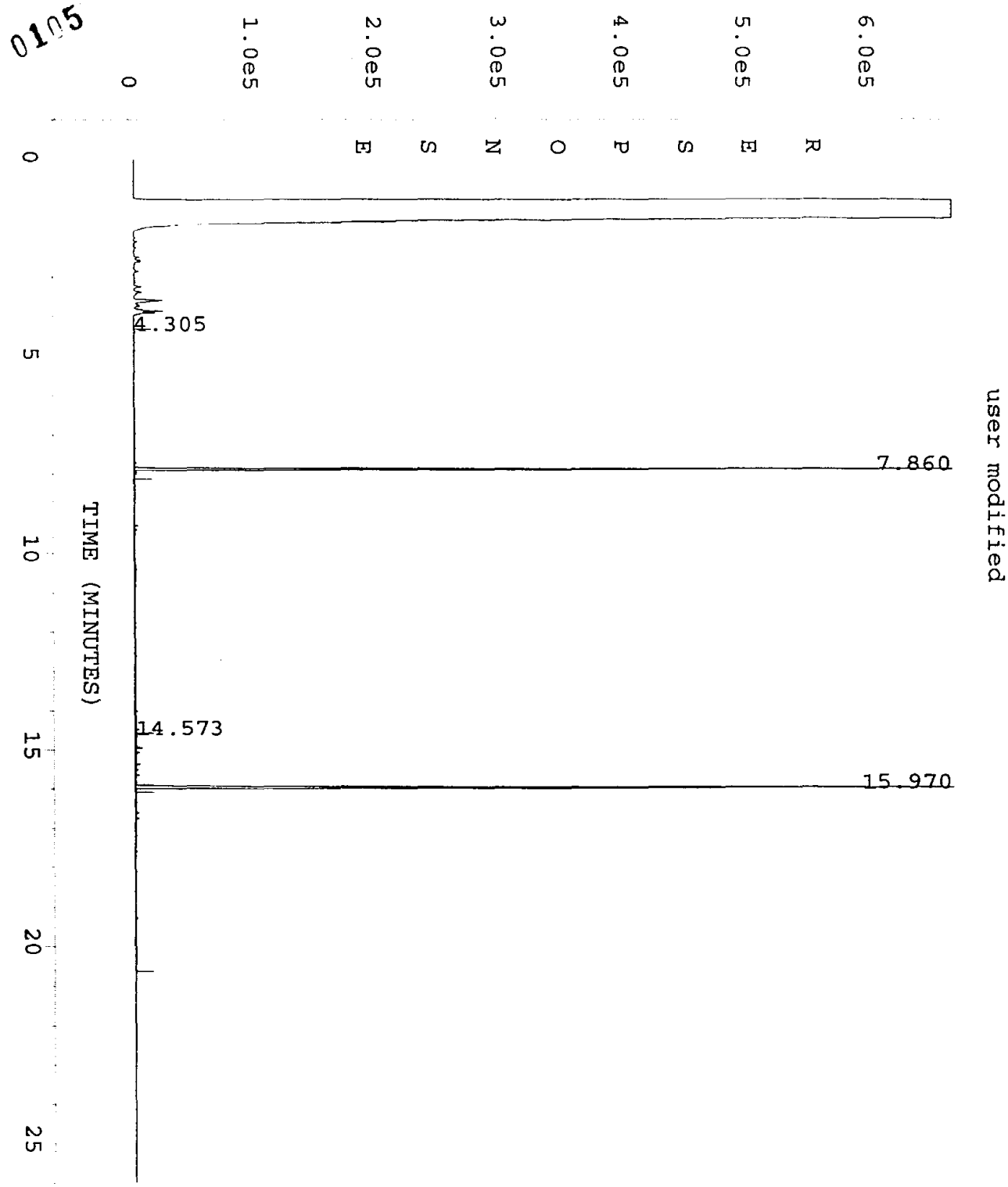
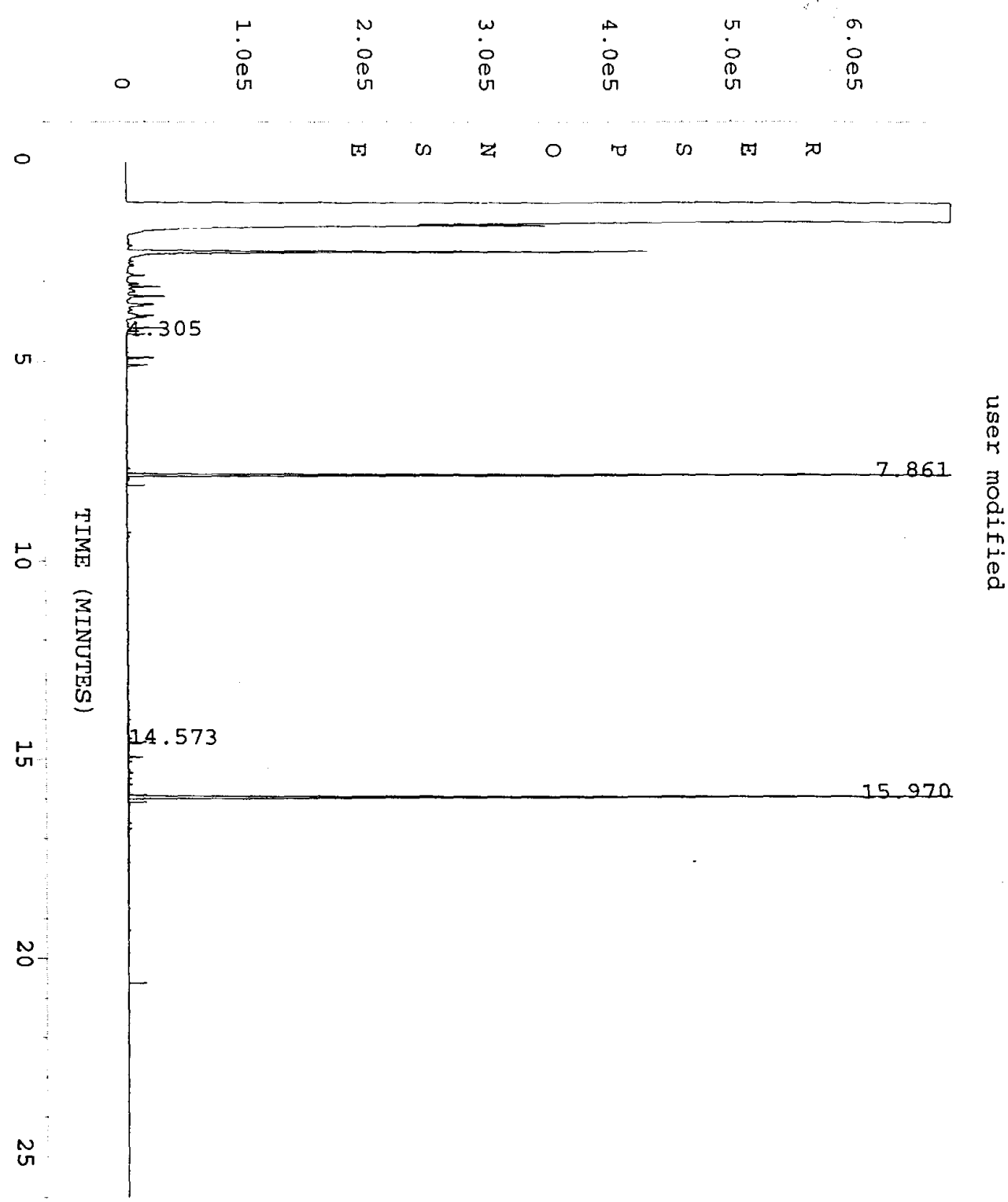
Operator : jc
Instrument : GC #8
Sample Name : b707217-04 r1
Run Time Bar Code:
Acquired on : 18 Jul 97 03:23 PM
Report Created on: 18 Jul 97 03:49 PM

