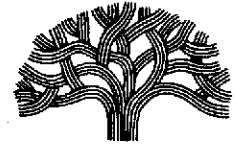




CITY OF OAKLAND



DALZIEL BUILDING • 250 FRANK H. OGAWA PLAZA, SUITE 5301 • OAKLAND, CALIFORNIA 94612-2034

Public Works Agency
Environmental Services

FAX (510) 238-7286
TDD (510) 238-7644

August 29, 2000

Mr. Barney Chan
Alameda County Environmental Health Services
1131 Harbor Bay Parkway
Alameda, California 94502-6577

**Subject: Second Quarter 2000 Monitoring Report and
Soil and Groundwater Investigation and Storm Drain Rehabilitation Report
City of Oakland Municipal Service Center
7101 Edgewater Drive
Oakland, California**

00 AUG 30 PM 3:15
ENVIRONMENTAL
PROTECTION

Dear Mr. Chan:

Enclosed are copies of the *Second Quarter 2000 Monitoring Report* prepared by our consultant, Cambria Environmental Technology Inc., and *Soil and Groundwater Investigation and Storm Drain Rehabilitation Project Report*, prepared by our consultant Subsurface Consultants Inc. for the City of Oakland Municipal Service Center at 7101 Edgewater Drive.

Please call me at 238-6259, if you have any questions or require additional information.

Sincerely,

Joseph A. Cotton
Environmental Program Specialist

cc: w/o encl.: David Elias, Cambria Environmental Technology
Diane Heinz, Port of Oakland

C A M B R I A

August 24, 2000

Mr. Joseph Cotton
City of Oakland, Public Works Agency
Environmental Services Division
250 Frank H. Ogawa Plaza, Ste. 5301
Oakland, California 94612-2034

Re: **Second Quarter 2000 Monitoring Report**
City of Oakland, Municipal Services Center
7101 Edgewater Drive
Oakland, California
Cambria Project #153-1247-021

Dear Mr. Cotton:



As required by the Alameda County Health Care Services Agency (ACHCSA), Cambria Environmental Technology, Inc. (Cambria) has prepared this second quarter 2000 groundwater monitoring report for the above-referenced site. Presented below are the second quarter 2000 activities and results, conclusions, and the anticipated third quarter 2000 activities. Groundwater elevations and hydrocarbon concentrations are presented on Figure 1. Analytic results are tabulated in Table 1, and the laboratory analytical report including chromatograms is included as Attachment A. Well sampling forms, completed in the field, are included as Attachment B, and our standard field procedures for sampling monitoring wells are included as Attachment C.

SECOND QUARTER 2000 ACTIVITIES AND RESULTS

On May 11, 2000, Cambria gauged monitoring wells MW-1, MW-2, and MW-5 through MW-17, and backfill wells TBW-1, TBW-3, TBW-4, TBW-5 and TBW-6 (Figure 1), and inspected the site wells for separate phase hydrocarbons (SPHs). Wells MW-3 and MW-4 were destroyed during the fourth quarter 1999. As per the ACHCSA approved schedule shown below, Cambria collected groundwater samples from monitoring wells MW-8 through MW-17, in the absence of SPHs. Select groundwater samples were analyzed for total petroleum hydrocarbons (TPH) as gasoline (TPHg), TPH as diesel (TPHd), TPH as kerosene (TPHk), TPH as motor oil (TPHmo), benzene, toluene, ethylbenzene and xylenes (BTEX), and methyl tert-butyl ether (MTBE) at Caltest Analytical of Napa, California, a California state-certified laboratory. The specific analytes for each well are presented below in Table A.

Oakland, CA
San Ramon, CA
Sonoma, CA
Portland, OR

**Cambria
Environmental
Technology, Inc.**


1144 65th Street
Suite B
Oakland, CA 94608
Tel (510) 420-0700
Fax (510) 420-9170

Table A - Well Sampling Protocol

Well	Sampling Frequency	Proposed Analytes
MW-1	1 st and 3 rd Quarters	TPHd, TPHk, TPHmo, TPHg/BTEX/ MTBE*, bioparameters
MW-2	1 st and 3 rd Quarters	TPHd, TPHg/BTEX/MTBE*, bioparameters
MW-3		None - destroyed well
MW-4		None - destroyed well
MW-5	1 st and 3 rd Quarters	TPHd, TPHk, TPHmo, TPHg/BTEX/MTBE*, bioparameters
MW-6	1 st and 3 rd Quarters	TPHd, TPHg/BTEX/MTBE*, bioparameters
MW-7	1 st and 3 rd Quarters	TPHd, TPHk, TPHmo, TPHg/BTEX/MTBE*, bioparameters
MW-8	1 st , 2 nd , 3 rd , and 4 th Quarters	TPHd, TPHk, TPHmo, TPHg/BTEX/MTBE*, bioparameters
MW-9	1 st , 2 nd , 3 rd , and 4 th Quarters	TPHd, TPHk, TPHmo, TPHg/BTEX/MTBE*, bioparameters
MW-10	1 st , 2 nd , 3 rd , and 4 th Quarters	TPHd, TPHk, TPHmo, TPHg/BTEX/MTBE*, bioparameters
MW-11	1 st , 2 nd , 3 rd , and 4 th Quarters	TPHd, TPHk, TPHmo, TPHg/BTEX/MTBE*, bioparameters
MW-12	1 st , 2 nd , 3 rd , and 4 th Quarters	TPHd, TPHk, TPHmo, TPHg/BTEX/MTBE*, bioparameters
MW-13	1 st , 2 nd , 3 rd , and 4 th Quarters	TPHd, TPHk, TPHmo, TPHg/BTEX/MTBE*, bioparameters
MW-14	1 st , 2 nd , 3 rd , and 4 th Quarters	TPHd, TPHk, TPHmo, TPHg/BTEX/MTBE*, bioparameters
MW-15	1 st , 2 nd , 3 rd , and 4 th Quarters	TPHd, TPHk, TPHmo, TPHg/BTEX/MTBE*, bioparameters
MW-16	1 st , 2 nd , 3 rd , and 4 th Quarters	TPHd, TPHk, TPHmo, TPHg/BTEX/MTBE*, bioparameters
MW-17	1 st , 2 nd , 3 rd , and 4 th Quarters	TPHd, TPHk, TPHmo, TPHg/BTEX/MTBE*, bioparameters

*Any positive results for MTBE will be confirmed by re-analysis using EPA Method 8260, except in MW-5. Confirmation by EPA Method 8260 for MW-5 is not necessary due to positive confirmation results in the third quarter 1998.
Bioparameters = Ferrous iron, ORP, DO, total alkalinity, nitrate, and sulfate and conducted only during 1st and 3rd quarters.

Groundwater Flow Direction



Cambria gauged all monitoring wells and the tank backfill wells on May 11, 2000. The measurements indicate a northwestern groundwater gradient of 0.02 ft/ft toward Damon Slough in the northern portion of the site, a western groundwater gradient of 0.006 ft/ft toward San Leandro Bay in the central portion of the site, and a southwestern groundwater gradient of 0.011 ft/ft in the southern portion of the site (Figure 1). The flow directions are generally consistent with historical measurements. The groundwater elevation data from newly installed wells MW-11 and MW-14, located in the central/western portion of the site, revealed a northwest/southeast-trending groundwater ridge, similar to the groundwater flow directions during the first quarter 2000. The flow direction interpretation in the northern portion of the site was not affected substantially by the removal of groundwater elevation data from previously destroyed wells MW-3 and MW-4. The contours near these former wells appear similar to previous sampling events, with groundwater flowing north towards Damon Slough. Groundwater elevation data are presented in Table 1.

Hydrocarbon Distribution in Groundwater

Chromatogram Review: Analytic laboratories will usually report the hydrocarbons detected in the range of the requested analysis, regardless of the pattern of the chromatogram. They may note if the pattern is different from the typical pattern associated with the requested analysis. However, this practice can still result in false positive hydrocarbon detections and reporting due to the overlapping of the ranges of different types of hydrocarbons. For example: a laboratory may report a diesel concentration, when in fact, the hydrocarbon detected is the lighter end of motor oil.

As discussed in the first quarter 2000 monitoring report, we noted that high motor oil concentrations were often associated with a lower diesel concentration for a number of the perimeter wells. The analytic laboratory completed a review of the chromatograms generated for this quarter to assess whether the TPHd detected in groundwater samples from the wells located along the shoreline were actually the lighter end of TPHmo. The results of this review indicated that most of the TPHd reported by the laboratory was actually motor oil (Table 1, Figure 2, Attachment A). This result of the chromatogram review is significant for two reasons: 1) the TPHd-impacted soil and groundwater appears to be restricted to onsite, and is not detected in groundwater water samples collected from downgradient perimeter wells MW-8, 9, 10, 13, 14, 15, or 17, and 2) the City does not have a history of an onsite motor oil release, nor has elevated TPHmo been detected historically in onsite groundwater or soil samples. Therefore, the TPHmo detected in the newly installed wells appears to originate from an offsite source located along the San Leandro shoreline and is not likely related to fuel dispensing activities associated with the City's Municipal Service Center.

ANALYSIS
LAB ANAL REP

Diesel in Groundwater: As discussed above, the majority of the diesel detected in groundwater samples for this quarter were actually the lighter end of motor oil. As shown in Table 1, none of the offsite perimeter wells contain diesel concentrations above the San Francisco Airport Ecological Protection Zone Tier I Standard of 640 $\mu\text{g/l}$.

Motor Oil in Groundwater: The maximum TPHmo concentration detected in groundwater was 110,000 $\mu\text{g/l}$ in new offsite well MW-13. As noted last quarter, elevated TPHmo concentrations appear to be restricted to the areas offsite and to the west of the Municipal Service Center property line.

Gasoline in Groundwater: The maximum TPHg concentration detected was 1,050 $\mu\text{g/l}$ in well MW-9, which is below the San Francisco Airport Ecological Protection Zone Tier I Standard acceptable threshold of 3,700 $\mu\text{g/l}$. TPHg concentrations appear to be defined in the downgradient and crossgradient directions to within acceptable ecological risk thresholds.

Benzene in Groundwater: A maximum benzene concentration of 280 $\mu\text{g/l}$ was detected in well MW-9. This was the only analytic result for benzene that exceeded the acceptable risk thresholds for both the San Francisco Airport Ecological Protection Zone Tier I Standards and the City of Oakland Risk-Based Tier I guidance thresholds for inhalation of indoor air vapors, of 71 and 110 $\mu\text{g/l}$, respectively.

MTBE in Groundwater: No MTBE was detected in any of the groundwater samples collected for this quarter's monitoring.

Separate-Phase Hydrocarbons: Separate-phase hydrocarbons (SPH) were detected in monitoring wells MW-6 and MW-16, and in backfill wells TBW-3 and TBW-5. However, the extent of SPH is defined in the downgradient direction for each of these areas by wells MW-13 and MW 17. It is unlikely that the SPH detected in well MW-16 is related to the SPH in well MW-6 because the hydrocarbon appears to be more viscous than the onsite diesel/gasoline SPHs. This conclusion was supported by forensic product analysis completed by Zymax Forensics of North Hills, California. These analytic results will be submitted under separate cover. Cambria is currently removing SPH from tank backfill well TBW-5 using a pneumatic skimmer. SPH in wells MW-6, MW-16, TBW-1 and TBW-3 are being removed with passive skimmers or hydrocarbon absorbing "pigs/socks".

OTHER SECOND QUARTER 2000 ACTIVITIES

Separate-phase Hydrocarbon Removal: Cambria installed an active, mobile free-product skimmer, and is currently removing free product from tank backfill well TBW-5. As of June 22, 2000, the active skimmer had removed approximately 59 gallons of SPHs from well TBW-5. In addition, the passive skimmer installed in well MW-6 had removed approximately 0.5 gallons of SPHs. The thickness of SPHs in wells TBW-1 and TBW-3 have not been significant enough to remove SPHs from those wells, and the high viscosity of the product found in well MW-16 has kept the product skimmer in that well from collecting SPHs. Therefore, the skimmers in wells TBW-1 and MW-16 were replaced with hydrocarbon absorbing "pigs/socks".

CONCLUSIONS

In summary, the analytic results for groundwater for this quarter indicate the following:

- The diesel concentrations detected in the offsite perimeter wells are from the light end of motor oil, and are not indicative of actual TPHd in groundwater.
- The offsite groundwater samples contained elevated TPHmo concentrations of up to 110,000 $\mu\text{g/l}$. These TPHmo concentrations are much higher than the concentrations detected historically in onsite wells where gasoline and diesel are the primary contaminants of concern. Since TPHmo appears to exist primarily offsite, there may be offsite TPHmo sources not associated with the historical operations at the Municipal Service Center. The site and the surrounding land is composed of large quantities of fill of unknown origin. Therefore, it is possible that motor oil was entrained in the material used to fill the offsite area.
- The viscous SPH detected in well MW-16 did not appear to be the same hydrocarbon as the mixed gasoline and diesel SPH detected in monitoring well MW-6. A report for product samples from wells MW-6 and MW-16 that supports this conclusion will be submitted under separate cover.

need to also compare
chromatograms of onsite sples.
to see if they are similar

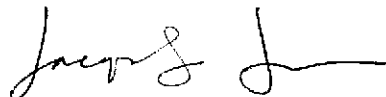
ANTICIPATED THIRD QUARTER 2000 ACTIVITIES

Cambria will gauge and measure any SPH detected in MW-1, MW-2, and MW-5 through MW-17, and collect groundwater samples from the wells. Following field activities, Cambria will tabulate the analytic data, contour groundwater elevations, and write a quarterly monitoring report.

CLOSING

Please call Jacquelyn Jones at (510) 420-3315 or David Elias at (510) 420-3307, if you have any questions or comments regarding this report or anticipated site activities.

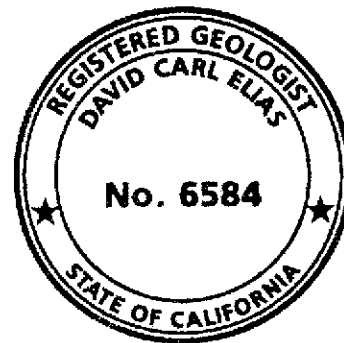
Sincerely,
Cambria Environmental Technology, Inc.