Page Number : 1
Vial Number : 15
Injection Number : 1
Sequence Line : 3
Instrument Method: AK101-W.MTH
Analysis Method : AK101-W.MTH

0105



Data File Name	: C:\HPCHEM\3\DATA\JUL17\064R1101.D		
Operator	: TF	Page Number	: 1
Instrument	: FUBAR	Vial Number	: 64
Sample Name	: 707217-01 W	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 11
Acquired on	: 17 Jul 97 09:35 PM	Instrument Method	: AK102R4.MTH
Report Created on	: 29 Jul 97 04:08 PM	Analysis Method	: TPHE.MTH



Data File Name	: C:\HPCHEM\3\DATA\JUL17\065R1101.D		
Operator	: TF	Page Number	: 1
Instrument	: FUBAR	Vial Number	: 65
Sample Name	: 707217-02 W	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 11
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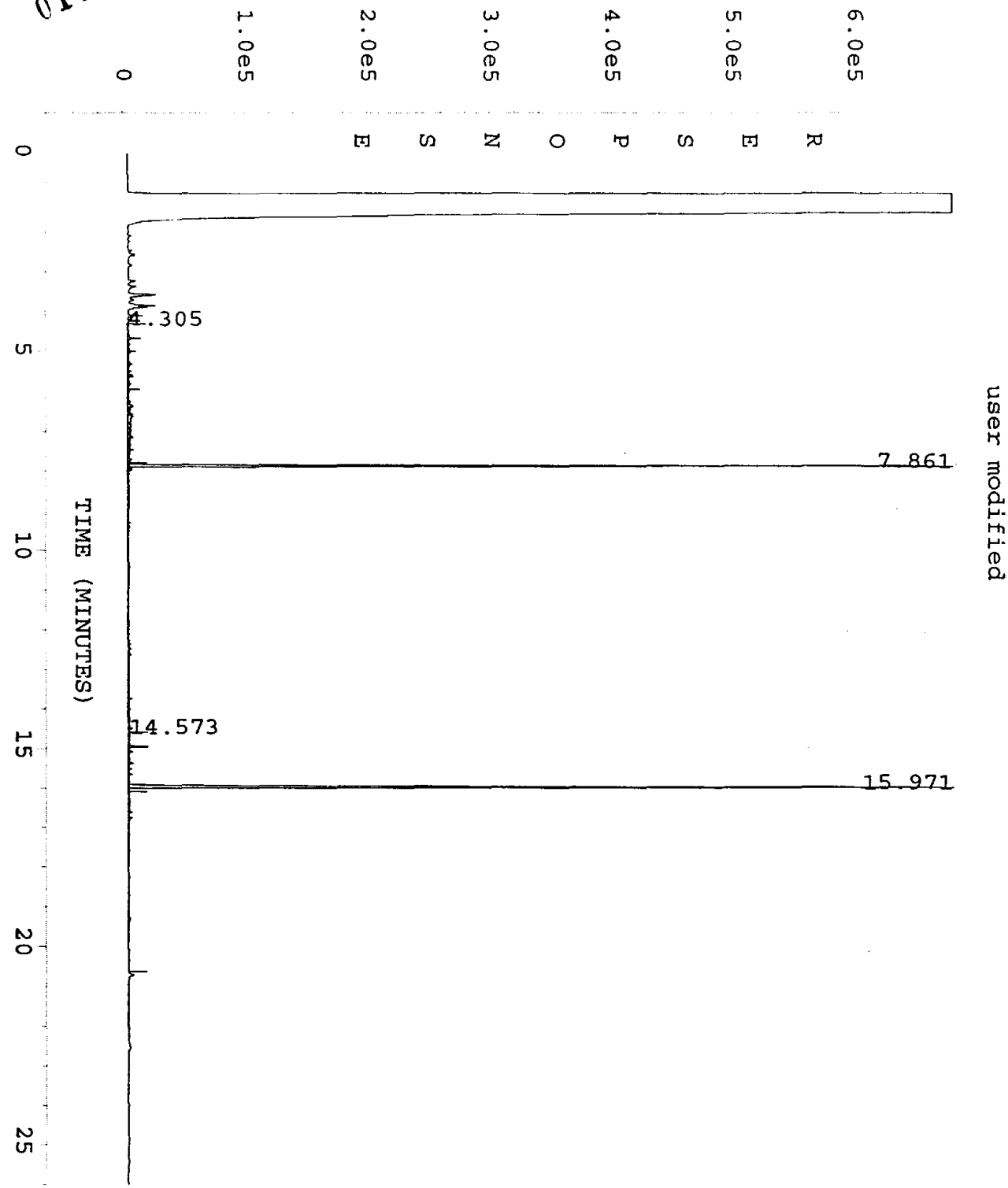
Report Created on	: 29 Jul 97 04:09 PM	Analysis Method	: TPHE.MTH

0107



Data File Name	: C:\HPCHEM\3\DATA\JUL17\066R1101.D		
Operator	: TF	Page Number	: 1
Instrument	: FUBAR	Vial Number	: 66
Sample Name	: 707217-03 W	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 11
Acquired on	: 17 Jul 97 10:40 PM	Instrument Method	: AK102R4.MTH
Report Created on	: 29 Jul 97 04:11 PM	Analysis Method	: TPHE.MTH

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UNOCAL CHAIN OF CUSTODY REPORT

UNOCAL INFORMATION

Facility Number: 5580
Site Address: 942 Gambell St
City, State, ZIP: Anchorage, AK
Site Release Number:
Unocal Manager: DR. Mark Brearley
CERT INFO: (check one) ☒ Evaluation o Remediation
o Detection o Demolition o Closure o Miscellaneous

CONSULTANT INFORMATION

Firm: GeoEngineers Project Number: 0161-409-18
Address: 4951 Eagle St
Anchorage, AK. 99503
Phone: 907-561-3478 Fax: 907-561-5123
Project Manager: LaRue Jean Duperian
Sample Collection by: Patrick J Timmer

Chain of Custody Record #: B707217

Quality Assurance Data Level: (A) B

A: Standard Summary

B: Standard + Chromatograms

Laboratory Turnaround Days: (10) 5 3 2 1

o Oregon o Washington Hydrocarbon Methods ☒ AK

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 Semi Vols. (EPA 8270)	PAHs by HPLC (EPA 8310)	Lead: Total or Dissolved	TCLP Metals (8)	SRO/Bet-X AK 101 8020	DRO AK102	NCA SAMPLE NUMBER
1. A	7-8-97/1320	W	3																X	X	B707217-01
2. B	/1400																		X	X	02
3. C	/14:30																		X	X	03
4. D	/ —		2																X		04
5.																					
6.																					
7.																					
8.																					
9.																					
10.																					

Relinquished by:	Firm:	Date & Time	Received by:	Firm:	Date & Time
1. Patrick J Timmer	GE/AK	7-9-97/1200	[signature]	NA	7/10/97 1200
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: Date:

Page 1 of 1

Rev. 2.2, 11/94

Comments:

Distribution: White, Laboratory; Yellow, Consultant; Pink, Unocal