Jacquelyn Jones
Senior Staff Geologist

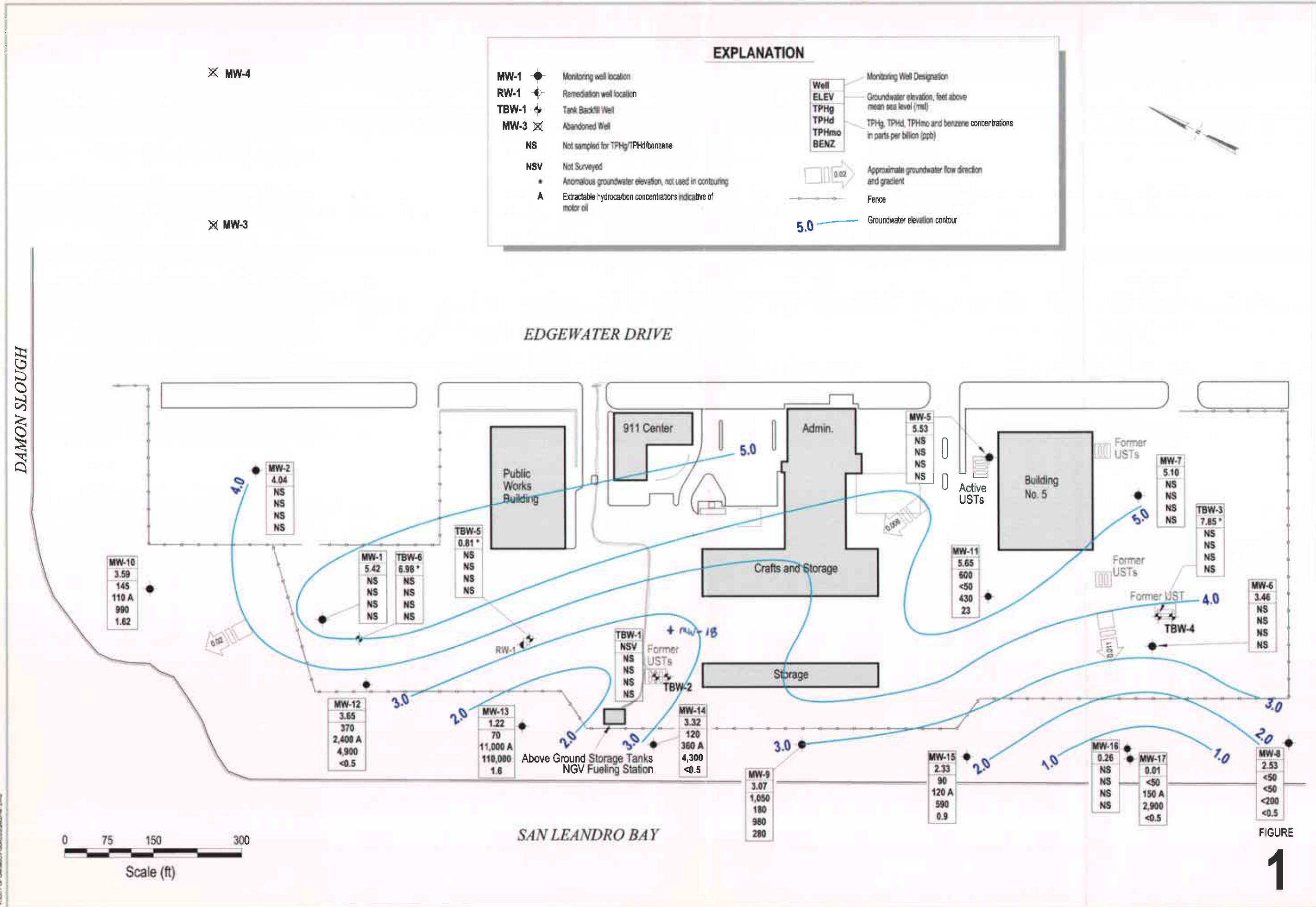


David Elias, R.G.
Senior Geologist



- Attachments: A - Laboratory Analytical Report
B - Well Sampling Forms
C - Standard Procedures for Monitoring Wells

H:\City of Oakland\Municipal Service Center\QM\2q00\CofO-2q00.wpd



EXPLANATION

- MW-1 ● Monitoring well location
- RW-1 ● Remediation well location
- TBW-1 ▲ Tank Backfill Well
- MW-3 ✕ Abandoned Well
- NS Not sampled for TPHg/TPHd/benzene
- NSV Not Surveyed
- * Anomalous groundwater elevation, not used in contouring
- A Extractable hydrocarbon concentrations indicative of motor oil

Well	ELEV	TPHg	TPHd	TPHmo	BENZ
	Monitoring Well Designation				
	Groundwater elevation, feet above mean sea level (msl)				
	TPHg, TPHd, TPHmo and benzene concentrations in parts per billion (ppb)				

- 0.02 Approximate groundwater flow direction and gradient
- Fence
- 5.0 — Groundwater elevation contour



FIGURE
1

CAMBRIA

Table 1. Groundwater Analytical Results for Fuel Hydrocarbons - City of Oakland Municipal Services Center, Oakland, California

Date	TOC Elev.	DTW Elev.	GW Elev.	BTEX Method	Notes	TPHd	TPHmo	TPHk	TPHg	Benzene	Toluene	Ethyl-benzene	Xylenes	MTBE	Organic Lead
←-----μg/l----->															
MW-1															
10/04/89	10.20	---	---	8020		---	---	---	540	65	26	14	22	---	---
10/04/89	10.20	---	---	8240		---	---	---	---	120	46	43	78	---	---
04/27/93	10.20	---	---	8020		---	---	---	<1,000	<1.0	<1.0	<1.0	<1.0	---	---
04/19/95	10.20	---	---	8020		---	---	---	3,200	880	15	23	21	---	---
07/27/95	10.20	4.62	5.58	8020		---	---	---	980	130	3.6	1.4	5.6	---	---
11/20/95	10.20	6.08	4.12	8020		---	---	---	400	99	2.8	1.1	4.6	---	---
02/21/96	10.20	4.62	5.58	8020		---	---	---	1,700	340	8.4	5.3	16	---	---
05/13/96	10.20	4.33	5.87	8020		---	---	---	7,300	2,000	30	42	38	---	---
08/27/96	10.20	5.25	4.95	8020		---	---	---	380	61	2.4	<0.5	4.2	---	---
02/23/98	10.20	1.75	8.45	8020		<50	<500	<50	820	160	4.9	3	9.7	---	---
08/19/98	10.20	4.78	5.42	8020	SGC	1,200	---	---	780	69	4.1	0.84	8.5	<5.0	---
11/11/98	10.20	5.64	4.56	---		---	---	---	---	---	---	---	---	---	---
02/23/99	10.20	3.41	6.79	8020	SGC	1,200	1,600	<50	1,100	190	5	3	12	<5.0	---
05/27/99	10.20	3.96	6.24	---		---	---	---	---	---	---	---	---	---	---
08/24/99	10.20	4.92	5.28	8020	SGC	640	1,900	<50	370	37	0.9	<0.5	1.9	<5.0	---
11/22/99	10.20	5.46	4.74	---		---	---	---	---	---	---	---	---	---	---
01/18/00	10.05	5.41	4.64	---		---	---	---	---	---	---	---	---	---	---
01/19/00	---	---	---	8020	SGC	50	<200	<50	660	43	2.3	1.1	6	<5.0	---
05/11/00	10.05	4.63	5.42	---		---	---	---	---	---	---	---	---	---	---
MW-2															
10/04/89	10.47	---	---	8020		---	---	---	<30	<0.3	<0.3	<0.3	<0.3	---	---
10/04/89	10.47	---	---	8240		---	---	---	---	2	<2.0	<2.0	<2.0	---	---
04/27/93	10.47	---	---	8020		---	---	---	<1,000	<1.0	<1.0	<1.0	<1.0	---	---
04/19/95	10.47	---	---	8020		---	---	---	<50	1.8	<0.5	<0.5	<0.5	---	---
07/27/95	10.47	6.22	4.25	8020		---	---	---	<50	2.3	<0.5	<0.5	<0.5	---	---
11/20/95	10.47	7.49	2.98	8020		---	---	---	<50	2.2	<0.5	<0.5	<0.5	---	---
02/21/96	10.47	6.68	3.79	8020		---	---	---	<50	1.7	<0.5	<0.5	0.5	---	---
05/13/96	10.47	6.32	4.15	8020		---	---	---	---	2	<0.5	<0.5	<0.5	---	---
08/27/96	10.47	6.84	3.63	8020		---	---	---	---	2.4	<0.5	<0.5	<0.5	---	---
02/24/98	10.47	5.44	5.03	8020		<50	<500	<50	---	1.6	<0.5	<0.5	<0.5	---	---
08/19/98	10.47	6.56	3.91	8020	SGC	330	---	---	<50	4.1	3.4	0.8	2.6	<5.0	<100
11/11/98	10.47	7.37	3.10	---		---	---	---	---	---	---	---	---	---	---
02/23/99	10.47	8.68	1.79	8020	SGC	200	900	<50	<50	3.5	0.6	0.6	1.2	<5.0	---
05/27/99	10.47	5.20	5.27	---		---	---	---	---	---	---	---	---	---	---
08/24/99	10.47	6.75	3.72	8020	SGC	140	700	<50	<50	2.6	<0.5	<0.5	<0.5	<5.0	---

CAMBRIA

Table 1. Groundwater Analytical Results for Fuel Hydrocarbons - City of Oakland Municipal Services Center, Oakland, California

Date	TOC Elev.	DTW Elev.	GW Elev.	BTEX Method	Notes	TPHd	TPHmo	TPHk	TPHg	Benzene	Toluene	Ethyl- benzene	Xylenes	MTBE	Organic Lead
<-----µg/l----->															
TBW-5															
02/23/99	---	9.72	---	---	SPH: 1.45 ft	---	---	---	---	---	---	---	---	---	---
05/27/99	---	7.03	---	---	SPH: 1.13 ft	---	---	---	---	---	---	---	---	---	---
08/24/99	---	6.52	---	---	SPH: 1.33 ft	---	---	---	---	---	---	---	---	---	---
11/22/99	---	8.31	---	---	SPH: 1.29 ft	---	---	---	---	---	---	---	---	---	---
01/18/00	10.22	6.20	4.02	---	SPH: 0.90 ft	---	---	---	---	---	---	---	---	---	---
05/11/00	10.22	9.41	0.81	---	SPH: 0.30 ft	---	---	---	---	---	---	---	---	---	---
TBW-6															
02/23/99	---	2.09	---	8020		160	600	<50	60	<0.5	<0.5	<0.5	<0.5	<5.0	---
05/27/99	---	3.31	---	---		---	---	---	---	---	---	---	---	---	---
08/24/99	---	7.29	---	8020 SGC		180	400	<50	130	<0.5	<0.5	<0.5	<0.5	<5.0	---
11/22/99	---	4.37	---	---		---	---	---	---	---	---	---	---	---	---
01/18/00	9.49	3.83	5.66	---		---	---	---	---	---	---	---	---	---	---
01/19/00	---	---	---	8020 SGC		55 C	<200	<50	170	0.6	<0.5	<0.5	<0.5	<5.0	---
05/11/00	9.49	2.51	6.98	8020 SGC		---	---	---	---	---	---	---	---	---	---
Trip Blank															
08/19/98	---	---	---	8020		---	---	---	<50	<0.5	<0.5	<0.5	<0.5	<5.0	---
11/22/99	---	---	---	8020		---	---	---	<50	<0.5	<0.5	<0.5	<0.5	<5.0	---

CAMBRIA

Table 1. Groundwater Analytical Results for Fuel Hydrocarbons - City of Oakland Municipal Services Center, Oakland, California

Date	TOC Elev.	DTW	GW Elev.	BTEX Method	Notes	TPHd	TPHmo	TPHk	TPHg	Benzene	Toluene	Ethyl-benzene	Xylenes	MTBE	Organic Lead
------	-----------	-----	----------	-------------	-------	------	-------	------	------	---------	---------	---------------	---------	------	--------------

<----- μg/l ----->

Notes

All concentrations in micrograms per liter (μg/l)

--- = not measured/analyzed

TOC = Top of casing

DTW = Depth to water

GW = Groundwater

BTEX = Benzene, toluene, ethylbenzene, and xylenes - analyzed by EPA Method 8020 or 8240/8260

TPHd = Total petroleum hydrocarbons as diesel - analyzed by Modified EPA Method 8015

TPHmo = Total petroleum hydrocarbons as motor oil - analyzed by Modified EPA Method 8015

TPHk = Total petroleum hydrocarbons as kerosene - analyzed by Modified EPA Method 8015

TPHg = Total petroleum hydrocarbons as gasoline - analyzed by Modified EPA Method 8015

MTBE = Methyl tert-butyl ether - analyzed by EPA method 8020 or 8260. Confirmation 8260 results shown in parentheses

DUP = Duplicate sample

SPH = Separate-phase hydrocarbons; measured thickness

SGC = Silica gel cleanup prior to TPHd, TPHk, or TPHmo analysis

NM = Not measured

TBW = Tank backfill well

A = The analytical laboratory reviewed the data and noted that petroleum hydrocarbons quantified in the diesel range are actually the front end of the motor oil pattern

B = The analytical laboratory reviewed the data and noted that the quantitation in the diesel range show no diesel pattern; the response looks like lower carbon chain compounds close to the gasoline range

C = The analytical laboratory reviewed the data and noted that there is no pattern related to diesel range the peaks are small and random

E = Results are estimated due to concentrations exceeding the calibration ranged

ATTACHMENT A

Laboratory Analytical Report

Caltest

ANALYTICAL LABORATORY

ENVIRONMENTAL ANALYSES

(Amended)

LAB ORDER No. : A050354
 Page 1 of 10

Report Date: 15 JUN 2000
 Received Date: 12 MAY 2000

Purchase Order: 153-1247


Sampled by: C. BELL

REPORT of ANALYTICAL RESULTS

Client: Cathy Bell
 Cambria
 1144 65th Street, Suite C
 Oakland, CA 94608

Project: CITY OF OAKLAND

<u>Lab Number</u>	<u>Sample Identification</u>	<u>Matrix</u>	<u>Sampled Date/Time</u>
A050354-1	MW-8	AQUEOUS	11 MAY 00 17:45
A050354-2	MW-9	AQUEOUS	11 MAY 00 17:05
A050354-3	MW-10	AQUEOUS	11 MAY 00 16:40
A050354-4	MW-11	AQUEOUS	11 MAY 00 16:05
A050354-5	MW-12	AQUEOUS	11 MAY 00 15:10
A050354-6	MW-13	AQUEOUS	11 MAY 00 16:50
A050354-7	MW-14	AQUEOUS	11 MAY 00 17:00
A050354-8	MW-15	AQUEOUS	11 MAY 00 17:15
A050354-9	MW-17	AQUEOUS	11 MAY 00 17:30


 Todd M. Albertson
 Project Manager


 Christine Horn
 Laboratory Director

CALTEST authorizes this report to be reproduced only in its entirety.
 Results are specific to the sample as submitted and only to the parameters reported.
 All analyses performed by EPA Methods or Standard Methods (SM) 18th Ed. except where noted.
 Results of 'ND' mean not detected at or above the listed Reporting Limit (R.L.).
 'D.F.' means Dilution Factor and has been used to adjust the listed Reporting Limit (R.L.).
 Acceptance Criteria for all Surrogate recoveries are defined in the QC Spike Data Reports.

Caltest

ANALYTICAL LABORATORY

ENVIRONMENTAL ANALYSES

ORGANIC ANALYTICAL RESULTS

(Amended)

LAB ORDER No.:

A050354

Page 2 of 10

<u>ANALYTE</u>	<u>RESULT</u>	<u>R.L.</u>	<u>UNITS</u>	<u>D.F.</u>	<u>ANALYZED</u>	<u>QC BATCH</u>	<u>NOTES</u>
LAB NUMBER: A050354-1							
SAMPLE ID: MW-8							
SAMPLED: 11 MAY 00 17:45							
METHOD: EPA 8015M							
TOTAL SEMI-VOLATILE PETROLEUM HYDROCARBONS				1	05.18.00	T000149TPH	1.2
TPH-Extractable, quantitated as diesel	ND	50.	ug/L				
TPH-Extractable, quantitated as Motor Oil	ND	200.	ug/L				
Surrogate o-Terphenyl	80.		%				
Kerosene	ND	50.	ug/L				

LAB NUMBER: A050354-1 (continued)

SAMPLE ID: MW-8

SAMPLED: 11 MAY 00 17:45

METHOD: EPA 8015/8020A

AROMATIC HYDROCARBONS AND TOTAL PURGEABLE PETROLEUM HYDROCARBONS				1	05.24.00	V000076G9A	3
TPH-Purgeable, quantitated as gasoline	ND	50.	ug/L				
Benzene	ND	0.5	ug/L				
Toluene	1.3	0.5	ug/L				
Ethylbenzene	ND	0.5	ug/L				
Xylenes (Total)	2.1	0.5	ug/L				
Methyl tert-Butyl Ether (MTBE)	ND	5.	ug/L				
Surrogate 4-Bromofluorobenzene [FID]	113.		%				
Surrogate 4-Bromofluorobenzene [PID]	108.		%				

LAB NUMBER: A050354-2

SAMPLE ID: MW-9

SAMPLED: 11 MAY 00 17:05

METHOD: EPA 8015M

TOTAL SEMI-VOLATILE PETROLEUM HYDROCARBONS				1	05.18.00	T000149TPH	124567
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- 1) Sample Preparation on 05-13-00 using EPA 3510
- 2) This sample was analyzed following Silica Gel Cleanup.
- 3) Sample Preparation on 05-24-00 using EPA 5030
- 4) The final volume of the sample extract was higher than the nominal amount, resulting in (a) higher reporting limit(s).
- 5) An unidentified petroleum hydrocarbon was present in the sample. An approximate concentration has been calculated based on Diesel #2 standards.
- 6) An unidentified petroleum hydrocarbon mixture was present in the sample. An approximate concentration has been calculated based on motor oil standards.
- 7) Some of the Diesel Range Hydrocarbons quantitated are the front end of the Motor Oil Pattern.

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<u>ANALYTE</u>	<u>RESULT</u>	<u>R.L.</u>	<u>UNITS</u>	<u>D.F.</u>	<u>ANALYZED</u>	<u>QC BATCH</u>	<u>NOTES</u>
LAB NUMBER: A050354-2 (continued)							
SAMPLE ID: MW-9							
SAMPLED: 11 MAY 00 17:05							
METHOD: EPA 8015M							
TOTAL SEMI-VOLATILE PETROLEUM HYDROCARBONS (continued)				1	05.18.00	T000149TPH	
TPH-Extractable, quantitated as diesel	180.	100.	ug/L				
TPH-Extractable, quantitated as Motor Oil	980.	400.	ug/L				
Surrogate o-Terphenyl	84.		%				
Kerosene	ND	100.	ug/L				

LAB NUMBER: A050354-2 (continued)
SAMPLE ID: MW-9
SAMPLED: 11 MAY 00 17:05
METHOD: EPA 8015/8020A

AROMATIC HYDROCARBONS AND TOTAL PURGEABLE PETROLEUM HYDROCARBONS				5.0	05.19.00	V000073G9A	1,2
TPH-Purgeable, quantitated as gasoline	1050.	250.	ug/L				
Benzene	280.	2.5	ug/L				
Toluene	7.0	2.5	ug/L				
Ethylbenzene	ND	2.5	ug/L				
Xylenes (Total)	5.9	2.5	ug/L				
Methyl tert-Butyl Ether (MTBE)	ND	25.	ug/L				
Surrogate 4-Bromofluorobenzene [FID]	119.		%				
Surrogate 4-Bromofluorobenzene [PID]	109.		%				

- 1) Sample Preparation on 05-19-00 using EPA 5030
- 2) An unidentified petroleum hydrocarbon was present in the sample. An approximate concentration has been calculated based on gasoline standards.

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ANALYTE	RESULT	R.L.	UNITS	D.F.	ANALYZED	QC BATCH	NOTES
LAB NUMBER: A050354-3 SAMPLE ID: MW-10 SAMPLED: 11 MAY 00 16:40 METHOD: EPA 8015M							
TOTAL SEMI-VOLATILE PETROLEUM HYDROCARBONS				1	05.18.00	T000149TPH	1-5
TPH-Extractable, quantitated as diesel	110.	50.	ug/L				
TPH-Extractable, quantitated as Motor Oil	990.	200.	ug/L				
Surrogate o-Terphenyl	81.		%				
Kerosene	ND	50.	ug/L				

LAB NUMBER: A050354-3 (continued)
SAMPLE ID: MW-10
SAMPLED: 11 MAY 00 16:40
METHOD: EPA 8015/8020A

AROMATIC HYDROCARBONS AND TOTAL PURGEABLE PETROLEUM HYDROCARBONS				1.0	05.24.00	V000072G9A	6.7
TPH-Purgeable, quantitated as gasoline	145.	50.	ug/L				
Benzene	1.62	0.5	ug/L				
Toluene	0.5	0.5	ug/L				
Ethylbenzene	0.5	0.5	ug/L				
Xylenes (Total)	0.9	0.5	ug/L				
Methyl tert-Butyl Ether (MTBE)	ND	5.	ug/L				
Surrogate 4-Bromofluorobenzene [FID]	113.		%				
Surrogate 4-Bromofluorobenzene [PID]	106.		%				

LAB NUMBER: A050354-4
SAMPLE ID: MW-11
SAMPLED: 11 MAY 00 16:05
METHOD: EPA 8015M

TOTAL SEMI-VOLATILE PETROLEUM HYDROCARBONS				1	05.18.00	T000149TPH	1,2,4
--	--	--	--	---	----------	------------	-------

- 1) Sample Preparation on 05-13-00 using EPA 3510
- 2) This sample was analyzed following Silica Gel Cleanup.
- 3) An unidentified petroleum hydrocarbon was present in the sample. An approximate concentration has been calculated based on Diesel #2 standards.
- 4) An unidentified petroleum hydrocarbon mixture was present in the sample. An approximate concentration has been calculated based on motor oil standards.
- 5) Most of the Diesel Range Hydrocarbons quantitated are from the front end of the Motor Oil Pattern.
- 6) Sample Preparation on 05-18-00 using EPA 5030
- 7) An unidentified petroleum hydrocarbon was present in the sample. An approximate concentration has been calculated based on gasoline standards.

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<u>ANALYTE</u>	<u>RESULT</u>	<u>R.L.</u>	<u>UNITS</u>	<u>D.F.</u>	<u>ANALYZED</u>	<u>QC BATCH</u>	<u>NOTES</u>
LAB NUMBER: A050354-4 (continued)							
SAMPLE ID: MW-11							
SAMPLED: 11 MAY 00 16:05							
METHOD: EPA 8015M							
TOTAL SEMI-VOLATILE PETROLEUM HYDROCARBONS (continued)				1	05.18.00	T000149TPH	
TPH-Extractable, quantitated as diesel	ND	50.	ug/L				
TPH-Extractable, quantitated as Motor Oil	430.	200.	ug/L				
Surrogate o-Terphenyl	78.		%				
Kerosene	ND	50.	ug/L				

LAB NUMBER: A050354-4 (continued)
SAMPLE ID: MW-11
SAMPLED: 11 MAY 00 16:05
METHOD: EPA 8015/8020A

AROMATIC HYDROCARBONS AND TOTAL PURGEABLE PETROLEUM HYDROCARBONS				1	05.18.00	V000072G9A	1.2
TPH-Purgeable, quantitated as gasoline	600.	50.	ug/L				
Benzene	23.	0.5	ug/L				
Toluene	2.1	0.5	ug/L				
Ethylbenzene	18.	0.5	ug/L				
Xylenes (Total)	15.	0.5	ug/L				
Methyl tert-Butyl Ether (MTBE)	ND	5.	ug/L				
Surrogate 4-Bromofluorobenzene [FID]	123.		%				
Surrogate 4-Bromofluorobenzene [PID]	110.		%				

- 1) Sample Preparation on 05-18-00 using EPA 5030
- 2) An unidentified petroleum hydrocarbon was present in the sample. An approximate concentration has been calculated based on gasoline standards.

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<u>ANALYTE</u>	<u>RESULT</u>	<u>R.L.</u>	<u>UNITS</u>	<u>D.F.</u>	<u>ANALYZED</u>	<u>QC BATCH</u>	<u>NOTES</u>
LAB NUMBER: A050354-5							
SAMPLE ID: MW-12							
SAMPLED: 11 MAY 00 15:10							
METHOD: EPA 8015M							
TOTAL SEMI-VOLATILE PETROLEUM HYDROCARBONS				1	05.18.00	T000149TPH	1-6
TPH-Extractable, quantitated as diesel	2400.	100.	ug/L				
TPH-Extractable, quantitated as Motor Oil	4900.	400.	ug/L				
Surrogate o-Terphenyl	69.		%				
Kerosene	ND	100.	ug/L				

LAB NUMBER: A050354-5 (continued)

SAMPLE ID: MW-12

SAMPLED: 11 MAY 00 15:10

METHOD: EPA 8015/8020A

AROMATIC HYDROCARBONS AND TOTAL PURGEABLE PETROLEUM HYDROCARBONS				1	05.18.00	V000072G9A	7,8
TPH-Purgeable, quantitated as gasoline	370.	50.	ug/L				
Benzene	ND	0.5	ug/L				
Toluene	ND	0.5	ug/L				
Ethylbenzene	ND	0.5	ug/L				
Xylenes (Total)	0.9	0.5	ug/L				
Methyl tert-Butyl Ether (MTBE)	ND	5.	ug/L				
Surrogate 4-Bromofluorobenzene [FID]	118.		%				
Surrogate 4-Bromofluorobenzene [PID]	106.		%				

- 1) Sample Preparation on 05-13-00 using EPA 3510
- 2) This sample was analyzed following Silica Gel Cleanup.
- 3) The final volume of the sample extract was higher than the nominal amount, resulting in (a) higher reporting limit(s).
- 4) An unidentified petroleum hydrocarbon was present in the sample. An approximate concentration has been calculated based on Diesel #2 standards.
- 5) An unidentified petroleum hydrocarbon mixture was present in the sample. An approximate concentration has been calculated based on motor oil standards.
- 6) A small portion of the Diesel Range Hydrocarbons quantitated are from the front end of the Motor Oil Pattern.
- 7) Sample Preparation on 05-18-00 using EPA 5030
- 8) An unidentified petroleum hydrocarbon was present in the sample. An approximate concentration has been calculated based on gasoline standards.

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<u>ANALYTE</u>	<u>RESULT</u>	<u>R.L.</u>	<u>UNITS</u>	<u>D.F.</u>	<u>ANALYZED</u>	<u>QC BATCH</u>	<u>NOTES</u>
LAB NUMBER: A050354-6							
SAMPLE ID: MW-13							
SAMPLED: 11 MAY 00 16:50							
METHOD: EPA 8015M							
TOTAL SEMI-VOLATILE PETROLEUM HYDROCARBONS						T000149TPH	1-7
TPH-Extractable, quantitated as diesel	11000.	500.	ug/L	1	05.18.00		
TPH-Extractable, quantitated as Motor Oil	110000.	10000.	ug/L	5	05.19.00		
Surrogate o-Terphenyl	68.		%	1	05.18.00		
Kerosene	ND	500.	ug/L	1	05.18.00		

LAB NUMBER: A050354-6 (continued)
SAMPLE ID: MW-13
SAMPLED: 11 MAY 00 16:50
METHOD: EPA 8015/8020A

AROMATIC HYDROCARBONS AND TOTAL PURGEABLE PETROLEUM HYDROCARBONS				1	05.18.00	V000072G9A	8.9
TPH-Purgeable, quantitated as gasoline	70.	50.	ug/L				
Benzene	1.6	0.5	ug/L				
Toluene	5.4	0.5	ug/L				
Ethylbenzene	1.2	0.5	ug/L				
Xylenes (Total)	7.6	0.5	ug/L				
Methyl tert-Butyl Ether (MTBE)	ND	5.	ug/L				
Surrogate 4-Bromofluorobenzene [FID]	111.		%				
Surrogate 4-Bromofluorobenzene [PID]	107.		%				

- 1) Sample Preparation on 05-13-00 using EPA 3510
- 2) This sample was analyzed following Silica Gel Cleanup.
- 3) The final volume of the sample extract was higher than the nominal amount, resulting in (a) higher reporting limit(s).
- 4) Sample diluted to bring concentration of target analyte(s) within the working range of the instrument, resulting in increased reporting limits.
- 5) An unidentified petroleum hydrocarbon was present in the sample. An approximate concentration has been calculated based on Diesel #2 standards.
- 6) An unidentified petroleum hydrocarbon mixture was present in the sample. An approximate concentration has been calculated based on motor oil standards.
- 7) The Diesel Range Hydrocarbons quantitated are from the front end of the Motor Oil Pattern.
- 8) Sample Preparation on 05-18-00 using EPA 5030
- 9) An unidentified petroleum hydrocarbon was present in the sample. An approximate concentration has been calculated based on gasoline standards.

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<u>ANALYTE</u>	<u>RESULT</u>	<u>R.L.</u>	<u>UNITS</u>	<u>D.F.</u>	<u>ANALYZED</u>	<u>QC BATCH</u>	<u>NOTES</u>
LAB NUMBER: A050354-7 SAMPLE ID: MW-14 SAMPLED: 11 MAY 00 17:00 METHOD: EPA 8015M							
TOTAL SEMI-VOLATILE PETROLEUM HYDROCARBONS				1	05.19.00	T000149TPH	1-6
TPH-Extractable, quantitated as diesel	360.	100.	ug/L				
TPH-Extractable, quantitated as Motor Oil	4300.	400.	ug/L				
Surrogate o-Terphenyl	87.		%				
Kerosene	ND	100.	ug/L				

LAB NUMBER: A050354-7 (continued)
SAMPLE ID: MW-14
SAMPLED: 11 MAY 00 17:00
METHOD: EPA 8015/8020A

AROMATIC HYDROCARBONS AND TOTAL PURGEABLE PETROLEUM HYDROCARBONS				1	05.18.00	V000072G9A	7
TPH-Purgeable, quantitated as gasoline	120.	50.	ug/L				
Benzene	ND	0.5	ug/L				
Toluene	ND	0.5	ug/L				
Ethylbenzene	0.5	0.5	ug/L				
Xylenes (Total)	ND	0.5	ug/L				
Methyl tert-Butyl Ether (MTBE)	ND	5.	ug/L				
Surrogate 4-Bromofluorobenzene [FID]	114.		%				
Surrogate 4-Bromofluorobenzene [PID]	108.		%				

- 1) Sample Preparation on 05-13-00 using EPA 3510
- 2) This sample was analyzed following Silica Gel Cleanup.
- 3) The final volume of the sample extract was higher than the nominal amount, resulting in (a) higher reporting limit(s).
- 4) An unidentified petroleum hydrocarbon was present in the sample. An approximate concentration has been calculated based on Diesel #2 standards.
- 5) An unidentified petroleum hydrocarbon mixture was present in the sample. An approximate concentration has been calculated based on motor oil standards.
- 6) Most of the Diesel Range Hydrocarbons quantitated are from the front end of the Motor Oil Pattern.
- 7) An unidentified petroleum hydrocarbon was present in the sample. An approximate concentration has been calculated based on gasoline standards.

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<u>ANALYTE</u>	<u>RESULT</u>	<u>R.L.</u>	<u>UNITS</u>	<u>D.F.</u>	<u>ANALYZED</u>	<u>QC BATCH</u>	<u>NOTES</u>
LAB NUMBER: A050354-8 SAMPLE ID: MW-15 SAMPLED: 11 MAY 00 17:15 METHOD: EPA 8015M							
TOTAL SEMI-VOLATILE PETROLEUM HYDROCARBONS				1	05.19.00	T000149TPH	1-5
TPH-Extractable, quantitated as diesel	120.	50.	ug/L				
TPH-Extractable, quantitated as Motor Oil	590.	200.	ug/L				
Surrogate o-Terphenyl	85.		%				
Kerosene	ND	50.	ug/L				

LAB NUMBER: A050354-8 (continued)
SAMPLE ID: MW-15
SAMPLED: 11 MAY 00 17:15
METHOD: EPA 8015/8020A

AROMATIC HYDROCARBONS AND TOTAL PURGEABLE PETROLEUM HYDROCARBONS				1	05.18.00	V000072G9A	6,7
TPH-Purgeable, quantitated as gasoline	90.	50.	ug/L				
Benzene	0.9	0.5	ug/L				
Toluene	0.9	0.5	ug/L				
Ethylbenzene	ND	0.5	ug/L				
Xylenes (Total)	3.3	0.5	ug/L				
Methyl tert-Butyl Ether (MTBE)	ND	5.	ug/L				
Surrogate 4-Bromofluorobenzene [FID]	112.		%				
Surrogate 4-Bromofluorobenzene [PID]	107.		%				

- 1) Sample Preparation on 05-13-00 using EPA 3510
- 2) This sample was analyzed following Silica Gel Cleanup.
- 3) An unidentified petroleum hydrocarbon was present in the sample. An approximate concentration has been calculated based on Diesel #2 standards.
- 4) An unidentified petroleum hydrocarbon mixture was present in the sample. An approximate concentration has been calculated based on motor oil standards.
- 5) Most of the Diesel Range Hydrocarbons quantitated are from the front end of the Motor Oil Pattern.
- 6) Sample Preparation on 05-18-00 using EPA 5030
- 7) An unidentified petroleum hydrocarbon was present in the sample. An approximate concentration has been calculated based on gasoline standards.

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ANALYTE	RESULT	R.L.	UNITS	D.F.	ANALYZED	QC BATCH	NOTES
LAB NUMBER: A050354-9 SAMPLE ID: MW-17 SAMPLED: 11 MAY 00 17:30 METHOD: EPA 8015M							
TOTAL SEMI-VOLATILE PETROLEUM HYDROCARBONS					1 05.19.00	T000149TPH	1-6
TPH-Extractable, quantitated as diesel	150.	100.	ug/L				
TPH-Extractable, quantitated as Motor Oil	2900.	400.	ug/L				
Surrogate o-Terphenyl	79.		%				
Kerosene	ND	100.	ug/L				

LAB NUMBER: A050354-9 (continued)
SAMPLE ID: MW-17
SAMPLED: 11 MAY 00 17:30
METHOD: EPA 8015/8020A

AROMATIC HYDROCARBONS AND TOTAL PURGEABLE PETROLEUM HYDROCARBONS					1 05.18.00	V000072G9A	7
TPH-Purgeable, quantitated as gasoline	ND	50.	ug/L				
Benzene	ND	0.5	ug/L				
Toluene	ND	0.5	ug/L				
Ethylbenzene	ND	0.5	ug/L				
Xylenes (Total)	ND	0.5	ug/L				
Methyl tert-Butyl Ether (MTBE)	ND	5.	ug/L				
Surrogate 4-Bromofluorobenzene [FID]	118.		%				
Surrogate 4-Bromofluorobenzene [PID]	115.		%				

- 1) Sample Preparation on 05-13-00 using EPA 3510
- 2) This sample was analyzed following Silica Gel Cleanup.
- 3) The final volume of the sample extract was higher than the nominal amount, resulting in (a) higher reporting limit(s).
- 4) An unidentified petroleum hydrocarbon was present in the sample. An approximate concentration has been calculated based on Diesel #2 standards.
- 5) An unidentified petroleum hydrocarbon mixture was present in the sample. An approximate concentration has been calculated based on motor oil standards.
- 6) The Diesel Range Hydrocarbons quantitated are from the front end of the Motor Oil Pattern.
- 7) Sample Preparation on 05-18-00 using EPA 5030

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SUPPLEMENTAL QUALITY CONTROL (QC) DATA REPORT


Report Date:
Received Date:

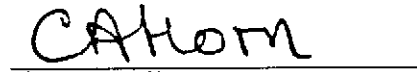
15 JUN 2000
12 MAY 2000

Client: Cathy Bell
Cambria
1144 65th Street, Suite C
Oakland, CA 94608

Project: CITY OF OAKLAND

<u>QC Batch ID</u>	<u>Method</u>	<u>Matrix</u>
T000149TPH	8015M	AQUEOUS
V000072G9A	8015/8020A	AQUEOUS
V000073G9A	8015/8020A	AQUEOUS
V000076G9A	8015/8020A	AQUEOUS


Todd M. Albertson
Project Manager


Christine Horn
Laboratory Director

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Results are specific to the sample as submitted and only to the parameters reported.
All analyses performed by EPA Methods or Standard Methods (SM) 18th Ed. except where noted.
Results of 'ND' mean not detected at or above the listed Reporting Limit (R.L.).
Analyte Spike Amounts reported as 'NS' mean not spiked and will not have recoveries reported.
'RPD' means Relative Percent Difference and RPD Acceptance Criteria is stated as a maximum.
'NC' means not calculated for RPD or Spike Recoveries.

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<u>ANALYTE</u>	<u>RESULT</u>	<u>R.L.</u>	<u>UNITS</u>	<u>ANALYZED</u>	<u>NOTES</u>
QC BATCH: T000149TPH					
TOTAL SEMI-VOLATILE PETROLEUM HYDROCARBONS					
Diesel Fuel	ND	50.	ug/L	05.19.00	1
TPH-Extractable, quantitated as diesel	ND	50.	ug/L		
Motor Oil	ND	200.	ug/L		
TPH-Extractable, quantitated as Motor Oil	ND	200.	ug/L		
Surrogate o-Terphenyl	79.		%		
Kerosene	ND	100.	ug/L		
QC BATCH: V000072G9A					
AROMATIC HYDROCARBONS AND TOTAL PURGEABLE PETROLEUM HYDROCARBONS					
Total Petroleum Hydrocarbons - Gasoline					
TPH-Purgeable, quantitated as gasoline	ND	50.	ug/L	05.18.00	
Benzene	ND	0.5	ug/L		
Toluene	ND	0.5	ug/L		
Ethylbenzene	ND	0.5	ug/L		
Xylenes (Total)	ND	0.5	ug/L		
Methyl tert-Butyl Ether (MTBE)	ND	5.	ug/L		
Surrogate 4-Bromofluorobenzene [FID]	113.		%		
Surrogate 4-Bromofluorobenzene [PID]	105.		%		
QC BATCH: V000073G9A					
AROMATIC HYDROCARBONS AND TOTAL PURGEABLE PETROLEUM HYDROCARBONS					
Total Petroleum Hydrocarbons - Gasoline					
TPH-Purgeable, quantitated as gasoline	ND	50.	ug/L	05.19.00	
Benzene	ND	0.5	ug/L		
Toluene	ND	0.5	ug/L		
Ethylbenzene	ND	0.5	ug/L		
Xylenes (Total)	ND	0.5	ug/L		
Methyl tert-Butyl Ether (MTBE)	ND	5.	ug/L		
Surrogate 4-Bromofluorobenzene [FID]	110.		%		
Surrogate 4-Bromofluorobenzene [PID]	105.		%		
QC BATCH: V000076G9A					
AROMATIC HYDROCARBONS AND TOTAL PURGEABLE PETROLEUM HYDROCARBONS					
Total Petroleum Hydrocarbons - Gasoline					
TPH-Purgeable, quantitated as gasoline	ND	50.	ug/L	05.24.00	
	ND	50.	ug/L		

1) This sample was analyzed following Silica Gel Cleanup.

METHOD BLANK ANALYTICAL RESULTS

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<u>ANALYTE</u>	<u>RESULT</u>	<u>R.L.</u>	<u>UNITS</u>	<u>ANALYZED</u>	<u>NOTES</u>
QC BATCH: V000076G9A (continued)					
AROMATIC HYDROCARBONS AND TOTAL PURGEABLE PETROLEUM HYDROCARBONS (continued)				05.24.00	
Benzene	ND	0.5	ug/L		
Toluene	ND	0.5	ug/L		
Ethylbenzene	ND	0.5	ug/L		
Xylenes (Total)	ND	0.5	ug/L		
Methyl tert-Butyl Ether (MTBE)	ND	5.	ug/L		
Surrogate 4-Bromofluorobenzene [FID]	121.		%		
Surrogate 4-Bromofluorobenzene [PID]	114.		%		

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LABORATORY CONTROL SAMPLE ANALYTICAL RESULTS

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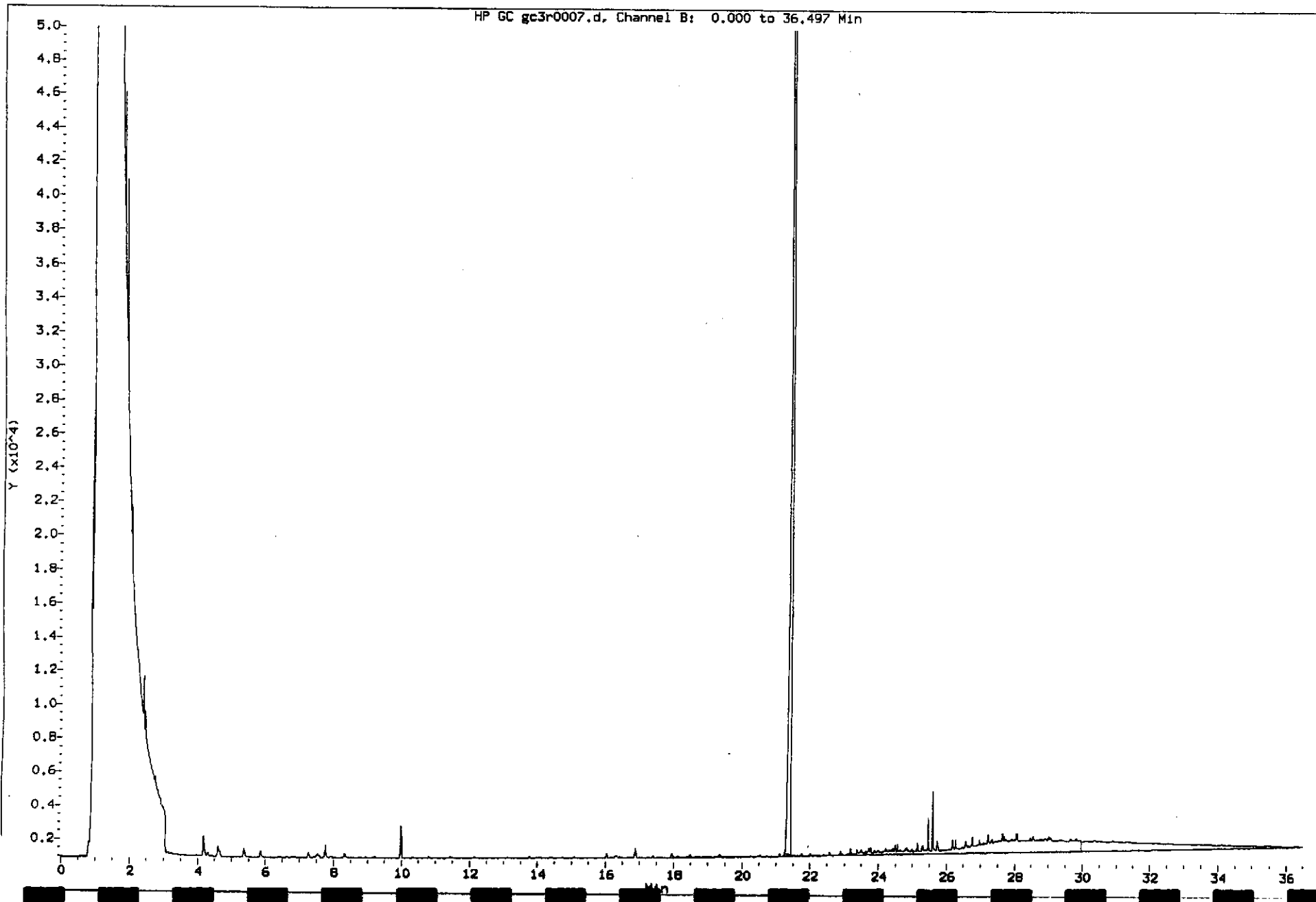
<u>ANALYTE</u>	<u>SPIKE AMOUNT</u>	<u>SPIKE\DUP RESULT</u>	<u>SPK\DUP %REC</u>	<u>ACCEPTANCE %REC \RPD</u>	<u>REL% DIFF</u>	<u>ANALYZED</u>	<u>NOTES</u>
QC BATCH: T000149TPH							
TOTAL SEMI-VOLATILE PETROLEUM HYDROCARBONS						05.18.00	1
Diesel Fuel	1000.	855.\	86\	36-102\			
Surrogate o-Terphenyl	100	82.5\	82\	40-140\			
QC BATCH: V000072G9A							
AROMATIC HYDROCARBONS AND TOTAL PURGEABLE PETROLEUM HYDROCARBONS						05.18.00	
Total Petroleum Hydrocarbons - Gasoline	550.	562.\	102\	50-130\			
Benzene	6.69	5.8\	87\	50-130\			
Toluene	39.0	37.1\	95\	50-130\			
Surrogate 4-Bromofluorobenzene [FID]	20.0	20.8\	104\	50-130\			
Surrogate 4-Bromofluorobenzene [PID]	20.0	21.9\	110\	50-130\			
QC BATCH: V000073G9A							
AROMATIC HYDROCARBONS AND TOTAL PURGEABLE PETROLEUM HYDROCARBONS						05.19.00	
Total Petroleum Hydrocarbons - Gasoline	550.	514.\	93\	50-130\			
Benzene	6.69	5.2\	78\	50-130\			
Toluene	39.0	34.\	87\	50-130\			
Surrogate 4-Bromofluorobenzene [FID]	20.0	23.\	115\	50-130\			
Surrogate 4-Bromofluorobenzene [PID]	20.0	22.\	110\	50-130\			
QC BATCH: V000076G9A							
AROMATIC HYDROCARBONS AND TOTAL PURGEABLE PETROLEUM HYDROCARBONS						05.24.00	
Total Petroleum Hydrocarbons - Gasoline	550.	516.\	94\	50-130\			
Benzene	6.69	5.02\	75\	50-130\			
Toluene	39.0	35.6\	91\	50-130\			
Surrogate 4-Bromofluorobenzene [FID]	20.0	23.1\	116\	50-130\			
Surrogate 4-Bromofluorobenzene [PID]	20.0	22.6\	113\	50-130\			

1) This sample was analyzed following Silica Gel Cleanup.

EPA 8015 EXTRACTABLE
DIESEL/MOTOROIL/KEROSENE
ANALYSIS

CALTEST ANALYTICAL
A050354-1
CLIENT: CAMBRIA
ID: MW-8/AQ
SAMPLED: 05-11 @ 1745

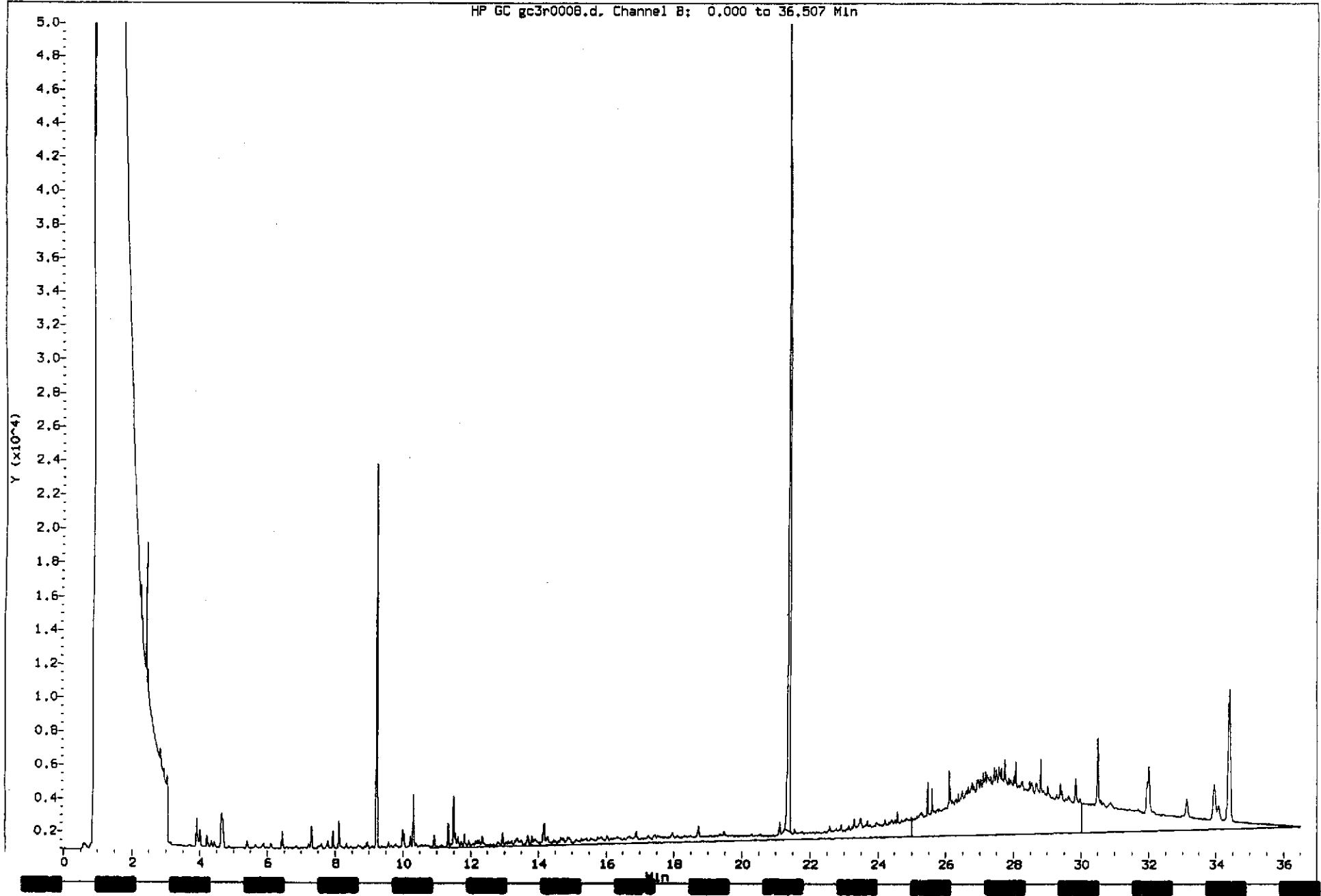
Data File: /var/chem/GC3.1/0518d.b/gc3r0007.d
Injection Date: 18-MAY-2000 20:01
Instrument: GC3.1
Client Sample ID:



EPA 8015 EXTRACTABLE
DIESEL/MOTOROIL/KEROSENE
ANALYSIS

CALTEST ANALYTICAL
A050354-2
CLIENT: CAMBRIA
ID: MW-9/AQ
SAMPLED: 05-11 @ 1705

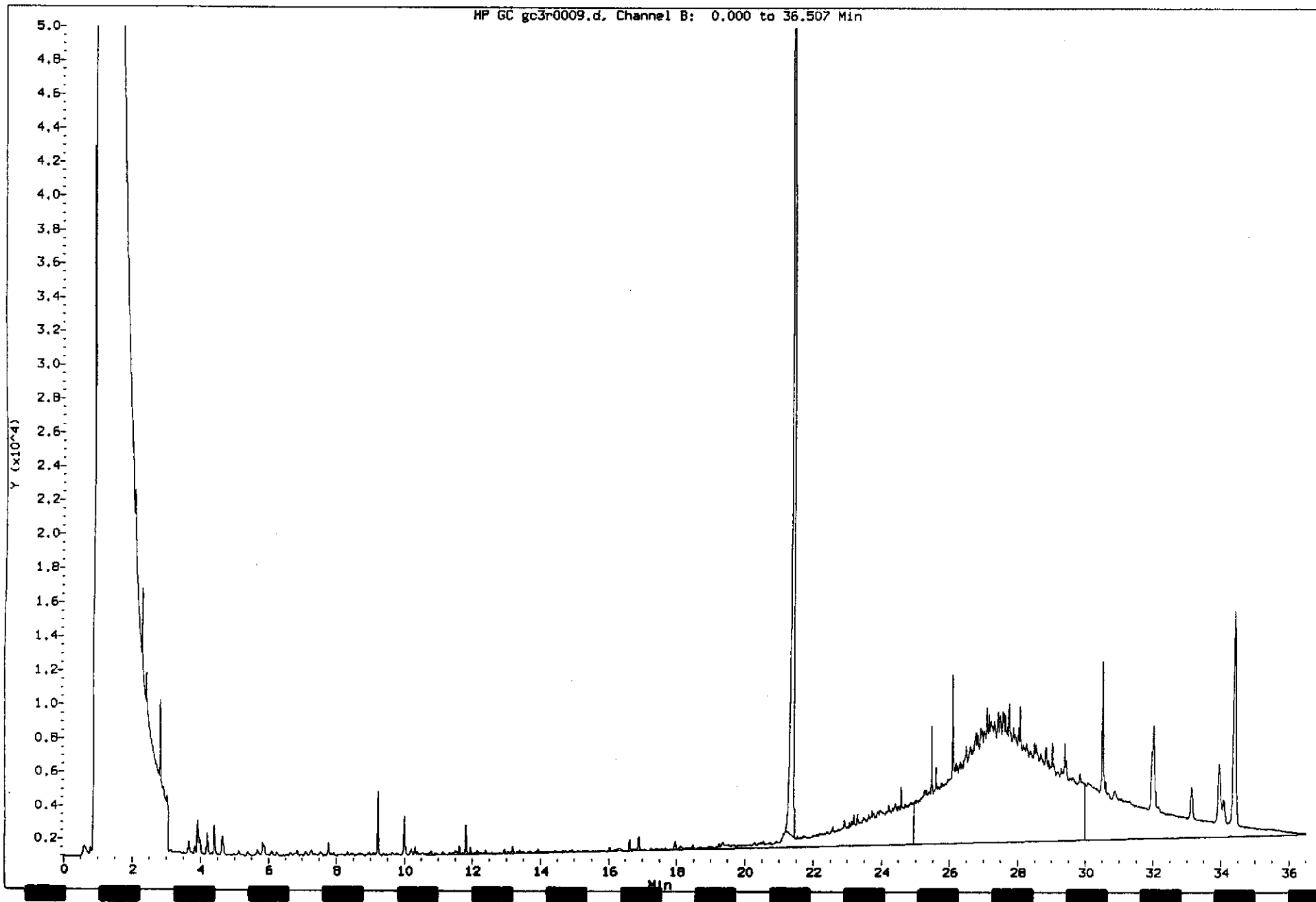
Data File: /var/chem/GC3.1/0518d.b/gc3r0008.d
Injection Date: 18-MAY-2000 20:48
Instrument: GC3.1
Client Sample ID:



EPA 8015 EXTRACTABLE
DIESEL/MOTOROIL/KEROSENE
ANALYSIS

CALTEST ANALYTICAL
A050354-3
CLIENT: CAMBRIA
ID: MM-10/AQ
SAMPLED: 05-11 @ 1640

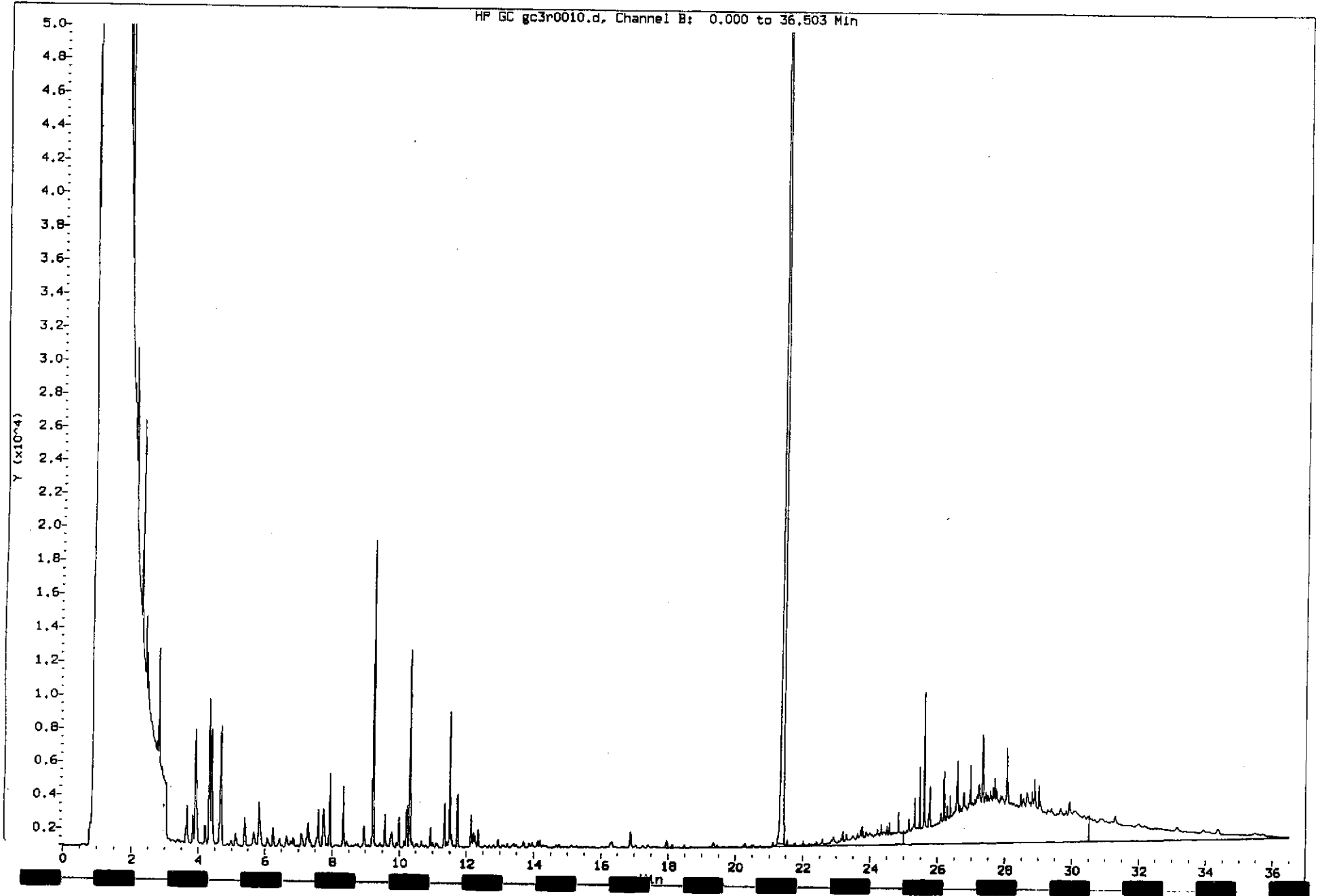
Data File: /var/chem/GC3.1/0518d.b/gc3r0009.d
Injection Date: 18-MAY-2000 21:34
Instrument: GC3.1
Client Sample ID:



EPA 8015 EXTRACTABLE
DIESEL/MOTOROIL/KEROSENE
ANALYSIS

CALTEST ANALYTICAL
A050354-4
CLIENT: CAMBRIA
ID: ~~MA~~-11/AQ
SAMPLED: 05-11 @ 1605

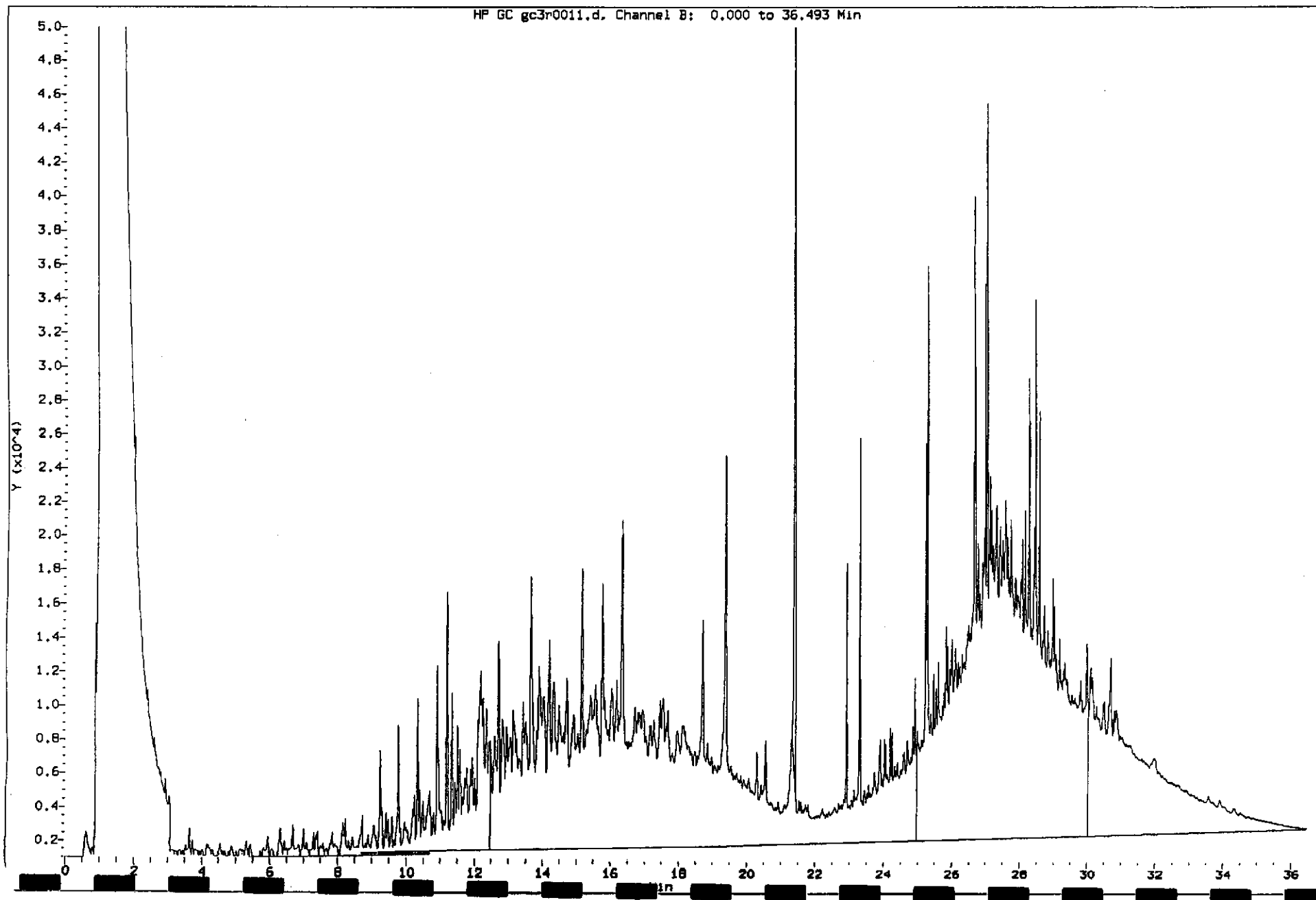
Data File: /var/chem/GC3.1/0518d.b/gc3r0010.d
Injection Date: 18-MAY-2000 22:21
Instrument: GC3.1
Client Sample ID:



EPA 8015 EXTRACTABLE
DIESEL/MOTOROIL/KEROSENE
ANALYSIS

CALTEST ANALYTICAL
A050354-5
CLIENT: CAMBRIA
ID: MW-12/AQ
SAMPLED: 05-11 @ 1510

Data File: /var/chem/GC3.1/0518d.b/gc3r0011.d
Injection Date: 18-MAY-2000 23:07
Instrument: GC3.1
Client Sample ID:

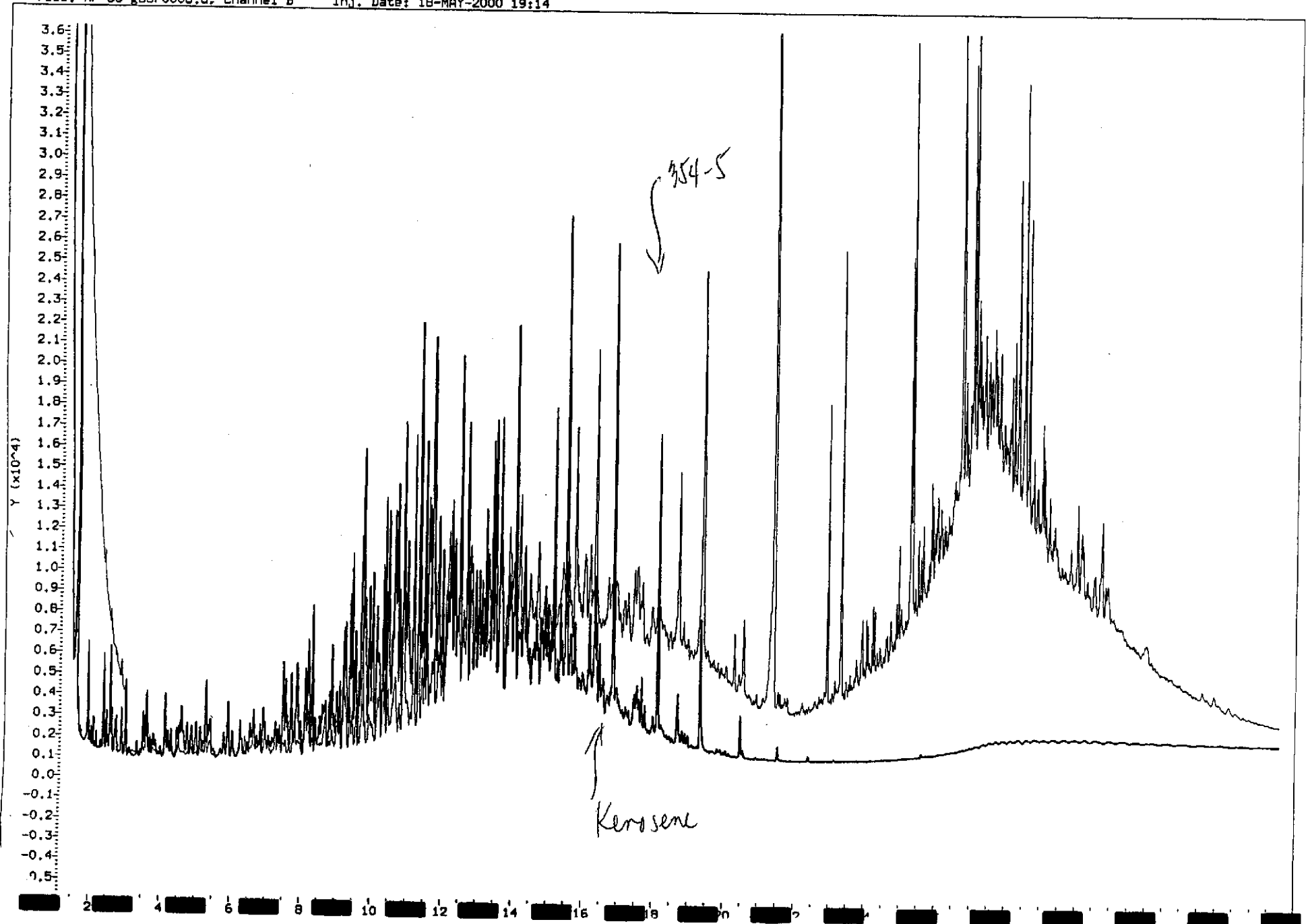


EPA 8015 EXTRACTABLE
DIESEL/MOTOROIL/KEROSENE
ANALYSIS

CALTEST ANALYTICAL
A050354-5
CLIENT: CAMBRIA
ID: MW-12/AQ
SAMPLED: 05-11 @ 1510

over lay
w/ kerosene

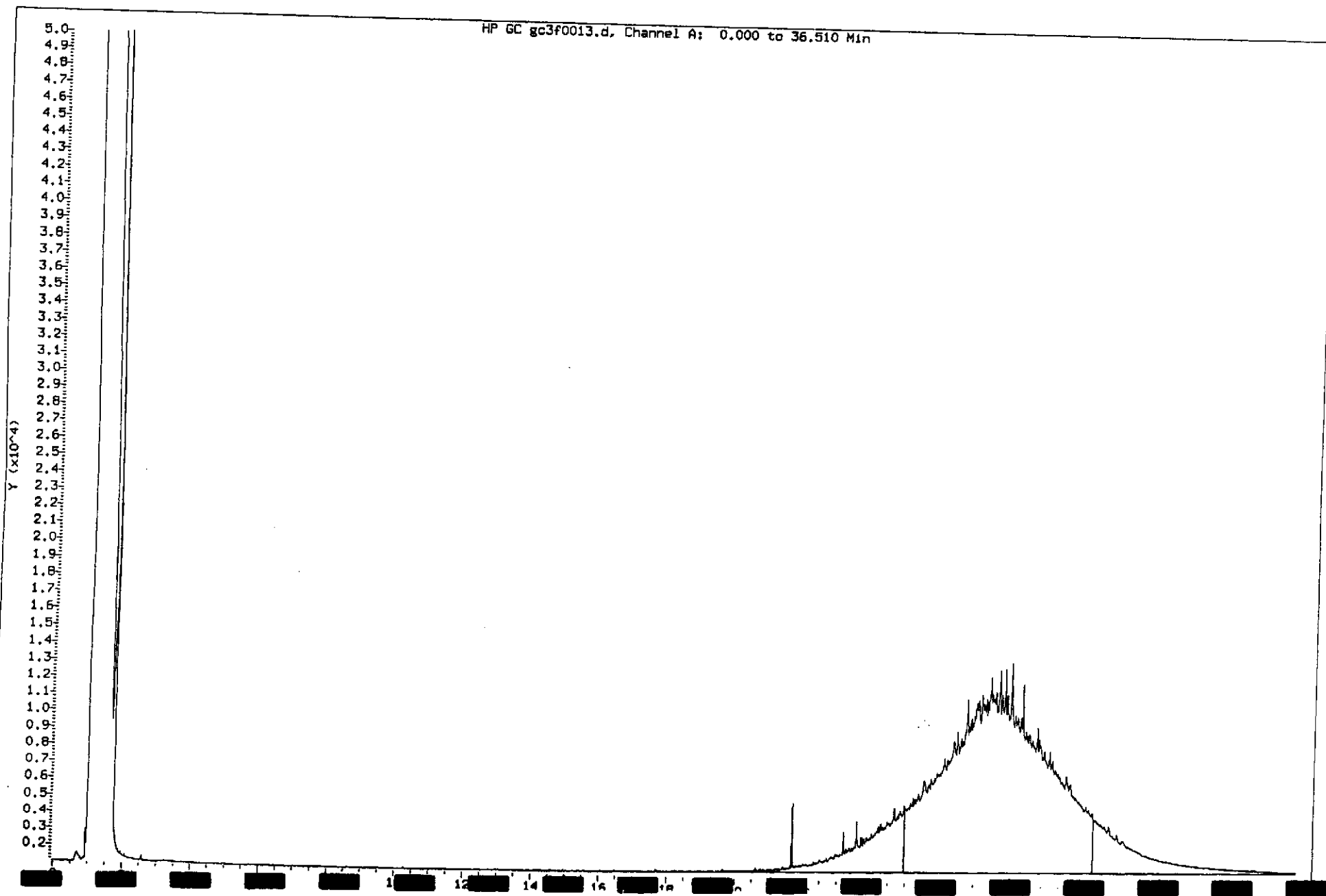
File: HP GC gc3r0011.d, Channel B Inj. Date: 18-MAY-2000 23:07
File: HP GC gc3r0006.d, Channel B Inj. Date: 18-MAY-2000 19:14



EPA 8015 EXTRACTABLE
DIESEL/MOTOROIL/KEROSENE
ANALYSIS

CALTEST ANALYTICAL
A050354-6
CLIENT: CAMBRIA
ID: MW-13/AQ
SAMPLED: 05-11 @ 1650

Data File: /var/chem/GC3.1/0519d.b/gc3f0013.d
Injection Date: 19-MAY-2000 23:57
Instrument: GC3.1
Client Sample ID:

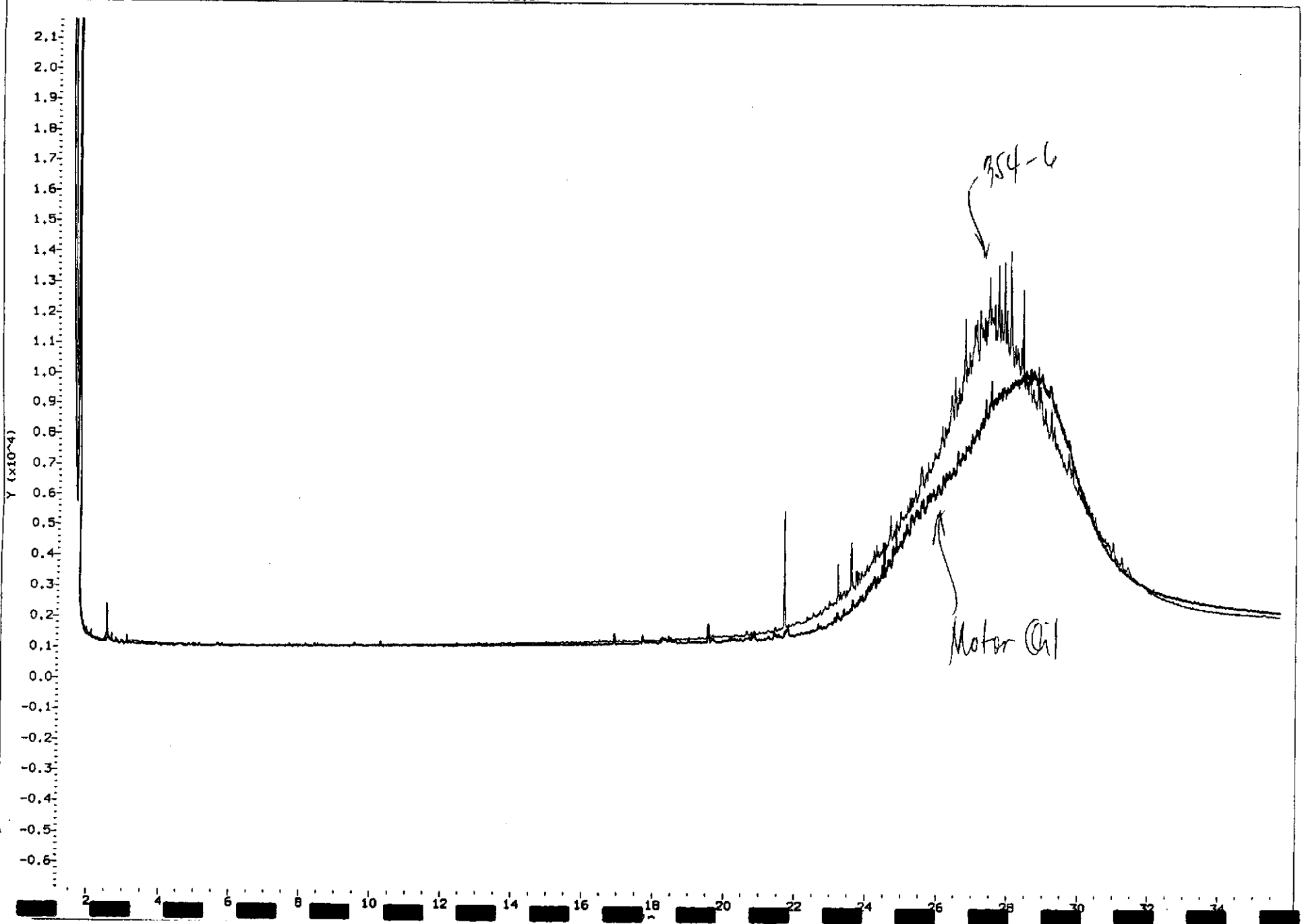


EPA 8015 EXTRACTABLE
DIESEL/MOTOROIL/KEROSENE
ANALYSIS

CALTEST ANALYTICAL
A050354-6
CLIENT: CAMBRIA
ID: MW-13/AQ
SAMPLED: 05-11 @ 1650

over Lay
w/ Motor Oil

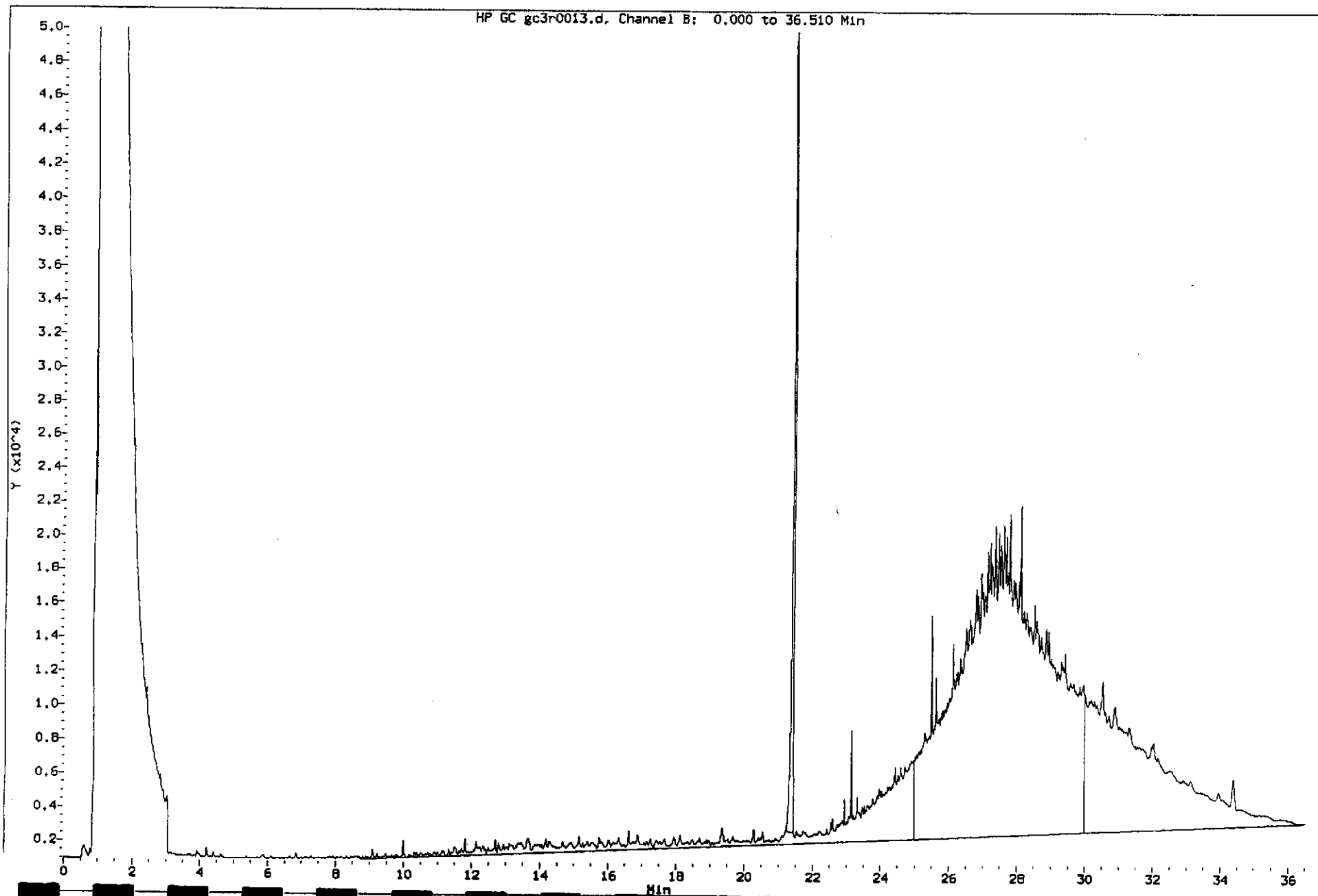
— File: HP GC gc3f0013.d, Channel A Inj. Date: 19-MAY-2000 23:57
— File: HP GC gc3f0016.d, Channel A Inj. Date: 20-MAY-2000 02:17



EPA 8015 EXTRACTABLE
DIESEL/MOTOROIL/KEROSENE
ANALYSIS

CALTEST ANALYTICAL
A050354-7
CLIENT: CAMBRIA
ID: MW-14/AQ
SAMPLED: 05-11 @ 1700

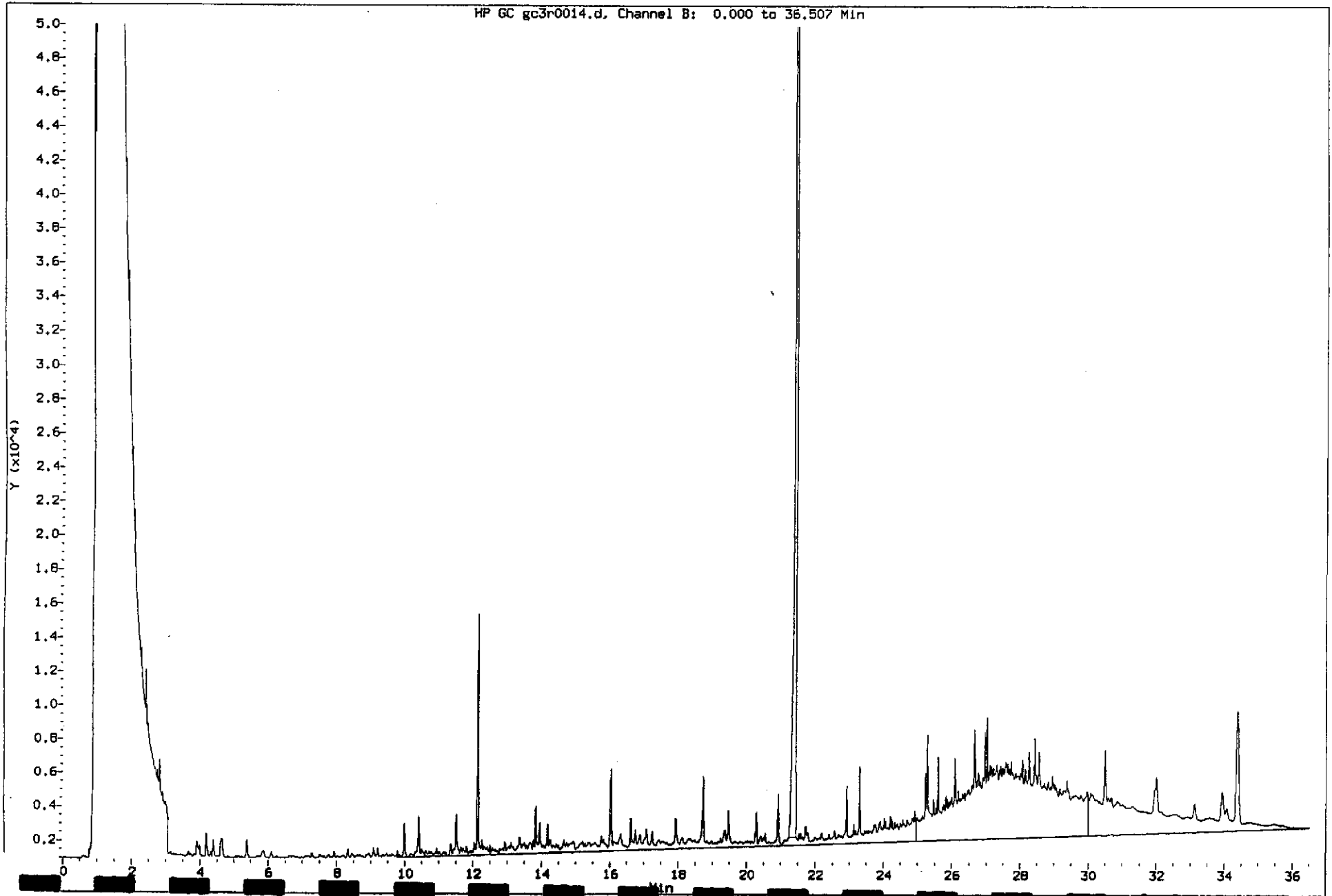
Data File: /var/chem/GC3.1/0518d.b/gc3r0013.d
Injection Date: 19-MAY-2000 00:41
Instrument: GC3.1
Client Sample ID:



EPA 8015 EXTRACTABLE
DIESEL/MOTOROIL/KEROSENE
ANALYSIS

CALTEST ANALYTICAL
A050354-8
CLIENT: CAMBRIA
ID: MW-15/AQ
SAMPLED: 05-11 @ 1715

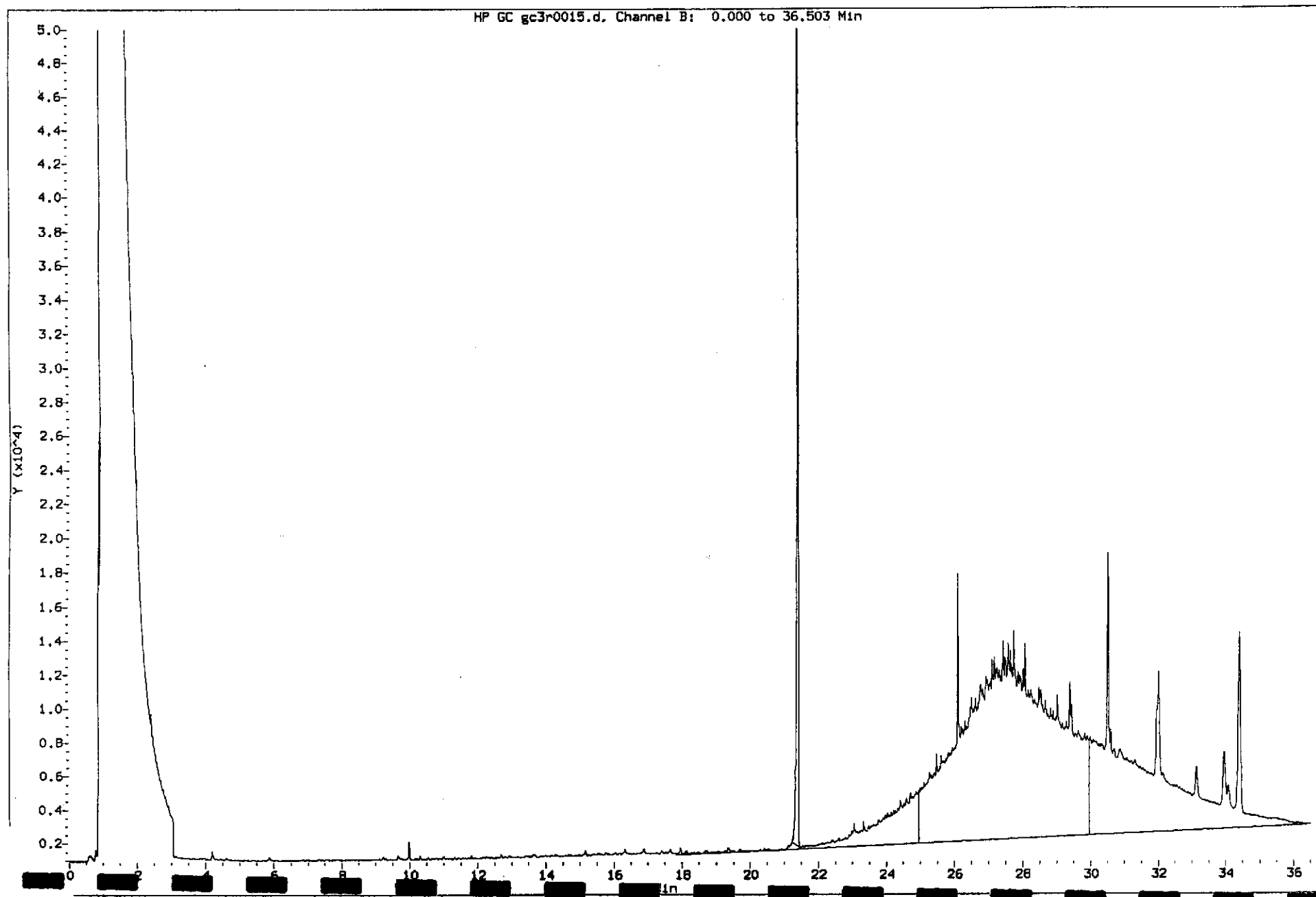
Data File: /var/chem/GC3.1/0518d.b/gc3r0014.d
Injection Date: 19-MAY-2000 01:28
Instrument: GC3.1
Client Sample ID:



EPA 8015 EXTRACTABLE
DIESEL/MOTOROIL/KEROSENE
ANALYSIS

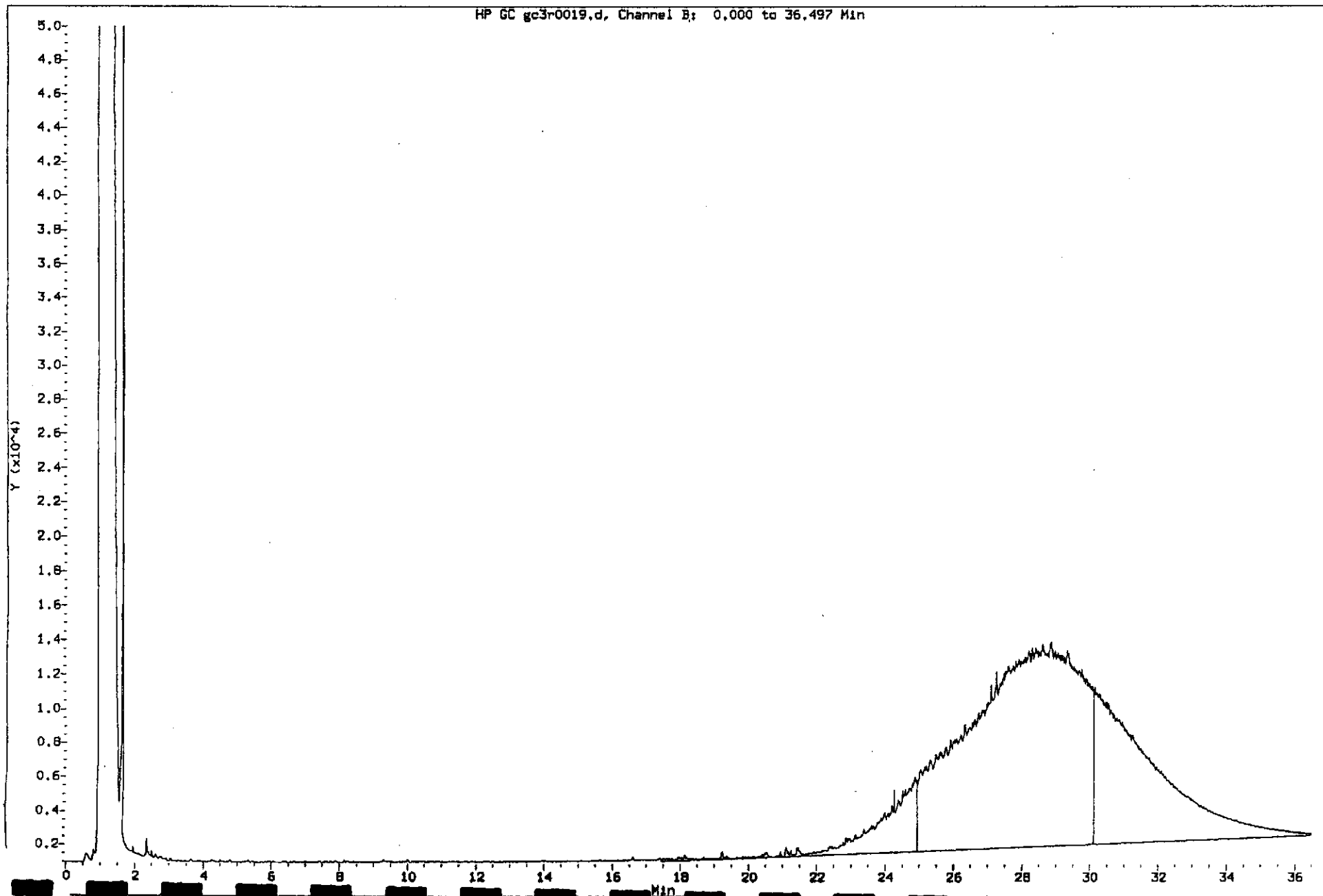
CALTEST ANALYTICAL
A050354-9
CLIENT: CAMBRIA
ID: MW-17/AQ
SAMPLED: 05-11 @ 1730

Data File: /var/chem/GC3.1/0518d.b/gc3r0015.d
Injection Date: 19-MAY-2000 02:15
Instrument: GC3.1
Client Sample ID:



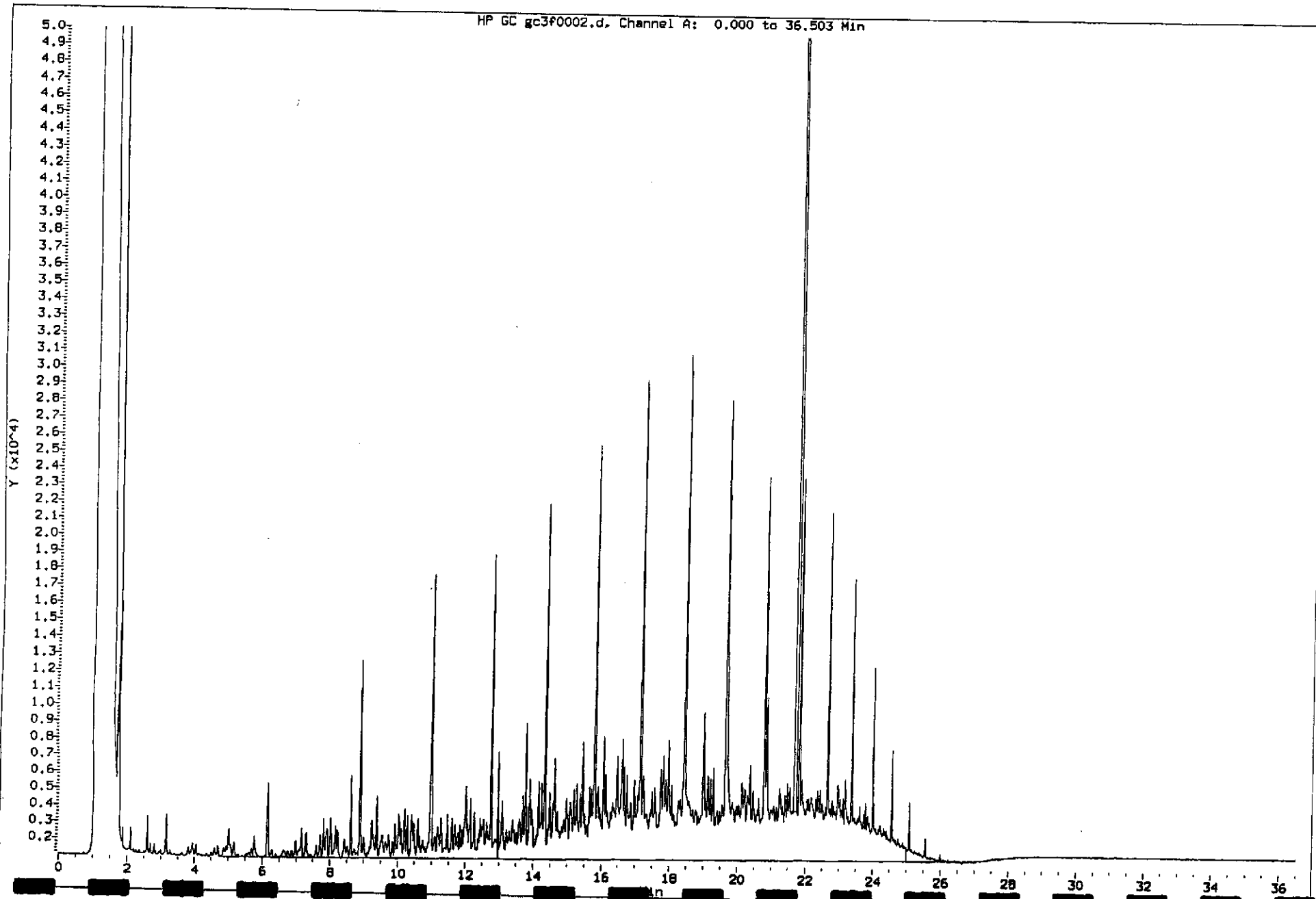
MOTOR OIL STANDARD
CARBON RANGE: C24-C36
MINUTES: 25-35

Data File: /var/chem/GC3.1/0518d.b/gc3r0019.d
Injection Date: 19-MAY-2000 05:21
Instrument: GC3.1
Client Sample ID:



DIESEL STANDARD
CARBON RANGE: C12-C24
MINUTES:13-25

Data File: /var/chem/GC3.1/0518d,b/gc3f0002.d
Injection Date: 18-MAY-2000 16:05
Instrument: GC3.1
Client Sample ID:



ATTACHMENT B

Well Sampling Forms

WELL DEPTH MEASUREMENTS

Well ID	Time	Product Depth	Water Depth	Product Thickness	Well Depth	Comments
MW-2	9:37 AM		6.43'			
TBW-6	9:41		2.51'			
MW-1	9:44		4.63'			WATER IN WELL VAULT
MW-12	9:51		6.78'			Water in well vault
TBW-5	9:52	9.11'	9.41'	0.3'		measured to top of well casing extension
RW-1	9:53		6.15'			no product detected
TBW-1	10:05	6.43'	6.90'	0.47'	0.10 ERROR	no product in skimmer. minimal sample from well @ 3:25.
MW-11	10:15		5.95'			water in well vault
MW-5	10:21		5.62'			water in well vault
TBW-3	10:26		2.07'			no product in skimmer
TBW-4	10:27		2.03'			
MW-6	10:31	7.51'	7.52'	0.01'		water in well vault. 3 1/2" vaults from product in skimmer (7")
MW-7	10:39		6.41'			water in well vault
MW-10	10:45		7.00'			
MW-13	10:49		10.12'			water in well vault

Project Name: City of Oakland

Project Number: 153-1247

Measured By: Mark Erickson & Cathy Bell

Date: 5/11/2000

WELL DEPTH MEASUREMENTS

Well ID	Time	Product Depth	Water Depth	Product Thickness	Well Depth	Comments
MW-14	10:51		6.73'			
MW-9	10:55		7.70'			
MW-15	11:00		10.03'			
MW-15	11:07	13.30'	13.31'	0.01'		
MW-16	11:07	13.30'	13.31'	0.01'		PRODUCT SAMPLE @ 11:10 am
MW-17	11:11		9.85'			skimmer coated but empty of product
MW-8	11:16		9.69'			

Project Name: City of Oakland

Project Number: 153-1247

Measured By: Mark Erickson & Cathy Bell

Date: 5/11/2000

WELL SAMPLING FORM

Project Name: City of Oakland	Cambria Mgr: DCE	Well ID: MW-8
Project Number: 153-1247	Date: 5/11/2000	Well Yield: —
Site Address: 7101 Edgewater Drive Oakland, California	Sampling Method: Disposable bailer	Well Diameter: 2" pvc
		Technician(s): ME/CB
Initial Depth to Water: 9.69'	Total Well Depth: 15.36'	Water Column Height: 5.67'
Volume/ft: .16 gal/ft	1 Casing Volume: .91 gal	3 Casing Volumes: 2.72 gal
Purging Device: disposable bailer sub pump	Did Well Dewater?: NO	Total Gallons Purged: 3 gal
Start Purge Time: 12:30	Stop Purge Time: 12:32	Total Time: 0:02

1 Casing Volume = Water column height x Volume/ft.

	Well Diam.	Volume/ft. (gallons)
POST ORP — mg/L	2"	0.16
POST DO — mg/L	4"	0.65
	6"	1.47

Time	Casing Volume	Temp. °C	pH	Cond. µS	Comments
12:30	1	17.4	7.4	1667	
12:31	2	17.0	7.4	1820	
12:32	3	16.8	7.5	1868	

Sample ID	Date	Time	Container Type	Preservative	Analytes	Analytic Method
MW-8	5/9/00	5:45	4 vov's	HCL	TPHg, BTEX, MTBE	8020/8015, confirm MTBE with 8260
MW-8	5/9/00	5:45	2 ambers	none	TPHd, TPHk, TPHmo	Note: Silica gel clean-up

WELL SAMPLING FORM

Project Name: City of Oakland	Cambria Mgr: DCE	Well ID: MW-9
Project Number: 153-1247	Date: 5/11/00	Well Yield: —
Site Address: 7101 Edgewater Drive Oakland, California	Sampling Method: Disposable bailer	Well Diameter: 2" pvc
		Technician(s): ME/CB
Initial Depth to Water: 7.70'	Total Well Depth: 14.20'	Water Column Height: 6.5
Volume/ft: .16	1 Casing Volume: 1.04	3 Casing Volumes: 3.12
Purging Device: disposable bailer	Did Well Dewater?: no	Total Gallons Purged: 4
Start Purge Time: 1:08	Stop Purge Time: 1:13	Total Time: :05

1 Casing Volume = Water column height x Volume/ ft.

	Well Diam.	Volume/ft (gallons)
POST ORP _____ mg/L	2"	0.16
POST DO _____ mg/L	4"	0.65
	6"	1.47

Time	Casing Volume	Temp. °C	pH	Cond. µS	Comments
1:08	1	18.2	7.9	1629	clear
1:10	2	18.1	7.4	1662	pumping slowly
1:12	3	17.3	7.5	1489	
1:13	3	17.5	7.4	1608	

Sample ID	Date	Time	Container Type	Preservative	Analytes	Analytic Method
MW-9	5/9/00	5:05	4 vov's	HCL	TPHg, BTEX, MTBE	8020/8015, confirm MTBE with 8260
MW-9	5/9/00	5:05	2 ambers	none	TPHd, TPHk, TPHmo	Note: Silica gel clean-up

WELL SAMPLING FORM

Project Name: City of Oakland	Cambria Mgr: DCE	Well ID: <i>MW-10</i>
Project Number: 153-1247	Date: <i>5/11/2000</i>	Well Yield: <i>---</i>
Site Address: 7101 Edgewater Drive Oakland, California	Sampling Method: Disposable bailer	Well Diameter: 2" pvc
		Technician(s):
Initial Depth to Water: <i>7.00'</i>	Total Well Depth: <i>15.21'</i>	Water Column Height: <i>8.21'</i>
Volume/ft: <i>.16 gal</i>	1 Casing Volume: <i>1.32 gal</i>	3 Casing Volumes: <i>3.95 gall</i>
Purging Device: disposable bailer	Did Well Dewater?: <i>no</i>	Total Gallons Purged: <i>4 gall</i>
Start Purge Time: <i>1:55</i>	Stop Purge Time: <i>1:58</i>	Total Time: <i>3 min</i>

1 Casing Volume = Water column height x Volume/ft.

<i>POST ORP</i> _____ <i>mg/L</i>	Well Diam.	Volume/ft (gallons)
<i>POST DO</i> _____ <i>mg/L</i>	2"	0.16
	4"	0.65
	6"	1.47

Time	Casing Volume	Temp. °C	pH	Cond. µS	Comments
<i>1:55</i>	<i>1</i>	<i>17.7</i>	<i>7.9</i>	<i>1505</i>	<i>clear</i>
<i>1:56</i>	<i>2</i>	<i>17.4</i>	<i>7.0</i>	<i>1330</i>	
<i>1:57</i>	<i>3</i>	<i>17.1</i>	<i>6.9</i>	<i>1534</i>	
<i>1:58</i>	<i>3</i>	<i>17.0</i>	<i>7.2</i>	<i>1179</i>	

Sample ID	Date	Time	Container Type	Preservative	Analytes	Analytic Method
<i>MW-10</i>	<i>5/9/00</i>	<i>4:40</i>	<i>4 vov's</i>	<i>HCL</i>	<i>TPHg, BTEX; MTBE</i>	<i>8020/8015, confirm MTBE with 8260</i>
<i>MW-10</i>	<i>5/9/00</i>	<i>4:40</i>	<i>2 ambers</i>	<i>none</i>	<i>TPHd, TPHk, TPHmo</i>	<i>Note: Silica gel clean-up</i>

WELL SAMPLING FORM

Project Name: City of Oakland	Cambria Mgr: DCE	Well ID: MW-11
Project Number: 153-1247	Date: 5/11/2000	Well Yield: —
Site Address: 7101 Edgewater Drive Oakland, California	Sampling Method: Disposable bailer	Well Diameter: 2" pvc
		Technician(s): ME/CB
Initial Depth to Water: 5.95'	Total Well Depth: 19.33'	Water Column Height: 13.38'
Volume/ft: .16 gal/ft	1 Casing Volume: 2.55 gal	3 Casing Volumes: 7.63 gal
Purging Device: disposable bailer	Did Well Dewater?: no	Total Gallons Purged: 8
Start Purge Time: 2:58	Stop Purge Time: 3:11	Total Time: 13 min.

1 Casing Volume = Water column height x Volume/ft.

POST ORP	_____ mg/L	Well Diam.	Volume/ft (gallons)
		2"	0.16
		4"	0.65
POST DO	_____ mg/L	6"	1.47

Time	Casing Volume	Temp.	pH	Cond.	Comments
3:02	1	19.0	7.5	1585	clear at first
3:07	2	18.8	7.1	1549	brown-gray silt
3:11	3	18.9	7.0	1555	

Sample ID	Date	Time	Container Type	Preservative	Analytes	Analytic Method
MW-11	5/9/00	4:05	4 voa's	HCL	TPHg, BTEX, MTBE	8020/8015, confirm MTBE with 8260
MW-11	5/9/00	4:05	2 ambers	none	TPHd, TPHk, TPHmo	Note: Silica gel clean-up

WELL SAMPLING FORM

Project Name: City of Oakland	Cambria Mgr: DCE	Well ID: MW-12
Project Number: 153-1247	Date: 5/11/2000	Well Yield: —
Site Address: 7101 Edgewater Drive Oakland, California	Sampling Method: Disposable bailer	Well Diameter: 2" pvc
		Technician(s): ME/CB
Initial Depth to Water: 6.78'	Total Well Depth: 14.81'	Water Column Height: 8.03'
Volume/ft: .16 gal^{hand}/ft	1 Casing Volume: 1.29 gal	3 Casing Volumes: 3.86 gal
Purging Device: disposable bailer	Did Well Dewater?: no	Total Gallons Purged: 4.25 gal
Start Purge Time: 2:28	Stop Purge Time: 2:58	Total Time: 10 min

1 Casing Volume = Water column height x Volume/ft.

	Well Diam.	Volume/ft (gallons)
POST ORP	2"	0.16
	4"	0.65
POST DO	6"	1.47

Time	Casing Volume	Temp.	pH	Cond.	Comments
2:29	1	19.2	8.0	1222	
2:33	2	17.9	7.9	1493	
2:35	3	17.8	7.6	1545	
2:37	3	17.7	7.5	1596	

Sample ID	Date	Time	Container Type	Preservative	Analytes	Analytic Method
MW-125	5/9/00	3:20	4 voa's	HCL	TPHg, BTEX, MTBE	8020/8015, confirm MTBE with 8260
MW-12	5/9/00	3:20	2 ambers	none	TPHd, TPHk, TPHmo	Note: Silica gel clean-up

WELL SAMPLING FORM

Project Name: City of Oakland	Cambria Mgr: DCE	Well ID: MW-13
Project Number: 153-1247	Date:	Well Yield: ---
Site Address: 7101 Edgewater Drive Oakland, California	Sampling Method:	Well Diameter: 2" pvc
	Disposable bailer	Technician(s): ME/CB
Initial Depth to Water: 10.12'	Total Well Depth: 20.07'	Water Column Height: 9.95'
Volume/ft: .16 gal/ft	1 Casing Volume: 1.60 gal	3 Casing Volumes: 4.78 gal
Purging Device: disposable bailer	Did Well Dewater?: yes	Total Gallons Purged: 2 gal
Start Purge Time: 1:47	Stop Purge Time: 1:49	Total Time: 2 min

1 Casing Volume = Water column height x Volume/ft.

POST ORP	_____ mg/L	Well Diam.	2"	Volume/ft (gallons)	0.16
POST DO	_____ mg/L		4"		0.65
			6"		1.47

Time	Casing Volume	Temp. °C	pH	Cond. µS	Comments
1:47	1	17.6	7.6	1366	clear DEWATERED

Sample ID	Date	Time	Container Type	Preservative	Analytes	Analytic Method
MW-13	5/9/00	4:50	4 vov's	HCL	TPHg, BTEX, MTBE	8020/8015, confirm MTBE with 8260
MW-13	5/9/00	4:50	2 ambers	none	TPHd, TPHk, TPHmo	Note: Silica gel clean-up

WELL SAMPLING FORM

Project Name: City of Oakland	Cambria Mgr: DCE	Well ID: MW-14
Project Number: 153-1247	Date: 5/11/2000	Well Yield: ---
Site Address: 7101 Edgewater Drive Oakland, California	Sampling Method: Disposable bailer	Well Diameter: 2" pvc
		Technician(s): ME/CB
Initial Depth to Water: 6.73'	Total Well Depth: 14.66'	Water Column Height: 7.93'
Volume/ft: .16 gal/ft	1 Casing Volume: 1.27 gal	3 Casing Volumes: 3.81
Purging Device: disposable bailer	Did Well Dewater?: no	Total Gallons Purged: 4 gal
Start Purge Time: 1:31	Stop Purge Time: 1:34	Total Time: 3 min

1 Casing Volume = Water column height x Volume/ft.

	Well Diam.	Volume/ft (gallons)
POST ORP _____ mg/L	2"	0.16
POST DO _____ mg/L	4"	0.65
	6"	1.47

Time	Casing Volume	Temp. °C	pH	Cond. µS	Comments
1:31	1	17.9	8.0	1834	gray, silty
1:33	2	18.0	8.0	1848	
1:34	3	17.8	7.9	1846	

Sample ID	Date	Time	Container Type	Preservative	Analytes	Analytic Method
MW-14	5/9/00	5:00	4 vov's	HCL	TPHg, BTEX, MTBE	8020/8015, confirm MTBE with 8260
MW-14	5/9/00	5:00	2 ambers	none	TPHd, TPHk, TPHmo	Note: Silica gel clean-up

WELL SAMPLING FORM

Project Name: City of Oakland	Cambria Mgr: DCE	Well ID: MW-15
Project Number: 153-1247	Date: 5/11/2000	Well Yield: —
Site Address: 7101 Edgewater Drive Oakland, California	Sampling Method: Disposable bailer	Well Diameter: 2" pvc
		Technician(s): ME/CB
Initial Depth to Water: 10.03'	Total Well Depth: 20.16'	Water Column Height: 10.13'
Volume/ft: .16 gal/ft	1 Casing Volume: 1.63 gal	3 Casing Volumes: 4.87 gal
Purging Device: disposable bailer	Did Well Dewater?: no	Total Gallons Purged: 4.95 gal
Start Purge Time: 12:57	Stop Purge Time: 12:59	Total Time: 2 min.

1 Casing Volume = Water column height x Volume/ft.

	Well Diam.	Volume/ft (gallons)
POST ORP _____ mg/L	2"	0.16
POST DO _____ mg/L	4"	0.65
	6"	1.47

Time	Casing Volume	Temp. °C	pH	Cond. μS	Comments
12:57	1	18.5	8.0	1276	gray, silty
12:58	2	18.3	7.8	1788	
12:58	3	18.2	7.7	1767	

Sample ID	Date	Time	Container Type	Preservative	Analytes	Analytic Method
MW-15	5/9/00	5:15	4 voa's	HCL	TPHg, BTEX, MTBE	8020/8015, confirm MTBE with 8260
MW-15	5/9/00	5:15	2 ambers	none	TPHd, TPHk, TPHmo	Note: Silica gel clean-up

WELL SAMPLING FORM

Project Name: City of Oakland	Cambria Mgr: DCE	Well ID: MW-17
Project Number: 153-1247	Date: 5/11/00	Well Yield: —
Site Address: 7101 Edgewater Drive Oakland, California	Sampling Method: Disposable bailer	Well Diameter: 2" pvc
		Technician(s): ME/CB
Initial Depth to Water: 9.85'	Total Well Depth: 18.44'	Water Column Height: 8.59'
Volume/ft: .16 gal/ft	1 Casing Volume: 1.38 gal	3 Casing Volumes: 4.13 gal
Purging Device: disposable bailer	Did Well Dewater?: NO	Total Gallons Purged: 4.25 gal
Start Purge Time: 12:42	Stop Purge Time: 12:45	Total Time: 0:03

1 Casing Volume = Water column height x Volume/ft.

	Well Diam.	Volume/ft (gallons)
POST ORP _____ mg/L	2"	0.16
POST DO _____ mg/L	4"	0.65
	6"	1.47

Time	Casing Volume	Temp. °C	pH	Cond. µS	Comments
12:43	1	17.4	7.9	>2000	dark gray-black purge w/
12:44	2	17.5	7.8	>2000	clearing up
12:45	3	17.3	7.8	>2000	

Sample ID	Date	Time	Container Type	Preservative	Analytes	Analytic Method
MW-17	5/9/00	5:30	4 vov's	HCL	TPHg, BTEX, MTBE	8020/8015, confirm MTBE with 8260
MW-17	5/9/00	5:30	2 ambers	none	TPHd, TPHk, TPHmo	Note: Silica gel clean-up

ATTACHMENT C

Standard Field Procedures for Monitoring Wells

STANDARD FIELD PROCEDURES FOR MONITORING WELLS

This document describes Cambria Environmental Technology's standard field methods for drilling, installing, developing and sampling groundwater monitoring wells. These procedures are designed to comply with Federal, State and local regulatory guidelines. Specific field procedures are summarized below.

Well Construction and Surveying

Groundwater monitoring wells are installed in soil borings to monitor groundwater quality and determine the groundwater elevation, flow direction and gradient. Well depths and screen lengths are based on groundwater depth, occurrence of hydrocarbons or other compounds in the borehole, stratigraphy and State and local regulatory guidelines. Well screens typically extend 10 to 15 feet below and 5 feet above the static water level at the time of drilling. However, the well screen will generally not extend into or through a clay layer that is at least three feet thick.

Well casing and screen are flush-threaded, Schedule 40 PVC. Screen slot size varies according to the sediments screened, but slots are generally 0.010 or 0.020 inches wide. A rinsed and graded sand occupies the annular space between the boring and the well screen to about one to two ft above the well screen. A two feet thick hydrated bentonite seal separates the sand from the overlying sanitary surface seal composed of Portland type I,II cement.

Well-heads are secured by locking well-caps inside traffic-rated vaults finished flush with the ground surface. A stovepipe may be installed between the well-head and the vault cap for additional security. The well top-of-casing elevation is surveyed with respect to mean sea level and the well is surveyed for horizontal location with respect to an onsite or nearby offsite landmark.

Well Development

Wells are generally developed using a combination of groundwater surging and extraction. Surging agitates the groundwater and dislodges fine sediments from the sand pack. After about ten minutes of surging, groundwater is extracted from the well using bailing, pumping and/or reverse air-lifting through an eductor pipe to remove the sediments from the well. Surging and extraction continue until at least ten well-casing volumes of groundwater are extracted and the sediment volume in the groundwater is negligible. This process usually occurs prior to installing the sanitary surface seal to ensure sand pack stabilization. If development occurs after surface seal installation, then development occurs 24 to 72 hours after seal installation to ensure that the Portland cement has set up correctly.

All equipment is steam-cleaned prior to use and air used for air-lifting is filtered to prevent oil entrained in the compressed air from entering the well. Wells that are developed using air-lift evacuation are not sampled until at least 24 hours after they are developed.

Groundwater Sampling

Depending on local regulatory guidelines, three to four well-casing volumes of groundwater are purged prior to sampling. Purging continues until groundwater pH, conductivity, and temperature have stabilized. Groundwater samples are collected using bailers or pumps and are decanted into the appropriate containers supplied by the analytic laboratory. Samples are labeled, placed in protective foam sleeves, stored on crushed ice at or below 4°C, and transported under chain-of-custody to the laboratory. Laboratory-supplied trip blanks accompany the samples and are analyzed to check for cross-contamination. An equipment blank may be analyzed if non-dedicated sampling equipment is used.